

**EVALUATION OF INTERACTION BETWEEN OVERWINTERING BALD
EAGLES AND THE AVIAN LINE ARRAY AT THE DALLES DAM.**



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INTRODUCTION

BACKGROUND

Westrick Park, located within the boundaries of The Dalles Dam, has been a preferred winter site for bald eagles (*Haliaeetus leucocephalus*) to gather and over the past two years has become known to the public as an area of eagle congregation. The Dalles Dam has hosted an “Eagle Watch” event for the public during January in 2011 and 2012. Bald eagle activity in this area brings them into close proximity with the avian line array that is located just downstream of The Dalles Dam ice and trash sluiceway outfall and adjacent to Westrick Park. The avian line array installed over the powerhouse tailrace protects juvenile salmonids (*Oncorhynchus sp.*) and lamprey (*Entosphenus tridentatus*) macrophthalmia from avian predation during the spring and summer fish passage season. In the winter months, when eagles are present, there are few juvenile salmonids in the river. As eagle numbers increased at the project, fisheries biologist Robert Cordie at The Dalles Dam became concerned over the possible negative interaction eagles may have with these lines; the primary concern being injuries due to contact. Interference by the avian line array with the eagle’s flight or foraging activities in the area may require action by the Corps such as the removal of these lines in the winter months.

Our goal was to determine whether the avian deterrent line array in the tailrace of The Dalles Dam adversely impacted the overwintering bald eagles that are typically seen at the project from January through March. We chose to evaluate this by directly observing their behavior in and around the area of the avian line array.

OBJECTIVES

Our objectives were to:

- 1) Determine the number of eagles at the project January through March.
- 2) Determine the impact the avian line array has on eagle activity.

SITE DESCRIPTION

The Dalles Dam is located at Columbia River mile 192. The powerhouse extends downriver parallel to the river flow. It connects via a non-overflow monolith section to the spillway which extends across to the Washington shore (Figure 1). Westrick Park is located on the tailrace side of the dam along the monolith section. The ice and trash sluiceway outfall (discharge visible in Figure 1) is located at the west end of the powerhouse. The river's flow along the park is considered to be within the powerhouse area of the tailrace. Various trees such as poplar (*Populus sp.*), ponderosa pine (*Pinus ponderosa*), big leaf maple (*Acer macrophyllum*), and Douglas fir (*Pseudotsuga menzeiss*) (personal communication Park Ranger Amber Tilton) reside in Westrick Park.



Figure 1. Image of The Dalles Dam April 2012 from Google© maps.

METHODS

OBSERVATIONS

Observations began December 18, 2011 and continued through March 31, 2012. A one hour observation was taken in the morning (AM) and a one hour observation was taken in the afternoon (PM) Monday through Thursday. Observations on Friday through Sunday were done once a day, alternating between AM and PM. Using binoculars (Leupold¹ 10x50 with a 5° field of view), a count of all birds (spot count) was taken at the beginning and end of each observation hour. Bald eagle counts were categorized as adult (white or mostly white headed) or immature (brown headed) and differentiated by behavior (flying, perched, or foraging).

Two observation locations were used: the main site was at the avian line array just downstream of the ice and trash sluiceway outfall in the powerhouse tailrace which was observed six days a week and the secondary site, the spillway (in which both forebay and tailrace could be seen simultaneously), was observed one day per week. Most observations of the powerhouse tailrace were taken from Seufert Park (Figure 1) on the Oregon shore except during occasional inclement weather when observations were taken from within Westrick Park. The Seufert Park area provided the best unobstructed view of the area with the least amount of interaction between observers and subjects.

During the one hour observation period eagle activity in the study area was accounted for by noting the number of times they flew in close proximity to or encountered the avian lines. These activities were separated into four categories; 1) fly over, which indicated an eagle flying over the line array, 2) a fly under/through, indicated an eagle flying under the lines and/or when they consequently flew between the lines from above or below the array, 3) flinch, indicated an eagle changing flight or almost colliding with a line and 4) contact, when an eagle actually collided with an avian line. For each observed behavior a hash mark was tallied on the data sheet and totaled at the end of the observation period. Foraging behavior during observation was also documented. A foraging attempt (eagle flying over the water looking for prey) was recorded with a hash mark and the area of a foraging event (eagle hitting the surface of the water with their talons) was recorded on the data sheet map with a dot.

To compare the abundance of bald eagles in our study area in the morning versus the afternoon we started by computing the mean number of eagles for each observation period by summing the spot counts from the beginning and ending of the hour and dividing this value by two. A seasonal mean of the AM and PM values was computed by calculating the mean value for each time period across the season.

¹ Use of brand name does not imply endorsement by the USACE.

OTHER BIRD COUNTS

Counts of other birds in our observation area were also collected during the pre and post observation spot counts. These counts are used to describe the presence of other species while eagles occupied the park.

THE DALLES DAM EAGLE COUNTS

Our observations focused on an area of the dam where bald eagles were known to congregate; however, they could also be seen flying or perched at other locations around the project. For a daily presence of eagles on project we used counts that the fisheries staff collected during their fishway inspections. Inspections are done once a day during winter months. The counts reflect the number of birds seen in all areas of the dam. The project fisheries crew has been recording information on eagle abundance at the dam for several years. Daily counts of eagles from 2009 through 2012 were compared to show general trends in eagle numbers.

RESULTS

OBSERVATIONS

A total of 128 hours of observations were taken throughout the study period. Bald eagle presence in the study area peaked during the month of January with a maximum spot count of 39 eagles on January 12 and a weekly mean count of 16.8 during this same time period (Table 1). The number of eagles present in the park decreased steadily in February and remained low through the rest of the study although a handful of eagles were often seen elsewhere at the project. Sampling was reduced on March 15 to four days a week, one hour each day due to a lack of eagle presence.

Table 1. Bald eagles counted at The Dalles Dam during observations. Both the minimum and maximum are reported with the mean weekly count.

Week	Minimum	Maximum	Mean
12/18-24	5	9	7.5
12/25-31	5	21	14.1
1/1-7	0	29	13.7
1/8-14	0	39	16.8
1/15-21	0	31	11.3
1/22-28	0	35	15.7
1/29-2/4	0	26	4.4
2/5-11	0	4	0.9
2/12-18	0	4	0.5
2/19-25	0	2	0.2
2/26-3/3	0	1	0.2
3/4-10	0	1	0.1
3/11-17	0	0	0.0
3/18-24	0	0	0.0
3/25-31	0	1	0.1

Foraging events were tallied for both the forebay and tailrace (Figure 2). The powerhouse tailrace was observed for 106 hours during which 89 foraging events were tallied. Foraging in the powerhouse tailrace occurred mainly downstream of the avian line array. Notes on foraging behavior included eagles chasing one another and on one occasion several eagles were seen attempting to scavenge off a sea lions take of an adult fish. The forebay was observed for 22 hours during which 19 foraging events were tallied. The forebay observations revealed that foraging in this area occurred mainly near the transmission towers. Eagles flew over the spillway tailrace but did not forage in this area. During forebay observations a single note of piracy involved an immature eagle stealing a shad from an adult. The event occurred during flight as the immature harassed the adult into dropping the fish which was then caught by the immature eagle.

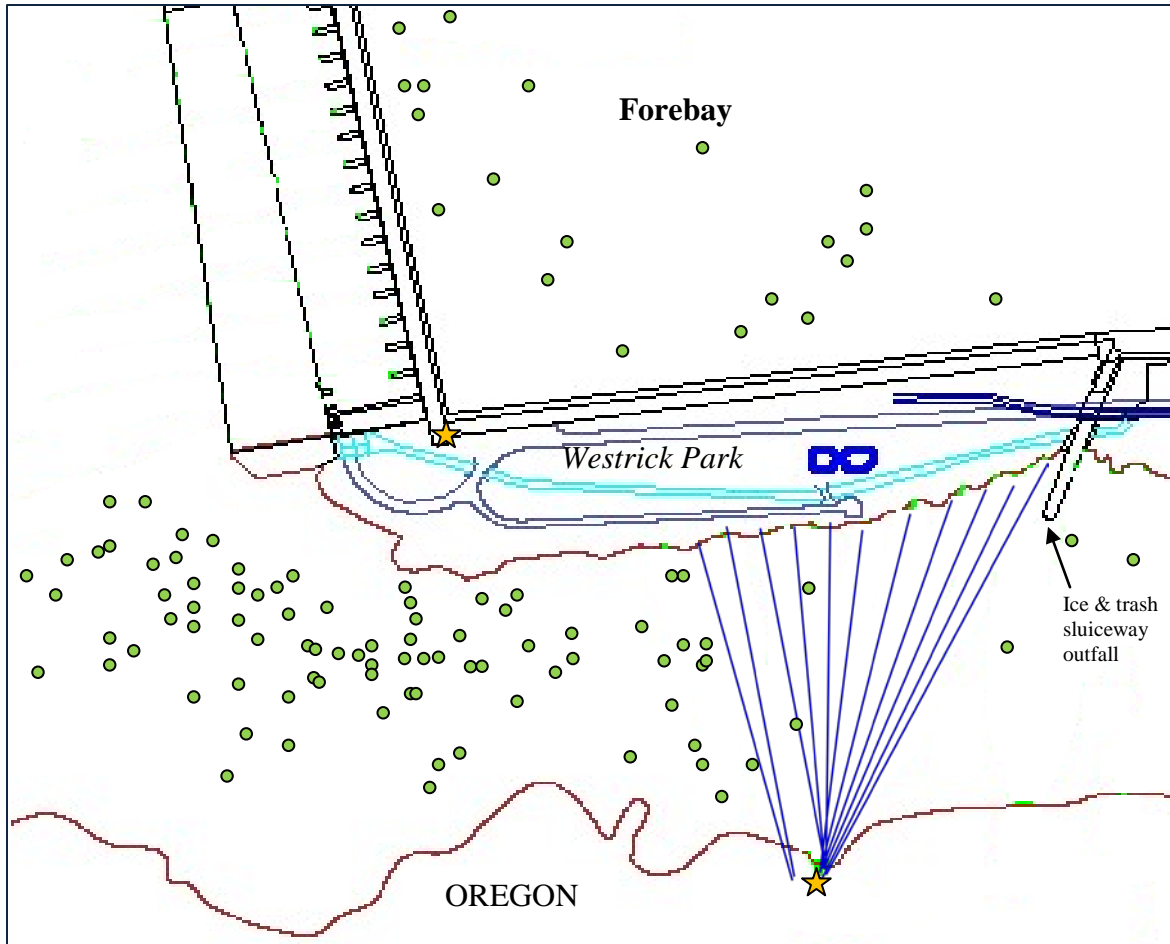


Figure 2. Map of the study area depicting the avian deterrent line array (blue lines) and their proximity to Westrick Park. Observation points are marked with an orange star. Foraging events are marked with green dots. Forebay observed for 22 hours. Tailrace observed for 106 hours.

Interaction with the avian line array while foraging occurred most frequently on January 2, as eagles were noted flying under and between the lines on 7 occasions (Figure 3). Throughout the rest of January the activity around the avian line array was described as eagles flying over the array. However, the morning observer on the 13th noted three occasions when eagles flew through the lines during foraging. By February eagle activity in the area of the avian array decreased sharply and remained low throughout the rest of the study. There were no observations of contact or avoidance of the avian line array.

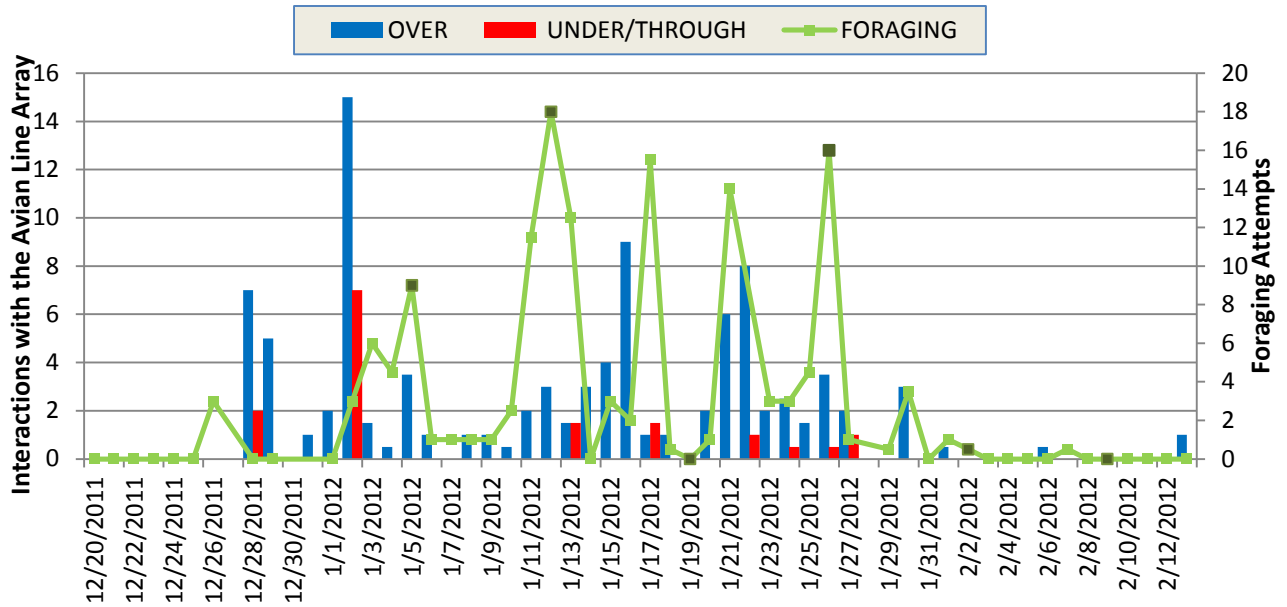


Figure 3. Bald eagle interaction with the avian line array in the tailrace of The Dalles Dam. Foraging attempts counted in the forebay denoted by a darker green marker.

Adult eagles were present in greater numbers than immature eagles (Figure 4). Mean daily number of adults counted from December 18 through February 29 was 7.7 and the mean daily number of immature for this period was 3.4. The number of both adult and immature eagles dropped off sharply by the end of January.

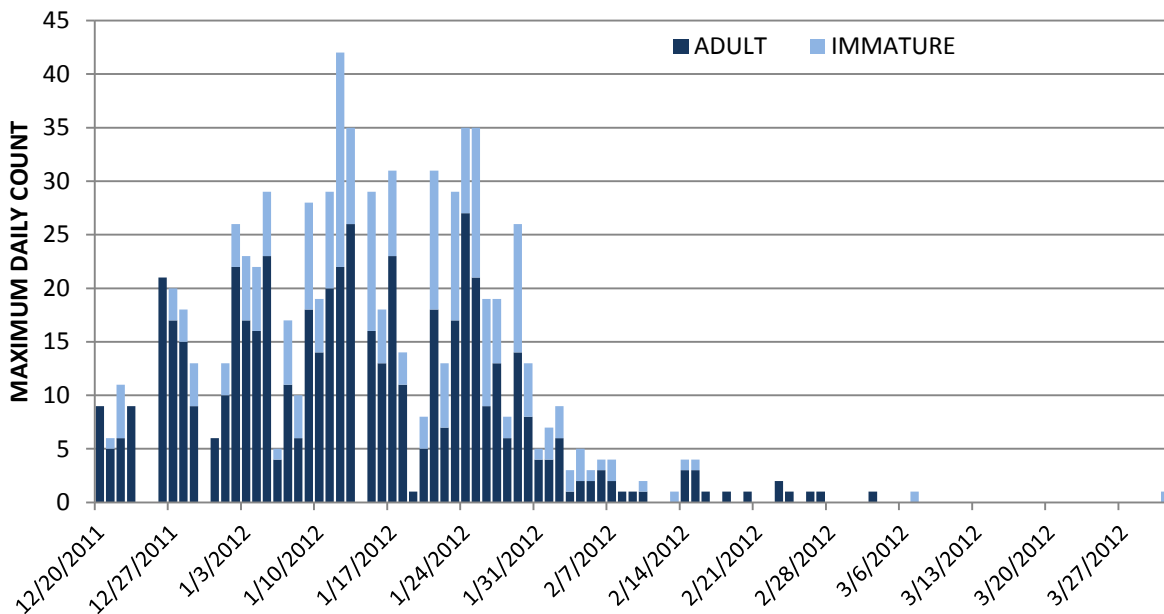


Figure 4. Maximum daily counts of adult and immature bald eagles differentiated by plumage.

Eagles spent a great deal of their time perched in the tree tops posturing for position or in the transmission towers along the top of the monolith section. Foraging attempts involved quick flights out over the water and back to the trees. Previous studies found that eagles tend to remain fairly inactive in the winter utilizing watch-and-wait hunting, scavenging and piracy as a preferable means of acquiring food (Stalmaster and Gessaman 1984, Fischer 1985, Keister et al. 1987, Restani et al. 2000). Of the 406 eagle counts recorded during the pre and post observation spot counts 84.9% (345/406) of them were counts of eagles perched, 8.4% (34/406) were counts of eagles flying by, and 6.7% (27/406) were counts of eagles actively foraging.

Bald eagle presence at the dam was greatest before noon tapering off later in the day (Figure 5). It was generally assumed that eagles arrived at the park early in the morning and left in the early evening, roosting elsewhere at night but this was not verified. Studies suggest that eagles use communal night roosting areas close to feeding grounds (Keister et al. 1987, Anthony et al. 1982, Stalmaster and Gessaman 1984), but the location of a communal night roost area near The Dalles Dam remains unknown.

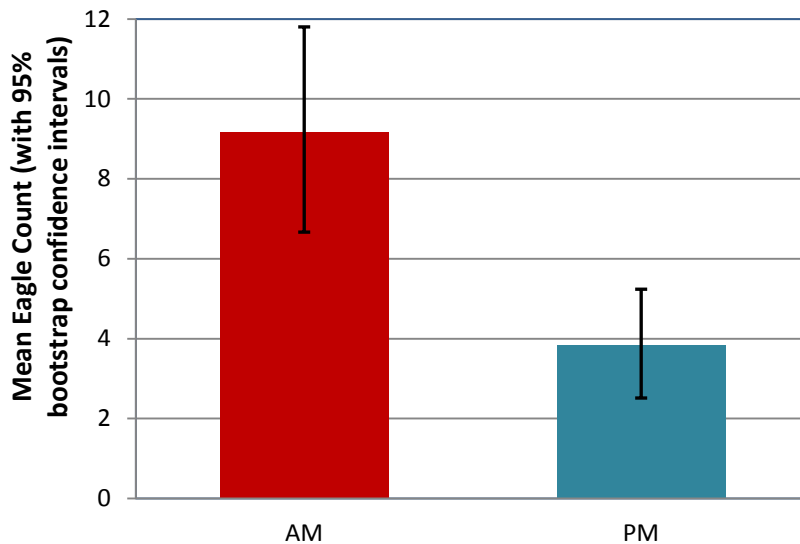


Figure 5. The mean of bald eagle counts taken AM (0700-1200) and PM (1200-1700) at The Dalles Dam.

OTHER BIRD COUNTS

Counts of other birds in the study area were also collected during pre and post observation spot counts. These counts included great blue heron (*Ardea herodias*), gulls (*Larus* spp), and double-crested cormorants (*Phalacrocorax auritus*), with a few Canada geese (*Branta canadensis*) and crows (*Corvus brachyrhynchos*). Towards the end of March other raptors were noted in the area

including red-tailed hawks (*Buteo jamaicensis*), peregrine falcons (*Falco peregrines*), Swainson’s hawks (*Buteo swainsoni*), and a possible golden eagle (*Aquila chrysaetos*) sighting. Of particular interest were the great blue herons, whose numbers also increased during January, as they seemed to be attracted to the presence of eagles (Figure 6). Herons were often seen standing under trees where eagles were feeding assumedly to scavenge dropped prey. Gulls observed in the area through the winter were likely glaucous-winged gulls (*Larus glaucescens*) and not the California (*Larus californicus*) and ring bills (*Larus delawarensis*) typically seen during spring and summer months. Double crested cormorants were frequently counted flying by or resting on islands just downstream of the Westrick Park area and in the forebay.

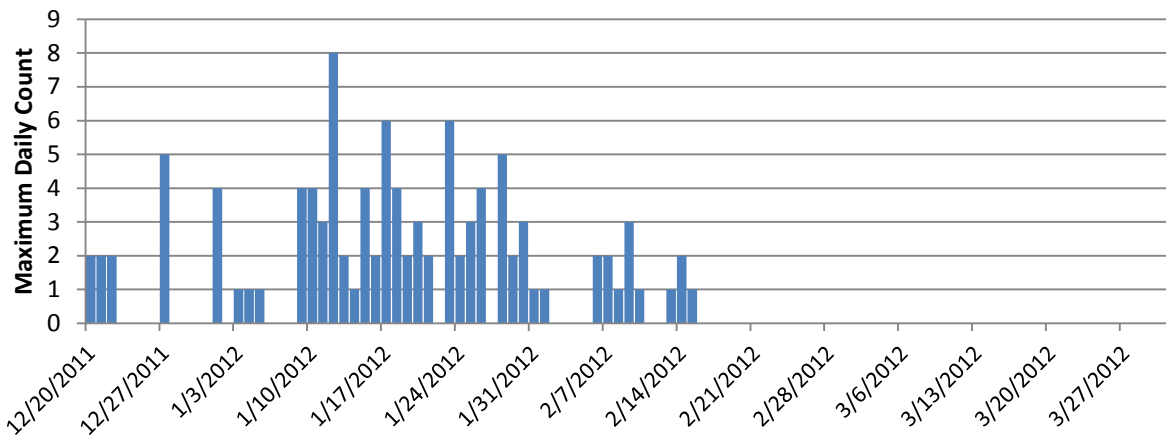


Figure 6. Maximum daily counts of great blue heron in the Westrick Park area during eagle presence at The Dalles Dam.

THE DALLES DAM EAGLE COUNTS

Bald eagles were first enumerated at the dam in December of 2009 and have been counted on project every winter since. Weekly means reported during the same time span over the three years are compared to show general trends in eagle presence (Figure 7). Over the last three winters bald eagles have appeared in mid December and remained in the area until the end of February. In 2010 the weekly mean number of eagles peaked at 33 late in January and again in early February. In 2011 the weekly mean eagle count rose to a high of 45 in mid January. In contrast eagle numbers in 2012 hit a high of 45 at the beginning and at the end of January tapering off sharply the first week of February.

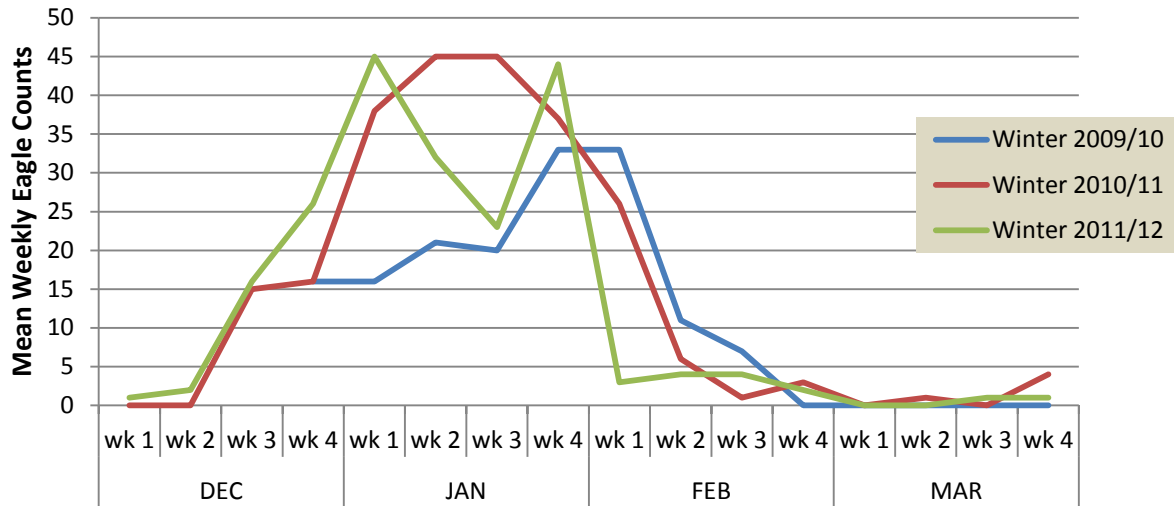


Figure 7. Mean bald eagle counts at The Dalles Dam from December to March, 2009 to 2012.

DISCUSSION

As bald eagle populations continue to rebound and usable habitat continues to shrink, their proximity to populated areas increases. Care should be taken to provide these birds with areas to roost, rest, and forage during winter. The Dalles Dam's Westrick Park has become such a place for bald eagles. A weekly mean of 45 eagles has been recorded at the dam by project fisheries personnel on several occasions. The general pattern of use has been consistent over the last few years. Eagles arrived at Westrick Park toward the end of December and then dispersed by early March. Similar patterns were seen in other over-wintering bald eagle populations (Fitzner and Hanson 1979, Keister et al 1987, Stalmaster and Gessaman 1984).

The avian line array effectively deterred eagles from foraging in the covered area. Prior to this study the general belief was that eagles foraged in the forebay or elsewhere and then brought their prey back to the park for consumption. But a substantial amount of foraging was observed just downstream of the lines that cover the ice and trash sluiceway outfall. It doesn't appear that the eagles were adversely impacted by the presence of the current line array. However, considering how much they utilize this area, the addition of more lines here may not be desirable. Other means of protecting spring and summer fish migrants such as additional focused hazing in this area may be more appropriate.

During winter, bald eagles in the Pacific Northwest tend to gather at communal night roosts and feeding areas. Several theories about the purpose of communal gathering have been put forth, but the behavior is not well understood. It has been suggested that communal roosts aid in locating food sources, enhance thermoregulation by selection of favorable microclimates, and aids in the establishment of social hierarchy (Anthony et al. 1982). It is known that eagles

change their roosting and feeding areas according to availability of prey and the distance of the feeding ground from the night roosting area (Keister et al. 1987). The night roosting area was not searched for during this study, thus it is unknown how far these birds are traveling back and forth to the dam.

It has been reported that eagles are more inactive in winter cutting their flight activities to a minimum to conserve energy (Stalmaster and Gessaman 1984). They use the watch-and-wait method to hunt for prey. Similar to these findings we observed that a great deal of their time was spent perched in the trees. Eagles took flight when a foraging opportunity presented itself or when forced to do so by human presence and activity in Westrick park. The park is an attractive feeding spot as the trees next to the river provide an ideal location for them to spot fish coming out of the ice and trash sluiceway outfall or the powerhouse turbine units. Although prey composition was not one of our objectives, anecdotal evidence suggests that adult shad were the primary forage fish for eagles. There were no observations of eagles attempting to take other birds during our study. However, fisheries personnel have previously witnessed bald eagles forage on ducks in the upper forebay areas of The Dalles Dam (personal communication Fisheries Biologist Robert Cordie), and bird carcasses have been found in the park over the winter period. Due to lack of watering many trees in the park that eagles seem to favor are falling over or have been viewed as a safety hazard and cut down. If the project continues to remove or allow these mature trees to die off the eagles may not continue to return.

RECOMMENDATIONS

Since it is established that the tailrace area adjacent to Westrick Park is an area of fishing interest for these birds, we recommend that the avian line array not be expanded here to prevent any further intrusion and allow safe refuge for wintering eagles. An additional year of data collection would strengthen our understanding of bald eagle behavior at Westrick Park and thus any recommendations to inform management.

ACKNOWLEDGMENTS

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