Attachments 1 and 2: Wheatridge Renewable Energy Facility I and II

- Draft Amended Noxious Weed Control Plan Requirements
- ODOE and Morrow County Review Comments

WREF 2024 Weed Monitoring and Treatment Plan

Wheatridge Renewable Energy Facilities I, II, III

Prepared for
NextEra Energy Resources

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1.0 Introduction

This memo describes the results of noxious weed inspections conducted in October 2023 at Wheatridge Renewable Energy Facility I (WREF I), Wheatridge Renewable Energy Facility II (WREF II), and Wheatridge Renewable Energy Facility (WREF III). In addition, this memo outlines the responsibilities of Tetra Tech, the operations manager (NextEra), the contracted herbicide applicator (Butter Creek Spraying) and Morrow County (Weed Supervisor) moving forward in regard to noxious weed monitoring and control.

2.0 Noxious Weed Monitoring Process and Responsibilities

2.1 Monitoring Contractor - Tetra Tech

- Performs site visits (4-8 times annually as needed) and documents weed occurrences;
- Provides summary memo after each visit to NextEra operations manager outlining findings and treatment recommendations;
- Communicates directly with herbicide applicator, providing maps, and photos of weed species locations;
- Communicates with Morrow County Weed Supervisor about survey findings and treatment plans;
- Prepares Annual Report for each facility describing weed monitoring findings and treatments;
- Organizes and attends quarterly calls with NextEra and herbicide applicator; and
- Attends calls with the Oregon Department of Energy and Morrow County as needed.

2.2 Site Manager - NextEra

- Communicates findings and recommendations from Tetra Tech to the herbicide applicator;
- Documents the work performed by the herbicide applicator and provides that documentation to Tetra Tech (documentation should include type and quantity of herbicides applied, dates applied, and any associated U.S. Environmental Protection Agency/U.S. Department of Environmental Quality licensing/documentation of chemicals used);
- Reviews annual reports to ensure all treatments performed by herbicide applicator are documented;

- Maintains landowner communications, providing guidance to Tetra Tech and herbicide applicator regarding landowner restrictions/requests for performing weed monitoring/treatment on their properties;
- Attends quarterly calls with Tetra Tech and herbicide applicator; and
- Attend calls with the Oregon Department of Energy.

2.3 Herbicide Applicator – Butter Creek Spraying

- Reviews Tetra Tech memos describing weed occurrences, recommendations and plans appropriate treatment to address those issues;
- Communicates treatment plan to NextEra;
- Maintains records of when, where, and what type of treatment are being performed;
- Maintains all appropriate documentation of chemicals applied (shared during the quarterly calls, and prior to Annual Report); and
- Attends quarterly calls with Tetra Tech and NextEra.

2.4 Morrow County

- Reviews Tetra Tech memos describing weed occurrences and recommendations; and
- Attends quarterly calls and provides recommendations.

Table 1. Weed Monitoring Schedule

Schedule	Frequency	Task
March -April	Once	Conduct a full site wide weed survey to identify areas for treatment. Work with Operations Manager (NextEra) and herbicide applicator (Butter Creek Spraying) on a chemical(post-emergent) and mechanical treatment plan. Monitor and report on previous treatments effectiveness.
April-September	Monthly or as needed	Monitor areas treated for effectiveness, identify and map new populations, make recommendations for retreatment or mechanical controls to manage new or small populations.
June-August	Once	Monitor and collect data in re-vegetation test plots including weed species and population size.
September-October	Once	Conduct a full site wide weed survey to monitor treated areas, identify new populations, make recommendations for retreatment(post-emergent) or mechanical controls. Create plan for pre-emergent applications in fall or winter, when conditions are appropriate.

3.0 Weeds Observed on Site

The weed monitoring conducted in October 2023 showed only a slight change in weed species' populations that had been identified in earlier surveys. The roads are well maintained, with only a few areas of Russian thistle (*Salsola tragus*) and puncture vine (*Tribulus terrestris*) in the gravel roadbed. In the previously disturbed areas outside of the roadways, including around turbine pads and the operations and maintenance building, the most common weed species are Russian thistle and kochia (*Bassia* [*Kochia*] *scoparia*). Some areas noted (Turbine 41-47) to have heavy weed pressure (Russian thistle and kochia) in previous surveys have recently been tilled and seeded into winter wheat, as well as treated for weeds by the landowner.

Small populations of noxious weeds including; yellow starthistle (*Centaurea solstitalis*), rush skeletonweed (*Chondrilla juncea*), diffused knapweed (*Centaurea diffusa*), Scotch thistle (*Onopordum acanthium*), jointed goatgrass (*Aegilops cylindrica*), spikeweed (*Centromadia pungens*) and cereal rye (*Secale cereale*), were identified and mapped for on-going monitoring and treatment.

Russian thistle is not listed on the Morrow County Noxious Weed List or the Oregon State Noxious Weed List, but is considered problematic by local landowners. Kochia is considered a species of Economic Importance in Morrow County and on Oregon State List B. Both of these species produce large amounts of seed and are easily spread into neighboring agricultural fields and grasslands, pushing out native species. Monitoring and treatment of these two weeds will be continued.

Table 2 lists the weeds observed on site in October and the frequency they were observed throughout the project sites.

Table 2. Weeds Observed on Site October 2023

Weed Species	Frequency	Morrow County Noxious Weed Status	Oregon State Noxious Weed List
Puncturevine *(Tribulus terrestris)*	Common	Economic importance	List B
Rush skeletonweed *(Chondrilla juncea)*	Infrequent	Noxious weed	List B and T
Scotch thistle *(Onopordum acanthium)*	Infrequent	Noxious weed	List B
Russian thistle *(Salsola tragus)*	Abundant	Not listed, but considered problematic by area farmers	Not listed
Yellow starthistle *(Centaurea solstitalis)*	Common	Noxious weed	List B
Kochia *(Bassia* [*Kochia*] *scoparia)*	Abundant	Economic importance	List B
Jointed goatgrass *(Aegilops cylindrica)*	Infrequent	Economic importance	List B
Diffuse knapweed *(Centaurea diffusa)*	Common	Economic importance	List B

Weed Species	Frequency	Morrow County Noxious Weed Status	Oregon State Noxious Weed List
Common spikeweed *(Centromadia pungens)*	Infrequent	Noxious weed	List B
Cereal rye *(Secale cereale)*	Common	Economic importance	Not listed

Sources: Morrow County 2015, ODA 2022.

List B Designated State Noxious Weed: A weed of economic importance that is regionally abundant but may have limited distribution in some counties.

List T Designated State Noxious Weeds: Priority noxious weed species selected and designated by the Oregon State Weed Board (OSWB) as the focus of prevention and control actions by the Noxious Weed Control Program.

4.0 Recommended Weed Control Measures

Table 3 summarizes the weeds observed on site and general control measures being utilized. Figure 1 and Figure 2 show representative diagrams of the operational footprint, construction disturbance area, and a 10-foot buffer around the construction disturbance that are being monitored and treated for noxious weeds. Details regarding the life cycle of these species and specific control methods are expanded upon below.

Table 3. Weed Control Measures

Weed Species	Life Cycle	Control - Fall/Winter	Control – Spring 2024
Puncturevine *(Tribulus terrestris)*	Summer annual	Mechanical (Hand Pulling or digging out plant)	Post-emergent herbicide application
Rush skeletonweed *(Chondrilla juncea)*	Perennial	Mechanical (Hand Pulling or digging out plant) Post-emergent herbicide applied in fall to be translocated to roots.	Post-emergent herbicide application
Scotch thistle *(Onopordum acanthium)*	Biennial	Mechanical (Digging out plant) Post-emergent herbicide application to new rosettes	Mechanical (digging out plant) Post-emergent herbicide application
Russian thistle *(Salsola tragus)*	Summer annual	Pre-emergent herbicide application	Post-emergent herbicide application
Yellow starthistle *(Centaurea solstitalis)*	Winter annual	Mechanical (Hand Pulling or digging out plant)	Post-emergent herbicide application
Kochia *(Bassia* [*Kochia*] *scoparia)*	Summer annual	Pre-emergent herbicide application	Mowing before flowering in spring and post-emergence herbicide application to seedling to bolting stage
Jointed goatgrass *(Aegilops cylindrica)*	Annual grass	Pre-emergent herbicide application	Post-emergent herbicide application before bolt stage

Weed Species	Life Cycle	Control - Fall/Winter	Control – Spring 2024
Diffuse knapweed *(Centaurea diffusa)*	Biennial	Mechanical (Hand Pulling or digging out plant)	Post-emergent herbicide application to rosette to bolt stage
Common spikeweed *(Hemizonia pungens, Centromadia pungens)*	Annual	Mechanical (Hand Pulling or digging out plant)	Mechanical (Hand-pulling plant) Post-emergent herbicide application
Cereal rye *(Secale cereale)*	Annual grass	Mechanical (Hand Pulling or digging out plant)	Mechanical (hand-pulling plant) Post-emergent herbicide application

Figure 1. Representative Operational Footprint for Roads

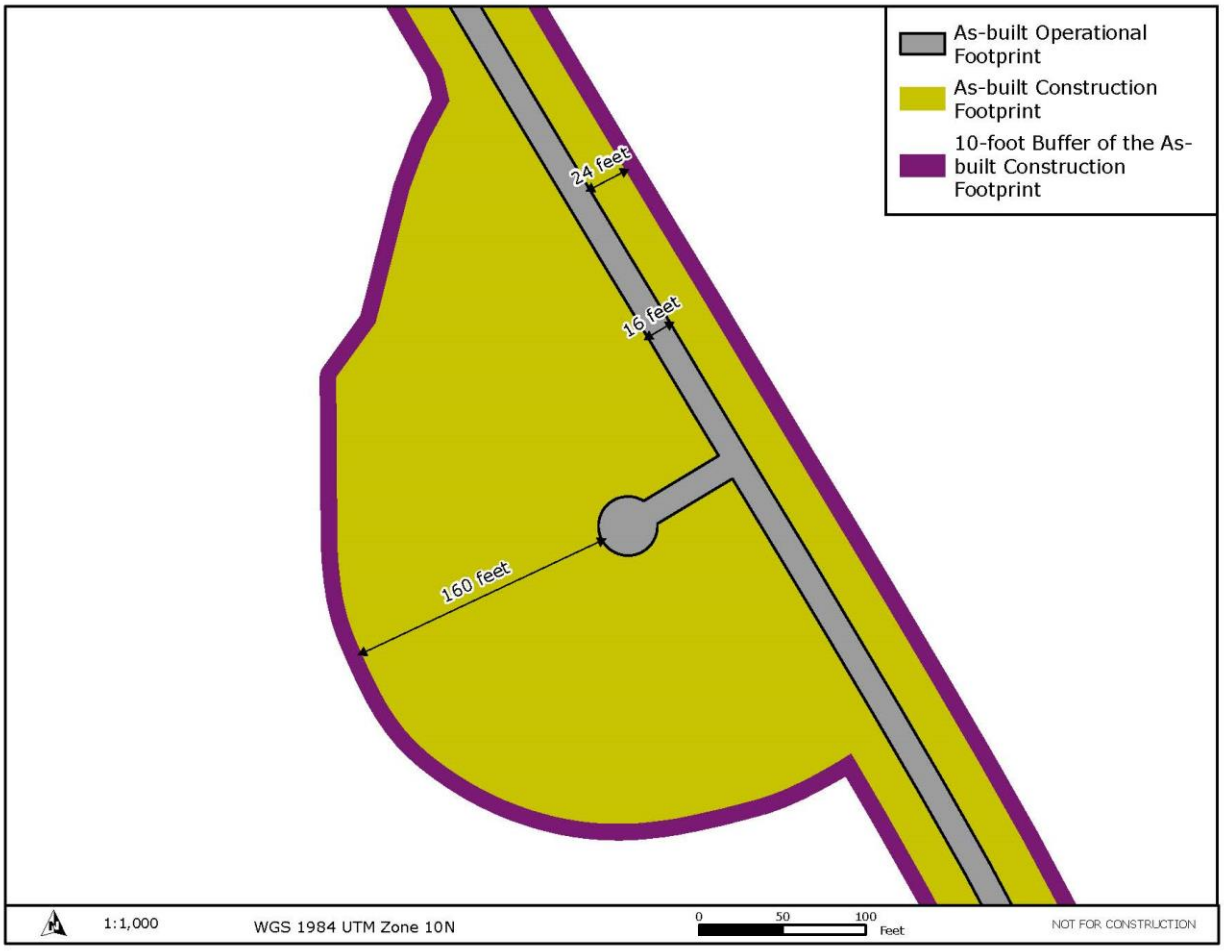

Figure 2. Representative Operational Footprint for Turbines

4.1 Puncturevine Treatment

Puncturevine (also known as goat head) is an annual broadleaf plant that grows low to the ground, forming dense mats 2 to 5 feet in diameter. It can grow in a wide variety of conditions, although it thrives in areas that are hot and dry. Seeds germinate in spring and summer when there is still moisture in the soil. Seedlings survive by rapidly growing a deep taproot and start flowering within 3 weeks of germination. Flowering continues throughout the summer, with each plant producing between 2,000 to 5,000 seeds. This species solely reproduces by seed and spreads through burr-like seedpods that stick on passing animals, humans, and vehicle tires. Seeds can survive dormant in the soil for up to 5 years. Puncturevine is very drought tolerant and common in disturbed soils throughout the arid west. It is often found growing in gravel roads, parking lots, and agricultural fields.

The key to successful control of Puncturevine is to prevent plants maturing and going to seed. The most effective control methods will be removing (hand digging) and disposing of the plant before seeds appear. This will require on-going removal efforts to keep decreasing the intensity of

infestations. Control efforts will be oriented toward continually targeting plants before they set seed. The following table lays out the methods of control and the timing of those treatments.

Table 4. Treatment Methods and Timing for Puncturevine

Treatment Method	Treatment Timing
Biological Control	If a source can be located, both the seed head weevil (*Microlarinus larynii*) and stem weevil (*M. lypriformis*) were introduced into the United States in 1961 and have been used effectively in California for many years (Wilen 2006). Species are known to survive the winters in Umatilla County.
Grazing	Grazing is not recommended. The sharp spines of the seedpod can injure the mouth and digestive tract of grazing animals.
Mechanical Controls	Digging up and disposing of plant before puncturevine goes to seed is the most effective treatment.
Herbicides	Apply a pre-emergent containing oryzalin, benefit or trifluralin or early postemergence containing 2,4-D or glyphosate.
Seeding Competitive Species	To enhance long-term control encourage or revegetate a healthy native or desired plant population.
Sources: Wilen 2006.	

4.2 Rush Skeletonweed Treatment

Rush skeletonweed is a non-native herbaceous perennial plant belonging to the sunflower (Asteraceae) family. This species can grow up to 4 feet tall from a deep and sometimes rhizomatous root system. Rush skeletonweed spreads by seeds as well as rhizomes and root fragments. While most seeds germinate within 1 year, the soil seed bank can remain viable for several years after seed fall. Seeds germinate in the fall, leaving seedlings or rosettes to overwinter. It is important to note that these seedlings do poorly when there is competition for light, as they are sensitive to shading. Due to this limiting factor, populations tend to be more abundant in highly disturbed sites, such as along roadsides, fallow fields, and overgrazed rangelands. Flowering stems bolt and branch during the spring resulting in flowering from spring to fall. Plants will resprout each spring from adventitious buds in their roots, and plants less than 1 year old are capable of producing viable seeds (Milan et al. 2016).

Grazing rush skeletonweed can be an effective control method that has been shown to reduce skeletonweed seed production. However, this method will only kill above-ground growth which could allow recovery from regenerative roots. If implemented, overgrazing will also need to be avoided to prevent long-term consequences for plant communities. Hand-pulling small, individual rush skeletonweed plants will help control small infestations but it is important to note that pulling large plants may increase the population if viable root fragments are left to regenerate. This method must be repeated regularly to prevent re-establishment from the seedbank or plants re-growing from root fragments. Herbicides may be used to successfully control small rush skeletonweed infestations. They are fast acting and have the potential to eradicate some populations. However,

chemical control can be damaging to desired vegetation, which is essential for long-term control and prevention of rush skeletonweed (Milan et al. 2016).

Successful management of rush skeletonweed will require land managers to understand how to identify rush skeletonweed in all stages of growth and the ways that it spreads. Using this knowledge, land managers can choose which weed control methods to implement and be able to recognize when to implement them. A combination of control methods consistently applied, evaluated, and adjusted through time may be necessary to prevent and eradicate rush skeletonweed (Milan et al. 2016). Table 5 provides details about the timing and methods of treatment for rush skeletonweed.

Table 5. Treatment Methods and Timing for Rush Skeletonweed

Treatment Method	Treatment Timing
Grazing	Goats, sheep, horses, cows, and some species of wildlife will graze rush skeletonweed in the young rosette stage. Sheep are believed to be the most effective. The best results have been found with continuous grazing, preventing the plant from bolting. However, it is important that the animals do not graze during seed set to prevent distribution. Heavy grazing is not recommended because it will decrease the competitive ability of desired plants.
Mechanical Control	Most effective on young plants; seedlings and rosettes growing for less than five weeks as they are not capable of full regeneration from severed roots. When plants are in flower or seed, cut off and bag all flower stalks prior to pulling to avoid dislodging and distributing seeds. Populations of older rush skeletonweed individuals must be pulled several times a year for multiple years.
Herbicides	Herbicides for the control of rush skeletonweed work best when applied while the weed is actively growing in spring or fall. Fall applications are most effective as herbicides more readily translocate to the roots, and then the added stress of winter increases plant mortality.
Seeding Competitive Species	Deep-rooted perennials such as alfalfa (*Medicago sativa*) compete with rush skeletonweed for much-needed soil moisture over the summer months. Ideally, planted seeds should contain a mixture of species that are quick to germinate and will provide long-term competition. Control of rush skeletonweed prior to seeding is essential as established plants are highly competitive.
Source: Milan et al. 2016.	

4.3 Scotch Thistle Treatment

Scotch thistle is a biennial broadleaf plant that can grow anywhere from 4 to 6 feet tall. This species reproduces only by seed. Seeds can remain viable in the soil for more than 30 years. Germination can occur in the spring and fall producing a large rosette of prickly leaves. During the second year of growth, scotch thistle will flower in the summer, with seeds matured by mid to late-summer, dispersed by wind, water, rodents, livestock, or vehicles. Scotch thistle thrives in disturbed areas such as gravel pits, roadsides, burned areas, and ditches (USDA 2017a).

Scotch thistle relies upon seed production to proliferate, and timing of control will be important. Mechanical and chemical treatments need to be done in the spring before flowers open or in fall when seedlings emerge (Zesiger et al. 2021). Table 6 lists treatment options and timing of those treatments.

Table 6. Treatment Methods and Timing for Scotch Thistle

Treatment Method	Treatment Timing
Grazing	Graze sheep, goats, or horses on young plants.
Mechanical Control	Sever and remove plants 2 to 4 inches below the soil surface before flower heads develop. If flowers or seeds are present bag and remove plant debris. If mowing is used, cut after plants begin to bolt but before flowering. Repeat mowing every 21 days during active growth.
Herbicides	Apply a post-emergent, foliar herbicide during the fall when plants are growing from seedlings to rosettes. Spraying in spring through summer is also effective but higher rates of application may be necessary.
Seeding Competitive Species	To enhance long-term control encourage or revegetate a healthy native or desired plant population.
Sources: USDA 2017a, Zesiger et al. 2021.	

4.4 Russian Thistle Treatment

Russian thistle is a summer annual broadleaf plant that can grow up to 4 feet tall. Seeds germinate in temperatures ranging from 52 to 90 degrees Fahrenheit and send out a taproot within 12 hours of germination. Seedlings are slender and flexible, with leaves that look like pine needles. Flowers bloom from July through October with each plant producing between 2,000 to 100,000 seeds. This species solely reproduces by seed that is dispersed when the mature plant breaks off at the ground, creating windblown tumble weeds. Seed is short-lived in the soil, with viability decreasing significantly after 1-2 years. It is very drought tolerant and common in disturbed soils throughout the arid west. It is often found along roadways, fence lines and in agricultural fields (Bernau et al. 2018).

The key to successful control of Russian thistle is to prevent plants from maturing and going to seed. Combining control methods will be the most effective in decreasing infestations. Control efforts will be oriented toward continually targeting seedlings (Bernau et al. 2018). Table 7 provides various treatment methods and ideal timing of those methods.

Table 7. Treatment Methods and Timing for Russian Thistle

Treatment Method	Treatment Timing
Grazing	Graze early in the spring before the thistle develops spines. Grazing will need to be paired with other treatment methods.
Mechanical Control	Mowing or harrowing before thistle goes to seed can be effective but invites further spread if field is left fallow without competing vegetation.

Treatment Method	Treatment Timing
Herbicides	Apply a pre-emergent such as Atrazine, Bromacli, or Imazapyr. Some herbicide resistant bio-types have emerged. Avoid repeat use of herbicides with same mode of action. Postemergence such as Chlorsulfuron must be applied early in the life cycle to be effective.
Seeding Competitive Species	To enhance long-term control encourage or revegetate a healthy native or desired plant population.
Sources: Bernau et al. 2018.	

4.5 Yellow Starthistle Treatment

Yellow starthistle is a winter annual broadleaf plant that will outcompete more desirable vegetation. It has an extended growing and flowering season allowing it to establish in an area of disturbance rather quickly. Rosettes begin forming in spring and have highly variable leaf shape growing up to 15 inches. Flowering begins in May and continues through October on winged flowering stems averaging about 2 feet tall. Viable seeds can develop in as little as 8 days. Seeds have no means of wind dispersal and most often germinate within a few feet of the parent plant but can be spread by birds, humans and vehicles. Flowering continues throughout the summer with each plant producing between 20 to 120 seeds. This species solely reproduces by seed that can survive dormant in the soil for up to 3 years. Yellow starthistle is very drought tolerant and common in disturbed soils, preferring deep loamy soils and south facing slopes. It is often found growing in grasslands, pastures, canyonlands hillsides, roadsides, and agricultural fields (DiTomaso et al. 2006).

The key to successful control of yellow starthistle is to prevent plants maturing and going to seed. The most effective control will be a combination of methods. This will require on-going efforts to keep decreasing infestations. Control efforts will be oriented toward continually targeting plants before they set seed (DiTomaso et al. 2006). Table 8 lays out the methods of control and the timing of those treatments.

Table 8. Treatment Methods and Timing for Yellow Starthistle

Treatment Method	Treatment Timing
Grazing	Grazing young plants with goats can be successful as part of control efforts to manage populations before going to seed.
Mechanical Control	Hand digging the entire plant, including the root before plants goes to seed, mowing after flowering but before going to seed can be useful in small infestations. Burning or tillage can be effective in combination with other control methods.
Herbicides	Apply a pre-emergent herbicide in fall or winter or early postemergence containing 2,4-D, clopyralid and glyphosate to rosettes.
Seeding Competitive Species	To enhance long-term control encourage or revegetate a healthy native or desired plant population.
Sources: DiTomaso et al. 2006.	

4.6 Kochia Treatment

Kochia is an introduced, summer annual broadleaf plant with a taproot that forms rounded bushes up to 7 feet tall. Kochia exhibits early germination making it capable of utilizing limited spring soil moisture in arid conditions. Kochia can also germinate multiple times throughout the growing season allowing it to take advantage of moisture when it becomes available. Kochia can only reproduce from seeds that remain viable for 1 to 2 years in the soil. Each plant can produce anywhere from 2,000 to 30,000 seeds. Mature seed is not dormant and can germinate immediately when conditions are suitable. When kochia reaches maturity, the stem breaks off from the base and will disperse seeds as a tumbleweed across vast distances (Casey 2014).

Kochia exhibits leaf characteristics of pubescence and a wax that makes absorption of herbicides difficult. Due to this resistance, the absorption and efficacy of herbicides greatly depend on the dose applied and the maturity of the kochia. Management of seedlings will be the most effective in controlling kochia. Due to a short-lived seed bank, two or three years of careful control can eradicate infestations (Casey 2014). Table 9 provides timing and methods of treatment for kochia.

Table 9. Treatment Methods and Timing for Kochia

Treatment Method	Treatment Timing
Grazing	Kochia can provide good livestock forage in small amounts, grazing can reduce populations when small plants are grazed intensively.
Mechanical Control	Dig or hand pull to control smaller populations. When digging, sever the root below the soil surface. Mow before flowering to prevent seed production. Revisit sites for continued treatment to ensure there is no regrowth.
Herbicides	To apply herbicides more effectively, use a surfactant to alter spray solution properties. Apply to young plants to increase absorption.
Seeding Competitive Species	Promoting competitive vegetation will slow spread and help prevent establishment. Perennial grass plantings have been shown to inhibit kochia establishment.
Sources: DiTomaso et al. 2013a, Casey 2014.	

4.7 Jointed Goatgrass Treatment

Jointed goatgrass is an introduced, cool season, annual grass that is closely related to and a common contaminant of winter wheat. Jointed goatgrass grows from 15 to 30 inches tall as a tufted, annual bunchgrass. The reproduction of jointed goatgrass is solely by seed that remain viable for 3 to 5 years in the soil. Each plant can produce approximately 3,000 seeds. Plants prefer to germinate in compacted soils thriving along roadways, between crop rows, railroad tracks, and other rights-of way (USDA 2017b).

Jointed goatgrass seedlings germinate from September to early November, dependent on favorable soil moisture. The plant then has an overwinter dormant period followed by new seed in the spring. The seed has a long flowering period which allows it to successfully compete with other species for sunlight, nutrients, and water. Additionally, jointed goatgrass tolerates drought better than winter wheat and other annual grasses (USDA 2017b).

The objective when managing existing infestations of jointed goatgrass is to eliminate as many live plants and disrupt as much seed production as possible. As a rule, actions to follow for an overall management approach are to check seed stock, hay, straw, and mulch for presence of seeds; remove grazing animals from infested areas before seed heads mature; encourage use of spray washing stations; detect, map, and eradicate new populations as early as possible; combine weed control methods (see below) for most effective control including implement monitoring and follow-up treatments for missed plants or seedlings (USDA 2017b). Table 10 lays out the methods of treatments and the timing of those treatments.

Table 10. Treatment Methods and Timing for Jointed Goatgrass

Treatment Method	Treatment Timing
Mechanical Control	Hand pull, cut, or hoe before the seed head exits the sheath in late winter or early spring to prevent plants from maturing and reaching seed production. Remove as much of the root as possible and allow eradicated plants to dry in place on the surface of the soil. Mow in late winter to early spring when inflorescences are formed but are still within the sheath. Several return visits to a site should be done to eliminate new plants.
Prescribed Burning	Prescribed burning is a cost-effective method to reduce germination of seeds lying on the soil surface. Burn in late spring to ensure seed kill. A second-year management strategy must be incorporated as germination may increase the year after due to increased fertility and light penetration.
Herbicides	A nonselective herbicide has been the primary option for effective treatment of jointed goatgrass. Consider using glyphosate as a spot treatment or as a broadcast spray. Glyphosate is advantageous compared to other nonselective herbicides because it allows reseeding shortly after spraying. Apply glyphosate to actively growing plants before the seedheads develop within the sheath.
Seeding Competitive Species	Plan to reseed after removal of jointed goatgrass with desirable native plants that will directly compete for soil moisture, light, nutrients, and space.
Sources: DiTomaso et al. 2013b, USDA 2017b.	

4.8 Diffuse Knapweed Treatment

Diffuse knapweed is an annual, biennial, or short-lived perennial, winter-hardy plant that can grow 1 to 3.5 feet tall. Diffuse knapweed has many spreading branches giving it a tangled ball-shaped form and a tumble-weed mobility when broken allowing a far range for seed dispersal. Flowering occurs from June through October, producing anywhere from 5 to 900 seeds per plant. Diffuse knapweed reproduces solely through seeds, which can remain viable in the soil for many years (Winston et al. 2015).

Diffuse knapweed is spread through the movement of seed-contaminated hay, wind, wildlife, water, or motorized equipment. It is essential to prevent the spread by ensuring avenues of contaminants are identified and eradicated whenever possible (Winston et al. 2015).

Weed control methods used to manage diffuse knapweed consist of herbicides, biological control, grazing, and mechanical strategies. Thirteen knapweed biocontrol species are permitted for release in the U.S. Below two are listed as viable options based on habitat and compatibility with other treatment methods. A combination of control methods should be used when managing diffuse knapweed (Winston et al. 2015). Table 11 lays out the methods of treatments and the timing of those treatments.

Table 11. Treatment Methods and Timing for Diffuse Knapweed

Treatment Method	Treatment Timing
Biological Control	Lesser knapweed weevil *(Larinus minutus*): Overwinter in soil litter. Adults feed on the leaves of rosettes and flowering plants, outer stem tissue, and flowers. Larvae feed on developing seeds. UV knapweed seedhead fly (*Urophora quadrifasciata*): Females lay up to 120 eggs within closed seedheads. Larval feed on receptacle tissue directly destroying seeds. Feeding induces the formation of galls which drain nutrients from plant.
Grazing	Rosettes of diffuse knapweed are readily grazed by sheep and goats. Spring and fall grazing can be effective at reducing flower production and density of young plants. Overgrazing must be avoided to prevent conditions that will facilitate diffuse knapweed growth. Life stages of biological control agents must be taken into consideration when grazing.
Mechanical Control	Hand pull or hoe small populations persistently. Remove as much of the root as possible and remove all plant parts to prevent seed dispersal. Mow frequently during the growing season as close to the ground surface as possible before plant is producing seed. A single mowing treatment does not injure the root system allowing plants to resprout. Mowing is recommended prior to fall herbicide application. If applying biological control agents avoid mowing during spring and early summer.
Herbicides	Best used on small patches or on edges of large infestations to prevent spreading. Apply when foliage first emerges in the spring or during the fall when plants are storing reserves for winter.
Seeding Competitive Species	Revegetation is best used in combination with other control tactics since diffuse knapweed is a strong competitor. Perennial grasses provide significant competition to knapweed species. Growing taprooted forbs along with grasses increases ground cover and may be more effective in minimizing invasion of diffuse knapweed than grasses only.
Sources: Winston et al. 2015.	

4.9 Spikeweed Treatment

Spikeweed (also known as common tarweed) is an summer annual broadleaf plant native to California. Part of the Asteraceae family, it can range from 4 inches up to 4 feet tall. It is found along roadways, grasslands, seasonal wetlands, cultivated fields, disturbed areas and in alkali soils. Spikeweed has tall ridged branches with sticky glandular hairs, and spines. Flowering occurs from July through September. Spikeweed can only reproduce through seed, falling and germinating close to the parent plant. Seeds can remain viable in the soil for 3 to 5 years. Weed control methods used to manage spikeweed consist of herbicides, grazing, and mechanical strategies (DiTomaso et al. 2013c). Table 12 lays out the methods of treatments and the timing of those treatments.

Table 12. Treatment Methods and Timing for Spikeweed

Treatment Method	Treatment Timing
Biological Control	There are no known biological controls.
Grazing	Seedlings of spikeweed are readily grazed by sheep in the winter or spring when still succulent. Grazing can be effective at reducing flower production and density of young plants. Overgrazing must be avoided to prevent conditions that will facilitate spikeweed growth.
Mechanical Control	Hand pull or hoe small populations persistently. Remove as much of the root as possible and remove all plant parts to prevent seed dispersal. Tillage in late spring may be effective at control.
Herbicides	Best used on small patches or on edges of large infestations to prevent spreading. Apply pre-emergent in winter such as Aminocyclopnachlor+ Chlorsulfuron or post-emergent such as 2,4-D in the spring to rosettes prior to bolting.
Seeding Competitive Species	Revegetation is best used in combination with other control tactics since diffuse knapweed is a strong competitor. Perennial grasses provide significant competition to spikeweed species. Growing taprooted forbs along with grasses increases ground cover and may be more effective in minimizing invasion of spikeweed than grasses only.
Sources: DiTomaso et al. 2013c.	

4.10 Cereal Rye Treatment

Cereal rye is a domestic annual, occasionally biennial grass that is problematic for wheat producers in the inland northwest. Cereal rye is part of the Poaceae family, growing up to 40 inches tall with upright, hollow stems. Cereal rye has a blueish green color, seen in wheat fields, grows faster and taller that wheat under the same conditions. It exhibits early germination, between mid-February and April, making it capable of utilizing limited spring soil moisture in arid conditions. Cereal rye can only reproduce from seeds, which can remain viable in the soil for 1 year and only retain 5 percent viability after 2 years. Each plant can produce anywhere from 100 to over 900 seeds. Cereal rye can be seen growing in wheat fields, roadsides, field edges and range land. The best controls for cereal rye are prevention of contamination and manually removing plants before going to seed.

There are no herbicides specifically for the control of cereal rye but non-selective, post-emergent herbicides can be effective (DiTomaso et al. 2013d).

Since cereal rye relies primarily on high seed production and seedling emergence for population growth, management of these life stages will be the most effective. Due to a short-lived seed bank, yearly removal of any plants can eradicate infestations (DiTomaso et al. 2013d). Table 13 lays out methods and timing of various available treatments for cereal rye.

Table 13. Treatment Methods and Timing for Cereal Rye

Treatment Method	Treatment Timing
Grazing	Cereal rye can provide good livestock forage in early spring. Grazing will not kill the plant and may not control infestations.
Mechanical Control	Dig or hand pull to control smaller populations.
Herbicides	Mow before flowering to prevent seed production. Revisit sites for continued treatment to ensure there is no regrowth.
Seeding Competitive Species	Apply nonselective herbicides as a post- emergent. Some herbicide resistance.
Sources: DiTomaso et al. 2013d.	

5.0 References

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ESTERSON Sarah * ODOE

From: Sarah.ESTERSON@energy.oregon.gov
Subject: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

From: Corey Sweeney <mcweed@co.morrow.or.us>
Sent: Wednesday, December 6, 2023 1:04 PM
To: Casler, Jennifer <JCasler@haleyaldrich.com>; Walters, Tim <TWalters@haleyaldrich.com>; ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>
Cc: KILSDONK Duane * ODOE <duane.kilsdonk@energy.oregon.gov>; Woodhouse, Kevin <KWoodhouse@haleyaldrich.com>
Subject: RE: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

That looks great Tim. I love the sampling goals!

Corey Sweeney

MORROW COUNTY WEED COORDINATOR

541-240-1743
MCWEED@CO.MORROW.OR.US
PO BOX 428 – LEXINGTON OR

From: Casler, Jennifer <JCasler@haleyaldrich.com>
Sent: Wednesday, December 6, 2023 8:25 AM
To: Walters, Tim <TWalters@haleyaldrich.com>; ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>; Corey Sweeney <mcweed@co.morrow.or.us>
Cc: KILSDONK Duane * ODOE <duane.kilsdonk@energy.oregon.gov>; Woodhouse, Kevin <KWoodhouse@haleyaldrich.com>
Subject: RE: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

[EXTERNAL EMAIL] - STOP and VERIFY - This message came from outside of Morrow County Gov

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Thanks for the follow up, Tim!

Jennifer A. Casler, RG, PG
Client Leader/Senior Associate Geologist

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From: Walters, Tim <TWalters@haleyaldrich.com>
Sent: Tuesday, December 5, 2023 11:51 PM
To: ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>; Corey Sweeney <mcweed@co.morrow.or.us>
Cc: KILSDONK Duane * ODOE <duane.kilsdonk@energy.oregon.gov>; Casler, Jennifer <JCasler@haleyaldrich.com>; Woodhouse, Kevin <KWoodhouse@haleyaldrich.com>
Subject: RE: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

Hi,
Just following up on our call – I expanded some of the thoughts that we discussed.

The plan looks good but it was light on monitoring and monitoring goals. I would suggest setting an approximate area of minimum plot coverage, I will throw out a minimum of 200 sq. meters per acre of disturbed ground will be quantitatively sampled using randomly selected plots. The rest of the disturbed area (area not sampled quantitatively by the plots) will be qualitatively sampled through meander surveys for noxious weeds. This can be conducted concurrently with the treatment of noxious weeds within the disturbed area. Any noxious weed found within the larger qualitatively sampled area that was not recorded within the quantitatively sampled area will be added to the quantitatively sampled area as a value of 0.01 percent coverage. Noxious weeds would be the only species recorded within the qualitatively sampled areas. (unless you would want to add federally or state-listed rare species). Erosional areas will also be recorded in this area.

Sampling Needs:
Plots will be quantitively sampled by a qualified botanist/ecologist. The percent cover of every species of vascular plant will be identified within the plots. Reference plots would not be needed.

Sampling Goals:
Class A noxious weeds = no greater than 0% percent coverage
Total noxious weeds (Class A & B combined) will be less than 10% cover
Native cover (includes grasses, forbs and shrubs native to the county using USDA plants website) = no less than 50% cover
Bare ground (lacking cryptograms & live vascular vegetation) shall be no greater than 10% coverage.
Invasive graminoids: Less than…..? (we didn't talk about this one – can definitely leave out)

These are typical or comparable requirements/goals that the Oregon Department of State Lands would require for wetland mitigation. Happy to discuss more!

Tim

Timothy L. Walters, PhD, PWS, CSE
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From: ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>
Sent: Wednesday, November 29, 2023 1:03 PM
To: Corey Sweeney <mcweed@co.morrow.or.us>; Walters, Tim <TWalters@haleyaldrich.com>
Cc: KILSDONK Duane * ODOE <duane.kilsdonk@energy.oregon.gov>; Casler, Jennifer <JCasler@haleyaldrich.com>
Subject: FW: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

CAUTION: External Email

Hi Corey and Tim,

Are you available next week to briefly discuss the attached monitoring/treatment plan provided by NextEra for WREFI and II? If you have time to review/comment, please do; and if there are dates/times next week that work for you, please propose some dates and we will get a discussion on the books.

Thank you!

From: Thomsen, Charles <Charles.Thomsen@nexteraenergy.com>
Sent: Tuesday, November 21, 2023 3:52 PM
To: Corey Sweeney <mcweed@co.morrow.or.us>; ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>; KILSDONK Duane * ODOE <Duane.KILSDONK@energy.oregon.gov>
Cc: Lehn, Jana <Jana.Lehn@nexteraenergy.com>; Horne, Clay <Clay.Horne@nexteraenergy.com>; Cambier, Matt <matt.cambier@tetratech.com>; Oosterhuis, Lynda <LYNDA.OOSTERHUIS@tetratech.com>; Mike Brosnan <brosnanm19@yahoo.com>
Subject: Weed Monitoring and Treatment Plan for Wheatridge 1 & 2

Team,

Here is our 2024 plan. Hope everyone has a good Thanksgiving.

Corey/Sarah/Duane,

Please let me know if you have any questions or concerns.

Thanks

Charles Thomsen,
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Attachment 3: Biglow Canyon Wind Farm

- Draft Amended Habitat Mitigation Plan (new attachments)
- ODOE and ODFW Review Comments

BIGLOW CANYON WIND FARM: HABITAT MITIGATION PLAN

[MAY 10, 2007, UPDATED JANUARY 2024]

I. Introduction

This Habitat Mitigation Plan (plan) describes methods and standards for enhancement of an area of land near the Biglow Canyon Wind Farm (BCWF) to mitigate for certain impacts of the facility on wildlife habitat.[1] The applicant has proposed a habitat mitigation area of approximately 117 acres as described below. The certificate holder shall enhance the mitigation area as described in this plan and shall place the area into a conservation easement for the life of the facility.[2]

The objective of the enhancement methods is to improve the habitat value of the mitigation area and to protect the area for wildlife use for the life of the facility. This plan has been prepared to guide the habitat enhancement efforts within the mitigation area. The plan specifies the primary actions the certificate holder must undertake and the goals, monitoring procedures, and success criteria to evaluate enhancement success.

Prior to any construction of the BCWF, the site certificate holder shall acquire the legal right to create, maintain and protect the habitat mitigation area for the life of the facility by means of an outright purchase, conservation easement or similar conveyance and shall provide a copy of the documentation to the Oregon Department of Energy (Department). Prior to any construction of the BCWF, the site certificate holder shall complete an "Implementation Plan" approved by the Department that describes in detail how the Habitat Mitigation Plan will be carried out. During the first phase of construction of the BCWF, the site certificate holder shall begin to implement this plan so that all of the specific enhancement methods described in Section VII are in place by the end of construction of that first phase.

II. Description of the Permanent Impacts

The BCWF would permanently affect a maximum of about 178 acres. Most of the area of permanent impact (about 167 acres) would be within currently cultivated agricultural fields or other developed land. This area is lower-value habitat (Category 6). The BCWF would occupy – or have a permanent impact on – a maximum of about 11.93 acres of higher-value Category 3 or Category 4 habitat. The actual area of each habitat category that the BCWF will permanently occupy will depend on the final design layout of the facility after consideration of micrositing factors.

Data collected at other wind energy facilities indicate that the operation of wind turbines may adversely affect the quality of nearby habitat that is important or essential for grassland avian species. This is often referred to as a "displacement" impact. Conducting a study at the BCWF site to determine whether operation of the facility had a displacement effect on grassland birds would take several years. If the study concluded that an adverse impact had occurred, additional mitigation would be needed. In lieu of conducting a multi-year study, the certificate

[1] This plan is incorporated by reference in the site certificate for the BCWF and must be understood in that context. It is not a "stand-alone" document. This plan does not contain all mitigation required of the certificate holder.
[2] As used in this plan, "life of the facility" means continuously until the facility site is restored and the site certificate is terminated in accordance with OAR 345-027-0110.

holder has proposed to provide additional mitigation, based on the assumed likelihood that operation of the facility would reduce the quality of nearby habitat that is important or essential for grassland bird species. The affected habitat near the BCWF wind turbines includes grassland, Conservation Reserve Program (CRP) and shrub-steppe habitat in Categories 3 and 4.

As defined by the fish and wildlife habitat mitigation goals and standards of the Oregon Department of Fish and Wildlife (ODFW), the affected habitat and corresponding mitigation goals are as follows:

- **Category 3:** Essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population.

  Mitigation Goal: No net loss of either habitat quantity or quality. Mitigation must be in-kind.

- **Category 4:** Important habitat for fish and wildlife species.

  Mitigation Goal: No net loss in either existing habitat quantity or quality. Mitigation may be either in-kind or out-of-kind.

III. Calculation of Impacts and Size of Mitigation Area

The area needed to mitigate for the amount of higher-value habitat occupied by the BCWF turbines and related facilities is determined by the facility's permanent impact within each habitat category. The amount of additional area needed to mitigate for a displacement effect that is uncertain cannot be precisely calculated. To determine a reasonable area for displacement mitigation, the applicant has performed a rough calculation of potential displacement impact by assuming a 50-percent reduction in use by grassland birds within 50 meters of wind turbines in native grassland/shrub steppe habitat and a 25 percent reduction in use by grassland birds within 50 meters of wind turbines in CRP habitat.[3] The applicant further assumed that the final design locations of wind turbines within the micrositing corridors would be such that the maximum area of native grassland would be affected (the "worst case"). The area of impact within each affected habitat category and the corresponding mitigation area for each category are as follows:

- The permanent impact is about 11.93 acres, of which about 8.41 acres are Category 3 habitat (grassland, CRP and shrub-steppe combined) and about 3.52 acres are Category 4 habitat (grassland, CRP and shrub-steppe combined).

- The calculated potential displacement impact is estimated to be about 33 acres, of which about 67 percent is Category 3 CRP habitat, 2 percent is Category 3 grassland/shrub steppe habitat, 26 percent is Category 4 CRP habitat, and 4 percent is Category 4 grassland/shrub steppe habitat.[4]

- The combined impacts equal about 45 acres. Mitigation must be sufficient to replace the quantity and quality of this combined impact in order to achieve "no net loss" in habitat quantity or quality. The mitigation area must be large enough

[3] The method of determining a reasonable mitigation area as described in this plan is not intended to be a precise formula or a precedent for determining appropriate mitigation for any other facility.
[4] Percentages based on information from Wally Erickson, WEST, Inc., in a personal communication with Tom Meehan, consultant for the Department, during the review of the site certificate application.

to be capable of achieving this goal. The certificate holder has secured a 117-acre mitigation area, based on the understanding that mitigation acreage that exceeds the actual acreage of permanent and indirect impacts may be applied to any future mitigation requirements (this "mitigation banking" is discussed in Section IX).

If the data from transect surveys at the Stateline Wind Project demonstrates a statistically significant displacement effect on grassland bird species that is greater than the displacement effect described in the *Stateline Wind Project Wildlife Monitoring Final Report, July 2001-December 2003*, then the certificate holder shall assume that the BCWF is having a greater displacement effect on grassland species than was assumed when the site certificate was issued and shall propose additional mitigation. The Department shall recommend appropriate mitigation to the Council, and the certificate holder shall implement mitigation as approved by the Council.

IV. Description of the Mitigation Site

The mitigation site is located to the northeast of the BCWF, less than 0.5 miles from the John Day River and just more than 0.5 miles from the nearest wind turbine. The site contains an intermittent spring that forms a small tributary drainage immediately west of the Emigrant Springs tributary and watershed.

Thus, the mitigation site sits immediately adjacent to both the John Day River riparian corridor and the large Emigrant Springs watershed, which provides additional forage, thermal and security cover, and water. No road access exists to the site, which is relatively remote and infrequently disturbed by humans.

The site is predominantly steep-sloped with shallow rocky soils and has been both recently and historically grazed. Areas most degraded from livestock grazing include the deeper soiled areas and the spring and associated riparian draw in the southern end of the mitigation site. Horizontal and vertical vegetative structure is largely depleted because of exposed slopes and livestock grazing impacts, and large patches of cereal rye have out-competed native species in some areas. However, the higher elevation western border consists of deeper silt loam soils, with the potential to provide a more diverse vegetative community.

Adjacent property to the west is cultivated and managed for wheat production. Adjacent property to the north and east is rangeland managed for livestock production. A four-strand barbed wire fence exists along the east boundary of the mitigation site. No fence exists along the crop field boundary to the east or along the north boundary; this area is grazed when fallow or electric fence is used during the planting and harvest period to exclude livestock. The area around the spring source and downstream lacks a vegetative buffer or a diverse vegetative community because of intensive grazing. Some tall sagebrush cover exists near the stream area while cattails and aquatic succulents occur in the spring source area.

Given the current condition of the site and livestock practices, the entire mitigation site is generally characterized as Category 4 habitat, according to ODFW's Habitat Mitigation Standards.

V. Site Potential for Wildlife Habitat Enhancement

For mitigation, the applicant has proposed entering into a conservation easement or similar agreement with two landowners to enhance the mitigation site's existing grassland,

shrub-steppe and riparian habitat for the life of the BCWF facility. The mitigation site presents the opportunity to enhance grassland and shrub-steppe habitat quality and quantity that is limited in the area for wildlife. Properly managed, the mitigation site has the potential to provide more diverse grassland in greater quantity with greater horizontal and vertical structure. If enhanced with reseeding, deeper soiled areas would provide better nesting habitat for grassland bird species and provide higher quality forage for big game. Excluding livestock with fencing would provide better fall, winter and early spring rangeland for big game by allowing Sandberg bluegrass, bluebunch wheatgrass, and various forbs to grow undisturbed in shallow-soiled slopes. Removal of cattle grazing should improve the habitat quality of the entire site and especially the deeper-soiled, spring and riparian areas. The site's steeper areas also will see some benefit from reduced grazing, especially during early spring green-up. As well, livestock exclusion would enhance summer habitat for ground-nesting birds.

The mitigation site also has the potential to provide several different quality ecotones.[5] Grassland patches in the lower-elevation eastern portion of the site may be of greater suitability to long-billed curlews because of closer proximity to the John Day River, where observations of this species breeding have been documented.

VI. Proposed Enhancement

To mitigate for the permanent loss of 11.93 acres of Category 3 and Category 4 habitat as a result of BCWF turbines, roads and other facilities, the site certificate holder will reseed 11.93 acres of deep-soiled Category 4 habitat within the mitigation site along the upper, more level slopes adjacent to cultivated areas. Reseeding is expected to improve about 11.93 acres of deep-soiled Category 4 habitat to a quality of Category 2 or Category 3 grassland habitats.

To mitigate for the displacement effect, the site certificate holder will install fences to remove livestock grazing from the 117-acre mitigation site. In combination with other actions described below, fencing is expected to improve most of the portion of the mitigation site that is not reseeded (about 105 acres) from Category 4 to at least Category 3 habitat.

The acreages stated above for maximum permanent and indirect displacement habitat impacts (*i.e.*, 11.93 acres and 33 acres, respectively, or a total of about 45 acres) are based on construction of the entire BCWF facility as approved under the site certificate. If only a portion of the BCWF facility is constructed, the maximum permanent and indirect displacement habitat impacts are expected to be less than 45 acres. Nevertheless, as part of the first phase of construction, the certificate holder has proposed to secure the entire 117-acre mitigation site, install the guzzler, enhance the spring area, and have the fencing installed to exclude livestock on the entire mitigation site. If only a portion of the BCWF facility is constructed and full build-out does not occur, then any enhanced mitigation acreage that exceeds the actual acreage of permanent and indirect habitat impacts may be applied to any future mitigation requirements, as outlined in the Wildlife Mitigation and Monitoring Plan and subject to approval by the Department.

[5] An "ecotone" is a transitional zone between ecological communities.

VII. Habitat Enhancement Methods

The goal of habitat enhancement is to improve the habitat quality of the mitigation site to achieve, over time, a Category 3 quality over most of the site and a mix of Category 2 and Category 3 on 11.93 reseeded acres. The site certificate holder will use the following five methods to enhance habitat quality and quantity on the site:

1. Reseeding

The site certificate holder shall prepare and seed about 11.93 acres within two defined areas located along the western edge of the mitigation site.[6]

A. Seed Mixture: At the recommendation of ODFW, the seed mixture in Table 1 was updated in 2022. This update was made because of marginal improvements in desirable vegetation at the seeding sites. The 2022 Updated Seeding Area Plan and Schedule is in Appendix C of the Habitat Mitigation Implementation Plan, and it includes a summary of the vegetation efforts at the mitigation area and the revised proposed enhancement actions. ~~The site certificate holder developed a seed mixture in consultation with Mary Beth Smith at the local United States Department of Agriculture Natural Resources Conservation Service office based on anticipated high value to both big game and non-game wildlife and the historic vegetative climax community for the area (Table 1).~~ If the seed mix proposed in Appendix C is revised in the future, ~~Prior to seeding~~, the site certificate holder shall consult with the Department to determine if any mixture adjustments, either in species composition or ratio of seed quantity among species, would further benefit wildlife.

B. Seed Planting Methods: If enhancement efforts occur in the winter or spring, seeding should occur sometime in February through early April, after the average last frost date. If enhancement efforts occur after the spring seeding window, seeding should occur sometime in October through November. Disturbed, unseeded ground may require chemical or mechanical weed control in May or June before weeds go to seed. In general, a weed-free seedbed should be prepared using conventional tillage equipment. Herbicide should be sprayed to control weedy and/or noxious species, following Oregon Department of Agriculture's (ODOA) guidelines. Summer fallowing may be required. Areas to be seeded shall be disked as needed in early spring and spot-sprayed on the ground each time with an herbicide. In some instances, disking the site may not be needed prior to seeding. Simply preparing a weed-free site using herbicide treatments may be all that is necessary. The disked and sprayed areas must then be harrowed prior to seeding. A conventional seed drill must be used, except in areas where a rangeland drill is deemed more applicable, with a spacing less than 12 inches and at a depth of 1/8-1/4 inch. A packing type roller must be used to properly compact the soil over the planted seed. The prescribed seed mixture (Table 1) must be drilled at a rate of 12 pounds pure live seed per acre. If an area is to be fallowed to increase soil moisture content, then the same procedure must be followed, but without seeding. Seeding would then occur the following spring.

[6] These two areas are identified in PGE's Habitat Mitigation Implementation Plan, February 2007, Appendix A.

~~Table 1. Seed mixture to be used for reseeding deeper soiled areas of the mitigation site.~~		
~~Common Name~~	~~Scientific Name~~	~~Pounds/ Acre[7]~~
~~Luna pubescent wheatgrass~~	~~*Thinopyrum intermedium*~~	~~1~~
~~Sherman big bluegrass~~	~~*Poa ampla*~~	~~1~~
~~Magnar basin wildrye~~	~~*Leymus cinereus*~~	~~1~~
~~Whitmar beardless wheatgrass~~	~~*Pseudoroegneria spicata* ssp. *Inermis*~~	~~2~~
~~Small burnett~~	~~*Sanguisorba minor*~~	~~0.5~~
~~Alfalfa~~	~~*Medicago sativa*~~	~~1~~
~~Sanfoin~~	~~*Psoralea onobrychis*~~	~~0.5~~
~~Sandberg bluegrass~~	~~*Poa secunda*~~	~~2~~
~~Idaho fescue~~	~~*Festuca idahoensis*~~	~~2~~
~~Basin big sagebrush~~	~~*Artemisia tridentata* ssp. *Tridentate*~~	~~1~~
~~TOTAL~~		~~12~~

Table 1. Seed mixture for reseeding deeper soiled areas of the HMA, recommended by ODFW, 2022.

Common Name	Scientific Name	Pounds PLS/ Acre[1]
'Whitmar' beardless wheatgrass	*Pseudoroegneria spicata* ssp. *Inermis*	2
'Pryor' slender wheatgrass	*Elymus trachycaulus*	1.5
Idaho fescue	*Festuca idahoensis*	1.5
'Magnar' basin wildrye	*Leymus cinereus*	1
'Sherman' big bluegrass	*Poa secunda* ssp. *juncifolia*	1
Alfalfa	*Medicago sativa*	1
Sandberg's bluegrass	*Poa secunda* ssp. *secunda*	1
Bottlebrush squirreltail	*Elymus elymoides*	1
Sainfoin	*Psoralea onobrychis*	0.5
Small burnett	*Sanguisorba minor*	0.5
Western Yarrow	*Achillea millefolium*	0.1
TOTAL		**11.1**

[1]Double rate for broadcast seeding.

~~[7] Pure live seed.~~

2. Weed Control

Large patches of nuisance weed species have out-competed native species in some areas of the mitigation site. The site certificate holder shall conduct eradication or control of nuisance weed species with measures approved by the Department.

3. Livestock Control

The site certificate holder shall fence the entire unfenced portion of the mitigation site to control and remove cattle grazing on the mitigation site. Over 9,200 feet of new fence will be installed following ODFW livestock fence specifications. The existing fence (4-strand barbed wire) located on the eastern edge of the project area and along a small 600 feet section running east/west along a portion of the northern border of the agricultural field will continue in use to the extent it remains effective in keeping cattle out of the mitigation site.

4. Creation of a Water Source

The site certificate holder shall create a water source for wildlife use in the northern end of the project area where no water source now exists. The site certificate holder will build and install a 500-gallon capacity cistern or "guzzler" using a design approved by ODFW and the Department. The new source of water should increase wildlife density in the mitigation site.

5. Spring Enhancement

The site certificate holder shall plant appropriate native species of woody shrubs near the source of the intermittent spring in the southern part of the site. Browse protection shall be provided as long as necessary. Over time, the shrubs will provide cover for wildlife as well as protect soils around the spring source.

VIII. Habitat Mitigation Implementation

Prior to the commencement of construction of the BCWF facility, the site certificate holder shall complete a Department-approved detailed implementation plan to guide implementation of the enhancement methods. The implementation plan shall include maps and photographs at appropriate scale and detail that show the topography, vegetation, habitat and other site conditions of the mitigation site; the proposed locations of the primary actions required by the mitigation plan; a schedule showing when the primary actions required in the mitigation plan will occur; and a proposed monitoring plan including monitoring protocols, locations of monitoring stations, and a schedule of monitoring actions. The implementation plan will take into consideration the physical and biological features of the mitigation site such as slope, soil depth, and existing habitat conditions, the appropriate time of year to conduct actions, and the appropriate sequence of actions. The purpose of the implementation plan is to describe details of applying the enhancement methods. The implementation plan is subject to the conditions of the site certificate and the requirements contained in this Habitat Mitigation Plan as amended from time to time.

The certificate holder shall not begin enhancement efforts until the Department has reviewed and approved the implementation plan. Enhancement methods must be carried out according to the schedule included in the implementation plan. The certificate holder shall take all actions necessary to implement the Habitat Mitigation Plan, including ongoing maintenance of the guzzler and fencing.

IX. Monitoring

1. Qualifications

For all components of this plan, the site certificate holder shall direct a qualified biologist, approved by the Department, to perform monitoring tasks (the "investigator"). The Department has approved the qualifications of the four biologists identified in the Final Order on Amendment #2. The certificate holder may select other qualified biologists to perform the monitoring tasks, subject to Department approval.

2. Reporting Schedule and Duration/Type of Monitoring

The site certificate holder shall provide an annual report discussing the investigator's findings and recommendations regarding habitat mitigation progress and success to the Department and ODFW. The site certificate holder shall include this report as part of the annual report on the BCWF or as otherwise agreed between the site certificate holder and the Department. The site certificate holder shall monitor the mitigation site for the life of the Biglow facility.

For the reseeded areas, the investigator will monitor every year for the first five years after the first seeding or until the area is determined by the Department to be trending toward successful habitat enhancement. Thereafter, the investigator shall revisit the reseeded areas every five years for the life of the BCWF facility. The certificate holder shall report the investigator's findings to the Department.

The investigator also shall monitor as necessary:

- Once a year for the life of the project: The effectiveness of weed eradication and control efforts throughout the mitigation site;
- Minimum of once a year for the life of the project and within one week of livestock turn-out on adjacent property: The effectiveness of fencing in excluding livestock from and allowing big game access to the mitigation site;
- Minimum of annual monitoring for the life of the project: The effectiveness of the new water source in providing water;
- Once a year for the life of the project: The effectiveness of enhancement actions for the spring area in providing improved cover for wildlife and reducing erosion near the spring source;
- Once a year for the life of the project: The overall condition of the mitigation site (including, for example, the degree of erosion, the occurrence of weed concentrations and changes in habitat quality); and
- Once a year for the life of the project: The general level of wildlife use, especially grassland birds, within the mitigation site.

In addition, the inspector shall periodically categorize the entire mitigation site in terms of ODFW habitat categories. The certificate holder shall propose a schedule for monitoring to the Department and shall conduct monitoring as approved by the Department.

3. Success Criteria

Permanent Impacts

The enhancement goal for the permanent impact of the BCWF facility is met when 70 percent of the 11.93-acre reseeded area (about 8.4 acres) is Category 2 habitat, the remaining 30 percent is Category 3 habitat and undesirable plant species (weeds) and erosion are under control and do not pose concern. If more than 8.4 acres of the reseeded area has been improved to Category 2 quality, those additional acres may be "credited" toward mitigation for other impacts upon Department approval.

Displacement Effects

Within the remainder of the mitigation area, consisting of 105.07 acres (117 acres less the 11.93 acres needed to mitigate for permanent impacts), the certificate holder shall provide mitigation for displacement effects. The enhancement goal for the displacement effects is met when:

- The habitat quality within at least 33 acres has been improved from Category 4 to Category 3 habitat or better and at least 23 acres (70 percent) of this improved area has the characteristics of established grassland and shrub-steppe plant communities.
- The condition of the rest of the land within the mitigation area does not pose a threat to maintaining habitat quality of the improved area.

Mitigation Banking

Within the remainder of the mitigation area, consisting of 72.07 acres (117 acres less 44.93 acres needed to mitigate for permanent impacts and displacement effects), the acres that the certificate holder improves from Category 4 to Category 3 habitat or better may be "credited" toward mitigation for other impacts, as outlined in the Wildlife Monitoring and Mitigation Plan, upon Department approval. To use any of the improved acres for mitigation, at least 70 percent of the area used must have the characteristics of established grassland and shrub-steppe plant communities.

Specific Success Criteria

Specific success criteria are as follows:

A. **Reseeded Areas:** A reseeded area is successfully enhanced when total canopy cover of all vegetation exceeds 30 percent and at least 25 percent of the ground surface is covered by desirable plant species. Desirable plant species are native species or desirable non-native species in the approved mitigation seed mix. After the above success criteria have been met (predominantly desirable vegetation has been established), the investigator shall verify, during subsequent visits, that the site continues to meet the success criteria for habitat enhancement. In addition, the investigator, in consultation with ODFW, shall evaluate the percentage of the reseeded site that has been enhanced to Category 2 and Category 3 quality.

   If all or part of the habitat within the reseeded area falls below the enhancement success criteria levels, the investigator shall recommend corrective measures. The Department may require reseeding or other corrective measures in those areas that do not meet the success criteria.

B. **Weed control:** Weed control is successful when weed species are eliminated or reduced to a level (based on considerations such as number, size and health of plants, and percent ground cover) that does not interfere with the goals of the mitigation plan. To meet success criteria, reseeding with seed approved by the Department may be necessary.

C. **Fencing**: Fencing is successful when the Department deems that fencing has been properly constructed according to ODFW specifications and continues to be effective at excluding livestock from entering the mitigation site. This criterion includes existing fencing.

D. **New Water Source**: The new water source is successful when the Department deems that the water source has been properly constructed according to ODFW specifications and continues to provide a reasonably reliable source of water for wildlife.

E. **Spring Area Enhancement**: Enhancement of the spring area is successful when appropriate native species of woody shrubs are planted, continue to grow, and provide cover for wildlife.

4. Corrective Measures

If mitigation and enhancement actions fail to meet the success criteria, the investigator shall recommend corrective measures for Department approval. The Department may require reseeding or other corrective measures for those areas and for those actions that do not meet the success criteria.

5. Success Criteria Rationale

The direct ("footprint") habitat impact of the BCWF is about 12 acres (11.93 acres). The proportion of the impact is about 70 percent Category 3 habitat and about 30 percent Category 4 habitat. To mitigate for this habitat loss requires the improvement of about 12 acres of Category 4 grassland within the mitigation area so that 70 percent becomes Category 2 grassland and 30 percent becomes Category 3 grassland. In addition, successful mitigation requires the protection of the improved habitat for the life of the facility.

The calculated potential grassland bird displacement impact is estimated to be about 33 acres. The proportion of the impact is about 70 percent Category 3 habitat (about 23 acres) and about 30 percent Category 4 habitat (about 10 acres). To mitigate for the Category 3 component of this habitat impact requires enhancing about 23 acres of current Category 4 habitat to Category 3 grassland habitat. To mitigate for the Category 4 component requires enhancing about 10 acres from Category 4 to Category 3 (this area need not be grassland habitat).

The total size of the mitigation area is 117 acres. Mitigation for the footprint impact requires about 12 acres, which leaves about 105 acres in the habitat mitigation site. Mitigation for the displacement impact requires about 33 acres, which leaves about 72 acres beyond the minimum land area needed to achieve successful mitigation for the impacts described in this plan. This 72 acres may be used for additional mitigation in the future, if the success criteria described above in Section 3 are met.

X. Amendment of the Plan

This Habitat Mitigation Plan may be amended from time to time by agreement of the certificate holder and the Oregon Energy Facility Siting Council ("Council"). Such amendments may be made without amendment of the site certificate. The Council authorizes the Department to agree to amendments to this plan. The Department shall notify the Council of all amendments, and the Council retains the authority to approve, reject or modify any amendment of this plan agreed to by the Department.

Habitat Mitigation Plan Attachments:

Spring Site Plan

Seeding Plan

Biglow Canyon Wind Farm
Habitat Mitigation Area
2022 Updated Seeding Area Plan and Schedule

SITE HISTORY

Consistent with the Habitat Mitigation Plan for Biglow Canyon Wind Farm (BCWF), a 12-acre portion of the 117-acre BCWF mitigation area was seeded during the fall of 2007 to establish predominantly native vegetation (EFSC 2008, PGE 2008). Due to the existing seed bank at the seeding site, the first post-seeding growing season was dominated by feral cereal rye (*Secale cereale*). In addition, the entire mitigation area burned during a wildfire in July 2008. The fire removed all vegetation including accumulations of duff, leaving behind bare mineral soil. In response to Oregon Department of Fish and Wildlife's (ODFW) concern that post-fire vegetation would again be dominated by cereal rye, a new Post-Fire Seeding Plan and Schedule was developed in consultation with ODFW in late 2008 (PGE 2009). The plan was intended to address the cereal rye seed bank through herbicide applications for 2-3 years followed by seeding desirable species to establish native vegetation. The plan was implemented between 2009 and 2011. Monitoring from 2012-2016 showed only a marginal improvement in the density of desirable species within the seeding area. In response, a new seeding plan was developed in 2017 (PGE 2018). The plan included an additional post-emergence chemical treatment of the cereal rye followed by another seeding attempt. Hydroseeding was recommended if site access was feasible, and timing could be coordinated with wheat crop production. The seeding site was chemically treated in spring 2019 and broadcast seeded in November 2019. Hydroseeding was not possible due to production in the adjacent wheat field limiting access to the seeding site. Monitoring between 2020 and 2022 shows only a marginal increase in desirable vegetation at the seeding site (PGE 2021).

In August 2022, PGE biologists visited the seeding site with Jeremy Thompson from ODFW. Although pockets of desirable vegetation exist within the seeding site, the consensus was that the repeated herbicide treatments may have done more harm than good by damaging native vegetation and the desirable seed bank, while allowing more open space for cereal rye to establish. Two new pre-emergent winter annual selective herbicide formulations, Open Range® G (granular imazapic) and Rejuvra® (indaziflam), have come on the market since 2019 and have already proven effective at long-term control of invasive annual grasses. It was decided that, given these new tools, another attempt should be made to treat the cereal rye and establish native vegetation. This updated plan lays out adaptive management steps to achieve the seeding area goals of the BCWF Habitat Mitigation Plan.

PROPOSED ACTION

Two objectives should be addressed to accomplish the goal of establishing a predominantly native plant community at the seeding site. The first objective is reduction of the existing cereal rye seed bank. The second objective is to promote the establishment of desirable species.

Reduction of the Seed Bank

Cereal rye is persistent and widespread throughout the Columbia Plateau, producing large seeds that remain viable in the soil for approximately three years. PGE plans to inhibit rye seed germination in the seeding area using selective herbicide treatments. PGE considered two chemical formulations, Open Range® G and Rejuvra®, for treating the feral rye. Rejuvra® was ultimately selected based on its well documented success on cereal rye during chemical treatment trials in Colorado and the plant's inclusion on the specimen label. Open Range® G may be effective at controlling cereal rye but its use is not documented nor does the plant appear on the specimen label. Open Range® G also requires proprietary application equipment, making it far more expensive to apply.

Rejuvra® is a newly developed pre-emergent herbicide that controls undesirable annual vegetation, including cereal rye and cheatgrass, for 2-4 years with just one application (Sebastian 2017). Established perennial vegetation benefits from an increase in water and nutrients, gaining a foothold during this period. The undesirable seed bank is also reduced during this interval. When cereal rye is present, a follow-up application is usually needed between two and three years. Due to the higher recommended concentration of Rejuvra® needed to control cereal rye, it should not be applied more than once in a 12-month period (Bayer 2020). For this reason, if areas of cereal rye emerge in the treatment area in the first spring, those areas will be selectively treated (chemically or mechanically) to prevent reseeding. Rejuvra® has a minimum 8-month plant back interval in rangeland and CRP areas. It is most effective at promoting desirable vegetation when applied in areas with some desirable vegetation established at the time of treatment. Trials in Colorado showed indaziflam also helped establish desirable vegetation when applied to sites with a monoculture of annual grasses that were drill-seeded nine months after treatment (Clark 2022).

A single application of Rejuvra® (7oz/acre) will be applied in fall 2022, using a fixed boom with flat fan nozzles, calibrated to deliver 20 gallons/acre. If the treatment is applied before cereal rye and cheatgrass emerge, Rejuvra® will be mixed with Efficax®, a soil adjuvant. If the treatment is applied after cereal rye and cheatgrass germinate, Rejuvra® will be mixed with Plateau® (imazapic) and MSO surfactant. If cereal rye emerges in the first spring after treatment, it will be selectively treated with glyphosate (weed wiper or backpack sprayer) or a mechanical roller-crimper. A follow-up indaziflam application will likely be needed between two and three years, depending on the persistence of the seed bank. Although indaziflam has been used successfully in other regions of the country to treat feral rye in rangeland and CRP areas, its effectiveness is not well documented in the Columbia Plateau. Therefore, this project will serve as a chemical trial for its use within the ecoregion.

Establishment of Desirable Species

The response of native and desirable vegetation to the first-year treatment(s) will dictate the methods used to establish additional desirable vegetation at the site. This is because

the degree of disturbance necessary should be scaled to the amount of desirable vegetation present after the first growing season.

In areas where established desirable vegetation should not be heavily disturbed, the seed mix (Table 1) will be broadcast on the site at a rate of 22 pounds pure live seed (PLS) per acre, lightly harrowed, and roller packed where possible to enhance seed-to-soil contact. The seeding will be completed in October or November to take advantage of winter/spring precipitation to increase the germination rate. Fall seeding is based on planting as soon as possible after the minimum 8-month plant back interval for Rejuvra®.

In areas where little desirable vegetation exists, the site will be disked and harrowed prior to seeding. A conventional or rangeland seed drill, whichever is more appropriate for the site, will be used to seed the mix, with a spacing of less than 12 inches and a depth of 1/8- to 1/4-inch. A roller packer will be used where feasible, to enhance seed-to-soil contact. The seed mix will be drilled at a rate of 11 pounds PLS per acre.

In addition to seeding, supplemental plantings and noxious weed treatments will be used to promote successful establishment of native vegetation. Rooted stock of Basin big sagebrush (*Artemesia tridentata* ssp. *tridentata*) and/or antelope bitterbrush (*Purshia tridentata*), depending on availability, will be planted throughout the seeding area. Class A and B noxious weeds will be spot treated using backpack sprayers throughout the HMA, including within the seeding area, to reduce competition and prevent further weed establishment. Noxious weeds known to exist in the HMA include rush skeletonweed, diffuse knapweed, field bindweed and Russian thistle. Rejuvra® provides long-term control of diffuse knapweed and Russian thistle (Bayer 2020).

Monitoring

The BCWF Habitat Mitigation Plan includes monitoring requirements and success criteria for the seeding site. The monitoring protocol outlined in the Mitigation Plan still applies and will be conducted on an annual basis until success criteria is met (ESFC 2008). The seeding site will be considered successful when the total canopy cover of the site exceeds 30% with at least 25% of the total cover is desirable species. Visual monitoring will be conducted between October and April to assess new annual grass germination, which will inform the need for and timing of follow-up herbicide or mechanical treatments. Seeding success monitoring using established transects and photo points will begin the fall after seeding is conducted and continue until seeding area objectives have been met.

Table 1. Seed mixture for reseeding deeper soiled areas of the HMA, recommended by ODFW, 2022.

Common Name	**Scientific Name**	**Pounds PLS/ Acre[1]**
'Whitmar' beardless wheatgrass	*Pseudoroegneria spicata* ssp. *Inermis*	2
'Pryor' slender wheatgrass	*Elymus trachycaulus*	1.5
Idaho fescue	*Festuca idahoensis*	1.5
'Magnar' basin wildrye	*Leymus cinereus*	1
'Sherman' big bluegrass	*Poa secunda* ssp. *juncifolia*	1
Alfalfa	*Medicago sativa*	1
Sandberg's bluegrass	*Poa secunda* ssp. *secunda*	1
Bottlebrush squirreltail	*Elymus elymoides*	1
Sainfoin	*Psoralea onobrychis*	0.5
Small burnett	*Sanguisorba minor*	0.5
Western Yarrow	*Achillea millefolium*	0.1
TOTAL		**11.1**

[1]Double rate for broadcast seeding.

Figure 1. Photo showing cereal rye response to indaziflam (right) compared to control area (left) at Indian Creek, CO (DJ Sebastian, Bayer Environmental Science, personal communication).

REFERENCES:

Bayer Environmental Science. 2020. Rejuvra® specimen label. <https://www.assets.envu.com/-/media/prfunitedstates/documents/resource-library/product-labels/rejuvra-herbicide.ashx>. Accessed 6 Oct 2022.

Clark SL, et al. 2022. Evaluating winter annual grass control and native species establishment following applications of indaziflam on rangeland. *Invasive Plant Science and Management* 13: 199-209.

EFSC 2008. Biglow Canyon Wind Farm Final Order on Amendment #3: Habitat Mitigation Plan. Biglow Canyon Wind Farm. Oregon Energy Facility Siting Council, Salem, OR.

PGE. 2008. Biglow Canyon Wind Farm 2007 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

PGE. 2009. Biglow Canyon Wind Farm 2008 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

PGE. 2018. Biglow Canyon Wind Farm 2017 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

PGE. 2022. Biglow Canyon Wind Farm 2021 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

Sebastian DJ, et al. 2017. Indaziflam: a new cellulose-biosysthesis-inhibiting herbicide provides long-term control of invasive winter annual grasses. *Pest Management Science* 10: 2149-2162.

Biglow Canyon Wind Farm
Habitat Mitigation Area
2022 Updated Spring Site Enhancement Plan and Schedule

SITE HISTORY

The 117-acre Biglow Canyon Wind Farm (BCWF) Habitat Mitigation Area (HMA) is predominately steep-sloped, with shallow rocky soils, and was grazed prior to PGE assuming management (PGE 2008). The area around the spring source, as well as downstream, lacked a vegetative buffer or diverse vegetative community because of past intensive grazing. When the Habitat Mitigation Plan was written, the entire mitigation site was generally characterized as Category 4 habitat, according to Oregon Department of Fish and Wildlife's (ODFW) Habitat Mitigation Standards. The Plan directs the site certificate holder to plant appropriate native species of woody shrubs near the source of the intermittent spring, located in the southern part of the site, and provide browse protection for as long as necessary. The goal is to provide cover for wildlife, as well as protect soils around the spring source (EFSC 2008).

Consistent with the Habitat Mitigation Plan for Biglow Canyon Wind Farm, the small spring site was planted with 50 shrubs during the spring of 2007 to promote woody shrub establishment and prevent erosion at the spring site (PGE 2008). The entire mitigation area burned during a wildfire in July 2008, killing most of the vegetation at the spring site, including pre-existing and planted shrubs. In spring 2009, an additional 50 shrubs were planted at the spring site to replace those that burned. Annual monitoring of the planting site was conducted between 2010 and 2014. In 2014, it was determined that all shrub plantings had failed. During a site visit with ODFW (Jeremy Thompson and Chase Brown) in fall 2013, ODFW recommended planting hybrid poplar thinking it might grow in the limited soils where other plantings had failed. In late 2014, 30 hybrid poplar were planted on the small bench above the waterline. Monitoring between 2015 and 2017 indicated that all plantings had again failed (PGE 2018).

Following multiple failed plantings at the site, PGE biologists concluded that the area immediately around the spring may not be suitable for riparian tree and shrub establishment. The spring is on a bedrock shelf, limiting soil depth and rooting medium. Banks surrounding the spring are steep, limiting the riparian species planting area to a narrow strip along the wetted edge.

CURRENT SITE CONDITION

Cattle exclusion fencing around the entire HMA has helped prevent erosion and degradation at the spring site and the area is healing from past grazing pressure and disturbance. The established vegetation at the spring site continues to expand year after year, as is evident in the photo record. This vegetation is functionally holding the site, preventing erosion and degradation. The dominant species is marsh hedge-nettle (*Stachys palustris*), which is expanding at the site annually. Reed canarygrass (*Phalaris arundinacea*) and broadleaf cattail (*Typha latifolia*), which are restricted to the perennially wetted spring, are also found at the site (Figure 2). However, this existing vegetation is not providing as much vertical diversity and cover as native woody shrub species would.

The adjacent, north-facing slope has pockets of established sagebrush and rabbitbrush, which are providing some vertical structure and are used by wildlife for cover. This creates an opportunity for expanding native woody shrub establishment adjacent to the small spring site, which would achieve the desired goals.

PROPOSED ACTION

To promote further establishment of native woody species on the slope adjacent to the spring site, PGE plans to plant the hillslope, in areas currently lacking a shrub component, with rooted stock of native woody shrub species including Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and antelope bitterbrush (*Purshia tridentata*). Both species are beneficial to ground-nesting birds and big game as cover and forage. PGE also proposes planting Great Basin wild rye (*Leymus cinereus*), thickspike wheatgrass (*Elymus trachycaulus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) restoration plugs between shrubs to promote bunchgrass diversity, add more vertical diversity, and reduce feral cereal rye (*Secale cereale*) between shrubs. Availability of rooted stock from native plant nurseries will determine which species are planted each year. Limitations for planting shrubs and grasses near the spring site include competition with cereal rye and cheatgrass (*Bromus tectorum*) for water and nutrients, seasonally arid conditions, and browsing.

To address competition by invasive annual grasses, 6-ft. by 100-ft. strips of landscape fabric will be installed and secured to block annual grass photosynthesis. These strips will be prepped for planting by mowing the cereal rye and clearing accumulated plant material from the soil. All desirable native vegetation within the strips will be retained and pulled through the landscape fabric. Rooted stock will be planted, using dibble bars, through small holes cut in the landscape fabric. Planting density will vary by species and stock availability, but shrubs will be planted approximately five feet apart and bunchgrasses will be planted between shrubs.

To address the seasonal lack of moisture while rooted stock is establishing, PGE will install a 900-gallon to 1500-gallon water tank and gravity drip system to seasonally irrigate individual plants throughout the first one to two growing seasons. The water tank will be refilled as needed, likely every 3-4 weeks, during the irrigation season. The irrigation system will be controlled by a solar- or battery- powered timer valve. If the head-pressure is insufficient, a small solar-powered pump will be installed.

Six strips will be installed, planted, and irrigated in year one (3,600 feet of growing space). If the irrigation system can support more plantings, additional strips will be installed following the first growing season. All plantings will be wrapped to provide browse protection. This system, including drip lines and planting runs, will be replicated across the hillslope as plants are established and no longer require supplemental watering. The plantings will be concentrated in three areas (Figure 1). Area 1 will be established first; Area 2 will be established after Area 1 is complete since it will require moving the irrigation runs 350-700 feet from the water tank; Area 3 will be established after Area 2 since the irrigation runs will have to be moved up to 1000 feet from the water tank.

In addition to this system, any excess planting stock will be planted upslope of the wetted spring along the bench. There is some rabbitbrush establishment in this area and sufficient moisture for these plants to establish, provided there is enough rooting medium for them. These species often grow within floodplains or terraces and, if successful, will help create additional vertical structure and cover where shallow soils will not support deep-rooted riparian vegetation.

MONITORING

Photo points will continue to be monitored annually. The following photo points specifically show the spring site and planting area:

- BCPP01A
- BCPP01B
- BCPP02
- BCPP10
- BCSD04
- Establish additional photo points as needed

In addition, the drip irrigation system will be monitored at least twice per month while operating during the growing season, to ensure it is functioning properly and to monitor the water level in the tank. This will be especially important in the first year or two as maintenance and functionality may require the system or timing to be modified. Plantings will be spot-checked while being irrigated to ensure they are not desiccated or browsed. Plant survival monitoring will be completed annually until plants are well established and runs will be replanted as needed to ensure establishment. Browse protection will be provided until plants are well established.

Annual monitoring results and effectiveness of enhancement actions for the spring area in providing improved cover for wildlife and reducing erosion near the spring source will be included in the annual report to Oregon Department of Energy. In accordance with the BCWF Habitat Mitigation Plan, enhancement of the spring area will be considered successful when appropriate native species of woody shrubs are planted, continue to grow, and provide cover for wildlife (EFSC 2008).

Figure 1. Area adjacent to spring site showing location of water tank (blue) and three proposed planting areas.

Figure 2. Photopoint #2 showing vegetation at the spring site, October 2022.

REFERENCES:

EFSC 2008. Biglow Canyon Wind Farm Final Order on Amendment #3: Habitat Mitigation Plan. Biglow Canyon Wind Farm. Oregon Energy Facility Siting Council, Salem, OR.

PGE. 2008. Biglow Canyon Wind Farm 2007 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

PGE. 2018. Biglow Canyon Wind Farm 2017 Annual Report. Biglow Canyon Wind Farm. Portland General Electric Environmental Services, Portland, OR.

From:	THOMPSON Jeremy L * ODFW
To:	Leah Hough
Subject:	RE: Biglow - updated plans for review
Date:	Tuesday, January 10, 2023 9:37:33 AM

Yes, those two look good.

From: Leah Hough <Leah.Hough@pgn.com>
Sent: Tuesday, January 10, 2023 9:31 AM
To: THOMPSON Jeremy L * ODFW <Jeremy.L.THOMPSON@odfw.oregon.gov>
Subject: RE: Biglow - updated plans for review

Thanks Jeremy! You reviewed the seeding plan and spring site plan also, correct? Just want to be sure before they are sent along to ODOE for approval.

Leah Hough Wildlife Biologist | 541-325-0978

From: THOMPSON Jeremy L * ODFW <Jeremy.L.THOMPSON@odfw.oregon.gov>
Sent: Monday, January 9, 2023 1:23 PM
To: Leah Hough <Leah.Hough@pgn.com>
Subject: RE: Biglow - updated plans for review

One small recommendation, the rest looks good. Sorry for my delay in reviewing, it had buried itself in the inbox..

Thanks!

Jeremy

From: Leah Hough <Leah.Hough@pgn.com>
Sent: Monday, January 9, 2023 1:03 PM
To: THOMPSON Jeremy L * ODFW <Jeremy.L.THOMPSON@odfw.oregon.gov>
Subject: FW: Biglow - updated plans for review

Hey Jeremy,

Just circling back on this to see if you've had a chance to review. I told Lenna Cope to let ODOE know the plans are with you for review and that you're spread thin. No rush, just making sure this doesn't get lost in the mix.

Thanks,

Leah Hough
Wildlife Biologist | Portland General Electric
726 SW Lower Bend Rd., Madras, OR 97741
541-325-0978 | Leah.Hough@pgn.com

From: Leah Hough
Sent: Friday, November 18, 2022 1:53 PM
To: THOMPSON Jeremy L ODFW <Jeremy.L.THOMPSON@odfw.oregon.gov>
Subject: Biglow - updated plans for review

Hi Jeremy,

I've attached the drafts of the site visit summary, seeding plan, and spring plan for your review. I'll send the Rejuvra info I have in a separate email.

Thanks for you help with this project!

Leah Hough
Wildlife Biologist | Portland General Electric
726 SW Lower Bend Rd., Madras, OR 97741
541-325-0978 | Leah.Hough@pgn.com

SLOAN Kathleen * ODOE

From: SLOAN Kathleen * ODOE
Sent: Monday, March 20, 2023 9:07 AM
To: Lenna Cope
Cc: ESTERSON Sarah * ODOE
Subject: ODOE review of HMP update for Biglow Wind Project

Hi Lenna,

ODOE has completed its review of the reseeding and site plan prepared in 2022 for work to be initiated in spring of 2023. The information supplements and updates information as required in the Oct. 2008 Habitat Mitigation Plan, specific to the enhancement efforts at the Habitat Mitigation Area (HMA). The plan documents the coordination with Oregon Department of Fish and Wildlife (ODFW) and is consistent with the plan requirements for coordination with ODFW on the habitat enhancement efforts. It includes information from a 2022 site visit with PGE and ODFW to discuss the enhancement measures to be attempted in 2023 and is reflective of ODFW input to ODOE on that site visit. In the future, please include ODOE in site visit opportunities when they are related to mitigation efforts as part of site certificate compliance.

Based upon that information, and a review of the plans submitted, the Department is requesting that you to submit as a request to amend the current HMP with the changes (plans) are included as an attachment (versus incorporated/integrated into the requirements of the plan that have already been implemented). You can use a similar approach as used for the Coyote facility).

Our recommendation/comment is that PGE consider monitoring the reseeding progress more than the required 1 year interval to see if it can be determined why all past efforts at reseeding appear to be unsuccessful in meeting the success criteria, after several years of effort to do so. The Department would recommend more frequent monitoring after reseeding efforts are implemented this year. If the site continues to be unsuccessful in meeting the success criteria (A) and (B) for enhancement actions 1 (reseeding) and 2 (weed control) as outlined in the HMP, we may need to consider other options, additional acreage, or sites, for achieving success.

Let me know if you have any questions,

OREGON DEPARTMENT OF ENERGY
Kathleen Sloan
Senior Siting Analyst
550 Capitol St. NE | Salem, OR 97301
P: 971-701-4913
Stay connected!

State of Oregon: Facilities - Energy Facility Siting

Attachment 4:

- Certificate Holder's Alternative Mitigation Proposal
- ODFW Review Comments
- Draft Amended WMMP

Brookfield
Renewable U.S.

Memo

To:	Sarah Esterson and Duane Kilsdonk, Oregon Department of Energy
From:	Jonathan Kirby, Brookfield Renewable
Cc:	Dan Perry and Matt Carson, Brookfield Renewable Partners
Date:	November 17, 2023
Subject:	**Shepherds Flat Central: Proposed Raptor Mitigation Alternatives**

SFC Central Proposed Raptor Mitigation Alternatives

This memo provides a brief proposal of raptor mitigation alternatives to the current mitigation practice of planting juniper trees at the Shepherds Flat Central (SFC) facility in Arlington, OR.

Project Background

Shepherds Flat Central (SFC) completed construction of a 116 turbine wind farm that became commercially operational in 2012. As required in the project's Site Certificate and associated WMMP, two years of post-construction avian fatality monitoring was conducted in 2013 and 2014. After review of post-construction monitoring (PCM) survey results and projected raptor fatality rates, ODOE and ODFW determined that an exceedance of raptor fatalities had occurred, primarily Swainson's hawk (SWHA) and ferruginous hawk (FEHA), thereby requiring the project proponent to implement mitigation measures specific to raptor habitat enhancement.

In addition to the PCM requirements, long-term raptor nest monitoring is conducted within the project boundary every five years, with the next survey scheduled for 2026.

ODFW Sensitive Species

Both SWHA and FEHA are classified as "sensitive species" by the ODFW and both are included in the Oregon Conservation Strategy as part of its goal to conserve fish and wildlife. ODFW's definition of "Sensitive" refers to "…fish and wildlife that are facing one or more threats to their populations and/or habitats…" and that "Implementation of appropriate conservation measures to address existing or potential threats may prevent them from declining to the point of qualifying for threatened or endangered status."

Furthermore, the ODFW uses the Sensitive Species List along with the Oregon Conservation Strategy to "…promote and guide conservation actions…" that are "…designed to encourage voluntary efforts that will improves species' status." Some conservation actions listed in the ODFW Frequently Asked Questions section of their website include:

• monitoring populations to detect either positive or negative changes in populations;

• conducting further research to identify threats and methods to address the threats;

• educating people about what these species need to persist and what actions people can take to assist in species' conservation.

• partnering with land management agencies to maintain, improve, and restore habitat;

• providing technical expertise, incentives, and recognition to landowners who provide habitat;

• creating cooperative agreements with assurances for private landowners who provide habitat;

• cooperatively incorporating species' needs into activities that could negatively affect them; and

• bringing together land managers, researchers, and other people to share information.

SFC Mitigation

In response to the PCM fatality exceedance after the 2013 and 2014 PCM surveys, SFC would implement mitigation measures (or conservation actions) to provide a conservation benefit to raptors. SFC has worked with ODOE and ODFW and committed to providing additional mitigation measures as described in the 2016 second amended Wildlife Mitigation and Monitoring Plan (WMMP):

(h) Additional Mitigation

Two years of monitoring showed an exceedance of the threshold of concern for the raptor group. The Department determined that mitigation is appropriate. Certificate holder proposed mitigation measures, and consulted with the Department and ODFW with respect to their design and implementation. Therefore certificate holder shall:

1) Amend the SFC Habitat Mitigation Plan to include tree planting and monitoring.

2) Install bird flight diverters, pole-to-pole, on the transmission line segments adjacent to turbines 372 and 332. The diverters shall be of the same type and at the same spacing as those installed at other locations in the facility.

3) Contribute $1,000 annually to the Rowena Wildlife Clinic (or equivalent rehabilitation facility approved by the Department and ODFW). Such contributions shall continue for the life of the facility.

Within 30-days of approval of the amended WMMP, the certificate holder shall provide to the Department an implementation schedule for measures (h)(2) and (3). The implementation schedule shall specify timing of purchase and installation of the bird flight diverters and schedule of fund disbursement to the rehabilitation clinic.

Condition 1 required that the Habitat Management Plan to be amended which included the following:

<u>Nesting Habitat:</u> In order to increase raptor nesting opportunities, the certificate holder shall plant at least five juniper trees, each at least three feet in height, in locations proposed by the certificate holder and approved by ODFW. Tree site selection will be based upon criteria as approved by the Department in consultation with ODFW. Plantings may be within or outside of the HMA. Within 30-days of approval of the amended HMP, the certificate holder shall provide a schedule to the Department specifying mitigation implementation dates such as timing of site identification, site/criteria evaluation, agency review and approval, tree purchase and planting, and monitoring.

SFC Mitigation Assessment

The amended plan originally accounted for at least 5 juniper trees to be planted, at a minimum of 3 ft in height. SFC included 3 plantings at 5 different sites near the SFC windfarm for a total of 15 juniper trees to provide a net benefit to ferruginous and Swainson's hawk. In addition to the tree plantings, the SFC site has been providing annual funding to the Rowena Wildlife Rehabilitation Clinic.

After monitoring the juniper tree plantings for the last 3 years, there has been little success in growth. Consulting monitors have observed issues with plant growth success, e.g., protective mesh wiring missing, plants that have been foraged or removed and plants that exhibit slow growth in dry, desert conditions. Currently, 5 of the 15 tree plantings have failed, with only 3 seasons of recordable observations.

Brookfield
Renewable U.S.

SFC Mitigation Alternative Options

After site visits with ODOE and its consulting botanist, there was consensus that an alternative plan to juniper tree planting be proposed to provide more efficient use of raptor mitigation funding and time.

SFC has reviewed alternate mitigation measures, discussed potential options with ODOE and has reviewed the ODFW "Sensitive Species" actions. Based on the Oregon Conservation Strategy's recommendations for conservation actions, SFC is proposing the following as an alternative to juniper tree planting:

- Increasing annual funding to the Rowena Wildlife Clinic that will work towards the protection and care of sensitive raptor species in the Columbia River Basin. Additional funds could be used for raptor rehabilitation facilities, supporting any captive breeding programs or for facility staffing that would provide a direct benefit to raptors.

Funding

Currently, as part of the amended WMMP that includes the juniper tree planting, SFC pays $1000/year to Rowena Wildlife Clinic. In lieu of tree planting, SFC will increase this annual payment amount to a total of $2000/year. This was calculated based on the initial costs incurred during the initial tree planting and nursing/monitoring efforts over the last 3 years. Based on this spend, SFC considers an additional $1000/year for the next 20 years, while the project is commercially operational, to pay Rowena Wildlife Clinic an equitable amount to address conservation actions under the Oregon Conservation Strategy for sensitive species.

SFC will continue to partner with Rowena Wildlife Clinic in raptor rehabilitation efforts and further discuss the increase in funding contributions.

ESTERSON Sarah * ODOE

From: Sarah.ESTERSON@energy.oregon.gov
Subject: Shepherds Flat Central Mitigation - Follow Up

From: SOMERS Lindsay N * ODFW <Lindsay.N.Somers@odfw.oregon.gov>
Sent: Thursday, November 30, 2023 10:23 AM
To: ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>
Cc: CHERRY Steve P * ODFW <Steve.P.CHERRY@odfw.oregon.gov>
Subject: RE: Shepherds Flat Central Mitigation - Follow Up

Hi Sarah,

Sorry about the late reply, the proposed alternative mitigation looks acceptable on our end. If the money can be used directly to benefit/release raptors it will likely have short term benefits if an injured raptor can be successfully released and continue to reproduce. Even though the juniper planting was deemed unsuccessful, Steve would like to see the already planted junipers monitored to some extent (annually?) to ensure they are not removed by landowners or cut down unnecessarily. The trees may still provide benefit to raptors if they continue to grow.

Lindsay

From: Kirby, Jonathan <Jonathan.Kirby@brookfieldrenewable.com>
Sent: Friday, November 17, 2023 2:21 PM
To: ESTERSON Sarah * ODOE <Sarah.ESTERSON@energy.oregon.gov>; KILSDONK Duane * ODOE <Duane.KILSDONK@energy.oregon.gov>; Walters, Tim <twalters@haleyaldrich.com>; Perry, Daniel <Daniel.Perry@brookfieldrenewable.com>
Cc: SOMERS Lindsay N * ODFW <Lindsay.N.Somers@odfw.oregon.gov>
Subject: RE: Shepherds Flat Central Mitigation - Follow Up

Hi Sarah,

Please find attached the proposal for alternative raptor mitigation at the Shepherds Flat Wind site.

If any questions, please let us know.

Thank you,

-Jon

Jonathan Kirby
Senior Manager, Compliance and ESG

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Brookfield
Renewable U.S.

Shepherds Flat Central: Amended Wildlife Monitoring and Mitigation Plan

[~~REVISED December 2022~~January 2024]

This plan describes wildlife monitoring that the certificate holder shall conduct during operation of Shepherds Flat Central (SFC)[1]. The monitoring objectives are to determine whether the facility causes significant fatalities of birds and bats and to determine whether the facility results in a loss of habitat quality.

SFC consists of up to 116 wind turbines, two non-guyed meteorological (met) towers, a substation and other related or supporting facilities as described in the site certificate. The permanent facility components occupy a combined area of up to 72 acres[2]. The affected habitat lies within a micrositing area of approximately 11,769 acres.

The certificate holder shall use experienced and properly trained personnel (the "investigators") to conduct the monitoring required under this plan. The professional qualifications of the investigators are subject to approval by the Oregon Department of Energy (Department). For all components of this plan, the certificate holder shall hire independent third party investigators (not employees of the certificate holder) to perform monitoring tasks. The monitoring will be performed in a manner that minimizes agricultural crop loss and interference with agricultural and ranching activities.

The Wildlife Monitoring and Mitigation Plan for SFC has the following components:

1. Fatality monitoring program including:
    - Removal trials
    - Searcher efficiency trials
    - Fatality search protocol
    - Statistical analysis
2. Washington ground squirrel colony assessment
3. Raptor nest monitoring
4. Ongoing monitoring, reporting and handling of wildlife injuries and fatalities
5. Avian Collision Fatality Risk Mitigation (RFA2)
6. Post-repowering avian and bat fatality monitoring program including:

[1] This plan is incorporated by reference in the site certificate for SFC and must be understood in that context. It is not a "stand-alone" document. This plan does not contain all mitigation required of the certificate holder.
[2] Estimates of the area that the facility components would occupy are shown in Tables 3 and 4 of the Final Order on Amendment #1.

- Standardized carcass searches;
- Carcass persistence trials;
- Searcher efficiency trials; and
- Data analysis and fatality estimation.

Based on the results of the monitoring programs, mitigation of significant impacts may be required. The selection of the mitigation actions should allow for flexibility in creating appropriate responses to monitoring results that cannot be known in advance. If the Department determines that mitigation is needed, the certificate holder shall propose appropriate mitigation actions to the Department and shall carry out mitigation actions approved by the Department, subject to review by the Oregon Energy Facility Council (Council).

1. Fatality Monitoring

a) Definitions and Methods

Seasons

This plan uses the following dates for defining seasons:

Season	Dates and Duration
Spring	March 16 to May 15 (2 months)
Summer	May 16 to August 15 (3 months)
Fall Migration	August 16 to October 31 (2.5 months)
Winter	November 1 to March 15 (4.5 months)

Schedule

The investigators shall perform fatality monitoring for two years for each phase of construction. For each phase of construction, the first monitoring year will begin one month after the beginning of commercial operation of that phase; the second monitoring year will begin directly following the first year.

In each monitoring year, the investigators shall conduct fatality monitoring searches at the rates of frequency shown below. Over the course of one monitoring year, the investigators will conduct 16 searches, as follows:

Season	Dates and Duration
Spring	2 searches per month (4 searches)
Summer	1 search per month (3 searches)
Fall	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

Search Plots

The investigators shall conduct fatality monitoring within search plots. The certificate holder, in consultation with the investigators and the Oregon Department of Fish and Wildlife (ODFW), shall select search plots based on a systematic sampling design that ensures that the selected search plots are representative of the habitat conditions in different parts of the site.

Each search plot will contain one turbine. Search plots will be circular. Circular search plots will be centered on the turbine location and will have a radius equal to the maximum blade tip height of the turbine contained within the plot. "Maximum blade tip height" is the turbine hub-height plus one-half the rotor diameter. The certificate holder shall provide maps of the search plots to the Department before beginning fatality monitoring at the facility. The investigators shall use the same search plots for each search conducted during a single monitoring year.

Sample Size

The sample size for fatality monitoring is the number of turbines searched per phase per monitoring year. For each phase of construction, the investigators shall search a representative sample of the turbines that are built in that phase, according to the following schedule:

Number of Turbines Built	Sample Size: First Year	Sample Size: Second Year
50 to 116	50	50
Less than 50	All turbines	All turbines

If 50 to 116 turbines are built in a phase, the investigators shall search a different representative sample of 50 turbines in the second year, to the extent possible based on the total number of turbines built.

b) Removal Trials

The objective of the removal trials is to estimate the length of time avian and bat carcasses remain in the search area. Estimates of carcass removal rates will be used to adjust carcass counts for removal bias. "Carcass removal" is the disappearance of a carcass from the search area due to predation, scavenging or other means such as farming activity.

The investigators shall conduct carcass removal trials within each of the seasons defined above during the years in which fatality monitoring occurs. For each trial, the investigators shall use 10 to 15 carcasses of small, medium and large-bodied species[3]. Trial carcasses shall be placed at least 1,000 feet from any search plots and distributed proportionately within habitat categories and subtypes similar to the search plots.

The investigators shall use game birds or other legal sources of avian species as test carcasses for the removal trials, and the investigators may use carcasses found in fatality monitoring searches. The investigators shall select species with the same coloration and size attributes as species found

[3] To reduce the combined number of carcasses used in the removal trials and searcher efficiency trials. these trials may be coordinated with similar trials for SFN and SFS if the trials take place in the same year and after consultation with ODFW and approval by the Department.

within the site boundary. If suitable trial carcasses are available, trials during the fall season will include several small brown birds to simulate bat carcasses. Legally obtained bat carcasses will be used if available.

Trial carcasses will be marked discreetly for recognition by searchers and other personnel. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (e.g., thrown over the shoulder), 2) hidden to simulate a crippled bird (e.g., placed beneath a shrub or tuft of grass) or 3) partially hidden. The planted carcasses will be located randomly within the carcass removal trial plots.

Trial carcasses will be left at the location until the end of the carcass removal trial. An approximate schedule for assessing removal status is once daily for the first 4 days, and on days 7, 10, 14, 21, 30 and 45. This schedule may be adjusted depending on actual carcass removal rates, weather conditions and coordination with the other survey work. The condition of scavenged carcasses will be documented during each assessment, and at the end of the trial all traces of the carcasses will be removed from the site. Scavenger or other activity could result in complete removal of all traces of a carcass in a location or distribution of feathers and carcass parts to several locations. This distribution will not constitute removal if evidence of the carcass remains within an area similar in size to a search plot and if the evidence would be discernable to a searcher during a normal survey.

Before beginning removal trials for the second year of fatality monitoring, the certificate holder shall report the results of the first year removal trials to the Department and ODFW. In the report, the certificate holder shall analyze whether four removal trials per year, as described above, provides sufficient data to accurately estimate adjustment factors for carcass removal. The number of removal trials for the second year of fatality monitoring may be adjusted up or down, subject to the approval of the Department.

c) Searcher Efficiency Trials

The objective of searcher efficiency trials is to estimate the percentage of bird and bat fatalities that searchers are able to find. The certificate holder shall conduct searcher efficiency trials on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated agriculture habitat types. A pooled estimate of searcher efficiency will be used to adjust carcass counts for detection bias.

The investigators shall conduct searcher efficiency trials within each of the seasons defined above during the years in which the fatality monitoring occurs. Each trial will involve approximately 40 carcasses (approximately 160 carcasses per year). The searchers will not be notified of carcass placement or test dates. The investigators shall vary the number of trials per season and the number of carcasses per trial so that the searchers will not know the total number of trial carcasses being used in any trial.

For each trial, the investigators shall use small, medium and large-bodied species. The investigators shall use game birds or other legal sources of avian species as test carcasses for the efficiency trials, and the investigators may use carcasses found in fatality monitoring searches. The investigators shall select species with the same coloration and size attributes as species found within the site

boundary. If suitable test carcasses are available, trials during the fall season will include several small brown birds to simulate bat carcasses. Legally obtained bat carcasses will be used if available. The investigators shall mark the test carcasses to differentiate them from other carcasses that might be found within the search plot and shall use methods similar to those used to mark removal test carcasses as long as the procedure is sufficiently discreet and does not increase carcass visibility.

The certificate holder shall distribute trial carcasses in varied habitat in rough proportion to the habitat types within the facility site. On the day of a standardized fatality monitoring search (described below) but before the beginning of the search, investigators will place efficiency trial carcasses randomly within search plots (one to three trial carcasses per search plot) within areas to be searched. If scavengers appear attracted by placement of carcasses, the carcasses will be distributed before dawn.

Efficiency trials will be spread over the entire season to incorporate effects of varying weather and vegetation growth. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (thrown over the shoulder), 2) hidden to simulate a crippled bird or 3) partially hidden.

The number and location of the efficiency trial carcasses found during the carcass search will be recorded. The number of efficiency trial carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses. Following plot searches, all traces of test carcasses will be removed from the site.

If new searchers are brought into the search team, additional searcher efficiency trials will be conducted to ensure that detection rates incorporate searcher differences. The certificate holder shall include a discussion of any changes in search personnel and any additional detection trials in the reporting required under Section 6 of this plan.

Before beginning searcher efficiency trials for the second year of fatality monitoring, the certificate holder shall report the results of the first year efficiency trials to the Department and ODFW. In the report, the certificate holder shall analyze whether the efficiency trials as described above provides sufficient data to accurately estimate adjustment factors for carcass removal. The number of removal trials for the second year of fatality monitoring may be adjusted up or down, subject to the approval of the Department.

d) Fatality Monitoring Search Protocol

The objective of fatality monitoring is to estimate the number of bird and bat fatalities that are attributable to facility operation as an indicator of the impact of the facility on habitat quality. The goal of bird and bat fatality monitoring is to estimate fatality rates and associated variances. The certificate holder shall conduct fatality monitoring using standardized carcass searches according to the schedule described above.

Personnel trained in proper search techniques ("the searchers") will conduct the carcass searches by walking parallel transects approximately 20 feet apart within the search plots. A searcher will

walk at a rate of approximately 45 to 60 meters per minute along each transect searching both sides out to three meters for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial.

Searchers shall flag all avian or bat carcasses discovered. Carcasses are defined as a complete carcass or body part, 10 or more feathers, or three or more primary feathers in one location. When parts of carcasses and feathers from the same species are found within a search plot, searchers shall make note of the relative positions and assess whether or not these are from the same fatality.

All carcasses (avian and bat) found during the standardized carcass searches will be photographed, recorded and labeled with a unique number. Searchers shall make note of the nearest two or three structures (turbine, power pole, fence, building or overhead line) and the approximate distance from the carcass to these structures. The species and age of the carcass will be determined when possible. Searchers shall make note of the extent to which the carcass is intact and an estimation of time since death. Searchers shall describe all evidence that might assist in determination of cause of death, such as evidence of electrocution, vehicular strike, wire strike, predation or disease, will be described. When assessment of the carcass is complete, all traces of it will be removed from the site.

Each carcass will be bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be kept with the carcass at all times. For each carcass found, searchers will record species, sex and age when possible, date and time collected, location, condition (e.g., intact, scavenged, feather spot) and any comments that may indicate cause of death. Searchers will photograph each carcass as found and will map the find on a detailed map of the search area showing the location of the wind turbines and associated facilities. The certificate holder shall coordinate collection of state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the U.S. Fish and Wildlife Service (USFWS). The certificate holder shall obtain appropriate collection permits from ODFW and USFWS.

The investigators shall calculate fatality rates using the statistical methods described in Section (f), except that the investigators may use different notation or methods that are mathematically equivalent with prior approval of the Department. In making these calculations, the investigators may exclude carcass data from the first search of each turbine (to eliminate possible counting of carcasses that were present before the turbine was operating).

The investigators shall estimate the number of avian and bat fatalities attributable to operation of the facility based on the number of avian and bat fatalities found at the facility site. All carcasses located within areas surveyed, regardless of species, will be recorded and, if possible, a cause of death determined based on blind necropsy results. If a different cause of death is not apparent, the fatality will be attributed to facility operation. The total number of avian and bat fatalities will be estimated by adjusting for removal and searcher efficiency bias.

On an annual basis, the certificate holder shall report an estimate of fatalities in eight categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors, 5) grassland birds, 6) nocturnal migrants, 7) State

Sensitive Species listed under OAR 635-100-0040 and 8) bats. The certificate holder shall report annual fatality rates on both a per-MW and per-turbine basis.

e) Incidental Finds and Injured Birds

The searchers might discover carcasses incidental to formal carcass searches (e.g., while driving within the project area). For each incidentally discovered carcass, the searcher shall identify, photograph, record data and collect the carcass as would be done for carcasses within the formal search sample during scheduled searches. If the incidentally discovered carcass is found within a formal search plot, the fatality data will be included in the calculation of fatality rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be reported separately. The certificate holder shall coordinate collection of incidentally discovered state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of incidentally discovered federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the USFWS.

The certificate holder shall develop and follow a protocol for handling injured birds. Any injured native birds found on the facility site will be carefully captured by a trained project biologist or technician and transported to a qualified rehabilitation specialist approved by the Department[4]. The certificate holder shall pay costs, if any, charged for time and expenses related to care and rehabilitation of injured native birds found on the site, unless the cause of injury is clearly demonstrated to be unrelated to the facility operations.

f) Statistical Methods for Fatality Estimates[5]

The estimate of the total number of wind facility-related fatalities is based on:

1) The observed number of carcasses found during standardized searches during the two monitoring years for which the cause of death is attributed to the facility[6].
2) Searcher efficiency expressed as the proportion of planted carcasses found by searchers.
3) Removal rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during the entire survey period.

[4] Approved specialists include Lynn Tompkins (wildlife rehabilitator) of Blue Mountain Wildlife. a wildlife rehabilitation center in Pendleton and the Audubon Bird Care Center in Portland. The ce1iificate holder must obtain Department approval before using other specialists.
[5] These statistical methods derived from the *Draft Avian and Bat Monitoring Plan for the Stateline Wind Project*. January 10. 2001 (prepared by FPL Energy. WEST Inc. and Northwest Wildlife Consultants). The present form of the description of statistical methods is based on revisions by the Council in the Klondike III Wildlife Monitoring and Mitigation Plan. June 30. 2006.
[6] If a different cause of death is not apparent, the fatality will be attributes to facility operation.

Definition of Variables

The following variables are used in the equations below:

- c_i the number of carcasses detected at plot i for the study period of interest (e.g., one year) for which the cause of death is either unknown or is attributed to the facility
- n the number of search plots
- k the number of turbines searched (includes the turbines centered within each search plot and a proportion of the number of turbines adjacent to search plots to account for the effect of the adjacent turbines on the search plot buffer area)
- $\bar{c}$ the average number of carcasses observed per turbine per year
- s the number of carcasses used in removal trials
- s_c the number of carcasses in removal trials that remain in the study area after 40 days
- se standard error (square of the sample variance of the mean)
- t_i the time (days) a carcass remains in the study area before it is removed
- $\bar{t}$ the average time (days) a carcass remains in the study area before it is removed
- d the total number of carcasses placed in searcher efficiency trials
- p the estimated proportion of detectable carcasses found by searchers
- I the average interval between searches in days
- $\hat{\pi}$ the estimated probability that a carcass is both available to be found during a search and is found
- m_t the estimated annual average number of fatalities per turbine per year, adjusted for removal and observer detection bias
- C nameplate energy output of turbine in megawatts (MW)

Observed Number of Carcasses

The estimated average number of carcasses ($\bar{c}$) observed per turbine per year is:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{k}. \qquad (1)$$

Estimation of Carcass Removal

Estimates of carcass removal are used to adjust carcass counts for removal bias. Mean carcass removal time ($\bar{t}$) is the average length of time a carcass remains at the site before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s - s_c}. \qquad (2)$$

This estimator is the maximum likelihood estimator assuming the removal times follow an exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at 40 days are collected, yielding censored observations at 40 days. If all trial carcasses are removed before the end of the trial, then s_c is 0, and $\bar{t}$ is just the arithmetic average of the removal times. Removal rates will be estimated by carcass size (small and large), habitat type and season.

Estimation of Observer Detection Rates

Observer detection rates (i.e., searcher efficiency rates) are expressed as p, the proportion of trial carcasses that are detected by searchers. Observer detection rates will be estimated by carcass size, habitat type, and season.

Estimation of Facility-Related Fatality Rates

The estimated per turbine annual fatality rate (m_t) is calculated by:

$$m_t = \frac{\bar{c}}{\hat{\pi}}, \tag{3}$$

Where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and observer detection bias assuming that the carcass removal times t_i follow an exponential distribution. Under these assumptions, this detection probability is estimated by:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I/\bar{t}\right) - 1}{\exp\left(I/\bar{t}\right) - 1 + p} \right]. \tag{4}$$

The estimated per MW annual fatality rate (m) is calculated by:

$$m = \frac{m_t}{C}. \tag{5}$$

The final reported estimates of m, associated standard errors, and 90% confidence intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. For each iteration of the bootstrap, the plots will be sampled with replacement, trial carcasses will be sampled with replacement, and $\bar{c}, \bar{t}, p, \hat{\pi}$ and m will be calculated. A total of 5,000 bootstrap iterations will be used. The reported estimates will be the means of the 5,000 bootstrap estimates. The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 5000 bootstrap estimates are estimates of the lower limit and upper limit of 90% confidence intervals.

Nocturnal Migrant and Bat Fatalities

Differences in observed nocturnal migrant and bat fatality rates for lit turbines, unlit turbines that are adjacent to lit turbines and unlit turbines that are not adjacent to lit turbines will be compared graphically and statistically.

g) Mitigation

The certificate holder shall use a worst-case analysis to resolve any uncertainty in the results and to determine whether the data indicate that additional mitigation should be considered. The

Department may require additional, targeted monitoring if the data indicate the potential for significant impacts that cannot be addressed by worst-case analysis and appropriate mitigation.

Mitigation may be appropriate if fatality rates exceed a "threshold of concern."[7] For the purpose of determining whether a threshold has been exceeded, the certificate holder shall calculate the average annual fatality rates for species groups after two years of monitoring. Based on current knowledge of the species that are likely to use the habitat in the area of the facility, the following thresholds apply to SFC:

Species Group	Threshold of Concern (fatalities per MW)
Raptors (All eagles. hawks. falcons and owls. including burrowing owls.)	0.09
Raptor species of special concern (Swainson's hawk. ferruginous hawk. peregrine falcon. golden eagle. bald eagle. burrowing owl and any federal threatened or endangered raptor species.)	0.06
Grassland species (All native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area. excluding horned lark. burrowing owl and northern harrier.)	0.59
State sensitive avian species listed under OAR 635-100-0040 (Excluding raptors listed above.)	0.2
Bat species as a group	2.5

If the data show that a threshold of concern for a species group has been exceeded, the certificate holder shall implement additional mitigation if the Department determines that mitigation is appropriate based on analysis of the data, consultation with ODFW and consideration of any other significant information available at the time. In addition, the Department may determine that mitigation is appropriate if fatality rates for individual avian or bat species (especially State Sensitive Species) are higher than expected and at a level of biological concern. If the Department determines that mitigation is appropriate, the certificate holder, in consultation with the Department and ODFW, shall propose mitigation measures designed to benefit the affected species. The certificate holder shall implement mitigation as approved by the Department, subject to review by the Council. The Department may recommend additional, targeted data collection if the need for

[7] The Council adopted ..thresholds of concern·· for raptors. grassland species and state sensitive avian species in the Final Order on the Application for the Klondike III Wind Project (June 30. 2006) and for bats in the Final Order on the Application for the Biglow Canyon Wind Farm (June 30. 2006). As explained in the Klondike III order: "Although the threshold numbers provide a rough measure for deciding whether the Council should be concerned about observed fatality rates. the thresholds have a very limited scientific basis. The exceeding of a threshold. by itself. would not be a scientific indicator that operation of the facility would result in range-wide population level declines of any of the species affected. The thresholds are provided in the WMMP to guide consideration of additional mitigation based on two years of monitoring data."

mitigation is unclear based on the information available at the time. The certificate holder shall implement such data collection as approved by the Council.

Mitigation should be designed to benefit the affected species group. Mitigation may include, but is not limited to, protection of nesting habitat for the affected group of native species through a conservation easement or similar agreement. Tracts of land that are intact and functional for wildlife are preferable to degraded habitat areas. Preference should be given to protection of land that would otherwise be subject to development or use that would diminish the wildlife value of the land. In addition, mitigation measures might include: enhancement of a protected tract that is degraded by weed removal and control; increasing the diversity of native grasses and forbs; planting sagebrush or other shrubs; constructing and maintaining artificial nest structures for raptors; improving wildfire response; and conducting or making a contribution to research that will aid in understanding more about the affected species and its conservation needs in the region.

h) Additional Mitigation

Two years of monitoring showed an exceedance of the threshold of concern for the raptor group. The Department determined that mitigation is appropriate. Certificate holder proposed mitigation measures, and consulted with the Department and ODFW with respect to their design and implementation. Therefore, certificate holder shall:

- ~~Amend the SFC Habitat Mitigation Plan to include tree planting and monitoring.~~
- Install bird flight diverters, pole-to-pole, on the transmission line segments adjacent to turbines 372 and 332. The diverters shall be of the same type and at the same spacing as those installed at other location in the facility.
- Contribute $2~~1~~,000 annually to the Rowena Wildlife Clinic (or equivalent rehabilitation facility approved by the Department and ODFW). Such contributions shall continue for the life of the facility.

2. Washington Ground Squirrel Assessment

A qualified professional biologist (investigator) will assess the status of that portion of the Washington ground squirrel (WGS) colony located within the site boundary[8]. The colony located on-site represents a small outpost of the larger complex off-site. It may expand or contract over the survey years as rainfall and vegetation affect the total population of the complex. There should be sufficient data collected before facility components are installed in the colony's vicinity for the investigator to assess natural colony fluctuation.

The investigator shall assess the status of the WGS colony when the squirrels are active (approximately mid-March through May) beginning in the first active period after the effective date

[8] The site ce1iificate application for the SFWF included a baseline assessment of the WGS colony. Weisskopf et al.. Shepherds Flat Washington Ground Squirrel and Burrowing Owl Surveys. May 27. 2007 (App Supp. Exhibit P. Attachment P-5a).

of the site certificate for SFC. The colony will be assessed annually thereafter through the second year after the turbines closest to the WGS colony become commercially operational.

During each assessment, the investigator shall monitor WGS activity to determine the extent of the on-site colony and estimate the number of squirrels present. The investigator shall examine the surroundings for evidence of project-caused conditions that might increase erosion or result in a decline in vegetation quality and adversely affect the colony.

3. Raptor Nest Monitoring

The objectives of raptor nest surveys are: (1) to estimate the size of the local breeding populations of raptor species that nest on the ground or aboveground in trees or other aboveground nest locations in the vicinity of the facility; and (2) to determine whether operation of the facility results in a reduction of nesting activity or nesting success in the local populations of the following raptor species: Swainson's hawk, golden eagle, ferruginous hawk and burrowing owl.

The certificate holder shall conduct short-term and long-term monitoring. The certificate holder's qualified investigators will use aerial and ground surveys to evaluate nest success by gathering data on active nests, on nests with young and on young fledged. The investigators will analyze the data as described in Section 3(c) and will share the data with state and federal biologists.

a) Short-Term Monitoring

Short-term monitoring will be done in two monitoring seasons. The first monitoring season will be in the first raptor nesting season after completion of construction of SFC. The second monitoring season will be in the fourth year after construction is completed. The investigators will analyze two years of data after the second monitoring season.

Survey Protocol for Raptor Species that Nest Aboveground

During each monitoring season, the investigators will conduct a thorough ground survey for raptor nests in late May or early June and additional surveys as described in this section. The survey area is the area within the SFC site and a 2-mile buffer around the site. All nests discovered during pre-construction surveys and any nests discovered during post-construction surveys, whether active or inactive, will be given identification numbers. Nest locations will be recorded on U.S. Geological Survey 7.5-minute quadrangle maps. Global positioning system coordinates will be recorded for each nest. Locations of inactive nests will be recorded because they could become occupied during future years.

Determining nest occupancy will likely require at least two visits to each nest. For occupied nests, the certificate holder will determine nesting success by a minimum of one ground visit to determine species, number of young and young fledged. "Nesting success" means that the young have successfully fledged (the young are independent of the core nest site). Nests that cannot be monitored due to the landowner denying access will be checked from a distance where feasible.

Survey Protocol for Burrowing Owls

The investigators will monitor burrowing owl nests according to the following protocol. The investigators will monitor all nests discovered during pre-construction surveys and any additional burrowing owl nest sites that are discovered during any wildlife monitoring tasks conducted under this plan. All nests will be given identification numbers. Nest locations will be recorded on U.S. Geological Survey 7.5-minute quadrangle maps. Global positioning system coordinates will be recorded for each nest site. Coordinates for ancillary burrows used by one nesting pair or a group of nesting pairs will also be recorded. Locations of inactive nests will be recorded because they could become occupied during future years.

For occupied nests, the certificate holder will determine nesting success by a minimum of one ground visit to determine species, number of young and young fledged. "Nesting success" means that the young have successfully fledged (the young may or may not be independent of the core nest site). Three visits to the nest sites may be necessary to determine outcome. Nests that cannot be monitored due to the landowner denying access will be checked from a distance where feasible.

b) Long-Term Monitoring

In addition to the two years of post-construction raptor nest surveys described above, the certificate holder will conduct long-term raptor nest surveys at five-year intervals for the life of the facility[9]. Investigators will conduct long-term monitoring during years divisible by five (i.e. 2030, 2035, 2040, etc.) to develop a consistent survey period across energy facilities within the Columbia Basin. In conducting long-term surveys, the investigators will follow the same survey protocols as described above in Section 3(a) unless the investigators propose alternative protocols that are approved by the Department. In developing an alternative protocol, the investigators will consult with ODFW. The investigators will analyze the data after each year of long-term raptor nest surveys.

c) Analysis

The investigators will analyze the raptor nesting data to determine whether a reduction in either nesting success or nest use has occurred in the survey area. If the analysis indicates a reduction in nesting success or nest use by Swainson's hawks, golden eagles, ferruginous hawks or burrowing owls, then the certificate holder will propose appropriate mitigation for the affected species as described in Section 3(d) and will implement mitigation as approved by the Department, subject to review by the Council.

Any reduction in nesting success or nest use could be due to operation of SFC or some other cause. The investigators will attribute the reduction to operation of SFC unless the investigators demonstrate, and the Department agrees, that the reduction was due to a different cause. At a minimum, if the analysis shows that a Swainson's hawk, golden eagle, ferruginous hawk or burrowing owl has abandoned a nest territory within the facility site or within ½ mile of the facility

[9] As used in this plan, "life of the facility" means continuously until the facility site is restored and the site ce1iificate is terminated in accordance with OAR 345-027-0110.

site or has not fledged any young over two successive surveys within that same area, the investigators will assume the abandonment or unsuccessful fledging is due to operation of the facility unless another cause can be demonstrated convincingly.

Given the low raptor nesting densities in the area, statistical power to detect a relationship between distance from a wind turbine and nesting parameters (e.g., number of fledglings per reproductive pair) will be very low. Therefore, impacts may have to be judged based on trends in the data, results from other wind energy facility monitoring studies and literature on what is known regarding the populations in the region.

d) Mitigation

The certificate holder will propose mitigation for the affected species in consultation with the Department and ODFW and will implement mitigation as approved by the Council. In proposing appropriate mitigation, the certificate holder will advise the Department if any other wind project in the area is obligated to provide mitigation for a reduction in raptor nesting success at the same nest site. Mitigation should be designed to benefit the affected species or contribute to overall scientific knowledge and understanding of what causes nest abandonment or nest failure. Mitigation may be designed to proceed in phases over several years. It may include, but is not limited to, additional raptor nest monitoring, protection of natural nest sites from human disturbance or cattle activity (preferably within the general area of the facility) or participation in research projects designed to improve scientific understanding of the needs of the affected species.

4. Ongoing Reporting and Handling of Wildlife Injuries and Fatalities

The certificate holder will implement an ongoing monitoring program for avian and bat casualties found during operation of the facility. The certificate holder will train facility personnel in the methods and practices needed to carry out this program. Facility personnel shall monitor the areas around all facility structures that may present a collision risk to avian and bat species, including turbine towers, meteorological towers, aboveground transmission lines, the substation and the field workshop. The monitoring program will include initial response, handling and reporting of bird and bat carcasses discovered incidental to maintenance operations ("incidental finds"). Maintenance personnel will follow the certificate holder's protocol for handling injured birds as described in Section 1(d).

All avian and bat carcasses discovered by maintenance personnel will be photographed and data will be recorded as would be done for carcasses within the formal search sample during scheduled searches as described in Section 1(d). Maintenance personnel will notify a project biologist of incidental finds. The project biologist must be a qualified independent professional biologist who is not an employee of the certificate holder. The project biologist (or the project biologist's experienced wildlife technician) will collect the carcass or will instruct maintenance personnel to have an on-site carcass handling permittee collect the carcass. The certificate holder's on-site carcass handling permittee must be a person who is listed on state and federal scientific or salvage collection permits and who is available to process (collect) the find on the day it is discovered. The find must be processed on the same day as it is discovered. The certificate holder shall coordinate

collection of state endangered, threatened, sensitive or other state protected species with ODFW. The certificate holder shall coordinate collection of federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian species with the USFWS.

During the years in which fatality monitoring occurs, if there are incidental finds outside the search plots for the fatality monitoring searches, the data will be reported separately from fatality monitoring data. Data on incidental finds within search plots will be included in the calculation of fatality rates.

The Department may determine that mitigation is appropriate if avian or bat fatalities are higher than expected and at a level of biological concern. If the Department determines that mitigation is appropriate, the certificate holder, in consultation with the Department and ODFW, shall propose mitigation measures designed to benefit the affected species. The certificate holder shall implement mitigation as approved by the Department, subject to review by the Council.

5. Avian Collision Fatality Risk Mitigation

To address potential indirect impacts of bird and bat collision fatality risk, the certificate holder shall implement the following avian collision fatality risk mitigation:

Within 1-year following completion of the O&M demonstration activity for wind turbines 368 and 370, as approved in the Final Order on RFA2, the certificate holder shall coordinate with ODOE in consultation with ODFW to determine an appropriate financial contribution or level of participation in a research project designed to improve scientific understanding of larger turbine components on birds and bats. As an alternative, the certificate holder may coordinate with ODOE in consultation with ODFW to determine an appropriate financial contribution to be remitted to the Rowena Wildlife Clinic (or equivalent rehabilitation facility approved by ODOE and ODFW).

6. Post-repowering Avian and Bat Fatality Monitoring

The following avian and bat fatality monitoring program addresses Site Certificate Condition 114:

> ***114*** *Following completion of Amendment #3 facility repower activities, the certificate holder shall conduct two years of avian and bat fatality monitoring, as described in the Wildlife Monitoring and Mitigation Plan, or based on protocol otherwise approved by the Department in consultation with ODFW, provided as Attachment E of the Final Order on Amendment 3.*

And the Final Order on Amendment 3 which further states:

> *…in response to ODFW recommendations, the certificate holder agrees that two years of fatality monitoring, to look at mortality effects from turbine repowering, following construction completion…*
>
> *As discussed in Section III.A.6, Fish and Wildlife Habitat, the certificate holder proposes to conduct 2-years of post-construction fatality monitoring to determine whether the changes in wind turbine dimensions result in increased fatality risk and then whether additional mitigation is necessary.*

The objective of fatality monitoring at SFC following repowering is to assess whether the changes in wind turbine dimensions (rotor diameter) result in increased fatality risk to bird and bat species. This assessment will also be completed at the Shepherds Flat North (SFN) and Shepherds Flat South (SFS) facilities. In an attempt to isolate the effect of increased rotor diameter on avian and bat mortality from other influencing factors, the certificate holder is conducting a before-after control-impact study (Smokorowski et al. 2017). Post-construction fatality monitoring was conducted following the original construction of the facility between September 2012 and September 2014, per the protocol described in Section 1 of this WMMP (Smith et al. 2015). The raw data collected during this study will be used to quantify "before" or provide baseline fatality rates to which "after" or post-repowering fatality rates can be compared. The GenEst fatality estimator program will be used to calculate and compare "before" rates to post-repowering "after" PCMM fatality estimates (Dalthorp et al. 2018). Following the repowering, 112 turbines will be repowered; four turbines will not be repowered (Table A). Repowering will result in two new blade dimensions, 127-meter rotor diameter and 116-meter rotor diameter. Repowered turbines will serve as the "After-Impact" group while all non-repowered turbines with the original 100-meter rotor diameter will serve as the "After-Control" group. Turbine locations and hub height (86 meters) will remain the same after repowering. The availability of a contemporaneous control group allows the effect of study year to be controlled; comparisons across years can often be confounded by a number of factors, including annual variation in wildlife abundance, ecological condition, and subsequent mortality risk (Smokorowski et al. 2017). To assess the after-treatment effect on fatality rates, fatality monitoring will be conducted at all After-Control turbines (not repowered turbines), and a striated random sample of After-Impact turbines at each of the SFN, SFC, and SFS facilities as presented in Table B (search method definitions provided in the following section). The certificate holder will then compare the control turbines after repowering (After-Control) to the repowered turbines (After-Impact). Results for all three facilities may be combined for analysis and discussion should fatality sample sizes necessitate this.

Table A. Turbine Dimensions and Count for SFC

Turbine Specifications	Pre-repower Turbine Count (Before-Control Group)	Non-repowered Turbine Count (After-Control Group)	Post-repowered Turbine Count (After-Impact Group)	Post-repowered Turbine Count (After-Impact Group)
Rotor diameter (meters)	100	100	116	127
Hub Height (meters)	86	86	86	86
Number of Turbines	116	4	19	93[1]
1. Includes two turbines repowered under Request for Amendment 2.				

Table B. Sample Size by Method Type across the Shepherds Flat Facilities

Facility	No. Turbines Repowered (After-Impact Group)		No. Turbines Not Repowered (After-Control Group) Tier 1 Search Method
	Tier 1 Search Method	Tier 2 Search Method	
North	20	50	9
Central	20	50	4
South	20	50	5
Total Turbines Monitored	60	150	20

The sections below describe methods for the fatality monitoring program to be conducted at SFC following repowering. The program will include two standardized search methods to detect fatalities, methods to adjust for sources of bias inherent in fatality detection, and the estimation of annual fatality rates attributable to facility operation based on these data. Sources of bias will be measured through (1) carcass persistence trials to estimate the probability that a carcass persists from one search to the next; (2) searcher efficiency trials to estimate the proportion of carcasses detected by investigators; and (3) estimation of the portion of carcass fall distribution that is searched (i.e. density-weighted proportion, DWP).

The methods within this document are designed to provide consistency of approach to the original study as possible and appropriate, taking into consideration improvements in the state of the science since the original study was conducted.

The investigators will perform two consecutive years (Year 1, Year 2) of fatality monitoring starting in the first or second full season following the repowering of all three Shepherds Flat Facilities (SFN, SFC, and SFS). Reporting, adaptive management, and mitigation are addressed in Sections 6i, 6f, and 6j, respectively.

a) Standardized Carcass Searches

The objective of standardized carcass searches is to systematically search facility turbines for bird and bat fatalities that occur in proximity to facility infrastructure at both repowered (after-impact) and control turbines (after-control).

Search Plot Size and Configuration

Turbine-related fatalities are distributed non-uniformly around a turbine (fall distribution). As a result, carcass density is not the same at all distances from a turbine, but typically density is higher closer to the turbine and eventually decreases to zero as distance from the turbine increases (Huso et al. 2016; Dalthorp 2020). The fall distribution depends on a number of factors including species' size and body mass (e.g., larger, heavier carcasses tend to land farther from turbines than lighter carcasses; Hull and Muir 2010, Huso et al. 2016, Choi et al. 2020), the maximum blade tip height of a turbine, and operational speed of the turbine. Therefore, search plot size and configuration selected

for standardized carcass searches is intended to minimize bias in fatality estimation by maximizing (1) the spatial coverage of facility turbines, (2) the visibility of smaller carcasses (Good et al. 2012; Maurer et al. 2020), and (3) the proportion of the fall distribution searched for each carcass size class.

All search plots are defined by a 150-meter radius circle around a turbine. Plots searched using the Tier 1 method include linear, north/south oriented transects spaced 6 meters apart across the plot. Plots searched using the Tier 2 methods composed of two areas: a delineated road and pad area and the remainder of the circle out to 150-meters (scan area).

Search Methods

The certificate holder will monitor search plots using one of two search methods: transect-based searches within a 150-meter radius around a turbine (i.e., Tier 1), and searches limited to the road and pad areas within the search plot, plus binocular scans from the turbine pad, all within 150-meter diameter around the turbine (i.e., Tier 2). Sample sizes for each method type are presented in Table B.

The Tier 1 method will focus on maximizing detection of all carcass size classes to determine a treatment effect and to estimate DWP. During the transect searches, the investigators will walk and search linear, north/south oriented transects across the 150-meter diameter circular plot. Transects will be spaced six meters apart; the investigators will scan three meters on either side of the transects, to ensure full coverage of the plot. The six-meter transect width matches the search methods used in the original fatality monitoring program at the facility (Smith et al. 2015). Unsearchable areas within each plot will be mapped at the beginning of the study to account for the effect on the proportion of the carcass distribution that is not searched as a result of visibility or access limitations. Areas that may be considered unsearchable include those with topographic limits (e.g., steep drainages, rocky outcrops), robust vegetation growth or made impassible due to fencing type and orientation.

The Tier 2 method will focus on high visibility areas for bats and birds, as well as large birds at distance. The road and pad areas will include the gravel pad surrounding the turbine, portions of all access roads that are within 150 meters of the turbine, and edge of the vegetation along the roadside. Ninety-nine percent of fatalities of small birds and bats are predicted to occur within 150 meters from the base of Facility turbines while greater than 85 percent of fatalities of large birds are predicted to occur within 150 meters from the base of Facility turbines (based on modeling for large turbines by Hull and Muir [2010]). Tier 2 searches within the road and pad area will be performed by investigators walking the gravel area around the turbine base and walking along the extent of access roads that occurs within 150 meters of the turbine. Investigators will search for fatalities by walking along one side of all access roads within 150 meters of the turbine, searching the road and bare ground to the vegetation line, walking toward the turbine, searching around the turbine pad, and returning to the starting location on the opposite side of the access road (Good et al. 2012; Maurer et al. 2020). Tier 2 searches within the scan area will involve binocular scans made from the turbine base and one to three topographical high points within the plot. From the turbine

base, the investigators will scan 90 degrees from each of the four cardinal directions out to the extent of the 150-meter circular search plot. To address any portions of the scan area that are not visible from the base of the turbine due to topographical or other features, investigators will walk out to points in the plot where those areas become visible.

Turbine Selection

The certificate holder will monitor a total of 74 turbines for SFC Facility (Table B). All control turbines (4) and 20 repowered turbines will be monitored using Tier 1 methods. Of those turbines, four repowered turbines will be paired with each of the four control turbines. This approach is to account for potential bias in the location of control turbines, which were not selected randomly. The remaining repowered turbines using Tier 1 methods (16) will be randomly selected. The intent of this approach is to increase the ability to detect a potential treatment effect by increasing the opportunity for an adequate fatality sample size, as well as accounting for potential difference in the fall distribution of carcass caused by an increase in rotor diameter. An additional 50 turbines will be monitored using Tier 2 methods.

Search Schedule and Interval

Fatality monitoring will commence with a "clearance search." The clearance search serves to identify fatalities that occurred prior to the initiation of the fatality monitoring program and for which the time period of occurrence cannot be assigned. After the initial clearance search, standardized carcass searches will begin.

Standardized carcass searches will be conducted biweekly (every 14 days) for both method Tiers during the spring, summer, fall, and winter seasons to capture migration and breeding seasons of birds and bats, and winter use for birds (Table C). The 14-day search interval is similar to the maximum removal of small carcasses in the original study (10 days; Smith et al. 2015) but adjusted to accommodate study logistics.

Table C. Search Interval by Season for SFC

Season	Dates	Search Interval1[1]	Number of searches
Spring	March 16 to May 31	14 days	5
Summer	June 1 to August 15	14 days	5
Fall	August 16 to November 15	14 days	7
Winter	November 16 to March 15	14 days	9
1. Search interval similar to maximum removal times reported by (Smith et al. 2015).			

The certificate holder, in consultation with the ODFW and the Department, may adjust the frequency of these searches to reflect considerations for specific species of concern and conditions at the Facility (e.g., probability of a carcass persisting from one search to the next; Section 6c).

Fatality Documentation

Investigators will flag all bird and bat carcasses discovered. Carcasses are defined as a complete carcass or body part, three or more primary flight feathers, five or more tail feathers, or 10 or more feathers of any type concentrated together in an area 3 meters square or smaller. When parts of carcasses and feathers from the same species are found within a search plot, investigators will make note of the relative positions and assess whether these are from the same fatality.

All carcasses (bird and bat) found during the standardized carcass searches will be photographed, recorded, and labeled with a unique number. Investigators will record the location of the carcass using a GPS-enabled device. Data collected per carcass found will include the date; the turbine number; the distance from and bearing from the nearest turbine; the species, age, and sex of the carcass when possible; the extent to which the carcass is intact; the estimated time since death; the habitat in which the carcass was found; whether the carcass was collected or left in place; and whether the carcass was found during a standardized carcass search or incidentally. Additional measurements may be required to identify the species of bat carcasses. Investigators will describe all evidence that might assist in determination of cause of death, such as evidence of electrocution, vehicular strike, wire strike, predation, or disease. If the necessary collection permits are not acquired by the certificate holder, all carcasses will be discreetly marked to avoid double counting and will be left in place.

If an investigator determines that a carcass found at the facility (during searches or incidentally) is a state or federally threatened or endangered species, reporting timelines specified in Section 5 will be followed.

b) Carcass Persistence Trials

Carcass persistence is defined as probability that a carcass will persist in the study area for a given amount of time (e.g., until the next survey), and accounts for carcass removal bias. Carcasses may be removed from the survey plot due to scavenging or other means (e.g., decomposition, farming practices). Carcass persistence is measured by the number of days a carcass remains within the search plot before it is no longer detectable by an investigator within a given search interval. It is assumed that carcass removal occurs at a constant rate and does not depend on the time since death of the organism. The objective of carcass persistence trials is to estimate the length of time bird and bat carcasses remain within the search area and available to be detected by investigators. Estimates of carcass persistence will be used to adjust raw carcass counts to understand removal bias.

The investigators will conduct carcass persistence trials within each Tier per season during a fatality monitoring year (Tables C and D). A minimum of 10 each of large bird, small bird, and bats or bat surrogate trial carcasses will be placed each season per Tier. The investigators will select species with the same coloration and size attributes as species expected to occur at or near the Facility, if possible. Trial carcass species may include legally obtained domestic species (e.g., ring-necked pheasants, juvenile Japanese quail), unprotected species (e.g. European starling, house sparrows), raptor carcasses (if the necessary collection permit allows), bats (if available), and dark

mice as a surrogate for bats. Bat carcasses may be collected under an ODFW Scientific Taking Permit to use for bias trials as carcass condition allows.

Table D. Carcass Persistence: Number of Carcasses Placed per Season per Tier

Bias Control Trial	Group (Number Turbines)	Method (Number Turbines)	Carcasses
Carcass Persistence	After-Control (4)	Tier 1 (4)	10 carcasses per size class
	After-Impact (70)	Tier 1 (20)	
		Tier 2 (50)	10 carcasses per size class

Trial carcasses will be marked discreetly for recognition by investigators and other personnel. Carcasses will be placed at randomly generated locations within the search plots. Small birds and bat surrogates will be placed within Tier 1 and Tier 2 plots on day 0 of the trial. Trial carcasses will be left in place until the end of the carcass persistence trial. An approximate schedule for assessing removal status is once daily for the first 4 days, and on days 7, 10, 14, 21, 28, and 35. This check schedule may be extended to include the possibility of longer persistence times after initial placement (e.g., 60 or 90 days) to capture potentially longer large bird persistence times. This check schedule may also be adjusted depending on actual carcass persistence rates, weather conditions, and coordination with the other survey work. The condition of scavenged carcasses will be documented during each assessment, and at the end of the trial all traces of the carcasses will be removed from the site. Scavenger or other activity could result in complete removal of all traces of a carcass in a location or distribution of feathers and carcass parts to several locations. This feather distribution will not constitute complete carcass removal if evidence of the carcass remains within an area similar in size to a search plot and if the evidence would be detectable to an investigator during a normal survey.

c) Searcher Efficiency Trials

Searcher efficiency is defined as the probability that investigators will find a carcass that is available to be found within the search plot. Several factors influence searcher efficiency, including investigator experience, vegetation conditions within a search plot, and characteristics of individual carcasses (e.g., size, color). The objective of searcher efficiency trials is to estimate the percentage of bird and bat fatalities that investigators are able to find.

A trained Searcher Efficiency Proctor (proctor) will conduct searcher efficiency trials within each of the seasons defined in Table C during the years in which the fatality monitoring occurs. A minimum of 12 each of large bird, small bird, and bat or bat surrogate trial carcasses will be placed in the spring, summer, and fall seasons within Tier 1 and Tier 2 search plots (Table E). In winter, when bat fatalities are not anticipated, a minimum of 12 each of large bird and small bird carcasses will be placed. Investigators will not be notified of carcass placement or test dates. The proctor will vary the number of trials per season to capture seasonal variation in site conditions that may affect the ability to detect fatalities, and the number of carcasses per trial so that the investigators will not

know the total number of trial carcasses being used in any trial. Similar to carcass persistence trials, searcher efficiency trial carcass species may include legally obtained domestic species (e.g., ring-necked pheasants, juvenile Japanese quail), unprotected species (e.g. European starling, house sparrows), raptor carcasses (if necessary collection permit allows), and dark mice as a surrogate for bats. Bat carcasses may be collected under an ODFW Scientific Taking Permit to use for bias trials as carcass condition allows.

Table E. Searcher Efficiency: Number of Carcasses Placed per Season per Tier

Bias Control Trial	Group (Number Turbines)	Method (Number Turbines)	Carcasses
Searcher Efficiency	After-Control (4)	Tier 1 (4)	12 carcasses per size class
	After-Impact (70)	Tier 1 (20)	
		Tier 2 (50)	12 carcasses per size class

The proctor will mark the trial carcasses to differentiate them from other carcasses that might be found within the search plot and in a manner that does not increase carcass visibility. On the day of a standardized carcass search before the beginning of the search, the proctor will place trial carcasses at randomly generated locations within search plots (one to three trial carcasses per search plot). The number and location of trial carcasses found during the standardized carcass search will be recorded. The number of efficiency trial carcasses available for detection during each trial will be determined immediately after the trial by the proctor. Following the standardized carcass search, all traces of searcher efficiency trial carcasses will be removed from the site. If new investigators are brought into the search team, additional searcher efficiency trials will be conducted to ensure that detection rates incorporate investigator differences. The certificate holder will include a discussion of any changes in investigators and any additional detection trials in the reporting required under Section 6i of this plan.

Before beginning searcher efficiency trials for any subsequent year of fatality monitoring, the certificate holder will report the results of the first-year searcher efficiency trials to the Department and ODFW. In the report, the certificate holder will analyze whether the searcher efficiency trials as described above provide sufficient data to accurately estimate adjustment factors for searcher efficiency. The number of searcher efficiency trials for any subsequent year of fatality monitoring may be adjusted up, subject to the approval of the Department.

d) Incidental Finds and Injured Birds

Incidental finds are carcasses that are detected outside the parameters of standardized carcass searches. Investigators may discover carcasses in areas surrounding the turbines but outside of the search plots (or designated search area, i.e., road and pad) while completing carcass persistence checks, or while moving through the facility. Additionally, carcasses detected during clearance surveys do not have an associated timeframe for fatality occurrence and therefore are considered incidental finds. For each incidental find, the investigator will identify, photograph, record data, and

collect the carcass as would be done for carcasses detected during standardized carcass searches. If the incidental find is located in a search plot within a reasonable timeframe from when that plot was to be searched (e.g., while placing searcher efficiency carcasses on the same day as the search), the fatality data will be included in the calculation of fatality rates. If the incidental find is found outside a formal search plot or search time, the data will be reported separately and excluded from statistical analysis.

The certificate holder will contact a qualified rehabilitation specialist approved by the Department[10] to respond to injured wildlife. The certificate holder will pay costs, if any, charged for time and expenses related to care and rehabilitation of injured native birds found on the site, unless the cause of injury is clearly demonstrated to be unrelated to the facility operations.

e) Adaptive Management of Fatality Monitoring Methods

Investigators may implement an alternate search strategy should dense fog and/or high winds limit investigators from successfully using binocular scans to search plots. Under these adverse weather conditions, investigators may alter the Tier 2 method within scan areas to include visual searches unassisted by binoculars. This alternative method includes starting at the turbine base and walking a total of 12 linear transects from the turbine base out to the 150-meter plot boundary at intervals of 30 degrees (e.g., 0 degrees from North, 30 degrees, 60 degrees, etc.) while visually scanning the plot to search for fatalities. Alternative full plot searches will include delineated visually unsearchable areas of the plots (as described above) and exclude areas made inaccessible by fences or hazardous topographic features.

If unforeseen circumstances arise that limit the ability to implement any portion of the fatality monitoring methods described herein, methods will be adaptively managed. Adaptive management may include, but is not limited to, managing the number of carcasses used for bias correction trials based on availability, sharing carcass persistence trial data between SFN, SFC, and SFS, and changing search intervals to improve detection rates following the results of Year 1. Adaptive management of methods must be approved by the Department with input from ODFW.

f) Fatality Estimation

Estimated annual fatality rates for the facility will be calculated at the end of each monitoring year (Year 1, Year 2). Annual fatality rates will be estimated by adjusting raw fatality counts for sources of bias including carcass persistence, searcher efficiency, and the proportion of the fall distribution that was searched for each size class (Huso and Dalthorp 2014).

Density Weighted Proportion

A correction factor (density weighted proportion; DWP) will be used to adjust for the proportion of the fall distribution that was searched for each size class within both method Tiers. The DWP will be calculated as the product of the percentage of a 10-meter annulus that is covered by the

[10] Approved specialists include of Blue Mountain Wildlife, a wildlife rehabilitation center in Pendleton, and the Audubon Bird Care Center in Portland. The certificate holder must obtain the Department's approval before using other specialists.

searched area within the plot and the proportion of the fall distribution of a given size class that overlaps that 10-meter annulus. The product of these values for each 10-meter annulus that overlaps the search plot will be summed to calculate the overall proportion of the fall distribution searched for each size class within the respective search method type. Calculations will utilize distributions based on ballistic modeling presented in Hull and Muir (2010) for small birds and bats, and distributions presented in Hallingstad et al. (2018) for large birds. Other peer-reviewed models that update the state of the science may be utilized if they become available within the duration of the monitoring period.

Estimation

Annual fatality rates will be estimated for nine categories within the After-Control group and the After-treatment group, provided a sufficient sample size (n=4) has been reached to allow estimation. The nine categories are:

1. All birds;
2. Small birds;
3. Large birds;
4. All bats;
5. Migratory tree-dwelling bats;
6. Raptors;
7. Raptor species of special concern;
8. Grassland species; and
9. State and federally listed threatened and endangered species and State Sensitive Species listed under Oregon Administrative Rules (OAR) 635-100-0040.

In 2018, the U.S. Geological Survey released a fatality estimator program, GenEst (Dalthorp et al. 2018). GenEst provides the most current state-of-the-science software for fatality estimation by minimizing biases associated with fatality estimation and allowing users to select the most appropriate methods and assumptions for project-specific circumstances. Rigorous testing of the performance of GenEst compared to other estimators using simulated data has shown GenEst to be the least biased, enabling more precise fatality estimation and reliable comparison of fatality estimates among projects (Simonis et al. 2018). Additionally, GenEst allows for fatality estimates to be split into subcategories which allows for estimates to be parsed by parameters such as season, year, or turbine type.

The estimation of annual fatality rates will account for:

1. The search interval;
2. The number of carcasses detected during standardized carcass searches within the monitoring period where the cause of death is assumed to be the operation of the facility;

3. Carcass persistence expressed as the probability that a carcass remains in the study area (persists) and is available for detection by the investigators during persistence trials;
4. Searcher efficiency expressed as the probability that a trial carcass is found by investigators during searcher efficiency trials; and
5. The portion of the fall distribution that was searched at the facility (DWP) for the given size class and search plot type.

Using this same approach, the certificate holder will reanalyze Smith et al. (2015) using GenEst. This Before-Control dataset will be used as the comparative dataset in the final analysis.

g) Final Analysis

To address the requirement specified in Condition 110 and addressed in the Final Order on Amendment 2, the certificate holder will use the estimated fatality generated using GenEst software for a final analysis that will examine the potential impact of rotor-diameter on bird and bat fatalities. As mentioned above, this study will use before-after control-impact (BACI) study design to isolate the effect of the change in rotor-diameter on bird and bat fatality (i.e., treatment) from variation (i.e., time). Before-Control and After-Control datasets will be modeled to determine differences in fatality at the same turbine model but at different time-periods, although this is dependent on an adequate fatality sample size (n=4) within each group. In addition, certificate holder will analyze the results of the After-Control and After-Treatment to determine the control-impact based on the change in rotor-diameter (also dependent on adequate fatality sample size).

h) Reporting

When Year 1 of monitoring at the facility has been completed, the raw data will be compiled by the investigators and the certificate holder in a memo, which will include fatality estimates (Section 6g). The certificate holder will consult with the Department and ODFW regarding adaptive management measures as necessary (Section 6f).

Following the second year of fatality monitoring (Year 2), the raw data will be compiled by the investigators and the certificate holder in a comprehensive report. The report will include fatality estimates for the two-year post-repowering study, the results of the re-analysis of the data gathered during the initial post-construction study by Smith et al. (2015), and an assessment of whether an effect of increased rotor diameter on avian and bat mortality can be discerned.

If fatality rates for the two-year post-repowering monitoring period at SFC exceed any of the thresholds of concern (Table F), the certificate holder will consult with the Department and ODFW regarding potential mitigation (Section 6j). If mitigation is deemed appropriate, the certificate holder will propose appropriate mitigation for the Department and ODFW review within 6 months after reporting the fatality rates to the Department.

i) Mitigation

Consistent with the previously conducted study, mitigation may be appropriate if fatality rates exceed a threshold of concern (Table F). Only fatality rates from the two-year post-repowering

fatality monitoring study will be compared against the thresholds of concern in consideration for potential mitigation. Neither the results of the re-analysis of the data from the original Smith et al. (2015) study using GenEst, nor the results of the comparison of the rates (re-analyzed data from original study vs. results of post-repowering study), will be considered against the thresholds of concern in consideration for potential mitigation.

For the purpose of determining whether a threshold has been exceeded, the certificate holder shall calculate the average annual fatality rates inclusive of 90 percent confidence intervals for species groups after two years of monitoring (provided four or more detections within any of the species groups listed below are available to accurately determine estimates for these groups). The thresholds of concern established by EFSC (Table F) will be used in conjunction with the revised fatality estimates derived from data from the original study (Smith et al. 2015), the most current regional fatality rates published by the Renewable Energy Wildlife Institute (formerly American Wind and Wildlife Institute) and any other significant information available at the time to evaluate the fatality rates associated with SFC following its repowering, and to guide discussions on appropriate mitigation.

Table F: Fatality Thresholds of Concern by Species Group

Species Group	Threshold of Concern[1] (Fatalities per MW)
Raptors[2] (All eagles, hawks, falcons and owls, including burrowing owls.)	0.09
Raptor species of special concern (Swainson's hawk, ferruginous hawk, golden eagle, bald eagle, burrowing owl.)	0.06
Grassland species (All native bird species that rely on grassland habitat and are either resident species occurring year-round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier.)	0.59
State sensitive avian species listed under OAR 635-100-0040 (Excluding raptors listed above.)	0.20
Bats[3]	2.50

1. EFSC adopted the concept of "thresholds of concern" for raptors, grassland species, and state sensitive avian species in the Final Order on the Application for the Klondike III Wind Project (June 30, 2006) and for bats in the Final Order on the Application for the Biglow Canyon Wind Farm (June 30, 2006). The exceeding of a threshold, by itself, would not be a scientific indicator that operation of the facility would result in range-wide population-level declines of any of the species affected.

3. Regionally, the median fatality rate for all raptors in the Northern Rockies avifaunal biome (includes eastern Oregon; 22 studies) was 0.06 fatalities per MW per year (AWWI 2020a). Within the USFWS Pacific Region (Idaho, Hawaii, Oregon, Washington; 51 studies) the median fatality rate for raptors was 0.10 fatalities per MW per year (West 2021).

4. Regionally, the USFWS Pacific Region (includes Oregon; 35 studies) had a range of 0.0 to 4.2 bat/MW/year, with a median of 0.7 bats/MW/year (AWWI 2018). In the updated report with two additional studies, the rate remains similar, with a median at 0.7 bats/MW per year and a mean rate of 1.1 bats/MW/year (AWWI 2020b).

If the data show that a threshold of concern for a species group or individual state sensitive bird species has been exceeded, the certificate holder will consult with the Department and ODFW to determine if mitigation is appropriate based on analysis of the data and consideration of any other significant information available at the time. If mitigation is determined to be necessary, the certificate holder will propose mitigation measures designed to benefit the affected species or species group. If, following consultation and any additional data collection, the Department determines that mitigation is required, the Certificate Holder will propose mitigation measures designed to benefit the affected species or species group.

Mitigation should be designed to benefit the affected species or group. Mitigation may include, but is not limited to, protection of nesting habitat for the affected group or species through a conservation easement or similar agreement. Tracts of land that are intact and functional for wildlife are preferable to degraded habitat areas. Preference should be given to protection of land that would otherwise be subject to development or use that would diminish the wildlife value of the land. In addition, mitigation measures might include: enhancement of a protected tract that is degraded by weed removal and control; increasing the diversity of native grasses and forbs; planting sagebrush or other shrubs; constructing and maintaining artificial nest structures for raptors; improving wildfire response; and conducting or making a contribution to research that will aid in understanding more about the affected species or group, their conservation needs in the region, or to develop possible ways to reduce impacts to the affected species or group.

7. Data Reporting

The certificate holder will report wildlife monitoring data and analysis to the Department. The certificate holder shall notify USFWS and ODFW immediately if any federal or state endangered or threatened species are killed or injured on the facility site. The certificate holder shall report fatality monitoring program data, raptor nest monitoring data and data on avian and bat casualties found by facility personnel. The certificate holder may include the reporting of wildlife monitoring data and analysis in the annual report required under OAR 345-026-0080 or submit this information as a separate document at the same time the annual report is submitted.

In addition, the certificate holder shall provide to the Department any data or record generated by the investigators in carrying out this monitoring plan upon request by the Department.

8. Amendment of the Plan

This Wildlife Monitoring and Mitigation Plan may be amended from time to time by agreement of the certificate holder and the Council. Such amendments may be made without amendment of the site certificate. The Council authorizes the Department to agree to amendments to this plan and to mitigation actions that may be required under this plan. The Department shall notify the Council of all amendments and mitigation actions, and the Council retains the authority to approve, reject or modify any amendment of this plan or mitigation action agreed to by the Department.

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