

Oregon Department of Fish and Wildlife
Solar Siting Guidance
March 2024



*SUPPORTING THOUGHTFULLY SITED, ADEQUATELY MITIGATED AND RESPONSIBLY
OPERATED RENEWABLE ENERGY TO PROVIDE STRONG LEADERSHIP IN OREGON'S EFFORT
TO RESPOND TO CLIMATE AND OCEAN CHANGE*

EXECUTIVE SUMMARY

The goal of this document is to provide a summary of current siting realities within the state of Oregon from the perspective of the Oregon Department of Fish and Wildlife (ODFW). ODFW is committed to being a partner in meeting the state's climate goals, and to meet these goals there will need to be additional energy resources developed within the state. Much of this energy will be derived from wind and solar installations. With the Columbia Plateau Ecoregion Wind Energy Siting and Permitting Guidelines and the Federal Wind Energy Guidelines ODFW staff have adequate direction and uniformity on how to approach applications for new wind energy projects. This document is meant to bridge the gap and provide a consistent baseline for ODFW to utilize in response to solar energy projects.

The six steps included in this document are meant to provide staff and interested parties with a general idea of likely input points in a permitting scenario. The first step is the Exploratory Planning step, and it is designed with early engagement and relationship development in mind. ODFW recognizes the challenges in developing a solar project, and we strive to make ourselves available as a resource in addition to the online planning tools provided in the document to highlight known resources to developers scoping potential project locations.

The Preliminary Project Planning step highlights environmental considerations once a developer has identified an area where a project may be sited. The materials in this step, which includes detailed information contained within appendix A, is put forth to help inform potential avoidance and minimization measures when designing site plans in a larger area chosen for siting a project.

Early Project Consultation is likely to coincide with pre-application conferences at the county level or concurrent with the Notice of Intent for larger projects. ODFW requests information on project location, description of project size and details, and an initial biological assessment. For many projects, this information may have already been relayed prior to this step depending on the developer and the pre-existing relationship they may have with local ODFW staff.

The fourth step in this guidance focuses on Addressing Wildlife in the PV Solar Application. This step is the most in-depth, as it will generally be the point at which ODFW staff have the greatest need for input. In addition to looking at projected impacts this step also looks at plans to address mitigation, revegetation, and noxious weeds.

The fifth step notes timing for mitigation once the plan is developed and finalized, providing guidance consistent with existing policy that mitigation should occur prior to or concurrent with initial construction activities.

Finally, items generally addressed post-construction such as monitoring and data analysis are the basis for step six.

The appendices provide opportunity for summary of current conditions and knowledge in a format that facilitates consistent updates and inclusion of new information.

This document is developed to be dynamic in nature, and ODFW is committed to updating the information provided within as new data and tools come available. We encourage partners and interested parties to forward any new science, online tools or other items that would be of benefit to these guidelines to the agency to be considered for inclusion.

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ACRONYMS

COA	Conservation Opportunity Area
CUP	Conditional Use Permit
DLCD	Department of Land Conservation and Development
EFSC	Energy Facility Siting Council
OAR	Oregon Administrative Rule
ODOE	Oregon Department of Energy
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
PV	Photovoltaic

INTRODUCTION

Oregon's diverse geology, climate, and ecological regions support a unique collection of species and habitats, which help define the state's culture and economy. Oregon's prosperity depends on use of land for agriculture, timber, industry, ranching, and outdoor recreation. These working landscapes, along with wilderness and other natural areas provide the rich mix of habitat that supports Oregon's fish and wildlife.

Abundant and accessible habitat is the foundation on which fish and wildlife populations persist. Challenges to the persistence of native fish and wildlife are increasingly complex and intersectional. Fish and wildlife are increasingly impacted by changing land and water use, climate, water quality and quantity and other anthropogenic issues as Oregon's human population and development needs grow.

The Oregon Department of Fish and Wildlife (ODFW) is charged with managing Oregon's fish and wildlife resources. It is the policy of the State of Oregon that wildlife "shall be managed to prevent serious depletion of any indigenous species" (ORS 496.012). The policy also describes seven coequal goals of wildlife management, including "to develop and manage the lands and waters of this state in a manner that will enhance the production and public enjoyment of wildlife." Protecting and enhancing habitat is a core action to preventing the serious depletion of Oregon's fish and wildlife species.

The Earth's climate and oceans are changing because of activities that emit greenhouse gases into the atmosphere. Oregon is already experiencing climatic changes that are consistent with changes observed and projected globally, such as increased average air and water temperatures, disrupted precipitation patterns, and increased ocean acidification and hypoxia. These changing conditions are undermining the ability of Oregon's lands and waters to support native fish and wildlife, and the cultural and economic benefits they provide. This represents a serious and immediate threat to ODFW's ability to achieve its mission and meet its statutory mandates to manage the public trust resources in its care. ODFW's [Climate and Ocean Change Policy](#) directs the agency to give highest priority to protecting habitat for native fish and wildlife that is currently high functioning and projected to remain or become high functioning despite the impacts of changing climate and ocean conditions.

ODFW recognizes it is vital to reduce global greenhouse gas emissions for Oregon to fulfill the state's wildlife policy. Reducing global greenhouse gas emissions should slow and prevent future systemic change that will be detrimental to fish and wildlife. While energy efficiency and energy conservation are an integral part of Oregon's clean energy future, development of new renewable energy resources in Oregon is also an essential part of the solution.

Renewable energy development, like any other land or water use, has impacts on fish and wildlife habitat. The effort to prevent future climate and ocean change should also seek to avoid impacts to essential and important habitats to the greatest extent possible. Therefore, *ODFW supports thoughtfully sited, adequately mitigated, and responsibly operated* renewable energy projects. These guidelines are intended to support such projects.

To facilitate responsible development of renewable energy resources while avoiding and minimizing impacts to fish, wildlife, and habitat, ODFW offers the following guidance specific to utility-scale photovoltaic (PV) solar projects. The focus on PV solar is in response to the rapid increase in projects in recent years (a five-fold increase between 2015-2019; [Oregon 2020 Biennial Energy Report](#)), the absence of other types of solar energy proposals in Oregon (i.e., concentrated solar power or solar trough), and the availability of other guidelines for wind energy (i.e., [Oregon Columbia Plateau Ecoregion Wind Energy Siting and Permitting Guidelines](#); [US Fish and Wildlife Service Land-Based Wind Energy Guidelines](#)).

The purpose of these guidelines is to promote responsible development and siting of utility-scale PV solar consistent with Oregon’s wildlife habitat protection policies. These guidelines are designed to assist ODFW staff when reviewing applications, but may also inform project proponents, permitting agencies, and other parties involved in utility-scale PV solar energy. The recommendations in these guidelines are based on the best available science to avoid and minimize impacts to fish and wildlife, while remaining practical, feasible, and hopefully streamlining the wildlife resource review process. Recommendations are offered for mitigating impacts consistent with the ODFW Fish and Wildlife Habitat Mitigation Policy ([OAR 635-415-0000 through -0025](#)) and can be applied to all lands within the state. These guidelines do not duplicate or supersede other legal or permitting requirements, and do not mandate or limit the alternatives an agency or permitting authority may choose to recommend or require. These guidelines are not intended to be exhaustive, or to apply in every situation. They are meant to serve as a reference for anyone involved in siting solar projects for considerations that may apply in certain circumstances, but not all projects.

This is a living document. The state’s knowledge regarding the impacts of PV solar development to fish and wildlife – and effective solutions for addressing these impacts –continues to increase as science becomes available. We expect to modify these recommendations as new findings inform our understanding. We welcome new research and commit to maintaining these recommendations as a living document. We encourage input that may improve future revisions. Please direct comments and questions to Oregon Department of Fish and Wildlife’s Energy Coordinator; [Jeremy Thompson](#).

EARLY SITING CONSIDERATIONS

All potential impacts to wildlife and associated habitats are reviewed based on a mitigation hierarchy: *avoid* impacts first, *minimize* impacts as much as possible, and *mitigate* unavoidable impacts through compensatory offsets. The selection of project sites is the most critical choice in avoiding impacts to fish and wildlife from renewable energy development. Avoidance is best achieved in the exploratory stage of the siting process when project proponents are first evaluating opportunities at the landscape scale. In the exploratory stage of siting, wildlife and conservation priorities can be evaluated and balanced among other physical, cultural, legal, or social constraints to find areas that minimize conflict while still capitalizing on the renewable energy resource, transmission capability, and market demand. It is easier to avoid impacts to wildlife and habitats if they are considered early in the siting process before projects have executed land leases or permits.

In general, project proponents should seek to use previously disturbed areas or areas with lower wildlife habitat value when possible. Examples of areas deemed previously disturbed include lands that had been previously tilled or farmed, brownfields, or other areas where past human practices have reduced the overall habitat value or utilization by species. Proponents should avoid high-value or sensitive wildlife resources and large areas of unfragmented habitat. Some examples of the types of wildlife values to be considered at the exploratory stage of siting include areas occupied by threatened, endangered, and sensitive species, mapped sage-grouse habitat, ungulate (big game) migration corridors and wintering areas, Priority Wildlife Connectivity Areas ([PWCA](#)) and [Oregon Conservation Strategy](#) Habitats and Conservation Opportunity Areas (COA’s). For a recommended list of siting tools and resources to help inform renewable energy siting, see [Step 1. Exploratory Planning](#) below.

While considering impacts to fish and wildlife, project proponents should also consider the potential impact of limiting public access or altering the character of the proposed project location. Additionally, consideration should be given to the surrounding landscape in which the project will be sited and the potential for cumulative impacts to fish and wildlife resources.

CONSTRUCTING UTILITY-SCALE PV SOLAR PROJECTS IN OREGON

Various federal, state, and county laws regulate the permitting of PV solar development in Oregon. Recent legislation has changed the acreage threshold that dictates the permitting pathway, and associated rules for a specific solar application based on the acreage of the project footprint. Table 1 below describes permitting pathways based on final legislative changes adopted in House Bill (HB) 3179 (2023).

There are specific wildlife standards found in the various regulatory pathways for permitting PV solar in Oregon:

- For PV solar projects permitting by the [Energy Facility Siting Council](#), there is the Fish and Wildlife Habitat Standard ([OAR 345-022-0060](#)) and the Threatened and Endangered Species Standard ([OAR 345-022-0070](#))
- For PV solar projects permitted by County, the wildlife standards depend on the acreage of the project (see table below for reference):
 - For County permitting with HB 2329 (2021) and HB 3179 (2023), see [ORS 215.446](#)
 - For County permitting of other PV solar projects not subject to ORS 215.446, see the Land Conservation and Development Commission’s Solar Rules found in [OAR 660-033-0130\(38\)](#)
 - Project proponents should also refer to each County’s applicable Goal 5 Programs addressing [Natural Resources, Scenic and Historic Areas, and Open Spaces](#)

<u>Oregon Permitting Pathway for PV Solar</u>			
Acreage Limitations by Permit and Land Type			
	County CUP under DLCD solar rule OAR 660-033-0130(38)	County CUP via ORS 215.446 HB 2329 (2019) and 3179 (2023)	EFSC
High-Value¹ Farmland	≤ 100	100 ≤ 240	≥ 240
Arable² Farmland	≤ 100	100 ≤ 2560	≥ 2560
Other Land³	≤ 320	320 ≤ 3840	≥ 3840

1. See [ORS 195.300\(10\)](#)
2. Land that is cultivated, or has soils capable of cultivation
3. Those lands not suitable for cultivation.

ODFW FISH AND WILDLIFE HABITAT MITIGATION POLICY

MITIGATION POLICY GUIDANCE

ODFW works cooperatively with project proponents and coordinates with the regulatory permitting agencies to identify potential impacts of PV solar projects on fish, wildlife, and their habitats. Where permitted by law or policy, ODFW may make recommendations to the permitting agency on strategies to avoid, restore, or replace habitat that would be impacted by a proposed project. The permitting agency determines what mitigation will be required within the final permit.

The Oregon Fish and Wildlife Commission directs ODFW staff to base comments and recommendations on the framework set forth in the [Fish and Wildlife Habitat Mitigation Policy](#) (OAR 635-415-0000 through 0025). The policy identifies preferred strategies to avoid or mitigate the impact of the proposed project on fish and wildlife habitat based on the importance of the habitat to a particular species of fish or wildlife. Depending upon the importance of the habitat, ODFW may recommend a variety of approaches to offset or replace habitat affected by the proposed project. The Fish and Wildlife Habitat Mitigation Policy also guides the review of projects where ODFW is the permitting agency, including fish screening and passage, and in-water blasting permits.

While the final decision on the project is made by another agency, proponents are encouraged to discuss the proposed project with staff from an [ODFW regional office](#) as early as possible. This may help identify potential issues and impacts on fish and wildlife habitat. Projects that are being considered within the occupied range for Greater Sage Grouse will also need to consider [rules](#) designed specifically for the protection of the species within Oregon. Once the permitting process is underway, ODFW and the permitting agency can work with the proponents to identify appropriate mitigation for those impacts, but addressing impacts while the project is still being designed may speed up final action on the permit by the permitting agency.

HABITAT CATEGORIZATION AND MITIGATION STRATEGIES

The Fish and Wildlife Habitat Mitigation Policy classifies habitat on a site into one of six categories, depending on the importance of the habitat to a specific species of fish or wildlife or the overall value of an individual habitat type. The more important the habitat, the greater the potential that disturbing the habitat will have a negative impact on fish or wildlife species.

FISH AND WILDLIFE HABITAT MITIGATION - KEY DEFINITIONS

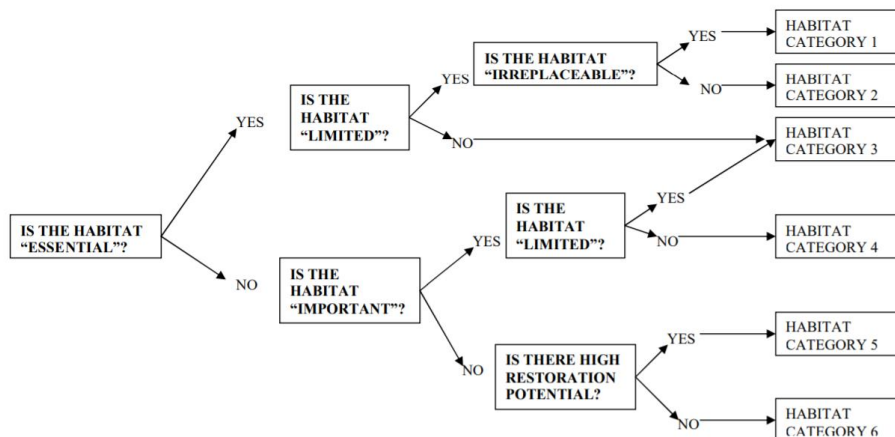
Habitat	The physical and biological conditions within the geographic range of occurrence of a species, extending over time, that affect the welfare of the species or any sub-population or members of the species.
Essential habitat	Any habitat condition or set of habitat conditions which, if diminished in quality or quantity, would result in depletion of a fish or wildlife species.
Limited habitat	An amount insufficient or barely sufficient to sustain fish and wildlife populations over time.
Important habitat	Any habitat recognized as a contributor to sustaining fish and wildlife populations over time.
Irreplaceable habitat	Successful in-kind habitat mitigation to replace lost habitat quantity and/or quality is not feasible within an acceptable period of time or location or involves an unacceptable level of risk or uncertainty.

Habitat with High Potential to be Essential or Important	Previous uses or activities that have reduced habitat values need to be able to be eliminated or severely reduced.
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HABITAT CATEGORIES

The Fish and Wildlife Habitat Mitigation Policy establishes mitigation goals for each category of habitat and, depending upon the importance of the habitat, identifies preferred strategies to avoid or mitigate the impact of proposed actions on fish and wildlife habitat. The policy sets sideboards within which ODFW recommends options and alternatives for mitigation. There is a greater diversity of options for mitigation available for habitats with lower function or quality. For example, if a project is sited in essential limited habitat (Category 2 or 3) for a species of concern, mitigation should be performed within similar (in-kind) habitat. If the same project was able to identify a site within an area that is not deemed important (Category 5 or 6), mitigation, if necessary, may occur in any area that provides a benefit. The flow chart and table below further explain how the Fish and Wildlife Habitat Mitigation Policy links mitigation strategies to the quality of habitat impacted by the proposed project.

Habitat Category	Definition	Goal for Mitigation	Mitigation Strategy
Category 1	Essential, limited, and irreplaceable habitat	No loss of habitat quantity or quality	Avoidance
Category 2	Essential and limited habitat	No net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality	In-kind, in-proximity mitigation
Category 3	Essential habitat, or important and limited habitat	No net loss of habitat quantity or quality	In-kind, in-proximity mitigation
Category 4	Important habitat	No net loss of habitat quantity or quality	In-kind or out-of-kind, in-proximity or off-proximity mitigation
Category 5	Habitat having high potential to become either essential or important habitat	Net benefit in habitat quantity or quality	Actions that improve habitat conditions
Category 6	Habitat that has low potential to become essential or important habitat	Minimize impacts	Minimize direct habitat loss and avoid off-site impacts



THE PROJECT REVIEW PROCESS

Project proponents are encouraged to engage early and directly with [local ODFW staff](#) to guide project siting and to assess and plan for mitigating potential fish and wildlife concerns. The following six steps lay out ODFW’s recommended process for assessing potential fish and wildlife habitat impacts associated with utility-scale PV projects in Oregon, and additional detail and guidance is contained in the appendices. This process is intended to be applicable to any project regardless of the regulatory pathway.

STEP 1. EXPLORATORY PLANNING

Recognizing that many factors are considered by project proponents, coordination with local ODFW staff as early as possible in project scoping can assist with locating potential conflicts within prospective project footprints. This collaboration, in addition to the siting tools listed below, can assist with identification of habitats or species within a geographic region that could potentially add complexity to the permitting process.

SITING TOOLS

There are a growing number of renewable energy siting tools and decision support systems available to assist with PV solar project siting. Many of these tools offer more than just fish and wildlife information and allow for project proponents, regulatory agencies, and the public to explore the multiple constraints and criteria facing renewable energy project exploration and the intersectional nature of land use decision making. These tools are also useful for multi-stakeholder collaborative processes designed to support place-based renewable energy solutions.

Below is a current list and brief description of known available online renewable energy siting tools. ODFW will continue to update this list as more tools become available:

Siting Tool	Web Address	Brief Description
Oregon Renewable Energy Siting Assessment (ORESA) Mapping and Reporting Tool	https://www.oregon.gov/energy/energy-oregon/Pages/ORESA.aspx	Data and information about renewable energy, military training and operational areas, economic development opportunities; land use considerations; natural, cultural, and environmental resources; and other regulatory requirements.

ODFW Centralized Oregon Mapping Products and Analysis Support System (COMPASS)	https://www.dfw.state.or.us/maps/compass/	Online system of wildlife information and maps to help plan land use, energy, transportation, conservation, and other large projects. Provides access to spatial representations of Oregon Conservation Strategy components. Includes a Strategy Reporting Tool that provides an aggregate report of Strategy data (such as species presence) within a user submitted area of interest.
Oregon Sage-Grouse Development Siting Tool	https://oregonexplorer.info/content/sage-grouse-development-siting-tool?topic&ptopic	Interactive application that allows prospective developers in Oregon to access information about potential project impacts to greater sage-grouse and estimates sage-grouse mitigation requirements specific to a project area.
Priority Wildlife Connectivity Areas (PWCA)	https://experience.arcgis.com/experience/6979b6598f904951bd0af1821e1595f1/	ODFW Priority Wildlife Connectivity Areas (PWCAs) provide non-regulatory information on the parts of the landscape expected to have the highest overall value for facilitating wildlife movement. The network of PWCAs serves as a science-based, informational tool to support planning for habitat enhancement, restoration, conservation, transportation mitigation, land-use, and development projects.
Oregon Explorer Natural Resources Digital Library	https://oregonexplorer.info/	Digital library that integrates and provides access to data and information from state and federal agencies, local governments, university scientists, and citizens to support informed decisions and actions by people concerned with natural resources, environment, and communities throughout Oregon.
Argonne National Laboratories Geospatial Energy Mapper (GEM)	https://gem.anl.gov/	A free online mapping tool for identifying areas within the US that may be suitable for power generation and energy corridors. Originally an Eastern Interconnection tool, recently expanded to be nationwide. Flexible modeling of facility siting factors such as slope and land protections.
Western Electricity Coordinating Council (WECC) Environmental and Cultural Data Viewer	www.wecc.org https://ecosystems.azurewebsites.net/WECC/Environmental/	Web mapping application to view and access environmental/cultural risk classification data layers developed by WECC stakeholders. Intended for use in regional transmission expansion planning, and siting level analysis.
Renewable Energy and Wildlife Research Hub	https://rewi.knack.com/rewi-research-hub	The Renewable Energy Wildlife Institute (REWI) Research Hub is a one-of-a-kind information-sharing center. Interactive and evolving, the Hub pools information from credible sources across the global research community. By making sound science accessible and consolidated, the Hub empowers energy and conservation/science stakeholders to make data-informed decisions, streamlining paths forward toward renewable energy and conservation goals.

BIOLOGICAL INFORMATION

The resources listed in the table below, in coordination with the siting tools listed above, assist with preliminary assessment of potential species presence in a project vicinity.

Biological Information	Web Address	Brief Description
USFWS Information for Planning and Consultation (IPaC)	https://ipac.ecosphere.fws.gov/	Allows users to integrate the USFWS environmental review process into project design by identifying USFWS managed resources in the project location.

Oregon Biological Information Center (ORBIC)	https://inr.oregonstate.edu/orbic	ORBIC's key function is to maintain, develop and distribute biodiversity information in the state. ORBIC also coordinates projects on biodiversity monitoring and provides technical assistance for the Oregon Natural Areas Program. ORBIC works with a variety of agency, non-profit, and private partners and is a member of the NatureServe network.
USGS Breeding Bird Survey (BBS)	https://www.pwrc.usgs.gov/bbs/	The BBS is a cooperative effort between the U.S. Geological Survey's Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service to monitor the status and trends of North American bird populations
Audubon Christmas Bird Count (CBC)	https://www.audubon.org/conservation/science/christmas-bird-count	Long-term citizen science project to document species presence annually within designated areas.
StreamNet	https://www.streamnet.org/	StreamNet is a cooperative information management and data dissemination project focused on fisheries and aquatic data and data-related services in the Pacific Northwest, with a focus on the Columbia River Basin
National Oceanic and Atmospheric Administration (NOAA)	https://www.fisheries.noaa.gov/science-and-data	NOAA Fisheries is responsible for the stewardship of the nation's ocean resources and their habitat.

STEP 2. PRELIMINARY PROJECT PLANNING

PROJECT LOCATION

The selection of a project site is the most critical choice in avoiding impacts to fish and wildlife from PV solar development. Proponents should seek to use previously disturbed areas or lower value wildlife habitat (Fish and Wildlife Habitat Mitigation Policy Habitat Categories 5 and 6) when possible. Co-location of PV solar projects with existing human disturbances is encouraged. Additional project location considerations for avoiding and minimizing impacts to fish, wildlife, and habitat are included in [Appendix A](#).

STEP 3. EARLY PROJECT CONSULTATION WITH ODFW

WHAT TO SUBMIT

This step will likely correspond with initiation of the permitting process, either a pre-application conference with county planning or the Notice of Intent with ODOE. The amount of preliminary project and site information initially requested by ODFW is dependent on the project's stage of development.

For projects in the earliest conceptual design phase with multiple alternative sites or a general region under exploration for development (like the Exploratory Planning phase described above), ODFW can provide an initial assessment of the project location(s). ODFW will provide insight into the scope of potential impacts for fish and wildlife, and whether there are areas of known conflict within or among proposed sites. In this case, proponents should submit:

- 1) A GIS layer, or similar file, of the potential project area.
- 2) A brief description of the project scope (acres, land ownership, and potential timing of construction).

For proponents who contact ODFW for the first time with fixed project boundaries or who have less flexibility in project location, ODFW requests the information below. Some counties encourage project proponents to participate in pre-application meetings, and this is the ideal time to invite ODFW to attend and to share the following:

- **Proposed project location.** Provide the legal description, GIS layer, and maps identifying the proposed project location. Delineation of the project area should include associated infrastructure, such as proposed power line corridors and access roads. Proponents should describe any considerations that were implemented in the selection of the project location to reduce impacts to fish and wildlife resources ([see Appendix A](#)).
- **Project description.** Please provide the following:
 - Acreage of the project
 - Nameplate energy generation capacity
 - Planned infrastructure including PV solar energy generation components, roads, fencing, power lines and lighting
 - Seasonal timing and duration of construction
 - Preliminary concepts for revegetation of temporary impact areas, invasive species management, and proposed fish and wildlife protections or mitigation
- **Initial biological assessment.** The project proponent should arrange for a qualified biologist who is knowledgeable about fish and wildlife in the region to conduct an initial desktop biological assessment of the proposed project location (see the [Siting Tools](#) section above). This assessment should include:
 - A description of the current land use, zoning, and the project site in relation to the larger landscape (e.g., proximity to high-priority fish and wildlife habitats, existing or previously disturbed areas, areas of industrial land use).
 - A habitat map delineating land cover, including major vegetation communities, existing surface disturbance, significant topographic or biological features (e.g. rock outcroppings, ridgelines, caves) and ephemeral and perennial waterbodies. This preliminary habitat map can be created using best available aerial imagery and remotely sensed datasets (see the resources listed above).
 - A list of potential or known threatened, endangered, or sensitive species or habitat within the project area and a 1-mile buffer surrounding the project area. The species list can be generated using ORBIC and/or iPAC, see above in the Resources for Biological Information section.
 - Results of any preliminary biological surveys or habitat assessments performed on site.
 - ODFW recommends including a preliminary categorization of habitats within the project area, following the habitat category definitions in the [ODFW Fish and Wildlife Habitat Mitigation Policy](#).

ODFW PRELIMINARY REVIEW

After receiving preliminary project and site information from the project proponent (Steps 1, 2, and 3), ODFW will offer the following preliminary review:

- 1) Assess the biological values of the proposed site(s).
- 2) Identify potential or known impacts to fish and wildlife resources.
- 3) Recommend appropriate biological surveys or habitat assessments to measure and quantify potential or known impacts. In areas potentially within greater sage-grouse habitat, contacting the

[Sage Grouse Mitigation Coordinator](#) is encouraged for direction on how to assess potential impacts and specific data needs.

- 4) Provide preliminary recommendations for project location, micro-siting of infrastructure, as well as applicable design, construction, and operations best practices (see [Appendix A](#) and [Appendix B](#)).
- 5) Work cooperatively with the project proponent and the permitting agency to ensure habitat mitigation plans adequately avoid, minimize, and mitigate project impacts. See the [Mitigation Policy](#) section above, and the [Mitigation Planning](#) section below.

Note: the Oregon Fish and Wildlife Commission directs ODFW staff to use the definitions, goals, and standards in the Fish and Wildlife Habitat Mitigation Policy as the framework for recommendations in land use and energy project review. However, the final determination of project siting conditions resides with the permitting authority.

STEP 4. ADDRESSING WILDLIFE IN THE PV SOLAR APPLICATION

In each of the regulatory processes discussed in the [Constructing Utility-Scale PV Projects in Oregon](#) section above, impacts to fish and wildlife and their habitats must be addressed and applicants are expected to work with relevant fish and wildlife agencies to develop wildlife habitat mitigation plans consistent with the standards specified in the relevant statutes and/or rules.

As a project proponent develops its application for county conditional use permit or EFSC site certificate, there are some key elements that help demonstrate fish, wildlife and habitat impacts have been considered and addressed, and that adverse effects will be offset. These key elements include an **impact assessment**, design, construction, and operational **minimization measures** including revegetation and noxious weed plans, and a **habitat mitigation plan** for how unavoidable impacts will be offset.

ODFW recommends project proponents begin developing their habitat mitigation plans as early as possible in their project planning process (Step 2 or 3, above) as mitigation planning takes time. From impact assessment, to designing avoidance and minimization measures, to determining appropriate offsets and establishing performance and durability measures, there are many milestones along the way in mitigation planning that will necessitate consultation with the regulatory entity and with ODFW.

ODFW recommends use of the mitigation framework laid out in the Fish and Wildlife Habitat Mitigation Policy as a known, consistent, and robust method of assessing and offsetting impacts to fish and wildlife habitat. This framework follows the classic mitigation approach of Avoid – Minimize – Mitigate impacts.

Project proponents may consult with ODFW staff on any of the following elements as they are developed. In many cases, a site visit to proposed mitigation sites may be of benefit, and other partners in the process may also provide valuable input if included in the process (local county officials, landowners, conservation partners/entities, etc.)

IMPACT ASSESSMENT

A project application should include an assessment of potential and likely impacts to fish, wildlife, and their habitats. An impact assessment should consider the potential impacts to species on or in the vicinity of the project, impacts to the quality and condition of the vegetation community, and the duration of the impacts.

Project proponents should consider and address all manner of impacts, including direct, indirect, temporary, and permanent impacts. Definitions are provided below:

Direct impacts: mortality or physical harm of wildlife caused by collision with infrastructure or collision with – or trampling by - construction equipment; and removal of habitat including vegetation, nests, or roost structures above or below-ground.

Examples: grading and clearing to prepare a site for PV panel arrays, areas within a fence enclosure no longer accessible to species

Indirect impacts: altering habitat structure, quality (including vegetation, light levels, noise levels, human activity levels), and function in ways that have ‘downstream’ effects on animal occurrence, behavior, reproduction, and migration.

Examples: increased traffic on project access roads, displacement of wildlife out of areas of increased human activity, reduced species diversity

Temporary impacts: any area impacted by construction but not permanently covered by pavement or infrastructure or permanently cleared for a right-of-way. Some temporary impacts may require mitigation, as the time for reestablishment may provide for loss of habitat. (i.e.. Sage-steppe shrubs or certain forest types)

Examples: construction and equipment storage areas capable of revegetating, temporary access roads, staging areas, laydown areas, fly yards, and pulling/tensioning sites outside of the fenced facility.

Permanent impacts: part of the final facility, typically under pavement or infrastructure, or permanently cleared of vegetation, no longer accessible to all wildlife species, for the life of the project’s impacts.

Examples: new access roads, paved or graveled areas, building footprints, permanently cleared rights-of-way, fenced panel arrays

Impacts should be assessed by a qualified wildlife professional using desktop methods as well as any recommended field surveys as described in Steps 1, 2, 3, and 5.

Once project impacts are enumerated, ODFW recommends project proponents categorize the habitats in their project area according to the definitions in the Fish and Wildlife Habitat Mitigation Policy (see the [Habitat Categorization and Mitigation Strategies](#) section, above). This methodology helps compare habitat functions and values with the potential direct and indirect impacts of the project and allows proponents to begin to identify strategies for offsetting unavoidable impacts.

The project’s impact assessment should be included in the project application and/or the project’s habitat mitigation plan.

AVOIDANCE AND MINIMIZATION MEASURES FOR DESIGN, CONSTRUCTION, AND OPERATIONS

Impacts to fish and wildlife can be minimized at PV solar developments through carefully designed project features, proper timing of construction and major maintenance work, minimization of human activity, and appropriate reclamation. Careful placement of roads, power lines, and other project infrastructure will further reduce impacts, especially if these associated project features can be co-located with existing infrastructure. Project design and infrastructure micro-siting may be informed by investigation and recommendations during preliminary project planning and further refined during pre-

and post-construction monitoring. See [Appendix A](#) and [Appendix B](#) for more detailed recommendations on project design and siting, and best management practices for project design construction, and operations.

Avoidance and minimization measures included in the design and plans for a project should be described in a proponent's habitat mitigation plan and included in the project application.

REVEGETATION AND NOXIOUS WEED PLANS

Revegetation should focus on ecologically appropriate seeds and plants based on project location and pre-construction surveys. In many instances local [National Resource Conservation Service](#), [Oregon State Extension](#), or [Soil and Water Conservation Districts](#) can be valuable sources of information on appropriate revegetation strategies. In addition, having soil survey data for areas in need of revegetation can increase overall success of efforts and planning. Soil data for Oregon can be found [here](#).

Noxious weed plans should reference both county and [state listed weed species](#), as well as any invasive plant species introduced through the construction process. Information and assistance with invasive weeds can be found [here](#).

Successful revegetation of temporary impacts can reduce the need for additional mitigation in cases where the habitats affected are dominated by vegetation that is relatively easy to establish.

WILDLIFE HABITAT MITIGATION PLANS

Mitigation for impacts that cannot be avoided or minimized can be accomplished in multiple ways. Regardless the avenue a project proponent chooses to pursue for mitigating impacts, highlighting the chosen path in a mitigation plan allows for review from the relevant permitting agency, and for review to be completed by ODFW as required in current siting rules in the state. The elements included below are meant to provide an example derived from past approved mitigation plans that provided adequate information for easy assessment by all parties.

Impact Assessment

- As described above

Avoidance and Minimization Measures

- Summary of onsite activities or actions directly taken in response to resources noted in consultation with ODFW staff or found in the impact assessment. Past examples include modifications to project footprint to avoid higher quality habitats, fencing modifications to allow passage through or around the project footprint, or seasonal timing restrictions to minimize impacts to special status species.

Habitat Categorization of the impact site and summary of impacts

- Summary table showing acres of temporary and permanent impact by habitat type, habitat category, and proposed acres of offset.

Proposed Mitigation Site(s)

- Location, size, description.
- Baseline assessment of habitats (the more quantitative the better including acres by habitat type, habitat category, % cover of dominant vegetation, notable water or riparian features), and current uses/human activities on the land.

- Proposed boundary.
- Proposed acres of mitigation available to achieve no net loss or net gain, as appropriate based on impact assessment. Including addition acres of mitigation and uplift should be planned to increase potential success of mitigative actions. For example, a 2:1 ratio for Cat. 2 has generally been recommended to achieve a net gain in mitigation offset, and account for potential failure of some uplift actions within the overall mitigation proposal. Mitigation ratios, while not prescribed within the Mitigation Policy, provide a streamlined standard for regulatory bodies

Proposed habitat enhancement or restoration actions, accounting for potential success of chosen actions.

- Enhancement should be site-specific with measurable outcomes based on desired future conditions of the mitigation site.

Proposed conservation or durability measures to ensure the mitigation meets the habitat goals for at least the life of the project's impacts.

- Information on or copy of proposed conservation instrument that will be used to secure the mitigation site(s). Including all allowable uses and documentation of willing landowner(s) shows viability and durability of proposed mitigation.

Monitoring and reporting

- Success criteria, monitoring plan, reporting schedule, and adaptive management actions if success criteria are not met.

Timing the Final Mitigation Plan

- Regulatory entities should require applicants to provide a complete mitigation plan prior to permit approval. This plan should provide enough specificity to ensure that mitigation proposed will be durable for at least the life of the impacts and that the approved mitigation site and/or actions are appropriate to offset impacts based on pre-construction assessment of the development location. If the applicant desires flexibility or options in final mitigation outcome the approved plan, at a minimum, regulators should ensure that each option desired is detailed enough that all interested parties can assess each potential outcome against the total impact for the project.

ODFW RECOMMENDATIONS

For a county level project ODFW staff will provide the county and the project proponent with formal, written recommendations for a proponent's plan of development as a component of the conditional use permit application. For projects permitted with EFSC, comments will be provided first with the Notice of Intent, and then as necessary during application for site certificate process and the draft proposed order. This formal input will be consistent with input provided throughout the project development process if ODFW has been engaged early in the proceedings. Project proponents should use this information to guide the selection of a project location and for infrastructure micro-siting, as well as design, construction, and operations to mitigate impacts to fish and wildlife to the maximum extent possible.

STEP 5. IMPLEMENTATION OF MITIGATION

Final plans should designate timing for implementation of agreed upon mitigation measures. Mitigation for temporary and permanent impacts should occur prior to or concurrent to any action that creates disturbance or other effects.

STEP 6. FISH, WILDLIFE AND HABITAT MONITORING, DATA ANALYSES

MONITORING AND REPORTING

ODFW will recommend that success criteria for revegetation, weed abatement, and mitigation are clearly defined and measurable. It is common to request monitoring for effects to sensitive species (ie. Washington ground squirrels, eagle nests etc.). Monitoring and reporting protocols vary based on the specific surveys agreed upon within the permitting process. Some local variability may occur due to differences in plant compositions and growing conditions by region, but in general, this monitoring will be requested to occur within the first two years after completion of designated activities, and on regular intervals (~5 years) thereafter for the life of the project.

DATA SHARING

Where feasible, ODFW requests that data and reports generated through project monitoring be shared with the agency. ODFW's analyses of project data over time supports better recommendations by the agency in the future, will inform future updates to this document and may reduce the need for some monitoring on future projects if impacts are determined to be understood or not exist.

The following Appendices identify factors that may be considered by ODFW and partners when assessing biological values of a proposed PV solar site, as well as ODFW’s most common recommendations for avoiding or minimizing potential impacts. Not all recommendations will apply to all projects, and recommendations will be made on a project-specific basis determined by the biological values of a particular site. These recommendations may be modified as new scientific findings become available. This table is not designed to be wholly inclusive of all potential situations, nor should it be viewed as explicitly applicable to every solar proposal.

APPENDIX A. INFRASTRUCTURE SITING AND PROJECT LOCATION CONSIDERATIONS

The selection of a project location and siting of infrastructure within the project area are the most critical choices in avoiding impacts to fish and wildlife from PV solar development. Proponents should avoid high-value or sensitive fisheries and wildlife resources and large areas of unfragmented habitat, which can be identified through coordination with ODFW biologists and using geospatial data resources found in [ODFW’s COMPASS](#) tool as well as the [Oregon Renewable Energy Siting Assessment Mapping Tool](#) (ORESAs). Projects that are placed in areas with fewer fish and wildlife concerns and that adopt best practices in layout, design, construction, and operations will result in reduced conflict with fish and wildlife values, and consequently will have reduced need for monitoring and further mitigation.

TABLE A.1. CONSIDERATIONS AND RECOMMENDATIONS FOR ADDRESSING BIOLOGICAL IMPACTS OF A PROPOSED PV SOLAR DEVELOPMENT.

AQUATIC RESOURCES
<p>Considerations</p> <ul style="list-style-type: none"> • Will soil disturbance occur in areas sensitive to wind and water erosion? • Does the site contain any inventoried wetlands? • Will project development potentially impact any fish-bearing waterways, or waters that contain an Oregon Conservation Strategy Species? • Does the site and/or infrastructure have the potential to act as barrier to fish passage?
<p>Recommendations</p> <ul style="list-style-type: none"> • Avoid construction, and staging of equipment, including servicing, fueling, and cleaning, within 100 feet of aquatic and riparian habitats • Avoid instream construction to minimize impacts to spawning fish. Spawning dates vary based on elevation and species. Follow ODFW In-water Work Timing Guidance. • Ensure all sediments and other pollutants are contained within the boundaries of the work area. Disturbed areas that are contributing sediment to surface waters because of project activities should be promptly revegetated to maintain water quality • In some instances, presence of aquatic wildlife may further impact available in-water work timing. Local ODFW staff can provide additional guidance in areas where this may occur. • Avoid obstructing fish passage and aquatic species movement. In the event of potential trigger of Oregon fish passage statute (ORS 509.580-910) and rule (OAR 635-412-0035), contact the ODFW Fish Passage Program as early as possible • Prevent the spread of aquatic invasive species from one body of water to another • Follow best management practices for cleaning of equipment used on site.

SAGE-GROUSE

Considerations

- Is the project compliant with the current State of Oregon Greater Sage-grouse Rules ([OAR 660-023-0115](#)) and Greater Sage-grouse Conservation Strategy ([OAR 635-140-0000 through -0025](#))?
- Where is the site in relation to significant greater sage-grouse core areas, low-density habitat, and general habitat as identified in Goal 5 Sage-Grouse OAR 660-023-0115?
- Is the proposed development considered a conflicting use in sage-grouse habitat as defined in OAR 660-023-0115(7)?
- Is all associated proposed development infrastructure being discussed while coordinating on the sage-grouse impact assessment?

Recommendations

- Coordinate with the [ODFW Sage-Grouse Mitigation Program](#) to work through State of Oregon greater sage-grouse rules and assessment of potential project impacts to sage-grouse through the Habitat Quantification Tool
- Use the [Oregon Sage-grouse Development Siting Tool](#) to guide project siting to reduce or eliminate direct and indirect impacts to sage-grouse habitat
- Once final project design has been determined the Habitat Quantification Tool will provide final mitigation requirements based on all project components and existing habitat quality. This tool is generally managed by the Sage-Grouse Mitigation Program
- Utility-scale PV solar development, and associated transmission lines, are not recommended in significant greater sage-grouse core or low-density habitats
- Any PV solar project that is constructed in core, low-density, or general habitat must comply with State of Oregon greater sage-grouse administrative rules referenced above for both land use and mitigation standards
- Above-ground infrastructure, such as roads and transmission lines should be sited to reduce impacts to contiguous sage-grouse habitat and occupied greater sage-grouse leks
- Avoid construction or operation activities from two hours before sunset to two hours after sun rise in significant greater sage-grouse habitat during the breeding and nesting seasons (March 1 to June 30).

RAPTORS (HAWKS, FALCONS, EAGLES, OWLS)

Considerations

- Are any of the following known or likely to occur on or near the proposed project site or its associated infrastructure?
 - Species federally listed as ‘threatened’ or ‘endangered’ or candidates for such listing or their habitats
 - Federally designated Critical Habitat components
 - Golden or bald eagles
 - [Oregon Conservation Strategy Species](#):
 - Burrowing owl
 - Ferruginous hawk
 - Flammulated owl
 - Great gray owl
 - Northern goshawk
 - Northern spotted owl
 - Peregrine falcon
 - Short-eared owl
 - Swainson’s hawk
- Are any raptor nests within one mile of the site?

<ul style="list-style-type: none"> • Are the PV solar site or any new transmission lines in or near any known raptor flight paths, foraging areas, or areas of orographic uplift or thermal updrafts?
<p>Recommendations</p> <ul style="list-style-type: none"> • Site energy collector components underground to the maximum amount feasible to reduce bird strike potential • Follow the Avian Power Line Interaction Committee’s (APLIC) guidelines for mitigating electrocution and collision risk for birds (aplic.org; APLIC 2006, APLIC 2012) • Avoid removal of active raptor nests, which ODFW considers Category 1 Habitat (as defined in the ODFW Fish and Wildlife Habitat Mitigation Policy) • Suspend construction within raptor nest buffers during the dates specified in Table A.2 (below) and in coordination with the US Fish and Wildlife Service (USFWS) • Consult the USFWS for buffers associated with eagle winter roosts, concentrated prey resources, and high-use areas • Avoid high-value golden eagle habitats (areas of high density, winter use, or movement) identified by the USFWS Western Golden Eagle Team
<p>OTHER BIRDS (WATERFOWL, SONGBIRDS, ETC.)</p>
<p>Considerations</p> <ul style="list-style-type: none"> • Are the following known or likely to occur on or near the proposed project site? <ul style="list-style-type: none"> ○ Species federally listed as ‘threatened or endangered’ or candidates for such listing or their habitats ○ Federally designated Critical Habitat components ○ Oregon Conservation Strategy Species • Is the site on or near important areas for seasonal movement, staging, wintering, foraging, roosting, nesting, or resting for birds?
<p>Recommendations</p> <ul style="list-style-type: none"> • Avoid removal of bird nests and minimize disturbance to nesting birds during the general bird breeding season (March 1- July 15th) • Minimize disturbance within 0.25 miles of known breeding concentrations of long-billed curlew, upland sandpiper, and western snowy plover during the general breeding season (April – July) to mitigate impacts to breeding individuals • Maximize distance from wetlands and irrigated pastureland known to be used by waterbirds and waterfowl as migratory stopover sites • Consider post-construction monitoring and adaptive management plans in areas with state or federally listed species • Consult the USFWS for opportunities to minimize impacts to migratory birds
<p>BATS AND OTHER NONGAME MAMMALS</p>
<p>Considerations</p> <ul style="list-style-type: none"> • Are the following known or likely to occur on or near the proposed project site? <ul style="list-style-type: none"> ○ Species federally listed as ‘threatened or endangered’ or candidates for such listing or their habitats, including federally designated Critical Habitat components ○ Oregon Conservation Strategy Species • Is the site on or near important areas for bat roosting, hibernacula, breeding/maternity colonies, migration, or foraging? Are there any caves, old-growth trees or standing dead trees (snags) with loose bark, ponds/wetlands, or riparian corridors within 0.25 miles of the project? • Are there pygmy rabbit or white-tailed jackrabbit burrow complexes in areas of potential ground disturbance? • Are there active Washington ground squirrel colonies within or near the areas of potential ground disturbance? • Consult with USFWS to address any impacts to federally protected species

Recommendations

- Avoid disturbance or removal of known bat roosts, hibernacula, or colonies which ODFW considers Category 1 Habitat consistent with the ODFW Fish and Wildlife Habitat Mitigation Policy.
- Avoid impacts to occupied Washington Ground Squirrel (WGS) colonies which meet the Category 1 Habitat definitions in the ODFW Fish and Wildlife Habitat Mitigation Policy, including a 785-foot buffer of suitable habitat around the colony. This buffer is based on documented dispersal distances and juvenile foraging distances and is considered requisite habitat for Washington ground squirrel survival. Information on WGS can be found [here](#).
- Avoid, minimize, and mitigate impacts to the Category 2 WGS suitable habitat. Suitable habitat generally includes non-agricultural and intact areas and extends approximately 5000 ft. from the occupied colonies in suitable habitats. This is based on the documented average dispersal distances of approximately 80% of WGS
- Provide training for construction personnel and environmental monitors on protocols for responding to new Washington ground squirrel colony discoveries, dead or injured squirrels, and other protocols related to avoiding and minimizing impacts.
- Restore temporarily disturbed areas identified as suitable habitat adjacent to Washington ground squirrel Category 1 habitat to the pre-construction form and function in a reasonable timeframe and monitor restoration efforts that may unintentionally cause adverse impacts to the species.
- Avoid, minimize, or mitigate impacts (digging, trenching, installation, roads, or trampling) to pygmy rabbit burrow complexes and white-tailed jackrabbit denning sites as both are considered Category 2 habitat as defined in the ODFW Fish and Wildlife Mitigation Policy.
- Protect underground cabling and wiring systems from rodent chewing or consider above-ground cabling systems, especially if implementing dual-use pollinator/native seed understory programs as those seed-bearing or flowering plants may inadvertently attract rabbits, rodents, and ground squirrels.

BIG GAME

Considerations

- Is the site within essential and/or important big game habitats such as winter range or summer range?
- Is the site within potentially irreplaceable and essential habitats such as known movement corridors?
- Does the surrounding landscape and project design, including fencing, allow for big game movement, as determined by best available science?
- Could the project impact any aspect of big game ecology or life history (e.g., will the project sever a migration corridor or otherwise subject wildlife to increased risks, such as highway/vehicle collisions)?
- What effects will habitat removal and fragmentation, as well as indirect disturbance from vehicles, human presence, and noise have on big game?

Recommendations

- Avoid siting PV solar facilities within known, documented big game migration corridors which may be considered irreplaceable habitats.
- Avoid, minimize, and mitigate impacts to essential and important big game habitats such as big game winter range and address impacts to other important big game habitats throughout their range. See [Eastern Oregon Big Game Winter Range](#), [Western Oregon Deer and Elk Habitat](#), and [Oregon Pronghorn Essential and Limited Habitat](#) maps and rationale.

<ul style="list-style-type: none"> • Avoid construction or development activities within big game winter range generally between December 1 and April 30, consulting with local Wildlife District Biologists for site-specific timeframes.
<p>HABITAT</p> <p>Considerations</p> <ul style="list-style-type: none"> • Are there high-value fish and wildlife habitat features present such as rock outcroppings, cliffs, caves, riparian areas, springs, wetlands, water, native fish-bearing streams, or unique vegetation communities? • What potential impacts to habitat connectivity would a proposed project have? Is the site located in a mapped Priority Wildlife Connectivity Area? • Which species of fish and wildlife use the project area and how do their numbers vary throughout the year? • Would the facility irreparably alter a fish or wildlife habitat not capable of being mitigated? For example, there is no current evidence demonstrating that migration corridors can be recreated or replicated. • What potential impacts would the development have on the biological values and hydrology of the site? • How will development alter the distribution of invasive species, including invasive annual grasses? • Will temporary impacts to habitats realize enough temporal loss of function to necessitate additional mitigation?
<p>Recommendations</p> <ul style="list-style-type: none"> • Develop and implement Revegetation Plans for the project to restore temporary disturbance areas to their pre-disturbance form and function, to minimize permanent impacts to wildlife habitat. Include monitoring and adaptive management in the plans. • Develop and implement Noxious Weed Plans for the project to avoid, minimize, and mitigate introduction and spread of noxious weeds during construction and operation of the facility. Include monitoring and adaptive management and conduct for the life of the project. • Develop and implement Habitat Mitigation Plans to avoid, minimize, and mitigate potential adverse effects of the PV solar project and associated infrastructure on fish, wildlife, and their habitats. ODFW recommends Habitat Mitigation Plans be consistent with the standards and goals of the ODFW Fish and Wildlife Habitat Mitigation Policy. • The above plans should be approved by the appropriate regulatory agency with jurisdiction for the project consistent with their relevant statutes and rules, and ODFW welcomes agency and developer consultation early and often throughout the permitting and implementation process. • See other sections of this table for addressing impacts to specific species' habitats on the site.
<p>LAND USE</p> <p>Considerations</p> <ul style="list-style-type: none"> • Will the proposed site require an exception to the statewide planning goals? • Is the proposed site already impacted, or part of a larger intact landscape? • Does existing law, regulation, or policy allow development at the site? • Are there any culturally significant plants, cultural resources, and sacred or important spaces for Oregon's tribes within the project area?
<p>Recommendations</p> <ul style="list-style-type: none"> • ODFW welcomes and encourages consultation with ODFW Regional Habitat Biologists, District Wildlife Biologists, and/or the Statewide Energy Coordinator in the pre-application

<p>phase of PV solar project scoping so that potential issues can be addressed early and avoid delays in project permitting.</p> <ul style="list-style-type: none"> • ODFW recommends consultation with Oregon’s tribes and SHPO on potential impacts of PV solar projects and associated infrastructure on areas of cultural significance.
<p>PUBLIC ACCESS</p>
<p>Considerations</p> <ul style="list-style-type: none"> • What are the tribal traditional values of the site, such as culturally significant plant gathering sites? • Will construction of the project at this site impede or restrict fish and wildlife-related recreation access to public lands? What are the potential fish, wildlife, and habitat consequences if alternative travel routes are constructed to facilitate access? • Will any increase in public access (e.g., through road construction) negatively affect fish, wildlife, or habitat?
<p>Recommendations</p> <ul style="list-style-type: none"> • Minimize public travel on new access and maintenance roads within the project area, as applicable for management purposes • Access for hunting or tribal traditional use should be allowed to continue within project lease areas on public lands and on private land with landowner permission. ODFW encourages project developers to work with landowners who are willing to provide public access.
<p>CUMULATIVE IMPACTS</p>
<p>Considerations</p> <ul style="list-style-type: none"> • Are there development thresholds or caps in the proposed project area? • Will this project contribute to population decline or habitat loss for wildlife species of concern?
<p>Recommendations</p> <ul style="list-style-type: none"> • In greater sage-grouse habitat, consult with county governments to ensure large-scale projects achieve the goal of protecting significant sage-grouse habitat in a core area (see OAR 660-023-0115(9)). • Consult with ODFW and USFWS early in project siting and design to consider the proposed project in the context of local and regional wildlife population trends

TABLE A.2. DISTURBANCE-FREE DATES AND BUFFERS FOR RAPTOR NESTS IN OREGON.

Dates cover territory establishment through fledging. Release dates can be used for unoccupied or failed nests.* Some geographic variation in seasonal restriction dates, please consult with local ODFW Regional Habitat or District Wildlife Biologists. ** Indicates Oregon Conservation Strategy Species.

Species	Spatial Buffer	Seasonal Restriction	Release Date if Unoccupied
Golden eagle	0.5 – 1 mile	Feb 1 – Aug 15	May 15
Bald eagle	0.5 mile	Jan 1 – Aug 15	May 31
Ferruginous hawk**	0.5 mile	Mar 15 – Aug 15	May 31
Northern goshawk**	0.5 mile	May 1 – Aug 15	June 30
Peregrine falcon**	0.25 mile	Jan 1 – Jul 1	May 15
Swainson’s hawk**	0.25 mile	Apr 1 – Aug 15	May 31
White-tailed kite	0.25 mile	Jan 1 – Aug 15	
Osprey	0.25 mile	Mar 1 – Sep 15	
Burrowing owl**	0.25 mile	Apr 1 – Aug 15	May 31
Flammulated owl**	0.25 mile	May 1 – Jul 31	June 15
Great gray owl**	0.25 mile	Apr 1 – Jul 31	May 31
Red-tailed hawk	0.10 mile	Mar 1 – Aug 15	May 31
Other hawks and owls	0.25 mile	Mar 1 – Aug 15	May 31

APPENDIX B. BEST PRACTICES FOR DESIGN, CONSTRUCTION, AND OPERATIONS

This appendix provides recommendations and best practices for siting, design, construction, operations, and reclamation. These are recommendations and may be modified or added as new practices and technologies emerge. These recommendations do not supersede regulatory agency requirements and/or landowner agreements or preferences. Projects that are placed in areas with fewer fish and wildlife concerns and that adopt recommendations and best practices in layout, design, construction, and operations will result in reduced conflict with fish and wildlife values, and consequently will have reduced need for monitoring or further mitigation.

SOLAR ENERGY GENERATION COMPONENTS AND FACILITIES

LIGHTING

Artificial lighting can have negative impacts to wildlife, including changing behavior and land use, disorienting wildlife, and potential increases in risk of mortality. The best approach to mitigate impacts from artificial lighting is to avoid its use whenever possible. Facilities should minimize light pollution whenever feasible and use the best available technologies.

Specific recommendations:

- Use only fully shielded, dark-sky friendly fixtures, so lights shine down towards the ground.
- Use only the amount of light needed.
- Install timers, motion sensors, or dimmer switches. Turn off lights when not in use.
- Limit the use of artificial lighting during peak migration periods.
- For facility lighting, use warmer-colored lights (<2200 Kelvin) versus cooler-colored light on the white-blue end of the spectrum (≥ 2200 Kelvin; [Longcore et al. 2018](#)).

FENCING

Fencing the Panel Array

The National Electric Code (2017; Section 110.31) requires utility-scale PV solar facilities to maintain a wall, fence, or screen to deter access by unauthorized people to certain portions of a project. The code further specifies that fences should be at least 7 feet tall, however big game species such as elk and deer can jump over fences less than 8 feet tall. To avoid entrapment of big game and potential damage to facility panels and wiring systems, ODFW recommends panel array fencing be at least 8 feet tall.

Where feasible, ODFW recommends fences be designed to allow permeability for smaller wildlife such as rabbits, meso-carnivores (coyote, badger, bobcat), and reptiles. Allowing for small gaps between the fence and the ground, at regular intervals around the perimeter fencing, reduces the habitat loss and fragmentation impacts for those smaller species. For large scale projects, ODFW may advocate for modifications in final fence design to facilitate landscape movements of larger mammals.

Gates for Egress

Big game can become entrapped inside exclusionary fencing that may be required at some renewable energy facilities. In such cases, having gates on multiple sides of the fenced perimeter can allow for easier egress. Include an adequate number of gates along the perimeter to facilitate big game egress (e.g., consider gates on opposite sides of facilities).

Wildlife-Friendly Fence Design

The construction of new fences should be avoided, if possible, to reduce collision risk and facilitate wildlife movement on the landscape. New fences, other than those intended to exclude wildlife, should be built to wildlife-friendly specifications. Fence design should include movement options around and through projects that maintain sufficient corridors and prevent loss of winter range habitat for big game. Consultation with local ODFW biologists is critical to ensure fences are appropriately sited.

Design specifications are available at:

https://efotg.sc.egov.usda.gov/references/Public/OR/382AAjs_OR_WildlifeFriendlyFence_4-15-10.pdf.

Fence Markers

Many species of birds are at risk of death by collision with fences. Bird diverter fence markers have proven to be a low-cost but effective approach to make fences more visible to birds and thereby reduce deaths to greater sage grouse, but little research has been conducted on benefits to other species. In areas of high bird use and potential low flight paths (adjacent to wetlands, grassland habitats) these markers may have benefit for other bird species as well as reducing ungulate pressure to cross fence.

- ODFW recommends:
 - Three-inch vinyl markers should be placed along the top wire at 3-foot intervals, with fence posts serving as markers.
 - Additional information is available through the Sage Grouse Initiative at: <http://www.sagegrouseinitiative.com/wp-content/uploads/2014/08/FENCEMARKER-FAQ.pdf>.
 - See information on stranded or injured wildlife provided below.

POWER LINES

Many species of birds are at risk of death by collision with or electrocution by power lines.

ODFW offers the following recommendations for any new power lines constructed in association with PV solar facilities:

- Site projects near substations or other points of tie-in to the energy grid to reduce the construction of new power lines.
- Burying transmission lines between facilities and substations will further reduce these risks.
- If burying is not feasible, proponents should follow the Avian Power Line Interaction Committee's (APLIC) guidelines for mitigating electrocution and collision risk for birds, which simultaneously minimizes power outages and fire risk associated with bird use (aplic.org; APLIC 2006, APLIC 2012).
- Avoid crossing naturally occurring perennial streams, lakes, reservoirs, riparian corridors, and large (>5 acres) wetlands with overhead power lines to the maximum extent possible.
- Mark overhead lines using bird flight diverters per APLIC guidelines to mitigate collision risk (APLIC 2006, APLIC 2012).

REVEGETATION AND RECLAMATION

Construction of PV solar facilities will create soil disturbance and may lead to soil erosion and growth of non-native, invasive plants. ODFW recommends revegetation of temporary disturbance areas and

underneath PV panels as quickly as possible after construction. The following recommendations apply to revegetation as well as final reclamation of the site once the facility is decommissioned.

Restoration following construction should contour soils to match the original topography as much as possible. Revegetation should re-establish native grasses, forbs, and shrubs to achieve cover, species composition, and life form diversity commensurate with the ecological site potential or pre-disturbance conditions. Where possible, use seed from local sources. ODFW can provide consultation on desirable plant seed mixes. In some instances, use of non-native but desirable vegetation may be recommended. Landowners should be consulted on a desired plant mix on private lands. Proponents should control noxious and invasive plant species and adopt the best management practices for topsoil handling.

Soils

Understanding the soils on the site can make the difference in successful revegetation and reclamation.

ODFW recommends project proponents identify the soils on the project site.

Basic information can be obtained from the Natural Resource Conservation Service (NRCS) Soil Survey.

Soil pits and testing properties on the site may be necessary to determine stability, pH, electrical conductivity, texture, calcium, carbonate, and gravel content. Properly preserved topsoil is critical for reclamation.

- ODFW recommends:
 - Maintaining existing vegetation or trampling vegetation is preferable to blading/removal of vegetation and grading of soils
 - If topsoil must be removed, remove topsoil from the site before facility construction activities, and salvage while at a low moisture content
 - Store topsoil stockpiles where:
 - Not disturbed by facility construction activities.
 - Not contaminated by foreign or spilled materials.
 - Movement of stockpiles would be minimal.
 - Exposure to erosional forces is minimal.
 - Pristine soils are not present.
 - Avoid mixing A horizon and B horizon soil layers.
 - Minimize soil compaction.
 - As an alternative to large-scale topsoil removal, skim surface vegetation with heavy equipment.
 - Best implemented generally between July 1 and March 14, outside of ground bird nesting season.

Vegetation

Identify native plant communities prior to disturbance and design revegetation plans to approximate pre-disturbance functions and values. It can be helpful to refer to [Ecological Site Descriptions](#) where available, to determine site potential post-disturbance.

ODFW recommends:

- Leave vegetative biomass in windrows to reduce wind and water erosion.
- Soil testing should be completed prior to re-establishment of desired vegetation.
- Appropriate soil amendments should be added prior to planting if necessary to establish native plant community.
- Reestablish on the replaced topsoil as quickly as possible to stabilize the site and prevent erosion.

- Commercial fertilizer is not recommended for native rangeland reestablishment due to the possibility of increased annual weeds.
- Regular monitoring should be conducted, and adaptive management implemented as needed to ensure no site degradation.

Invasive Weed Management Plan

The proponent should develop and implement a plan to control invasive species (including invasive annual grasses and noxious weeds), with an expectation that invasive plants will be controlled for the life of the renewable energy facility and until final reclamation is complete.

Thoroughly wash all surfaces and undercarriages of vehicles and equipment before moving to the project site and after leaving the site to remove any undesirable plant seeds. This will reduce the possibility of transporting noxious or non-native plants from one site to another.

All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction should be seeded using species appropriate to the project vicinity.

Proponents should coordinate with the [County Weed Offices](#) for guidance.

STRANDED, INJURED OR DEAD WILDLIFE

During construction and operation of facilities reports of interactions with wildlife have occurred. In most cases, ODFW does not have the capacity to respond to such calls. ODFW recommends that project proponents have an operations plan for onsite staff on how to deal with wildlife encounters. Proper fencing and protocols on gate operations can assist with reducing the amount of stranded wildlife within facility boundaries. For injured wildlife found by staff, operational plans should include contact information for local rehabilitators, where available, or local ODFW offices. Some species may not be handled without a permit, so coordination is key. ODFW also requests that any dead wildlife found within facility boundaries be reported as soon as possible, or within agreed upon reporting protocols with date of discovery, location and photographs if available.

SEASONAL TIMING LIMITATIONS

Recommendations from ODFW may include specific guidelines on survey timing or limitations on construction and activities based on species utilization and presence within the project vicinity. The table below summarizes timing windows generally referred to in project review. Local conditions may alter these timing windows, and the table generally refers to maximum known periods of concern.

Oregon Species Timing Periods												
	January	February	March	April	May	June	July	August	September	October	November	December
Eagle Nesting												
Raptor Nesting												
Big Game Winter												
Sage Grouse Lek and Nesting												
In-Water Work Window	Varies by Watershed and Waterbody											
WGS active												
Primary ground bird nesting												
Bat Migration												

APPENDIX C. ODFW AUTHORITIES

Comments offered by ODFW must be consistent with the authorities offered the agency through statute and rule. ODFW should consider the following authorities while reviewing applications:

Oregon Revised Statutes (ORS):

- ORS 496.012 State Wildlife Policy
- ORS 496.171-182 Threatened and Endangered Fish and Wildlife Species. A listing of State and Federal threatened, endangered and candidate species can be found on the Department's website at: http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp
- ORS 498.301-346 Screening and By-pass devices for Water Diversions or Obstructions
- ORS 498.500-504 Oregon Sage-Grouse Mitigation
- ORS 506.036 Protection and Propagation of Fish
- ORS 506.109 Food Fish Management Policy
- ORS 509.140 Placing Explosives in Water
- ORS 509.580-910 Fish Passage; Fishways; Screening Devices. A listing of requirements under the Department's Fish Passage Program can be found on the Department's website at <http://www.dfw.state.or.us/fish/passage/>

Oregon Administrative Rules (OAR):

- OAR Chapter 635, Division 100 provides authority for adoption of the State sensitive species list and the Wildlife Diversity Plan and contains the State list of threatened and endangered wildlife and fish species. A current list of State sensitive species can be found on the Department's website at: http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_category.pdf
- OAR Chapter 635, Division 140 provides background and definitions for the "Greater Sage-Grouse Conservation Assessment and Strategy for Oregon" (2011) as well as requires compensatory mitigation for direct and indirect impacts from developments within sage-grouse core, low density and general habitats.
- OAR Chapter 635, Division 415 Fish and Wildlife Habitat Mitigation Policy can be found on the Department's website at: <https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=2989> describes six habitat categories and establishes mitigation goals and standards for each wildlife habitat ranging from Habitat Category 1 (irreplaceable, essential, limited) to Habitat Category 6 (non-habitat)
- OAR 635, Division 900 is the ODFW Climate and Ocean Change Policy, which directs ODFW to be a leader in response to changing climate and ocean conditions in the state.
- Native Fish Conservation Policy (OAR 635-007-0502-0535)
- Trout Management (OAR 635-500-0100-0120)
- Elk Management Plan (OAR 635-160-0000)
- Mule Deer Management Plan (OAR 635-190-0000)
- Black-tailed Deer Management Plan (OAR 635-195-0000)