

SODA HYDROELECTRIC PROJECT SPINNING RESERVE STUDY – IMPACTS ON NESTING MIGRATORY BIRDS



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INTRODUCTION

PacifiCorp's FERC license for the Bear River Hydroelectric Project provides for the utilization of spinning reserve at the Soda Development. PacifiCorp has not declared spinning reserve at the Soda Development under the current license. Changing needs for reserve power created by the ever-increasing volume of variable renewable power (solar and wind) being integrated into the energy grid make it advantageous to implement spinning reserve operations at the Soda Development. In preparation for doing so, PacifiCorp and the Bear River Project Environmental Coordinating Committee (ECC) would like to understand and document the potential environmental effects of spinning reserve releases of up to 2,600 cfs from the Soda Development.

One such environmental effect is the potential for spinning releases to disrupt breeding of migratory birds. The likely mechanism for this disruption would be rising water levels inundating nests that were already built and potentially containing eggs or pre-fledged chicks. In such a circumstance, reproductive success could be impacted. This analysis examines species at risk for these kinds of impacts, focusing on species with current downward population trends that could be exacerbated by the impacts of spinning reserve releases.

OBJECTIVE AND ASSUMPTIONS

The objective of this study is to identify any potentially significant, adverse effects of implementing spinning reserve releases on the nesting success of migratory birds. Inundation of nests containing eggs or pre-fledged chicks is the specific mechanism addressed. Several assumptions and other considerations should be noted to clarify how the study was designed to meet this objective:

- This is a “red flag” review to assess the potential for major adverse effects, not a detailed analysis of all potential effects.
- Accordingly, the assessment focuses on the “worst-case” scenario (i.e., flooding of the entire inundation zone, from the mean high-water mark up). While other factors such as high runoff or boater flows could raise water levels during breeding season and reduce the net effect of spinning releases, these events are not considered in the assessment.
- A spinning reserve release would have a projected total flow of 2,600 cfs below the Soda Development. The increment of additional discharge necessary to achieve this total would vary. For the purposes of this study, the duration of a spinning release will be 2 hours, and one release per year is projected. This duration and frequency is based on the history of spinning reserve calls at PacifiCorp's Oneida Development. The timing of that release is assumed to be random, with equal probability throughout the year. Once a spinning release call is made, the 2,600 cfs total flow will be achieved within 10 minutes.
- As noted, high flows occur in this reach for a number of reasons, due to natural variation as well as management of the river system. What sets the spinning release flows apart from other high flow events is their random timing and sudden onset rather than their flow rate *per se*.
- PacifiCorp provided a range of modeled seasonal flow scenarios, each indicating projected flows through each segment of the study reach. While this assessment focuses on the migratory bird breeding season, spanning the spring run-off and summer irrigation scenarios, the projected flows are not relevant to the assessment; the assessment is based on spatial extent of inundation rather than the flows that account for inundation. As noted, the assessment assumes the maximum extent of inundation.

METHODS

This study was conducted using data from several sources: inundation area data provided by PacifiCorp, habitat data from aerial imagery classification, species presence data from surveys conducted on the affected reach of the Bear River during the breeding season, local and regional population trend data from the Breeding Bird Survey (BBS), and life history data from The Birds of North America (BNA).

Inundation Area

The inundation area was defined by a modeling effort undertaken by Bowen Collins & Associates at the request of PacifiCorp. The modeling used a digital elevation model, bathymetric survey data, and flow data from monitoring stations on the river. Photographs taken of the floodplain during flooding in the spring of 2017 were used to validate the model results (Bowen Collins 2017). The final inundation area and the accompanying report were provided to Cirrus by PacifiCorp.

Imagery Classification

During the summer of 2017, PacifiCorp contracted with GeoTerra to collect 6-inch resolution aerial imagery of the project area. For this analysis, the portion of this imagery within the PacifiCorp-provided inundation area was classified into five broad vegetation classes using supervised classification methods in the ENVI software package. Those vegetation classes were: bare ground, sparse upland vegetation, dense upland vegetation, wetland vegetation, and woody vegetation. The acreage of these classes was used to determine how much potential nesting habitat for each species occurs within the inundation area.

Surveys

In order to determine what migratory birds may be present and breeding in the inundation area, two rounds of bird surveys were conducted on the affected reach of the Bear River during the 2018 breeding season. Canoe-based surveys were conducted April 30–May 4 and May 18–21, during the early morning activity period. During each of these two survey rounds, two crews floated all accessible reaches. Some reaches were not accessible by canoe, and the same surveyors walked the banks in these areas where terrain and property access permitted (Figure 1).

Both survey crews floated or walked down the river in tandem, with each crew having primary responsibility for one side of the river. Survey crews consisted of two members, a canoe pilot and an observer. The canoe pilot was responsible for navigating the river, leaving the observer free to focus on detecting and documenting birds. Birds were detected by both sight and sound. When a bird was detected, the species and an approximate number of individuals observed were recorded on datasheets. In order to prevent duplicate tallies, both observers recorded the species encountered, but only one observer documented the number of individuals observed. Species observed in each reach and the estimated number of individuals observed were later digitized from the field datasheets in Excel.

Breeding Bird Survey

The BBS is an international bird survey effort conducted by the U.S. Geological Survey (USGS) and the Canadian Wildlife Service (CWS). The program was started in 1966 with the intent of documenting bird population trends at a large geographic scale. The BBS consists of over 4,100 survey routes across North America, each surveyed annually during the peak of bird breeding season. Many of these survey routes have data going back several decades.

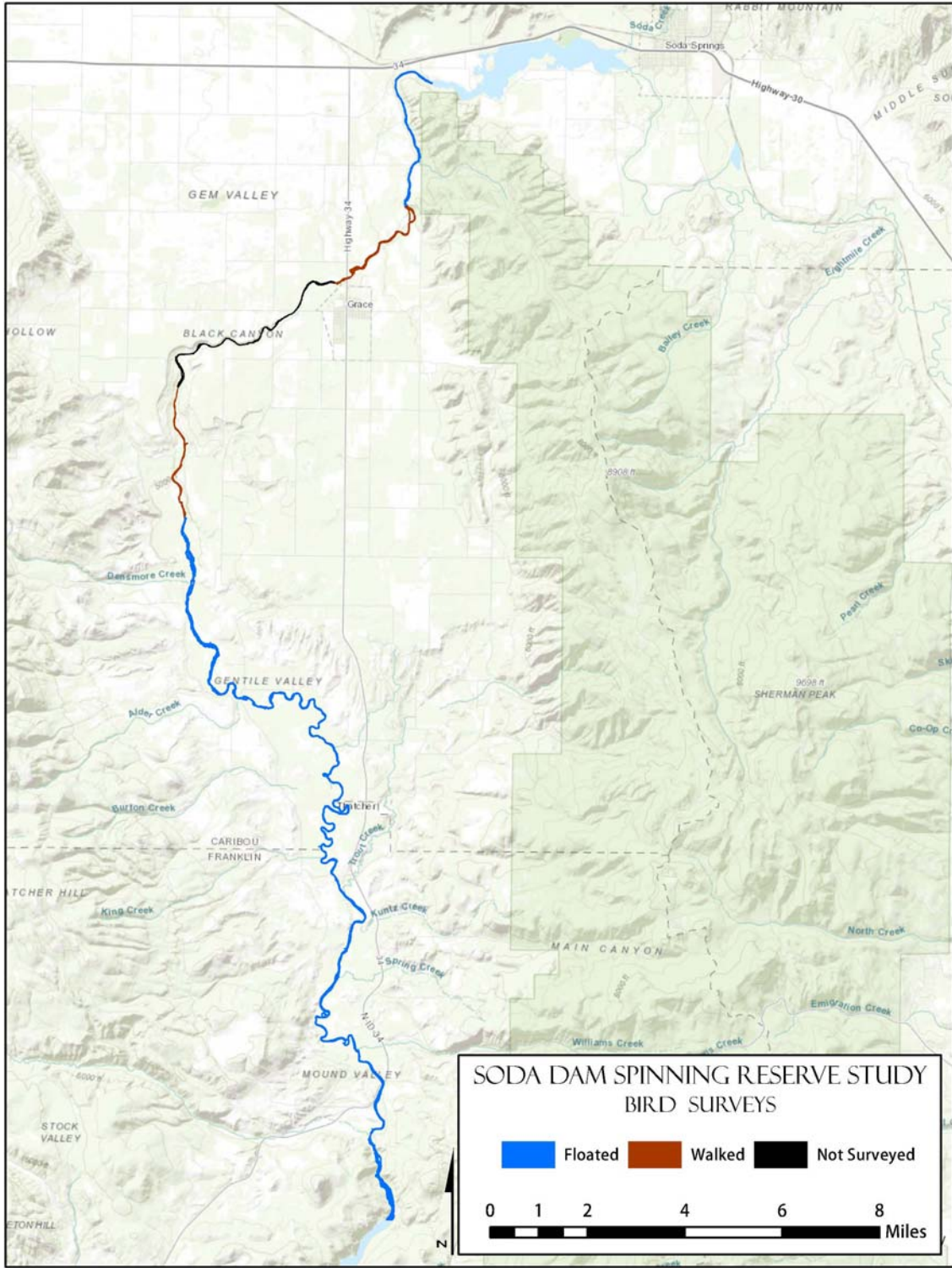


Figure 1. Bird survey coverage.

For this analysis, four BBS routes in southeast Idaho, as well as the combined total of all routes, were used to determine local and large-scale population trends. Local population trends were calculated by averaging the four southeast Idaho BBS counts for each species and each year (1979-2017) then plotting the averages per year in Excel with a line of best fit. Species with fit lines with a negative slope were classified as declining and those with a positive fit-line slope were classified as increasing. Some species observed during the aforementioned project-specific surveys were not observed or were observed in low numbers at the four southeast Idaho BBS routes.

For each species with a negative fit-line slope, or insufficient data to plot based on the four southeast Idaho BBS routes, large-scale trends calculated by the USGS and CWS were examined. If a species was found to have a negative fit-line slope or insufficient data for the local population, as well as a downward large-scale trend (with a 95 percent confidence interval not overlapping 0), that species was carried into in-depth analysis since further impacts could exacerbate existing downward trends. Species with positive or neutral trends would be more resilient to potential impacts.

The Birds of North America

BNA is a collection of species accounts for all bird species in North America. For this analysis, BNA was used to determine which species observed during project-specific surveys could potentially have their breeding impacted by spin calls. Species that nest on the ground, on vegetation near the waterline, or very low in riparian vegetation within habitats in the inundation zone were identified as potentially impacted. For each of these species, BNA was also used to identify the time of year that nests would be vulnerable (i.e., the period between nest building and chick fledging). These dates were used to determine the likelihood of a randomly timed spin call impacting each species' breeding success.

RESULTS

Imagery Classification

Within the PacifiCorp-provided inundation area, there are a total of 335 acres of potential nesting habitat: 83 acres of sparse upland grass, 154 acres of dense upland grass, 76 acres of wetland grass, and 22 acres of woody vegetation.

Surveys

We observed a total of 111 species over the course of our surveys (Table 1).

American avocet	Cinnamon teal	Lark sparrow	Spotted sandpiper
American bittern	Cliff swallow	Lazuli bunting	Spotted towhee
American coot	Common goldeneye	Least sandpiper	Swainson's hawk
American crow	Common merganser	MacGillivray's warbler	Townsend's warbler
American dipper	Common raven	Mallard	Tree swallow
American goldfinch	Common yellowthroat	Marsh wren	Trumpeter swan
American kestrel	Cooper's hawk	Mourning dove	Turkey vulture
American robin	Dark-eyed junco	Northern flicker	Vaux's swift

Table 1 (cont'd). Bird species observed during surveys conducted during the breeding season between Soda Dam and Oneida Reservoir.

American white pelican	Double-crested cormorant	Northern harrier	Vesper sparrow
American wigeon	Downy woodpecker	Northern rough-winged swallow	Violet-green swallow
Bald eagle	Dusky flycatcher	Orange-crowned warbler	Virginia rail
Bank swallow	Eastern kingbird	Osprey	Virginia's warbler
Barn swallow	Eurasian collared-dove	Pied-billed grebe	Warbling vireo
Belted kingfisher	European starling	Pine siskin	Western kingbird
Black-billed magpie	Fox sparrow	Pinyon jay	Western meadowlark
Black-capped chickadee	Franklin's gull	Red-breasted merganser	Western tanager
Black-headed grosbeak	Gadwall	Red-tailed hawk	White-crowned sparrow
Black-throated gray warbler	Golden eagle	Red-winged blackbird	White-faced ibis
Brewer's blackbird	Grasshopper sparrow	Ring-billed gull	Willet
Broad-tailed hummingbird	Great blue heron	Ring-necked duck	Wilson's phalarope
Brown-headed cowbird	Green-tailed towhee	Ring-necked pheasant	Wilson's snipe
Bullock's oriole	Green-winged teal	Rock pigeon	Wilson's warbler
California gull	Hermit thrush	Rock wren	Yellow warbler
Canada goose	Horned lark	Ruby-crowned kinglet	Yellow-headed blackbird
Canyon wren	House finch	Sandhill crane	Yellow-rumped warbler
Cassin's finch	House sparrow	Savannah sparrow	
Cedar waxwing	House wren	Say's phoebe	
Chipping sparrow	Killdeer	Song sparrow	

Life History and Trend Data

Of the 111 species observed, 63 have the potential to nest in the inundation area (Table 2).

Table 2. Bird species observed during breeding bird surveys with the potential to nest in the inundation area.

American avocet	Gadwall	Rock wren
American bittern	Grasshopper sparrow	Ruby-crowned kinglet

Table 2 (cont'd). Bird species observed during breeding bird surveys with the potential to nest in the inundation area.

American coot	Green-tailed towhee	Sandhill crane
American dipper	Green-winged teal	Savannah sparrow
American robin	Grey catbird	Say's phoebe
American wigeon	Horned lark	Song sparrow
Bank swallow	House wren	Spotted sandpiper
Belted kingfisher	Killdeer	Spotted towhee
Black-headed grosbeak	Lark sparrow	Trumpeter swan
Bobolink	Lazuli bunting	Vesper sparrow
Brewer's blackbird	MacGillivray's warbler	Violet-green swallow
Brown-headed cowbird	Mallard	Virginia rail
California gull	Marsh wren	Virginia's warbler
Canada goose	Northern harrier	Warbling vireo
Cinnamon teal	Northern rough-winged swallow	Western meadowlark
Common merganser	Orange-crowned warbler	White-crowned sparrow
Common yellowthroat	Pied-billed grebe	Willet
Dusky flycatcher	Red-breasted merganser	Wilson's phalarope
Eastern kingbird	Red-winged blackbird	Wilson's snipe
Fox sparrow	Ring-necked duck	Yellow warbler
Franklin's gull	Ring-necked pheasant	Yellow-headed blackbird

Of the 63 observed species with the potential to nest in the inundation area, the local population trend analysis yielded 27 species with a fit line with a negative slope and 10 with low numbers for local BBS routes (Tables 3 and 4).

Of the 37 species in Tables 3 and 4, eight of these species also have downward national trends: Brewer's blackbird, killdeer, MacGillivray's warbler, red-winged blackbird, savannah sparrow, song sparrow, western meadowlark, and yellow warbler. Impacts of this action on these eight species are discussed in detail below.

Table 3. Observed species from Table 1 with a negative fit-line slope based on data from four BBS routes in southeast Idaho.

American coot	Killdeer	Savannah sparrow
American robin	Northern harrier	Song sparrow
American wigeon	Northern rough-winged swallow	Spotted sandpiper
Brewer's blackbird	Orange-crowned warbler	Violet-green swallow
Brown-headed cowbird	Red-winged blackbird	Western meadowlark

Table 3 (cont'd). Observed species from Table 1 with a negative fit-line slope based on data from four BBS routes in southeast Idaho.		
California gull	Ring-necked duck	Willet
Dusky flycatcher	Ring-necked pheasant	Wilson's snipe
Green-tailed towhee	Rock wren	Yellow warbler
House wren	Sandhill crane	Yellow-headed blackbird

Table 4. Observed species from Table 1 with numbers too low to plot a fit-line based on data from four BBS routes in southeast Idaho.		
American Bittern	MacGillivray's Warbler	Virginia's Warbler
American Dipper	Red-breasted Merganser	White-crowned Sparrow
Belted Kingfisher	Trumpeter Swan	
Common Merganser	Virginia Rail	

DISCUSSION

The following species-specific discussions focus on background and impacts associated with nesting, since that life-stage is where the greatest risk from the proposed spinning releases lies.

Brewer's Blackbird

Background

This species builds nests in a wide variety of places. Nest are built high in man-made structures or trees, low in shrubs, on the ground, or in emergent vegetation. Brewer's blackbirds are colonial, so many pairs nest in the same vicinity with many nest types (e.g., ground, trees, shrubs) present in the same colony. This species is known to re-nest if the initial nest fails. Pairs have been observed making up to three nesting attempts per season when previous nests failed (Martin 2002).

Brewer's blackbirds begin arriving in SE Idaho in early April (eBird 2018). Following arrival in breeding areas, nest site selection and nest construction begins and is typically completed by the end of April, when the first eggs are laid. Nest construction takes 9–10 days. Chicks typically hatch and leave the nest within 26 days of eggs being laid (Martin 2002).

Analysis

Most of the inundation area is nesting habitat for Brewer's blackbirds, and this species would be vulnerable to disturbance by a spin call from early April through early May, or roughly 10 percent of the year. Assuming an average of one spin call per year (as has been projected at ECC meetings) and a random distribution of spin calls, it could be expected that a spin call would occur during the vulnerable period for this species one 1 of every 10 years. Considering the wide variation in nest sites, only a portion of the nests in the inundation area would be impacted at this low frequency. Pairs with nests that were impacted would likely re-nest, reducing the impact of a spin call on recruitment.

At the expected interval of occurrence, and considering the aforementioned life history characteristics of this species, it is highly unlikely that the authorization of spinning releases on this stretch of the Bear River would have any measurable impacts on local or large-scale population trends for Brewer's blackbirds.

Killdeer

Background

Killdeer nest on the ground in small depressions scraped out in areas with low sparse vegetation cover. This species is known to produce multiple broods per season regardless of whether the initial brood is successful or not (Jackson and Jackson 2000).

Killdeer begin arriving in SE Idaho in early March (eBird 2018). Nest site selection and construction occurs in late March or early April. Nest construction is not a lengthy process since nest are very simple. The first clutch of eggs is generally laid in early April and hatch an average of 25 days later. Chicks are precocial at hatching and are often led away from the nest immediately by the parents. Since multiple broods per year are common for this species, the nesting season stretches from early April through late July (Jackson and Jackson 2000).

Analysis

There are approximately 83 acres of potential killdeer nesting habitat in the inundation area. Since multiple broods are reared per year, nests in this habitat would be vulnerable to disturbance by a spin call approximately 33 percent of the year. With the same assumptions used above, this species would be impacted by a spin call 1 out of every 3 years.

Killdeer are a common species in the study area, and there is a very large amount of nesting habitat in the area surrounding the inundation zone. Due to the small percentage of available habitat that would be impacted, potential spinning release impacts are likely to be absorbed without exacerbating the current downward trends locally or at larger scale.

MacGillivray's Warbler

Background

MacGillivray's warblers typically nest near the ground in areas of dense woody riparian vegetation. In SE Idaho this species is associated with shrub, aspen, and Douglas fir habitats and avoids high percentages of agriculture, cottonwoods, and herbaceous wetlands at the landscape level. Nests on the ground or high in trees have been observed, but most nests are built at a height of 30–60 centimeters above the ground. This species is not known to re-nest if the initial nest fails (Pitocchelli 2013).

MacGillivray's warblers begin arriving in SE Idaho in early May (eBird 2018). Nest site selection and construction is completed in late May to early June, and eggs are typically laid by June 5. Eggs typically hatch after 12 days and chicks are altricial. Fledging of chicks takes 8–9 days after hatching (Pitocchelli 2013).

Analysis

There are approximately 22 acres of woody riparian vegetation in the inundation area; however, this habitat exists in a highly agricultural landscape that MacGillivray's warblers are unlikely to select. There was a single detection of this species during surveys conducted for this project, and that detection occurred just below Soda Dam, in an area outside the inundation zone. Bank inundation in this area would occur in the event of a spin call, but the total area impacted would be very small since the banks are steep in this reach. Any nests in this small area of habitat would be vulnerable to a spin call for approximately 7 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 14 years.

Given the small area of potential habitat impacted and the low interval of occurrence, it is highly unlikely that the authorization of spinning releases on this stretch of the Bear River would have any measurable impacts on local or large-scale population trends for MacGillivray's warblers.

Red-winged Blackbird

Background

This species builds nests in a wide variety of places. Nests are woven into emergent vegetation, in agricultural fields, in upland grass communities, or in woody vegetation. Nests range in height from ground level to up to 7 meters above ground. If the initial clutch of eggs is lost, this species commonly re-nests (Yasukawa and Searcy 1995).

Red-winged blackbirds are present in SE Idaho year-round (eBird 2018). Nesting typically begins in mid-March and nests are built in 1–3 days once a site is selected. Egg laying is sometimes delayed several days, but once eggs are laid chicks hatch in approximately 13 days. Chicks are altricial and are fledged 12 days after hatching (Yasukawa and Searcy 1995).

Analysis

All of the inundation area could be considered red-winged blackbird nesting habitat. This species would be vulnerable to a spin call for approximately 7 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 14 years. Considering the wide variation in nest sites, only a portion of the nests in the inundation area would be impacted at this low frequency. Pairs with nests that were impacted would likely re-nest, reducing the impact of a spin call on recruitment.

At the expected interval of occurrence, and considering the aforementioned life history characteristics of this species, it is highly unlikely that the authorization of spinning releases on this stretch of the Bear River would have any measurable impacts on local or large-scale population trends for red-winged blackbirds.

Savannah Sparrow

Background

Savannah sparrows nest on the ground in areas of dense herbaceous cover. This species is known to produce multiple broods per season regardless of whether the initial brood is successful or not (Wheelwright and Rising 2008).

Savannah sparrows begin arriving in SE Idaho in early April (eBird 2018). Once the nest location is selected, construction is rapid taking as little as 2 days. The first eggs are laid immediately after nest completion, and the clutch is typically completed after 4 days. Altricial chicks hatch 14–16 days after eggs are laid and are fledged 11–12 days later. The second clutch of eggs is typically laid about 14 days after the first brood is fledged (Wheelwright and Rising 2008).

Analysis

There are approximately 154 acres of dense herbaceous cover that could provide potential nesting habitat for this species in the inundation area. Due to their habit of producing multiple broods per season, the period during which savannah sparrows would be vulnerable to a spin call would be extended. This period would represent approximately 16 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 6 years.

Savannah sparrows are a somewhat common species in the study area, and there is a very large amount of nesting habitat in the area surrounding the inundation area. Due to the small percentage of available habitat that would be impacted and the long interval between disturbances, potential spinning release impacts are likely to be absorbed without exacerbating the current downward trends locally and nationally.

Song Sparrow

Background

Song sparrows typically nest on the ground in riparian areas with dense herbaceous or woody cover. This species is known to produce multiple broods per year and can produce up to seven broods in one breeding season (Arcese et al. 2002).

Song sparrows are present in SE Idaho year-round (eBird 2018). The timing of the first brood is thought to be dependent upon food availability but generally begins with laying of eggs in early April. Young or eggs may be present in the nest from early April through the end of July (Arcese et al. 2002).

Analysis

There are approximately 176 acres of potential nesting habitat in the inundation area. Due to their habit of producing multiple broods per season, the period during which song sparrows would be vulnerable to a spin call would be extended. This period would represent approximately 33 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 3 years.

Song sparrows are one of the most common and widespread bird species in North America (Arcese et al. 2002). However, in the arid west, this species nesting habitat is generally limited to riparian areas such as those in the inundation area. While there is other riparian habitat in Gentile Valley, the Bear River provides a large portion of the available nesting habitat. Impacts from potential spinning releases at the interval of 1 out of every 3 years could exacerbate local downward trends but is not likely to be noticeable in large-scale trends since population numbers are so high.

Mitigation of impacts on local populations could be accomplished by the creation of additional suitable nesting habitat outside the inundation area.

Western Meadowlark

Background

Western meadowlarks nest on the ground in areas with herbaceous cover of medium height and density. This species is known to produce a second clutch after successful nesting attempts and will re-nest up to six times if unsuccessful (Davis and Lanyon 2008).

Western meadowlarks begin arriving in SE Idaho in early March (eBird 2018). Egg laying typically begins in early May, and altricial chicks hatch 13–15 days after eggs are laid. Fledglings leave the nest after 10–12 days. Successive broods are raised through early August (Davis and Lanyon 2008).

Analysis

There are approximately 237 acres of herbaceous cover that could provide potential nesting habitat for this species in the inundation area. Due to their habit of producing multiple broods per season, the period during which western meadowlarks would be vulnerable to a spin call would be extended. This period would represent approximately 25 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 4 years.

Western meadowlarks are a common species in the study area, and there is a very large amount of nesting habitat in the area surrounding the inundation zone. Due to the small percentage of available habitat that would be impacted, potential spinning release impacts are likely to be absorbed without exacerbating the current downward trends locally and nationally.

Yellow Warbler

Background

Yellow warblers build nests in forks of woody riparian vegetation. Nests are built as low as a few centimeters and as high as 14 meters, but most are 1–2 meters above ground. Second broods are only rarely attempted (Lowther et al. 1999).

Yellow warblers begin arriving in SE Idaho in mid-April (eBird 2018). Nest construction occurs in late May and takes approximately 4 days. Egg laying typically begins in late May, and altricial chicks hatch approximately 12 days later. Chicks are fledged 8–10 days after hatching (Lowther et al. 1999).

Analysis

There are approximately 22 acres of woody riparian vegetation in the inundation area. This species would be vulnerable to a spin call for approximately 7 percent of the year. With the same assumptions used above, this species would be impacted by a spin call approximately 1 out of every 14 years. Considering the wide variation in nest heights and the fact that most nests are over 1 meter above ground level, only a portion of the nests in the inundation area would be impacted at this low frequency.

Yellow warblers are a common species in the study area. The willow habitats they nest in are under pressure on some parts of the Bear River but are well protected and extensive in others. Due to the low frequency of anticipated impacts and the low percentage of potential habitat impacted, potential spinning release impacts are unlikely to exacerbate downward trends locally or nationally.

CONCLUSION

Given the proportion of available habitat for the song sparrow that would be impacted at a relatively frequent interval, impacts on this species may be noticeable at the local scale. Mitigation through creation of nesting habitat outside the inundation area may offset local scale impacts.

For most migratory bird species in the area, potential impacts would be easily absorbed without causing or exacerbating downward population trends.

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