Atlin Lake
Terrestrial Environment Baseline Studies

2010 Amphibian Surveys

Prepared for:
Yukon Energy Corporation
and
AECOM Canada Ltd.

Prepared by:
Lis Rach
TerraNiche Environmental Solutions
Smithers, BC

In association with:

ARDEA BIOLOGICAL CONSULTING
Smithers, BC

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Executive Summary

Terrestrial baseline studies were completed by Ardea Biological Consulting Ltd. within the Atlin Lake area. As part of the terrestrial baseline environment studies, amphibian surveys were carried out in July 2010 and consisted of ground-based surveys for western toad, wood frog, spotted frog and long-toed salamander. The main purpose of this work was to determine the presence of amphibians and identify critical habitats used by amphibians, with the surveys carried out by Lis Rach (TerraNiche Environmental Solutions) and members of the Ardea team.

The Atlin Lake project area is located in the northwestern corner of BC, approximately 180 kilometres south of Whitehorse within the mountainous terrain on the western and eastern boundaries of the Teslin Plateau and Tagish Highland ecosections (Demarchi 1995). Within the project area, wetlands and aquatic habitats representative of the areas of Atlin Lake that may be affected by the storage concept were selected for study.

Selected wetlands of Atlin Lake and Atlin River were assessed for amphibian species potentially occurring in the area July 12 through 16, 2010. A variety of survey methods were used to assess amphibian presence and habitat use including area-based surveys that were systematically conducted depending on area size and complexity. All field assessments were conducted in accordance with accepted practices and standards.

Surveys were conducted in Logger Bay, North and South Telegraph Bay, McKee Creek and O’Donnel River, and the backchannels and wetlands of Atlin River. No surveys were conducted within Atlin Lake Provincial Park or the Atlin Recreation Area during 2010 as permits were not received in time. Within these wetlands, habitats including streams, ponds, shallow water, meadows and forested uplands were surveyed.

The Atlin Lake area supports a variety of habitats from productive forests, creeks, and wetlands to herb, sedge and scrub birch meadows and wetlands. These habitats were found to be spatially discrete and confined to relatively small areas. Amphibians were identified in a total of six assessment locations and five of these were identified as amphibian breeding areas.

Breeding habitat was determined based on the identification of amphibians in larval, newly emerged toadlet/froglet, and juvenile forms within or near suitable bodies of water.

Western toad was identified in the large sedge/scrub birch meadow wetland located on the south side of the west end of Atlin River and juveniles and tadpoles were observed in pond and terrestrial habitats of O’Donnel River. Wood frogs from juvenile to adult were identified using the aquatic and terrestrial habitats of Atlin River, Logger Bay and Telegraph Bay. Breeding areas were identified for wood frog at Logger Bay, Telegraph Bay and Atlin River; and for western toad on the north side of the O’Donnel River.

Amphibian surveys in the Atlin Lake area were conducted during the potential amphibian breeding and rearing season. A range of habitats and sites were visited in July, a time when toad and frog adults could have been detected in terrestrial or aquatic habitats and when tadpoles and newly emerged froglets and toadlets were expected to be present in aquatic habitats (Corkran and Thoms 1996). The combination of survey timing and intensity, in the range of habitats assessed demonstrates that the sampling was sufficient to detect amphibian breeding habitats within the wetlands surveyed. Additional surveys are planned to take place in the wetlands located at the southern end of Atlin Lake in spring/summer of 2011.

Suggested Citation:

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Disclaimer

This report has been prepared by the authors under the direction of Ardea Biological Consulting Ltd. (Ardea) for Yukon Energy Corporation and AECOM Canada Ltd. (the Clients) to provide baseline ecological information for the Atlin Lake Storage Concept. The information contained in this report have been obtained and prepared in accordance with generally accepted biological survey standards and is intended for the exclusive use of the Clients. The information contained in this report is dependent on the conditions at the time and any recommendations or conclusions are based on the author’s best judgement at the time of preparation. The Clients acknowledge that ecological conditions can change over time and that the conclusions and recommendations outlined in this report are time sensitive.

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INTRODUCTION

Yukon Energy Corporation (YEC) has engaged AECOM Canada Ltd. (AECOM) to assist with the study of several key energy enhancement projects as identified in YEC’s 20-Year Resource Plan. One of the studies is the Atlin Lake Storage Concept, which proposes controlling the output of Atlin Lake at the Atlin River to increase fall and winter storage capacity and increase flows downstream to the Whitehorse Rapids generating station. Atlin Lake provides approximately 40% of the total annual flows to the Yukon River system and control of the water through the storage concept could increase winter generation capacity and reduce diesel fuel consumption and greenhouse gas emissions.

Ardea Biological Consulting Ltd. (Ardea) was contracted by AECOM to complete terrestrial baseline studies within the Atlin Lake area. These baseline terrestrial studies were initiated in the summer of 2009 and continued in 2010. As part of the baseline terrestrial environment studies, amphibian surveys were carried out in July 2010 and consisted of ground-based surveys for western toad, wood frog, spotted frog and long-toed salamander. These surveys were carried out by Lis Rach (TerraNiche Environmental Solutions) with assistance by members of the Ardea team. This field summary focuses on the methodology and results of the 2010 surveys for amphibians in the Atlin Lake study area.

STUDY AREA

Atlin Lake is located in the northwestern corner of BC, approximately 180 kilometres south of Whitehorse, and is the headwaters of the Yukon River. Atlin Lake is oriented in a north-south direction and with a surface area of 577 km² (Reid Crowther 1983), is the largest natural lake in BC. Atlin River flows almost five kilometres from the west side of Atlin Lake into Tagish Lake, water from Atlin Lake then drains northward into Yukon to Marsh Lake and the Yukon River. Atlin Provincial Park and the Atlin Recreation Area encompass the southern portion of Atlin Lake.

Atlin Lake lies within mountainous terrain on the western and eastern boundaries of the Teslin Plateau and Tagish Highland ecossections (Demarchi 1995). Three biogeoclimatic (BEC) subzones occur in the area: Boreal White and Black Spruce dry cool (BWBSdk), Engelmann Spruce Sub-alpine Fir wet very cold (ESSFww) and Spruce Willow Birch undifferentiated (SWBun) (Banner et al. 1993). The Atlin Lake Study Area is shown in Figure 1.

Average annual rainfall reported for Atlin is 192.5 mm and average snowfall is 154.8 cm. Summer day temperatures average 13°C to 17°C and winter temperatures range between -10°C and -20°C (Environment Canada 2010).

Based on the proposed Atlin Lake Storage Concept and the large area of Atlin Lake, only selected areas of the lake were chosen for detailed study. These included the Atlin River and adjacent wetlands and forests where potential development activities associated with the construction of a diversion structure are proposed. Other wetland, shallow bays, river outlets and associated aquatic and upland habitats were selected that were felt to represent the areas of Atlin Lake that may be affected by the storage concept. These included Logger Bay, Telegraph Bay, McKee Creek, O’Donnel River and Hoboe Creek (Figure 1).
Figure 1. Location of Atlin Lake survey areas.
SPECIES HISTORY AND CONSERVATION

Amphibians represent an important component of biodiversity. Significant range contractions have occurred in North America for many amphibian species. The greatest threat to amphibians within Canada is habitat loss. In particular, altering or draining wetlands for development has decreased the number of breeding sites, decreased the connectivity between habitats (or increased the connectivity to insupportable habitats) and severed corridors by increasing the distance between sites (Seburn and Seburn 2000). Amphibians are tied to moist environments and most species require standing water (e.g. ponds, marshes, and wet meadows) or running water (e.g. permanent creeks and small streams) to meet all of their life requirements (Davis 2002).

According to Corkran and Thoms (1996), Seburn and Seburn (2000) and Davis (2002), amphibian species that are likely to be found in the project area include western toad (*Bufo boreas*), wood frog (*Lithobates sylvatica*) and Columbia spotted frog (*Rana luteiventris*). The long-toed salamander (*Ambystoma macrodactylum*) has not been previously identified in the Atlin Lake area, however, they have been detected south of Atlin Lake in the Stikine and Taku watersheds in north-western BC and south-eastern Alaska, including the Telegraph Creek area and the Taku and Nakina rivers (Slough and Mennell 2006). These species and their status within British Columbia are listed in Table 1.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ranks amphibian species by reviewing each species for their habitat loss potential and susceptibility to environmental and chemical changes. Once reviewed, some species may be deemed a Species of Special Concern or found to be Threatened or Endangered. The BC Conservation Data Centre (BC CDC) ranks species as Red, Blue or Yellow-listed. The list contains species that are legally designated as endangered or threatened under the Wildlife Act, are extirpated from BC, are candidates for legal designation, considered a species of concern due to their declining status, or considered secure and not at risk.

Table 1. Amphibian species potentially occurring in the Atlin Lake area.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Species Code</th>
<th>Status**</th>
<th>BC</th>
<th>COSEWIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Toad</td>
<td><em>Bufo boreas</em></td>
<td>A-BUBO</td>
<td>Yc</td>
<td>SC</td>
<td></td>
</tr>
<tr>
<td>Columbia Spotted Frog</td>
<td><em>Rana luteiventris</em></td>
<td>A-RALU</td>
<td>Ye</td>
<td>NAR</td>
<td></td>
</tr>
<tr>
<td>Wood Frog</td>
<td><em>Lithobates. sylvatica</em></td>
<td>A-LISY</td>
<td>Ye</td>
<td>NAR</td>
<td></td>
</tr>
<tr>
<td>Long-toed Salamander</td>
<td><em>Ambystoma macrodactylum</em></td>
<td>A-AMMA</td>
<td>Ye</td>
<td>NAR</td>
<td></td>
</tr>
</tbody>
</table>

**Species Rankings: BC: R=Red List (extirpated, endangered or threatened); B=Blue List (special concern); Yc=Yellow List (secure), conservation concern; Ye=Yellow List (secure), managed at ecosystem level. COSEWIC: E=Endangered; SC=Special Concern; UR=Under Review; NAR=Not at Risk**

In BC, the BC CDC has designated western toad as Yc (secure but of conservation concern) due to their declines in some southern BC regions (BC CDC 2011) and COSEWIC has ranked the western toad as Special Concern also due to their declines in some regions (COSEWIC 2010).

Western toads use three habitat types: breeding sites, terrestrial summer ranges, and winter hibernation sites. Preferred breeding sites are permanent or temporary water bodies with shallow, sandy bottoms. Breeding occurs in late April or early May at more northern latitudes (Pyare et al. 2005). In some locations, such as Atlin Warm Springs, western toads begin
breeding in February and March with the first toadlets emerging in early April (Yukon Environment 2005.). Eggs hatch in three to twelve days, depending on water temperatures (Jones et al. 2005). The tadpoles forage in large schools and are able to recognize siblings. Faster-growing tadpoles release a substance that slows the growth of smaller tadpoles and results in waves of 12 mm toadlets emerging 6-8 weeks later (Yukon Environment 2005). Toadlets spend the first period of their terrestrial life in the riparian zone adjacent to their nursery eventually dispersing upland in large groups where they forage, develop and disperse within the terrestrial environment (forests and grasslands) throughout the growing season (Corkran and Thoms 1996). Because toads exhibit strong annual site fidelity, they return to breed at their traditional breeding sites from their over wintering grounds (Oldham 1965). Terrestrial habitats are damp and can be as far as 1600 m from breeding sites outside of breeding season (Davis 2002). Western toads spend much of their time underground in burrows they have dug in loose soils or in existing small mammal burrows, beneath logs, and within rock crevices. These toads over-winter by hibernating, often communally in burrows below the frost line (up to 1.3 m underground). Western toads are nocturnal in southern regions and active during the day in northern regions.

Western toads are widespread in BC and are found in all but the Taiga Plains Ecoprovince at elevations from sea level to 2250 m (Corkran and Thoms 1996). They have been found around geothermal springs (Coal River Springs, a spring at the Meister River in southern Yukon and at the Atlin Warm Springs in BC) (Yukon Environment 2005). The Atlin area appears to be their north-western extent and southeast Yukon appears to be their north-eastern extent due to special environmental conditions of the geothermal springs (Yukon Environment 2005.)

Wood frogs live in habitats such as marshes, wet meadows, moist woodlands and brush; they breed in shallow pond edges, seasonal pools, flooded meadows and slow-moving parts of streams. They are small frogs with adults ranging up to 60 mm in length. Depending upon weather conditions in local areas, adults may emerge and begin breeding as early as March (range is March through June), as soon as temperatures rise above freezing during the day and before all pond ice has melted (Nussbaum et al. 1983). Wood Frogs are explosive breeders; while breeding may take a few weeks in more southerly parts of their distribution, it may occur over only a few days in the north (MacDonald 2003). Egg laying occurs 4 to 10 days after the first frogs appear and they can hatch in as few as 4 to 7.5 days depending on temperature. Eggs are laid together in masses attached to sedges and other submerged vegetation at, or near the surface of shallow water. Metamorphosis generally occurs 45 to 80 days after the eggs are laid (Frogwatch BC 2010). Tadpoles live in the shallowest, warmest water available to them, predominately located at the edge of water bodies before they transform at 6-12 weeks of age.

Wood frogs are widespread in British Columbia in all but the Georgia Depression and Southern Interior Mountains Ecoprovinces at elevations from 400 to 1800 m (Corkran and Thoms 1996). Wood frogs are found farther north than any other amphibian in North America, having been found as far north as the Old Crow Flats in the Yukon (Yukon Environment 2005).

The wood frog thrives in northern climates because it grows quickly and can tolerate cold. At any temperature, the wood frog has the fastest rate of egg to tadpole development of any North American frog and can function at lower temperatures than any other amphibian (MacDonald 2003). Northern wood frogs also exhibit cannibalism prior to hibernation when insects become scarce. It survives the winter by digging a resting chamber in leaf litter on the forest floor and hibernating for up to six months under the snow (MacDonald 2003). This species also exhibits a tolerance to freezing and dehydration during hibernation. While most amphibians freeze to death if cooled below -1 or -2°C, glucose is used as a cryo-protectant which allows up to 65 percent of the water in the wood frogs body to gradually crystallize into ice as body temperature drops to as low as -12°C (MacDonald 2003).
Columbia spotted frogs are considered habitat generalists and use various wetland habitats including lake edges, ponds, slow-moving streams and marshes. Spotted frogs require two types of water bodies; deep, warm bottomed lakes for over-wintering and shallow wetlands for the remainder of the year. This species may be particularly sensitive to population disturbance (Corkran and Thoms 1996, BCWLAP 2004) due to a relatively long developmental period before reaching sexual maturity. The Columbia spotted frog hibernates under water. Unlike the wood frog, it cannot survive freezing, so the shallow ponds it inhabits must be covered with ice and a thick layer of snow. When the snow melts in the spring and floods pond edges, the Columbia spotted frog uses these areas as breeding sites (MacDonald, 2003).

Columbia Spotted Frogs occur from southern Yukon Territory and north-western British Columbia (Bennett Lake and its upper watershed close to the Alaska border), southward along non-coastal British Columbia to central Nevada and Utah. Spotted frogs are widespread in BC (except in the lower mainland) and are found in all but the Taiga Plains Ecoprovince at elevations from 40 to 2440 m (Corkran and Thoms 1996). Spotted Frogs have been documented along the mainland of Southeast Alaska at Salmon River, Unuk River, Stikine River, Pt. Agassiz, and Taku River (MacDonald 2003).

Long-toed salamanders use various aquatic and terrestrial habitats including grasslands, woods and disturbed areas. They breed in seasonal pools, shallow lake edges, flooded areas, and very slow streams. Breeding takes place in winter during periods of warm rain. Sudden freezing at this time can kill both adults and their eggs (Corkran and Thoms 1996). Eggs are laid in water less than 0.5 m deep and are laid singly or in clusters attached to fine stems, leaves or pebbles. Hatchlings and larvae can be found living in surface sediments and under rotting leaves, logs, or rocks in shallow water. Juveniles live under rocks at pond edges and adults stay underground except in rain, when they can be found under rocks and logs. Long-toed salamanders are found in all but the Taiga Plains Ecoprovince at elevations from sea level to 2500 m (Corkran and Thoms 1996) and have been documented along the Taku and Tulsequah Rivers (Rach 2008, MacDonald 2003). This species is thought to range as far north as the Taku River (Mennell and Slough 1998, Hodge 1976, MacDonald 2003).

METHODS

Potential survey locations were selected based on a variety of semi-terrestrial and aquatic wetlands identified using aerial photographs and TRIM water information. Survey site selection was further refined through the selection of representative wetland types around Atlin Lake such as river outlets and shallow bays and those areas on Atlin River near the proposed infrastructure areas.

A variety of survey methods were used to assess amphibian presence and habitat use within the various survey areas including area-based surveys that were systematically conducted depending on area size and complexity. In general, surveys consisted of walking a transect along the edge of the wetted portion of a wetland and adjacent upland areas that contained sufficient vegetation to provide suitable adult habitats such as forested or shrubby vegetation and accumulations of debris on the forest floor. Aquatic searches for tadpoles, juveniles and adults were conducted using a dip net to search through the mud and water at the bottom of ponds and around vegetation. Terrestrial searches for juvenile and adult amphibians were conducted by listening and watching for disturbed individuals while walking slowly through an area, by searching underneath medium to large coarse woody debris and boulders, and by looking in hollows and other spaces where amphibians may be found.

All field assessments were conducted in accordance with accepted practices and standards such as those outlined in peer reviewed literature and the Inventory Methods for Plethodontid
Salamanders (RIC 1999), Inventory Methods for Pond Breeding Amphibians and Painted Turtle (RIC 1998) and Hygiene Protocols for Amphibians Fieldwork (BC MOE 2008). Species, location and habitat data, including general wetland class (e.g. fen, bog, swamp), were collected and entered into a database for review and analysis. Water temperature and pH were also collected in the areas sampled. Incidental observations of amphibians recorded by other members of the study team conducting baseline terrestrial environment studies for the Atlin Lake project for aquatic birds, mammals, rare plants and wetland mapping were also entered into the database.

RESULTS

Selected wetlands of Atlin Lake and Atlin River were assessed for amphibian species potentially occurring in the area July 12 through 16, 2010. Surveys were conducted in selected wetlands of Atlin Lake including Logger Bay, North and South Telegraph Bay, McKee Creek and O'Donnel River, and the backchannels and wetlands of Atlin River (Appendix A). No surveys were conducted within Atlin Lake Provincial Park or the Atlin Recreation Area during 2010 as permits were not received in time. Within these wetlands, habitats including streams, ponds, shallow water, meadows and forested uplands were surveyed.

Amphibians were identified in a total of six assessment locations and five of these were identified as amphibian breeding areas (Table 2). Breeding habitat was determined based on the identification of amphibians in larval, newly emerged toadlet/froglet, and juvenile forms within or near suitable bodies of water.

Two amphibian species were identified in the Atlin Lake area. Western toad was identified in the large sedge/scrub birch meadow wetland located on the south side of the west end of Atlin River. Adults (Photo 1), toadlets (Photo 2) and tadpoles were observed in pond and terrestrial habitats of O'Donnel River. Wood frogs (Photo 3) from juvenile to adult were identified using the aquatic and terrestrial habitats of Atlin River, Logger Bay and Telegraph Bay, while tadpoles with leg buds were observed in a pond south of Logger Bay (Photo 4). Breeding areas were identified for wood frog at Logger Bay, Telegraph Bay and Atlin River; and for western toad on the north side of the O'Donnel River. The locations of the wetland areas surveyed along with the identified amphibian species and breeding areas are shown in Appendix A.

Table 2. 2010 amphibian survey results.

<table>
<thead>
<tr>
<th>Wetland ID</th>
<th>Survey Area Name</th>
<th>Identified Species</th>
<th>Age Class¹</th>
<th>Identified Breeding Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Logger Bay</td>
<td>Wood Frog</td>
<td>3-6</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Telegraph Bay – North</td>
<td>Wood Frog</td>
<td>4-6</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Telegraph Bay - South</td>
<td>Wood Frog</td>
<td>5-6</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Atlin River – west end south side</td>
<td>Wood Frog</td>
<td>4-6</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Atlin River – west end south side</td>
<td>Western Toad</td>
<td>6</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Atlin River – west end north side</td>
<td>Wood Frog</td>
<td>4-5</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>McKee Creek</td>
<td>No Species Found</td>
<td>N/A</td>
<td>Unknown</td>
</tr>
<tr>
<td>6</td>
<td>O’Donnel River</td>
<td>Western Toad</td>
<td>2-6</td>
<td>Yes</td>
</tr>
</tbody>
</table>

DISCUSSION

The Atlin Lake area supports a variety of habitats from productive forests, creeks, and wetlands to herb, sedge and scrub birch meadows and wetlands. These habitats were found to be spatially discrete and confined to relatively small areas. The main purpose of this work was to determine the presence of amphibians and identify high use and critical habitats used by
amphibians. Amphibians were detected in six of the seven survey locations with wood frogs in five and western toad in two.

Overall, wood frogs were found to be somewhat ubiquitous throughout the surveyed areas; with the exception of McKee Creek. The habitats within the wetland habitats of McKee Creek appeared to contain all of the life requisites for amphibians; however, surveys detected none. This could be due many things such as the presence of deposition from placer mining upstream or fish (slimy sculpin and likely long nose suckers and grayling in ponds near the creek outlet (Connor pers. comm.), or other unknown conditions. Logger Bay (Photo 5 and Photo 6) and Telegraph Bay (Photo 7 and Photo 8) both contained somewhat complex habitats with streams and small isolated ponds containing shallow warm water and emergent vegetation, providing ideal breeding and rearing habitat for wood frogs (see previous section). Although a great effort was put into locating tadpoles, only juvenile and adult wood frogs were found. Because wood frogs are known to breed as soon as there is open water, which can be as early as April, tadpoles can transform and become terrestrial by June. Conducting surveys earlier may have found tadpoles; however, the occurrence of juveniles also confirms breeding in area.

Aquatic habitats of O’Donnel River (Photo 9 and Photo 10) were found to support the most diverse wetland habitat types in the surveyed areas. It is also the only significant cottonwood floodplain in the Atlin Lake area (de Groot and Pojar 2009). The calm shallow water areas, passive channels and forests are protected from Atlin Lake’s fluctuation water levels by a delta at the mouth of the river. This area exhibited high densities of western toad tadpoles. These were rearing in shallow warm ponds (Photo 10) at a time when water levels in the lake were low enough to isolate them from the open lake environment. At higher lake water levels, these ponds would have likely had cooler water temperature and increased water movements. Western toads are dependent on oligotrophic and fishless ponds and small lakes for breeding (Wind and Dupius 2002), so the presence of fish in Atlin Lake may limit their distribution. Slimy sculpin, lake chub, Arctic grayling and long-nose suckers are present in O’Donnel River (Connor 2011).
Breeding populations of western toads have previously been documented in Atlin Warm Springs (Slough and Mennell 2006) and adults have been observed in the vicinity of the northwest and south portions of Atlin Lake (Nussbaum et al. 1983). Of the areas surveyed, western toads were only identified in two locations while wood frogs were found in five. These species were only found together in the Atlin River wetland where the toad was an adult.

Studies have shown that many amphibian eggs and hatchlings inhabiting the same pond can successfully complete metamorphosis. However, Petranka et al. (1994) reports that wood frog tadpoles are effective predators of toad eggs and hatchlings and found that adult toads strongly avoided breeding in ponds that contained wood frog tadpoles. It is thought that this avoidance behaviour may be causing western toads to choose less than optimal ponds to avoid wood frogs, resulting in possible breeding failure in years where wood frogs are more successful.

Amphibian surveys in the Atlin Lake area were conducted during the potential amphibian breeding and rearing season. Wood frogs and western toads are both assiduous breeders, breeding as soon as there is open water to lay their eggs in. Egg hatching and tadpole growth depends on water temperature with the maximum time to transformation being approximately 12 weeks. Based on survey results and normal climatic conditions, it can be assumed that the wood frogs laid their eggs early to late April while western toads laid their eggs late April to early May. A range of habitats and sites were visited in July, a time when toad and frog adults could
have been detected in terrestrial or aquatic habitats and when tadpoles and newly emerged froglets and toadlets were expected to be present in aquatic habitats (Corkran and Thoms 1996). Supported by survey findings, it can be concluded that the surveys occurred within the breeding season for amphibians in the Atlin Lake area. The combination of survey timing and intensity, in the range of habitats assessed demonstrates that the sampling was sufficient to detect amphibian breeding habitats within the wetlands surveyed.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Survey results show that wood frogs and western toads are breeding in the Atlin Lake area. Spotted frogs were not found in the areas that were surveyed; however, their presence here has previously been documented (Green et al. 1992, Yukon Environment 2005, Funk et al. 2008). The lack of long-toed salamander observations supports the theory that this species range may not go further north than the Taku River (Hodge 1976, Mennell and Slough 1998, MacDonald 2003, Funk et al. 2008).

Recommendations

Additional surveys are recommended to provide a more complete account of amphibian distribution and habitat use within the Atlin Lake project area. Surveys of the north and south portions of the lake are required prior to development to provide additional information for assessment of potential effects.

REFERENCES


Connor M. Habitat Steward, Taku River Tlingit First Nation. Personal communication, January, 2011.


APPENDIX A: REPORT MAPS.