

APPENDIX H AVIAN COLLISION RISK ASSESSMENT



PGE Utility Facility Replacement and Interconnection

Avian Collision Risk Assessment

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APPENDIX A AVIAN SPECIES OCCURRING WITHIN TUALATIN RIVER NATIONAL WILDLIFE REFUGE

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
APLIC	Avian Power Line Interaction Committee
Applicant	TUAL bn, LLC
BESS	Battery Energy Storage System
City	City of Sherwood
ERM	Environmental Resources Management Inc.
gen-tie	generation-tie
IBA	Important Bird Area
kV	kilovolt
NABCI	North American Bird Conservation Initiative
NWR	National Wildlife Refuge
OCS	Oregon Conservation Strategy
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
PGE	Portland General Electric
USFWS	United States Fish and Wildlife Service

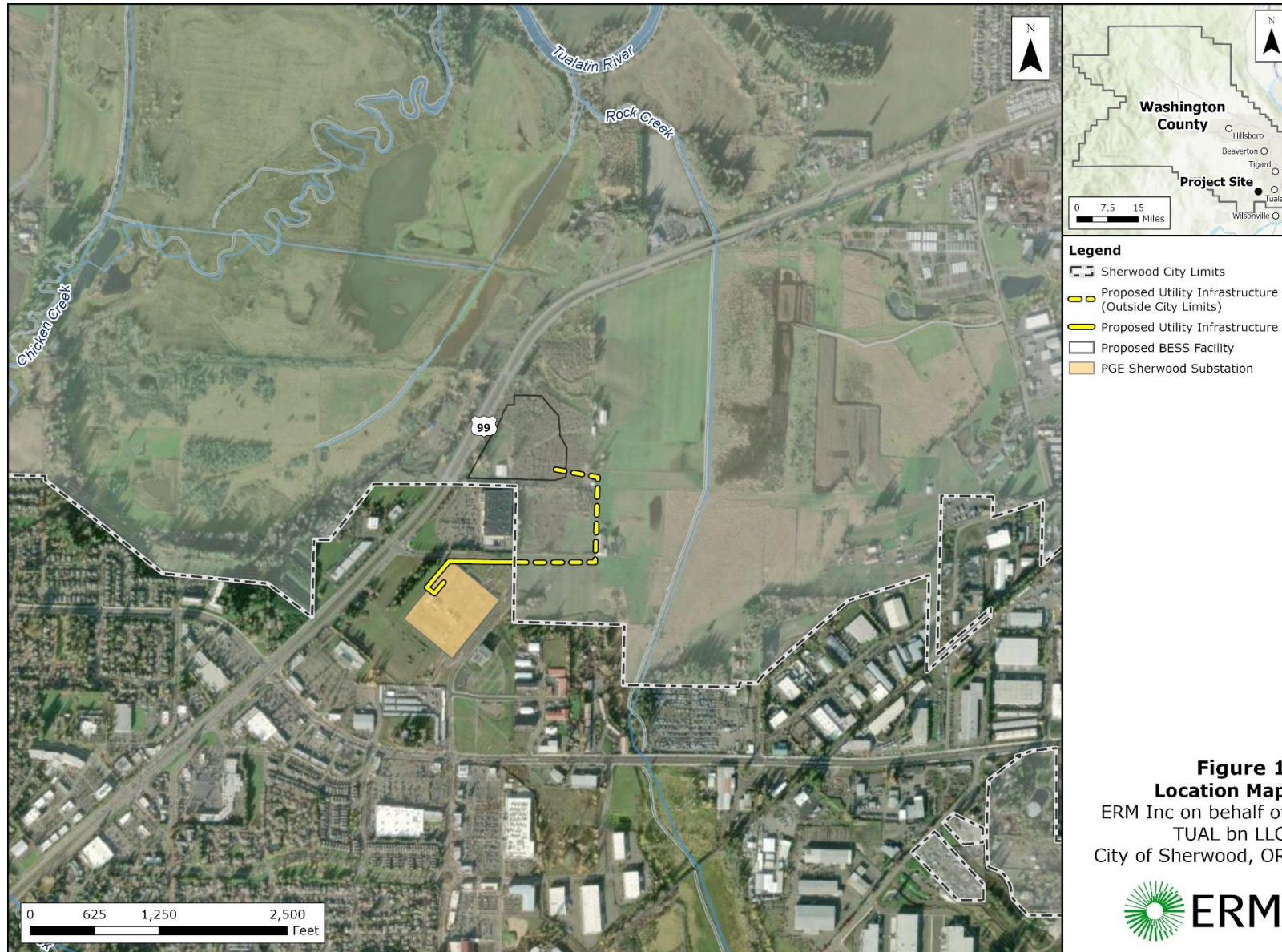
1. INTRODUCTION

TUAL bn, LLC (Applicant), a subsidiary of BrightNight, LLC, is proposing to develop the Nottingham Battery Energy Storage System (BESS) Project (Project) located in Washington County, Oregon (Figure 1). The Project is a lithium-ion battery energy storage facility capable of storing and delivering power to the Portland General Electric (PGE) regional transmission grid. The Project is on Tax Lots 2S120D001200 and 2S120D001100 and will occupy a 12.5-acre site. The Nottingham BESS received its Special Use and Development Review approval from Washington County in May 2025 (Casefile L2400314-SU/D) with construction anticipated in 2028.

The Nottingham BESS will interconnect to PGE's regional transmission grid at the PGE Sherwood Substation, located within the City of Sherwood (the City). An approximately 0.5-mile (2,640 feet) 230 kilovolt (kV) generation-tie line (gen-tie) will connect the proposed Nottingham BESS to the Sherwood Substation; approximately 1,200 feet of the gen-tie is within the City of Sherwood and will be co-located on PGE's existing utility infrastructure. The Applicant is upgrading existing PGE poles to accommodate the approximately 1,200 feet of 230 kV gen-tie along with PGE's existing 115 kV line on up to five utility poles (proposed route). The proposed route for the gen-tie is shown in Figure 1. Section 6.1 of this report describes the proposed gen-tie alignment and design within the City of Sherwood.

The Applicant requested Environmental Resources Management Inc. (ERM) to prepare an avian collision risk assessment for the portion of the proposed gen-tie line that is located within the City of Sherwood limits and subject to the City's Conditional Use Permit and Site Plan review. This assessment utilizes a qualitative approach that integrates available biological information, site-specific observations, habitat characteristics, species occurrence data, and accepted industry guidance to characterize avian risk associated with the proposed gen-tie

FIGURE 1 PROJECT LOCATION



2. REGULATORY CONTEXT

The Project is subject to a variety of federal, state, and local regulations intended to conserve migratory birds, protected wildlife species, and their habitats.

2.1 FEDERAL REGULATIONS

The following federal regulations are applicable to the Project:

- The Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) protects migratory birds, their nests, eggs, and parts. The Migratory Bird Treaty Act applies to most native bird species that may occur within the Project area, including waterfowl, waterbirds, raptors, shorebirds, and passerines.
- The Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d) prohibits the unauthorized take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), including actions that may disturb, injure, or kill eagles.
- The Endangered Species Act (16 U.S.C. §§ 1531-1544) provides protection for species listed as threatened or endangered and for designated critical habitat.

2.2 STATE REGULATIONS

The following state regulations are applicable to the Project:

- Oregon protects certain wildlife species under the Oregon Revised Statutes 496.171-496.192, which states that the Fish and Wildlife Commission, through the Oregon Department of Fish and Wildlife (ODFW) has the authority to designate species of wildlife as endangered or as protected species, which also includes threatened and sensitive species. Consistent with Oregon's Sensitive Species Rule (OAR 635-100-0040), "Sensitive" species are defined as having small or declining populations, are at-risk, and/or are of management concern; "Sensitive-Critical" species are of particular concern and further population decline may warrant threatened or endangered status.
- The Oregon Conservation Strategy (OCS) is an overarching state strategy for conserving fish and wildlife in the state of Oregon. It provides a shared set of priorities for addressing Oregon's conservation needs. The Conservation Strategy identifies 58 bird Strategy Species. Strategy Species are species of greatest conservation need defined as having small or declining populations, are at-risk, and/or are of management concern. OCS emphasizes proactive conservation through voluntary actions to prevent species from becoming imperiled and reduce the need for future listings under the Endangered Species Act.

3. STUDY AREA

The proposed gen-tie is within a developed utility corridor in an area characterized by existing electrical infrastructure as well as nearby prior agricultural, light industrial, and commercial development. The PGE Sherwood Substation and the portion of the gen-tie that are within City limits are within the Adams Avenue North Concept Plan regional urban growth boundary (City of Sherwood 2026).

The area represents a transition between existing utility infrastructure and surrounding habitats: existing substations, powerlines, and industrial development limit local avian use patterns, while nearby wetland and riparian habitat and prior agricultural land provide foraging, roosting, and nesting resources for birds (Figure 2).

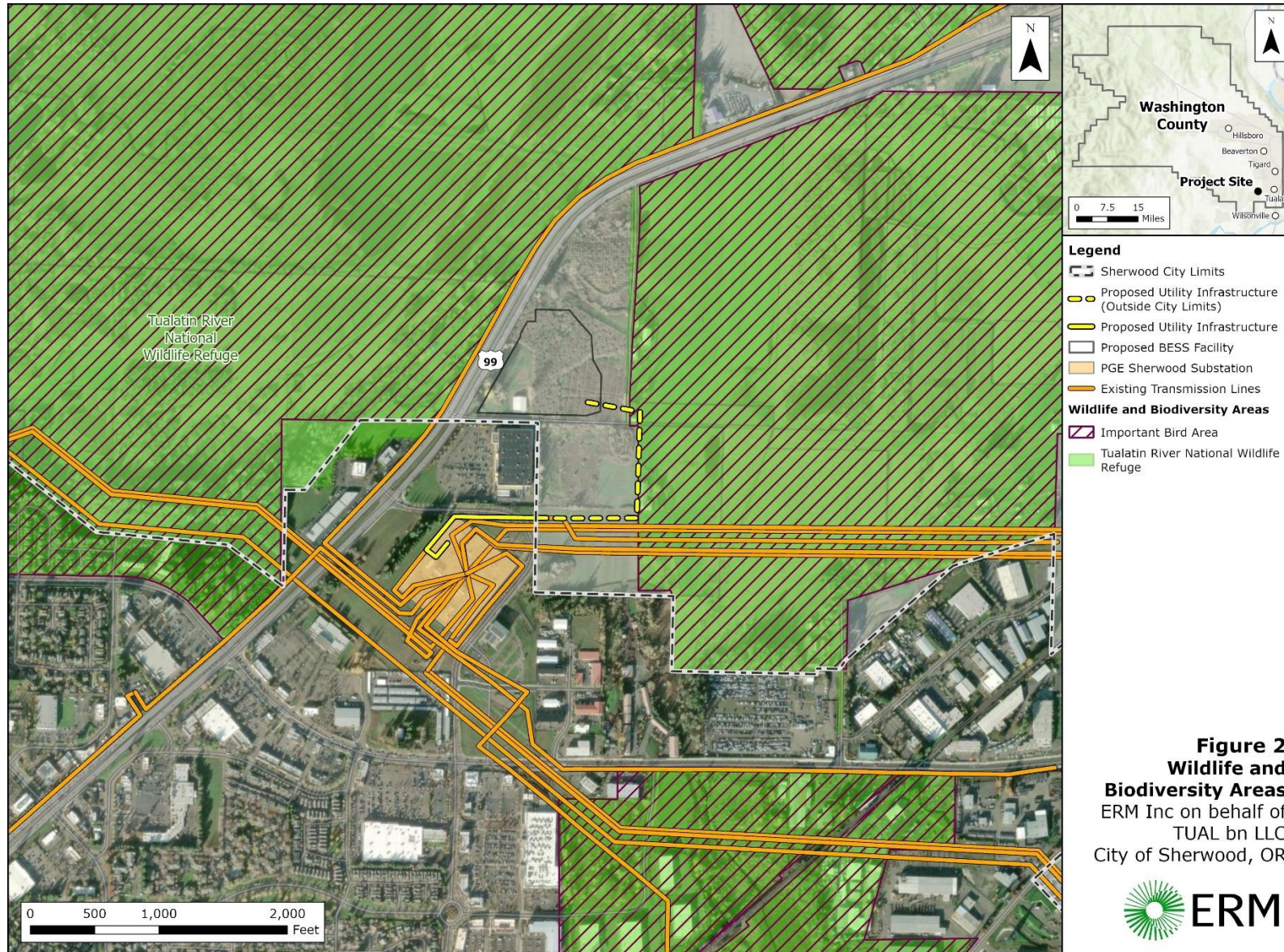
The proposed gen-tie is within the ODFW Tualatin River Conservation Opportunity Area, but it is not within ODFW mapped wetland key habitat (ODFW 2024). The existing utility corridor overlaps the western edge of Priority Wildlife Connectivity Area Region R12, hexagons H210 and H228 (ODFW 2024). These ODFW areas are non-regulatory and serve to provide planning guidance to identify important habitat and achieve broad wildlife conservation goals.

The existing utility corridor is also within North American Bird Conservation Initiative (NABCI) Bird Conservation Region 5 Northern Pacific Rainforest (NABCI 2021); this National Audubon Society Important Bird Area (IBA) is shown with hatching on Figure 2 (Audubon 2026). The National Audubon Society's IBA program identifies areas of particular importance to bird conservation based on standardized biological criteria, including concentrations of birds, occurrence of species of conservation concern, and important habitat. IBA boundaries are conservation-planning designations and do not independently establish regulatory restrictions or protected-land status. The existing utility corridor is also within and adjacent to the Tualatin River National Wildlife Refuge (NWR), which is shown as a shaded area in Figure 2. Though the two areas overlap in places, the Audubon IBA boundary is distinct from the federally managed Tualatin River NWR boundary. The Tualatin River NWR is managed by the U.S. Fish and Wildlife Service (USFWS), whereas the Audubon IBA is a broader conservation designation intended to identify areas important to birds.

3.1 CLIMATE

Sherwood, Oregon lies within the northern Willamette Valley and experiences warm, dry summers and cool, wet winters. NOAA 2006-2020 Climate Normals (NCEI 2026) for Portland-Hillsboro Airport, the nearest long-term observing station to the proposed gen-tie, indicate average annual precipitation totaling approximately 34 inches, with most precipitation occurring from October to March and very little precipitation during July and August. The average winter temperature is approximately 40 °F, while the average summer temperature is approximately 66 °F. Climate normals indicate wetter and more overcast conditions during late fall through spring compared to summer months. Reduced visibility associated with fog and low cloud conditions can occur periodically during winter weather events.

FIGURE 2 WILDLIFE AND BIODIVERSITY AREA



4. METHODS

4.1 FIELD INVESTIGATIONS

ERM conducted a desktop review and subsequent pedestrian surveys on January 24 to 25 and May 16, 2024, to identify avian habitat (including wetlands and waters due to their habitat value for birds) and to collect avian data and observations (ERM 2024a, ERM 2024b). ERM conducted pedestrian surveys for general wildlife, including avian species, during normal daylight hours and fair weather conditions to assess direct and indirect evidence of potential wildlife presence and activity (e.g., confirmed visual or auditory observations, presence of animal tracks or scat, indications of active animal forage or nesting). To assess avian habitat, ERM documented habitat types and delineated wetland and water features. ERM evaluated potentially regulated features using indicators of wetland or waterbody characteristics, or the lack thereof.

4.2 AVIAN DATA COMPILATION

ERM reviewed the following data sources for information on mapped wildlife habitat and potential or known protected species and habitats within a 1-mile radius of the gen-tie:

- Current and historical aerial imagery (Google Earth and Esri Topographic Web Mapping);
- USGS topographic contours;
- USFWS IPaC species list (USFWS 2026);
- USFWS Birds of Conservation Concern 2012: Migratory Bird Program (USFWS 2021);
- The ODFW Compass—OCS Reporting Tool (ODFW 2021);
- Audubon Important Bird Areas (Audubon 2025);
- North American Bird Conservation Initiative Bird Conservation Regions (NABCI 2021);
- Oregon Biodiversity Information Center (ORBIC) Rare Species Data (ORBIC 2025);
- Homeland Infrastructure Foundation Level Database Transmission Line data (Oregon Explorer 2024);
- State of Oregon GEOHub Data Oregon Wetland Database (State of Oregon 2019);
- U.S. Department of Agriculture, Natural Resources Conservation Service soil survey maps (NRCS 2026);
- USFWS National Wetland Inventory maps (USFWS 2004); and,
- USGS National Hydrography Database maps (USGS 2001).

ERM reviewed eBird bar chart data for the NWR to assess overall avian species detection frequencies and composition in the area (eBird 2026). ERM filtered the data to compile a list of the species¹ with maximum detection frequencies of 6 percent or greater² at any point in the year

¹ This does not include non-species taxa – observational categories used when a bird cannot be definitively identified to a single, distinct species, but can still be meaningfully described or grouped (eBird 2025a).

² eBird determines likelihood of observing a species in a given area based on frequency of detection. Detection frequencies less than 6 percent signify a species is either infrequent or unrecorded in that area (eBird 2021).

(to account for seasonal use of nearby habitat by migrants) over a roughly 9.5-year period from January 2016 to July 2026.

The frequency of detection is the percentage of complete eBird checklists that report a specific bird species in a given region and time frame (eBird 2025b). Species detected at frequencies lower than 6 percent are considered uncommon (eBird 2011) and therefore less likely to interact with the proposed gen-tie infrastructure. As such, these uncommon species were not considered for this assessment. Importantly, detection frequency does not necessarily reflect abundance. For example, Snow Goose (*Anser caerulescens*) was documented in the area during migration and the non-breeding season. Although the species reached its highest detection frequency in October (approximately 13 percent), the maximum count recorded that month was only six individuals. In contrast, Snow Goose detection frequency in January was lower (5.6 percent), but the maximum count was substantially higher at 102 individuals.

ERM assigned species to three broad groups - waterbirds, raptors, and other birds - and assessed the USFWS, State of Oregon (ODFW 2021), and OCS conservation status for each species.

4.3 RISK ASSESSMENT

ERM considered collision risk for the species groups included in the final avian species list and conducted a qualitative exposure analysis considering frequency of occurrence, seasonal use, susceptibility (i.e., flight maneuverability, flocking behavior, known collision vulnerability), and the utility infrastructure location and configuration in relation to surrounding habitat resources.

5. RESULTS

5.1 FIELD INVESTIGATIONS

The desktop assessment identified federal and state listed and sensitive species and OCS habitats including oak woodlands, flowing water and riparian areas, and wetlands with potential to occur within the Project study area (ERM 2024a), which included the proposed work area for the utility infrastructure within the City of Sherwood as well as portions of the Project area that are outside City limits. ERM did not observe oak woodlands during the pedestrian survey, although limited wetland and shrub habitat was observed. In addition, ERM observed that Rock Creek, offsite to the east of the study area (and outside of City limits), had flooded the eastern end of the surveyed parcels as well as neighboring parcels.

ERM observed two sensitive species during the biological resources survey: a Bald Eagle (Bald and Golden Eagle Protection Act) perching in trees within the Project study area, and one Western Meadowlark (state sensitive-critical) flyover; no suitable nesting habitat was identified for these species within the Project study area. ERM did not observe any other sensitive species in the vicinity of the Project during surveys. An unmaintained hazelnut orchard in the northern portion of the Project study area (outside of City limits) provides nesting and foraging habitat for passerine species. In addition, ERM documented a potential Spotted Towhee (*Pipilo maculatus*) nest near the southwestern edge of the forested habitat near the proposed BESS location (outside of City limits). ERM determined the site may provide some foraging habitat for raptors and nesting habitat for passerines (songbirds), and that limited aquatic habitat was present toward the northern end of the Project study area.

ERM observed and/or delineated three wetlands, one stream, and one excavated pond within the Project study area during the initial field surveys in January 2024 (ERM 2024b). ERM did not identify any additional wetland or waters features within the Project study area during the field survey in May 2024. All identified wetlands and waters are located outside of City limits within unincorporated Washington County.

5.2 AVIAN RESOURCES

5.2.1 HABITAT

The primary habitats in the immediate vicinity of the proposed gen-tie are highly disturbed and provide limited resources for birds. The utility corridor is managed by PGE and primarily consists of open, non-native annual and perennial grassland with sparse tree cover, Himalayan blackberry (*Rubus armeniacus*) thickets, and other non-native and invasive species along the margins of the right-of-way. The western end of the proposed gen-tie crosses the proposed Adams Avenue North Concept Plan, an area with proposed urban development along Southwest Langer Farms Parkway, before terminating at PGE's Sherwood Substation. Habitat in this area is largely limited to landscaping along the road and extensive energy infrastructure converges at the substation (Figure 3).

The proposed gen-tie is near the Tualatin River National Wildlife Refuge (NWR), a United States Fish and Wildlife Service (USFWS)-managed complex of six refuge management units totaling



2,217 acres (USFWS 2012). The Refuge includes portions of the Tualatin River and its tributaries, seasonal and persistent wetlands, riparian corridors, river floodplain habitat, and agricultural fields (USFWS N.D.). During the period between November and May, increased precipitation in the area leads to flooding and runoff diversion into the NWR. The Atfalat'i Unit (555 acres), to the north of the proposed gen-tie, borders the Tualatin River and comprises seven wetland cells. The Onion Flats Unit (139 acres), to the northeast and east of the proposed gen-tie, is a low-lying basin bisected by the channelized Rock Creek (USFWS 2012). In winter, flooded wetlands in these areas provide important habitat for wintering waterfowl, and there are typically 15,000 to 30,000 individuals on the refuge, with Northern Pintail (*Anas acuta*) exceeding 18,000 individuals and Cackling Goose (*Branta hutchinsii*) exceeding 8,000 individuals (all units including the disjunct Wapato Unit) (Audubon 2024). During spring and fall migration periods, mudflats are abundant drawing groups of up to 100 birds.

Based on recent Google Earth imagery from February 2025, the month with the greatest average daily discharge rate measured on the Tualatin River (USFWS 2012), wetland habitat is concentrated to the north of the proposed gen-tie in the Atfalat'i and Onion Flats Units. Rock Creek remains channelized toward the southern end of the Onion Flats Unit to the east of the proposed gen-tie.

5.2.2 SPECIES COMPOSITION

The eBird data for the NWR contained 234 species documented during the 9.5-year period from January 2016 to July 2026, of which 149 species had a maximum detection frequency of 6 percent or greater and could be considered frequently detected in the area (Appendix A). This species assemblage accounts for transient or flyover use of the proposed gen-tie area. Habitat in the immediate vicinity of the proposed gen-tie is either non-existent or unsuitable for many (including all waterbirds) of these 149 species.

Special status species frequently documented at the NWR are summarized in Table 1, NWR Special Status Species. None of these species are of high conservation importance (i.e., federally or state endangered or threatened).

FIGURE 3 RARE SPECIES AND HABITAT RESOURCES

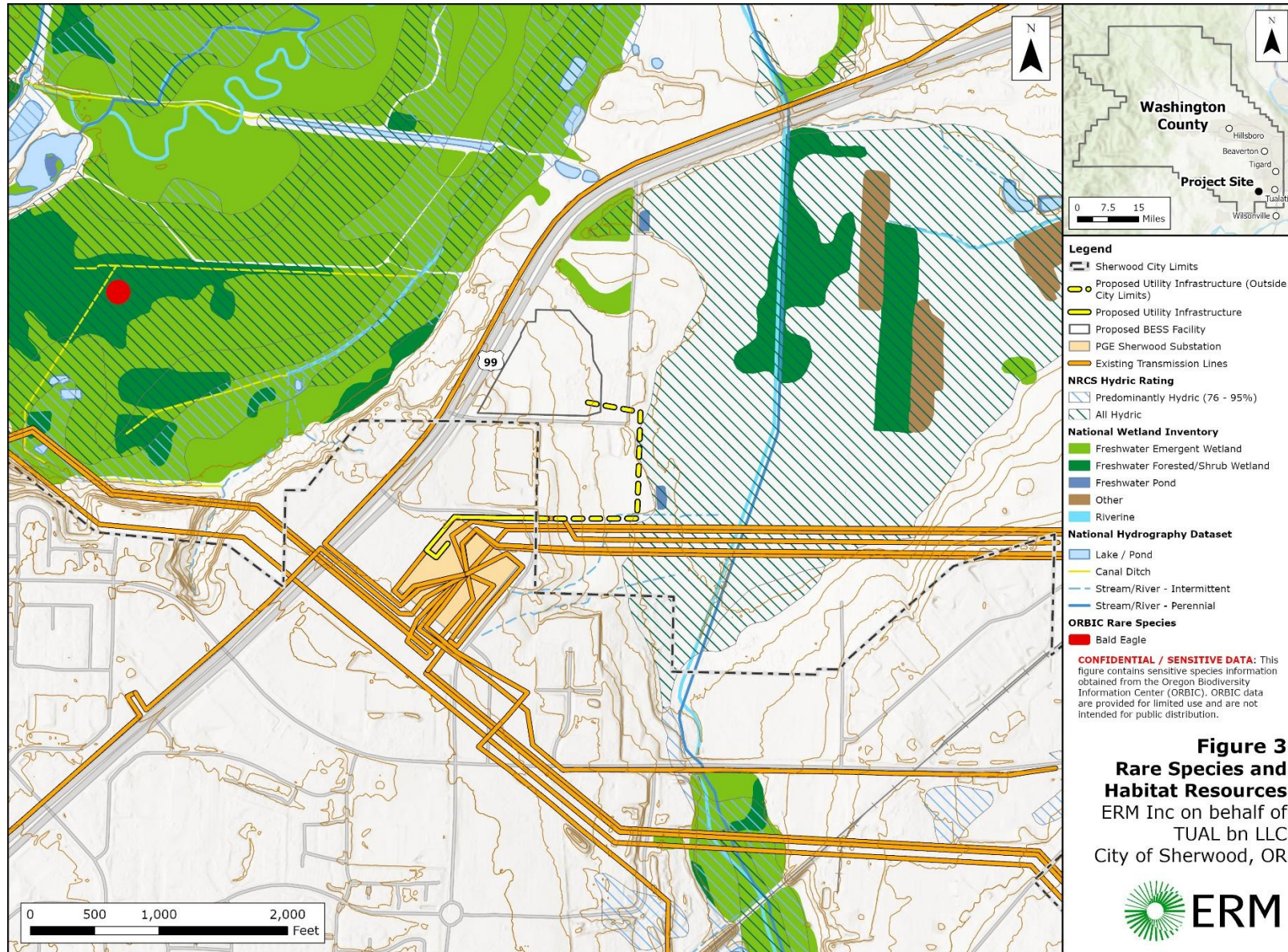


TABLE 1 NWR SPECIAL STATUS SPECIES

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
California Gull (<i>Larus californicus</i>)	Waterbird	Seabird	BCC	-	-	8%
Lesser Yellowlegs (<i>Tringa flavipes</i>)	Waterbird	Shorebird	BCC-nb	-	-	40%
Marbled Godwit (<i>Limosa fedoa</i>)	Waterbird	Shorebird	BCC-nb	-	-	8%
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	Waterbird	Shorebird	BCC	-	-	10%
Wilson's Phalarope (<i>Phalaropus tricolor</i>)	Waterbird	Shorebird	-	-	SGCN	16%
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Raptor	Eagle	BGEPA	-	-	72%
Peregrine Falcon (<i>Falco peregrinus</i>)	Raptor	Falcon	-	SC	-	13%
Rufous Hummingbird (<i>Selasphorus rufus</i>)	Other bird	Hummingbird	BCC	-	-	13%
Vaux's Swift (<i>Chaetura vauxi</i>)	Other bird	Hummingbird	BCC	-	-	62%
Chestnut-backed Chickadee (<i>Poecile rufescens</i>)	Other bird	Passerine	BCC	-	-	22%
Purple Martin (<i>Progne subis</i>)	Other bird	Passerine	-	SC	SGCN	60%
Western Bluebird (<i>Sialia mexicana</i>)	Other bird	Passerine	-	S	SGCN	9%
Western Meadowlark (<i>Sturnella neglecta</i>)	Other bird	Passerine	-	SC	SGCN	13%
Western Wood-Pewee (<i>Contopus sordidulus</i>)	Other bird	Passerine	-	S	-	60%
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	Other bird	Passerine	BCC	-	SGCN	30%
Willow Flycatcher (<i>Empidonax traillii</i>)	Other bird	Passerine	-	SC	SGCN	46%

Notes:

USFWS Classifications - BGEPA = Bald and Golden Eagle Protection Act; BCC = Bird of Conservation Concern; BCC-nb = Bird of Conservation Concern, non-breeding

State Classifications - S = Sensitive; SC = Sensitive-Critical

OCS Classification - SGCN = Species of Greatest Conservation Need

5.2.2.1 WATERBIRDS

Of the species frequently documented within the NWR, 59 are waterbirds including waterfowl, shorebirds, gulls, herons, rails, and pelicans. Twenty-four waterfowl species are frequently documented at the NWR including Tundra Swan (*Cygnus columbianus*), Snow Goose (*Anser caerulescens*), and Cinnamon Teal (*Spatula cyanoptera*). While some of the waterfowl species documented at the NWR are resident, many are migratory and utilize extensive wetland and floodplain habitat present between November and May. Many migratory waterfowl species form large flocks during migration and when on their wintering grounds. Twenty-two shorebird species are frequently documented at the NWR including Spotted Sandpiper (*Actitis macularius*), Lesser Yellowlegs (*Tringa flavipes*), and Least Sandpiper (*Calidris minutilla*). Shorebird species are typically found foraging along the margins of water bodies and in shallower water and most are present in the area during migration and into the summer months when water levels recede following the rainy season. Thirteen species of other waterbirds are frequently documented at the NWR including California Gull (*Larus Californicus*), Pied-billed Grebe (*Podilymbus Podiceps*), and Great Blue Heron (*Ardea herodias*). This group is diverse, and while many species are solitary and utilize habitat within emergent vegetation, the American Coot (*Fulica americana*) and American White Pelican (*Pelicanus erythrorhynchos*) utilize open aquatic habitat and are more gregarious.

5.2.2.2 RAPTORS

Twelve species of raptor are frequently documented within the NWR, including Bald Eagle (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), Merlin (*Falco sparverius*), and Red-shouldered Hawk (*Buteo lineatus*). Many of the raptor species documented at the NWR are resident species and likely breed in the area. While most raptors are solitary, Bald Eagles can congregate in large numbers on their wintering grounds and Turkey Vultures (*Cathartes aura*) are often observed in groups of varying sizes when foraging. Raptor species documented at the NWR utilize a broad range of habitat types including grassland, oak woodland, riparian forest, and wetland.

5.2.2.3 OTHER BIRDS

Seventy-eight species frequently documented within the NWR are passerines, hummingbirds, doves, woodpeckers, game birds, and one species of kingfisher. These include common species such as Song Sparrow (*Melospiza melodia*), Brewer's Blackbird (*Euphagus cyanocephalus*), Northern Flicker (*Colaptes auratus*), and Rufous Hummingbird (*Selasphorus rufus*). While many birds in this group are year-round residents, others display a broad range of migratory habits: most warblers, swallows, hummingbirds, and flycatchers breed in the area and migrate during the winter, and many species of sparrow overwinter in the area and are absent during the breeding season. This group of species utilizes a broad range of habitat types found throughout the area. While some species such as Red-winged Blackbird (*Agelaius phoeniceus*) breed in loose colonies, others such as the Ruby-crowned Kinglet (*Corthylio calendula*) forage in mixed-species flocks during the non-breeding season.

5.3 COLLISION RISK ASSESSMENT

Site-specific variables define collision risk, and not all transmission lines present an equal risk to birds. Avian collision risk is determined by assessing species-specific factors, site-specific factors (e.g., habitat, land-use, topography, weather), and power line-specific factors (Avian Power Line Interaction Committee (APLIC) 2012; Bernardino et al. 2018; Mojica et al. 2009).

Collision risk is not random among species; those at greatest risk of collision with overhead lines are large, heavy-bodied birds with limited maneuverability and large wingspans such as waterfowl, cranes, pelicans, and herons (APLIC 2012; Bevanger 1994). Gregarious, flocking species are generally considered more vulnerable to collision than species with solitary habits (Bernardino et al. 2018; Bevanger 1994). Species with visual limitations or reduced visual acuity are more likely to collide with less visible components of transmission line design such as shield wires, guy wires, and overhead optical ground wires (Bevanger 1994). Landscape context is also critical; lines that cross major flight paths or movement corridors, occur between roosting and feeding areas, follow prominent topographical features, or are located in areas with frequent fog and poor visibility are more likely to lead to potential interactions (Bernardino et al. 2018; Bevanger 1994; Mojica et al. 2009).

5.3.1 EXPOSURE ANALYSIS

Despite the proximity of the proposed gen-tie line to the Tualatin River National Wildlife Refuge, the proposed gen-tie does not cross major water bodies or wetland complexes and is not near known communal bird roost sites. These characteristics distinguish the Project from other transmission line settings that are most associated with elevated avian collision rates described in the literature.

Wetland habitat is concentrated to the north of the proposed gen-tie in the Atfálat'i and Onion Flats Units of the NWR. East of the proposed gen-tie, habitat becomes more concentrated in the southern portion of the Onion Flats Unit due to the channelization of Rock Creek. Based on habitat conditions and distribution, ERM expects most east to west bird movements to occur north of the proposed gen-tie, while most north to south bird movements are likely to occur east of the proposed gen-tie. Because the area lies within the Pacific Flyway, one of the four major bird migration corridors within the continental U.S., movements towards the north and south are expected to increase during spring and fall migration. The rise in elevation to the west and northwest, combined with the distance between the proposed gen-tie and the core of the Atfálat'i Unit to the north, likely serves as a buffer that may reduce collision risk by limiting altitude changes as birds approach or depart refuge habitats (Figure 3).

5.3.1.1 WATERBIRDS

Waterbirds can collide with transmission lines because of their poor maneuverability, which is often associated with high wing-loading (Bevanger 1998; Rioux, Savard, and Gerick 2013). Most waterbird collisions with transmission lines occur in specific habitats, especially where they cross water bodies (Bevanger 1998), between resting and foraging areas (Savereno et al. 1996), near and parallel to shores (APLIC 2012), and through valleys (Bevanger 1998).

Waterbird abundance and distribution throughout the NWR is correlated with the spatial distribution of aquatic habitats, which vary significantly throughout the year. During drier months, aquatic habitat is largely limited to areas closer to the Tualatin River and along Rock Creek and waterbird species are unlikely to encounter the proposed gen-tie area due to lack of suitable habitat within the utility right-of-way and lack of a known movement corridor across the utility right-of-way. During wet months, availability of aquatic habitats in the NWR significantly increases, and habitat to the northeast and east of the proposed gen-tie is flooded. This increase in availability of wetland habitat likely increases bird activity in the area. That said, bird movement in the area is likely concentrated north of the proposed gen-tie in the east to west direction across Route 99 West between refuge areas. The area around the proposed gen-tie provides limited roosting habitat for waterbirds, and it is unlikely that birds move through the area to fly to or from roosts.

5.3.1.2 RAPTORS

The potential for raptors to interact with tall structures such as transmission lines, towers, and guy-wires is relatively low in comparison to other species groups since raptors have excellent eyesight, do not form flocks, and are generally better able to maneuver around obstacles than many other large birds (APLIC 2012; Bernardino et al. 2018; Eccleston and Harness 2018; Mojica 2020). That said, some raptor species are more likely to engage in high-speed flights when hunting, which can make them susceptible to unforeseen obstacles (APLIC 2012). Studies have shown that raptors avoid transmission lines intersecting regular movement corridors suggesting that individuals may become acclimatized to fixed obstacles within frequently used areas (Mojica 2020).

Raptor foraging habitat and nesting substrate in the immediate vicinity of the proposed gen-tie are limited. Some species such as Red-tailed Hawk (*Buteo jamaicensis*) and American Kestrel (*Falco sparverius*) frequently hunt in open habitat and likely utilize the area within the utility corridor. Even so, these species typically engage in hovering or slow flight when hunting in such habitat rather than the high-speed flight more likely to result in line collision. Both resident and migrant raptors occur in the area and utilize habitat within the NWR when foraging. Whereas most documented species are habitat generalists, Bald Eagles and Osprey hunt for aquatic prey and, like waterbirds in the area, their foraging patterns can be expected to shift with seasonal variation in the spatial distribution of aquatic habitats. ORBIC data includes a known Bald Eagle nest to the west of Route 99 West, and one Bald Eagle was observed perched within the BESS Project area to the north of the proposed gen-tie during the Biological Resource Survey in 2024 (ERM 2024a). None of the raptor species discussed in this section are known to have a high collision risk.

5.3.1.3 OTHER BIRDS

Because they are generally small, passerine collision risk may be underestimated because carcasses are difficult to detect and have a high scavenging rate. That said, most are not heavy bodied and have low wing-loading and greater maneuverability (APLIC 2012). Some passerine species such as the European Starling (*Sturnus neglectus*) are highly social and form large flocks, a behavior which can increase the risk of collision, especially when startled (APLIC 2012). The majority of resident and wintering passerine and other bird species expected in the vicinity of the

proposed gen-tie are relatively solitary or form smaller, multi-species flocks during the non-breeding season. Because of the limited vegetative cover in the vicinity of the proposed alignment, the area is not attractive to this group. While some of these other bird species likely utilize habitat along the margins of the utility infrastructure, habitat for others is not present. This group is unlikely to interact with the proposed gen-tie infrastructure.

6. APLIC-BASED AVOIDANCE AND MINIMIZATION MEASURES

The Applicant will design and construct the proposed gen-tie to avian-safe design standards, including in accordance with Reducing Avian Collisions with Power Lines (APLIC 2012), and Suggested Practices for Avian Protection on Power Lines (APLIC 2006).

6.1 PROPOSED GEN-TIE ALIGNMENT AND DESIGN

The proposed gen-tie alignment provides the shortest practicable route between the City limit and PGE's required point of interconnection and minimizes impacts to existing PGE infrastructure by consolidating the existing 115 kV and new 230 kV conductors within an established utility corridor. The Applicant proposes to replace existing wood poles with steel monopoles capable of supporting both the existing 115 kV conductors and the new 230 kV conductors. Approximately 1,200 linear feet of the existing 115 kV conductors will be re-strung on the replacement structures rather than relocated to a new corridor and the new 230 kV conductors will be integrated on the replacement structures.

The proposed design comprises five vertically configured double circuit monopoles. The anticipated structure configurations will be approximately 120 to 140 feet tall, depending on span distances (current structures are approximately 53 to 63 feet tall). Proposed conductor heights at mid-span will range from approximately 46 to 109 feet high (current conductor heights at mid-span range from approximately 33 to 50 feet high). The gen-tie span distances will range from approximately 167 to 360 feet. Vertical spacing will be approximately 12 to 15 feet between the 230 kV conductors and 8 feet between the 115 kV conductors. Based on the current design, the gen-tie will not utilize an overhead shield wire, the transmission line feature which accounts for most avian collisions (APLIC 2012, Bernardino et al. 2018). Three monopole structures will be erected atop pier foundations and two will have their bases embedded below-grade; no structures will require guy wires. The proposed design incorporates optical fiber cables which will be installed toward the base of the towers beneath the 115 kV and 230 kV conductors.

6.2 LINE VISIBILITY MEASURES

Because of their smaller diameter, shield wires, guy wires, and overhead optical ground wires pose the greatest risk for avian collisions and will be marked with flight diverters or other approved devices in accordance with APLIC guidelines (APLIC 2012). Numerous studies have shown that flight diverters (line markers) can significantly decrease avian collision rates (Mojica et al 2009; Bernardino et al. 2018; Murphy et al. 2016). Barrientos et al. (2011) analyzed the results of 21 independent studies on power line marking and reported an average 78% reduction in collisions across various types of marking technologies in different geographic locations. Bernardino et al. (2019) analyzed 191 studies on power line marking and reported an average reduction in collisions of 50.4% across different device-types under different scenarios.

Although existing PGE facilities in the corridor are not currently marked, installation of diverters on the new conductors will represent an enhancement measure intended to further reduce the already low anticipated collision risk associated with the proposed gen-tie. Since the new infrastructure will be taller than the existing infrastructure, flight diverters can help to limit risk

posed by the increased height of the new towers and lines. Fog and a lower cloud ceiling during wet months decrease visibility for flighted birds, leading to lower flight altitudes and increased collision risk. Flight diverters that glow-in-the-dark with bright coloration and reflective features are helpful under such conditions and are recommended due to frequency of fog and low cloud ceiling in the Project region.

In addition to marking power lines to increase visibility to birds in flight and thus reduce exposure risk, collocating power lines in existing rights-of-way immediately adjacent or parallel to existing power lines has been shown to reduce exposure risk (Thompson 1978, APLIC 2012). Best practice guidelines suggest that new power lines be sited along existing linear elements (e.g., existing powerline right-of-way and roads) to help mitigate collisions and reduce exposure risk (Williams 2003, Prinsen et al. 2012, SNH 2016). Because the proposed gen-tie is co-located with existing PGE infrastructure and within a highly developed utility corridor, resident birds are likely acclimated to the presence of lines in the area (Mojica 2020).

7. CONCLUSIONS

Based on the proposed alignment, existing utility setting, surrounding habitat conditions, anticipated bird-movement patterns, and implementation of appropriate line-marking measures (Bernardino et al. 2018), ERM concludes that the proposed gen-tie would result in minimal additional avian collision risk. Habitat within and in the immediate vicinity of the proposed gen-tie is degraded and provides marginal value to birds. While the Tualatin River NWR and nearby Audubon IBA see large numbers of birds, especially during migration and winter months, the proposed alignment does not pose a barrier to movement between NWR resources or bisect the IBA and ODFW habitat. The nearest portions of the IBA occur approximately 1,000 feet east of the portion of the proposed gen-tie within City limits. The distribution of refuge resources suggests that bird movement is more likely to occur between refuge units north and northeast of the proposed gen-tie than directly across the alignment. Because it has been channelized, Rock Creek, to the northeast and east, is not a significant habitat resource for large-bodied waterbirds outside of the rainy season. Additionally, Rock Creek and its floodplain lie to the east of the proposed gen-tie and most avian movement along the creek and associated habitats is likely concentrated in the north to south direction along the creek, which does not cross the proposed gen-tie.

PGE has had no reported bird collisions associated with its existing facilities in the existing utility right-of-way proposed for the gen-tie (PGE, pers. comm.). While the absence of reported collisions does not establish that collisions never occur, it provides useful local context alongside the data and risk assessment summarized herein and the Applicant's commitment to adhere to APLIC guidance.

While the proposed infrastructure will be taller than existing infrastructure within the utility corridor, any potential collision risk associated with the additional height of towers and lines can be significantly reduced by utilizing flight diverters. Marking the conductors along the proposed gen-tie will occur. Additionally, by not using an overhead shield wire, the design removes the aspect of the transmission line most often involved in avian collisions.

8. REFERENCES

- APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection On Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, California.
- _____. 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C.
- Barrientos, R., J.C. Alonso, C. Ponce, and C. Palacin. 2011. *Meta-analysis of the Effectiveness of Marked Wire in Reducing Avian Collisions with Power Lines*. *Conservation Biology* 25(5): 893-903.
- Bernardino, J., K. Bevanger, R. Barrientos, J.F. Dwyer, A.T. Marques, R.C. Martins, J.M. Shaw, J.P. Silva, F. Moreira. 2018. *Bird Collisions with Power Lines: State of the Art and Priority Areas for Research*. *Biological Conservation*, 222:1-13.
- Bevanger, K. 1994. Bird interactions with utility structures: collision and electrocution, causes and mitigating measures. *Ibis* 136: 412-425.
- _____. 1998. *Biological and Conservation Aspects of Bird Mortality Caused by Electricity Power Lines: A Review*. *Biological Conservation*, 86(1998):67-76.
- City of Sherwood. 2026. *Adams Avenue North Concept Plan*. Accessed 16 August 2026. Retrieved from: <https://www.sherwoodoregon.gov/projects/adams-avenue-north-concept-plan/>
- Cornell Lab of Ornithology. 2026. *All About Birds*. Cornell Lab of Ornithology, Ithaca, New York. Accessed 18 August 2026. Retrieved from: <https://www.allaboutbirds.org>
- eBird. 2025a. *eBird Bar Charts and Graphs*. Cornell Lab of Ornithology, Ithaca, New York. Accessed 15 August 2026. Retrieved from: <https://support.ebird.org/en/support/solutions/articles/48001255130-ebird-bar-charts-and-graphs>
- eBird. 2025b. *The eBird Taxonomy*. Cornell Lab of Ornithology, Ithaca, New York. Accessed 15 August 2026. Retrieved from: <https://support.ebird.org/en/support/solutions/articles/48000837816-the-ebird-taxonomy>
- eBird. 2026. *Bird Observations: Tualatin Wildlife Refuge*. Cornell Lab of Ornithology, Ithaca, New York. Accessed 15 August 2026. Retrieved from: https://ebird.org/barchart?byr=2016&eyr=2026&bmo=1&emo=12&r=US-OR_2564
- Eccleston, D.T., and R.E. Harness. 2018. *Raptor Electrocutions and Power Line Collisions*. In: Sarasola, J., J. Grande, J. Negro (eds) *Birds of Prey: Biology and Conservation in the 21st Century*. Springer.
- ERM (Environmental Resources Management, Inc.). 2024a. *Biological Resources Survey Report: Tualatin BESS Project*. Prepared for BrightNight LLC. July 2024.
- _____. 2024b. *Wetlands and Waters Delineation Report: Tualatin*. Prepared for BrightNight LLC. June 2024, revised November 2024.

- Mojica, E.K., B. Watts, J.T. Paul, S.T. Voss, J. Pottie. 2009. *Factors Contributing to Bald Eagle Electrocutions and Line Collisions on Aberdeen Proving Ground, Maryland*. Journal of Raptor Research, 43(1):000
- Mojica, E.K., C.E. Rocca, J. Luzenski, R.E. Harness, J.L. Cummings, J. Schievert, D.D. Austin, M.A. Landon. 2020. *Collision Avoidance by Wintering Bald Eagles Crossing a Transmission Line*. Journal of Raptor Research, 54(2):147-153.
- Murphy R.K., J.F. Dwyer, E.K. Mojica, M.M. McPherron, R.E. Harness. 2016. *Reactions of Sandhill Cranes Approaching a Marked Transmission Power Line*. Journal of Fish and Wildlife Management, 7(2):480-489.
- National Audubon Society. 2024. *Important Bird Areas: Explore Important Bird Areas*. Accessed August 2026. Retrieved from:
https://gis.audubon.org/portal/apps/sites/?_gl=1*15pi6uv*_gcl_au*MTk3NTY1NDg1MS4xNzg3MDY4MDU1*_ga*MjA0NjUwMTY5Ni4xNzUxMzk1MjQ3*_ga_X2XNL2MWTTCzE3ODc2MDg3MjUkbzgkZzAkdDE3ODc2MDg3MjUkajYwJGwwJGgw#/nas-hub-site
- _____. 2025. *IBA Polygons Public*. National Audubon Society. Accessed 15 August 2026. Retrieved from: <https://data-library-audubon.hub.arcgis.com/maps/087b591fd12d4dc482a4d9a3e2b60246/about>
- NCEI (National Centers for Environmental Information). 2026. *U.S. Climate Normals 1991-2020: Portland-Hillsboro AP, OR*. National Oceanic and Atmospheric Administration, National Centers for Environmental Information. Accessed 17 August 2026. Retrieved from: <https://www.ncei.noaa.gov/access/us-climate-normals/>
- NABCI (North American Bird Conservation Initiative). 2021. *Bird Conservation Regions*. North American Bird Conservation Initiative. Accessed 15 August 2026. Retrieved from: <https://nabci-us.org/resources/bird-conservation-regions/>
- NRCS (Natural Resources Conservation Service). Web Soil Survey. U.S. Department of Agriculture. Accessed August 2026. Retrieved from: <https://websoilsurvey.nrcs.usda.gov/>.
- Oregon Explorer. 2024. *Transmission Lines*. Oregon State University Libraries & Press and Institute for Natural Resources. Accessed 17 August 2026. Retrieved from: <https://hub.oregonexplorer.info/datasets/OSUGISci::transmission-lines-2024-1/about>
- ODFW (Oregon Department of Fish and Wildlife). 2021. *Oregon Department of Fish and Wildlife Sensitive Species List*. Accessed 16 August 2026. Retrieved from: https://www.dfw.state.or.us/wildlife/diversity/species/sensitive_species.asp
- _____. 2024. *Compass: Mapping Oregon's wildlife habitats*. Accessed January 2024. Retrieved from: <https://www.dfw.state.or.us/maps/compass/>
- ORBIC (Oregon Biodiversity Information Center). 2025. *Rare, Threatened, and Endangered Zoology Species of Oregon*. Institute for Natural Resources, Portland State University, Portland, Oregon.
- Prinsen, H.A.M., J.J. Smallie, G.C. Boere, and N. Pires.(Compilers) 2012. *Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-*

- Eurasian Region*. AEWa Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWa Technical Series No. 50, CMS Raptors MOU Technical Series No. 3, Bonn Germany.
- Rioux, S., J.L. Savard, A.A. Gerick. 2013. *Avian Mortalities due to Transmission Line Collisions: A Review of Current Estimates and Field Methods with an Emphasis on Applications to the Canadian Electric Network*. Avian Conservation and Ecology, 8(2):7.
- Savereno, A.J., L.A. Savereno, R. Bottcher, S.M. Haig. 1996. *Avian Behavior and Mortality at Power Lines in Coastal South Carolina*. Wildlife Society Bulletin, 24(4):636-648.
- Shiomi, K., M. Tatani, D.M. Kikuchi. 2024. BirdWingData: Wingspan and Wing Area Data of Birds Compiled from Multiple Literature Sources and Original Measurements. Ecological Research, DOI:10.1111/1440-1703.12502
- Scottish Natural Heritage (SNH). 2016. *Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds*. Guidance Version 1: July 2016. www.snh.gov.uk
- State of Oregon. 2019. *Oregon Wetland Database*. Oregon GeoHUB. Accessed 15 August 2026. Retrieved from: <https://geohub.oregon.gov/maps/c2f5f74b4e6a4d4f86b4e2bd9f6fe872/about>
- Thompson, L. S. 1978. *Transmission line wire strikes: mitigation through engineering design and habitat modification*. In Avery, M. L. (ed) Impacts of Transmission Lines on Birds in Flight: Proceedings of a Workshop. Biological Services Program FWS/OBS-78/48.
- USFWS (U.S. Fish and Wildlife Service). N.D. *Tualatin River National Wildlife Refuge*. U.S. Department of the Interior. Accessed 17 August 2026. Retrieved from: <https://www.fws.gov/refuge/tualatin-river>
- _____. 2004. *National Wetlands Inventory*. Department of the Interior. Accessed August 2026. Retrieved from: <https://doi.org/10.7944/USFWS.NWI>
- _____. 2012. *Tualatin River National Wildlife Refuge, Draft Comprehensive Conservation Plan and Environmental Assessment*. Department of the Interior, Sherwood, OR: Tualatin River National Wildlife Refuge. Accessed August 2026. Retrieved from: <https://iris.fws.gov/APPS/ServCat/Reference/Profile/43348>
- _____. 2026. *Information for Planning and Consultation (IPaC)*. Department of the Interior. Accessed August 2026. Retrieved from: <https://ecos.fws.gov/ipac/>
- _____. 2021. *Birds of Conservation Concern 2021, Migratory Bird Program*. Department of the Interior. Accessed August 2026. Retrieved from: <https://www.fws.gov/media/birds-conservation-concern-2021pdf>
- USGS (U.S. Geological Survey). 2001. *National Hydrography Dataset*. Department of the Interior. Accessed August 2026. Retrieved from: <https://www.usgs.gov/3d-hydrography-program/access-3dhp-data-products>
- Williams, J.H. 2003. *International Best Practice for Assessing and Reducing the Environmental Impacts of High-Voltage Transmission Lines*. Prepared for the Third Workshop on Power Grid Interconnection in Northeast Asia, Vladivostok, Russia.



APPENDIX A

AVIAN SPECIES OCCURRING WITHIN TUALATIN RIVER NATIONAL WILDLIFE REFUGE

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
American Bittern (<i>Botaurus lentiginosus</i>)	Waterbird	Other Waterbird	-	-	-	11%
American Coot (<i>Fulica americana</i>)	Waterbird	Other Waterbird	-	-	-	71%
American White Pelican (<i>Pelecanus erythrorhynchos</i>)	Waterbird	Other Waterbird	-	-	-	55%
Double-crested Cormorant (<i>Nannopterum auritum</i>)	Waterbird	Other Waterbird	-	-	-	54%
Great Blue Heron (<i>Ardea herodias</i>)	Waterbird	Other Waterbird	-	-	-	93%
Great Egret (<i>Ardea alba</i>)	Waterbird	Other Waterbird	-	-	-	84%
Green Heron (<i>Butorides virescens</i>)	Waterbird	Other Waterbird	-	-	-	34%
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	Waterbird	Other Waterbird	-	-	-	75%
Sora (<i>Porzana carolina</i>)	Waterbird	Other Waterbird	-	-	-	13%
Virginia Rail (<i>Rallus limicola</i>)	Waterbird	Other Waterbird	-	-	-	12%
Wilson's Snipe (<i>Gallinago delicata</i>)	Waterbird	Other Waterbird	-	-	-	30%
Bonaparte's Gull (<i>Chroicocephalus philadelphia</i>)	Waterbird	Seabird	-	-	-	7%
California Gull (<i>Larus californicus</i>)	Waterbird	Seabird	BCC	-	-	8%
American Avocet (<i>Recurvirostra americana</i>)	Waterbird	Shorebird	-	-	-	39%
Baird's Sandpiper (<i>Calidris bairdii</i>)	Waterbird	Shorebird	-	-	-	6%
Black-bellied Plover (<i>Pluvialis squatarola</i>)	Waterbird	Shorebird	-	-	-	7%
Black-necked Stilt (<i>Himantopus mexicanus</i>)	Waterbird	Shorebird	-	-	-	19%
Dunlin (<i>Calidris alpina</i>)	Waterbird	Shorebird	-	-	-	12%
Greater Yellowlegs (<i>Tringa melanoleuca</i>)	Waterbird	Shorebird	-	-	-	73%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Killdeer (<i>Charadrius vociferus</i>)	Waterbird	Shorebird	-	-	-	87%
Least Sandpiper (<i>Calidris minutilla</i>)	Waterbird	Shorebird	-	-	-	61%
Lesser Yellowlegs (<i>Tringa flavipes</i>)	Waterbird	Shorebird	BCC-nb	-	-	40%
Long-billed Dowitcher (<i>Limnodromus scolopaceus</i>)	Waterbird	Shorebird	-	-	-	69%
Marbled Godwit (<i>Limosa fedoa</i>)	Waterbird	Shorebird	BCC-nb	-	-	8%
Pectoral Sandpiper (<i>Calidris melanotos</i>)	Waterbird	Shorebird	-	-	-	22%
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	Waterbird	Shorebird	-	-	-	17%
Ruff (<i>Calidris pugnax</i>)	Waterbird	Shorebird	-	-	-	7%
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	Waterbird	Shorebird	-	-	-	13%
Semipalmated Sandpiper (<i>Calidris pusilla</i>)	Waterbird	Shorebird	-	-	-	8%
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	Waterbird	Shorebird	-	-	-	9%
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	Waterbird	Shorebird	BCC	-	-	10%
Solitary Sandpiper (<i>Tringa solitaria</i>)	Waterbird	Shorebird	-	-	-	16%
Spotted Sandpiper (<i>Actitis macularius</i>)	Waterbird	Shorebird	-	-	-	65%
Western Sandpiper (<i>Calidris mauri</i>)	Waterbird	Shorebird	-	-	-	47%
Wilson's Phalarope (<i>Phalaropus tricolor</i>)	Waterbird	Shorebird	-	-	SGCN	16%
American Wigeon (<i>Mareca americana</i>)	Waterbird	Waterfowl	-	-	-	69%
Black Swan (<i>Cygnus atratus</i>)	Waterbird	Waterfowl	-	-	-	18%
Blue-winged Teal (<i>Spatula discors</i>)	Waterbird	Waterfowl	-	-	-	31%
Brant (<i>Branta bernicla</i>)	Waterbird	Waterfowl	-	-	-	11%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Bufflehead (<i>Bucephala albeola</i>)	Waterbird	Waterfowl	-	-	-	81%
Cackling Goose (<i>Branta hutchinsii</i>)	Waterbird	Waterfowl	-	-	-	82%
Canada Goose (<i>Branta canadensis</i>)	Waterbird	Waterfowl	-	-	-	91%
Canvasback (<i>Aythya valisineria</i>)	Waterbird	Waterfowl	-	-	-	8%
Cinnamon Teal (<i>Spatula cyanoptera</i>)	Waterbird	Waterfowl	-	-	-	79%
Common Merganser (<i>Mergus merganser</i>)	Waterbird	Waterfowl	-	-	-	8%
Eurasian Wigeon (<i>Mareca penelope</i>)	Waterbird	Waterfowl	-	-	-	26%
Gadwall (<i>Mareca strepera</i>)	Waterbird	Waterfowl	-	-	-	86%
Greater White-fronted Goose (<i>Anser albifrons</i>)	Waterbird	Waterfowl	-	-	-	35%
Green-winged Teal (<i>Anas crecca</i>)	Waterbird	Waterfowl	-	-	-	79%
Hooded Merganser (<i>Lophodytes cucullatus</i>)	Waterbird	Waterfowl	-	-	-	25%
Lesser Scaup (<i>Aythya affinis</i>)	Waterbird	Waterfowl	-	-	-	30%
Mallard (<i>Anas platyrhynchos</i>)	Waterbird	Waterfowl	-	-	-	90%
Northern Pintail (<i>Anas acuta</i>)	Waterbird	Waterfowl	-	-	-	84%
Northern Shoveler (<i>Spatula clypeata</i>)	Waterbird	Waterfowl	-	-	-	84%
Ring-necked Duck (<i>Aythya collaris</i>)	Waterbird	Waterfowl	-	-	-	64%
Ruddy Duck (<i>Oxyura jamaicensis</i>)	Waterbird	Waterfowl	-	-	-	68%
Snow Goose (<i>Anser caerulescens</i>)	Waterbird	Waterfowl	-	-	-	13%
Tundra Swan (<i>Cygnus columbianus</i>)	Waterbird	Waterfowl	-	-	-	20%
Wood Duck (<i>Aix sponsa</i>)	Waterbird	Waterfowl	-	-	-	33%
American Kestrel (<i>Falco sparverius</i>)	Raptor	Falcon	-	-	-	53%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Raptor	Eagle	BGEPA	-	-	72%
Cooper's Hawk (<i>Accipiter cooperii</i>)	Raptor	Hawk	-	-	-	17%
Great Horned Owl (<i>Bubo virginianus</i>)	Raptor	Owl	-	-	-	10%
Merlin (<i>Falco columbarius</i>)	Raptor	Falcon	-	-	-	8%
Northern Harrier (<i>Circus hudsonius</i>)	Raptor	Hawk	-	-	-	55%
Osprey (<i>Pandion haliaetus</i>)	Raptor	Osprey	-	-	-	51%
Peregrine Falcon (<i>Falco peregrinus</i>)	Raptor	Falcon	-	SC	-	13%
Red-shouldered Hawk (<i>Buteo lineatus</i>)	Raptor	Hawk	-	-	-	8%
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	Raptor	Hawk	-	-	-	60%
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	Raptor	Hawk	-	-	-	6%
Turkey Vulture (<i>Cathartes aura</i>)	Raptor	Vulture	-	-	-	50%
California Quail (<i>Callipepla californica</i>)	Other bird	Game bird	-	-	-	13%
Ring-necked Pheasant (<i>Phasianus colchicus</i>)	Other bird	Game bird	-	-	-	11%
Anna's Hummingbird (<i>Calypte anna</i>)	Other bird	Hummingbird	-	-	-	58%
Rufous Hummingbird (<i>Selasphorus rufus</i>)	Other bird	Hummingbird	BCC	-	-	13%
Vaux's Swift (<i>Chaetura vauxi</i>)	Other bird	Hummingbird	BCC	-	-	62%
Belted Kingfisher (<i>Megasceryle alcyon</i>)	Other bird	Kingfisher	-	-	-	49%
American Crow (<i>Corvus brachyrhynchos</i>)	Other bird	Passerine	-	-	-	67%
American Goldfinch (<i>Spinus tristis</i>)	Other bird	Passerine	-	-	-	68%
American Pipit (<i>Anthus rubescens</i>)	Other bird	Passerine	-	-	-	14%
American Robin (<i>Turdus migratorius</i>)	Other bird	Passerine	-	-	-	91%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Bank Swallow (<i>Riparia riparia</i>)	Other bird	Passerine	-	-	-	16%
Barn Swallow (<i>Hirundo rustica</i>)	Other bird	Passerine	-	-	-	88%
Bewick's Wren (<i>Thryomanes bewickii</i>)	Other bird	Passerine	-	-	-	55%
Black Phoebe (<i>Sayornis nigricans</i>)	Other bird	Passerine	-	-	-	24%
Black-capped Chickadee (<i>Poecile atricapillus</i>)	Other bird	Passerine	-	-	-	66%
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)	Other bird	Passerine	-	-	-	53%
Black-throated Gray Warbler (<i>Setophaga nigrescens</i>)	Other bird	Passerine	-	-	-	9%
Brewer's Blackbird (<i>Euphagus cyanocephalus</i>)	Other bird	Passerine	-	-	-	18%
Brown Creeper (<i>Certhia americana</i>)	Other bird	Passerine	-	-	-	27%
Brown-headed Cowbird (<i>Molothrus ater</i>)	Other bird	Passerine	-	-	-	59%
Bullock's Oriole (<i>Icterus bullockii</i>)	Other bird	Passerine	-	-	-	7%
Bushtit (<i>Psaltiriparus minimus</i>)	Other bird	Passerine	-	-	-	43%
California Scrub-Jay (<i>Aphelocoma californica</i>)	Other bird	Passerine	-	-	-	76%
Cassin's Vireo (<i>Vireo cassinii</i>)	Other bird	Passerine	-	-	-	7%
Cedar Waxwing (<i>Bombycilla cedrorum</i>)	Other bird	Passerine	-	-	-	78%
Chestnut-backed Chickadee (<i>Poecile rufescens</i>)	Other bird	Passerine	BCC	-	-	22%
Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)	Other bird	Passerine	-	-	-	59%
Common Raven (<i>Corvus corax</i>)	Other bird	Passerine	-	-	-	7%
Common Yellowthroat (<i>Geothlypis trichas</i>)	Other bird	Passerine	-	-	-	85%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Dark-eyed Junco (<i>Junco hyemalis</i>)	Other bird	Passerine	-	-	-	68%
European Starling (<i>Sturnus vulgaris</i>)	Other bird	Passerine	-	-	-	81%
Fox Sparrow (<i>Passerella iliaca</i>)	Other bird	Passerine	-	-	-	24%
Golden-crowned Kinglet (<i>Regulus satrapa</i>)	Other bird	Passerine	-	-	-	39%
Golden-crowned Sparrow (<i>Zonotrichia atricapilla</i>)	Other bird	Passerine	-	-	-	56%
Hermit Thrush (<i>Catharus guttatus</i>)	Other bird	Passerine	-	-	-	7%
House Finch (<i>Haemorhous mexicanus</i>)	Other bird	Passerine	-	-	-	74%
House Sparrow (<i>Passer domesticus</i>)	Other bird	Passerine	-	-	-	9%
Hutton's Vireo (<i>Vireo huttoni</i>)	Other bird	Passerine	-	-	-	10%
Lazuli Bunting (<i>Passerina amoena</i>)	Other bird	Passerine	-	-	-	68%
Lesser Goldfinch (<i>Spinus psaltria</i>)	Other bird	Passerine	-	-	-	44%
Lincoln's Sparrow (<i>Melospiza lincolni</i>)	Other bird	Passerine	-	-	-	21%
Marsh Wren (<i>Cistothorus palustris</i>)	Other bird	Passerine	-	-	-	28%
Northern Rough-winged Swallow (<i>Stelgidopteryx serripennis</i>)	Other bird	Passerine	-	-	-	35%
Northern Shrike (<i>Lanius borealis</i>)	Other bird	Passerine	-	-	-	9%
Northern Yellow Warbler (<i>Setophaga aestiva</i>)	Other bird	Passerine	-	-	-	34%
Orange-crowned Warbler (<i>Leiothlypis celata</i>)	Other bird	Passerine	-	-	-	44%
Pacific Wren (<i>Troglodytes pacificus</i>)	Other bird	Passerine	-	-	-	16%
Pine Siskin (<i>Spinus pinus</i>)	Other bird	Passerine	-	-	-	11%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
Purple Finch (<i>Haemorhous purpureus</i>)	Other bird	Passerine	-	-	-	29%
Purple Martin (<i>Progne subis</i>)	Other bird	Passerine	-	SC	SGCN	60%
Red-breasted Nuthatch (<i>Sitta canadensis</i>)	Other bird	Passerine	-	-	-	35%
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)	Other bird	Passerine	-	-	-	93%
Ruby-crowned Kinglet (<i>Corthylio calendula</i>)	Other bird	Passerine	-	-	-	46%
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	Other bird	Passerine	-	-	-	72%
Song Sparrow (<i>Melospiza melodia</i>)	Other bird	Passerine	-	-	-	85%
Spotted Towhee (<i>Pipilo maculatus</i>)	Other bird	Passerine	-	-	-	79%
Steller's Jay (<i>Cyanocitta stelleri</i>)	Other bird	Passerine	-	-	-	41%
Swainson's Thrush (<i>Catharus ustulatus</i>)	Other bird	Passerine	-	-	-	50%
Tree Swallow (<i>Tachycineta bicolor</i>)	Other bird	Passerine	-	-	-	68%
Violet-green Swallow (<i>Tachycineta thalassina</i>)	Other bird	Passerine	-	-	-	46%
Western Bluebird (<i>Sialia mexicana</i>)	Other bird	Passerine	-	S	SGCN	9%
Western Flycatcher (<i>Empidonax difficilis</i>)	Other bird	Passerine	-	-	-	20%
Western Meadowlark (<i>Sturnella neglecta</i>)	Other bird	Passerine	-	SC	SGCN	13%
Western Tanager (<i>Piranga ludoviciana</i>)	Other bird	Passerine	-	-	-	35%
Western Warbling Vireo (<i>Vireo swainsoni</i>)	Other bird	Passerine	-	-	-	22%
Western Wood-Pewee (<i>Contopus sordidulus</i>)	Other bird	Passerine	-	S	-	60%
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	Other bird	Passerine	BCC	-	SGCN	30%

Species	Group	Subgroup	Conservation Status			Max. Detection Frequency
			USFWS	State	OCS	
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)	Other bird	Passerine	-	-	-	46%
White-throated Sparrow (<i>Zonotrichia albicollis</i>)	Other bird	Passerine	-	-	-	6%
Willow Flycatcher (<i>Empidonax traillii</i>)	Other bird	Passerine	-	SC	SGCN	46%
Wilson's Warbler (<i>Cardellina pusilla</i>)	Other bird	Passerine	-	-	-	29%
Eurasian Collared-Dove (<i>Streptopelia decaocto</i>)	Other bird	Pigeon/Dove	-	-	-	21%
Mourning Dove (<i>Zenaida macroura</i>)	Other bird	Pigeon/Dove	-	-	-	54%
Downy Woodpecker (<i>Dryobates pubescens</i>)	Other bird	Woodpecker	-	-	-	37%
Hairy Woodpecker (<i>Dryobates villosus</i>)	Other bird	Woodpecker	-	-	-	8%
Northern Flicker (<i>Colaptes auratus</i>)	Other bird	Woodpecker	-	-	-	69%
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	Other bird	Woodpecker	-	-	-	8%
Red-breasted Sapsucker (<i>Sphyrapicus ruber</i>)	Other bird	Woodpecker	-	-	-	28%

Notes:

USFWS Classifications - BGEPA = Bald and Golden Eagle Protection Act; BCC = Bird of Conservation Concern; BCC-nb = Bird of Conservation Concern, non-breeding

State Classifications - S = Sensitive; SC = Sensitive-Critical

OCS Classification - SGCN = Species of Greatest Conservation Need



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