



Grant County
PUBLIC UTILITY DISTRICT
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April 16, 2013

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12
888 First Street, N.E.
Washington, D.C. 20426

**RE: Priest Rapids Hydroelectric Project No. 2114-217
License Compliance Filing – Article 411 Transmission Line Avian Collision
Protection Plan 2012 Annual Report**

Dear Secretary Bose,

Public Utility District No. 2 of Grant County, Washington (Grant PUD) respectfully submits to the Federal Energy Commission Regulatory Commission (FERC) its 2012 Transmission Line Avian Collision Protection Plan Annual Report.

On April 15, 2010, Grant PUD filed its Transmission Line Avian Collision Protection Plan (Plan) with FERC. On August 24, 2010, FERC issued an approving and modifying Order. Per the Plan, Grant PUD is required to install bird flight diverters (BFDs) upon ten transmission line spans from 2011 – 2015, conduct avian surveys from 2011 – 2016 and every fifteen years thereafter, and provide annual reports to the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW) and FERC by April 17 of each reporting year.

The Plan identified ten transmission line spans located within five different transmission line corridors for avian interaction studies and line marking. In 2010, Grant PUD proposed to install BFDs all on these transmission line spans to be in accordance with the guidelines set forth in “Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006,” by the Edison Electric Institute and the Avian Power Line Interaction Committee (APLIC), or as such publication may be updated from time to time. In 2012, APLIC updated its suggested practices.

In review of the APLIC publication released in 2012 (APLIC 2012), Grant PUD determined that two of its three Midway transmission line spans were in accordance with the APLIC 2012 guidelines. The Midway transmission line spans are the interior spans of a five-span

Public Utility District No. 2 of Grant County, Washington

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transmission line cluster thereby reducing avian collision potential due to the line configuration. As a result, Grant PUD proposed to its consulting parties – USFWS and WDFW – to not install BFDs on the two Midway transmission line spans. In addition, Grant PUD proposed to remove the overhead ground wires on one de-energized span, which will also reduce avian collision potential. Discussion of these proposals occurred over a number of occasions with the consulting parties; formal approval for these proposal was sought and received during the consulting parties review of this annual report in which the proposal are included. The USFWS and WDFW concurred with both of Grant PUD's proposals.

Grant PUD will continue to install BFDs as outlined in the Plan: Wanapum Switchyard - 2013, Columbia/Moses Coulee - 2014, and the one remaining Midway - 2015.

The attached document was provided to the consulting parties on March 20, 2013. Comments were received on March 26, 2013 from USFWS and WDFW on April 11, 2013. Their comments are included as appendix B and a response table to those comments in Appendix C.

FERC staff with any questions should contact Tom Dresser at 509-754-5088, ext. 2312 or by email at tdresse@gcpud.org.

Respectfully,



Julie E. Pyper
License Compliance Manager

Enclosures: Final 2012 Transmission Line Avian Collision Protection Plan Report

Cc: Jessica Gonzales, USFWS
Steve Lewis, USFWS
Pat Verhey, WDFW

Priest Rapids Project – FERC No. 2114
Transmission Line Collision Protection Plan
2012 Annual Report
License Article 411

By

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April 2013

Executive Summary

On August 24, 2010, the Federal Energy Regulatory Commission (FERC) issued the order modifying and approving the Transmission Line Avian Collision Protection Plan (Plan) pursuant to Article 411 of the license for the Priest Rapids Project No. 2114 (Project). Per FERC's approval of the Plan, Public Utility District No. 2 of Grant County, Washington (Grant PUD) is required to insure that 10 of its transmission line spans are compliant with the guidelines set forth in "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" or an updated publication. In 2010, Grant PUD proposed to install bird flight diverters (BFDs) upon ten transmission line spans within five transmission line corridors from 2011–2015, conduct avian surveys from 2011–2016 and every 15 years thereafter, and provide annual reports to the U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and FERC by April 17 of each report year.

Pursuant to the Plan, Grant PUD scheduled the installation of BFDs upon the overhead ground wires (OHGW) at the following corridors and years: 1) South Moran Slough (2011), 2) North Moran Slough (2012), 3) Wanapum Switchyard (2013), 4) Wanapum-Columbia/Moses Coulee (2014), and Midway/Columbia River downriver from Priest Rapids Dam (2015). Grant PUD has installed BFDs upon all three spans at South Moran South in 2011 and the one span at North Moran Slough in 2012.

However, FERC stated modifications to the transmission lines must be in accordance with the guidelines set forth in "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" or an updated publication. In October 2012, the Avian Power Line Interaction Committee (APLIC) released a new publication titled, "Reducing Avian Collisions with Power Lines: The State of the Art in 2012" (APLIC 2012).

In review of the APLIC (2012), Grant PUD determined that that two of its Midway transmission line spans are currently in accordance with the State of the Art in 2012 guidelines since two of these lines are the interior spans of a five-span transmission line cluster thereby reducing avian collision potential through line configuration. As a result, Grant PUD proposed not installing BFD's on these two spans, and the United State Fish and Wildlife Service (USFWS) and the Washington Department of Fish and Wildlife (WDFW) concurred that these two spans are in accordance with the State of the Art in 2012 guidelines. In addition, Grant PUD proposes to remove the OHGWs on one de-energized span, which will also reduce avian collision potential instead of installing BFDs upon the OHGWs for this span. The USFWS and WDFW also concurred that this approach was in accordance with the APLIC State of the Art in 2012 guidelines. Grant PUD will continue to install BFDs at the Wanapum Switchyard (2013), Columbia/Moses Coulee (2014), and one the transmission line span at Midway in 2015.

Avian surveys were conducted at the five transmission line corridors. The surveys recorded data in three categories: 1) Site Information, 2) Avian Location Type, and 3) Avian Interaction Survey to incorporate information within 0.25 miles of the transmission lines. The Wanapum-Columbia/Moses Coulee transmission line corridor was the only raptor location, and the site was characterized as having a high number (>10) of ledges and alcoves on the cliffs with intermittent updrafts present on warm sunny days. The

South Moran Slough, North Moran Slough, Wanapum Switchyard, and the Midway/Columbia River corridors were all characterized as waterfowl locations which had open water, nesting habitat, and brood cover.

A total of 60 avian interaction surveys were conducted in 2012 at the five transmission line corridors and recorded a total of 5,852 birds. Forty-seven different bird species were identified in 2012; however, only one species observed in 2012 (i.e., the American white pelican) was found to have a state and/or federal listing status.

A comparison of bird flight behavior data were assessed at the South Moran Slough and North Moran Slough corridors because of the availability of pre-BFD installation and post-BFD installation bird behavior data. Statistical comparisons were conducted where sample sizes and degrees of freedom allowed a two-tailed Student's t-Test ($\alpha=0.05$) to be performed to examine if bird behavior rates differed between pre-BFD-installed and post-BFD-installed transmission line spans. Where comparisons could be performed, no behavioral differences were observed in birds of prey. For smaller passerines, unaltered flight behavior increased after the BFDs were installed. Birds of prey (i.e., raptors) and passerine birds (i.e., songbirds) are reported to have the keenest sight of all birds, and they can resolve details at distances 2.5-3 times the distance that humans can (Gill 2007). For waterfowl, unaltered flight behavior was shown to increase after BFD's were installed. Whereas for herons, unaltered flight behavior significantly decreased after BFDs were installed, and this finding could mean that herons likely see the BFDs and increased their altered flight behavior as a result of BFD installation. A further look at the data indicated that herons tended to show an increase in altered flight behavior after the BFDs were installed, but statistical analyses could not be performed due to low sample sizes. Grant PUD will continue to collect the behavioral data through 2016 pursuant the Plan for further analyses.

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1.0 Introduction

On August 24, 2010, the Federal Energy Regulatory Commission (FERC) issued the order modifying and approving the Transmission Line Avian Collision Protection Plan (Plan) pursuant to Article 411 of the license for the Priest Rapids Project No. 2114 (Project)¹. FERC's approval of the Article 411 requires the Public Utility District No. 2 of Grant County, Washington (Grant PUD) to be required to insure that 10 of its transmission line spans are compliant with the guidelines set forth in "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" or an updated publication. In 2010, Grant PUD proposed to install bird flight diverters (BFDs) upon ten transmission line spans within five transmission line corridors from 2011–2015, conduct avian surveys from 2011–2016 and every 15 years thereafter, and provide annual reports to the U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and FERC by April 17 of each report year.

In 2001, Grant PUD assessed the potential for avian collisions with its transmission system. Avian surveys were conducted at a total of 28 transmission line corridors and included substations and switchyards (Framatome ANP 2003). In general, the primary source of birds collisions within the transmission system are birds colliding with the overhead ground wires (OHGW), and the installation of BFDs upon the OHGWs have reduced bird collisions in the range of 57-89% (Koops and De Jong 1982; Koops 1987).

Within the approved Plan, Grant PUD will mark five 230 kV transmission line corridors with BFDs. Grant PUD will install BFDs upon OHGW and any guy wires associated with the ten transmission line spans within the five transmission line corridors. It is not necessary to mark the transmission lines (T-lines); because, the 230 kV T-lines have a line diameter equal to or greater than one inch in diameter (APLIC 1994). Additionally, most BFDs and devices cannot be installed on energized conductors with voltages over 230 kV (APLIC 1994).

2.0 Materials and Methods

2.1 Bird Flight Diverter Installation

Pursuant to the Plan, Grant PUD scheduled the BFD installation upon the OHGW at the following corridors and years: 1) South Moran Slough (2011), 2) North Moran Slough (2012), 3) Wanapum Switchyard (2013), 4) Wanapum-Columbia/Moses Coulee (2014), and Midway/Columbia River downriver from Priest Rapids Dam (2015). All outages were scheduled to occur during the months of September and October for the marking years. See Appendix A for site maps of the five T-line corridors.

2.2 Avian Surveys

Pursuant to the approved Plan, avian surveys were conducted at the five corridors (South Moran Slough, North Moran Slough, Wanapum Switchyard, Wanapum-Columbia/Moses Coulee, and Midway/Columbia River downriver from Priest Rapids Dam). The transmission line corridor surveys recorded data in three categories: 1) Site Information, 2) Avian Location Type, and 3) Avian Interaction Survey to incorporate information within 0.25 miles of the transmission lines. See Appendix A for the datasheets used to record the data.

¹ 132 FERC ¶ 62,127 (2010)

2.2.1 Site Information Data

The Site Information included the following data:

- Date
- Surveyor
- Site Name
- Survey Period: Spring Migration (February–March); Nesting (April–May); Summer (July–August); Fall/Winter (Mid-September–November)
- Day Time Period: AM (survey started at civil twilight), Mid-Day, PM (survey concluded at civil twilight)
- Survey Start Time
- Survey End Time
- Bird Flight Diverter Status (Installed or Not Installed)
- Raptor Perches (Present/Absent)
- Large Migratory Flights (Present/Absent)
- Geographic Funnel (Present/Absent). River valleys and canyons are examples of geographic funnels.

2.2.2 Avian Location Types

The Avian Location Types were classified at Raptor Locations or Waterfowl Locations. Raptor Locations noted the presence of ledges and alcoves on cliffs as not applicable (N/A), Low (0-5), Moderate (6-10), or High (>10). The presence or absence of updrafts and thermals were also recorded for Raptor Locations.

Waterfowl Locations Types recorded data on open water, nesting habitat, and brood cover. Open water data were recorded as present or absent. Nesting habitat data were recorded as present or absent during the nesting survey period only. Nesting habitat data were not applicable during the other survey periods. Brood cover data were recorded as present or absent during the Nesting and Summer Survey Periods. Brood cover data were not applicable during the other survey periods.

2.2.3 Avian Interaction Survey Data

The avian interaction survey collected data within 0.25 miles of the transmission line spans. The avian interaction survey recorded data for observation time, bird category, number of birds, listing status, vertical plane interaction, weather, and behavior. The survey time lengths were two hours during the nesting, summer, and fall/winter survey periods and three hours for the spring migration survey period. Observation time was recorded as military time. Bird categories were recorded as the following: A) Birds of Prey, B) Waterfowl, C) Wading Birds (herons), D) Shorebirds (plovers, sandpipers), E) Aerialists (pelicans, gulls, terns), F) Fowl-Like Birds, G) Passerine (songbirds), H) Misc. Non-Passerine Birds (doves, swifts, hummingbirds, woodpeckers, nightjars, kingfishers). Listing status included any state or federal listing status for the particular bird species. The vertical plane interaction data were recorded as the following: N/A (Did Not Intersect T-Line), 0–10 ft., 11–25 ft., 26–50 ft., 51–100 ft., >101 ft. and

additionally the distance was specific to birds flying in the following four vertical zones: 1) N/A (Did Not Intersect T-Line), 2) below transmission lines, 3) between transmission lines and OHGWs, and 4) above OHGWs. Weather included notes relating to cloud cover, precipitation, and wind speed. Behavior data were recorded as Unaltered Flight, Flight Among Wires, Altered Flight, Abrupt Altered Flight, Flushed, Perched on Tower, Perched on Wire, Perched on Other, On Water/Ground (Table 1; Framatome ANP 2003).

Table 1 A description of the behavior data recorded during avian interaction surveys.

Unaltered Flight	Flight above or below (but not among) the transmission lines that includes no observable alterations in flight altitude, direction, speed or other flight characteristic that could be construed as a response to the transmission line structures, wires, or OHGW.
Flight Among Lines	Flight between transmission line wires, OHGW, or both that exhibited no observable alterations in flight altitude, direction, speed or other flight characteristic that could be construed as a response to the transmission line structures, wires, or OHGW.
Altered Flight	Any change in flight altitude, direction, speed, or other flight characteristic in apparent response to a transmission line structure, wire, or OHGW. The behavior occurs as the bird approaches the structure, wire or OHGW giving the individual the time necessary to make a relatively minor flight adjustment and avoid the structure.
Abrupt Altered Flight	Any change in flight altitude, direction, speed, or other flight characteristic in apparent response to a transmission line structure, wire, or OHGW occurring in very close proximity to a transmission line structure and involving a rapid and/or major flight adjustment to avoid the structure.
Flushed	Rapid take off from vegetative cover, water, or ground that was construed as being a direct result of disturbance (usually by the observer, but also including passing vehicles).
Perched on Tower	Perching on any transmission line tower, OHGW support, or structure that supports a wire, including those associated with a substation or switchyard.
Perched on Wire	Perching on any wire associated with the transmission line, substations, or switchyards, or adjacent distribution lines including OHGW or support (guy) wires.
Perched on Other	Perching on vegetation, fences or posts, autos and other machinery, cliffs, distribution poles, or any other man-made structures.
On Water/Ground	Stationary or moving on the ground, or on water (e.g., loafing, foraging on the surface, diving, or swimming).

3.0 Results and Discussion

3.1 Bird Flight Diverter Installation

BFDs installation upon the OHGW's at the North Moran Slough was completed on November 9, 2012. A complete list of BFD installation progress is presented in Table 2.

Table 2 The bird flight diverter installation completion dates for transmission line corridors.

Date of Completion	Span of BFD Installation	Corridor
August 30, 2011	Priest Rapids – Midway 230kV Line #3 between Structures #211 and #212	South Moran Slough
September 12, 2011	Priest Rapids – Midway 230kV Line #1 between Structures #11 and #12	South Moran Slough
October 10, 2011	Priest Rapids – Midway 230kV Line #2 between Structures #111 and #112	South Moran Slough
November 9, 2012	Priest Rapids 230kV line between Structures #76 and #77	North Moran Slough

3.2 Avian Surveys

3.2.1 Site Information Data & Avian Location Types

The five transmission line corridors were characterized by site information and avian location descriptions. The transmission line corridor site information data of avian location type, raptor perch presence/absence, geographic funnel presence/absence, and large migratory flight presence/absence were presented in Table 3. The Wanapum-Columbia/Moses Coulee transmission line corridor was the only raptor location, and the site was characterized as having a high number (>10) of ledges and alcoves on the cliffs with intermittent updrafts present on warm sunny days. The South Moran Slough, North Moran Slough, Wanapum Switchyard, and the Midway/Columbia River corridors were all characterized as waterfowl locations. The waterfowl site characterization presence/absence data of open water, nesting habitat, and brood cover were presented in Table 4, Table 5, and Table 6, respectively. The survey dates were presented for all five transmission line corridors survey sites with respect to the survey season and daytime period the surveys were conducted in Table 7. In 2012, the spring migration surveys were performed between April 13, 2012 and May 22, 2012, and the nesting surveys were conducted between June 13, 2012 and June 30, 2012.

Table 3 The avian location type and site descriptive data of raptor perches, geographic funnel, and large migratory flights for the five transmission line corridors.

Corridor	Avian Location Type	Raptor Perches	Geographic Funnel	Large Migratory Flights
South Moran Slough	Waterfowl	Present	Absent	Absent
North Moran Slough	Waterfowl	Present	Absent	Absent
Wanapum Switchyard	Waterfowl	Absent	Absent	Absent
Wanapum-Columbia/Moses Coulee	Raptor	Present	Present	Absent
Midway/Columbia River downriver from Priest Rapids Dam	Waterfowl	Absent	Present	Absent

Table 4 The open water habitat waterfowl characterization data for the four waterfowl transmission line corridors.

Corridor	Open Water			
	Spring Migration	Nesting	Summer	Fall/Winter
South Moran Slough	Present	Present	Present	Present
North Moran Slough	Present	Present	Present	Present
Wanapum Switchyard	Present	Present	Absent	Absent
Midway/Columbia River downriver from Priest Rapids Dam	Present	Present	Present	Present

Table 5 The nesting habitat characterization data for the four waterfowl transmission line corridors.

Corridor	Nesting Habitat			
	Spring Migration	Nesting	Summer	Fall/Winter
South Moran Slough	N/A	Present	N/A	N/A
North Moran Slough	N/A	Present	N/A	N/A
Wanapum Switchyard	N/A	Present	N/A	N/A
Midway/Columbia River downriver from Priest Rapids Dam	N/A	Present	N/A	N/A

Table 6 The brood cover habitat characterization data for the four waterfowl transmission line corridors.

Corridor	Brood Cover			
	Spring Migration	Nesting	Summer	Fall/Winter
South Moran Slough	N/A	Present	Present	N/A
North Moran Slough	N/A	Present	Present	N/A
Wanapum Switchyard	N/A	Present	Present	N/A
Midway/Columbia River downriver from Priest Rapids Dam	N/A	Present	Present	N/A

Table 7 The dates the avian surveys were conducted at the five transmission line corridors with respect to survey period and daytime period.

Survey Period	Corridor	AM	Mid-Day	PM
Spring Migration	South Moran Slough	5/22/2012	4/20/2012	5/8/2012
	North Moran Slough	5/21/2012	5/4/2012	5/10/2012
	Wanapum Switchyard	4/17/2012	4/13/2012	5/12/2012
	Wanapum-Columbia	4/13/2012	4/16/2012	5/14/2012
	Midway	5/18/2012	4/23/2012	5/7/2012
Nesting	South Moran Slough	6/29/2012	6/21/2012	6/28/2012
	North Moran Slough	6/30/2012	6/20/2012	6/14/2012
	Wanapum Switchyard	6/28/2012	6/22/2012	6/26/2012
	Wanapum-Columbia	6/26/2012	6/21/2012	6/25/2012
	Midway	6/13/2012	6/19/2012	6/27/2012
Summer	South Moran Slough	8/29/2012	8/13/2012	8/20/2012
	North Moran Slough	8/21/2012	8/13/2012	8/23/2012
	Wanapum Switchyard	8/30/2012	8/16/2012	8/28/2012
	Wanapum-Columbia	8/31/2012	8/16/2012	8/30/2012
	Midway	8/16/2012	8/14/2012	8/21/2012
Fall/Winter	South Moran Slough	11/16/2012	10/1/2012	10/11/2012
	North Moran Slough	11/17/2012	11/16/2012	11/16/2012
	Wanapum Switchyard	11/15/2012	10/3/2012	10/3/2012
	Wanapum-Columbia	11/10/2012	11/10/2012	11/10/2012
	Midway	11/7/2012	10/1/2012	10/1/2012

3.2.2 Avian Interaction Surveys

A total of 60 avian interaction surveys were conducted in 2012 at the five transmission line corridors. Forty-seven different bird species were identified in 2012, and their state and federal listing statuses were presented in Table 8. Only the American white pelican was found to have a state and/or federal listing status. A total of 5,852 birds were enumerated during the 2012 surveys. The bird counts were presented by site (Table 9) and survey period (Table 10). Passerine species continue to be most abundant species for each site. In 2012, the most abundant bird species during the survey periods were red-winged blackbirds and European starlings. American kestrels and northern harriers were the most abundant birds of prey in 2012. Canadian geese were the most abundant waterfowl species in 2011 (Turner 2012) and 2012. Gull species were the most abundant aerialists in 2011 (Turner 2012) and 2012, and swallows (e.g., cliff and barn) were the most abundant non-passerine birds in 2011 (Turner 2012) and 2012.

The bird interaction behavior data were presented by the bird categories with respect to their flight across the transmission lines (i.e., above the OHGW, between OHGW and the T-Lines, or below T-Lines). In general, about half of the birds of prey, herons and passerine bird observations were below the T-Lines. Waterfowl and aerialists primarily flew above the OHGW or below the T-Lines, and fowl-like birds and non-passerine birds primarily flew below the T-Lines (Table 11).

The behavior birds exhibited as they intersected a transmission line was also evaluated by bird category. Most of the birds were either perched (on tower, on other, on wire), on the ground, on the water, flew amongst the wires, or flew above the OHGW or below the transmission lines with unaltered flight behavior. Of the birds with altered flight or abruptly altered flight, herons and aerialists showed altered flight behavior 15.3% and 13.7% of the time, respectively. A total of 98 herons were recorded intersecting the transmission lines in 2012, and 15 birds displayed altered flight. Of the 131 aerialist bird interactions that were recorded, 17 altered flight behaviors with one abruptly altered flight behavior were recorded. Of the 5,852 observations in 2012, no bird collisions were documented, and only one abruptly altered flight behaviors was observed. The abruptly altered flight observations occurred at the Midway transmission line crossings. The bird species that demonstrated the abruptly altered flight was an American white pelican flying into the sunrise on August 16, 2012, and the abruptly altered flight behavior occurred within 11-25 feet of the transmission and OHGW lines, so the potential for an avian collision appeared low.

A comparison of bird flight behavior data were assessed at the South Moran Slough and North Moran Slough sites because of the availability of pre-BFD installation and post-BFD installation bird behavior data (Table 13, Table 14). Statistical comparisons were conducted where sample sizes and degrees of freedom allowed a two-tailed Student's t-Test ($\alpha=0.05$) to be performed to examine if bird behavior rates differed between pre-BFD-installed and post-BFD-installed transmission line spans. No differences in bird behavior could be detected at the South Moran Slough site with respect to birds of prey (Table 13). Birds of prey (i.e., raptors) and passerine birds (i.e., songbirds) are reported to have the keenest sight of all birds, and they can resolve details at distances 2.5-3 times the distance that humans can (Gill 2007). No differences in the pre-BFD-installed and post-BFD-installed behavior data could mean that the birds of prey already observed the OHGWs prior to BFD installation. It is also possible that cluster span configurations, such as the South Moran Slough corridor three-span cluster, increase the visibility of the wires (APLIC 2012). As a result, the installation of BFDs at clustered-span corridors likely does little to reduce collision potential for bird species with excellent vision that most likely observed the wires prior to BFD installation. A t-Test could not be performed at the North Moran Slough Site for due to low birds of prey samples sizes (Table 14).

For waterfowl, the unaltered flight behavior of waterfowl increased after the BFDs were installed at the North Moran Slough Site (Table 14), however, no differences were observed at the South Moran Site (Table 13). The North Moran Slough site is a single transmission line span. After the BFDs were installed at North Moran Slough, the waterfowl observations showed an increase in unaltered flight behavior. A review of the data showed that waterfowl either flew over the lines at comfortable heights with unaltered flight, or the waterfowl flew within ¼ mile of the transmission line with unaltered flight, but these waterfowl observations within ¼ mile never intersected the vertical plane of the transmission line. Furthermore, the Washington State waterfowl hunting season was concurrent with the post-BFD installation surveys at North Moran Slough, and hunting pressure may have likely impacted bird flight behaviors too. More data are

needed to further assess the waterfowl behavior data with respect to BFD installation at the North Moran Slough corridor. The South Moran Slough corridor showed no waterfowl differences in pre-BFD and post-BFD behavior. As previously mentioned, the South Moran Slough corridor is also a three-span transmission line cluster. Based APLIC (2012) guidelines, clustered spans have increased visibility, and it is possible that waterfowl behavior may not have changed after BFD installation since the transmission line cluster was likely highly visible to waterfowl species prior to BFD installation. Grant PUD will continue to collect the behavioral data through 2016 pursuant the Article 411 plan and further assess the behavioral data as the sample sizes increase.

For herons, unaltered flight behavior significantly decreased by 40.8% at the South Moran Slough corridor after BFD installation (Table 13). A decrease in unaltered flight for larger birds, such as herons, typically indicates that the BFDs are increasing the visual profile of the static wires and the birds are altering their flight. Although a lack of degrees of freedom prevented the statistical analyses, altered flight behavior for herons increased by 20.8% at the South Moran Slough corridor after BFDs were installed. No analyses could be performed on heron behavioral data at the North Moran Slough corridor for pre-BFD and post-BFD installation comparisons because no post-BFD herons observations occurred in 2012 (Table 14). Grant PUD will continue to collect the behavioral data through 2016 pursuant the Plan and further assess the behavioral data as the sample sizes increase.

For smaller birds, such as passerine birds, the unaltered flight behavior increased at both North Moran Slough and South Moran Slough after BFDs were installed. Passerine birds have keen vision (Gill 2007), and it is likely that passerine birds readily observed the OHGWs prior to the installation of BFDs. At South Moran Slough, the behavior of landing on the OHGW significantly increased after the BFDs were installed (Table 13).

The behavioral data of miscellaneous non-passerine birds were inconclusive for pre-BFD and post-BFD comparisons. Low post-BFD sample sizes prevented the behavioral comparison for miscellaneous non-passerine birds at North Moran Slough (Table 14). The flight among wires behavior significantly decreased at South Moran Slough after the BFDs were installed (Table 13). More data are needed to further assess the post-BFD installation behavior of non-miscellaneous birds.

Table 8 A list of species identified during the avian interaction surveys with their state and federal listing statuses.

Bird Category	Species	State Listing Status	Federal Listing Status
Birds of Prey	American Kestrel		
	Northern Harrier		
	Owl sp.		
	Prairie Falcon		
	Red-Tailed Hawk		
Waterfowl	Canadian Goose		
	Common Goldeneye		
	Common Merganser		
	Coot		
	Double-Crested Cormorant		
	Gadwall		
	Green-Winged Teal		
	Mallard		
	Pied-Billed Grebe		
	Redhead		
	Scaup		
Hérons	Black-Crowned Night Heron		
	Egret		
	Great Blue Heron		
Wading Birds	Long-Billed Dowitcher		
Aerialists	American White Pelican	Endangered	
	California Gull		
	Caspian Tern		
	Ring-billed Gull		
Fowl-Like Birds	California Quail		
Passerine Birds	Bullock's Oriole		
	Crow		
	Eastern Kingbird		
	Goldfinch sp.		
	House Finch		
	House Sparrow		
	Magpie		
	Northern Shrike		
	Raven		
	Red-Winged Blackbird		
	Robin		
	Say's Phoebe		
	Starling		
	Western Kingbird		
Western Meadowlark			
Yellow-Headed Blackbird			
Misc. Non-Passerine Birds	Barn Swallow		
	Belted Kingfisher		
	Cliff Swallow		
	Mourning Dove		
	Night Hawk		
	Northern Flicker		

Table 9 A list of bird species and the number birds enumerated at each transmission line corridor.

Bird Category	Species	Midway	North Moran Slough	South Moran Slough	Wanapum Switchyard	Wanapum-Columbia	Grand Total
Birds of Prey	American Kestrel			2	34	13	49
	Northern Harrier	1	14	2	6		23
	Owl				8		8
	Prairie Falcon				2	2	4
	Red-Tailed Hawk	3	6	2	4	3	18
Waterfowl	Canadian Goose	152	539	48	60		799
	Common Goldeneye	1		1			2
	Common Merganser	60		1			61
	Coot			9			9
	Double-Crested Cormorant	104	2	2			108
	Gadwall		7	19			26
	Green-Winged Teal		2				2
	Mallard	59	54	19	40		172
	Pied-Billed Grebe			31			31
	Redhead			12			12
	Scaup			7			7
	Unknown	1	2	5			8
	Hérons	Black-Crowned Night Heron	5	5	23		
Egret		27					27
Great Blue Heron		8	23	7			38
Wading Birds	Long-Billed Dowitcher			1			1
Aerialists	American White Pelican	29	19	2			50
	California Gull	9	1	7			17
	Caspian Tern	2	6				8
	Misc. Gull	50	1	3			54
	Ring-billed Gull	1	1				2
Fowl-Like Birds	California Quail			3	3	2	8
Passerine Birds	Bullock's Oriole	15	1	2			18
	Crow	8					8
	Eastern Kingbird	10	2	11	9		32
	Goldfinch			2			2
	House Finch			17		42	59
	House Sparrow				4		4
	Magpie	41	16	22	86		165
	Northern Shrike				1		1
	Raven	28	7		8	21	64
	Red-Winged Blackbird	49	372	559	198		1,178
	Robin	5	2	9	22	68	106
	Say's Phoebe		1			1	2
	Starling	118	161	1024	453	84	1,840
	Unknown	48	23	12	11	71	165
	Western Kingbird	15		4	16	4	39
	Western Meadowlark	1	4	6			11
Yellow-Headed Blackbird	1	5				6	
Misc. Non-Passerine Birds	Barn Swallow		8				8
	Belted Kingfisher			4			4
	Cliff Swallow	15	146	8		25	194
	Misc. Swallows	4	51	163	13	17	248
	Mourning Dove	9	4	6	18	15	52
	Night Hawk	4	10	7	3		24
Grand Total	Northern Flicker		3	4	16	22	45
		883	1,498	2,066	1,015	390	5,852

Table 10 A list of bird species and the number birds enumerated during each survey period.

Bird Category	Species	Spring Migration	Nesting	Summer	Fall/Winter	Grand Total
Birds of Prey	American Kestrel	6	29	8	6	49
	Northern Harrier	15	4		4	23
	Owl			8		8
	Prairie Falcon	3	1			4
	Red-Tailed Hawk	2	8	5	3	18
Waterfowl	Canadian Goose	16		182	601	799
	Common Goldeneye	1			1	2
	Common Merganser	7	1	22	31	61
	Coot	8			1	9
	Double-Crested Cormorant	21	16	40	31	108
	Gadwall	25	1			26
	Green-Winged Teal				2	2
	Mallard	51	19	47	55	172
	Pied-Billed Grebe	1	1	17	12	31
	Redhead	12				12
	Scaup	7				7
	Unknown		5		3	8
	Hérons	Black-Crowned Night Heron	4	29		
Egret			2	24	1	27
Great Blue Heron		15	15	8		38
Wading Birds	Long-Billed Dowitcher	1				1
Aerialists	American White Pelican	22	24	3	1	50
	California Gull	3		5	9	17
	Caspian Tern	3	5			8
	Misc. Gull	20	2		32	54
	Ring-billed Gull			2		2
Fowl-Like Birds	California Quail	4	1	3		8
Passerine Birds	Bullock's Oriole	6	10	2		18
	Crow	8				8
	Eastern Kingbird		10	22		32
	Goldfinch		2			2
	House Finch			21	38	59
	House Sparrow				4	4
	Magpie	52	7	34	72	165
	Northern Shrike	1				1
	Raven	25	1	8	30	64
	Red-Winged Blackbird	171	385	469	153	1,178
	Robin	39	26	5	36	106
	Say's Phoebe	1	1			2
	Starling	17	6	770	1047	1,840
	Unknown	72	83	1	9	165
	Western Kingbird	11	14	12	2	39
	Western Meadowlark	4	4	2	1	11
Yellow-Headed Blackbird	2		4		6	
Misc. Non-Passerine Birds	Barn Swallow			8		8
	Belted Kingfisher			3	1	4
	Cliff Swallow	9		179	6	194
	Misc. Swallows	146	102			248
	Mourning Dove	15	12	22	3	52
	Night Hawk		12	12		24
	Northern Flicker	3	6	5	31	45
Grand Total		829	844	1,953	2,226	5,852

Table 11 The flight distribution of birds intersecting the transmission line spans presented by bird category.

	Vertical Plane	Birds of Prey	Waterfowl	Hérons	Wading Birds	Aerialists	Fowl-Like Birds	Passerine Birds	Misc. Non-Passerine Birds	Grand Total
Above OHGW	0-10 ft	2						92		94
	11-25 ft	2	20	1		1		99	1	124
	26-50 ft	2	34	5		9		138		188
	51-100 ft	3	114	22		26		49	10	224
	>100 ft	9	461	14		34		8		526
Above OHGW Total		18	629	42		70		386	11	1,156
Between T-Lines & OHGW	0-10 ft	7	3	5		3		647	32	697
	11-25 ft	6	17	2		11		576	41	653
Between T-Lines & OHGW Total		13	20	7		14		1,223	73	1,350
Below T-Lines	0-10 ft		2	7				14	16	39
	11-25 ft	7	7	5				156	127	302
	26-50 ft	7	6			1		416	56	486
	51-100 ft	9	62	2	1	12	1	715	71	873
	>100 ft	10	193	32		24	5	252	38	554
Below T-Lines Total		33	270	46	1	37	6	1,553	308	2,254
N/A	N/A	38	318	3		10	2	538	183	1,092
N/A Total		38	318	3		10	2	538	183	1,092
Grand Total		102	1,237	98	1	131	8	3,700	575	5,852

Table 12 The flight behavior of birds intersecting the transmission line spans presented by bird category.

Bird Category	Behavior										Grand Total
	Abrupt	Altered Flight	Flight Among Wires	Flushed	On Ground	On Water	Perched on Other	Perched on Tower	Perched on Wire	Unaltered Flight	
Birds of Prey		2	5	1			19	13	8	54	102
Waterfowl		90	14			166	4			963	1,237
Hérons		15	6		1	7	1			68	98
Wading Birds										1	1
Aerialists	1	17	8		4	6				95	131
Fowl-Like Birds				2	5					1	8
Passerine Birds		8	516	47	16		344	690	150	1,929	3,700
Misc. Non-Passerine Birds		4	65	1	22		119	7	7	350	575
Grand Total	1	136	614	51	48	179	487	710	165	3,461	5,852

Table 13 A comparison of pre-BFD installation and post-BFD installation bird flight behavior data at South Moran Slough.

South Moran Slough	Behavior	Pre-BFD Installation		Post-BFD Installation		Grand Total	Post-BFD % minus Pre-BFD %	t-Test	Degrees of Freedom	Critical two-tailed t-value ($\alpha=0.05$)	Significance
		Total	%	Total	%						
Birds of Prey	Altered Flight	2	10.0%	2	11.8%	4	1.8%	0.0775	1	12.7065	No
	Flight Among Wires	0	0.0%	2	11.8%	2	11.8%	N/A			
	Perched on Other	3	15.0%	1	5.9%	4	-9.1%	N/A			
	Perched on Tower	4	20.0%	2	11.8%	6	-8.2%	0.3615	1	12.7065	No
	Perched on Wire	3	15.0%	2	11.8%	5	-3.2%	0.1420	1	12.7065	No
	Unaltered Flight	8	40.0%	8	47.1%	16	7.1%	0.4000	7	2.3646	No
Birds of Prey Total		20		17		37					
Waterfowl	Altered Flight	4	3.5%	7	3.6%	11	0.0%	0.0045	3	3.1824	No
	Flight Among Wires	6	5.3%	3	1.5%	9	-3.8%	0.5332	2	4.3026	No
	Flushed	2	1.8%	0	0.0%	2	-1.8%	N/A			
	On Water	55	48.7%	98	50.0%	153	1.3%	0.2628	54	2.0049	No
	Unaltered Flight	46	40.7%	88	44.9%	134	4.2%	0.7902	45	2.0141	No
Waterfowl Total		113		196		309					
Hérons	Altered Flight	1	12.5%	10	33.3%	11	20.8%	N/A			
	Flight Among Wires	0	0.0%	5	16.7%	5	16.7%	N/A			
	On Ground	0	0.0%	1	3.3%	1	3.3%	N/A			
	Unaltered Flight	7	87.5%	14	46.7%	21	-40.8%	3.0625	6	2.4469	Yes
Hérons Total		8		30		38					
Wading Birds	Unaltered Flight	0	N/A	1	100.0%	1	N/A	N/A			
Wading Birds Total		0		1		1					
Aerialists	Unaltered Flight	2	100.0%	13	100.0%	15	0.0%	N/A			
Aerialists Total		2		13		15					
Fowl-Like Birds	On Ground	0	N/A	3	100.0%	3	N/A	N/A			
Fowl-Like Birds Total		0		3		3					
Passerine Birds	Altered Flight	0	0.0%	4	0.2%	4	0.2%	N/A			
	Flight Among Wires	0	0.0%	173	9.3%	173	9.3%	N/A			
	Flushed	0	0.0%	1	0.1%	1	0.1%	N/A			
	On Ground	2	0.1%	3	0.2%	5	0.1%	0.0229	1	12.7065	No
	Perched on Other	750	40.6%	174	9.3%	924	-31.2%	14.1522	173	1.9738	Yes
	Perched on Tower	796	43.1%	670	36.0%	1,466	-7.1%	3.8133	669	1.9600	Yes
	Perched on Wire	27	1.5%	125	6.7%	152	5.3%	2.3475	26	2.0555	Yes
	Unaltered Flight	273	14.8%	711	38.2%	984	23.4%	12.8593	272	1.9600	Yes
Passerine Birds Total		1,848		1,861		3,709					
Misc. Non-Passerine Birds	Altered Flight	14	7.5%	3	1.5%	17	-6.0%	0.8460	2	4.3026	No
	Flight Among Wires	97	52.2%	16	8.2%	113	-44.0%	6.4261	15	2.1314	Yes
	On Ground	2	1.1%	0	0.0%	2	-1.1%	N/A			
	Perched on Other	7	3.8%	96	49.0%	103	45.2%	8.8624	6	2.4469	Yes
	Perched on Wire	13	7.0%	0	0.0%	13	-7.0%	N/A			
Misc. Non-Passerine Birds Total		186		196		382					
Grand Total		2,177		2,317		4,494					

Table 14 A comparison of pre-BFD installation and post-BFD installation bird flight behavior data at North Moran Slough.

North Moran Slough	Behavior	Pre-BFD Installation		Post-BFD Installation		Grand Total	Post-BFD % minus Pre-BFD %	t-Test	Degrees of Freedom	Critical two-tailed t-value ($\alpha=0.05$)	Significance
		Total	%	Total	%						
Birds of Prey	Flight Among Wires	4	9.3%	0	0.0%	4	-9.3%	N/A			
	Perched on Other	3	7.0%	1	50.0%	4	43.0%	N/A			
	Perched on Tower	6	14.0%	1	50.0%	7	36.0%	N/A			
	Unaltered Flight	30	69.8%	0	0.0%	30	-69.8%	N/A			
Birds of Prey Total		43		2		45					
Waterfowl	Altered Flight	40	7.5%	0	0.0%	40	-7.5%	N/A			
	Flight Among Wires	18	3.4%	0	0.0%	18	-3.4%	N/A			
	On Water	4	0.8%	0	0.0%	4	-0.8%	N/A			
	Unaltered Flight	468	88.3%	487	100.0%	955	11.7%	26.9695	467	1.9600	Yes
Waterfowl Total		530		487		1,017					
Hérons	Altered Flight	7	13.2%	0	N/A	7	N/A	N/A			
	Flight Among Wires	2	3.8%	0	N/A	2	N/A	N/A			
	Unaltered Flight	44	83.0%	0	N/A	44	N/A	N/A			
Hérons Total		53		0		53					
Aerialists	Altered Flight	3	7.9%	0	N/A	3	N/A	N/A			
	Flight Among Wires	5	13.2%	0	N/A	5	N/A	N/A			
	Unaltered Flight	30	78.9%	0	N/A	30	N/A	N/A			
Aerialists Total		38		0		38					
Passerine Birds	Altered Flight	21	0.9%	0	0.0%	21	-0.9%	N/A			
	Flight Among Wires	1,421	59.9%	71	26.2%	1,492	-33.7%	6.4497	70	1.9944	Yes
	Flushed	1	0.0%	0	0.0%	1	0.0%	N/A			
	On Water	7	0.3%	0	0.0%	7	-0.3%	N/A			
	Perched on Other	55	2.3%	20	7.4%	75	5.1%	0.8661	19	2.0930	No
	Perched on Tower	7	0.3%	21	7.7%	28	7.5%	1.2776	6	2.4469	No
	Perched on Wire	436	18.4%	3	1.1%	439	-17.3%	2.8570	2	4.3026	No
Unaltered Flight	426	17.9%	156	57.6%	582	39.6%	10.0124	155	1.9754	Yes	
Passerine Birds Total		2,374		271		2,645					
Misc. Non-Passerine Birds	Flight Among Wires	90	23.4%	0	0.0%	90	-23.4%	N/A			
	On Ground	17	4.4%	0	0.0%	17	-4.4%	N/A			
	Perched on Other	0	0.0%	1	50.0%	1	50.0%	N/A			
	Unaltered Flight	278	72.2%	1	50.0%	279	-22.2%	0.4442			
Misc. Non-Passerine Birds Total		385		2		387					
Grand Total		3,423		762		4,185					

4.0 Adaptive Management – Midway Spans

On August 24, 2010, FERC issued the order modifying and approving the Transmission Line Plan pursuant to Article 411 of the license for the Project². In the order, FERC stated modifications to the transmission lines must be in accordance with the guidelines set forth in “Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006” or an updated publication. In October 2012, the Avian Power Line Interaction Committee (APLIC) released a new publication titled, “Reducing Avian Collisions with Power Lines: The State of the Art in 2012” (APLIC 2012).

In the State of the Art 2012 publication, APLIC provided numerous approaches to reduce avian collisions with power lines and be in accordance with APLIC guidelines. The Midway corridor has eight transmission lines spans that are configured in a five-span cluster and a three-span cluster. Based on APLIC (2012), two of Grant PUD’s Midway spans currently meet the criteria to be considered compliant with the 2012 APLIC reduced-collision guidelines; because, the transmission lines were constructed in a reduced-risk cluster configuration by being interior spans in the five-span cluster (Table 15; Figure 1). When transmission lines are built to run parallel and in close proximity to each other, collisions risks are minimized because the resulting network of wires is confined to a smaller area and the lines are more visible to birds (APLIC 2012). As a result, birds only have to make one ascent and descent to cross transmission lines constructed in this cluster configuration (Figure 1; APLIC 2012).

The five transmission lines clustered together at Midway are of similar height which continues to support that these lines are in accordance with APLIC (2012) guidelines. Within this five-span cluster, Grant PUD owns two interior transmission spans (i.e., Priest Rapids – Midway 230kV Line #2 between Structures #679 and #678; Priest Rapids – Midway 230kV Line #1 between Structures #40 and #41; Figure 2). Additionally, the Bonneville Power Administration is required to maintain Federal Aviation Administration marker balls on the furthest upriver line in this five-transmission-line cluster.

At the three-span transmission line cluster, Grant PUD owns two of the three spans (i.e., the middle span [Midway – Frenchman Hills 230kV line between Structures #681 and #682] and a downriver span [Priest Rapids – Midway 230kV Line #2 between Structures #144 and #145]; Figure 3). The middle transmission line span within this three-span cluster is no longer energized, and in Chapter 5 (Minimizing Collision Risks) of APLIC (2012), the removal of the shield wires (or overhead ground wires) is another option utilities can implement to be in accordance with APLIC guidelines. Based upon the APLIC (2012) guidelines, removing the shield wire is a valid approach to reduce avian collision potential. Because this transmission line is not energized and not connected to the transmission grid or any substations, Grant PUD can remove the shield wires and be in accordance with APLIC guidelines to reduce avian collisions on this span (Table 15). Grant PUD believes marking the OHGWs upon the furthest downriver span with BFDs remains the best approach to be compliant with the 2012 APLIC reduced-collision guidelines (Table 15; Figure 3).

Grant PUD examined all the bird flight behavior data collected at Midway from 2011-2012 (Table 16). When the 2011-2012 Midway bird flight behavior data were analyzed, the data showed that 14.3% of herons and 16.0% of aerialists were already altering their flight behavior at Midway (Table 16). Altered flight behavior can imply that the birds are physically seeing the

² 132 FERC ¶ 62,127 (2010)

transmission lines and altering their flight pattern in response to the clustered transmission line corridors. Grant PUD did observed abruptly altered flight on five occasions, and these instances occurred at the three-span cluster when birds were flying into the sunrise or sunset. Different bird species and families have different fields of vision and variable flight behaviors (Martin and Shaw 2010; Martin 2011). However, the solutions to avoiding collisions typically incorporate increasing the conspicuousness of the line and early warning alerts, such as sound (Martin 2011). The birds with abruptly altered flight did not strike the transmission lines, but all birds came within 11-25 ft. of the transmission lines by either going between the transmission lines and OHGW or going below the transmission lines. Martin (2011) suggested sound as a collision prevention solution, thus it is likely that birds also avoid transmission lines because these lines emit a prominent crackling sound when energized, and this sound appears to alert the birds to transmission lines too.

Table 15 Grant PUD’ APLIC (2012) collision minimization compliance status and collision minimization options at Midway.

Midway Spans Identified for Reduced Collision	Collision Minimization Options
Priest Rapids – Midway 230kV Line #2 between Structures #144 and #145	Install Bird Flight Diverters
Midway – Frenchman Hills 230kV line between Structures #681 and #682	Remove Shield Wires/Overhead Ground Wires
Priest Rapids – Midway 230kV Line #2 between Structures #679 and #678	APLIC Compliant Line: Reduced Risk Clustering/Inside Line
Priest Rapids – Midway 230kV Line #1 between Structures #40 and #41	APLIC Compliant Line: Reduced Risk Clustering/Inside Line

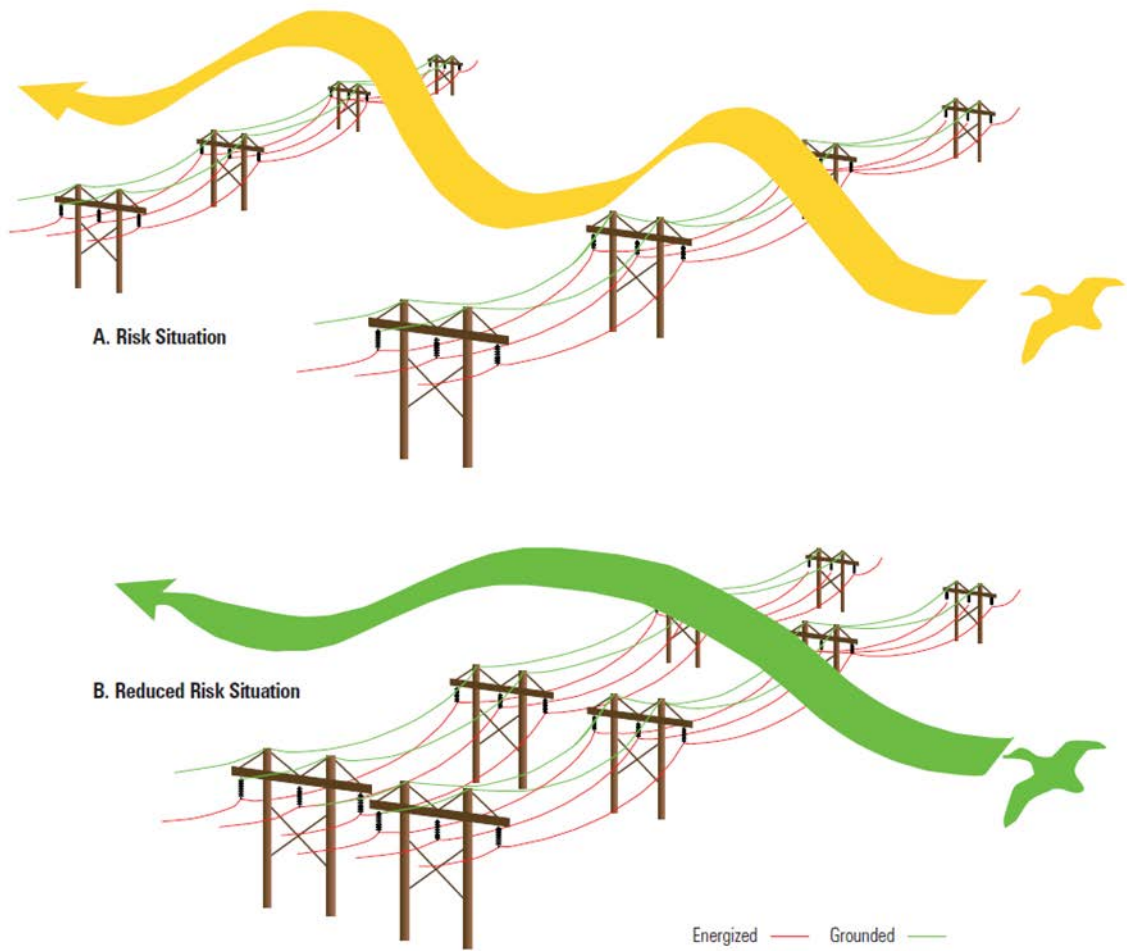


Figure 1 Reduced collision risk options by clustering lines in one right-of-way (APLIC 2012).

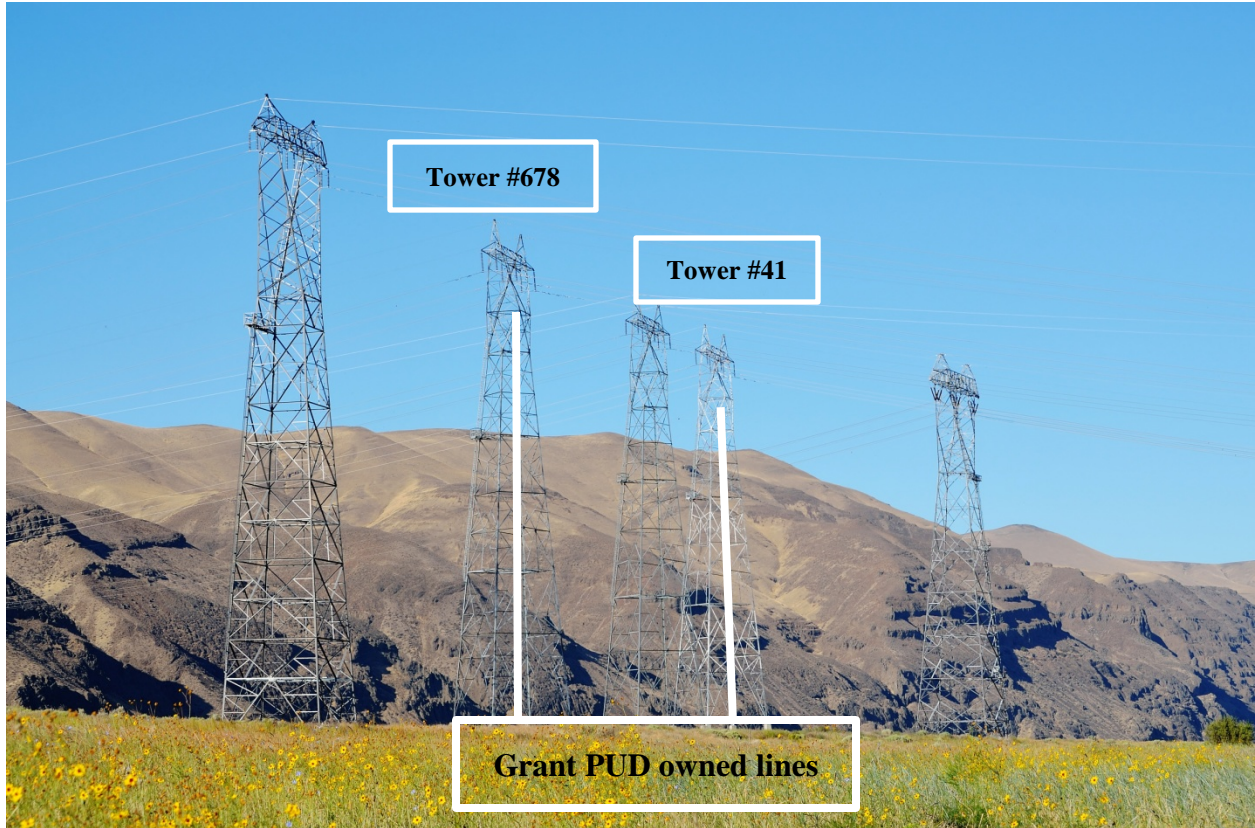


Figure 2 The five-span transmission line cluster at Midway with Priest Rapids – Midway 230kV Line #2 between Structures #679 and #678 and Priest Rapids – Midway 230kV Line #1 between Structures #40 and #41 identified.



Figure 3 The three-span transmission line cluster at Midway with Midway – Frenchman Hills 230kV line between Structures #681 and #682 and Priest Rapids – Midway 230kV Line #2 between Structures #144 and #145 identified.

Table 16 The 2011-2012 Midway bird behavior count and percentage data presented by bird category.

Midway	Behavior	Total	%
Birds of Prey	Unaltered Flight	7	100.0%
Birds of Prey Total		7	
Waterfowl	Abrupt Altered Flight	2	0.2%
	Altered Flight	52	6.3%
	Flight Among Wires	6	0.7%
	Flushed	47	5.7%
	On Water	182	21.9%
	Perched on Other	4	0.5%
	Unaltered Flight	538	64.7%
Waterfowl Total		831	
Herons	Abrupt Altered Flight	1	1.6%
	Altered Flight	8	12.7%
	Flight Among Wires	1	1.6%
	On Ground	3	4.8%
	On Water	7	11.1%
	Perched on Other	1	1.6%
	Unaltered Flight	42	66.7%
Herons Total		63	
Aerialists	Abrupt Altered Flight	2	1.1%
	Altered Flight	26	14.9%
	Flight Among Wires	7	4.0%
	On Ground	4	2.3%
	On Water	10	5.7%
	Unaltered Flight	125	71.8%
Aerialists Total		174	
Passerine Birds	Altered Flight	13	0.7%
	Flight Among Wires	99	5.3%
	Flushed	1	0.1%
	On Ground	3	0.2%
	Perched on Other	130	7.0%
	Perched on Tower	7	0.4%
	Unaltered Flight	1,608	86.4%
Passerine Birds Total		1,861	
Misc. Non-Passerine Birds	Altered Flight	9	9.5%
	Flight Among Wires	2	2.1%
	Perched on Other	3	3.2%
	Perched on Tower	1	1.1%
	Unaltered Flight	80	84.2%
Misc. Non-Passerine Birds Total		95	
Grand Total		3,031	

5.0 Recommendations

The FERC order modifying and approving the Transmission Line Plan pursuant to Article 411 of the license for the Project identified 10 transmission line spans located within five different transmission line corridors for avian interaction studies and line marking. In 2010, Grant PUD proposed to install BFDs all on 10 transmission line spans.

In review of the APLIC (2012), Grant PUD has determined that that two of its Midway transmission line spans are currently in accordance with the State of the Art in 2012 guidelines since two of these lines are the interior spans of a five-span transmission line cluster thereby reducing avian collision potential through line configuration. Therefore, Grant PUD proposes not installing BFD's on these two spans. In addition, Grant PUD proposes to remove the OHGWs on one de-energized span, which will also reduce avian collision potential instead of installing BFDs upon the OHGWs for this span. Grant PUD will continue to install BFDs at the Wanapum Switchyard (2013), Columbia/Moses Coulee (2014), and one the transmission line span at Midway in 2015.

6.0 Consultation

On March 20, 2013, Grant PUD submitted the Priest Rapids Project – FERC No. 2114 Transmission Line Collision Protection Plan 2012 Annual Report for License Article 411 to the United States Fish and Wildlife Service (USFWS) and the Washington Department of Fish and Wildlife (WDFW) for review and comment in response to a newly released 2012 publication by APLIC titled, “Reducing Avian Collisions with Power Lines: The State of the Art in 2012.” When Grant PUD reviewed the 2012 APLIC publication, additional options were available for the requirements within Article 411 to be in accordance with FERC Order³. The USFWS submitted its comments on March 26, 2013, and WDFW submitted its comments on April 11, 2013. The USFWS and WDFW both agreed that Grant PUD's collision minimization proposals presented in Table 15 were in accordance with APLIC (2012).

7.0 Acknowledgements

Grant PUD appreciates Environmental Assessment Services, LLC assistance in conducting the summer and fall/winter 2012 avian surveys and quality assurance and quality control for the data collected pursuant to the Plan.

³ 132 ¶ 62,127 (2010)

List of Literature

- Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute. Washington, D.C.
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- Gill, F.B. 2007. Ornithology. Third Edition. W.H. Freeman and Company. New York, NY.
- Koops, F.B. 1987. Collision victims of high-tension lines in the Netherlands and effects of marking. KEMA Report 01282-MOB 86-3048.
- Koops, F.B., and J. de Jong. 1982. Vermindering van draadslachtoffers door markering van hoogspanningsleidingen in de omgeving van Heerenveen (Reducing the number of bird collisions by marking high-voltage lines in the Heerenveen area). *Overdruk uit: Elektrotechniek* 60(12):641–646. (Translation provided for readers benefit).
- Martin, G.R. 2011. Understanding bird collisions with man-made objects: a sensory ecology approach. *The International Journal of Avian Science IBIS* 153:239-254.
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Appendix A
Article 411 Survey Forms

Article 411 Transmission Line Collision Protection Plan Survey
Site Description Survey Form

Date: _____

Surveyor: _____

- Site:** Wanapum – Columbia (Span 1)
Type D1 Towers,
3 T-Lines
2 OHGW's
- North Moran Slough (Span 3)
Type TR1 & Tangent A1 Towers,
3 T-Lines
2 OHGW's
- Priest – Midway (Span 5, 7, and 9)
Type B2 Special Towers,
3 T-Lines/Span
2 OHGW's/Span

- Wanapum Switchyard (Span 2)
Type A2 Tangent & DS Towers,
3 T-Lines
2 OHGW's
- South Moran Slough (Span 4, 6, and 8)
Type A1 Tangent Towers,
3 T-Lines/Span
1 OHGW/Span
- Midway – Frenchman (Span 10)
Type SC Special Towers,
3 T-Lines
2 OHGW's

Survey Period

- Spring Migration (Feb – Mar) Nesting (April – May)
 Summer (July – Aug) Fall/Winter (Mid-Sept – Nov)

Day Time Period

- AM Mid-Day PM

Start Time: _____ End Time: _____

Bird Flight Diverters Installed?

- Yes No

Miscellaneous Information (Presence/Absence)

- Raptor Perches
 Large Migratory Flights
 Geographic Funnel (i.e., Canyons/Valleys)

Avian Location Type:

- Raptor Location Type
- Ledges & Alcoves on Cliffs
 N/A
 Low (0-5)
 Moderate (6-10)
 High (>10)
- Updrafts/Thermals
 Present Absent

- Waterfowl Location Type
- Open Water
 Present Absent
- Nesting Habitat (Nesting Survey Only)
 Present Absent N/A
- Brood Cover (Nesting/Summer Survey)
 Present Absent N/A

Page __ of __

Article 411 Transmission Line Collision Protection Plan Survey
Avian Survey Form

Time	Bird Category	Species	n	Listing Status	Vertical Plane	Below T-Lines, Between T-Lines & OHGW, Above OHGW	Weather	Behavior

Observation Range: Within 0.25 Miles of Transmission Line
Time: (Military). Survey Each Site 2 Hours. In Spring, Survey 3+ Hours.
Bird Category: A) Birds of Prey, B) Waterfowl, C) Wading Birds (herons), D) Shorebirds (plovers, sandpipers), E) Aerialists (pelicans, gulls, terns), F) Fowl-Like Birds, G) Passerine (songbirds), H) Misc. Non-Passerine Birds (doves, swifts, hummingbirds, woodpeckers, nightjars, kingfishers)
n: Count of Birds
Listing Status: State Listed, Federally Listed, Both
Vertical Plane: N/A (Did Not Intersect T-Line), 0–10 ft, 11–25 ft, 26–50 ft, 51–100 ft, >101 ft.
Weather: Cloud Cover, Precipitation, Wind Speed & Direction
Behavior: Unaltered Flight, Flight Among Wires, Altered Flight, Abrupt Altered Flight, Flushed, Perched on Tower, Perched on Wire, Perched on Other, On Water/Ground

Appendix B
Agency Comments

Behr Turner

From: Lewis, Stephen <stephen_lewis@fws.gov>
Sent: Tuesday, March 26, 2013 1:49 PM
To: Behr Turner
Cc: Jessica_Gonzales@fws.gov; Verhey, Patrick M (DFW); Debbie Firestone; Ross Hendrick; Tom Dresser; Julie Pyper
Subject: Re: Transmission Line Collision Protection Plan 2012 Annual Report

Hi Behr-

Thanks for giving me a heads-up on Grant PUD's view of compliance for their transmission lines in accordance with the new APLIC 2012 guidelines. I've had time to review the subject document and have a few comments for your consideration in an effort to make a more complete document:

- While I generally agree that two of Grant PUD's Midway transmission line spans are currently in accordance with the State of Art in 2012 guidelines since two of these lines are the interior spans of a five-span transmission line cluster thereby reducing avian collision potential through the line configuration, I'm also concerned about low-flying bird species and/or juvenile bird species that are not quite familiar with these types of configurations. Discussing this issue in the document would be helpful. I would also recommend some level of carcass surveys in the upcoming year (or two) to verify whether or not Bird Flight Diverters are warranted for the two Midway lines.
- I read the document pretty thoroughly and maybe I missed it, but I didn't see a discussion of when (during the day) two-hour block surveys were completed? This type of discussion would greatly enhance the overall perspective of the avian interaction with the transmission lines. For example, were the two-hour blocks in the early morning versus the late evening? Inserting and defining these time blocks in specific terms would also be a good move as well.
- Figure 3 is a bit confusing and it's likely due to my ignorance of not seeing these transmission line configurations out in the field. However, this figure appears to suggest that Tower #144 is on the outside of this particular configuration, perhaps warranting BFD's? I know the figure resolution is a bit obscure, but the BPA appears not to have BFD's as well? Some clarity in reference to this figure would be helpful.
- I have one last comment in reference to the Section 5.0 Recommendations. I'm not questioning the intent of Grant PUD, but stating that Grant PUD will continue its monitoring obligations in this section in accordance with the Transmission Line Collision Protection Plan would be helpful.

Thanks for giving us the opportunity to review this document...it was very helpful and informative!

S-

On Wed, Mar 20, 2013 at 2:36 PM, Behr Turner <Bturner@gcpud.org> wrote:

Dear Jessica, Steve, and Patrick,

For your review, comment, and attached in this email is the Priest Rapids Project – FERC No. 2114 Transmission Line Collision Protection Plan 2012 Annual Report for License Article 411.

The District does respectfully request that you please submit any comments by Wednesday, April 10th as this report is due to FERC on April 17, 2013.

I appreciate your interests in this report. Please feel free to contact me directly if there anymore resources that I can provide or questions I can answer.

Thank you for your time,

Behr Turner, Senior Biologist

Grant County PUD

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(509) 895-1423

bturner@gcpud.org

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"If a road has no obstacles, it probably doesn't lead to anywhere." S. Lewis

Behr Turner

From: Verhey, Patrick M (DFW) <Patrick.Verhey@dfw.wa.gov>
Sent: Thursday, April 11, 2013 1:25 PM
To: Behr Turner
Subject: RE: Transmission Line Collision Protection Plan 2012 Annual Report

Behr, thank you for the opportunity to review and comment on the *DRAFT* Priest Rapids Project – FERC No. 2114 Transmission Line Collision Protection Plan 2012 Annual Report for License Article 411 (DRAFT) prepared by the Grant County Public Utilities District.

The use of the word “site or sites” is used throughout the DRAFT when we believe corridor or corridors should be used. For example, in the second paragraph of the Executive Summary, in Section 2.1 Bird Flight Diverter Installation, and in Section 3.1, Table 2 the word “sites” appears to be one in the same with “corridor.” This is confusing since both the first paragraphs of the Executive Summary and the Introduction identify five transmission line corridors. This should be addressed and clarified in the Final Report.

As a suggestion, the Executive Summary, and other sections of the Report where similar language could be used, might read as follows:

Pursuant to the Plan, Grant PUD scheduled the installation of BFDs upon the overhead ground wires (OHGW) at the following **corridors** and years: 1) South Moran Slough (2011), 2) North Moran Slough (2012), 3) Wanapum Switchyard (2013), 4) Wanapum-Columbia/Moses Coulee (2014), and Midway/Columbia River downriver from Priest Rapids Dam (2015). **To date**, Grant PUD has installed BFDs upon all three spans at South Moran **Slough Corridor** in 2011 and the one span at North Moran Slough **Corridor** in 2012.

We agree that the two internal spans of the Midway corridor are in accordance with the 2012 APLIC and that no BFD’s are required on these internal spans. Likewise we agree that the removal of the OHGW on the de-energized span will also not require BFD’s, but the DRAFT does not identify in the corridor where the de-energized span occurs. Additional clarification would be useful.

Also, the three spans where no BFD’s will be installed are part of the original 10 spans approved by FERC in 2010. Does the PUD intend to add three more spans where BFD’s can be installed in order to stay in compliance with FERC. Additional clarification would be useful.

During our telephone conversation on March 19, you mentioned Grant PUD installs BFD’s in certain distribution lines where the probability of avian strikes is relatively high or avian mortalities have been documented. A mention of this in the annual report along with a few examples of location where BFD’s are installed would be informative.

Finally, we agree with the comments provided to the PUD by the USFWS. Please contact me if you have any questions or concerns. I appreciate your willingness to consult and coordinate with WDFW.



Patrick Verhey

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Work schedule is M-Th

From: Behr Turner [<mailto:Bturner@gcpud.org>]
Sent: Wednesday, March 20, 2013 2:36 PM
To: Jessica_Gonzales@fws.gov; Stephen_Lewis@fws.gov; Verhey, Patrick M (DFW)
Cc: Debbie Firestone; Ross Hendrick; Tom Dresser; Julie Pyper
Subject: Transmission Line Collision Protection Plan 2012 Annual Report

Dear Jessica, Steve, and Patrick,

For your review, comment, and attached in this email is the Priest Rapids Project – FERC No. 2114 Transmission Line Collision Protection Plan 2012 Annual Report for License Article 411.

The District does respectfully request that you please submit any comments by Wednesday, April 10th as this report is due to FERC on April 17, 2013.

I appreciate your interests in this report. Please feel free to contact me directly if there anymore resources that I can provide or questions I can answer.

Thank you for your time,

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Appendix C
Grant County PUD responses to Agency Comments

Submitting Entity	Date Received	Paragraph #	Agency Comment	Grant PUD Response
USFWS	03/26/2013	1	Thanks for giving me a heads-up on Grant PUD's view of compliance for their transmission lines in accordance with the new APLIC 2012 guidelines. I've had time to review the subject document and have a few comments for your consideration in an effort to make a more complete document:	Grant PUD appreciates the USFWS's acknowledgement of Grant PUD's collaborative efforts.
USFWS	03/26/2013	2	While I generally agree that two of Grant PUD's Midway transmission line spans are currently in accordance with the State of Art in 2012 guidelines since two of these lines are the interior spans of a five-span transmission line cluster thereby reducing avian collision potential through the line configuration, I'm also concerned about low-flying bird species and/or juvenile bird species that are not quite familiar with these types of configurations. Discussing this issue in the document would be helpful. I would also recommend some level of carcass surveys in the upcoming year (or two) to verify whether or not Bird Flight Diverters are warranted for the two Midway lines.	<p>Grant PUD appreciates the USFWS's agreement that the two Grant PUD-owned interior spans within the 5-span Midway transmission line cluster are compliant with the APLIC 2012 State of the Art Publication and compliant with FERC Order132 FERC ¶ 62,127.</p> <p>Grant PUD also shares the USFWS concerns about low-flying bird species. As a result, Grant PUD conducted an avian study in 2001 which included carcass surveys (Framatome ANP 2003). A total of three carcasses were discovered during the 2001 carcass surveys (American robin at Wanapum Switch yard and a white-crowned sparrow and long-billed dowitcher at North Moran Slough). Two additional unknown birds were also found and described as "piles of feathers and bones." During the Article 411 surveys, it was discovered the birds such as merlins, American Kestrels, and prairie falcons reside in these areas, land on transmission towers and OHGWs, and likely feed on the birds species that were discovered near these transmission line corridors. The data of those avian surveys resulted in the issuance of Article 411. Grant PUD is in the process of implementing its FERC Order per Article 411 (132 FERC ¶ 62,127).</p>
USFWS	03/26/2013	3	I read the document pretty thoroughly and maybe I missed it, but I didn't see a discussion of when (during the day) two-hour block surveys were completed? This type of discussion would greatly enhance the overall perspective of the avian interaction with the transmission lines. For example, were the two-hour blocks in the early morning versus the late evening? Inserting and defining these time blocks in specific terms would also be a good move as well.	<p>Grant PUD described the survey times in bulleted headings in Section 2.2.1 Site Information Data as "Day Time Period".</p> <p>... "Day Time Period: AM (survey started at civil twilight), Mid-Day, PM (survey concluded at civil twilight)"</p>

Submitting Entity	Date Received	Paragraph #	Agency Comment	Grant PUD Response
USFWS	03/26/2013	4	Figure 3 is a bit confusing and it's likely due to my ignorance of not seeing these transmission line configurations out in the field. However, this figure appears to suggest that Tower #144 is on the outside of this particular configuration, perhaps warranting BFD's? I know the figure resolution is a bit obscure, but the BPA appears not to have BFD's as well? Some clarity in reference to this figure would be helpful.	Grant PUD understands the confusion, and agrees that is hard to determine the three-dimensional depth in a two-dimensional photograph without site knowledge. Tower #144 is on the outside of this configuration, and yes, Grant PUD plans to install BFD on the span with Tower #144. Grant PUD has also modified "Section 4.0 Adaptive Management – Midway Spans" to enhance the clarification.
USFWS	03/26/2013	5	I have one last comment in reference to the Section 5.0 Recommendations. I'm not questioning the intent of Grant PUD, but stating that Grant PUD will continue its monitoring obligations in this section in accordance with the Transmission Line Collision Protection Plan would be helpful.	Grant PUD will continue to implement monitoring approved in the Article 411 Plan (132 FERC ¶ 62,127).
WDFW	4/11/13	1	Behr, thank you for the opportunity to review and comment on the DRAFT Priest Rapids Project – FERC No. 2114 Transmission Line Collision Protection Plan 2012 Annual Report for License Article 411 (DRAFT) prepared by the Grant County Public Utilities District.	Grant PUD appreciates WDFW's willing to review and comment upon the report.
WDFW	4/11/13	2	The use of the word "site or sites" is used throughout the DRAFT when we believe corridor or corridors should be used. For example, in the second paragraph of the Executive Summary, in Section 2.1 Bird Flight Diverter Installation, and in Section 3.1, Table 2 the word "sites" appears to be one in the same with "corridor." This is confusing since both the first paragraphs of the Executive Summary and the introduction identify five transmission line corridors. This should be addressed and clarified in the Final Report.	Grant PUD agrees with WDFW and modified the report to reflect WDFW's recommendations throughout the report.
WDFW	4/11/13	3	As a suggestion, the Executive Summary, and other sections of the Report where similar language could be used, might read as follows:	Comment noted.
WDFW	4/11/13	4	Pursuant to the Plan, Grant PUD scheduled the installation of BFDs upon the overhead ground wires (OHGW) at the following corridors and years: 1) South Moran Slough (2011), 2) North Moran Slough (2012), 3) Wanapum Switchyard (2013), 4) Wanapum-Columbia/Moses Coulee (2014), and Midway/Columbia River downriver from Priest Rapids Dam (2015). To date, Grant PUD has installed BFDs upon all three spans at South Moran Slough Corridor in 2011 and the one span at North Moran Slough Corridor in 2012.	Grant PUD incorporated WDFW's recommendation.
WDFW	4/11/13	5	We agree that the two internal spans of the Midway corridor are in accordance with the 2012 APLIC and that no BFD's are required on these internal spans. Likewise we agree that the removal of the OHGW on the de-energized span will also not require BFD's, but the DRAFT does not identify in the corridor where the de-energized span occurs.	Grant PUD respects WDFW acknowledgement that the two interior transmission line spans are in accordance with the APLIC 2012 State of the Art publication.

Submitting Entity	Date Received	Paragraph #	Agency Comment	Grant PUD Response
			Additional clarification would be useful.	Grant PUD has modified "Section 4.0 Adaptive Management – Midway Spans" for clarification.
WDFW	4/11/13	6	Also, the three spans where no BFD's will be installed are part of the original 10 spans approved by FERC in 2010. Does the PUD intend to add three more spans where BFD's can be installed in order to stay in compliance with FERC. Additional clarification would be useful.	Grant PUD does not intend to add additional span marking to Article 411. Grant PUD conducted an avian transmission line survey in 2001 (Framatome ANP 2003) and the results of that study was the impetus for Article 411. Per the Article 411 FERC Order (132 FERC ¶ 62,127), Grant PUD plans to insure these 10 spans are in accordance with the guidelines set forth in "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006," by the Edison Electric Institute and the Avian Power Line Interaction Committee (APLIC), or as such publication may be updated from time to time.
WDFW	4/11/13	7	During our telephone conversation on March 19, you mentioned Grant PUD installs BFD's in certain distribution lines where the probability of avian strikes is relatively high or avian mortalities have been documented. A mention of this in the annual report along with a few examples of location where BFD's are installed would be informative.	In addition to Article 411, Grant PUD does implement an Avian Protection Plan (APP); however, the APP is not part of Article 411 and thus information related to the APP is not included in this report, but is available upon request. In implementing the APP, Grant PUD does mark distribution lines and new transmission lines with BFDs per APLIC Suggested Practices.
WDFW	4/11/13	8	Finally, we agree with the comments provided to the PUD by the USFWS. Please contact me if you have any questions or concerns. I appreciate your willingness to consult and coordinate with WDFW.	Grant PUD appreciates WDFWs coordination comments and suggestions.