

Grant Lake Hydroelectric Project (FERC No. 13212)

Avian Protection Plan

Draft

Kenai Hydro, LLC

May 2015

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Acronyms and Abbreviations

ADF&G	Alaska Department of Fish & Game
APLIC	Avian Powerline Interaction Committee
APP	Avian Protection Plan
ARRC	Alaska Railroad Corporation
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
cfs	cubic feet per second
CNF	Chugach National Forest
DBH	diameter and breast height
DLA	Draft License Application
ECM	Environmental Compliance Manager
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
GPS	global positioning system
KHL	Kenai Hydro, LLC
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
MW	megawatt
NAVD 88	North American Vertical Datum of 1988
Project	Grant Lake Hydroelectric Project
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

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1 INTRODUCTION

This document provides a draft of Kenai Hydro, LLC's (KHL) proposed Avian Protection Plan (APP) for the Grant Lake Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 13212. The Project has developed the guidelines in this APP to support avian conservation during construction and operations of the Project, including avoidance and minimization of disturbance to avian species. The principles presented in these voluntary guidelines are intended to allow the Project to tailor the APP to the Project-specific construction and operations as well as furthering the conservation of avian species in the Project area. Implementing the principles contained in these APP guidelines will greatly reduce avian risk as well KHL's risk of enforcement under both the Migratory Bird Treaty Act (MBTA) and the Bald Eagle Protection Act (BGEPA). By following the guidelines within this APP, specific avian issues can be addressed through voluntary compliance.

Activities associated with the proposed construction and operation of the Project include the construction of a powerhouse, access road, tailrace channel, switchyard connection, penstock and tunnel, temporary construction access routes and staging areas, diversion structure, and transmission line. The activities and structures associated with this Project have the potential to impact the bird populations within the area.

1.1. Location

The proposed Grant Lake Project will be located near the community of Moose Pass, Alaska (population 219) in the Kenai Peninsula Borough, approximately 25 miles north of Seward, Alaska (population 2,693), and just east of the Seward Highway (State Route 9); this highway connects Anchorage (population 291,826) to Seward. The Alaska Railroad (ARRC) parallels the route of the Seward Highway, and is also adjacent to the Project area. Grant Lake is located in the mountainous terrain of the Kenai Mountain Range and has a normal water surface elevation of 703 feet North American Vertical Datum of 1988 (NAVD 88) and surface area of approximately 1,790 acres. A map showing the location of the Project is provided in Figure 1.¹

¹ The Project boundary alignment, in the vicinity of Grant Lake, follows the 703-foot contour line derived from USGS developed topographic data. Due to imprecision in the USGS topography, the Project boundary around Grant Lake does not currently align with the USFS-developed aerial imagery presented in the maps that depict the Project boundary as proposed by KHL in the Draft License Application (DLA; KHL 2015b). The Project boundary alignment will be refined as additional survey data of the Grant Lake shoreline becomes available. The updated Project boundary is anticipated to align more precisely with USFS imagery.

1.2. Project Description

The Grant Lake Project will consist of the Grant Lake/Grant Creek development, an intake structure in Grant Lake, a tunnel, a surge chamber, a penstock, a powerhouse, tailrace channel with fish exclusion barrier, access roads, a step-up transformer, a breaker, a switchyard, and an overhead transmission line. The powerhouse will contain two Francis turbine generating units with a combined rated capacity of 5 megawatts (MW) with a maximum design flow of 385 cubic feet per second (cfs). The general proposed layout of the Project is shown in Figure 2.

1.2.1. Grant Creek Diversion

The proposed Project consists of a reinforced concrete intake structure located on the south side of the natural lake outlet. No structural modifications would be made to the existing lake natural outlet. The Project will divert water up to a maximum of 385 cfs into the intake structure. When the lake level exceeds the natural outlet of 703 feet NAVD 88, a maximum of 385 cfs will be diverted into the intake structure and routed to the powerhouse. Flow in exceedance of 385 cfs would pass over the natural outlet to Grant Creek.

1.2.2. Grant Lake Intake

The Project water intake would be a concrete structure located approximately 500 feet east of the natural outlet of Grant Lake and adjacent to the shore. The intake structure consists of a reinforced concrete structure extending from approximately elevation 675 NAVD 88 feet up to a top deck elevation of 715 feet NAVD 88. The structure has an outside dimension of 38 feet by 20 feet. The structure includes intake trashracks, a selective withdrawal intake gates with wire rope hoist, and a roller gate located on the water conveyance intake. The intake is divided into three bays, each fitted with an intake gate to provide flexibility for delivering the full flow range of 58 cfs to 385 cfs. The gate position within the water column will be set to deliver the required water temperature to Grant Creek below the powerhouse. The roller gate would be 11 feet tall by 11 feet wide and fitted with a wire rope hoist lift mechanism. Electrical power will be extended from the powerhouse to the intake to operate the intake and isolation gates. Pressure transducers will be installed to monitor the water level at the lake as well as within the intake tower. An access bridge 16 feet wide would be installed from the lake shore out to the intake structure.

The intake would allow for drawdown of Grant Lake to elevation 690 feet NAVD 88 thereby creating approximately 18,790 acre-feet of active storage for the Project between elevations 703 feet NAVD 88 and 690 feet NAVD 88. The intake can be designed to allow the Project to draw water near the surface at various levels of storage, if deemed necessary to meet downstream temperature requirements. The invert of the intake would be at elevation 675 feet NAVD 88 to provide for adequate submergence to the tunnel.

A bypass pipe would extend from the intake structure to the base of the existing water fall in Grant Creek. The installed pipe would be 900 feet long and approximately 18 inches in diameter allowing the minimum flow ranging from 5 to 10 cfs to be released. A control gate would be located within the intake structure to regulate and monitor the bypass flow releases.

1.2.3. Tunnel and Surge Chamber

The intake structure would connect to a tunnel extending to the Project powerhouse. The tunnel would be approximately 3,300 feet long with a 10-foot-horseshoe shape. Drill and shoot techniques would be used to construct the tunnel using an entrance portal at the powerhouse for access. The lower 900 feet of tunnel would be constructed at a 15 percent slope. This section of the tunnel will be concrete lined. The upper 2,400 feet of tunnel would be constructed at a 1 percent slope and would be unlined. This proposed arrangement provides a low pressure hydraulic conduit in the upper tunnel reaches suitable for an unlined tunnel. A surge chamber is located at the transition between the two tunnel slopes. This chamber is approximately 10 feet in diameter and would extend from the tunnel invert elevation of 670 feet NAVD 88 to the ground surface at approximately elevation 790 feet NAVD 88. The surge chamber provides a non-mechanical relief for hydraulic transients that could occur if a load rejection occurs at the powerhouse. Rock anchors and shotcrete stabilization techniques would be used to stabilize the tunnel exposed rock surface where required. A rock trap would be located at the surge chamber location to collect dislodged rocks from the unlined tunnel section.

The tunnel would transition to a 6-foot diameter steel penstock approximately 150 feet from the powerhouse. The transition section would consist of a welded steel concentric structure which transitions from the 10-foot tunnel section to the 72-inch diameter penstock. A steel liner would extend from the downstream tunnel portal approximately 300 feet into the tunnel. The liner would be installed within the exposed rock surface with grout pumped behind the liner to provide an impermeable and structurally sound tunnel section. A similar steel tunnel liner section would be installed at the connection to the intake structure for a total distance of approximately 150 feet.

1.2.4. Penstock and Surge Tank

A 72-inch diameter steel penstock extends 150 feet from the downstream tunnel portal to the powerhouse. The welded steel penstock would be supported on concrete pipe saddles along the penstock route. The penstock would bifurcate into two 48 inch diameter pipes feeding each of the powerhouse turbines. The penstock fitted with welded steel thrust rings would be encased in concrete thrust blocks at the tunnel portal as well as the powerhouse. These thrust blocks would be designed to resist the full hydraulic load associated with the Project operation. An interior and exterior coating system would be applied to the penstock providing full corrosion protection. An access manway would be provided on the exposed penstock section allowing access for future inspection and maintenance.

1.2.5. Tailrace

The powerhouse draft tubes would connect to a tailrace channel located on the north side of the powerhouse structure. The draft tubes would extend from a low point elevation of approximately 509 feet NAVD 88 up to the tailrace channel invert elevation of 515 feet NAVD 88. The channel would continue to the east bank of Grant Creek. Each of the draft tubes will be gated allowing the flow to be routed to the detention pond for spinning reserve operation. Isolation bulkheads would be provided allowing dewatering of the draft tubes for inspection and maintenance of the turbine. The tailrace channel would be trapezoidal in shape with a bottom

width of 43 feet, side slopes of 2H:1V and a channel depth ranging from 13 feet at the powerhouse to 7 feet at the creek. A concrete structure would be constructed at the confluence of the channel and Grant Creek. A picket-style fish barrier would be placed on this concrete structure as well as provision for installation of stoplogs allowing the tailrace channel to be dewatered for inspection and maintenance. The channel would be excavated from native material and lined with riprap to provide a long term stable section. A staff gage and pressure transducer will be placed in the channel to monitor the water level in the channel.

1.2.6. Tailrace Detention Pond

An off-stream detention pond would be created to provide a storage reservoir for flows generated during the rare instance when the units being used for spinning reserve are needed for the electrical transmission grid. In this situation, the additional powerhouse flows would be diverted into the detention pond and then released slowly back into Grant Creek. It is anticipated that the discharge associated with a spinning reserve event would be dispersed via the tailrace channel which flows into Grant Creek. The detention pond would be located immediately south of the powerhouse and would have a capacity of approximately 15 acre-feet and a surface area of approximately 5 acres.

1.2.7. Powerhouse

The powerhouse would be located on the south bank of Grant Creek immediately west of the downstream tunnel portal and adjacent to the detention pond. The powerhouse would consist of a concrete foundation and a pre-engineered metal building superstructure. The building would be approximately 100 feet long (east to west) and 50 feet wide (north to south). The penstock would tie into the powerhouse on the south side and the tailrace channel on the north side of the building. The building floor would be set at approximately elevation 523 feet NAVD 88 and the centerline of the turbine runner at elevation 526 feet NAVD 88. The draft tube floor would be set at elevation 509 feet NAVD 88 with an operating tailwater inside the draft tubes ranging from 518.0 feet to 519.3 feet NAVD 88.

Two horizontal Francis type turbine/generator units with a rated total capacity of 5,000 kilowatt (kW) would be housed in the powerhouse structure. The powerhouse flow would range from a maximum of 385 cfs to a minimum of 58 cfs with each turbine operating flow ranging from 192.5 cfs to 58 cfs. Associated mechanical and electrical equipment would include hydraulic power units, turbine isolation valves, penstock drain, utility water system, lube oil system, oil water separator, battery system, and heating, ventilating, and air conditioning (HVAC) system. A control room housing the motor control center, communication rack, fiber optic panels, computers, and related equipment would also be provided. The Project switchgear would be located within the powerhouse. A standby generator, transformer, and fused pad mounted switch assembly would be mounted on an enclosed switchyard located on the south side of the powerhouse. Dewatering pumps would be provided to support dewatering of the turbine draft tubes. A 30-ton bridge crane would be provided for equipment maintenance. The crane would travel on rails mounted on the steel building support columns. An energy dissipation valve would extend off the penstock and provide bypass flows into the Project tailrace.

1.2.8. Transmission Line/Switchyard

An overhead 115-kilovolt (kV) transmission line will extend from the powerhouse to the existing 115-kV transmission line located on the east side of the Seward Highway. In addition to any overhead transmission structures, the facilities would include a switchyard at the powerhouse consisting of a 115-kV fused pad-mounted disconnect switch and a pad-mounted 115-kV GSU transformer. The transmission line would run from the powerhouse parallel to the access road where it would intersect Chugach Electric's transmission line. The interconnection would have a pole mounted disconnect switch.

Wooden poles would be designed as tangent line structures on about 250-foot centers. Design of the line would also incorporate the latest raptor protection guidelines. Collision avoidance devices would be installed on the line at appropriate locations to protect migratory birds.

1.2.9. Appurtenant Facilities

The following pertinent mechanical and electrical equipment will be applicable to the Project:

- Intake selective withdrawal intake gate
- Intake trashrack system
- Intake roller gate used to isolate the tunnel and downstream generation facilities
- Control gate located on the bypass pipeline pipe
- A 30-ton bridge crane in the powerhouse
- Pumps located in the powerhouse used to dewater the draft tubes
- Pressure transducers located throughout the project used to monitor the water level in the reservoir, tunnel and tailrace, as well as pressures in the tunnel and penstock
- Security cameras at the intake and powerhouse
- Sanitary waste holding tank at the powerhouse
- A power line extending from the powerhouse to the intake to supply electrical power to the gates and trashrack
- Temperature instrumentation at the intake structure and at various stream locations to monitor water temperature

This equipment along with other identified miscellaneous mechanical and electrical equipment will be developed during the final design and included in the construction documents.

1.2.10. Access Roads

The Project would require an access road to both the powerhouse located near the base of the Grant Creek canyon and to the intake at Grant Lake. The access road would be used to construct the Project and afterwards, to maintain the facilities. It is anticipated that the powerhouse would be visited approximately once a week and the intake visited approximately once a month beginning just after the ice melts and continuing until just before freeze up. The powerhouse access road would be maintained year around. The intake access road would not be maintained in winter.

The 24-foot wide access road would tie into the Seward Highway at approximately MP 26.9. The route would travel eastward to cross Trail Lakes at the downstream end of the narrows between Upper and Lower Trail lakes and then continue eastward to the powerhouse. This route would be approximately one mile long. It would cross the ARRC tracks near an existing railroad crossing for a private driveway. The road would cross the narrow channel connecting Upper and Lower Trail lakes with an approximately a 110-foot-long single lane bridge. This bridge is proposed as a clear span with the west abutment located on bedrock and the east abutment on fill. The proposed route would avoid cuts and travel along the base of some small hills on the south side of Grant Creek to the powerhouse. This proposed access road would have one 90-degree crossing of the Iditarod National Historic Trail (INHT).

The intake access road would be approximately one mile long, beginning at the powerhouse. The road would ascend a 230-foot bluff to reach the top of the southern rim of the Grant Creek canyon. A series of road switchbacks would be required to maintain a road grade of less than 8 percent. The road would then generally follow the southern edge of the canyon until it descends to Grant Lake. A small parking area and turn-a-round area would be provided at the intake structure. A 16-foot wide bridge will extend from the bank out to the intake structure.

The road would be gravel with a 16-foot top width. Maximum grade would be 8 percent. Periodic turnouts would be provided to allow construction traffic to pass. Fifty-foot radius curves would be used to more closely contour around the small steep hills of bedrock to limit the extent of the excavation and the height of the embankments.

1.2.11. Project Operations

Once constructed, the Project will operate to generate power throughout the calendar year based on inflow, available storage, lake elevation, and minimum flow requirements with Grant Creek. The lake will operate from the natural Grant Lake outlet elevation of 703 feet NAVD 88 down to a minimum lake elevation of 690 feet NAVD 88. The lake will be drawn down in the winter months utilizing a combination of Grant Creek inflows and stored water to meet the instream flows in the bypass reach while also maintaining power production. Water flow predictions will be used to estimate snowpack and the corresponding runoff volume. The Project operation will then be tailored to maximize winter power production while also ensuring the lake refills to elevation 703 feet NAVD 88.

2 REGULATIONS PROTECTING AVIAN SPECIES

This section describes the applicable regulations pertinent for the development of this APP. Native birds in the United States are protected primarily under three main pieces of legislation: the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), and the Bald and Golden Eagle Protection Act (BGEPA). Additional protections are provided to migratory birds by FERC through a memorandum of understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS) (FERC and USFWS 2011). The USFWS is, in part, responsible for the protection of wildlife including avian species. The USFWS mission, in part, is “to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit [of] the

American people.” The U.S. Forest Service (USFS) identified a list of sensitive avian species requiring protection measures for projects located on the Chugach National Forest. Furthermore, Audubon publishes an Avian Species of Special Interest list for Alaska which state and federal agencies typically reference as part of the review process to assess project impacts on avian species.

2.1. Endangered Species Act

The purpose of the ESA is “to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species.” Section 9 of the ESA prohibits “take” of threatened or endangered species, which includes killing, injuring, or harming a listed species or its habitat. Any activity that may result in the “incidental take” of a threatened or endangered species requires permits issued from the USFWS under Sections 7 or 10 of the ESA. There are no documented threatened or endangered avian species or critical habitats in the Project area.

2.2. Migratory Bird Treaty Act

Most avian species in Alaska are protected wildlife under the MBTA. Under MBTA (16 U.S.C. 703), it is illegal for anyone to “take” migratory birds, their eggs, feathers, or nests. “Take” includes by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof. The MBTA does not distinguish between intentional and unintentional take. In Alaska, all native birds except grouse and ptarmigan (protected by the State of Alaska) are protected under the MBTA. The Alaska Department of Fish & Game’s (ADF&G) legal framework to manage these upland game bird species is derived from Article VIII of the Alaska Constitution and implementing statutes. Alaska Statute Title 16 is the primary statute governing the state’s management of fish and wildlife.

2.3. Bald and Golden Eagle Protection Act

The BGEPA is the primary law protecting eagles. BGEPA prohibits “take” of eagles without a permit (16 USC 668-668c). BGEPA defines “take” to include “pursue, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb,” and prohibits take of individuals and their parts, nests, or eggs. The USFWS expanded this definition by regulation to include the term “destroy” to ensure that “take” includes destruction of eagle nests. The term “disturb” is further defined by regulation as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause,....injury to an eagle, a decrease in productivity, or nest abandonment” (50 CFR 22.3).

2.4. Chugach National Forest Sensitive Species and Species of Special Interest

Six bird species found in the Project area are listed by the USFS as sensitive species or species of special interest (osprey, Northern goshawk, bald eagle, Townsend’s warbler, marbled murrelet, and trumpeter swan). Additionally, eight more bird species are considered high-priority species (Red-Listed Species) for conservation in Alaska by the Audubon Alaska’s Watchlist (red-throated loon, varied thrush, olive-sided flycatcher, Kittlitz’s murrelet, solitary sandpiper, lesser yellowlegs, wandering tattler and blackpoll warbler). Although neither federally listed nor

candidate threatened or endangered, these species are of increasing concern because of low and/or declining populations or other population threats. These species of conservation concern have either been documented or are likely to occur in terrestrial and freshwater habitats in the Project area during the breeding, migration, and/or wintering seasons. The Project would not affect any habitats designated as high-value or essential for these bird species.

3 AVIAN SPECIES AT GRANT LAKE

Wildlife studies, including avian studies (waterfowl, raptors, and breeding landbirds) were performed in support of KHL's licensing of the Project. The Grant Lake Terrestrial Resource Study Report details all avian investigations conducted and their associated findings (KHL 2014; 2015a). A summary of avian study results are presented below.

3.1. Waterfowl

Field efforts were conducted to evaluate waterbirds in the Project area. Trumpeter swans were observed on March 3, 2013, on the east side of Lower Trail Lake. Winter surveys detected trumpeter swans in the open water portion at the south end of Grant Lake (December 4, 2013) and on the east side of Lower Trail Lake (March 27, 2014). Trumpeter swans feed primarily on submerged vegetation. Grant Lake and the narrows may or may not provide foraging habitat for this species in the winter, but their presence in these area indicate that the swans are benefiting from the open water habitat in some way.

3.2. Bald Eagles and other Raptor Species

Field efforts were conducted to evaluate presence of Northern goshawks in the Project area. One adult female Northern goshawk was detected during the 2-year sampling period in 2013-2014. The habitat in which it was detected has been described in the Terrestrial Resources Study Report (KHL 2014; 2015a).

Incidental observations of other raptors during field efforts included:

- A bald eagle nest in a large cottonwood along Grant Creek was recorded with a pair of adults in attendance; the adults appeared to be in the process of incubating eggs as assessed by behavior on May 22, 2013. This nest sight has been documented in previous years (2010 and 2012). The pair was re-sighted on June 14-17, 2013 and again appeared to be incubating eggs. During the field effort (July 8-9, 2013), the pair was once again sighted in the nest and appeared to have at least one hatched young as assessed from observed feeding behavior.
- An immature bald eagle was observed on July 19, 2013, attempting to capture a duckling.
- An adult bald eagle was observed flying over Lower Trail Lake on June 25, 2014.
- A pair of adult bald eagles was observed perched along Lower Trail Lake on July 10, 2014.
- A pair of merlin was detected on May 21, 2013, on the small island just south of the Trail Lake narrows. The merlin did not appear to be incubating at that time; however, they did appear to have established a breeding territory based on assessed behavior. The pair was

detected again during subsequent field visits at the same location; however, no effort was made to locate a nest due to high water near the suspected location of the nest.

- A merlin was detected on June 25, 2014, in the vicinity of the small island just south of the Trail Lake narrows, and again on July 9 and 10, 2014.
- An adult male osprey (based on plumage) was detected flying over the Trail Lake Narrows during the June 14–17, 2013 field visit.

3.3. Breeding Landbird Species

Surveys for breeding landbirds and shorebirds in the Project area were conducted to collect baseline information on the occurrence, and habitat use of breeding landbird and shorebird species in the Project area. Point-count data were used with the habitat map for qualitative habitat-association analyses. More than 65 bird species (excluding waterfowl and raptors) were recorded during surveys or as incidentals during field efforts for the Grant Lake project. No threatened or endangered species were observed, but six bird species of concern were recorded during the field efforts: Townsend's warbler, varied thrush, olive-sided flycatcher, solitary sandpiper, lesser yellowlegs, and wandering tattler.

4 PROJECT IMPACTS

4.1. Impacts Common to all Species

Removal or loss of vegetation affects avian species directly by loss of old growth trees for nesting, foraging, and cover habitat. Nests and habitat are lost every year to natural events that include high winds, flooding, and fire. The loss of the vegetative habitat from the previous season can be a limiting factor in successful breeding, but this is not predicted to impact avian species populations on the Kenai. The direct removal of any active nest structure is prohibited. The USFWS (2005) has published recommendations for time periods to avoid vegetation clearing. These recommendations are provided to help avoid vegetation removal and "take" as defined by the MBTA during the breeding season.

Direct mortality may increase with the placement of power lines along the access route. Avian species unaccustomed to these lines may be impacted by flying into the line or injury by electrocution. Collision and nesting deterrent methods will be considered during the Project design phase to avoid or minimize impacts of overhead power lines.

4.2. Impacts Specific to Waterfowl Species

Changes in lake and creek outflow levels during the winter may indirectly impact waterfowl and waterbirds like trumpeter swans and diving ducks by decreasing or altering open water habitat at the outlet of Grant Lake and the "mouth" of Grant Creek at the narrows. Decreased open water availability may lead to decreased resting and foraging habitat during the winter season.

Waterfowl that overwinter in the region and spend time on waterbodies in this area of the Kenai Peninsula are currently subject to the natural freeze up / thaw processes during the winter. The

possible Project-related alterations to open water habitat are not predicted to impact the overall waterfowl population of the Kenai Peninsula.

4.3. Impacts Specific to Bald Eagles

The following bald eagle ecology information is taken from the National Bald Eagle Management Guidelines (USFWS 2007).

4.3.1. Feeding and Nesting Habitat

Bald eagles are opportunistic feeders. Although fish comprise much of their diet, they also prey on waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Eagles are visual hunters and typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles will take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

Bald eagles generally nest near coastlines, rivers, large lakes, or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human constructed structures including power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.

4.3.2. Nesting Timeline and Sensitivity

Nesting activity begins several months before egg-laying. Egg-laying dates are as early as April in Alaska. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in Table 1.

Table 1. Nesting bald eagle sensitivity to human activities.

Phase	Activity	Timeline	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	February – mid-May	Most Sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg Laying	April – mid-June	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	April – mid-June	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Early May – mid-September	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledgling	August – mid-October	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest.

Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to 0.25 mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged).

5 AVIAN PROTECTION MEASURES

KHL has developed the guidelines in this APP to support avian conservation during construction and operations of the Project. Protection measures are detailed below separately for measures related to general migratory bird species, as part of the MBTA, and measures related to bald eagles as part of the BGEPA. The principles presented in these voluntary guidelines are intended to allow the Project to tailor an APP that will allow for construction and operation of the Project in a responsible fashion while furthering the conservation of avian species. Implementing the principles contained in these APP guidelines will greatly reduce avian risk as well its own risk of enforcement under both the MBTA and BGEPA.

KHL is committed to working cooperatively towards the protection of migratory birds while maintaining its goal of developing the Project. KHL will comply with the regulatory requirements protecting avian species, as well as the need to obtain and comply with all necessary permits, monitor incidents of avian mortality, and make reasonable efforts to construct and maintain infrastructure to reduce the incidence of avian mortality.

KHL plans on limiting avian mortality by focusing its efforts in a cost-effective manner on the areas that pose the greatest risk to migratory birds. Therefore, the protection measures outlined below focus on: 1) avoiding disturbance during the breeding season; 2) avoiding incompatible power line design; and 3) establishment of vegetation removal timelines.

Destruction of active nests, loss of adults, young, and / or eggs is considered a “take” under the MBTA. Bird mortality may increase with the placement of power lines along the access route. Lastly, removal of vegetation during the breeding season directly impacts forest nesting and foraging raptor species.

KHL will implement the following protection measures during the construction and operations phases of the Project to minimize impacts to birds. Further, in accordance with the Public Safety and Access Plan (to be submitted with the FLA), hunting, fishing, and trapping by KHL employees and contractor personnel in the Project area is strictly prohibited during Project construction and operations. The following voluntary practices will be incorporated into the development and maintenance phases of the Project and are intended to mitigate for avian “take” as defined by BGEPA and MBTA. These measures are described in more detail in Sections 5.1 and 5.2.

The protection measures for migratory birds consist of:

- Plan of construction and operation timeline
- Risk assessment of activity and timeline
- Measures taken based on Project actions
 - Monitoring associated with vegetation removal
 - Monitoring associated with power line and infrastructure placement
- Documenting and reporting

The protection measures for bald eagles consist of:

- Plan of construction and operation timeline
- Risk assessment of activity and timeline
 - Aerial nest surveys
- Measures taken based on Project actions
 - Nest mitigation and monitoring
 - Buffer boundaries
 - Nest monitoring
- Documenting and reporting

5.1. Mitigating for MBTA “Take” of Migratory Birds

5.1.1. Plan of Construction and Operation Timeline

Removal of vegetation during the breeding season directly impacts forest nesting and foraging raptor species including Northern goshawks and sharp-shinned hawks as well as many nesting songbirds all of which are protected under MBTA. Destruction of active nests, loss of adults, young, and / or eggs is considered a “take” under the MBTA. To the extent that is practicable, KHL will adopt best management practices (BMP) associated with the typical vegetation growing season between May 1 and July 15 of construction years. Where curtailment of construction activities is not practicable, KHL will conduct nest surveys in advance of vegetation clearing to avoid areas with active nests. This plan will minimize potential “take” as defined by MBTA.

5.1.2. Risk Assessment of Activity and Timeline

A risk assessment will be undertaken to determine the impacts of construction and operations (or maintenance) during the breeding/nesting season and non-breeding season. If vegetation removal during construction and / or operation cannot be completely restricted during the USFWS recommended timeline (May 1 – July 15), an assessment will be undertaken to delineate the time periods in which vegetation removal would cause the least impact to breeding birds, for example removing vegetation prior to egg laying. The assessment may include input and recommendations from knowledgeable area biologists.

Mortality (direct impact) to breeding birds and shorebirds may increase with the placement of power lines along the access route. Birds, especially resident species, unaccustomed to these lines may be impacted by flying into the line or through electrocution. Raptors attracted to

power poles for nest construction (Osprey) may suffer mortality events by electrocution, while at the same time cause power outages, impacting the Project.

5.1.3. Measures Taken Based on Project Actions

Mitigation actions and associated measures are described below for construction activities and Project operations.

5.1.3.1. *Monitoring Associated with Vegetation Removal*

Most avian species in Alaska are protected wildlife under the MBTA. Species will nest on the ground, in trees and shrubs, and nest detection is very difficult as birds are secretive in nature and many of the structures themselves are inconspicuous. Protocols have been developed for surveying prior to vegetation removal; however, these methods are not 100 percent effective at identifying all nest locations. Exact survey and monitoring methods would be developed prior to construction, however below is a summary of the anticipated methods. Monitoring would occur within the Project footprint and a 100-foot buffer around all Project infrastructure and construction areas.

Monitoring Method

For vegetation removal activities occurring during construction and operation that occur during the bird nesting season (May 1 – July 15), an approved Biologist will survey the anticipated construction work areas including a 100-foot buffer. Surveys will be conducted prior to any vegetation removal activity and within three calendar days of the commencement of such activity.

Prior to surveys, a comprehensive list of bird species with potential to nest in the area will be reviewed. This list identifies the specific and preferred habitats where nesting is generally expected to occur and categorized by the following nesting habitats: grassland (ground nesting), shrubland, tree, and structure (cavity).

Surveys will consist of walking transects as well as a sit and scope (survey station) component that will be spaced accordingly to allow complete visual coverage of all habitats including: open fields, barren areas, manmade structures (e.g., bridges), riparian corridors, wooded areas and brush dominated ground cover within, and adjacent to, the project area that could support nesting birds. Appropriate spacing will ultimately be determined by the Biologist in the field, but the following guidelines will be implemented to ensure adequate coverage of habitats:

- 100-300 feet for open grasslands
- 25-50 feet for areas with dense brush or shrubs.
- < 25 feet as needed for a dense stand of trees or very dense vegetation

The Biologist will spend 5-10 minutes at each survey station recording all birds seen and heard, including flyovers (flyovers should be noted as such).

When breeding or nesting activities are suspected or observed, the surveyor will spend additional time watching the activity (with the aid of binoculars when appropriate) to determine the status of the observed activity. The following behaviors are indicators that an active nest may be present:

- Carrying material to build nests within the survey area
- Copulation
- Carrying food or feeding young
- Carrying fecal sacks away from nest
- Mate-feeding; repeated “bee-line” flying to likely nest site
- Observation of nest
- Observation of chicks
- Females giving call or chip notes alerting their mate that they are off the nest
- Auditory evidence of chicks

When conducting walking transects between survey stations an “Active Nest Search” component will be implemented and consist of a thorough walk-through documented search of all vegetation including: trees, shrubs, grasslands, down trees as well as standing snags for active nests in the proposed disturbance area. This will also include actively searching for low-level, ground, cavity and tree nests in the vegetation proposed for disturbance. For example, cavity nesting “Active Nest Searches” would include searching/inspecting all relevant local features: structures, suitable tree holes and cavities and may require an extension pole with mirror to make a determination. If any nests are discovered, it will quickly be determined whether they are actively being used or not. If there is inconclusive evidence to determine whether the nest is being actively utilized, it may be necessary to conduct additional surveys. Up to three additional survey events of the nest itself, up to two hours each, will be conducted to document the nest is not active.

The location of any confirmed active nest of a protected species will be included in the daily survey log and then flagged in the field. The survey log(s) and a map illustrating the location of the nest will be submitted to Project staff for review. Daily survey logs will include:

- Observer
- Date of survey
- Survey start and end times
- Species observed
- Weather conditions
- Description of nests observed
- Description of survey location
- Description of vegetative habitat(s)
- Map of survey station locations and active nest search routes
- Description of the developmental stage of juvenile birds observed and the anticipated fledge date

Frequency and timing of nest surveys prior to vegetation removal:

- Surveys will be conducted between May 1 and July 15
- Two (2) surveys will be conducted to determine the presence of active nests within each designated construction / maintenance area

The requirements of the pre-construction survey protocol consist of:

- Surveys shall be conducted no more than 3 days prior to vegetation clearing
- Survey areas will be defined by the construction/operation schedule and will be conducted prior to any ground disturbance, vegetation or tree removal activities that could result in take of migratory birds or raptors during the nesting season
- Each survey will:
 - Occur one-half hour before sunrise and for up to four hours after sunrise
 - Occur within four hours before sunset and into the evening for a minimum of one-half hour for owls
 - If a nest is located within the survey area, it will be surveyed up to three additional 2-hour surveys to determine whether it is active. This additional time will determine the need to establish an environmental sensitive area.
- Observation routes (or stations) will be placed in the best possible locations to hear or see bird activity
- Surveys will observe breeding behavior and activity of all bird species

5.1.3.2. Monitoring Associated with Power Lines and Infrastructure Placement

Mortality to forest raptors may increase with the placement of power lines along the access route. Birds, especially resident species, unaccustomed to these lines may be impacted by flying into the line or through electrocution. KHL will review existing power line construction configurations recommended including those by the Avian Powerline Interaction Committee (APLIC) (see Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996 and Mitigating Bird Collisions with Power Lines: The State of the Art in 1994, or the most current editions of these documents) or may choose to instead develop their own internal construction standards that meet or exceed these guidelines.

Collision and nesting deterrent methods will be considered during the Project design phase to avoid or minimize impacts of overhead power lines. Prior to construction efforts commencing, KHL will consult with an avian specialist and the requisite stakeholders to discuss the final Project infrastructure with specific emphasis placed on the transmission line corridor. Determinations will be made as to the potential for and level of impact to migratory species. Once determined, KHL will develop a list of specific infrastructure design parameters designed for protecting avian species and distribute to stakeholders for comment and approval prior to finalizing and implementing associated construction efforts. Nesting deterrents may include constructing platforms above power poles to minimize attempts to build nests on power poles if deterrents are unsuccessful. The presence of an older dominant pair may in itself be a deterrent to younger inexperienced breeders that may build multiple nests.

Once constructed, line-transect surveys will be utilized to determine the effectiveness of the mitigation measure utilized to minimize impacts. Surveys will consist of walking the entire length of the power line. Surveys will be conducted four times annually during years 1 and 5 of

operations, to determine seasonality of impacts if any. Prior to surveys, a comprehensive list of bird species potentially in the area will be reviewed.

Surveys will consist of walking transects and identifying dead or injured birds along the route, as well as nests or attempts at nesting. No structures, carcasses or injured birds will be removed or handled unless permitted by USFWS. Information on any structures, dead or injured birds detected during the surveys will include:

- Observer
- Date of Survey
- Survey Start and End times
- Species observed / Photo
- Weather conditions
- Description of dead or injured bird
- Description of structure
- Description of survey location
- Description of vegetative habitat(s)
- Description of the developmental stage of bird observed: adult, juvenile or fledgling

Frequency and timing of power line surveys:

- Surveys will be conducted 4 times a year during years 1 and 5 of operations, once each quarter

5.1.4. Documenting and Reporting

5.1.4.1. *Vegetation Removal*

Pre-construction / maintenance nesting bird survey reporting and nest protection field data will be submitted to USFWS as part of the Annual Compliance Report process (see Section 6) The Project will provide a copy of all field data including: the survey maps, field notes, and observation forms used during preconstruction bird surveys. In areas where nests are determined to be active by the above stated monitoring method, a Nest Protection Plan will be developed in consultation with the USFWS. Nest Protection Plans will be submitted to USFWS for final review and subsequent approval and filed with FERC.

Measures undertaken for active bird nests:

- Coordination with wildlife regulatory agencies, and/or USFWS.
- If a bird is observed nesting within 100 feet (non-raptor) or 1,320 feet (raptor species) of the nearest (or projected) work site, the Biologist will prepare a Nest Protection Plan that will be reviewed by the USFWS for review and approval.
- During the development of the monitoring plan, the nesting area and buffer area will be avoided. An environmentally sensitive area will be implemented immediately for the nesting site. The environmentally sensitive area will include the active nesting site and an additional buffer of 100 feet for non-raptor species, unless otherwise determined by the USFWS that this buffer can be decreased or increased to adequately protect the active nest. The adequacy of buffer widths varies with species discovered and circumstances of the construction area.

- The environmentally sensitive area will not be entered until:
 - USFWS has agreed to the monitoring plan or
 - The Biologist has determined that the juvenile birds have fully fledged and left the area or,
 - The nest has failed and the area has been resurveyed to verify the absence of bird species involved in any process of the breeding cycle.
 - Avoidance and minimization measures may be adjusted only after consultation with USFWS (for all protected species).
 - The Biologist will monitor all environmentally sensitive areas to ensure proper buffer area inclusion.
 - The Biologist will survey the environmentally sensitive areas weekly to ensure the integrity and their effectiveness in keeping people, vehicles, or equipment out of the sensitive area.
 - Indications of significant disturbance to nesting birds that fall within the environmentally sensitive areas may generate further consultation with the USFWS. On a case-by-case basis, the adequacy of buffer widths will be addressed with input from the Biologist. Buffer widths may be adjusted following consultation with the USFWS (for threatened or endangered species).

Prior to construction, all areas will be surveyed and buffers will be in place to protect occupied nests, as required by the Nest Protection Plan. Pre-construction nesting bird surveys will have been completed prior to the initiation of construction and conducted in conjunction with the pre-construction invasive plant delineations outlined in the Grant Lake Vegetation Management Plan (KHL 2015c). Construction compliance reporting will be incorporated into the Annual Compliance Report (see Section 6) and reviewed annually with all stakeholders to document compliance and discuss results.

With respect to this resource area, documentation will include:

- A list of dates during which monitoring activities were conducted.
- Surveyors name(s), survey/monitoring date and time period, and areas surveyed/monitored.
- A summary of construction activity in the survey/monitoring area.
- A summary of all bird avoidance and impact minimization measures implemented at the site(s), if applicable.
- The location and status of observed nests, as well as activities that indicate possible or probable nesting.
- An account of any disturbance or incidental take of threatened/endangered species/species of special concern during construction (take applies to threatened/endangered species only).
- A list of potential compliance issues and the resolution or status of each issue.

5.1.4.2. Power Lines and Infrastructure

Operation compliance reporting will be incorporated into the Annual Compliance Report (see Section 6) and reviewed annually with all stakeholders to document compliance and discuss results.

With respect to this resource area, documentation will include:

- A list of dates during which monitoring activities were conducted.
- Surveyors name(s), survey/monitoring date and time period, and areas surveyed/monitored.
- A summary of activity in the survey/monitoring area.
- A summary of all bird avoidance and impact minimization measures implemented at the site(s), if applicable.
- The location and status of observed nests, as well as activities that indicate possible or probable nesting.
- An account of any disturbance or incidental take of threatened/endangered species/species of special concern during construction (take applies to threatened/endangered species only).
- A list of potential compliance issues and the resolution or status of each issue.

5.2. Mitigating for BGEPA “Take” of Bald Eagles

5.2.1. Plan of Construction and Operation Timeline

Disturbance to bald eagles and/or the removal of their nests are prohibited without a permit. Bald eagle mortality due to inadequately designed power lines is considered a “take” and is a violation of BGEPA. KHL will conduct an aerial nest survey in advance of construction commencement in order to place an appropriate buffer boundary around each nest to limit disturbance. This plan will minimize potential “take” as defined by BGEPA. If an appropriate buffer zone is not possible, KHL will consult with USFWS for the best course of action which may include the submission of an application for permitted take.

5.2.2. Risk Assessment of Activity and Timeline

A risk assessment will be undertaken to determine the impacts of construction and operation (or maintenance) during: bald eagle breeding/nesting season and non-breeding season. An aerial survey prior to construction will provide information on the presence of bald eagle nests. *If nests are detected*, then KHL will adopt the following measures:

- Buffers will be established around identified nests. Distance of buffer boundaries will be determined upon visual range from the construction activities, as presented in Table 2. Once identified, buffer boundary polygons will be provided to construction surveyors and equipment operators for use during vegetation removal and construction.
- If buffers are not practicable, KHL will consult with USFWS for the best course of action. Actions may include the submission of an application for permitted take, 50 CFR 22.26, (Form 3-200-71).

Table 2. Activity buffer distances from bald eagle nest based on visibility.

	If there is no similar activity within 1 mile of the nest	If there is similar activity closer than 1 mile from the nest
If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season (~March – August).	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season (~March – August).

5.2.3. Measures Taken Based on Project Actions

Mitigation actions and associated measures are described below for construction and Project operations if nests have been detected during the aerial survey.

5.2.3.1. Nest Detection and Monitoring Associated with Construction

Bald eagles and their nests are protected under BGEPA. Nest structures are very large and detection can be obtained utilizing aerial surveys. Once detected, permitted (if needed), and/or associated buffer boundaries established, protocols have been developed for surveying during construction activities.

Monitoring Method

Detected bald eagle nests will be monitored during the construction phases of the Project. Nests will be monitored three times during the nesting season (incubation, brooding and fledgling consistent with the timing identified in Table 1) to determine the fate of the nest and nestlings. KHL will consult with the USFWS to determine the need for modifications to these nest detection surveys and monitoring after construction is completed. Nest structures will be monitored using binoculars or a spotting scope. The observer will note the condition of the nest and will document signs of activity (e.g., one or both adult birds present, nestling or fledgling observed in the nest or in the nest area, fresh greenery in nest, down on perimeter of nest or in branches adjacent to nest). In addition, behavioral observations that may be used to help determine nest status will be noted (e.g., adult in incubating posture on nest, aggressiveness of adults to observer(s), etc.).

If there is enough information to conclusively determine if a nest is active, the observer will record the necessary information and leave the area as soon as practicable to reduce stress to adults and/or juvenile raptors. The surveyor will not mark the area, nest tree or route to the nest. Moreover, the nest tree will not be climbed to assess number of eggs laid, number of young hatched, number of young depredated, etc.

Nest monitoring will consist of observations at the nest sight and will include:

- Observer
- Survey / nest identification
- Date of survey
- Survey start and end times
- Global positioning system (GPS) location of observation point(s)
- Description of distance and bearing to nest from each GPS point
- Weather conditions
- Description of structure
- Description of survey location
- Presence of adults
- Behaviors Observed
- Description of vegetative habitat(s)
- Description of the developmental stage of bird observed: adult, juvenile or fledgling

Monitoring observations (three surveys / nest) as well as the following will be submitted as part of the corresponding Annual Compliance Report (see Section 6):

1. An ESRI shapefile in the UTM, NAD83, Alaska Zone 4 geographic coordinate system that depicts nest locations, GPS tracks for routes walked during surveys, Project features (e.g., roads, power lines, etc.), if available.
2. If requested by USFWS, the surveyor(s) will provide general characterization of the nest stand, and information will be collected within a 1.9 acre circular area with radius of 50 m that extends out from the base of the nest tree. The following components of the nest stand will be described:
 - Tree composition (i.e., a brief description of the dominant tree species present in the nest stand)
 - Stand age (e.g., young, mature, or old-growth)
 - Presence and abundance of large woody debris
 - Canopy cover and height (i.e., percent canopy cover within the nest stand, and mean height of all trees within the nest stand)
 - Vegetative ground cover (i.e., percent shrub and herbaceous cover)
 - Areal extent and continuity of the nest stand
 - Slope position (e.g., upper third, middle third, lower third) and topographic character (e.g., “nest tree is located on middle third of slope on mid-slope bench”), if applicable.
 - Percent slope at the nest tree
 - Slope aspect (in degrees) at the nest tree
 - Elevation (in feet) at nest tree
 - Nest tree species
 - Nest tree diameter at breast height (DBH; in inches)
 - Nest tree height (in feet)
 - Nest height (in feet)
 - Shortest distance to the edge of the woodland stand or clearing and the nest tree

3. Distances from existing and proposed anthropogenic and natural features (e.g., roads and trails, power line/fence-line corridors, rail line, etc.) pertinent to impact assessment will be recorded. If appropriate, the observer will describe intervening terrain or vegetation features that may modify aural or visual detection from the nest.
4. The observer will take pictures of the nest and nest area. The observer will take: 1) one close-up photo of his or her GPS with UTM coordinates clearly displayed; 2) one photo of the nest tree with the nest in the frame; 3) one zoomed-in image of the nest; and 4) one representative photo of the nest stand.
5. Collection of production data or nest phenology information is not required. The survey objective is to locate active and inactive nest structures, and determine nest occupancy status (e.g., active, inactive, or unknown status) using descriptive, noninvasive methods as described under “DETERMINING ACTIVITY STATUS OF NESTS”, while minimizing the duration and intensity of disturbance to adult, nestling, or fledgling raptors. As noted above, climbing the nest tree, taking pictures of nest contents, or marking of nest trees, nest stand, or route to the nest is not authorized for purposes of these surveys, and may be punishable under BGEPA.

5.2.3.2. Project Operation

Upon completion of construction, KHL will comply with the established HEA Management Directive 503 for Wildlife Protection (Appendix 1) to maintain an ongoing dialogue with the USFWS in the reporting of any injured or dead wildlife and any additional mitigation work completed. The HEA Management Directive 503 for Wildlife Protection along with the USFWS Bird Fatality/Injury Reporting Program, Field Report and USFWS Injured Bird Protocol (2011) are attached as Appendix 1. HEA is currently in the process of updating the management directive.

Prior to large scale vegetation removal associated with maintenance, KHL will evaluate the activity and consult with the USFWS with respect to permitted take if necessary.

5.2.4. Documenting and Reporting

A final report on activities and nest fate will be provided to the USFWS at the completion of the construction phase of the Project.

6 COORDINATION AND REPORTING

Provisions in this APP will be formally adopted and implemented by KHL upon FERC approval of the APP and after issuance of the FERC license. Requisite stakeholders will be consulted well in advance of construction efforts being implemented to assure a comprehensive and collaborative planning effort for those measures (described above) associated with construction.

All APP activities in a given year will be documented as part of an annual compliance reporting/meeting process. Every winter, KHL will convene a global meeting with all

stakeholders and FERC to review all management plans and related monitoring efforts associated with construction and subsequent operation of the Project. It is during these annual proceedings when results will be documented, identified issues will be discussed and modifications to plans and/or additional measures will be adopted to ensure that minimal impact to the natural environment is occurring as a result of Project construction and operations. With respect to the APP, primary topics discussed during the annual compliance reporting/meeting process will include:

- A summary of the actions that KHL implemented during the previous calendar year.
 - Migratory species
 - Bald eagles
- A discussion of any substantial differences between the actions provided in the APP (and subsequent agreements) and the actions that KHL implemented, including explanations for any substantial differences.
- Results of any surveying that occurred during the previous calendar year, conclusions that KHL draws from the monitoring results, and any change to the APP that KHL proposes based on the monitoring results.
- Stakeholder input with respect to any necessary modifications to the existing APP.

Ultimately, the draft Annual Compliance Report will be revised to incorporate stakeholder comments and update modified plans for the following year's natural resource implementation and compliance efforts. The Annual Compliance Report will be filed with FERC by April 1 of each year and copies will be made available to the stakeholders and FERC via the internet.

Additionally, all monitoring efforts during construction activities will be managed by KHL's on-site Environmental Compliance Monitor (ECM). This person will be responsible for assuring that all procedural aspects of the natural resource and construction management plans as well as general BMP for construction efforts are being adhered to. This person will be the lead in confirming that all methods and associated data collection activities are occurring as scheduled and all associated data is being entered and reported on appropriately. The ECM will be the primary, on-site contact for both confirmation of appropriate activities with respect to monitoring during construction and the conduit for communicating any issues that may be occurring to insure timely resolution.

7 REFERENCES

APLIC (Avian Power Line Interaction Committee). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

FERC and USFWS. 2011. Memorandum of understanding between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service regarding implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds."

- KHL (Kenai Hydro LLC). 2014. Grant Lake Hydroelectric Project (FERC No. 13212). Terrestrial Resources, Final Report. Prepared by McMillen LLC for Kenai Hydro, LLC. June 2014.
- KHL. 2015a. 2014 Wildlife Resources Study Addendum, Terrestrial Resources Study Report. Prepared by ERM, Inc for Kenai Hydro, LLC. March 2015.
- KHL. 2015b. Grant Lake Hydroelectric Project (FERC No. 13212), Draft License Application. March 2015.
- KHL. 2015c. Grant Lake Hydroelectric Project (FERC No. 13212), Draft Vegetation Management Plan. May 2015.
- USFWS (U.S. Fish and Wildlife Service). 2005. Recommended Time Periods for Avoiding Vegetation Clearing in Alaska in order to Protect Migratory Birds. Advisory. 2p.
- USFWS. 2007. National Bald Eagle Management Guidelines. 25p.Ebasco (Ebasco Services, Inc.). 1984. Grant Lake Hydroelectric Project Detailed Feasibility Analysis. Volume 2. Environmental Report. Rep. from Ebasco Services Incorporated, Bellevue, Washington.

Appendix 1: HEA's Management Directive for Wildlife Protection

WILDLIFE PROTECTION

Purpose: To establish reporting and tracking procedures for the discovery of injured or dead wildlife and completion of mitigation work.

1. The Engineering department will maintain an ongoing dialogue with the United States Fish and Wildlife Service (USF&W) on the HEA wildlife mitigation program. The Manager of Engineering Services will telephone the USF&W as necessary for prompt reporting, but not less than a minimum of once per month to review HEA mitigation efforts and the past month's activity.
2. If injured or dead wildlife is discovered at or under our electric system, the following procedure will be followed:
 - A. The employee making the discovery will immediately report to the Engineering Department. The designee will promptly make a telephone report to the USF&W.
 - B. The employee making the discovery will complete the "Wildlife Injury/Mortality Report Form" and submit it to the Engineering Department designee the same day.
 - C. The Engineering Department will fax the report to the USF&W the same day.
 - D. Within four (4) days of notification of wildlife injury or death, the Engineering Department will design/recommend mitigation action to prevent a future occurrence.
 - E. The Engineering Department will fax a mitigation report to the USF&W within five (5) days on wildlife discovery. The report will include a description of the work order/action being taken to mitigate further incidents and the time line for completion of the work or action. If USF&W has not participated in mitigation planning, their agreement with planned action will be solicited.
 - F. The Operations Department will complete planned mitigation work within five (5) working days.
3. The Engineering Department will maintain a Wildlife Protection working file centrally located within the department. The file shall include:
 - A. Log and description of all telephone notifications of wildlife injury/death.
 - B. Supply of Wildlife Injury/Mortality Report forms.
 - C. Original copies of all completed wildlife injury/mortality report forms and fax confirmations.
 - D. Log of all HEA contacts to the USF&W. The log will list the time, date, person making the call, person contacted and description of discussion.
 - E. Log of all calls from the USF&W. The log will list the time, date, person receiving the call, and description of discussion.
 - F. A copy of all completed mitigation and fax confirmation reports, work orders and service orders.

4. The Engineering Department will complete and forward a bi-weekly report to the General Manager summarizing injury/mortality reports received, mitigation efforts and contacts to/from USF&W.

RESPONSIBILITY:

The Manager of Engineering Services is responsible for administration of this directive.

8-12-02
Effective Date

N. L. Story
N. L. Story, General Manager

Copies: All Librarians and employees



INJURED BIRD PROTOCOL 2011 - WHO TO CONTACT



WHEN RESPONDING TO AN INJURED BIRD CALL - PLEASE REMEMBER TO ALWAYS WRITE DOWN:

- 1) The caller's name
- 2) Phone number
- 3) LOCATION OF BIRD –remember, if it is **South of Deep Creek**, the Alaska Maritime NWR will respond
- 4) Date and time of the call
- 5) TYPE OF BIRD AND INJURY

DURING REFUGE OFFICE HOURS:

FOR INJURED BIRDS LOCATED NORTH OF DEEP CREEK

--The Kenai NWR or Marianne Clark (local licensed bird rehabilitator) will respond

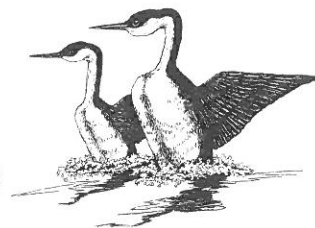
FOR ALL INJURED BIRDS, RAPTORS, SONGBIRDS, GULLS, DUCKS, and RAVENS

Refer the caller to Marianne Clark 262-3969 or cell phone 398-3979,

If no answer, refer caller to:

Plan A - Forward the call to one of the biology staff (Toby or Todd)

Plan B - Contact Chris Johnson in Law Enforcement (cell) 252-9840



AFTER OFFICE HOURS:

Marianne Clark 398-3979 (cell)

Toby Burke 398-9522 (cell)

Todd Eskelin 398-9553 (cell)

FOR INJURED BIRD OR RAPTOR LOCATED SOUTH of DEEP CREEK

-- Call the Alaska Maritime NWR:

During office hours AND after office hours contact list:

Arthur Kettle 235-6546 (AK Maritime NWR) or 235-5118 (home)

Leslie Slater 235-6546 (AK Maritime NWR) or 235-1279 (home)

Dave Roseneau 235-6546 (AK Maritime NWR) or 235-0713 (home)

SEABIRDS and MARINE WILDLIFE in Homer:

Charlotte Adamson 235-2725

Marine Wildlife Rescue Team (also Charlotte Adamson) 235-2700



FOR INJURED BIRDS IN COOPER LANDING or SEWARD

-- Refer callers to the Alaska Sealife Center's 24 hour Hotline (in Seward) 1-888-774-7325

FOR INJURED BIRDS in ANCHORAGE:

-- Refer callers to the Bird Treatment and Learning Center (in Anchorage) at 1-800-562-4852

What about other animals?

INJURED MAMMALS - Refer callers to the Soldotna ALASKA DEPT of FISH & GAME (262-9368), or Fish and Wildlife Protection / Troopers (262-4573)

INJURED OR STRANDED MARINE MAMMALS (whales, seals, sea lions) and SEA BIRDS - Refer callers to the Alaska Sealife Center's 24 hour Stranding Hotline (in Seward) 1-888-774-SEAL (7325)



**U.S. Fish and Wildlife Service
Bird Fatality/Injury Reporting Program
Field Report**

Point of Contact Information

Name of Individual Filing Report:	Name of Company/Organization:
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Fatality/Injury Details

Date Bird was Discovered (mm/dd/yyyy):
Type of Bird (e.g., bald eagle, red-tail hawk, etc.):
Condition of Bird (circle one): Alive / Dead:
If alive, actions taken:
Describe any visible injuries to the bird:
Disposition of the bird (circle one): Recovered / Not Recovered
If recovered, circle one of the following: Disposed of Rehabilitation Center Transferred-to/Picked-up-By USFWS Veterinarian
Enter disposition details (i.e., how disposed of, name of rehab. Center, name of FWS employee, name of vet.):
Apparent cause of fatality/injury (circle <u>all</u> that apply): Electrocution Probable Electrocution Collision Probable Collision Other (explain...)
Was this incident associated with an outage (circle one)? Yes / No / Unknown If "Yes", approximate time of outage: Outage ID (if applicable):

Location Where Bird Was Found

State:
Town or Community:
Circuit Number: Circuit Name: Op. Area ID:
Pole Number (if applicable):
GPS Coordinates (if applicable):
Nearest road or landmark (please be as specific as possible, e.g., milepost number nearest crossroad):

**U.S. Fish and Wildlife Service
Bird Fatality/Injury Reporting Program
Field Report - Continued**

Configuration Details

Enter the name of the configuration type that most closely matches the one involved in this incident (e.g., <i>Single-phase Crossarm (RUS A9-1)</i> , <i>substation</i> , etc.):
If you entered "Substation", identify all applicable equipment:
Is this a transmission line (circle one): Yes / No
If you answered "Yes" to transmission line, please answer the following questions: Is there an underbuild on the pole (circle one): Yes / No Is there an overhead static line (circle one): Yes / No Are there any existing markers on the conductors (i.e., Bird Flight Diverters): Yes / No Are there any flapper devices on the conductors (i.e., "Fireflies"): Yes / No What is the voltage, in kV:
If this incident was related to an electrocution, or possible electrocution, enter <u>all</u> applicable equipment on the pole (e.g., arrestors, capacitors, switches, etc.):
Enter the voltage, in kV:
Did ground wire, or neutral, contribute to the electrocution (circle one)?: Yes / No
If there was a cross-arm, what was the length?:
If pole or equipment on pole is suspected cause, where was bird found in relation to pole or equipment?:

Environmental Conditions

Surrounding Environment (circle all that apply): Forrest Grassland/Tundra Rural Wetland Urban	Food sources nearby (circle all that apply): Cannery Dumpster Landfill Fish processing plant/fish cleaning station Person feeding Prey Restaurant/Cafe Salmon Stream Other food source - <i>please specify</i> :
Weather Conditions (circle all that apply, if known): Clear Fog Wind Snowing Raining Other - <i>please explain</i> :	
Approximate time of Day (circle, if known): Day / Night	Details about nesting information (i.e., is there a nest on the structure or in the area?):

U.S. Fish and Wildlife Service
Bird Fatality/Injury Reporting Program
Field Report - Continued

Existing Protection / Retrofit Measures

Existing raptor protection on the structure (select yes/no): Yes / No

Please mark all existing raptor protection devices that apply:

- ☐ Bird Deterrent Device (other than perch guard) *please describe:*
- ☐ Bird Flapper device (ie. "Firefly")
- ☐ Bird or Swan Flight Diverter (BFD or SFD)
- ☐ Bushing Cover(s)
- ☐ Conductor Spacing increased (other than above) *please describe:*
- ☐ Elevated Perch
- ☐ Extension Link (non-Conducting)
- ☐ Groundwire Cover/Insulation
- ☐ Jumper Wire Cover/Insulation
- ☐ Jumper Wire(s) Suspended under Crossarm
- ☐ Lowered Crossarm
- ☐ Perch Guard(s) (to discourage birds from perching)
- ☐ Pole-top Extension
- ☐ Primary Insulator Cover (ie. "Birdguard")
- ☐ Other Raptor Protection *if "other", please specify:*

Additional Information / Photographs

Please include any additional observations/remarks regarding this fatality/injury:

Did you take any photographs (circle one)? Yes / No

If so, how many:

Please include all photographs with your submittal

Types of Pole Configurations

Single Phase – Crossarm (RUS A9-1)
Single Phase – No Crossarm (RUS A-1)
Substation
Three Phase Corner Pole – (RUS 2 C7's at 90 degree angles)
Three Phase Deadend (RUS C7)
Three Phase Double Deadend (RUS C8)
Three Phase Tangent (RUS C1 Config)
Three Phase Tangent (RUS C9-1 with all four wires on crossarm)
Three Phase Tangent (RUS C9-1 with netural down on pole)
Three Phase Horizontal Insulators
Three Phase Underbuild
Three Phase Wishbone
Two Phase Tangent (RUS B1)
Other/None/Not Applicable: _____

Equipment on Pole

Arrestor(s)
Capacitor(s)
Cutout(s)
Exposed Energized Jumper Wires
Ground Guy Wire(s)
Grounded Metal Bracket(s)
Pole Top Ground
Primary Metering
Recloser(s)/Setionalizer(s)
Regulator(s)
Switch(s)
Transformer (only 1)
Transformer Bank (only 1)
URD Riser

Voltage in kV: _____

Did Ground Wire or Neutral contribute to Electrocution: _____

Was neutral involved: _____

If there was a cross arm, what length: _____