

**WILDLIFE RESOURCE STUDIES**

**CASCADE CREEK HYDROELECTRIC PROJECT**

**FERC NO. 12495-002**

December 7, 2010

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## ACRONYMS AND ABBREVIATIONS

ADFG	Alaska Department of Fish and Game
AKNHP	Alaska Natural Heritage Program
BAS	Broadcast Acoustical Survey
CCLLC	Cascade Creek Limited Liability Corporation
FERC	Federal Energy Regulatory Commission
GIS	Geographical Information System
MIS	Management Indicator Species
MSIM	Multiple Species Inventory and Monitoring
MSL	Mean Sea Level
POG	Productive Old-Growth
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

## 1. INTRODUCTION

In February, 2008, Cascade Creek Limited Liability Corporation (CCLLC) received a Preliminary Permit from the Federal Energy Regulatory Commission (FERC) for the Cascade Creek Hydroelectric Project (FERC No. 12495-002) located in southeast Alaska near the city of Petersburg (Figure 1). The proposed project involves construction and operation of a 70-megawatt hydroelectric plant utilizing a run-of-the-river design, in which water would be drawn from Swan Lake at a rate congruent with inflow to maintain natural lake level fluctuations. Swan Lake is located approximately 17 miles northeast of Petersburg, on Alaska's mainland in the Cosmos Range bordering Thomas Bay, at an elevation of approximately 1,500 feet above mean sea level (MSL). Swan Lake drains into Thomas Bay by way of Cascade Creek, the latter of which will receive reduced flows during draw down events.

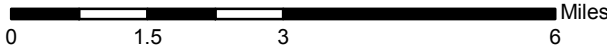
Water would be delivered to the powerhouse from a lake siphon via a drilled and excavated 12-foot-diameter mostly unlined rock power tunnel that originates at the gatehouse at 1,430 feet MSL and extends 13,100 feet at a slope of approximately 1 percent. From this point, it would drop into a 1,290-foot-long vertical shaft/vent. The vertical shaft would be connected at the bottom end to another 1,624-foot-long tunnel at a slope of approximately 1 percent that would terminate at the penstock at an elevation of approximately 265 feet MSL. The penstock would consist of a 600-foot-long, 9-foot-diameter buried steel pipe that would connect to the powerhouse at an elevation of approximately 50 feet MSL at tidewater on Thomas Bay. A tailrace would be constructed to allow the discharge of water into Thomas Bay. One dock in Thomas Bay would be installed and a minor frontage road would be constructed to allow operational access to the powerhouse. Operational access to facilities at Swan Lake would require helicopters and/or seaplanes.

Additionally, a transmission line would be installed connecting the powerhouse the Scow Bay Substation approximately two miles southwest of Petersburg. The transmission line generally follows a southeast alignment to the Scow Bay Substation consisting of the following segments: a 2.4-mile subsea portion in Thomas Bay; a 4.5-mile overhead portion across Agassiz Peninsula; a 6.5-mile subsea portion across Frederick Sound; and a 2.6-mile overhead portion along Mitkof Island just south of Petersburg.

The majority of the proposed project occurs on lands administered by the U.S. Forest Service (USFS), specifically the Tongass National Forest. The legal description of the project footprint comprises the following:

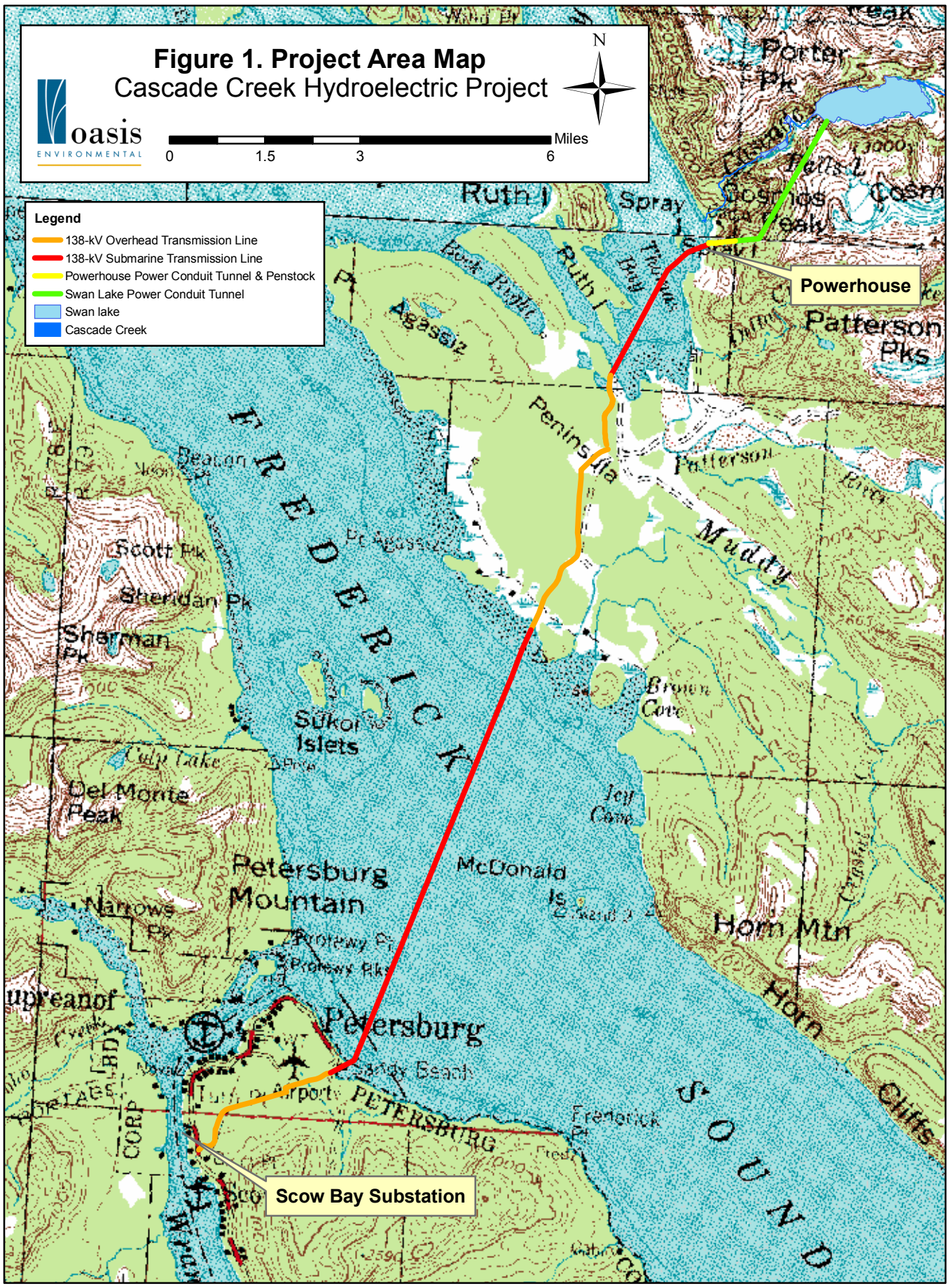
- Township 56 South, Range 79 East, Sections 24, 25, 26, and 35;
- Township 56 South, Range 80 East, Sections 8, 17, 18, and 19;
- Township 57 South, Range 80 East, Sections 4, 9, 16, 17, 20, 29, 31, and 32;
- Township 58 South, Range 79 East, Sections 13, 24, 25, 34, 35, and 36;
- Township 58 South, Range 80 East, Sections 6, 7, and 18; and

**Figure 1. Project Area Map**  
**Cascade Creek Hydroelectric Project**



**Legend**

- 138-kV Overhead Transmission Line
- 138-kV Submarine Transmission Line
- Powerhouse Power Conduit Tunnel & Penstock
- Swan Lake Power Conduit Tunnel
- Swan lake
- Cascade Creek



Powerhouse

Scow Bay Substation

- Township 59 South, Range 79 East, Sections 3 and 4.

During initial consultation and scoping, project stakeholders including state and federal resource agencies indicated concern for project effects on wildlife resources within the project area and close proximity. The Wildlife Study Plan was developed to address baseline and impact-evaluation data needs which will allow CCLLC and stakeholders to evaluate impacts.

This report summarizes the wildlife studies (including field surveys) that were conducted as outlined in the Wildlife Study Plan. Primary objectives of the wildlife studies were to determine presence/absence, habitat suitability, and distribution of wildlife within the project area.

## 2. STUDY AREA

Wildlife studies were conducted at various levels of intensity depending on the anticipated impacts on species and their habitat. Study areas described in the following report will be referenced relative to:

### Upper Cascade Creek

- This study area comprises the portion of Cascade Creek that flows from a natural fish barrier, approximately 1 mile upstream of Swan Lake, and drains into Swan Lake. The area also encompasses Spring Creek running parallel to Upper Cascade Creek for approximately 1 mile upstream of Swan Lake.

### Swan Lake

- This study area encompasses Swan Lake and its immediate surroundings including the intake for the tunnel system and any temporary staging or storage areas during project construction on the shoreline of Swan Lake.

### Lower Cascade Creek Corridor

- This includes Cascade Creek between the Swan Lake outlet and the Falls Lake inlet, and from Falls Lake inlet along Cascade Creek to its discharge in Thomas Bay. This study area also includes Falls Lake and the pond area between Falls Lake and Swan Lake.

### Project Powerhouse and Tunnel

- The tunnel study area lies between the intake at Swan Lake, continuing 13,100 feet in two horizontal and one vertical section in a southwesterly direction to the powerhouse site, and is entirely underground.
- The powerhouse site study area begins at the point where the tunnel daylights and includes the penstock, 8-acre powerhouse pad, tailrace, and any temporary staging and storage areas that will be used during construction.

### Transmission Line Routes

- The Thomas Bay Subsea Transmission Line study area includes the subsea transmission line between the powerhouse site and the overhead transmission connection on the eastern shore of Point Agassiz Peninsula.
- The Point Agassiz Overhead Transmission Line study area includes the overhead transmission line and access corridor from the shore of Thomas Bay, southwest approximately 6 miles to the subsea initiation at Frederick Sound just north of Agassiz South Base.
- The Frederick Sound Subsea Transmission Line study area includes the section initiating at the point where the overhead transmission line becomes subsea from

the western shores of Point Agassiz Peninsula and crosses Frederick Sound southwest to the eastern shores of Mitkof Island.

- Lastly the Petersburg Overhead Transmission Line study area includes the point at which the Frederick Sound Subsea Transmission Line connects to the eastern shores of Mitkof Island approximately 1 mile south of Petersburg, and continues over land to the substation.

### **3. SITKA BLACK-TAILED DEER WINTER RANGE ASSESSMENT**

The Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) is endemic to Alaska and is designated a Management Indicator Species (MIS) by the USFS. The Sitka black-tailed deer is of significance to the project because this species is used more than any other terrestrial species in Southeast Alaska for hunting and subsistence. This species is also an important food source for wolves and black bears.

Deep snow and harsh winters limit deer populations on the mainland. Therefore, the quantity, quality, distribution and arrangement of winter habitat are important factors for healthy deer populations in southeast Alaska. Sitka black-tails largely favor old-growth forests during the winter. Old-growth forests are vital due to increased snow-intercept capabilities. Suitable winter range habitat is characterized by abundant and nutritious forage, minimal snow cover, nearby permanent unfrozen waters, relatively flatter ground, and slope aspects that are more likely to remain free of snow (USFS 2008, Kirchoff and Hanley 1992).

#### **3.1. Objectives**

The purpose of this study was to address concerns regarding changes to land cover type resulting from overland transmission line development, which could reduce the amount and quality of winter range habitat. A reduction in winter range habitat could affect local Sitka black-tailed deer population size.

The objective of the deer winter range assessment was to evaluate the relative quality and availability of winter range habitat in the Cascade Creek project area. The assessment will be used to provide information to project stakeholders on existing conditions in order to assess potential impacts.

#### **3.2. Methods and Study Area**

Sitka black-tailed deer winter range assessments were conducted in September 2010 along the transmission corridor on Point Agassiz Peninsula and at the powerhouse site (Figure 2). Suitable winter range habitat was evaluated using methodology that was developed by Kirchoff and Hanley (1992) specifically for deer in southeast Alaska known as the “Quick-Cruise Method.”

Sitka-black-tailed deer winter habitat consists of old-growth conifer forests, typically below 800 feet (USFS 2008). Therefore, only old-growth habitat below 800 feet was assessed in the project area. Habitat was stratified using the Tongass National Forest Size-Density Model (SDM), which was developed for effects analysis for the Tongass Land and Resource Management Plan Final Environmental Impact Statement. The SDM uses the quadratic mean diameter of trees and average tree density to characterize productive old-growth (POG) into 7 classes based on spatial modeling of aerial imagery (Hanley and Friberg 2009).

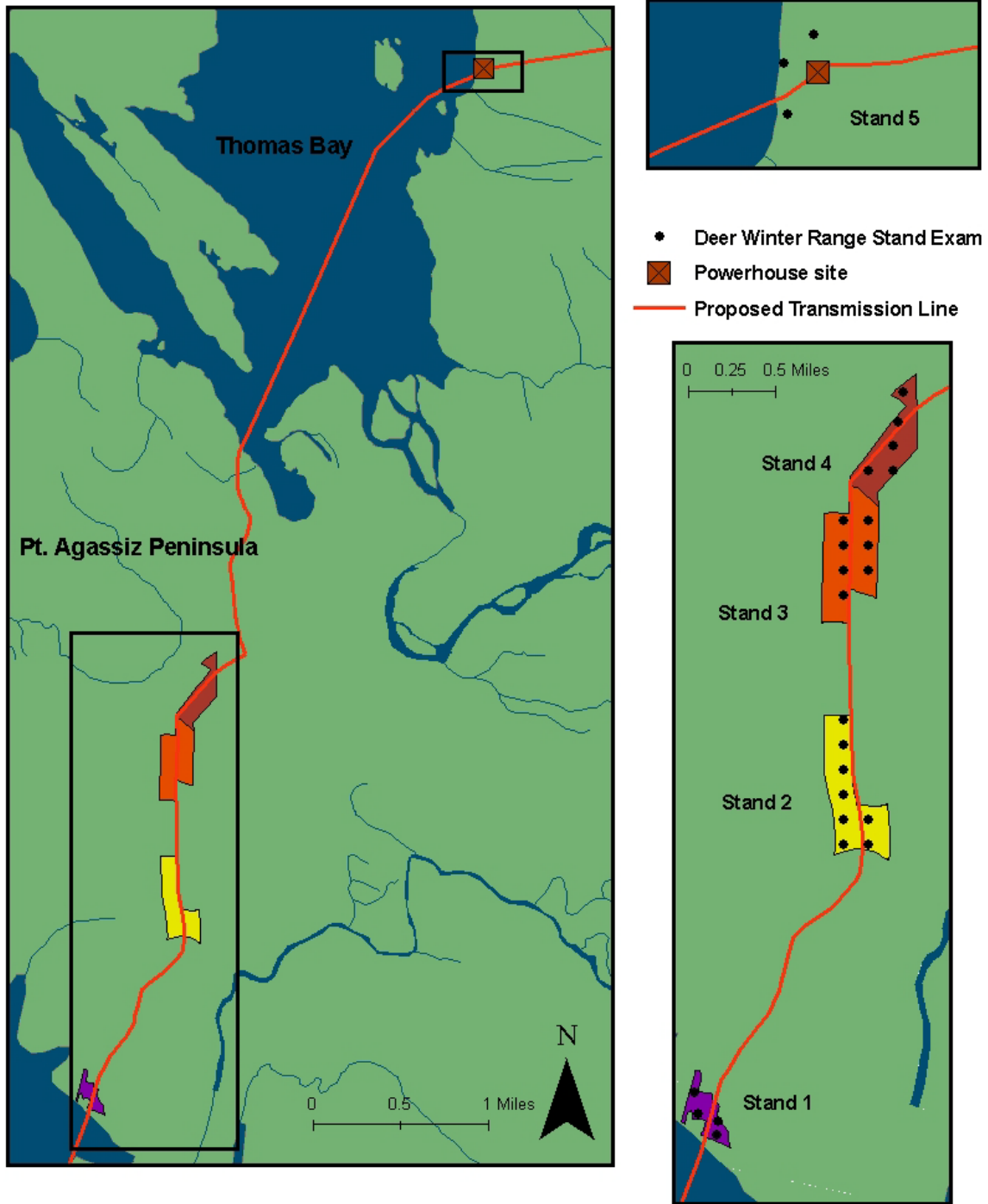


FIGURE 2. DEER WINTER RANGE STAND EXAMS

The SDM represents the best available information for quantifying and portraying structural patterns for old-growth on the Tongass National Forest. This model is consistently used by the Tongass National Forest to manage wildlife at a landscape level, particularly Sitka black-tailed deer, and efforts have been made to hone this model for project specific use (Krosse and O'Connor 2009).

The survey area was chosen using a stratified approach in which all old-growth habitat (i.e. POG) according to the SDM was identified within 500 feet of the proposed overland transmission line on Point Agassiz Peninsula. All POG stands within the 500-foot criteria were overlaid with a grid of sampling points spaced 450 feet apart utilizing a Geographical Information System (GIS). Although not within old-growth, sampling points were also randomly placed in the vicinity of the powerhouse site to ensure coverage of the project area. This resulted in twenty-seven deer winter range stand exams within 5 stands; 4 stands that contained POG along the transmission line corridor, and 1 stand that was located at the Powerhouse Site (Figure 2).

The quality of habitat was assessed using the Quick-Cruise method. This is essentially a scoring method that the highest value to the most suitable winter range habitat for deer. Correspondingly, winter range habitat criterion included:

- Forage (50% of total score)
- Shrubs (Blueberry)
- Forbs (Bunchberry/Goldthread/5 leaf Bramble)
- Nutritional Quality (Overstory canopy cover; shaded areas indicate higher nutritional value)
- High Value Species within 100' of Plot Center (Huckleberry/Skunk Cabbage/Shield Fern)

Snow Conditions (50% of total score)

- Snowfall
- Elevation
- Distance from Coast
- Snow Interception
- Snow Melt (Evaluation of slope and aspect)
- Shading (Angle to horizon)

Datasheets for each stand exam are included in Appendix 1. In addition to the information collected on each data sheet, researchers also noted the presence or absence of deer, abundance of pellet groups, evidence of bedding, trails, condition of vegetation, snowdrifts, and animal scat. All completed sampling points were averaged by stand to provide a baseline of overall quality of winter range habitat.

### 3.3. Results

Sitka black-tailed deer winter range scores were averaged per stand, of which scores ranged from 64.3% to 78.7% (Table 1). According to the SDM, habitat along the proposed transmission corridor is ranked as size-density (SD) class 67 and the powerhouse site is ranked as an SD class of 3.

**Table 1. Mean Deer Winter Range Stand Exam Scores & Size-density Model Class.**

Stand	Acreage	Number of Surveys	Mean Winter Score (%)	Size-Density Class	Representative Photo #
1	11.1	4	64.3	67	1
2	38	8	66.1	67	2
3	43.3	7	78.7	67	3
4	26.5	5	67.8	67	4
5	8.8	3	65	3*	5

\* Timber Type Size Class 3 is not old-growth.

Values of SD67 relate to stand sizes that are old-growth saw-timber with a diameter at breast height (DBH)  $\geq 9''$ , and ages greater than 150 years. Volume sizes are greater than 30 million board feet (MBF) per acre. Generally, SD67 contains forest types with low tree density but large diameter trees, of which tree diameters greater than 40 inches are common and uniformly distributed throughout the stand. Size-density class 3, such as that of the powerhouse site, relates to pole-timber with DBH between 5'' and 9'' and volume between 8 and 20 MBF/acre. The last harvest was between 20 and 50 years ago.



**Photo 1. Representative photo of Stand 1, located at the southern end of the proposed transmission corridor on the Point Agassiz Peninsula.**



**Photo 2. Representative photo of Stand 2, located approximately 1.5 miles from the southern end of the proposed transmission corridor on the Point Agassiz Peninsula.**



**Photo 3. Representative photo of Stand 3, located midway between the southern end of the proposed transmission corridor on the Point Agassiz Peninsula.**



**Photo 4. Representative photo of Stand 4, located midway between the southern end of the proposed transmission corridor on the Point Agassiz Peninsula and Thomas Bay and adjacent to Stand 3.**



**Photo 5. Representative photo of Stand 5, located at the Powerhouse Site adjacent to Thomas Bay.**

### 3.4. Discussion

There have been no studies to date relating quick cruise values with actual deer population size, occupancy, or level of use. Values only provide context in relation to other estimates in the Tongass National Forest. According to the Tongass National Forest Wildlife Biologist for the Petersburg Ranger District, quick cruise values obtained for this project (64.3% to 78.7%) correlate with medium quality winter range habitat based on observational data. Comparisons can be made to similar quick cruise values obtained on Kupreanof Island for the Tonka timber sale (approximately 65%). The Tonka timber sale area was studied by the Alaska Department of Fish and Game (ADFG) and resulted in significant numbers of deer utilizing the area during winter (personal communication with Chuck Parsley).

The results of our study gave similar scores to the previously harvested stand at the powerhouse site and POG stands on Point Agassiz Peninsula. This may be a result of the powerhouse site's likeliness to have relatively light snowpack. Lighter snowpack is expected because the location is on a relatively steep slope with a south-westerly aspect. This favorable aspect receives a greater amount of solar radiation than the flat aspects of the POG stands.

Size-density values also provide information on winter habitat quality. According to the SDM model, values of SD67 contain the highest density of trees compared with other old-growth forest types. In previous models such as the DeGayner (1997) model, SD67 was correlated with high densities of Sitka black-tailed deer during winter months (USFS 2008). However, this model rated some SD67 stands as too high quality of deer winter range because these stands often consist of widely spaced, large spruce trees commonly located in riparian floodplains. When these conditions are present, habitat quality is poor during the winter due to greater snow accumulation and less suitable winter forage (USFS 2008). Recently, Hanley and Friberg (2009) re-grouped SDM classes into 3 supra-classes to better classify deer habitat pertaining to deer forage resources. Stand-density values of 67 remains grouped solitarily in the "Large" supra-class. Hanley and Friberg models indicate that stands classified as "Large" are utilized less (deer-days/hectare) than all other old-growth classes.

In conclusion, the project corridor likely provides medium quality habitat for deer during winter months along the transmission line and possibly at the powerhouse site. Based on the comparison to Kupreanof Island and the results of the ADFG deer study, this habitat could support significant numbers of deer during the winter.

## 4. SMALL MAMMAL SURVEYS

### 4.1. Objectives

The Cascade Creek Hydroelectric project has the potential to affect local small mammal populations, many of which are endemic to southeast Alaska, through surface disturbances from development of overhead transmission lines, powerhouse site, penstock, access roads and outbuildings. Endemics are generally more vulnerable than non-endemics to natural or human-caused disturbances due to their limited geographic extent, and small mammals are an important source of food for predators in the area (USFS 2008). Therefore, the purpose of this study is to understand which small mammal endemics occur in the proposed project area in order for stakeholders to determine project effects. The objective of this study is to obtain baseline data regarding species composition of small mammals.

### 4.2. Methods and Study Area

The sampling design used in this study was adapted from the methodology for small mammal trapping described in the U.S. Department of Agriculture (USDA) Forest Service Multiple Species Inventory and Monitoring (MSIM) Technical Guide (Manly et al. 2006).

Four study stations were randomly located within the proposed project footprint. Three stations were assigned along the transmission line on Point Agassiz Peninsula and one station was located at the powerhouse site (Figure 3). Transects were established at each station. Transects rather than grids were utilized for this study because transects are a better method to adequately sample the long narrow transmission corridors. Transects consisted of ten traps placed in a line centered at the random station, perpendicular to the corridor trajectory, and spaced 20 meters apart to accommodate average home-range size of most small mammals. Traps remained in place for three days in each survey area and were checked twice daily.

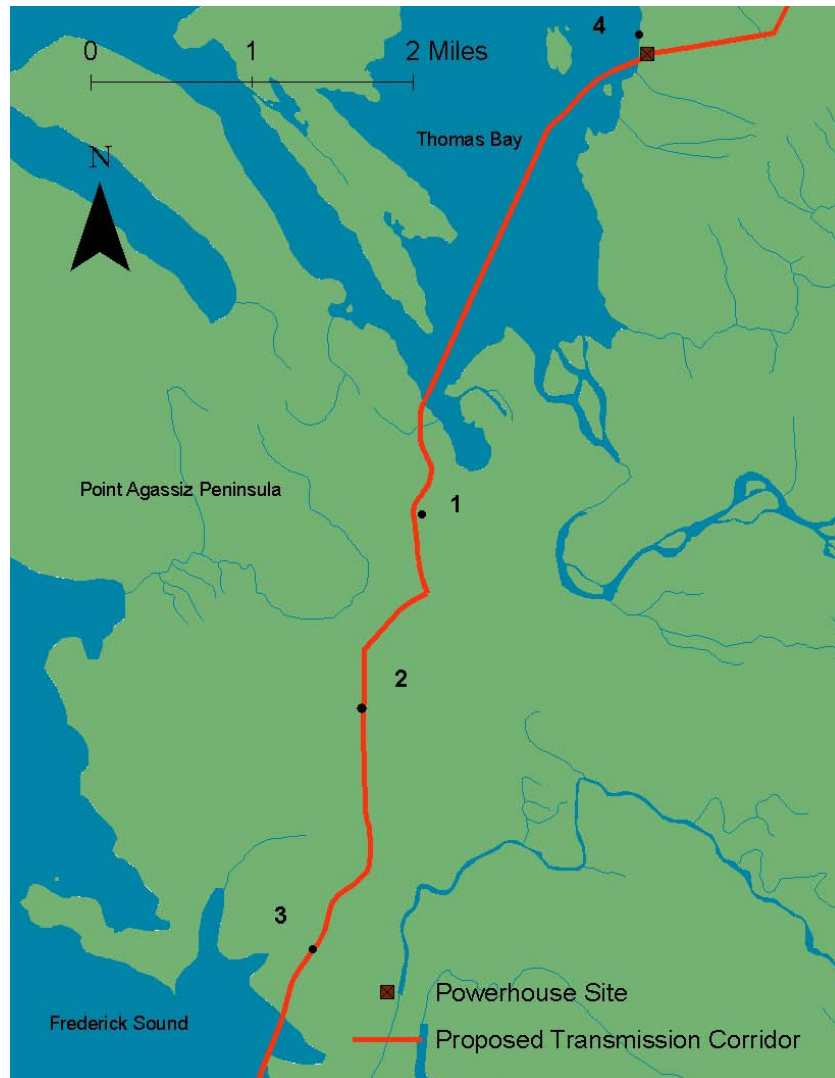
Small mammal traps utilized for the surveys included 34 extra long (XLK model, 7.6 x 9.5 x 30.5 cm) and extra large (XLF15 model, 10.2 x 11.4 x 38cm) Sherman Live Traps throughout the study area supplemented with six pitfall traps. The combination of live and pitfall traps was intended to provide a more accurate description of small mammal community composition, as it allowed for the sampling of the entire range of species that may be present in the study area.

All captured small mammals were identified to species level, marked by clipping a small amount of pelage in the rump area, and recorded on Sherman Live Trapping Forms (Appendix 2).

### 4.3. Results

Small mammal surveys were completed in late September of 2010. With one exception, all forty traps were deployed for three nights and visited twice daily. One trap at the

powerhouse site was removed for the last night due to a trap-happy squirrel (captured 3 times in 2 days); therefore, this particular trap was deployed for only two nights. Four species were captured in total, including: 17 northern red-backed voles (*Myodes rutilus*), 3 northwestern deer mice (*Peromyscus keeni*), 3 Cinerus Shrew (*Sorex cinerus*), and 1 red squirrel (*Tamiasciurus hudsonicus*). Several individuals were captured on more than one occasion (Table 2).



**FIGURE 3. LOCATIONS OF SMALL TRANSECTS**

**Table 2. Species, Location, and Capture Rate of Small Mammals**

Species	Trap Station	Live Capture	Mortality	Recapture	Representative Photo #
Cinereus shrew	4		3		6
Red squirrel	4	1		2	7
Northwestern deer mouse	1,4	4			8
Northern red-backed vole	2,4	16	1	8	9



**Photo 6. Photo of a Cinerus Shrew, captured at Trap Station #4**



**Photo 7. Photo of a red squirrel, captured for the third time at Trap Station #4**



**Photo 8. Photo of a northwestern deer mouse, captured at Trap Station #4**



**Photo 9. Photo of 2 northern red-backed voles, captured in a pitfall trap on Trap Station #3.**

#### **4.4. Discussion**

Results of small mammal surveys suggest that northern red-backed voles are the most common species present within the study area. The majority of northern red-backed voles were captured at Trap Station #2, located exclusively in an old-growth stand. Trap Station #4 within the vicinity of the proposed powerhouse facility, captured the greatest diversity of small mammals and was located in a second growth forest (20 to 50 years old) containing mixed conifer and alder.

These results are consistent with current knowledge about small mammals in southeast Alaska. Density of voles is greater in late-seral forests than elsewhere (Smith 2005), and mixed conifer-alder young growth stands hold more habitat for small mammals than other young-growth stands (Deal 2007). The same type of habitat at Trap Stations #2 and #4 occur throughout the corridor along Agassiz Peninsula; therefore, these same species would be expected in approximately the same ratios per habitat type.

## 5. QUEEN CHARLOTTE NORTHERN GOSHAWK SURVEYS

The Queen Charlotte subspecies of the northern goshawk (goshawk) is a year-round resident and an endemic to coastal forests from the northern portion of southeast Alaska to Vancouver Island in British Columbia, Canada. The goshawk is designated a sensitive species and MIS in the Tongass National Forest. This species is also included in the yellow category of the Audubon WatchList 2010 (USFS 2008) and is designated an Alaska Species of Special Concern by ADFG.

The Queen Charlotte northern goshawk is believed by ADFG to inhabit the Thomas Bay area on a year-round basis. However, formal goshawk surveys have not been conducted to date, so presence has not been confirmed. Goshawks prefer mature and old-growth stands with an open understory for foraging and nesting. Suitable habitat such as this occurs in the vicinity of the proposed powerhouse site and overhead transmission line on Point Agassiz Peninsula. If goshawks occurred in the project vicinity, the project could affect breeding, nesting, and foraging goshawks.

### 5.1. Objectives

The objective of these surveys was to determine presence of goshawks and/or goshawk nests in the proposed Cascade Creek Hydroelectric Project vicinity.

### 5.2. Methods and Study Area

Goshawk surveys were conducted during May and August of 2010, which corresponds to the nestling and fledgling-dependency period, respectively. Breeding phenology was verified with local ADFG experts (personal communication with Richard Lowell). Approximately half of the surveys were conducted in May and the remaining were completed in August. Surveys were performed along the terrestrial portion of the transmission line corridor located on the Point Agassiz Peninsula and at the proposed powerhouse site. Survey stations were established 200 meters (656 feet) apart along a single transect the length of the transmission line corridor, and on the four corners representing the proposed powerhouse site.

Surveys were conducted using a modified Broadcast Acoustical Survey (BAS) approach established by Kennedy and Stahlecker (1993), further described in the 2006 USDA Northern Goshawk Inventory and Monitoring Technical Guide, and modified in the BAS methods adapted for projects in the Tongass National Forest (Stangl 2009).

Biologists utilized an Edge Mighty Predator electronic caller to broadcast the adult alarm call and solicit female and/or juvenile call-back response. Broadcast calls were made at an angle of sixty degrees for a period of ten seconds, followed by a 30 second listening and watching period. This sequence was completed two more times at each station, approximately 120 degrees from the last broadcasts. A minimum of four minutes were spent at each station. One minute was spent watching and listening before broadcasting, and up to five minutes was spent watching and listening after the last call had been made.

While travelling between stations, surveyors listened and watched for responsive goshawks as well as for any nests or sign. Broadcasting only took place in rainy and windy conditions if the weather was not expected to interfere with broadcast results.

All data collected during northern goshawk surveys was recorded on the Tongass National Forest Goshawk & Wildlife Survey Form (Appendix 3).

### 5.3. Results

Goshawk surveys during 2010 resulted in no detections in the project area. On several occasions after calls were broadcasted, Stellar jays (*Cyanocitta stelleri*) and red-breasted sapsuckers (*Sphyrapicus ruber*) flew in and remained in close proximity for several calls along the survey route. The Stellar jays exhibited mobbing behaviors in response to the broadcasted calls.

### 5.4. Discussion

Although goshawks were not detected along the corridor, presence cannot be discounted at this time. Presence/absence determinations are complicated because detectability of goshawks varies during the reproductive cycle. For instance, prior to egg-laying, detectability is high because of courtship vocalizations and over-canopy flights. On the other hand, during the incubation and the early nestling stage, adult females are often unresponsive (Squires and Reynolds 1997; McClaren et al. 2003). Because detectability may have been low during the times that surveys were conducted, particularly in May, additional surveys should be conducted before a determination of presence/absence for the project area can be determined. This is consistent with the protocols prescribed in the USDA Northern Goshawk Inventory and Monitoring Technical Guide and the Tongass National Forest BAS procedures by Stangl (2009). Studies by Boyce et al. (2005) demonstrate that a single visit to a nest area is inadequate to determine occupation, and that if broadcast surveys are repeated more often, goshawk absence can be inferred with a higher level of confidence. It should also be noted that because goshawks utilize territories in which movements are made to several alternate nests between years, up to 1.8 km apart, detectability may vary spatially and temporally (Squires and Reynolds 1997; Woodbridge and Detrich 1994; Boyce et al. 2005).

## 6. AMPHIBIAN PRESENCE/ABSENCE LITERATURE REVIEW

### 6.1. Introduction

Alaska hosts a total of eight amphibian species, of which wood frogs (*Rana sylvatica*) and western toads (*Bufo boreas*) are the most common and widespread. Southeast Alaska is considered the northernmost extreme of the range for all amphibian species found in the study area except for the wood frog and the western toad. The red-legged frog (*Rana aurora*) and the Pacific chorus frog (*Pseudacris regilla*) are listed as nonnative species. Other amphibian species found in southeast Alaska include the northwestern salamander (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), rough-skinned newt (*Taricha granulosa*) and the Columbia spotted frog (*Rana luteiventris*). Table 3 displays these species and their current status.

**Table 3. Amphibians in Southeast Alaska**

Common Name	Scientific Name	Status
Northwestern Salamander	<i>Ambystoma gracile</i>	ADFG, S3, ESA PS
Long-toed Salamander	<i>Ambystoma macrodactylum</i>	ADFG, S3
Rough-skinned Newt	<i>Taricha granulosa</i>	ADFG, S4
Western Toad	<i>Bufo boreas</i>	ADFG, S3S4, ESA PS
Wood Frog	<i>Rana sylvatica</i>	ADFG, S5
Columbia Spotted Frog	<i>Rana luteiventris</i>	ADFG, S2, BLM S, ESA PS
Pacific Chorus Frog	<i>Pseudacris regilla</i>	ADFG, SNR
Red-legged Frog	<i>Rana aurora</i>	ADFG, SNR
Alaska worm salamander	<i>Batrachoseps caudatus</i>	---

ADFG: Legally protected from taking

BLM S: Sensitive

ESA PS: Partial status, U.S. Endangered Species Act of 1973, as amended by the U.S. Fish and Wildlife Service and the U.S. National Marine Fisheries Service (as of October 2002)

S1: Critically Imperiled— Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.

S2: Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure—Common, widespread, and abundant in the nation or state/province.

SNR: Unranked—National or subnational conservation status not yet assessed.

SR: Reported to occur.

In Alaska, amphibians are managed by Alaska Department of Fish and Game under statute 16.05.030, in which amphibians are legally included in the definition of “fish”. This statute makes it illegal for anyone to “hold, transport or release” any native amphibians without a valid permit. The species occurring in the project vicinity are not currently listed as threatened or endangered under state or federal law (MacDonald 2003).

Amphibians are often considered indicator organisms, meaning the relative health of amphibian populations can be used to track large-scale changes in environmental quality and ecosystem functions. These species serve well as bioindicators because amphibians have highly permeable skin and eggs, which makes them sensitive to toxins and changes in moisture and temperature conditions. Amphibians also occupy a key trophic role in both aquatic and terrestrial ecosystems functioning as consumers of invertebrates and as prey for larger animals (ADFG 2006).

Amphibian populations around the world are declining rapidly, however, research is lacking on amphibian populations in Alaska. Significant declines have been noted for the western toad within the state, but little is known about total populations or current trends of other amphibians in Alaska. Loss and degradation of habitat are major factors for amphibian decline on a global level, but there are many unknowns as to why amphibian populations are declining so rapidly. Several fungal diseases, such as chytrid fungus, have been discovered recently and pose major threats to amphibians worldwide. Chytrid fungus has been documented in Alaskan amphibians. Many scientists consider cumulative effects to be the major factor; i.e., the combination of habitat degradation and other environmental effects such as climate change, which are contributing to reduced amphibian populations globally. Other common sources of mortality for amphibians include increased UV-B radiation, predation from introduced fish and amphibian species and damage to immune systems from pesticides and other pollutants. Amphibian populations in Alaska appear to have higher rates of deformity than in most areas within the United States but reasons for this are not yet known (ADFG 2006, Woodford 2006).

Amphibian species composition and population size is largely unknown in the project area because comprehensive amphibian surveys have not been completed. However, amphibians are known to occur in the project area. Frogs and salamanders have been documented during related project field work, and one Columbia spotted frog survey was conducted on Agassiz Peninsula. Amphibian species are of concern because of the possible effects to permanent waters along Cascade Creek, of which amphibians are dependent upon during the breeding season, and possible habitat disturbance. Additionally, some species of amphibians have special status to various agency stakeholders.

## **6.2. Objectives**

The objective of this literature review is to provide initial baseline data on amphibians potentially occurring in the project area. Specifically, this report aims to assess the potential presence or absence (within the project area) for each of the eight species known to exist in southeast Alaska. This report also focuses on providing adequate information to project stakeholders to assess potential impacts, determine what further studies may be necessary, and develop a preliminary study program.

### 6.3. Methods and Study Area

An intensive literature review was conducted to determine which species could potentially occur in the project area. The assessment of potential presence/absence is based on records and anecdotal information on current and historical distribution; presence according to life cycle and phenology (i.e., breeding, migration, aestivation etc.); observations during other field investigations related to the project; and availability of suitable habitat in the project area. In order to obtain this information, a number of sources were reviewed. Primary sources included, but are not limited to:

- ADFG and USFWS published periodic amphibian survey reports and species accounts;
- Alaska Natural Heritage Program (AKNHP) database listings for important and sensitive species, species accounts and published reports;
- Communication with agency experts and university experts; and
- Books and peer-reviewed literature.

The areas under study for this literature review include: Upper Cascade Creek, Swan Lake, Lower Cascade Creek Corridor, Project Powerhouse and Tunnel, and the Transmission line routes. Suitable amphibian habitat was evaluated within these areas and compared with historical and current distribution to determine potential of occurrence. The results of this analysis are described in further detail in the following sections.

### 6.4. Results

According to the literature review, all native southeast Alaska amphibians as indicated in Table 3 are expected to occur in the project area. The non-native red-legged frog and Pacific chorus frog were determined not to have potential to occur because agency experts indicated that these species remain close to the sites to which they were originally introduced. Records evaluated during this literature review indicate that these frogs are not found in the vicinity. In fact, records show that the Pacific chorus frog remains isolated to Revillagigedo Island over 100 miles south of the project area, and the red-legged frog is found on Chichagof Island approximately 100 miles northwest of the project area. Therefore, these two non-native species will not be discussed further.

The Alaska worm salamander is also not discussed further in this document because it is unlikely to occur in the project area. This species is considered enigmatic in Alaska because detections are contentious. For instance, a single specimen was supposedly collected by Lt. H.E. Nichols from Annette Island in August, 1882, but the collection date is listed as December 1881, when Nichols and crew were not believed to be in Alaska. Two questionable specimens of *Batrachoseps attenuates* were also collected in Yakutat Bay, Alaska by W.H. Dall in 1874, but these specimens have been labeled “all data questionable” (MacDonald 2003). The specimen collected by Nichols was nearly identical to *Batrachoseps attenuates* specimens that were also collected in the San

Francisco area by Nichols. Many herpetologists believe that the Yakutat Bay specimens were likely mislabeled and did not come from Alaska. This salamander has never been positively identified north of the Columbia River (MacDonald 2003, MacDonald and Cook 2007). Therefore, this species will not be discussed further.

The following sections describe the life history, habitat, distribution and potential occurrence for each of the species determined to potentially occur in the project area.

#### **6.4.1. Northwestern Salamander**

##### **6.4.1.1. Life History and Habitat**

The northwestern salamander is a lunged salamander found between sea level and 10,200 feet in elevation. Exact habitat for this species in Alaska is not well known but it is believed that this species generally prefers moist forested areas of glacial refugia. In the contiguous United States this species occupies a variety of mesic habitats including open grassland, woodland and forested habitats, but only if near permanent sources of freshwater. Adults remain in the uplands outside the breeding season, tending to utilize rodent burrows (Nussbaum et al. 1983). Northwestern salamanders prefer to be subterranean except during rainy periods or during migration to aquatic breeding sites, which most often occurs on rainy nights (ADFG 2006, AKNHP 2006, MacDonald 2003, Waters 1991).

The breeding season varies greatly throughout the range of the northwestern salamander. Breeding may begin shortly after the new year for populations in the southernmost reaches in the contiguous United States and may extend as late as July for populations at higher latitudes and/or higher elevations. This species can often be found under rocks and logs during the breeding season and has been observed breeding in muskeg ponds and freshwater lakes within Alaska. Populations in Washington State breed in deep lakes and ponds in forested subalpine basins (ADFG 2006, AKNHP 2006, Hoffman et al. 2003, MacDonald 2003). Juveniles may take 1 to 2 years to fully metamorphose, and inhabit breeding areas year round (Efford and Mathias 1969).

In ponds, lakes and slow-moving streams this salamander will attach egg masses to aquatic vegetation. These egg masses contain 15 to 200 eggs and take approximately two to four weeks to hatch. Larval periods are from one to two years in length and require permanent sources of water. Larvae may coexist with fishes and bullfrogs because the larvae are reportedly distasteful to these potential predators (ADFG 2006, AKNHP 2006, Hoffman et al. 2003, MacDonald 2003).

Hibernation habits for the northwestern salamander have not yet been observed in Alaska. Populations in Washington have been observed to hibernate, though, and emerge from hibernation, migrating to breeding ponds in January or February at sea level and as late as July in montane environments at 4,000 feet (Snyder 1956).

The diet of this species of salamander is not well studied. It is believed that larvae feed on zooplankton and aquatic invertebrates and terrestrial adults feed on a variety of terrestrial invertebrates (AKNHP 2006, MacDonald 2003).

#### 6.4.1.2. *Distribution and Abundance*

The northwestern salamander is found along the Pacific coast from California to southeast Alaska, the latter of which marks the northernmost extent of the range. Global population size is unknown but believed to be greater than 10,000 and possibly exceeding 100,000. This salamander is considered rare in Alaska and only two specimens have been documented and verified in the state. The specimens were collected in coastal forests at Mary Island southeast of Ketchikan and northwest of Chichagof Island near Pelican, approximately 150 miles southeast and 150 miles northwest from the project site, respectively. One unverified record indicates that a globular egg mass, presumably of this species, was found in 1991 at Figure Eight Lake along the Stikine River, approximately 30 miles southeast of the project site (ADFG 2006, AKNHP 2006).

#### 6.4.1.3. *Potential Occurrence Within Project Area*

Although northwestern salamanders are rare in Alaska, as only two specimens have been collected, this species has potential to occur in the project area. The project area is within the distribution and range, and a likely sighting occurred along the Stikine River, approximately 30 miles southeast of the site.

The project area contains a variety of breeding and juvenile habitat potentially suitable to the northwestern salamander. Suitable breeding habitat such as muskeg ponds, freshwater lakes, slow moving streams, and still waters occur throughout the project area with abundant aquatic vegetation for egg mass attachment. These areas include the Swan Lake inlet, Spring Creek, the pond above Falls Lake, Falls Lake and some ponds within the vicinity of the transmission line corridor. Upland habitat for post-metamorphosed adults occurs throughout.

### **6.4.2. Long-toed Salamander**

#### 6.4.2.1. *Life History and Habitat*

The long-toed salamander is known for occupying a diverse range of habitats throughout its range including sub-alpine meadows, dry woodlands, humid forests and rocky areas along ponds and lakes. Common elements among these habitat types include well-drained areas of thick litter near permanent freshwater bodies. Long-toed salamander occurrences have been documented in active logging areas, 3 year-old clear-cuts and old-growth forests. This species is found at a variety of elevations ranging between sea level and 10,000 feet. Much like the northwestern salamander, adult long-toed salamanders are subterranean primarily, and inhabit areas close to breeding ponds such as logs, rocks and other debris (ADFG 2006, AKNHP 2006, MacDonald 2003).

Migration to breeding ponds typically occurs on rainy nights in early spring, when breeding season begins. In the Stikine Valley approximately 30 miles to the south of the project area, breeding has been observed by this species in April and May. Mating season is typically the only time that this species will enter water and males tend to arrive at breeding grounds before females and remain until after the females have departed. Breeding takes place in both temporary and permanent ponds and along still portions of rivers and streams (AKNHP 2006, MacDonald 2003).

After courtship, female long-toed salamanders attach single eggs or small egg clusters to the underside of submerged logs or vegetation such as alder twigs. Researchers have also observed eggs that were deposited in the open water. Eggs typically hatch in around three weeks and metamorphosis takes place during the first summer or after overwintering. In Alberta, the life span of the long-toed salamander has been observed as long as 10 years, but more typically around six years. Sexual maturity is reached after two years (AKNHP 2006, MacDonald 2003, Thompson 2001).

This species hibernates communally in burrows with 8 to 14 individuals. Hibernation has been observed at depths below the frost line in large gravel substrate in low-lying areas that likely maintain elevated moisture levels (AKNHP 2006, MacDonald 2003, Thompson 2001).

Adult long-toed salamanders eat a variety of terrestrial and aquatic invertebrates including insects and insect larvae, spiders, slugs, earthworms and amphipods. Larvae feed on zooplankton, small insects, snails and on occasion other salamander larvae, including conspecifics (AKNHP 2006).

#### 6.4.2.2. *Distribution and Abundance*

The long-toed salamander has a broad range extending from California to southeast Alaska and eastward to the Rockies. This species is common throughout its range but less common in Alaska (MacDonald and Cook 2007). There have been numerous occurrences within southeast Alaska, the closest being at Mallard Slough approximately 20 miles south of the project site. Other occurrences include the mouth of the Stikine River at Figure Eight Lake (30 miles south), Andrew Slough (25 miles south), Farm Island (25 miles south) and Sokolof Island (35 miles south). One specimen was collected in 2003 in the Taku River Valley of the Coast Range, approximately 110 miles north of the project site (Carstensen et al. 2003). Amphibian surveys conducted along the Stikine River in 1991 did not yield any specimens (AKNHP 2006).

#### 6.4.2.3. *Potential Occurrence Within Project Area*

The long-toed salamander has potential to occur in the project area because it has been observed along the Stikine River approximately 30 miles away and the species is well known to occupy a variety of habitats throughout a wide range of elevations. The project site contains numerous areas that would provide suitable breeding habitat such as permanent and temporary ponds, and along still moving creeks and streams. Permanent

and temporary ponds with abundant aquatic vegetation are plentiful in the areas directly surrounding Swan Lake, the pond above Falls Lake, Falls Lake and along the transmission line corridor. Spring Creek above the Swan Lake inlet also provides ideal breeding habitat for the long-toed salamander due to the slow-moving water and abundance of submerged vegetation and woody debris suitable for attaching egg clusters.

### **6.4.3. Rough-skinned Newt**

#### **6.4.3.1. *Life History and Habitat***

Throughout the year, rough-skinned newts are strongly associated with permanent freshwater ponds and small lakes in forested areas with an abundance of aquatic vegetation. Populations are typically greater in old growth forests. Forested areas near breeding ponds are often used for foraging, but many adults do not stray far from water. Occurrences have been documented from elevations at sea level to 9,200 feet (ADFG 2006, Carstensen et al. 2003, MacDonald 2003).

Adult newts migrate from terrestrial habitats to aquatic habitats for breeding, although some adults remain in breeding ponds year-round (AKNHP 2006, Carstensen et al. 2003, MacDonald 2003). Breeding habitat includes quiet habitats such as ponds, lakes, reservoirs, drainage ditches, and slowly flowing sections of streams (Gordon 1939, Bishop 1947, and Stebbins 1985). Rough-skinned newts in Alaska are believed to begin breeding in April and continue through the month of June. Researchers have observed these newts in breeding ponds in Alaska as late as early September (Carstensen et al. 2003). Eggs laid by this newt are attached singly to submerged vegetation. Hatching periods range from 5-10 weeks and metamorphosis may take longer than two years. Larvae remain in ponds year-round. Sexual maturity is reached in 4 to 5 years (AKNHP 2006, Carstensen et al. 2003). Following metamorphosis, juveniles will often migrate considerable distances, becoming predominantly fossorial, and may not return to breeding ponds for several years (Chandler 1918, Twitty 1955, Efford and Mathias 1969, and Pimentel 1952). While terrestrial, adults are also predominantly subterranean. Hibernaculum includes logs and rocks in the forest as far as 300 feet from ponds (AKNHP 2006, Carstensen et al. 2003, MacDonald 2003).

Adults tend to feed primarily on small terrestrial and aquatic invertebrates. Larvae are believed by researchers to eat zooplankton and aquatic invertebrates (AKNHP 2006, Carstensen et al. 2003, MacDonald 2003).

#### **6.4.3.2. *Distribution and Abundance***

Rough-skinned newts are commonly found throughout western Canada south to California. Populations have also been identified as far east as the Rocky Mountains of Idaho. The global population of rough-skinned newts has not been well studied but is expected to exceed 100,000 globally (MacDonald and Cook 2007). This newt is the most common tailed amphibian in Alaska and has been observed in numerous locations

throughout the state from the mainland of southeast to as far north as Juneau (Carstensen et al. 2003).

One discrete population exists north of the Stikine River near Juneau that is believed to have been introduced from the Shelter Island stock in the 1960's. There have been approximately five documented occurrences of rough-skinned newts at various locations on Mitkof Island, approximately twenty miles from the project area, which appear to be the nearest documented occurrences at this time (MacDonald and Cook 2007). One rough-skinned newt specimen was observed by an OASIS Environmental Inc. (OASIS) biologist in June of 2010 in the vicinity of the proposed transmission corridor route on Point Agassiz Peninsula.

#### 6.4.3.3. *Potential Occurrence Within Project Area*

Rough-skinned newts have been observed within the project area, and are expected to occur throughout the proposed corridor because suitable breeding, foraging, and overwintering habitats are common. In addition, the project site is well within the documented range and distribution. Important habitat features may be found within ponds and muskegs in the vicinity of the transmission line, and into the higher elevations near Falls Lake, the pond above Falls Lake, Swan Lake and Spring Creek.

### 6.4.4. **Western Toad**

#### 6.4.4.1. *Life History and Habitat*

The western toad is primarily a terrestrial amphibian that occupies a variety of habitats but prefers open areas near permanent sources of freshwater and forest cover from sea level to high mountains. In Alaska these open areas include young areas and recently-disturbed landscapes such as riverine oxbows, large gravel substrate and ponds created by glaciation. Globally this species is found in habitats ranging from desert springs and streams to meadows, woodlands and high-mountain lakes. Waters 1991 described the western toad as the amphibian species in Alaska which demonstrated the greatest variability in habitat use and environmental tolerances. When active, this toad is most commonly found foraging in open areas adjacent to forested lands, except for during the breeding season.

The western toad breeding patterns are highly variable depending on location and elevation, but in Alaska this species generally breeds from late-April through July. This species migrates to breeding locations from unforested habitats up to one mile from the nearest breeding location. During the breeding season mating takes place during the daytime in ponds including muskeg ponds, small lakes, stream backwaters, and brackish water. After mating, females remain in these areas and lay a long string containing as many as 12,000 eggs. Eggs are placed in shallow waters around submerged vegetation in the ponds where mating took place (AKNHP 2006, Carstensen et al. 2003).

Larvae metamorphose by the end of the first summer and shortly after this time mounding may occur. Mounding, which protect toadlets from dessication, generally takes place once toadlets have recently metamorphosed and their tails have begun to resorb. During this time, hundreds of toadlets can be observed in single mounds that are 4-8 inches across and numerous toadlets deep (Carstensen et al. 2003).

Adult toads eat a variety of terrestrial invertebrates. Larvae feed on suspended plant solids and bottom detritus. In late summer western toads of all ages migrate inland to overwintering sites for hibernation. Overwintering occurs in animal burrows, deep crevices, and other locations below the frost line in open habitats of forested lands. Western toads generally hibernate communally (AKNHP 2006, MacDonald 2003).

#### 6.4.4.2. *Distribution and Abundance*

Globally the western toad is common and widespread from Alaska south to Baja California and east to the Rocky Mountains. The total global population is unknown but likely exceeds 100,000. Sharp declines in western toad populations have been noted at numerous locations since the 1970's. Areas where population declines of this species have been observed include the Yosemite area, the Rocky Mountains of Colorado and Wyoming, the Yellowstone area in Montana and Wyoming, southern British Columbia and the Pacific Northwest of the United States (ADFG 2006, AKNHP 2006).

In Alaska the western toad is considered very common, but ADFG has also reported sharp declines in recent years within southeast Alaska (ADFG 2006). Occurrences have been documented in nearly all areas within southeast Alaska from the mainland to remote islands in the westernmost portion of the state, and as far north as the Tasnuna River near Prince William Sound, over 500 miles northwest of the project area (AKNHP 2006, MacDonald and Cook 2007).

Occurrences have also been documented throughout the Cascade Creek proposed project site. Western toads have been observed in the vicinity of Petersburg on Mitkof Island by MacDonald and Cook (2007) and in the mainland portion of the project area. For instance, OASIS biologists observed numerous western toads near the inlet on the eastern edge of Swan Lake and along a small creek near the USFS cabin in August of 2010. Also in August 2010, guests of the USFS cabin observed four western toads in a single evening from the steps of the cabin. Two western toads were also observed in the pond between Swan Lake and Falls Lake during the same period. Lastly, MacDonald and Cook (2007) reported two separate occurrences of the western toad in "Thomas Bay."

#### 6.4.4.3. *Potential Occurrence Within Project Area*

The western toad occurs throughout the proposed project corridor, and suitable foraging, breeding, and overwintering habitat is common. Important breeding habitat may include muskegs and ponds within the vicinity of the transmission line corridor, Falls Lake, the pond above Falls Lake, Swan Lake, the delta at the Swan Lake inlet and along Spring

Creek. The area within the proposed powerhouse site footprint may be important adult upland habitat due to the extensive wetlands that occur there.

#### **6.4.5. Wood Frog**

##### **6.4.5.1. Life History and Habitat**

In Alaska, the wood frog is strongly associated with interior forested habitats containing small ponds, but may inhabit a variety of areas including muskegs, grassy meadows, open forest and tundra. Forested habitat may include temperate forests, hardwood swamps and inland conifer. Within these habitats, the wood frog prefers shaded areas and will seek cover under leaf litter, bark and other debris when relative humidity is low. This frog is found from sea level to elevations of 8000 feet MSL, although the latter includes observations based in Wyoming (ADFG 2006, Dunlap 1977, Heatwole 1961, MacDonald 2003).

Adult wood frogs in Alaska migrate to breeding ponds from upland habitats in April or as soon as the snow melts. Breeding occurs in fish-free shallow bodies of permanent or ephemeral freshwater including streams, backwater sloughs, mountain lakes, backwater lakes, beaver ponds, muskeg and outwash ponds. Waters (1991) observed heavy use of outwash ponds for breeding in the Stikine River basin, approximately 30 miles south of the project site. The breeding period for this frog is very brief relative to other amphibians in southeast Alaska, and takes place over a period of several days. Eggs are laid in masses usually attached to submerged vegetation, although sometimes egg masses are observed free in the water. Metamorphosis occurs over a matter of weeks and sexual maturity is generally reached within 2-3 years. Adult wood frogs eat small, terrestrial invertebrates and larvae feed on algae, plant tissue, organic debris and amphibian eggs on occasion (AKNHP 2006, MacDonald 2003, Waters 1991).

After breeding, adults tend to remain sedentary near the edge of ponds and will occasionally venture into nearby forested uplands to forage. This species is capable of covering large distances and adults disperse to upland forested habitats after breeding. In general, this frog will move further into the uplands in later parts of the summer until selecting a location to hibernate, which may be over 300 feet from breeding ponds. The wood frog may go into hibernation as early as mid-August in central Alaska and prefers to overwinter in crevices under deep, snow covered forest litter (ADFG 2006, AKNHP 2006, MacDonald 2003, Waters 1991).

##### **6.4.5.2. Distribution and Abundance**

The wood frog is patchily distributed throughout much of North America from Alaska in the west to Labrador in the east. The wood frog is the most widely distributed amphibian in the state of Alaska and is the only amphibian found north of the Arctic Circle. In southeast Alaska, this species has been documented on the mainland on the Taku and Chilkat rivers, the Yakutat area and numerous locations along the Stikine River. The

Stikine River occurrences are the nearest documented specimens to the proposed Cascade Creek project area, approximately 30 miles to the south (ADFG 2006, MacDonald 2003).

#### 6.4.5.3. *Potential Occurrence Within Project Area*

The wood frog is expected to inhabit the proposed project area because it is the most widely distributed and most common amphibian species in Alaska and is known to occupy a variety of forested habitats. The project area is within the range of the species, as specimens have been collected at numerous locations along the Stikine River approximately 30 miles south, and along the Taku River and Chilkat rivers approximately 150 and 200 miles respectively north.

The project area contains abundant terrestrial habitat within the forested habitats throughout the project corridor. Suitable breeding habitat occurs within shallow waters such as Spring Creek, the pond above Falls Lake and muskegs and small ponds near Swan Lake and along the transmission line on Agassiz Peninsula.

### 6.4.6. **Columbia Spotted Frog**

#### 6.4.6.1. *Life History and Habitat*

The Columbia spotted frog is considered a highly aquatic species and is rarely seen far from permanent freshwater sources. This frog is often found in areas near permanent water that are flooded during spring and summer. Upland habitat for summer foraging is generally limited to very moist areas such as riparian corridors, wetlands and grasses growing along the edge of water bodies. Although this species forages primarily within the aquatic zone, during extremely wet weather foraging may occur within short distances to forested areas. This frog generally migrates short distances (less than 0.5 miles) between breeding sites and summer foraging grounds along riparian corridors. Most typically, this species will stay within 1500 feet of breeding sites during summer foraging and overwintering (AKNHP 2006, Davis 2005, MacDonald 2003).

Suitable breeding habitat for the Columbia spotted frog includes permanent waters such as muskeg ponds, backwater lakes, beaver ponds, stream channels and rivers. Waters (1991) noted use of outwash ponds and a backwater lake for breeding in the Stikine River area, approximately 30 miles to the south of the project area. The Columbia spotted frog breeds from mid-April to mid-May in southeast Alaska, shortly after the spring thaw. Eggs are laid over a period of 1 to 20 days and eggs are laid communally in masses. Metamorphosis occurs during autumn of the first year or during the following spring, after hibernation. Time to sexual maturity is largely determined by latitude and elevation and occurs over a period of 2 to 5 years (AKNHP 2006, Davis 2005, MacDonald 2003).

Hibernation generally occurs in the fall under mud at the bottom of ponds deep enough to avoid freezing over during the winter. Occasionally this frog hibernates under stream banks or in small animal burrows (AKNHP 2006, Davis 2005, MacDonald 2003). This species is considered an opportunistic feeder and generally feeds on terrestrial and

aquatic insects, mollusks, crustaceans and arachnids. Larvae are believed to feed on organic debris, algae, plant tissue and aquatic insects (AKNHP 2006, Davis 2005, MacDonald 2003).

#### 6.4.6.2. *Distribution and Abundance*

Columbia spotted frogs are generally found from the southernmost portion of Yukon Territory, south to Washington and Oregon, and east to the Rocky Mountains. In Alaska, the Columbia spotted frog has been documented along numerous mainland rivers in the southeast including the Salmon, Unuk, and Taku Rivers, and on several delta islands near the Stikine River, approximately 30 miles south of the project area. There have also been sightings near Haines, but these reports remain unconfirmed (AKNHP 2006, Davis 2005, MacDonald 2003, Waters 1991). Within the project area, specimens were captured during USFWS surveys conducted on Point Agassiz Peninsula and near Petersburg on Mitkof Island in May of 1998 (Lindell and Grossman 1998). This species is considered common throughout its range but significant declines have been noted in many historically populated areas (AKNHP 2006).

#### 6.4.6.3. *Potential Occurrence Within Project Area*

The Columbia spotted frog is expected to occur within the project area because previous amphibian surveys detected this species on Point Agassiz Peninsula along the transmission line and near Petersburg on Mitkof Island. The permanent freshwater ponds and muskeg ponds found along the transmission line corridor, Lower Cascade Creek, Spring Creek, and Upper Cascade Creek at the inlet would provide suitable habitat for the Columbia spotted frog.

## 6.5. Conclusion

Results of the literature review indicate that two species are known to occur, and four species of amphibians could potentially occur in the project area. The two species that are known to occur have been previously observed in the project area, and include the western toad and rough skinned newt. Four species are expected to occur, and include the long-toed salamander, northwestern salamander, wood frog and Columbia spotted frog. The Columbia spotted frog is very likely to be present, as this species was detected during surveys in 1998 within the vicinity of the project footprint.

An Amphibian Habitat Map (Appendix 4) has been developed to illustrate potential areas that amphibians may be distributed within the project area, although the map is primarily focused on breeding habitat. As discussed in the previous sections, many amphibians are seasonally migratory and may utilize uplands during the winter or throughout the year depending on their breeding status.

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# **APPENDIX 1**

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## **DEER WINTER RANGE STAND EXAM FORMS**

## **APPENDIX 2**

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### **SHERMAN LIVE TRAPPING FORMS**

## **APPENDIX 3**

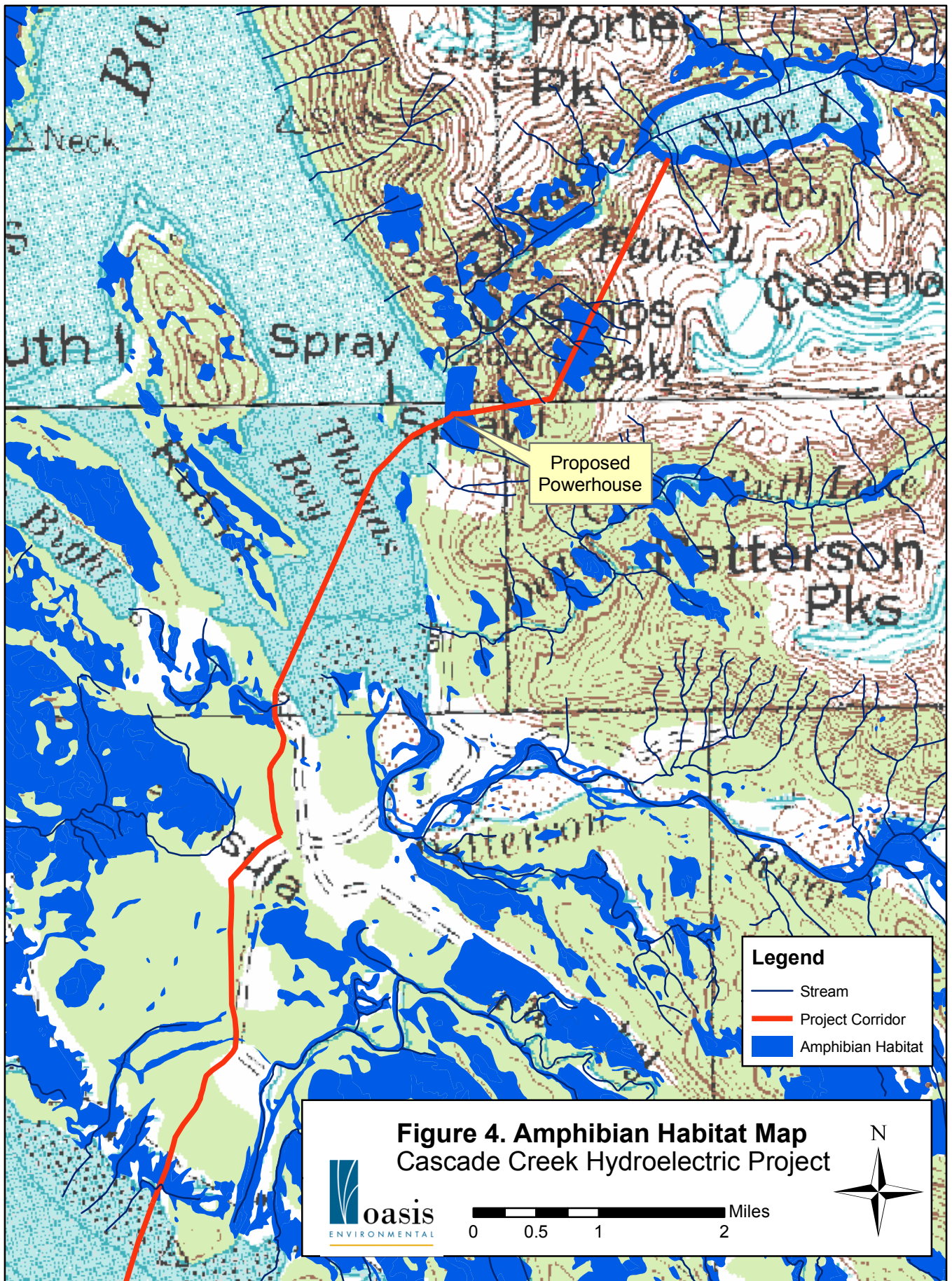
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### **TONGASS NATIONAL FOREST GOSHAWK & WILDLIFE SURVEY FORM**

## **APPENDIX 4**

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### **AMPHIBIAN HABITAT MAP**



# **APPENDIX 5**

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## **WILDLIFE HABITAT MAP**

