# *BRIDGE-COASTAL FISH AND WILDLIFE RESTORATION PROGRAM*

# INVENTORY AND RESTORATION PRESCRIPTIONS OF RIPARIAN WILDLIFE HABITATS IN THE ASH RIVER WATERSHED

*Prepared for:*

**Hupacasath First Nations**
**Port Alberni, B.C.**

***With the Financial Support of:***

**BC Hydro, Bridge-Coastal Fish and Wildlife Restoration Program**

*Prepared by:*

**Toth and Associates Environmental Services**
6821 Harwood Drive
Lantzville, B.C. V0R 2H0

March, 2003

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*BCRP 02.As.45*

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# EXECUTIVE SUMMARY

In the spring of 2002 the Hupacasath First Nation (HFN) received funding from BC Hydro's Bridge Coastal Fish and Wildlife Restoration Program (BCRP) for the proposed inventory of wildlife use, and development of wildlife habitat prescriptions in the riparian areas of Elsie Lake and the Lower Ash River. The primary goals of the study were to assess riparian area wildlife, the factors limiting riparian wildlife use and to develop prescriptions for mitigating, restoring, enhancing or protecting key riparian wildlife habitats within the project area.

The creation of the Elsie reservoir in 1957 resulted in the flooding of 401 ha of riparian, wetland and terrestrial habitats. Flooding of the upper Ash River valley included 19 km perimeter of Elsie Lake, 380 ha of valley bottom and 21 ha of upland habitats. Wildlife habitat losses included marsh, riparian and wetland feeding/breeding habitat for waterfowl, passerines and small mammals, feeding habitat for bears & ungulates, and loss of valley side habitat for ungulates and carnivores.

Field surveys (May – September, 2002) of wildlife use included: night-time bat and spotlight surveys, small mammal / amphibian trapping (pitfall traps), breeding bird surveys, riverine bird surveys, track plating and general surveys of wildlife occurrences and available/limiting habitats. The majority of field survey effort was applied to the portion of the study area surrounding Elsie Lake. Historically this area has experienced the greatest amount of impacts, both from flooding and timber harvest and therefore has the greatest need for inventory and restoration.

Twenty-seven days of field survey were conducted, including 72 track plate set days and 35 pitfall set days.

The inventory documented 87 wildlife species within the riparian areas of the lower Ash River and Elsie Lake, including 16 mammals, 63 birds and 8 herptiles. Seven of the species documented were blue-listed while one species was red-listed. The inventory also documented 154 plant species consisting of 16 tree, 48 shrub, 67 herb and 21 bryophyte species.

The riparian areas of the Ash River downstream of Elsie dam appeared to be in relatively intact, functioning condition, while true riparian areas associated with the shoreline of Elsie Lake were practically non-existent.

The proposed prescriptions developed to restore riparian wildlife habitat involve 7 stages of effort including:

- Planting of selected Elsie Lake shoreline areas,
- Monitoring of wildlife use and wildlife habitat prescriptions,
- Unofficial camping areas site restoration,
- Wildlife tree creation and nest box installation,
- Signage program
- Select sites stand thinning and tending; and,
- Prescribed burning of rafted woody debris

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# 1.0 INTRODUCTION

In the spring of 2002 the Hupacasath First Nation (HFN) received funding from BC Hydro's Bridge Coastal Fish and Wildlife Restoration Program (BCRP) for the proposed inventory of wildlife use, and development of wildlife habitat prescriptions in the riparian areas of Elsie Lake and the Lower Ash River. The primary goals of the study were to assess riparian area wildlife, the factors limiting riparian wildlife use and to develop prescriptions for mitigating, restoring, enhancing or protecting key riparian wildlife habitats within the project area.

The project entailed background information compilation of existing data concerning historic and current wildlife use of the riparian and aquatic areas of the Ash River and Elsie Lake. Field surveys were conducted to verify habitat types, plant associations, inventory riparian wildlife species use and identify key riparian wildlife habitats within the project area. The end goal was to develop site-specific prescriptions that would increase riparian wildlife use and public awareness of wildlife within the project area.

This project was one of two BCRP projects funded in the Ash Watershed during 2002. The second project: "Determination of Restoration Options for Elsie Lake and its Inlet Tributaries" was completed by the HFN, Dave Burt and Associates, and CBR and Associates.

## 1.1 Background

The BCRP is a joint initiative by BC Hydro, the Government of British Columbia and the Government of Canada to address the historical effects of hydroelectric development on fish and wildlife resources in the Bridge-Coastal Generation Area (Figure 1). The goal of BCRP is to restore, to the extent practicable, fish and wildlife resources that have been adversely affected by the original 'footprint' development of hydroelectric facilities. Footprint impacts are the historical effects on fish and wildlife that occurred primarily as a result of reservoir creation, watercourse diversions and construction of dam structures.

The BCRP is intended to support opportunities to improve fish and wildlife habitats and populations. It is recognized that there is limited potential to physically restore highly altered watersheds to pre-development ecological conditions. In specific situations, however, there are opportunities to reduce adverse effects and to replace some of the lost fish and wildlife values associated with historical development of hydroelectric facilities.

The production of hydroelectric power historically required that water from natural river systems be stored behind dams, then released through either turbines or spillways. Recently, B.C. Hydro has initiated a call for "Green Power Generation" development such as "run-of-the-river" type hydroelectric facilities that utilize a Government agency agreed upon percentage of the Mean Annual Discharge (MAD) of a watercourse to produce hydro-power. These systems generally direct a portion of the stream flows from high gradient stream reaches to a bypass pipe or penstock which delivers the flow to a lower elevation turbine / powerhouse, then return the water to the source watercourse via a tailrace channel.

The creation of the Elsie reservoir in 1957 resulted in the flooding of 401 ha of riparian, wetland and terrestrial habitats. Flooding of the upper Ash River valley included 19 km perimeter of Elsie Lake, 380 ha of valley bottom and 21 ha of upland habitats. Wildlife habitat losses included marsh, riparian and wetland feeding/breeding habitat for waterfowl, passerines and small mammals, feeding habitat for bears & ungulates, and loss of valley side habitat for ungulates and carnivores. Reduced flows occur in the lower 25 km of the Ash River due to the diversion tunnel redirecting water from Elsie Lake to Great Central Lake. This diversion has also reduced riparian habitats in the Ash River in the 25 km downstream of the dam site.

The B.C. *Fish Protection Act* defines "riparian area" as "the area adjacent to a stream that may be subject to temporary, frequent or seasonal inundation and supports plant species that are typical of an area of inundated or saturated soil conditions, and that are distinct from plant species on freely drained adjacent upland sites because of the presence of water".

Rationale for this project was supported within BCRP's Strategic Plan, with specific recommendations contained in Sections 3.3 and 3.4 of Chapter 4, Volume 2 of the plan. Limiting Factors as stated in Volume 2 of the Strategic Plans, and to be addressed during the course of the study included:

1. Habitat Loss: Loss of riparian habitat and wetland habitats in flooded valley bottoms. Potential effects include availability of habitat for amphibians, water shrews and other small mammals and their predators, and breeding habitat for some species of neo-tropical migrants.

2. Lack of riparian vegetation in draw-down zones; effects on furbearers, small mammals and several species of passerines including some neo-tropical migrants.

3. Wildlife Migration: Barrier to wildlife caused by reservoir.

**Table 1.** Project Reference Information

| | |
|---|---|
| **BCRP Project Number** | 02.As.45 |
| **MWLAP Region** | 1 |
| **MWLAP District** | Vancouver Island |
| **Management Unit** | 1-7 |
| **Forest Region** | Vancouver |
| **Forest District** | South Island |
| **Forest Licensee** | Weyerhaeuser Canada, TFL #44 |
| **First Nations Claim Area** | Hupacasath First Nation |
| **Watershed Name** | Ash River |
| **Parent Watershed Code** | 930-137400 |
| **Ash River Watershed Code** | 930-137400-99500-20200 |
| **NTS Maps** | 92F/6, 92F/7 |
| **TRIM Maps** | 92F.035, 92F.045 |

| | |
|---|---|
| **Ecoprovince** | Northern Georgia Depression |
| **Ecoregion** | Eastern Vancouver Island |
| **Ecosection** | Leeward Island Mountains |
| **BEC Zone** | Coastal Western Hemlock |
| **Field Sampling Dates** | May 26 – September 17, 2002 |

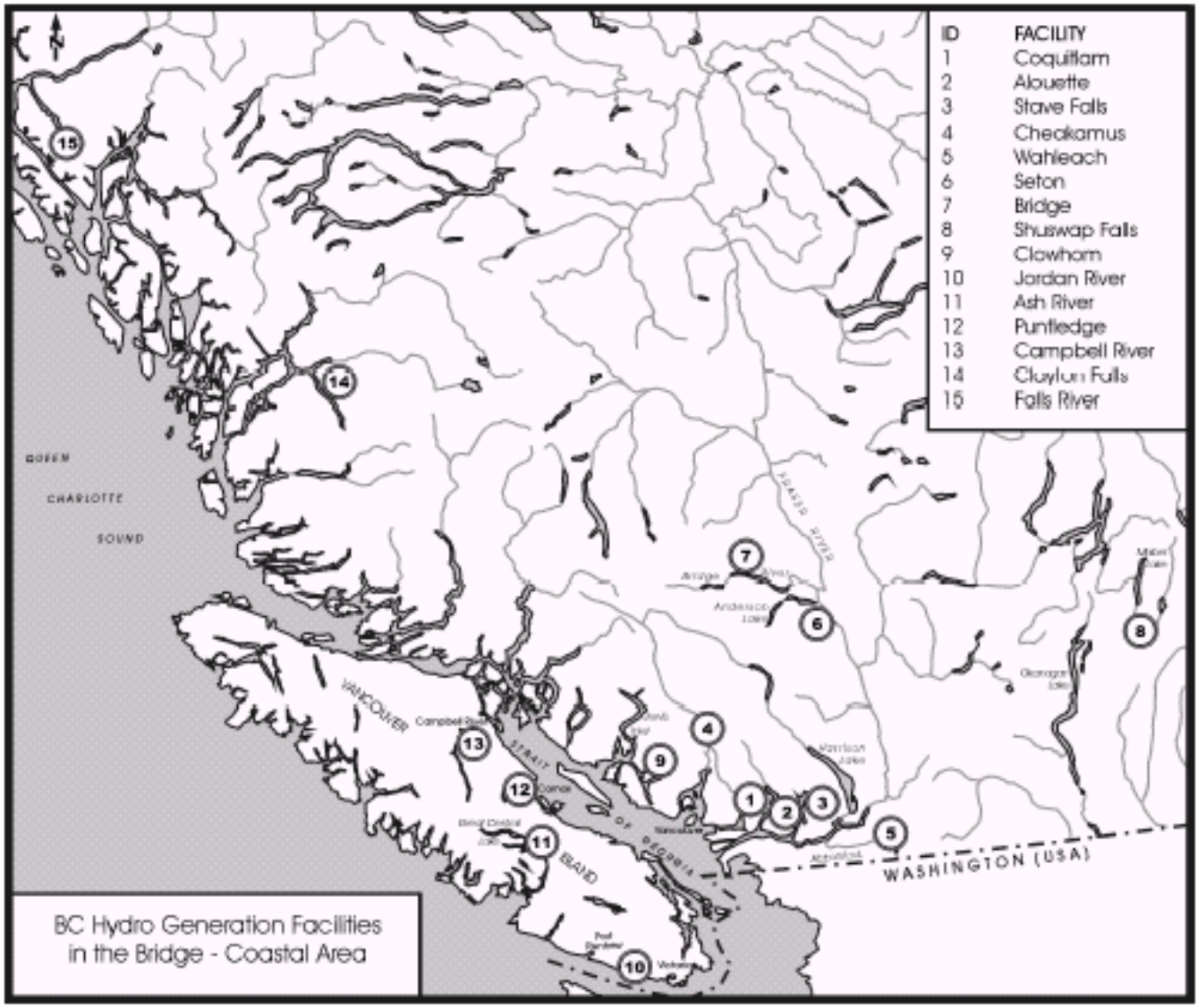



**Figure 1**. BC Hydro Generation Facilities in the Bridge-Coastal Generation Area.

## 1.2 Study Area

The Study Area included the area of the Elsie Lake footprint and immediately adjacent riparian and terrestrial habitats as well as the 22 km of the Ash River riparian area downstream of the dam site (Figure 2). The Ash River watershed is situated about 40 km northwest of Port Alberni in the central portion of Vancouver Island, between the Beaufort Range and Strathcona Provincial Park. The mean basin elevation is 700 m. Elsie Lake Reservoir is approximately 7 km long and 1 km wide. The Ash River watershed occurs within the Coastal Western Hemlock biogeoclimatic Zone (Meidinger and Pojar, 1991).

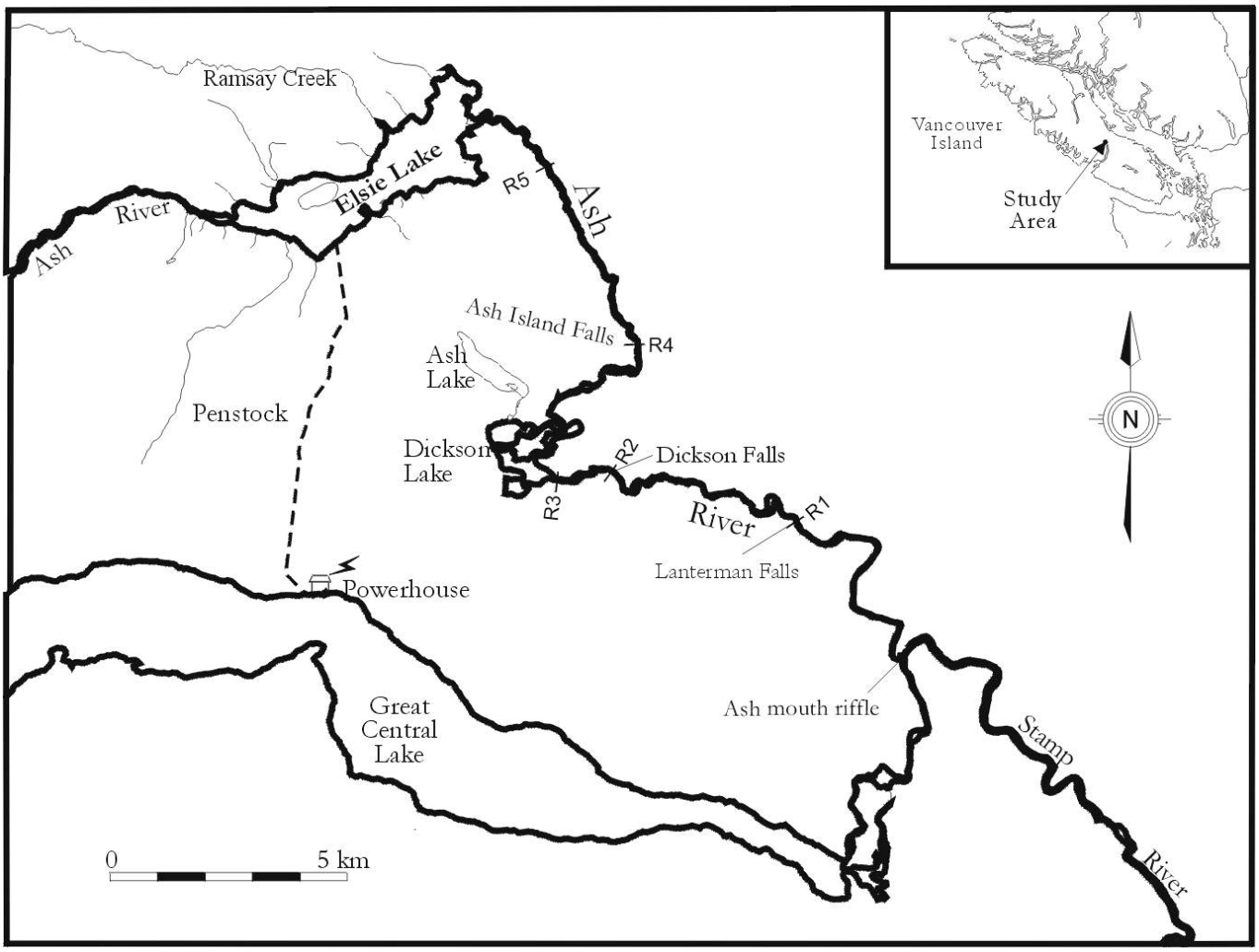



**Figure 2.** Study Area

The Elsie Lake hydroelectric project consists of a storage dam impounding Elsie Lake, four saddle dams, a free crest weir, a low-level outlet and an intake on the south shore of Elsie Lake

where water is diverted 6.5 km south through a power tunnel to the 25.2 MW powerhouse on the northern shore of Great Central Lake.

# 2.0 METHODS

The project involved 3 stages of effort including:

- Background information gathering and data compilation,
- Field surveys of wildlife habitats and use, and;
- Development of wildlife habitat mitigation, restoration, protection or enhancement prescriptions

Tasks were accomplished by the lead proponent (Hupacasath First Nation), and Toth and Associates Environmental Services. The two person field crew consisted of Steve Toth, AScT (Toth and Associates) and either Cameron Tatoosh or Shawny Lauder (HFN).

## 2.1 Background Information Review

Compilation of background information included: a review of available reports, maps (TRIM, NTS, Forest Cover, bathymetric), and aerial photographs, contacts with WLAP personnel, BC Hydro, BC Conservation Data Center, Forest Licensees, First Nations, and local fish and game associations.

## 2.2 Field Surveys / Habitat Assessment

In general, the methods utilized for the inventory followed four sources. Bio-inventory methodologies followed those outlined in Environmental Objectives, Best Management Practices and Requirements for Land Developments (MELP, March 2001). Forest values were described and defined within the context of the biogeoclimatic ecosystem classification system (BEC) using methodologies for classification to the site series level modified from Green and Klinka (1994). Ecosystem descriptions were based on those outlined in the Field Manual for Describing Terrestrial Ecosystems (MELP, MOF, 1998). Sampling design followed Species Inventory Fundamentals (MELP, 1998). All wildlife surveys were conducted at the presence / not-detected level according to survey methods outlined in respective Resources Inventory Standards Committee (RISC) Standards for Components of British Columbia's Biodiversity (CBCB) Guidebooks .

A capture and handling permit (Sundry Permit No. D009953) was obtained from MWLAP, Region 1, which authorized the capture and handling of reptiles, amphibians and small mammals

during the study. Field surveys were conducted to verify habitat types, plant associations, inventory wildlife species use and identify key wildlife habitats within the project area to determine factors limiting wildlife use. The end goal was to develop site-specific prescriptions that would increase wildlife use and public awareness of wildlife within the project area.

Field surveys (May – September, 2002) were conducted in order to meet the Wildlife Restoration Objectives as outlined in Section 2.3. Field surveys of wildlife use included: night-time bat and spotlight surveys, small mammal / amphibian trapping (pitfall traps), breeding bird surveys, riverine bird surveys, track plating and general surveys of wildlife occurrences and available/limiting habitats.

Due to the extent of the proposed surveys, large size of the study area and limited budget, it was not possible to conduct surveys strictly according to RISC guidelines. The large project area and limited budget dictated that the surveys be more generalized in scope and investigate all wildlife occurrences instead of focusing on specific wildlife guilds. For instance, the recommended RISC methodologies for bat surveys include the use of mist nets, acoustic listening devices and/or Harp traps; all of which are relatively expensive and time intensive, and could not be supported on the project's limited budget. The objective was therefore to document the presence of bats, roosting locations and provide qualitative descriptions of abundance. Hopefully the information gathered will aid future researchers undertaking more specific wildlife inventories.

The surveyors recorded direct and indirect wildlife utilization evidence during all surveys, including direct observations, vocalizations, tracks, game trails, scat, browsed and grazed vegetation, bones, feathers, nests, nest cavities and woodpecker holes. Utilization of forest types and special habitat features by wildlife was deduced from an analysis of habitat features, and observations and evidence of utilization.

All survey sites, wildlife occurrences, and identified prescription sites were photographed, flagged and spatially referenced (GPS). Photo stations were established at proposed prescription sites to provide continuity and comparison between photos taken of pre-treatment, during treatment and post treatment at each prescription site.

As part of the field work, training was provided to Hupacasath First Nations crew members in a wide range of wildlife/plant inventory methodologies and procedures. These included wildlife habitat inventory procedures, wildlife capture techniques, plant identification, and surveying. This training will be provided on an ongoing basis during the implementation of field studies and prescriptions proposed for 2003.

### 2.2.1 Habitat Descriptions

Habitat values were assessed within the project area by establishing sample plots within relatively homogenous plant community types. Plot establishment involved delineating a 400 square metre plot (20 m by 20 m) in an area representative of the surrounding polygon. Physiographic feature descriptions included estimates of:

- slope gradient (clinometer), aspect (GPS); slope position; slope shape (visual estimate); microtopography (visual estimate); and exposure.

Species of vascular plants and byrophytes occurring within each plot were recorded and cover classes based on visual estimates were assigned to each species. Total cover for each stratum, as described in Land Management Handbook No. 25 (1998), were recorded (A - Trees; B - Shrubs; C - Herbs; D - Mosses/Seedlings). In addition to species occurring within sample plots, the immediate area was searched to identify uncommon or rare species outside of plot boundaries.

Additional features described for each site included: wind damage; evidence of fire and historic logging; susceptibility to fire/wind damage; geologic features; surface water features; and drainage patterns.

Forest community composition and structure was qualitatively assessed to determine the suitability in providing habitat features of value to known or potential wildlife species. Habitat features identified during the inventory included: wildlife trees, veteran trees ($A_0$ layer), horizontal and vertical structure, coarse woody debris, forage abundance and availability; and special features (nest sites, etc.).

Generally, biogeoclimatic ecosystem classification to the site series level was accomplished using two approaches:

1. In most cases an analysis of indicator plant species presence and abundance was adequate to determine soil moisture and nutrient regimes and subsequently site series from the appropriate edatopic grids, or
2. Where indicator species analysis was precluded by inadequate representation of shrub and herb layers in high canopy closure or recently disturbed sites, the site series was determined from an analysis of physiographic features.

An example of the field form used for the project is provided in Table 2. Completed field forms are included in Appendix A.

**Table 2.** Sample site field data form

| | | | | | |
|---|---|---|---|---|---|
| **SITE #** | | | **PLOTS** | | |
| **PROJ. ID.** | **02.As.45** | **SURVEYOR:** | | | |
| **DATE:** | | **ASPECT** | | **MAPSHEET:** | |
| **SITE SERIES** | | | **UTM:** | | |
| **LOCATION:** | | | | | |
| **HISTORY:** | | | | | |
| **GENERAL DESCRIPTION:** | | | | | |
| ***PHYSICAL*** | | | | | |
| Slope position/gradient/shape | | | | | |
| Microtopography | | | | | |
| **Soil** | | | | | |
| Soil depth/rooting depth | | | | | |
| Soil texture/coarse fragments | | | | | |

| | |
|---|---|
| Gleying/water table | |
| A horizon | |
| Humus form/thickness | |
| ***VEGETATIVE*** | |
| **Forest Canopy** | |
| Stand Structural Stage | |
| Canopy closure | |
| A Layer (Trees) | |
| **Understory** | |
| B Layer (Shrubs) | |
| C Layer (Herbs) | |
| D Layer (Bryophytes/Seedlings, fungi) | |
| ***CWD/WILDLIFE TREES/WILDLIFE*** | |
| **Coarse Woody Debris** | |
| **Wildlife Trees (Snags)** | |
| **Wildlife: Direct Contacts** | |
| **Wildlife: Sign** | |

### 2.2.2 Small Mammals and Amphibians

The presence of small mammals was accomplished using pitfall traps, sooted track plates, general observations made during other surveys and active searches. The presence of amphibian species was accomplished using pit fall traps as well as active searches of suitable habitats such as wetlands, ponds, watercourses and course woody debris. Pitfall traps were constructed using a staked in place 50 cm high fence of gardener's light-weight weed barrier cloth and 10 litre black plastic planting pots. Fence length's varied depending on the available space at each trapping site, but generally exceeded 6 m in length.

Captured shrews were identified using the Royal British Columbia Museum Handbook: Opossums, Shrews and Moles of British Columbia (Nagorsen 1996).

### 2.2.3 Track Plates

The presence of small predators (i.e. weasels and pine marten) was accomplished using sooted track plates similar to those described by Zielinski et. al (1995). This method involved the use of a carbon-blackened aluminium plate (20 x 72 x 0.1 cm), partially covered with contact paper near the upper third of the plate. Animals crossing the track plate pick-up soot on the bottoms of their feet and transfer a positive track impression to the sticky contact paper. This method can provide a detailed record of even very small animals such as mice, shrews and salamanders. A makeshift kerosene lamp was constructed using a clean tin can and braided cotton rag as a wick.

The wick was soaked with enough kerosene to provide approximately 2 minutes of burn time, which was sufficient to blacken one track plate. A 22 x 30 cm section of sticky contact paper (Mac Tac) was fastened sticky side up to the upper third of the track plate leaving approximately 20 cm of unsooted track plate above the contact paper. The protective cover on the contact paper was removed just prior to placing the track plate in the cubby. The sooted and sticky papered track plate was then placed within a cubby constructed of a collapsible plywood box. Cubbies were placed at the base of a large stump, decaying log or tree to prevent animals from entering from the rear of the cubby. Chicken parts (backs, necks, or legs) were placed at the upper end of the track plate beyond the contact paper. Commercial grade fish fertilizer was applied to nearby vegetation with a spray nozzle container to also act as an attractant.

Tracks were identified using methodologies described in: Identification of Mammal Tracks from Sooted Track Stations in the Pacific Northwest (Taylor and Raphael 1988).

### 2.2.4 Riverine Birds

The presence of riverine birds was accomplished using simple river shoreline presence/not-detected surveys as outlined in Inventory Methods for Riverine Birds: Harlequin Duck, Belted Kingfisher and American Dipper, CBCB No. 12 (MELP1998). The field crew walked the stream-banks of the Ash River, stopping occasionally in areas with good visual sightlines to watch and listen for riverine bird species (i.e. harlequin ducks, belted kingfishers and dippers) while recording vegetative and wildlife habitat features. Due to the limited access, topography and stream morphology of the majority of the study area, it was not possible to access all of the reaches of the Ash River within the project area.

### 2.2.5 Night Surveys

Two night surveys were conducted on August 21 and 22, 2002 to evaluate evening / night-time wildlife use of the study area. Several evening / twilight viewing sites were visited by the survey crew where wildlife observations were made using a Bushnell Spacemaster 15-45X60 mm spotting scope and tripod. Sites were visited for 20 – 30 minutes each, where observations were made while listening and viewing the lake shoreline through the spotting scope.

Spotlight surveys of the shoreline of Elsie Lake were performed on these dates using a 12V – 750,000 candle-power spotlight.

A bat colony located on the southeast side of the Elsie dam was visited to obtain a count of bats as they left their roost in a rock crevice.

### 2.2.6 Bird Surveys

Observations of bird species were made along linear encounter transects and listening stations/point count stations as described in Inventory Methods for Forest and Grassland Songbirds, CBCB No. 15 (MELP 1999) and Inventory Methods for Woodpeckers, CBCB No. 19 (MELP 1999). Transects and listening stations were conducted along the perimeter of Elsie Lake and the Ash River. Point counts were also conducted simultaneously with pitfall and track plate installation, as well as during other surveys such as riverine bird or general wildlife surveys.

## 2.3 Restoration Objectives

Wildlife Restoration Objectives to be addressed during the course of this proposed study, and as stated in Section 3.4 of Chapter 4, Volume 2 of the Strategic Plan are provided below.

**Objective 1: Rehabilitate reservoir draw-down zones to enhance productivity and wildlife habitat in Elsie Lake.**
Develop foreshore habitat complexes at suitable locations.
Create snags along reservoir shorelines for cavity nesters and perching raptors.
Provide artificial nesting structures for osprey.

**Objective 2: Conserve riparian and wetland habitats in the downstream portions of Ash River watershed.**
Identify key habitats for conservation of biodiversity and enhanced production.
Undertake conservation, through protective measures, habitat acquisition and other means in the Ash River watershed.

**Objective 3: Create or enhance wetlands and riparian habitats for aquatic species (amphibians, waterfowl, cavity dependent species, small mammals).**
Consider various opportunities to dyke selected draw-down areas to hold water during growing and breeding season (spring and summer), or fall migration, when reservoir is normally drawn down at those times. Flood shallow basins in the watershed where feasible. Identify through field surveys other appropriate areas for creation of wetland habitats.

Where practicable, create backwater channel and associated riparian habitats along Ash River segments where reduced downstream flows have diminished natural channel complexity in the floodplain.

**Objective 4: Protect small groups of old or second growth trees in strategic locations for current and future nesting use by bald eagles or ospreys.**

**Objective 5: Improve the knowledge base on rare, endangered and threatened species and habitat utilization in the Ash River watershed.**

## 3.0 RESULTS

A meeting was held at the Hupacasath office in Port Alberni, B.C. on May 21, 2002. Topics discussed included logistics, field schedule, personnel and equipment.

A reconnaissance survey of the study area was conducted on May 26 – 27, 2002 with field technicians from HFN, Toth and Associates Environmental Services, D. Burt and Associates, and CBR and Associates.

The field surveys were conducted from June 2 to September 17, 2002.

Due to the large size of the project area and only a two-person field crew, active searches of general wildlife occurrence was the most practical method of documenting wildlife use and was the method most widely employed during this project. The draw-down of Elsie Lake to below normal summer levels in order to conduct repairs on the hollow cone valve provided an excellent opportunity to assess wildlife use around the perimeter of Elsie Lake by documenting tracks in the newly exposed soft lake bottom substrates. The lake levels reached in September, 2002 were similar to pre-impoundment water levels. The distinct basins evident in the historic aerial photographs were clearly visible during the September field survey. The draw-down also provided a bonanza of aquatic invertebrates, amphibians and juvenile fish stranded in isolated pools and backwaters which appeared to attract small predators such as mink, pine marten and weasels, as well as waterfowl and shorebirds. The exposure of lake bottom substrates produced a late growth of sedges and willows that attracted black-tailed deer, wolves and black bear to the lake-shore area.

Table 3 provides a summary of activities undertaken and effort applied for the inventory of wildlife and wildlife habitats within the riparian areas of Elsie Lake and the lower Ash River by the Hupacasath First Nation and Toth and Associates Environmental Services.

**Table 3.** Effort and activities

| Dates | Activity | Results |
|---|---|---|
| May 21, 2002 | Meeting | Logistics, field schedule, personnel, equipment |
| May 26, 27 | Reconnaissance | Reviewed project area, access, sample sites |
| June 2 - 7 | Field survey | Track plating, pit-fall trapping, breeding bird surveys, point counts and encounter transects |
| July 11, 12, 15 – 19 | Field survey | Track-plating, site series, vegetation and wildlife habitat, shoreline survey |
| August 15, 16, 19 - 23 | Field survey | Pit-fall trapping, point counts, wildlife surveys, night surveys |
| September 11, 12, 13, 16, 17 | Field survey | Pit-fall trapping, point counts, wildlife surveys, prescription surveys |

Twenty-seven days of field survey were conducted, including:

- 72 track plate set days; and,
- 35 pitfall set days

To facilitate communication of project activities and accomplishments, the project included the undertaking of an open house at the Hupacasath Band office on November 20, 2002 to provide an opportunity to disseminate project activities and accomplishments to other members of the Hupacasath First Nations and to the community of Port Alberni.

Reporting (October, 2002 – March, 2003) includes all data gathered during the data compilation and field surveys. Recommendations for site-specific habitat prescriptions (mitigation, restoration, protection or enhancement) developed from the study are included within this report. Site photographs of proposed prescription site conditions and site locations are included.

## 3.1 Background Information Review

1994 colour aerial photographs of the study area were purchased from Weyerhaeuser Canada Inc. in Nanaimo. Historic black and white aerial photographs showing pre-impoundment conditions were ordered from Land Data BC.

**Table 4.** Aerial Photographs reviewed for the study

| Year | Flight Line | Frames |
|---|---|---|
| 1994 | MB94010 | 073-080 |
| 1994 | MB94010 | 014-020 |
| 1994 | MB94010 | 050-053 |
| 1994 | MB94010 | 060-063 |
| 1994 | MB94010 | 103-119 |
| 1994 | MB94007 | 295-296 |
| 1951 | BC1422 | 99 |
| 1946 | BC254 | 94 |

Staff from the Ministry of Sustainable Resource Management (MSRM) were contacted in order to gather additional information regarding the study area, including identified bird species nest sites. MSRM's Conservation Data Centre (CDC) was contacted to determine the presence of threatened or endangered vertebrate and invertebrate species, plant species and plant communities within the study area. A review of TRIM maps and aerial photographs was conducted. Habitats within the study area were typed keying in on study area features such as forest stand features, topography and special sites. Special sites included wetlands, riparian areas, rock outcrops, watercourses and mature trees.

A search of the internet was conducted for the enclosed phrases: "Elsie Lake" and "Ash River", using the search engines Dogpile and Yahoo. A significant amount of varied information was

found for the study area, including breeding bird survey results, hiking trails, sports fishing, and dam safety upgrades. However, most of the information found concerned the impacts of Elsie dam and water diversion on the downstream fisheries resources in the Ash and Stamp / Somass Rivers.

A Recreation Access Inventory conducted by the Public Advisory Group of Weyerhaeuser's West Island Timberlands Environmental Management System identified concerns for migrating western toads on Ash Branch Roads 83 and 84 in the vicinity of Lanterman Creek. Western toads were observed near Lanterman Creek during this study.

The Breeding Bird Survey of Canada identified red-throated loons breeding at Elsie Lake, however, there are at least 3 "Elsie Lakes" in B.C. and it is unknown if the Elsie Lake referred to is the Elsie Lake within the Ash study area.

A considerable amount of detailed fisheries information was found in various B.C. Hydro reports for the Ash River Watershed. Information concerning wildlife within the project area was primarily contained in B.C. Hydro reports in anecdotal form or drawn from existing listings of wildlife species use of biogeoclimatic zones and rare species occurrences.

It appears that historic pre-impoundment information concerning wildlife habitat and wildlife populations within the Ash River Watershed is practically non-existent. General information regarding expected wildlife and vegetative species occurrences within the Coastal Western Hemlock biogeoclimatic zone including: Wildlife Diversity in British Columbia (Ministry of Forests 1995), and Land Management Handbook No. 25 (MOF, 1998), were reviewed in order to provide a list of predicted and potential occurrences.

The Ash River Water Use Planning Committee has identified several primary objectives for the Ash Watershed that tie-in with the objectives of this study and include:

- Maximize the productivity of riparian wildlife habitat in the Ash Watershed,
- Maximize recreational opportunities in Elsie Lake and the Ash River,
- Maximize the spawning, rearing and migration of fish species, and;
- Maximize the littoral and pelagic productivity of Elsie Lake

Fish Restoration Objectives from Section 2.4, Chapter 4 Volume 2 of the Ash River Watershed Plans (BCRP, 2000) also contain several objectives that tie-in or compliment the objectives of this study and include:

- Opportunities to purchase or covenant floodplain properties for future habitat projects
- Opportunities for habitat development and for planting riparian vegetation
- Feasibility of low-level fertilization trials in fish-bearing tributaries and performance indicators
- Potential methods to achieve self-sustaining nutrient levels and reduce costs
- Ecological effects of fertilization on non-target plants and aquatic animals
- Wildlife biodiversity values at all proposed fish habitat development sites
- Restoration of fish access through draw-down zones to historical upstream habitats
- Artificial recruitment scheme to restore delivery of some sediment and wood to main-stem (Ash River)

Habitats evident from pre-flooding historic air-photos of Elsie Lake include riverine/riparian, shallow open wetlands and extensive littoral zones. It is evident from the pre-impoundment aerial photographs that the majority of the valley bottom surrounding Elsie Lake was primarily composed of open sedge dominated meadows, wetlands and riparian forest communities (Figure 3). The amount of each type of historic habitat lost to impoundment is shown in Table 4. This table is taken from Chapter 4, Vol. 2 of the BCRP Strategic Plans. The habitat area calculations were reportedly performed by GIS, however it appears that the calculations may have underestimated the amount of wetland and riparian habitats. The original total open water area of the Elsie Lake basins are reported at 271 ha; a brief review of the historic air photos would seem to indicate that the amount of wetland and riparian habitats present at that time accounted for approximately the same amount of area as the open water.

The amount of timber harvest in the vicinity of Elsie Lake evident in the 1946 and 1951 air photos is very extensive and includes evidence of logging occurring to the banks of fish-bearing streams, including the Ash River.

**Table 5.** Habitat area lost to flooding

| **Elsie Lake Reservoir** | **Original habitat lost** |
|---|---|
| Lake flooded (ha) | 271 |
| Land flooded (ha) | 401 |
| Lake shoreline (km) | 19 |
| Main-stem: length (km) | 5 |
| Channel (ha) | 30 |
| Riparian * (ha) | 30 |
| Tributary: length (km) | 5 |
| Riparian ** (ha) | 14 |
| Wetland: (ha) | 72 |

* Main-stem riparian zone calculated 30 m from each bank
** Tributary riparian zone calculated 15 m from each bank

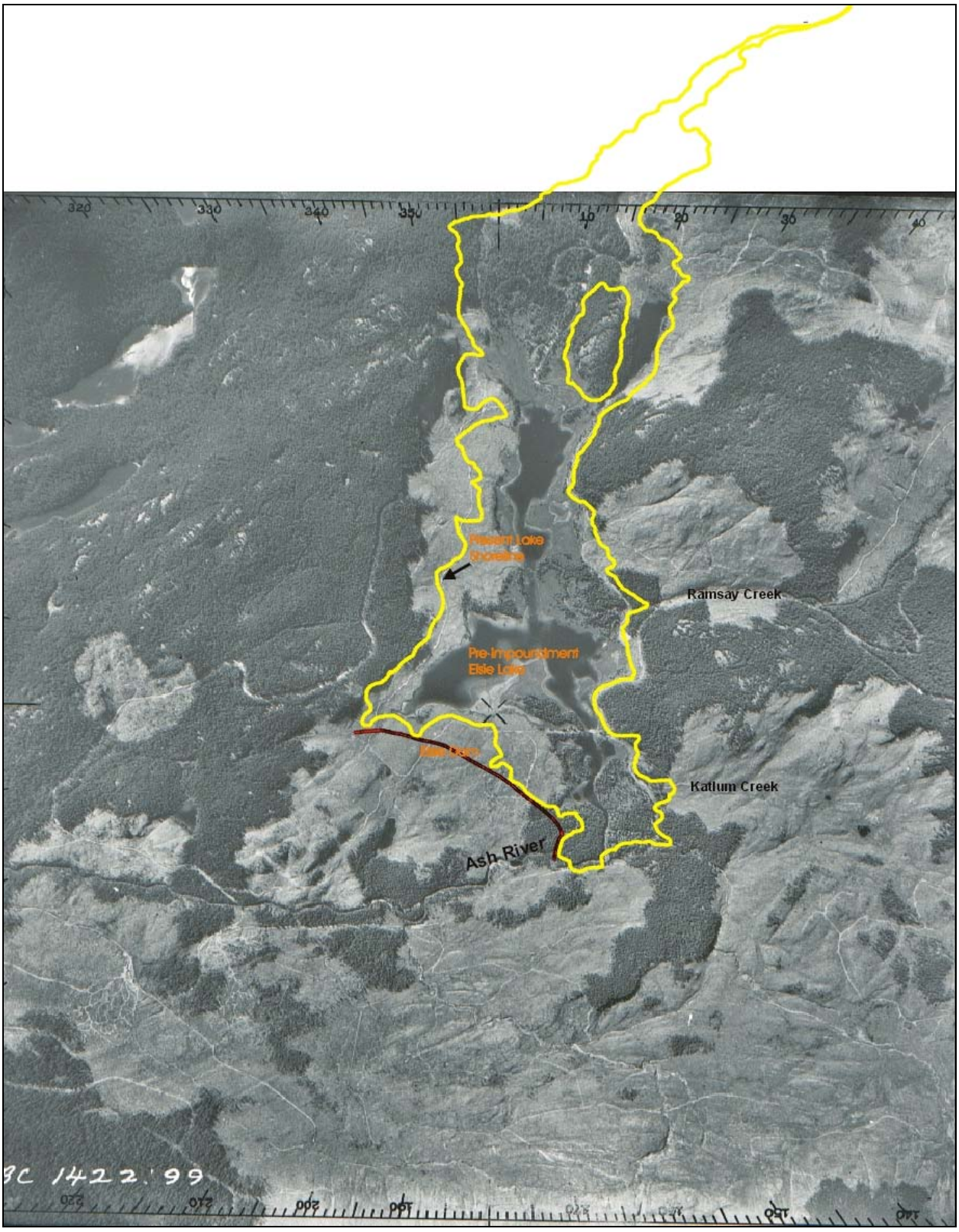



**Figure 3.** 1951 Aerial Photograph (BC1422:99) of pre-impoundment Elsie Lake, with the present lake shoreline indicated by the yellow outline.

The Ash watershed has two sub-basins with the upper sub-basin dominated by mountains up to 2000 m high, which form the boundary between the Ash, Campbell and Comox watersheds. From these mountain sources, the Ash River flows into Oshinow Lake at an elevation of 410 m after a drop of 1200 m and a run of 12 km. Oshinow Lake is 5 km long and 0.6 km wide and receives inflows from about 30% of the basin area. Below Oshinow Lake, the Ash River drops a further 80 m in 13 km to Elsie Lake at elevation 330 m. This lower sub-basin has lower relief than the upper basin, with a maximum height of approximately 1,350 m. Elsie Lake Reservoir is about 7 km long and 1 km wide. Smooth peak inflow occurs from May to July from snowmelt. Low inflow occurs in August-September. Slightly lower but more volatile peak inflows occur in November due to rain-storms. The original Elsie Lake was relatively shallow, based on the maximum reservoir depth of 30 m and the dam height of 19 m.

Elsie Lake dams, created in 1957, provide storage for diversion of water and discharge into Great Central Lake. The original Elsie Lake was 271 ha in area; current size of the reservoir is 672 ha. Licensed diversions historically allowed for one-half of the total reservoir inflow to be diverted. The (licensed) diversion makes up a substantial portion of the total stream flow of Ash River (11 vs. 18 m3/s). This has reportedly reduced riparian habitat in the Ash River in the 25 km downstream and also restricted steelhead migration over the falls downstream. Water temperature may have also been adversely affected.

Non-hydro impacts on fish and wildlife in the Ash River watershed are principally the historic and current effects of logging. Much of the timber between Elsie and Dickson lakes has been harvested since 1972, with various areas of active logging still occurring (Griffith 1993). The main land use activities in the area include forestry, road construction, hydro generation, recreation and mining activities. Since little merchantable timber exists in the area, forest management objectives are currently geared toward intensive management and protection, with some active timber harvest occurring at higher elevations. Second growth forest cover is dominated by Douglas-fir and western hemlock, with amabilis-fir and red cedar. Small patches of remnant mature timber are located on rock outcrops above Elsie Lake and in the steep canyon and ravine sections of the lower Ash River.

Elsie Lake is considered to be a nutrient poor, oligotrophic lake. Minimal aquatic macrophytes are found in Elsie Lake because riparian vegetation was removed prior to the impoundment of the lake (Triton 1995) and due to large annual fluctuations in lake levels.

Elsie Lake experiences exposed stumps during reservoir draw-down (Photograph 1), which are considered unsightly (B.C Hydro 1993). Floating debris is common during flood storage (B.C. Hydro 1981).

Elsie Lake receives moderate recreational use with available sites being filled to capacity on occasion. Annual visitation to the area is around 6,000 visitors (Van Dijk 1995). The Ash River area provides recreational opportunities for activities such as boating, fishing, camping, hiking, swimming, bird watching, rock hounding and hunting. The reservoir is used mainly by local residents, with most of this use occurring during the summer months and on weekends (B.C. Hydro 1993).

**Photograph 1.** View of exposed lake bottom on south shore of Elsie Lake.

Draw-down on Elsie Lake begins around early July to early August and the lake remains low usually until the onset of fall rains in mid-October. Draw down rates during the summer of 2002 averaged 20 – 25 cm per day during August and September. Elsie Lake usually spills from October to May. The free crest weir spillway at 330.71 m controls high Elsie Lake water levels.

The land at the dam sites, generation facilities and the diversion intake is owned by B.C. Hydro. Strathcona Provincial Park is located beyond the western edge of the lake. Most of the area surrounding Ash River and Elsie Lake is within the Esquimalt and Nanaimo Railway Land Grant and is controlled by Weyerhaeuser (B.C. Hydro 1997).

Power Supply Operations posts current reservoir level data on the internet at: http://www.bchydro.com/info/res_hydromet/res_hydromet843.html

### 3.1.1 CDC Ranking Protocol

The CDC provided two listings of rare element occurrences within or nearby the study area, which included:

- Blue-listed Vancouver Island ermine sighting (January, 1994) located 1.5 km east of Dickson Lake on the Ash River; and,
- Blue-listed Small spike rush locality (July, 1972) on Ash Lake

Other listed species documented as occurring nearby the study area include:

- Woodland Penstemon above the north side of Elsie Lake
- Common water shrew (*Brooksi spp*.) at Robertson Creek hatchery and Lowry Lake
- Thyme-leaved spurge in the vicinity of Great Central Lake
- Wolverine (*Vancouverensis spp*.) at Mt. Joan
- California tea near Port Alberni

The British Columbia Conservation Data Centre's (CDC) threatened and endangered species lists (August, 2002) include 38 terrestrial or aquatic vertebrates, 156 vascular plant species and 67 plant associations for the South Island Forest District. Red and Blue-listed species documented during the study or with a high probability of occurring within the study area are provided in Table 12.

All rare entities tracked by the B.C. Conservation Data Centre have been assigned provincial and global conservation status ranks. Most entities also have a designation on the Ministry of Environment's Red or Blue list. Definitions of the Ministry's Red and Blue lists, and the relationship between list status and the CDC provincial rarity rank ("S" rank) are explained below.

**I. PROVINCIAL LIST STATUS**

**RED LIST:**
Includes indigenous species or subspecies that have, or are candidates for Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed.

**BLUE LIST:**
Includes indigenous species or subspecies considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

**YELLOW LIST:**
Any indigenous species or subspecies (taxa) which is not at risk in British Columbia. The CDC tracks some Yellow listed taxa which are vulnerable during times of seasonal concentration (e.g. breeding colonies).

**II. DERIVATION OF LIST STATUS FROM CDC "S" RANK (PROVINCIAL RANK)***

| | **RED LIST** | **BLUE LIST** |
|---|---|---|
| **ANIMALS** | S1 S1S2 S2 S2? S1S3 | S2S3 S2S4 S3 S3? S3S4 |
| **PLANTS** | S1 S2 | S2S3 S3 |
| **PLANT COMMUNITIES** | S1 S1S2 S2 S2? | S2S3 S3 S3? |

Conservation Status Ranks reflect the relative imperilment or 'conservation status' of plants, animals and ecological communities on a global, national and sub-national (provincial) level. These ranks are assigned, reviewed and revised according to standard criteria developed by The Nature Conservancy and the Association for Biodiversity Information (ABI).

Each element is assigned a global rank (called a G-rank), that applies across its entire range; a national rank (N-rank) for each nation in its range; and a provincial rank (S-rank) based solely on its status within British Columbia. In general, global and national ranks are assigned by ABI scientists, on the basis of information supplied by subnational data centres and experts on particular taxonomic groups. Provincial ranks are assigned by Program Specialists at the Conservation Data Centre. New information provided by field surveys, monitoring activities, consultation, and literature review is used to improve accuracy and keep ranks current.

The conservation status of an element consists of a whole number from 1 to 5 preceded by a G (Global), N (National) or S (Subnational). The numbers have the following general meanings:

1 = Critically imperilled, either because of known threats or declining trends, or because extremely restricted breeding or non-breeding range make the element vulnerable to unpredictable events; a candidate for 'endangered' status.
2 = Imperilled; a candidate for 'threatened' status.
3 = Vulnerable; usually more abundant or widespread than elements defined above, but sensitive to threats; perhaps declining
4 = Apparently secure, but may have restricted range or possible long-term concerns.
5 = Demonstrably secure; usually widespread and abundant.

## 3.2 Field Surveys

The majority of field survey effort was applied to the portion of the study area surrounding Elsie Lake. Historically this area has experienced the greatest amount of impacts, both from flooding and timber harvest and therefore has the greatest need for inventory and restoration.

Sample plot distribution was designed to maximize the coverage of the study area and major forest and plant community types. As rare plant species and significant wildlife habitat values are often associated with special habitat features, sample plot locations were biased towards incorporating these features into field sampling. Sample site locations within the project area were located using a Garmin GPS 12XL Global Positioning System.

The inventory documented 87 wildlife species within the riparian areas of the lower Ash River and Elsie Lake, including 16 mammals, 63 birds and 8 herptiles. Seven of the species documented are blue-listed while one species is red-listed. The inventory also documented 154 plant species consisting of 16 tree, 48 shrub, 67 herb and 21 bryophyte species.

### 3.2.1 Riparian Habitat Conditions

The riparian areas of the Ash River downstream of Elsie dam appeared to be in relatively intact, functioning condition. This was largely due to the majority of this section of river being confined within steep sided ravines and bedrock canyons. Most of the side slopes below the canyon or ravine crests have not been logged, as is evident in the historic and recent air photos. Riparian area widths associated with the Ash River within the study area are generally limited by the bedrock channel morphology and narrow floodplains available within the confined canyons or steep ravine reaches of the river. The field surveys conducted within these reaches indicated that the actual extent of riparian (hydrophytic) vegetation within a large proportion of these areas was fairly minimal. Vegetation through these areas was generally composed of plant species that thrive on wet rock walls, in splash zones, seepage sites or damp shady habitats, as opposed to species that rely specifically on hydritic soils.

**Photograph 2.** View of bedrock canyon confinement and extent of riparian vegetation on the Ash River approximately 1 km downstream of Elsie dam.

Stream reaches with more extensive riparian areas are present in sections of the Ash River from the Ash Pit Bridge downstream to Dickson Lake, and from the confluence of the Ash River and Lanterman Creek downstream to the Stamp River. These sections represent the lower gradient reaches of the Ash River.

**Photograph 3**. View downstream on the Ash River near the confluence with the Stamp River showing well developed riparian zones.

True riparian areas associated with the shoreline of Elsie Lake are practically non-existent. The potential for riparian vegetation development is limited in many areas by the relatively steep upslope areas adjacent to the shoreline. Riparian areas around Elsie Lake are typified by narrow, 1 – 3 m wide areas of deciduous tree and shrub (predominantly willow, red alder and Sitka alder) vegetation present along the high water mark. In many areas of the lake terrestrial upslope second growth forests extend to the lake shoreline with no transition to riparian vegetation. Much of the "riparian" vegetation present represents plants that take advantage of the reduced competition and increased available light between the upslope forests and the high water mark of the lake, and do not necessarily indicate true riparian plant associations, which are reliant on hydritic soil conditions. The annual draw-down (Photograph 4) on Elsie Lake is generally so extensive that it creates drought or "desert" like conditions in the area between the edge of the terrestrial forests and the water, effectively preventing riparian vegetation development by killing any riparian or littoral zone plants that may have colonized this area during the year.

Areas of Elsie Lake that did have developing riparian areas were documented at the northwest end of the lake (Photograph 5), the mouth of the unnamed (Italian) creek on the south side of the lake, and at the southeast end of the lake (Photograph 6). These sites represent the available areas on Elsie Lake that have gradual sloping shorelines with relatively deep, moisture retentive soils. Several other areas with potential for riparian zone development were documented. Current development of riparian vegetation within these areas appears to be inhibited by draw-down regimes and/or accumulations of small and large woody debris.

**Photograph 4.** View from Elsie Lake looking upstream on Ramsay Creek on September 12, 2002 showing the lack of riparian vegetation development.

**Photograph 5.** View of riparian vegetation development at the northwest end of Elsie Lake.

**Photograph 6.** July 18, 2002 . View of riparian vegetation development at the southeast end of Elsie Lake. The abundance of small woody debris along the shoreline may be inhibiting further vegetation establishment at this site.

Lakes in the vicinity of Elsie Lake were visited to document riparian vegetation conditions and species as a comparison to conditions and species present at Elsie Lake. Lakes visited within the Ash Watershed included Oshinow, Nimnim, Pear, Turnbull, McLaughlin, Ash and Dickson. Based on conditions presented on the historic aerial photographs of Elsie Lake, Dickson and Pear Lakes probably best exhibit riparian conditions that would have been similar to those sustained historically by Elsie Lake.

**Photograph 7.** July 15, 2002. View north along the shoreline of Pear Lake showing extensive shoal, littoral and riparian areas.

Plant species documented within the riparian zones of area lakes are provided in Table 6.

**Table 6.** Riparian plant species documented from area lakes

| **Species Name** | **Scientific Name** |
|---|---|
| **Trees** | |
| Red alder | *Alnus rubra* |
| Yellow cedar | *Chamaecyparis nootkatensis* |
| Western flowering dogwood | *Cornus nutalli* |
| Shore pine | *Pinus contorta* |
| Western white pine | *Pinus monticola* |
| Western yew | *Taxus brevifolia* |
| Coastal western redcedar | *Thuja plicata* |
| Western hemlock | *Tsuga heterophylla* |
| Mountain hemlock | *Tsuga mertensiana* |
| **Shrubs** | |
| Sitka alder | *Alnus crispa* |
| Saskatoon | *Amelanchier alnifolia* |
| Kinnikinnick | *Arctostaphylos uva-ursi* |
| Copperbush | *Cladothamnus pyroliflorus* |
| Red-osier dogwood | *Cornus stolonifera* |
| Salal | *Gaultheria shallon* |
| Labrador tea | *Ledum groenlandicum* |
| Twinflower | *Linnaea borealis* |

| Species Name | Scientific Name |
|---|---|
| Black twinberry | *Lonicera involucrata* |
| Pacific crab-apple | *Malus fusca* |
| False azalea | *Menziesia ferruginea* |
| Sweet gale | *Myrica gale* |
| Devil's club | *Oplopanax horridus* |
| Pacific ninebark | *Physocarpus capitatus* |
| Thimbleberry | *Rubus parviflorus* |
| Salmonberry | *Rubus spectabilis* |
| Trailing blackberry | *Rubus ursinus* |
| Pacific willow | *Salix lucida* |
| Scouler's willow | *Salix scouleriana* |
| Sitka willow | *Salix sitchensis* |
| Red elderberry | *Sambucus racemosa* |
| Sitka mountain-ash | *Sorbus sitchensis* |
| Hardhack | *Spiraea douglasii* |
| Alaskan blueberry | *Vaccinium alaskense* |
| Dwarf blueberry | *Vaccinium caespitosum* |
| Black huckleberry | *Vaccinium membranaceum* |
| Oval-leaved huckleberry | *Vaccinium ovalifolium* |
| Red huckleberry | *Vaccinium parvifolium* |
| Evergreen huckleberry | *Vaccinium ovatum* |
| High-bush cranberry | *Viburnum edule* |
| **Herbs** | |
| Baneberry | *Actaea rubra* |
| Spreading dogbane | *Apocynum androsaemifolium* |
| Red columbine | *Aqulegia formosa* |
| Goat's beard | *Aruncus dioicus* |
| Bluejoint | *Calamagrostris canadensis* |
| Common harebell | *Campanula rotundifolia* |
| Kellogg's sedge | *Carex kelloggii* |
| Slough sedge | *Carex obnupta* |
| Common red paintbrush | *Castilleja miniata* |
| Wood reedgrass | *Cinna latifolia* |
| Bunchberry | *Cornus canadensis* |
| Tufted hairgrass | *Deschampsia cespitosa ssp. beringensis* |
| Pacific bleeding heart | *Dicentra formosa* |
| Round-leaved sundew | *Drosera rotundifolia* |
| Dulichium | *Dulichium arundinaceum* |
| Creeping spike-rush | *Eleocharis palustris* |
| Common horsetail | *Equisetum arvense* |
| Narrow-leaved cotton-grass | *Eriophorum angustifolium* |
| Woodland strawberry | *Fragaria vesca* |
| Northern Rice-root | *Fritillaria camschatcensis* |
| King gentian | *Gentiana sceptrum* |
| Common sweetgrass | *Hierchloe odorata* |
| Western St. John's wort | *Hypericum formosum* |

| Species Name | Scientific Name |
|---|---|
| Dagger-leaved rush | *Juncus ensifolius* |
| Tiger lily | *Lilium columbianum* |
| Skunk cabbage | *Lysichiton americanum* |
| Field mint | *Mentha arvensis* |
| Buckbean | *Menyanthes trifoliate* |
| Yellow pond-lily | *Nuphar polysepalum* |
| Coast Penstemon | *Penstemon serrulatus* |
| White bog orchid | *Platanthera dilatata* |
| Marsh cinquefoil | *Potentilla palustris* |
| Self-heal | *Prunella vulgaris* |
| Pink wintergreen | *Pyrola asarifolia* |
| Lesser spearwort | *Ranunculus flammula* |
| Tule | *Scirpus lacustris* |
| Small-flowered bulrush | *Scirpus microcarpus* |
| Foamflower | *Tiarella trifoliata* |
| Sticky false asphodel | *Tofieldia glutinosa* |
| False bugbane | *Trautvetteria caroliniensis* |
| American brooklime | *Veronica beccabunga spp. americana* |

Plant species documented during a single day of survey from these lakes included 9 tree, 30 shrub and 41 herb species.

Plant species documented within the lake shoreline area of Elsie Lake are provided in Table 7.

**Table 7**. Lake shore plant species documented on Elsie Lake

| Species Name | Scientific Name |
|---|---|
| **Trees** | |
| Red alder | *Alnus rubra* |
| Shore pine | *Pinus contorta* |
| Black cottonwood | *Populus trichocarpa* |
| Douglas-fir | *Pseudotsuga menziesii* |
| Coastal western redcedar | *Thuja plicata* |
| Western hemlock | *Tsuga heterophylla* |
| **Shrubs** | |
| Sitka alder | *Alnus crispa* |
| Saskatoon | *Amelanchier alnifolia* |
| Kinnikinnick | *Arctostaphylos uva-ursi* |
| Scotch broom | *Cytisus scoparius* |
| Salal | *Gaultheria shallon* |
| Thimbleberry | *Rubus parviflorus* |
| Salmonberry | *Rubus spectabilis* |
| Trailing blackberry | *Rubus ursinus* |
| Pacific willow | *Salix lucida* |
| Scouler's willow | *Salix scouleriana* |

| Species Name | Scientific Name |
|---|---|
| Sitka willow | *Salix sitchensis* |
| Sitka mountain-ash | *Sorbus sitchensis* |
| Hardhack | *Spiraea douglasii* |
| Oval-leaved huckleberry | *Vaccinium ovalifolium* |
| Red huckleberry | *Vaccinium parvifolium* |
| **Herbs** | |
| Rosy pussytoes | *Antennaria microphylla* |
| Kellogg's sedge | *Carex kelloggii* |
| Slough sedge | *Carex obnupta* |
| Common horsetail | *Equisetum arvense* |
| Western fescue | *Festuca occidentalis* |
| Woodland strawberry | *Fragaria vesca* |
| Wall lettuce | *Lactuca muralis* |
| Oxeye daisy | *Leucanthemum vulgare* |
| Field mint | *Mentha arvensis* |
| Self-heal | *Prunella vulgaris* |
| Pink wintergreen | *Pyrola asarifolia* |
| Lesser spearwort | *Ranunculus flammula* |
| Early blue violet | *Viola adunca* |

Plant species documented within the riparian / lake shoreline area of Elsie Lake included 5 tree, 15 shrub and 13 herb species. As is evident from the species list, many of the plant species documented are not true riparian dependent species (i.e. pussytoes, oxeye daisy, scotch broom and kinnikinnick) but instead are hardy or invasive plants which take advantage of the increased exposure and reduced competition along the lake shoreline. The most commonly occurring plant assemblage within the draw-down zone of Elsie Lake included willow, field mint, lesser spearwort and Kellogg's sedge. A list of plant species documented during the field surveys conducted within the study area is provided in Appendix B.

### 3.2.2 Track Plating

Seventy-two track plate set days were conducted within the study area. The track plates indicated that at the time of survey, pine marten, weasels and other small carnivores were not common within the existing riparian areas of the study area, or that track plating was not an effective means of determining presence. Track plates yielded only tracks comprised of mice / shrews, 3 pine marten, 3 black bear and 1 ermine. Table 8 provides the results of the track plating.

**Table 8.** Track Plate Results

| Date | Plate # | Location (UTM) | Site | Results |
|---|---|---|---|---|

| Date | Plate # | Location (UTM) | Site | Results |
|---|---|---|---|---|
| June | 1 | 10.350522.5473664 | 80 m downstream of ermine sighting, 1 km below Dickson Lake | 1. No tracks, 2. Wrecked by bear, mice |
| June | 2 | 10.350482.5475718 | Approximately 500 m upstream of Ash Pit bridge | 1. Mice, 2. No tracks |
| June | 3 | 10.349081.5474947 | 300 m upstream of Dickson Lake | 1. No tracks, 2. Mice |
| June | 4 | 10.347752.5481349 | Approximately 500 m downstream of Elsie dam | 1. No tracks, 2. Mice |
| June | 5 | 10.343681.5478570 | Approximately 80 m northeast of the bottom of Turnbull hill | 1. No tracks, 2. Mice |
| June | 6 | 10.342470.5479286 | North side of Else Lake, 250 m west of campsite at upper end of lake | 1. No tracks, 2. Mice |
| July | 1 | 10.348336.5480972 | Old growth Douglas-fir, 1 km downstream of Elsie dam | 1. Wrecked by bear, 2. Mice, 3. Marten, |
| July | 2 | 10.347726.5481724 | North east of Elsie dam on rock outcrop | 1. Disturbed by campers, 2. Mice, 3. Mice |
| July | 3 | 10.347505.5481977 | Northwest side of Elsie Lake, 300 m north of dam site | 1. Mice, 2. Mice, 3. No tracks |
| July | 4 | 10.347106.5482285 | 150 m southeast of Katlum Creek bridge and 50 m below road | 1. No tracks, 2. No tracks, 3. No tracks |
| July | 5 | 10.346664.5481991 | 400 m west of Katlum Creek bridge and 30 m above high water mark. | 1. Mice, 2. Mice, 3. Mice |
| July | 6 | 10.346651.5481960 | 800 m upstream from Elsie Lake on Ramsay Creek | 1. Mice, 2. Mice, 3. Wrecked by bear |
| July | 7 | 10.343424.5478704 | 100 m west of mouth of unnamed (Italian) creek | 1. Unknown, mice and ermine, 2. Mice, 3. Mice |
| July | 8 | 10.341400.5479432 | South side of lake, 1 km east of upper Ash River bridge | 1. Mice, 2. Mice, 3. Mice |
| July | 9 | 10.342553.5479483 | Within draw-down zone, near campsite at west end of lake on north side | 1. Mice, 2. Mice, 3. Mice |
| July | 10 | 10.343425.5479957 | Approximately 300 m east of track plate 9 | 1. Mice, 2. Mice, 3. Mice |
| July | 11 | 10.344055.5480068 | On north side of lake, 50 m below 124 road opposite west end of island | 1. Mice, 2. Mice, 3. Mice, ants |
| July | 12 | 10.347687.5479952 | In draw-down zone of bay at southeast end of lake, at south end of saddle dams | 1. Mice, 2. Mice, 3. Mice |
| July | 13 | 10.347336.5480934 | 150 m south of control weir on Elsie Lake | 1. Mice, 2. Mice, 3. Female and juvenile marten, mice |

A study undertaken by Toth and Associates on the Tsable River during May, 2002 yielded far better results with an effort of only 18 track plating days. The only significant difference

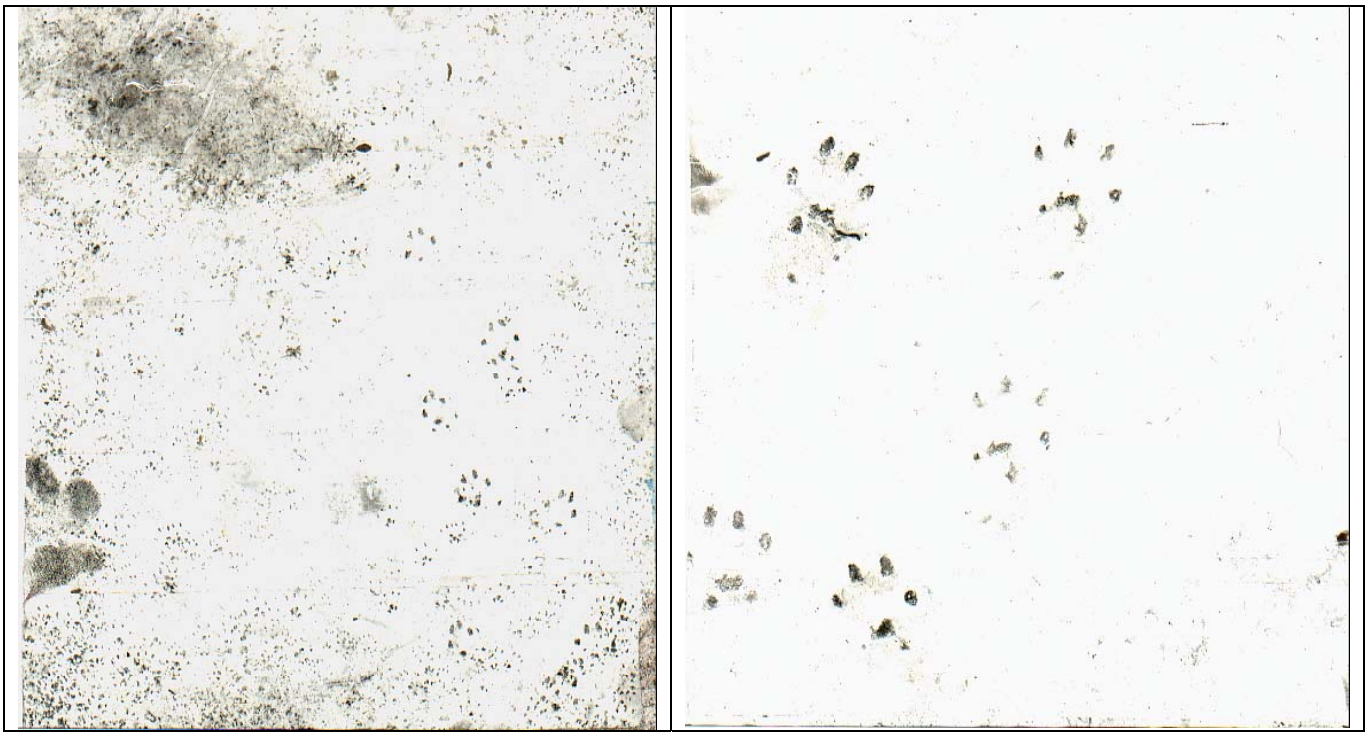
between these two surveys was that track plate sets on the Tsable River project utilized natural materials, whereas the Ash River study used pre-fabricated plywood cubbies as recommended in the RISC manual: Inventory Methods for Marten and Weasels, Version 2 (MELP 1998). The use of the pre-fabricated cubbies may have resulted in target species avoidance of the track plate sets. The photographs below show the obvious differences between the different cubbies.

**Photograph 8.** View of track plate in a cubby constructed from natural materials.

**Photograph 9**. View of cubby made from natural materials located in second growth coastal western hemlock / step moss forest.

**Photograph 10.** View of pre-fabricated plywood cubby used on the Ash River project

It is possible that the time of year had a significant impact on track plating efficiency. Recommended timings for small predator surveys are during late winter to early spring (CBCB No. 24, MELP 1998). The Ash River track plating was conducted during June and July, which likely coincides with a peak in the available prey supply, presumably making baits less effective. Although track plating efficiency was low, it was noted during August and September field surveys that small predator tracks were common within the draw-down zone of Elsie Lake. Photograph 11 provides the results of two track plates from the study area.



**Photograph 11.** View of two track plate results. The photo on the left shows mice, ermine and possibly a juvenile cougar track. The photo on the right shows pine marten tracks.

### 3.2.3 Pitfall Trapping

Thirty-five pitfall set days were conducted throughout the study with only 3 capture events (dusky shrews). The low capture efficiency suggests that small mammals and amphibians are not common within the riparian habitats sampled within the study area. Table 9 provides the results of pitfall trapping.

**Table 9.** Pitfall Trap Results

| Date | Pitfall # | Location (UTM) | Site | Results |
|---|---|---|---|---|
| June | 1 | 10.355646.5470491 | Tributary to lower Ash R. | 1. Nothing, 2. Nothing |
| June | 2 | 10.355586.5470451 | Tributary to lower Ash R. | 1. Two dusky shrews, 2. Nothing |
| June | 3 | 10.347469.5482016 | 30 m downslope from July track plate 3 | 1. Nothing, 2. Nothing |
| June | 4 | 10.347469.5482016 | Same site as July Track plate 5 | 1. Nothing, 2. Nothing |
| August | 1 | 10.347684.5479902 | Same site as track plate 12 | 1. Empty, 2. Empty |
| August | 2 | 10.347281.5480853 | 400 m west of Elsie free crest weir | 1. Empty, 2. Empty |
| August | 3 | 10.342512.5479457 | 100 m west of track plate 9 | 1. Empty, 2. Empty |

| Date | Pitfall # | Location (UTM) | Site | Results |
|---|---|---|---|---|
| Sept. | 1 | 10.355292.5470784 | Confluence of outlet from Moran lake and Ash R. | 1. Empty, 2. Empty, 3. Empty |
| Sept. | 2 | 10.349031.5474880 | 250 m upstream from Dickson Lake | 1. Empty, 2. Empty, 3. One dusky shrew |
| Sept. | 3 | 10.347336.5480934 | In draw-down at southeast end of lake. Same site as T.P. 12 | 1. Empty, 2. Empty, 3. Empty |

**Photograph 12.** View of pit-fall construction at southeast end of Elsie Lake.

Active searches were performed for amphibians and reptiles within the study area. Active searches were conducted on riparian area coarse woody debris and in the draw-down zone of Elsie Lake.

Northern alligator lizards were observed along the shoreline of Elsie Lake and the south facing side of the lower Ash River, as well as in exposed road cuts outside of the study area. Northern alligator lizards appeared to be fairly common within the study area.

Common and wandering garter snakes were observed at several locations within the study area, including the terrestrial and riparian habitats adjacent to Elsie Lake and the lower Ash River. The habitats where garter snakes were observed were generally similar to those of the northern alligator lizard, which included relatively dry, exposed south facing rock outcrops and rocky areas.

Red-legged frogs were observed on only three occasions within the study area. Two sightings occurred within the draw-down zone of Elsie Lake, while the other sighting was in the old growth floodplain forest adjacent to the Ash River upstream of Dickson Lake. Unidentified tadpoles were observed stranded in ponds in the draw-down zone of Elsie Lake on two occasions. Unidentified larval salamanders were observed stranded in the draw-down zone of Elsie Lake on one occasion. Pacific tree-frogs were not found within the riparian areas but were observed on several occasions in nearby terrestrial forest habitats outside of the study area. One western toad was found crossing an old access road on the north side of the Ash River, upstream of Lanterman Creek. Adult salamanders were not found in the study area, despite searches of CWD, isolated pools and ponds within the study area. Painted turtles were not observed within the study area, but were found outside of the study area near Great Central Lake.

**Photograph 13.** View of common garter snake on moss covered rock outcrop adjacent to the lower Ash River.

**Photograph 14.** View of Pacific tree frog near the north west end of Elsie Lake.

**Photograph 15.** View of young northern alligator lizard captured from a road-cut on the north side of Elsie Lake.

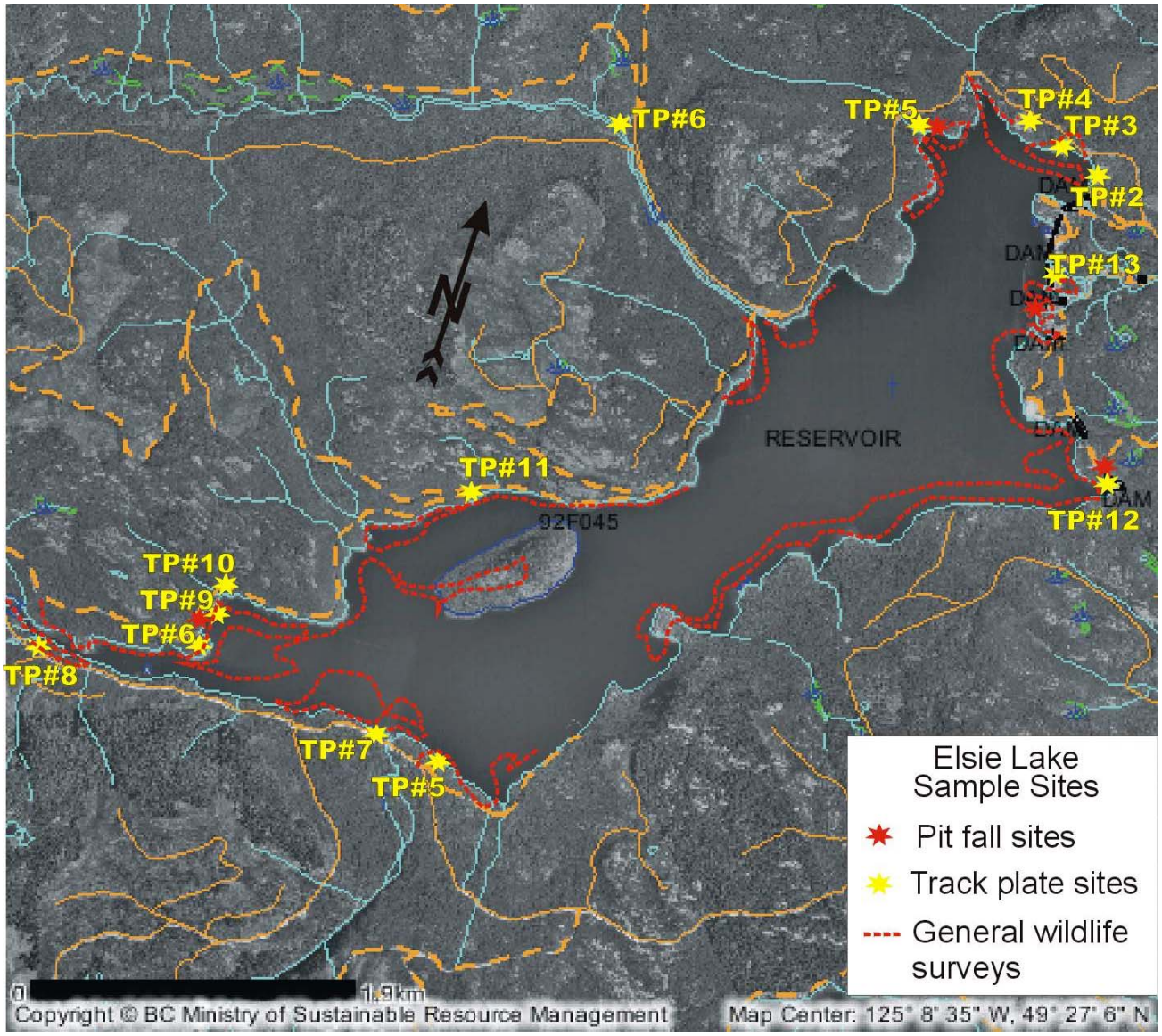



**Figure 4.** Sampling Sites on Elsie Lake

### 3.2.4 Riverine Birds

Surveys for riverine birds were conducted at the locations indicated on figures 5, 6 and 7. Two juvenile harlequin ducks were observed at Lanterman Creek on May 27, 2002; this is approximately 1 month earlier then the expected hatching times stated in the available literature on harlequins. Harlequin ducks were not observed again during the course of the study. Dippers (*Cinclus mexicanus)* and belted kingfishers (*Megaceryle alcyon)* were observed frequently and appeared to be relatively common within the riverine sections of the study area. Active nest sites for these species were not found.

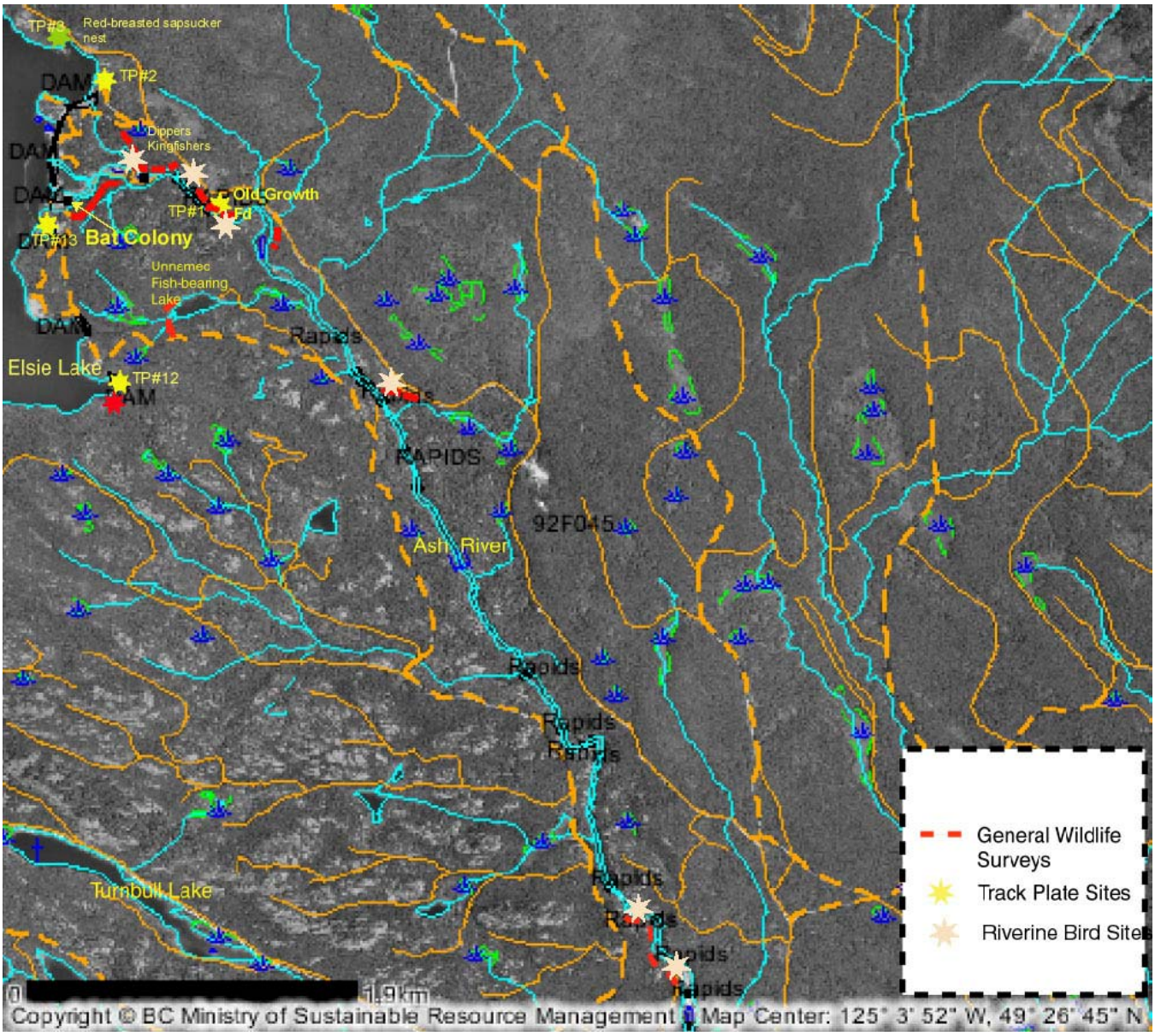



**Figure 5.** Sample sites on the Ash River, from Elsie dam to Ash Pit bridge.

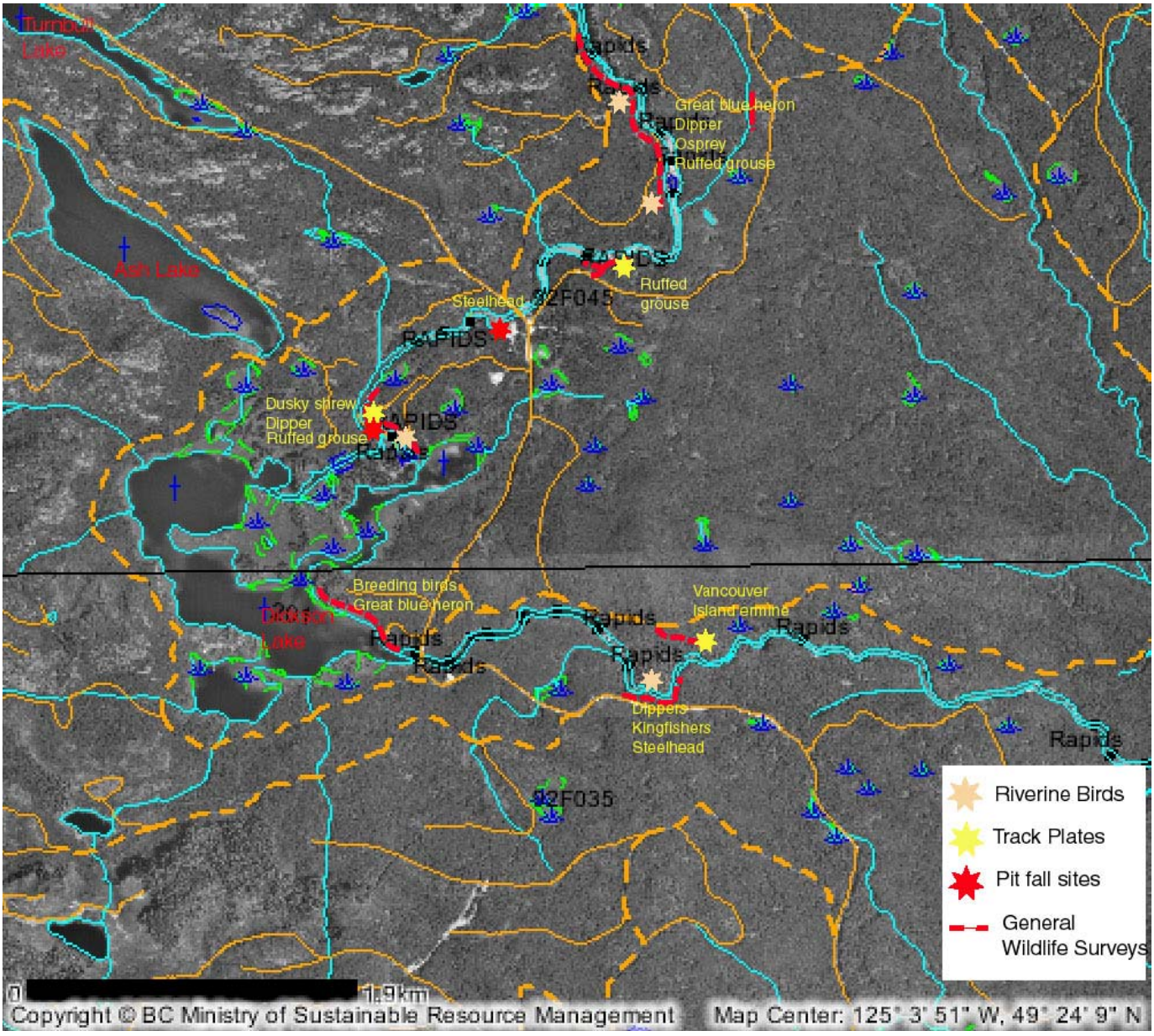



**Figure 6**. Sample sites upstream and downstream of Dickson Lake

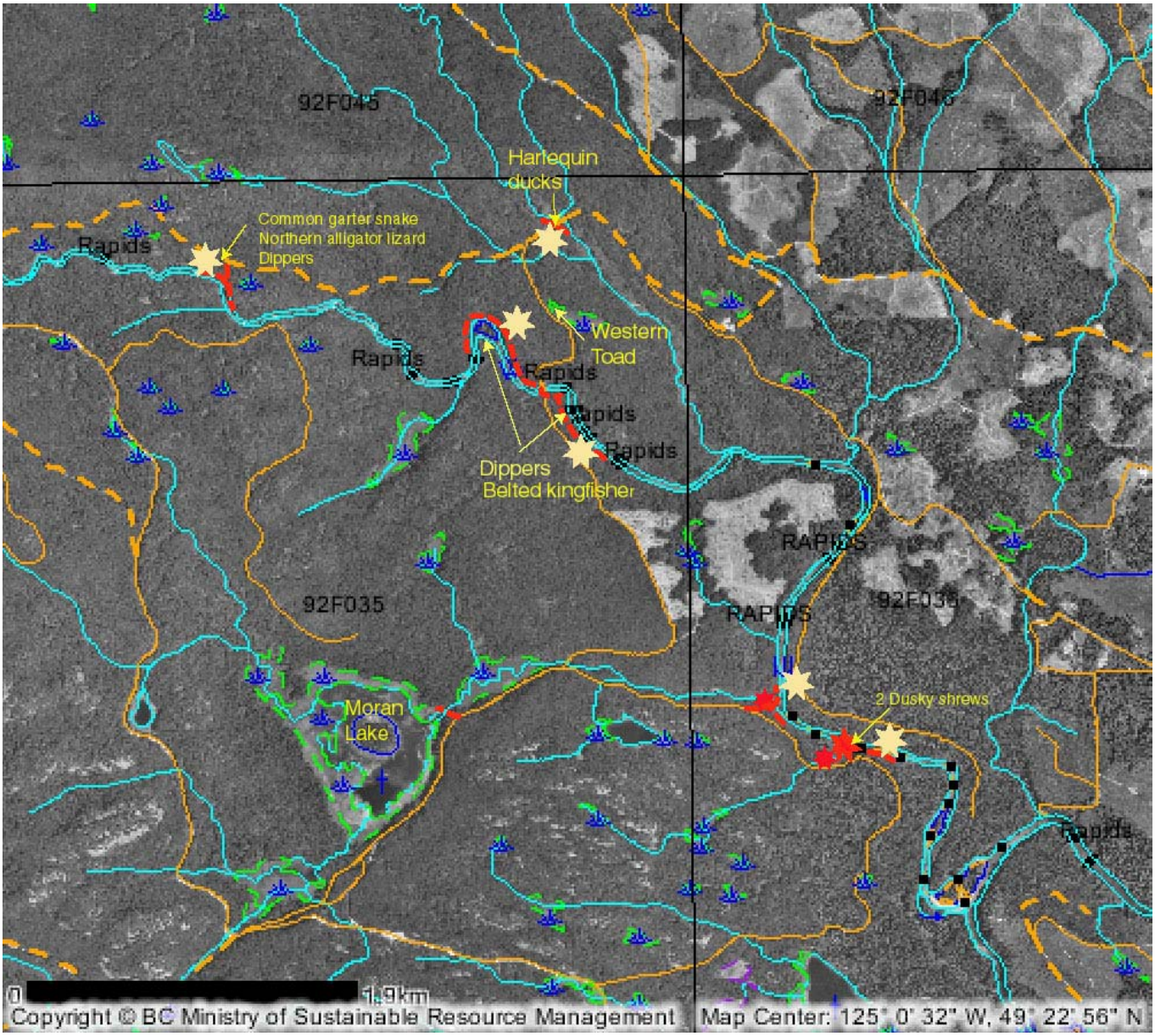



**Figure 7.** Sample sites downstream of Dickson Lake to Ash / Stamp confluence.

### 3.2.5 Bird Surveys

Bird surveys were conducted at track plate and pit fall sampling sites and during general wildlife surveys, as well as during vehicle travel to and from the sample sites. Highlights of these surveys included observations of northern goshawk, sandhill cranes, saw-whet owl, merlin, sharp-shinned hawk, great-horned owl and pine grosbeak. Four blue-listed and one red-listed bird species were documented. The location of the red-listed northern goshawk sighting was forwarded to MWLAP and the CDC.

The diversity of bird species observed did not vary greatly between survey dates. Table 10 provides a list of bird species documented during the field surveys. Table 10 includes species observed both within, and in close proximity to the study area.

**Table 10.** Bird species documented in the Ash River Watershed

| **Birds** | | |
|---|---|---|
| Northern goshawk | *Accipiter gentiles laingi* | Red |
| Sharp-shinned hawk | *Accipiter striatus* | |
| Spotted sandpiper | *Actitis macularia* | |
| Saw-whet owl | *Aegolius acadicus* | |
| Mallard | *Anas platyrhynchos* | |
| Great blue heron | *Ardea herodias fannini* | Blue |
| Cedar waxwing | *Bombycilla cedrorum* | |
| Ruffed grouse | *Bonasa umbellus* | |
| Canada goose | *Branta canadensis* | |
| Great horned owl | *Bubo virginianus* | |
| Common goldeneye | *Bucephala islandica* | |
| Red-tailed hawk | *Buteo jamaicensis* | |
| Turkey vulture | *Cathartes aura* | |
| Brown creeper | *Certhia familiaris* | |
| Killdeer | *Charadrius vociferus* | |
| Common nighthawk | *Chordeiles minor* | |
| Dipper | *Cinclus mexicanus* | |
| Marsh wren | *Cistothorus palustris* | |
| Northern flicker | *Colaptes nauratus* | |
| Band-tailed pigeon | *Columba fasciatus* | Blue |
| Olive-sided flycatcher | *Contopus borealis* | |
| Western wood pewee | *Contopus sordidulus* | |
| Northwestern crow | *Corvus caurinus* | |
| Common raven | *Corvus corax* | |
| Steller's Jay | *Cyanocitta stelleri* | |
| Blue grouse | *Dendragapus obscurus* | |
| Yellow-rumped warbler | *Dendroica coronata* | |
| Yellow warbler | *Dendroica petechia* | |
| Pileated woodpecker | *Dryocopus pileatus* | |
| Pacific slope flycatcher | *Empidonax difficilis* | |
| Merlin | *Falco columbarius* | |
| Common snipe | *Gallinago gallinago* | |
| Common loon | *Gavia immer* | |
| Northern pygmy owl | *Glaucidium gnoma swarthi* | Blue |
| Bald eagle | *Haliaeetus leucocephalus* | |
| Harlequin duck | *Histrionicus histrionicus* | |
| Hermit thrush | *Hylochichla guttata* | |
| Swainson's thrush | *Hylochichla ustulata* | |
| Tree swallow | *Iridoprocne bicolour* | |
| Varied thrush | *Ixoreus naevius* | |

| | | |
|---|---|---|
| Dark-eyed junco | *Junco hyemalis* | |
| Hooded merganser | *Lephodytes cucullatus* | |
| Red crossbill | *Loxia curvirostra* | |
| Song sparrow | *Melospiza melodia* | |
| Common merganser | *Mergus merganser* | |
| Osprey | *Pandion haliaetus* | |
| Chestnut-backed chickadee | *Parus rufescens* | |
| Fox sparrow | *Pasarella iliaca* | |
| Hairy woodpecker | *Picoides villosus* | |
| Pine grosbeak | *Pinicola enucleator carlottae* | Blue |
| Rufous-sided towhee | *Pipilo erythropthalmus* | |
| Western tanager | *Piranga ludoviciana* | |
| Pied-billed grebe | *Podilymbus podiceps* | |
| Golden-crowned kinglet | *Regulus satrapa* | |
| Rufous hummingbird | *Selaphorus rufus* | |
| Red-breasted nuthatch | *Sitta canadensis* | |
| Red-breasted sapsucker | *Sphyrapicus ruber* | |
| Chipping sparrow | *Spizella passerina* | |
| Violet-green swallow | *Tachycineta thalassina* | |
| Winter wren | *Troglodytes troglodytes* | |
| Warbling vireo | *Vireo gilvus* | |
| Solitary vireo | *Vireo solitarius* | |
| Wilson's warbler | *Wilsonia pusilla* | |

Primarily resident year-round bird species were observed within the study area. Bird species diversity within the Elsie Lake portion of the study area was low. Chestnut-backed chickadee, golden-crowned kinglet, spotted towhee, and winter wren were commonly observed along with red-breasted nuthatch, varied thrush, American robin, north-western crow and common raven. Steller's jays were abundant within the study area.

Evidence was not found of raptor or heron nesting within the study area. Raptor nests, white-wash or owl pellets were not found. A single osprey was observed over Elsie Lake on three occasions and on the lower Ash River on one occasion. A single adult bald eagle was observed over Elsie Lake on two occasions. A northern goshawk was observed outside of the study area on May 26 within the riparian area of the Ash River upstream of Elsie Lake. Red-tailed hawks were observed on several occasions over the study area and perched along the logging road on the northwest end of Elsie Lake.

Great blue herons were observed on three occasions at Elsie Lake and commonly on the lower Ash River. The remains of a great blue heron were found on the Ash River approximately 1 km upstream of the Ash Pit Bridge. Likely nest sites for this species would include the old growth forest along the north end of Dickson Lake, and the mature black cottonwood and big-leaf maple stands in the riparian area of the lower Ash River.

Only one great-horned owl was observed within close proximity to the riparian area of the lower Ash River. Northern saw-whet and pygmy owls were heard on two occasions within the riparian areas. A northern saw-whet owl was observed in the riparian area of the upper Ash River near Oshinow Lake, outside the study area.

The area located outside of the study area between the upper end of Elsie Lake and Oshinow Lake appeared to be a good area for raptor sightings, with several species documented on each of the two trips to this area.

Old woodpecker and sapsucker forage and nesting/roosting holes were observed throughout the study area. Woodpecker and sapsuckers including northern flickers, pileated, downy, red-breasted and hairy woodpeckers were observed or heard during the course of the surveys. Red-breasted sapsuckers were common throughout the study area with three active nest sites found. It was observed that there was very little recent evidence of pileated woodpecker foraging within the study area, although this species was heard calling and observed on several occasions.

Ruffed grouse with large broods were commonly observed along logging roads and terrestrial forests adjacent to the study area during June and July; reduced broods were observed during August and September. Blue grouse were observed on only one occasion.

Bird species observed to breed within Elsie Lake and the draw-down area included: common loon, spotted sandpiper, Canada goose, and killdeer. Pied billed grebes, mallard ducks, hooded merganser, common merganser and common goldeneye were also observed during the surveys, but juvenile birds were not observed.

During the two days of survey conducted in late May, migratory species were noted within the study area. Wilson's warblers were observed in flocks of 10 or more birds in the riparian willow growth located at the northwest and southeast ends of Elsie Lake. These birds were not observed again within the study area. American robins, common nighthawks, tree and violet green swallows, rufous hummingbirds, killdeer, spotted sandpipers, and western wood pewee were also observed at this time within the Elsie Lake portion of the study area.

Several species observed within the study area during the September survey were also migrants. Several large flocks of sandhill cranes were observed over Elsie Lake on September 17, 2002. One flock of approximately 25 birds made a sudden descent, circling and dumping air to drop towards the mouth of the unnamed (Italian) creek on the south shore of the lake. The birds descended to approximately 300 m elevation, but did not land at the lake. American widgeon and green-winged teal were also observed at this time.

### 3.2.6 Night Surveys

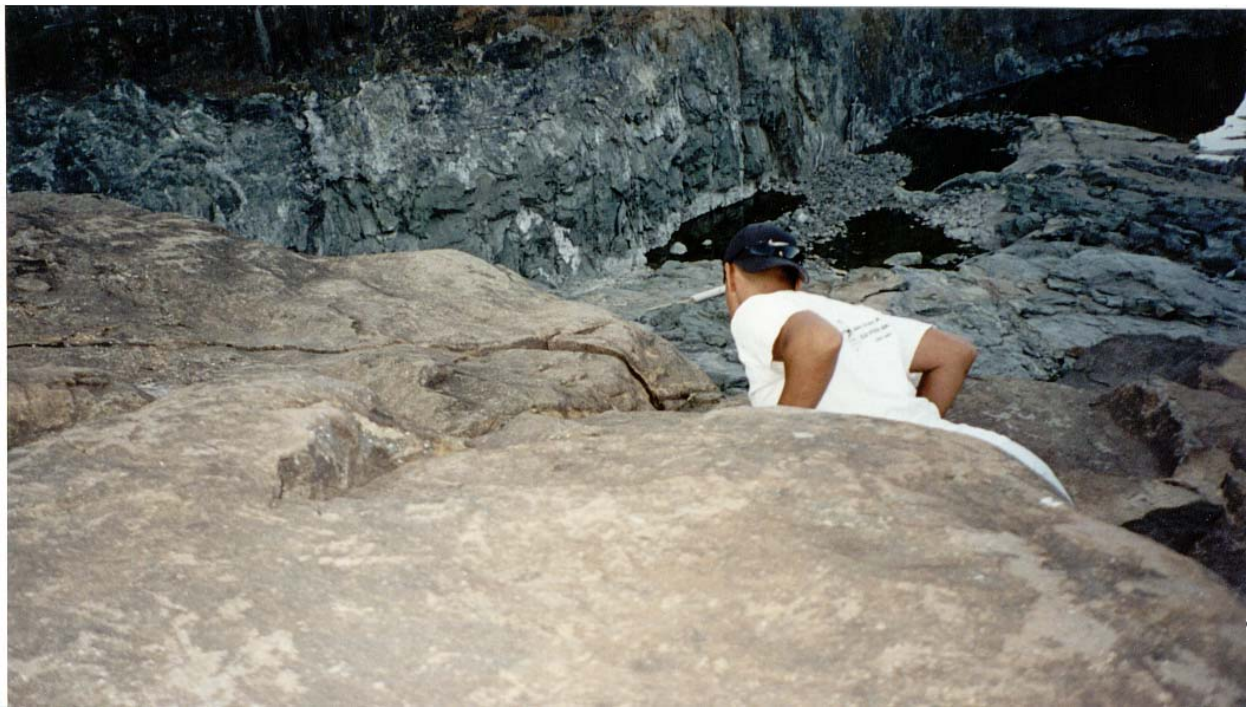
Evening / Night surveys were conducted on August 20 and 21, 2002. The primary objective of these surveys was to document the location of a reported bat colony near the Elsie dam site and

get a count on the number of bats as they left their day roost. The approximate location of the colony was supplied by Peter Warburton (B.C. Hydro's Environmental Monitor). The location of the colony apparently changes frequently and could not be located on the first night of survey. On the second evening the colony was located approximately 80 m downstream of the concrete spillway on the right side (facing downstream) of the rock cut (Photograph 9). The bat's vocalizations were clearly audible within 3 – 4 m of the colony. The bats were observed to be tightly crowded together within the rock crevice, with frequent noisy interactions noted. The bats were of a small size, with dark brown to black fur on the back and slightly lighter brown fur covering the underside. The bat's ears were not markedly large.

Sixty-two bats were counted as they left the roost; all appeared to be of the same species and size. Most of the bats appeared to be foraging over the isolated pools in the channel below the spillway. The survey crew noted that mosquitos at this site were very abundant after sunset. One other area with large numbers of bats was noted outside the study area, approximately 1 km southeast of the crest of Turnbull hill or approximately 800 m northwest of Turnbull Lake. The roost was not located, but is most likely in the southwest facing rock outcrops in the old growth Douglas fir stand mid-way up the hill. The colony is likely located within close proximity to the logging main, as many bats were observed flying low over the road in one location, before dispersing and flying down the road in the direction of Turnbull Lake. Bats were not observed with the aid of a spotlight over Elsie Lake.

Spotlight surveys of the shoreline of Elsie Lake were performed on these dates using a 12V – 750,000 candle-power spotlight. Animals were not observed within the study area using the spotlight, however a sow black bear with 3 cubs and one doe black-tailed deer were observed during travel to and from the sample sites.

Evening / twilight viewing stations were also conducted around Elsie Lake using a Bushnell Spacemaster 15-45X60mm spotting scope and tripod. Several sites were visited for 20 – 30 minutes each, where observations were made while listening and viewing the lake shoreline through the spotting scope. Animals were not observed from the viewing stations, however many bird species were noted using this technique.



### 3.2.7 General Wildlife Surveys

The ungulate inventory component was removed from this study as it was deemed to be too ambitious by BCRP, considering the scope of the proposed work and the available budget. However, deer and elk are relatively large animals that generally leave substantial amounts of sign, making it difficult not to observe and record occurrences during field surveys. The field crew recorded all wildlife observations during the field surveys, including ungulates. The ungulate information is presented as primarily qualitative comments.

Black-tailed deer (*Odocoileus hemionus columbianus*) trails, pellets, tracks, and browsed vegetation were present but not common throughout most of the project area. Buck rubs were very rare within the project area. The evidence of habitat utilization by black-tail deer was more common in the vicinity of wetlands, rock outcrops and at the upper (northwest) end of the study area, particularly in areas of Elsie Lake where draw-down had exposed sedges and young willow growth and on the island in Elsie Lake. Other areas within the study area where deer sign was noted were comprised of mixed deciduous tree canopies where sword fern or salmonberry were abundant. Important forage species for black-tailed deer include red huckleberry, sword fern, salmonberry, lichen, deer fern, salal, dull Oregon grape, red elderberry, willow, red-osier dogwood, common snowberry, trailing blackberry, fireweed, Douglas-fir and western redcedar (Bunnell 1990, Forbes 1975, Rochelle 1980).

Only one black-tailed deer (yearling doe) was observed within the study area during 27 days of field survey. Evidence of does with single or twin fawns were relatively common during June and July as evidenced by the number of tracks left in the draw-down zone of Elsie Lake. However, it was noted over the course of the summer that the number of fawn tracks decreased proportionately with the increase in wolf sign in these same areas. During the September surveys, it was noted that only one single set of fawn tracks was noted on Elsie Lake.

Evidence of use by Roosevelt elk (*Cervus elaphus roosevelti*) was limited to a single set of tracks (young bull) noted on two separate occasions near the mouth of Ramsay Creek. No other evidence of elk use was observed during the course of the study. A single set of elk tracks had been documented in the same area during fisheries surveys undertaken in the summer of 2001 (Cameron Tatoosh HFN, pers. Comm.).

Black bear (*Ursus americanus*) were abundant throughout the study area with 21 sightings. True den sites were not found, but bear beds, tracks, marked trees and scat were found throughout the project area and the rest of the Ash River Watershed. Bear beds that appeared to be used for extended periods or as denning sites were found at a few locations. Evidence of long term use was indicated by the prevalence of several scat piles of varying ages around the perimeter of the bed. On the island in Elsie Lake, a very well worn bear bed was found with many scat piles of varying ages deposited nearby into a single hole in the ground, effectively acting as a bear "toilet". This behaviour had not been observed before by any of the field personnel.

Black bear were often seen during travel to and from the study area. All of the bears observed were either females with cubs or young males; no large males were observed. Females with triplets were observed on two occasions. Bears were most often active in the late morning and late afternoon periods, especially on overcast or rainy days. Bears were also observed during night-time spotlight surveys. Bears destroyed the track plate sets on three occasions.

Wolf sign documented within the study area appeared to indicate two family groups were present. Tracks and scat observed on the logging roads between Dickson Lake and Elsie Lake suggested approximately 3 – 4 wolves were present in this area, while tracks observed in the draw-down zone of Elsie Lake indicated 5 wolves were using the northwest end of the lake as part of their territory. Wolf scat was observed to contain the hair, bones and hooves of black-tailed deer fawns. Wolf kills were not found, and wolves were not observed or heard during the study. On one occasion, campers at the southeast end of the lake did report hearing wolves howling around the lake at night.

Confirmed evidence of cougar utilization of the study area was not found during the study. Fresh tracks of a female and single young were found crossing the logging road approximately 2 km downstream of the Elsie dam, outside of the study area. Table 11 provides a list of wildlife documented during the field surveys.

**Table 11.** Wildlife species documented within the Ash River Study Area.

| Species | Scientific Name | Status |
|---|---|---|
| **Mammals** | | |
| Wolf | *Canis lupus* | |
| Roosevelt elk | *Cervus elaphus roosevelti* | Blue |
| Cougar | *Felis concolor* | |
| Pine marten | *Martes americana* | |
| Vancouver Island ermine | *Mustela eminea anguinae* | Blue |
| Mink | *Mustela vison* | |
| Bats* | *Unknown spp.* | |
| Black-tailed deer | *Odocoileus hemionus columbianus* | |
| Deer mouse | *Peromyscus maniculatus* | |
| Columbian mouse | *Peromyscus oreas* | |
| Raccoon | *Procyon lotor* | |
| Dusky shrew | *Sorex monticolus* | |
| Vagrant shrew | *Sorex vagrans* | |
| Eastern cottontail | *Sylvilagus floridanus* | |
| Douglas' squirrel | *Tamias douglasii* | |
| Black bear | *Ursus americanus* | |
| **Herptiles** | | |
| Long-toed salamander | *Ambystoma macrodactylum* | |
| Western toad | *Bufo boreas* | |
| Northern alligator lizard | *Gerrhonotus coeruleus* | |
| Pacific treefrog | *Hyla regilla* | |
| Red-legged frog | *Rana aurora* | Blue |
| Common garter snake | *Thamnophis sirtalis pickeringi* | |
| Wandering garter snake | *Thamnophis elegans vagrans* | |
| Rough-skinned newt | *Taricha granulosum* | |

**Note: Possible red or blue-listed species*

## 4.4 Wildlife Capability

Many species documented during the field surveys have specific habitat requirements. The amount of each specific habitat type present in the study area would result in limited use of the study area by a majority of the species listed. The occurrence of a significant proportion of species is related to the occurrence of deciduous / riparian forest types, the presence and relative abundance of wildlife trees and CWD, and the presence of wetland habitat types.

Observations of wildlife on most survey dates increased outside of the study area. Wildlife encounters and species diversity were generally observed to be greater outside of the boundaries of the study area. Areas with high numbers of wildlife occurrences and diversity included the

riparian areas of the other lakes in the Ash Watershed (Nimnim, Oshinow, Ash, McLaughlin and Pear) and along the upper Ash River, between the top end of Elsie Lake and Oshinow Lake.

The deciduous tree dominated areas contain abundant red alder snags that provide wildlife foraging and nesting habitat while the watercourses provide habitats important for amphibians, riverine and passerine birds.

A number of the wildlife species that were documented during the study, or have the potential to occur within the study area have been placed on the provinces tracking list for vertebrate animals. These species are discussed below in the context of their occurrence and the effects of proposed prescriptions on their continued use of the study area.

**Table 12.** Wildlife Species with Provincial Management Status for the Ash River Study Area

| Provincial Status | Species | Rank | Source |
|---|---|---|---|
| Blue List | Roosevelt elk | S2S3 | Observation |
| Red List | Keen's long eared myotis | S1S3 | Range overlap |
| Blue List | Great blue heron | S3BS4N | Observation |
| Blue List | Band-tailed pigeon | S3S4B,SZN | Observation |
| Blue List | Northern pygmy owl, *swarthi* subsp. | S3 | Range overlap |
| Blue List | Islands pine grosbeak | S3B, SZN | Observation |
| Blue List | Vancouver Island ermine, *anguinae* subsp. | S3 | Observation |
| Blue List | Red-legged frog | S3S4 | Observation |
| Red List | Northern goshawk, *laingi* subsp. | S2B, SZN | Observation |
| Red List | Common water shrew, *brooksi* subsp. | S2 | Range overlap |

### 4.4.1 Roosevelt Elk

Very little evidence of elk use of the study area was documented during the field surveys. It is unclear why the study area did not support a significant elk population, considering elk herds are located in similar nearby watersheds surrounding Port Alberni and Courtenay. Roosevelt elk are largely a riparian species that prefer moist habitats and will extensively utilise wetlands, seepages, floodplains and riparian habitats (Brunt, 1990).

Restoration prescriptions that promote riparian vegetation development and enhancement of deciduous tree, shrub and herb species should benefit potential elk populations within the study area.

### 4.4.2 Keen's Long-Eared Myotis

Keen's long-eared myotis (*Myotis keenii*) appears on the species list largely because records indicate its range may overlap the study area (Nagorsen and Brigham 1993). Keen's long-eared myotis appear to be restricted to the coastal forests between the Olympic Peninsula and Wrangell, Alaska with the majority of records for this species from coastal British Columbia. Although bat species were not specifically sampled for, bats were observed during the night-time field surveys. Sufficient habitats are present within the study area that would offer foraging and roosting opportunities for this species.

We recommend that BCRP consider funding surveys of bat species presence and habitat use in the lower Ash River Watershed. The location of the bat colony at the Elsie Lake dam site should be protected from disturbance.

### 4.4.3 Great Blue Heron

The distribution of the Great Blue Heron (*Ardea herodias*) includes Vancouver Island, coastal mainland and the Queen Charlotte Islands. Breeding locations include south-eastern Vancouver Island and the southern Gulf Islands. Colonies are located in deciduous, coniferous or mixed mature forests that are located near suitable foraging sites. Great Blue Herons were recorded within the study area. It is expected that they utilize the lower Ash River and, to a degree Elsie Lake within the study area for feeding and this is likely to occur primarily during draw-down on Elsie Lake and the fall salmon runs on the lower Ash River. Consequently, the possibility of herons using riparian areas within the study area for roosting and nesting habitat should be taken into consideration.

Prescriptions that involve the protection of mature and old growth forest stands in proximity to open water would likely benefit this species.

### 4.4.4 Band-tailed Pigeon

The band-tailed pigeon breeds from southern Vancouver Island and the south mainland coast, north to Alta and west to Tofino. It frequents natural and man-associated habitats including edges and openings in mature coniferous, mixed, and deciduous forests, city yards and parks, wooded groves, open bushland and golf courses (Campbell *et al*., 1990). Nests are generally poorly constructed twig platforms located near the end of coniferous branches between 3 and 10 m high. Band-tailed pigeons feed heavily on the berries of red elderberry, *Vaccinium* spp., cascara, European and Sitka mountain ash, arbutus and acorns of the garry oak. Small numbers of band-tailed pigeons were observed flying over the study area, and throughout the Ash Watershed.

Restoration prescriptions that involve planting of berry producing shrub and tree species within the study area would promote the continued use of the study area by band-tailed pigeons.

### 4.4.5 Northern Pygmy Owl

The *swarthi* subspecies of northern pygmy owl is endemic to Vancouver Island. The status of the *swarthi* subspecies reflects both its low numbers and loss of habitat throughout its range on Vancouver Island. Although this species was not observed within the study area, It was heard on two occasions and habitats within the study area are sufficient to sustain all life histories of the pygmy owl.

There are few records of the occurrence of northern pygmy owls on Vancouver Island, therefore its distribution and habitat requirements are poorly understood. Toth and Associates have observed northern pygmy owls on two occasions, with sightings near Cedar, B.C. and on Wolf Creek near Nanaimo Lakes. Both occurrences occurred in mature Douglas fir dominated forests.

The northern pygmy owl is one of the few owl species that is active during the day. It is considered one of a number of species that require mature and old growth forest habitats for their critical life history functions (Stevens, 1995). Mature forest types present in the study area would provide suitable conditions for northern pygmy owls.

Restoration prescriptions that involve the creation of wildlife trees, or enhance riparian area growth and complexity would likely benefit this species.

### 4.4.6 Islands Pine Grosbeak

The *carlottae* subspecies of the pine grosbeak (*Pinicola enucleator*) is endemic to Vancouver Island and the Queen Charlotte Islands. Pine grosbeaks were observed within the study area during the course of field work. It is included on the Provinces Blue list as population size is small and relatively little is known about its habitat use in British Columbia. It reportedly nests at higher elevations on Vancouver Island and forages in lowland forests during winter months. As it relies primarily on coniferous tree seeds as a source of food, the maintenance and conservation of mature coniferous tree species within the riparian areas of the lower Ash River and Elsie Lake would perpetuate the use of the study area by this species.

### 4.4.7 Vancouver Island Ermine

Vancouver Island ermine were documented as occurring within the study area, with one sighting and one track plating confirmation. Interestingly, the sighting occurred at approximately the

same location as the sighting listed by the CDC from January, 1994. Distribution of this subspecies is restricted to Vancouver Island and Saltspring Island. Ermine prey on a variety of small mammals, primarily voles and mice. However, Vancouver Island has relatively few species of appropriate prey. Elsewhere, ermine occupy a variety of habitats over a wide range of altitudes, often associated with riparian areas. Ermine occupy dens in burrows in the ground or in hollow logs. The home range of ermine has been estimated as 12–25 ha. There are fewer than 20 known occurrences, although more likely exist (B.C. Conservation Data Centre 1998).

Restoration prescriptions that result in increased available habitats for prey species (i.e. shrews, voles and mice) such as riparian planting or creation of habitat complexes (brush piles) should benefit Vancouver Island ermine populations within the study area.

### 4.4.8 Red-legged frog

Red-legged frogs are found from Vancouver Island and the adjacent mainland/Fraser Valley to northern Baja California (Green and Campbell 1998). Red-legged frogs on Vancouver Island are a forest-dwelling frog and are usually found along small streams, ponds or swamps within a moist forest. Red-legged frogs were observed at a number of locations during the study, including the Ash River floodplain within the study area, and within the draw-down zone of Elsie Lake.

The lower Ash River is not typical red-legged frog breeding or juvenile rearing habitat. Red-legged frogs breed during February and March at a time when the Ash River would likely be too high and water temperatures too cold for use as a breeding area. However, the observations of red-legged frogs within the study area indicates that this area is used by adult red-legged frogs during summer months.

Prescriptions which involve increasing riparian vegetation, and the creation of wetlands on Elsie Lake, would likely promote the population of red-legged frogs in the study area. However, the operation and draw-down regime of the reservoir would have to be modified to allow the Elsie Lake area to be used as successful amphibian breeding habitat.

### 4.4.9 Northern goshawk

One northern goshawk was observed in close proximity to the study area.

The *laingi* subspecies of northern goshawk is resident on the Queen Charlotte Islands, Vancouver Island and other coastal islands (e.g., West Cracroft and Nootka Islands), and possibly on the coastal mainland. The northern goshawk is a forest raptor that breeds in mature and old-growth coastal coniferous forests. It hunts in forests, along edges of openings, in riparian areas, and above the canopy. Foraging habitat may include a diversity of landforms and forest

cover types but areas with larger trees, high canopy coverage, and open forest floors tend to be preferred. It preys mainly on medium-sized forest birds such as grouse, jays, thrushes, woodpeckers, northwestern crows, and sharp-shinned hawks, or mammals such as red squirrels. On Vancouver Island and parts of the Queen Charlotte Islands, red squirrels may be a critical food during the spring period.

The primary threat to this subspecies is logging of old-growth and mature second-growth coniferous forests, especially the low to mid-elevation productive stands that most goshawks use, and where timber values are concentrated. Nest trees are usually live conifers that are larger than others in a stand, but dead conifers and deciduous red alders are also used. These are usually on gentle slopes at the bottom third of the slope, and generally face west or east on Vancouver Island and southwest on the Queen Charlotte Islands.

Restoration prescriptions that result in stand thinning, increased riparian habitat or increased prey species populations such as squirrels and grouse should result in increased use of the study area by northern goshawks.

### 4.4.10 Vancouver Island water shrew

*Sorex palustris brooksi* is restricted to Vancouver Island. Few occurrences are known, and the known populations on the southeast side of Vancouver Island are threatened by loss of riparian habitat due to urbanization. Based on the few specimens that have been captured and thus have habitat information associated with them, swampy slow moving water, with aquatic vegetation is required.

Water Shrews frequent the edges of streams and wetlands, but seem to be most abundant near swift-flowing streams with rocks or logs in and alongside the stream and tree roots in overhanging banks. They feed primarily on aquatic invertebrates but will also take some small fish and amphibians, as well as terrestrial prey. This solitary, asocial species has activity peaks just before dawn and just after dusk. Generally, Water Shrews mature their first spring, have two or three litters in the late spring or summer, and die the same fall or winter (Nagorsen 1996).

Water shrews were not captured during the study, but have been documented at Robertson Creek and Lowry Lake. A possible sighting of a water shrew by a member of the fisheries crew working on a tributary stream at the northwest end of Elsie Lake was investigated, but shrews were not observed or captured.

## 4.5 Plant Species and Plant Communities of Management Concern

Plants species identified during the study were compared with recent (March, 2003) Rare Vascular Plant Tracking Lists for the South Island Forest District presented by the CDC.

Although there is presently no legislation regarding the preservation of imperilled plant communities, the CDC ranking imparts value to them at the Regional and Provincial level. Conserving the attributes of significant representative examples of imperilled communities on the landscape is, therefore, an appropriate consideration with respect to the development and management of forested lands.

The study area contains plant species which may represent the younger stages of rare natural plant communities including: Douglas fir / sword fern (CWHdm/04, red-listed) and Western redcedar / sword fern (CWHxm1/05, blue-listed) very dry maritime.

Stand age varies across the study area and includes pioneer, pole/sapling, young and mature stands with stands of veteran Douglas-fir and western hemlock observed at a few locations. Stand composition is variable but in general Douglas fir and coastal western hemlock were the dominant species throughout the study area with big leaf maple and red alder dominating in small patches, and mixed species canopies present throughout the study area. Mixed species canopies are typically represented by Douglas-fir/western hemlock/big leaf maple, western redcedar/red alder, western hemlock / amabilis fir.

# 5.0 DISCUSSION

The key element to the success of several wildlife habitat restoration prescriptions proposed in the following sections is the modification of the operation of Elsie Lake. Prescriptions such as riparian planting and wetland creation will only be successful if the operation of Elsie Lake is modified to create a more natural sequence of draw-downs and flooding. We recommend a water level regime that is drawn-down from the approximate high water mark of 330.7 m to approximately 327 m by the beginning of the growing season or approximately April 15, and to 326 m by June 1. The reservoir should be maintained at this level for as long as possible into the summer in order to allow riparian vegetation establishment.

Elsie Lake is riparian zone inhibited. Riparian vegetation is limited to the upper and lower ends of the lake and the mouth of the unnamed creek (Italian Creek) on the south side of the lake near the northwest end of Turnbull hill. The remainder of the lake-shore riparian vegetation zone consists of a sporadic, narrow (1 – 3 m wide) strip of deciduous tree and shrub species. Forest cover surrounding the lake consists primarily of pole-sapling to young forest aged second growth coastal western hemlock and Douglas fir which extends to the high water mark of the lake. Factors which limit riparian vegetation development include the unnatural and extensive draw-down regime of the reservoir, combined with the relatively steep side slopes and coarse grained soils of the present lake shoreline.

Wildlife use of the Elsie Lake area is limited by several factors including:

- Minimal available riparian and littoral area,
- Lack of wetland habitats,
- Scarcity of large diameter wildlife trees, coarse woody debris and mature forests,
- Unnatural draw-down regime,
- Extensive network of roads

- The general lack of complexity in the even-aged second growth forests surrounding Elsie Lake

Achievement of the Wildlife Restoration Objectives as listed in Section 2.3 and as stated in Section 3.4 of Chapter 4, Volume 2 of the Strategic Plan would involve the following:

**Objective 1: Rehabilitate reservoir draw-down zones to enhance productivity and wildlife habitat in Elsie Lake.**

- **Developing foreshore (shoreline) habitat complexes at suitable locations.**

"Habitat complexes" is read to mean any structure that provides increased micro-habitat complexity, primarily in the form of brush piles and large woody debris.

Coarse Woody Debris (CWD) was found to be rare to common within the sampling sites. Large CWD and large diameter wildlife trees were found to be rare to non-existent at all sites in the vicinity of Elsie Lake. Woody debris is abundant along the high water mark in most areas of Elsie Lake. However, a large proportion of this wood is not functional, as it is still mobile in high water. Potentially, this wood could be moved to areas along the lake shoreline above the high water mark to increase the amount of CWD available for CWD dependent wildlife species.

- **Create snags along reservoir shoreline for cavity nesters and perching raptors.**

In general, wildlife trees are rare along the shoreline of Elsie Lake. Medium to large diameter snags are practically non-existent as all of the upslope forests adjacent to the lake are comprised of relatively even-aged young second growth forests. Wildlife tree creation could be accomplished by the selective girdling of shoreline trees. This method would also serve to create gaps in the forest canopy that should result in increased sub-canopy, shrub and herb layer development.

- **Provide artificial nesting structures for osprey**

Ospreys were observed on three occasions over Elsie Lake and on one occasion along the Ash River during this study. Nest sites were not found within the study area. Provision of an artificial nesting platform for osprey on Elsie Lake is feasible, however this may not result in use by ospreys and may not be beneficial for the target species due to the abundance of stumps and woody debris located just below the lake surface, which could lead to increased probability of osprey mortality. It was also noted during the field surveys that the prevailing winds and exposed fine lake bottom sediments from the draw-down regime also result in periods of increased turbidity within the shallows of Elsie Lake, which would impact osprey foraging success. By providing a nest site for osprey on Elsie Lake we may in fact be subjecting the target species to unnaturally high probability of mortality. Suitable large diameter trees are available for osprey nest sites on the island in Elsie Lake.

An alternate option is to provide osprey nesting platforms at other lakes within the Ash Watershed which may have a higher probability of target species use and would likely be more suitable to breeding success. Of the area lakes visited, Pear Lake and Dickson Lake were observed to have what appeared to be significant self-sustaining fish populations with extensive shallow water areas. The advantage of Dickson Lake would be that a breeding pair of osprey would have the option to forage on several lakes within the immediate vicinity of Dickson Lake (i.e. Ash, Turnbull, McLaughlin, Lois and Lowry).

**Objective 2: Conserve riparian and wetland habitats in the downstream portions of Ash River Watershed.**

- **Identify key habitats for conservation of biodiversity and enhanced production and undertake conservation, through protective measures, habitat acquisition and other means in the Ash River watershed.**

Ideally, all areas within the Riparian Management Areas of the study area should be acquired from the timber licensees by B.C. Hydro for the conservation of fish, wildlife and vegetation biodiversity. Alternatively, formal agreements could be sought between the land owners, B.C. Hydro, government agencies and other stakeholders in the watershed to protect these areas from future timber harvest, resource extraction or development.

Under the *Forest Land Reserve Act*: Private Land Forest Practices Regulation, **Division 2 – General Requirements around Streams and Fish Habitat** the requirements for protection of fish, wildlife and vegetation normally covered by the Forest Practices Code on crown land do not apply to land that is within 30 m of the high water mark of a reservoir used for generating hydroelectric power. This exemption from regulation significantly impacts the potential for restoration activities on Elsie Lake as the vast majority of land around the lake is privately held forest lands.

Areas with significant fish, wildlife and vegetation values were documented within the Ash River section of the study area downstream of Elsie Lake. An area of mature coastal Douglas fir occurs on both sides of a canyon Reach of the Ash River approximately 1 km downstream of the Elsie dam. Forest cover and plant associations at this site suggest a Coastal Douglas Fir moist maritime (CDFmm) biogeoclimatic classification. However, this site is well outside the boundaries of accepted occurrence for this BEC classification and it was therefore given the Coastal Western Hemlock dry maritime (CWHdm/01) site-series class. This site represents the only mature forest cover found to occur above the ravine crest on the Ash River within the study area. The site consists of south and north facing moss covered rock outcrops with mature or old growth forest cover. The canyon pools are important holding habitat for summer-run steelhead. See Objective 4, below.

**Photograph 17.** View of old growth Douglas-fir / moss covered rock outcrop polygon

**Objective 3: Create or enhance wetlands and riparian habitats for aquatic species (amphibians, waterfowl, cavity dependent species, small mammals).**

- **Consider various opportunities to dyke selected draw-down areas to hold water during growing and breeding season (spring and summer), or fall migration, when reservoir is normally drawn down at those times. Flood shallow basins in the watershed where feasible. Identify through field surveys other appropriate areas for creation of wetland habitats.**

The lack of permanent wetland areas around Elsie Lake was identified as a major limiting factor for wetland dependent species during the 2002 wildlife inventories. However, issues such as provisions for fish passage, possible fish mortality due to stranding, elevated water temperatures during summer months, appropriate siting, engineering, maintenance and high cost of construction need to be sorted out prior to implementation. It is hoped that these issues can be addressed during proposed works for 2003 and that wetland creation can be a specific prescription to increase both fish and wildlife production within Elsie Lake in a BCRP proposal for 2004.

Two or possibly 3 major sites that have potential for wetland creation were identified during field surveys. These are the same sites that currently have riparian area development, with shallow slopes and moisture retentive soils that allow riparian vegetation to survive draw down periods. The largest site is located at the west end of the lake on the north side.

- **Where practicable, create backwater channel and associated riparian habitats along Ash River segments where reduced downstream flows have diminished natural channel complexity in the floodplain.**

The survey crew did find sites with potential for off channel habitat creation on the lower Ash River. However, areas upstream of Dickson Falls are currently only accessible to summer-run steelhead. Potential for increasing steelhead and resident rainbow trout numbers on coastal systems through off channel habitat enhancement is negligible (Lister et. al. 1997). The best opportunities for off channel creation are within the lower gradient reaches of the river located between the Ash Pit bridge and Dickson Lake and from the confluence with Lanterman Creek to the confluence with the Stamp River; access to the latter being somewhat limited. These areas have relict or abandoned stream channels that would provide suitable areas for off channel enhancement.

It is questionable that post-impoundment downstream flows on the Ash River have resulted in reduced riparian habitat. As mentioned previously, a large proportion of this length of river is constrained within bedrock channel morphology, bedrock canyons, or steep sided ravines; all of which limit riparian development by confinement and limited available floodplain habitat.

An alternative to off channel habitat restoration on the Ash River would be to enhance the fish, wildlife and riparian habitats of tributaries to the lower Ash River. Funds spent on these locations would likely yield far greater return on the investment then on the mainstem of the Ash River.

**Objective 4: Protect small groups of old or second growth trees in strategic locations for current and future nesting use by bald eagles or ospreys.**

The recommendation is to protect, through acquisition or landholder agreement, the land within 30 m of the high water mark on Elsie Lake as well as the island on Elsie Lake. The island on Elsie Lake has the only mature / old growth timber within the immediate vicinity of the lake.

**Objective 5: Improve the knowledge base on rare, endangered and threatened species and habitat utilization in the Ash River watershed.**

This objective was achieved from the field surveys conducted in 2002.

A number of wildlife species observed within the study area or that have the potential to occur within the study area are dependent on wildlife trees to fulfill their critical life history functions. Species include the chestnut-backed chickadee, red-breasted nuthatch (*Sitta canadensis*), brown creeper (*Certia americana*), pileated woodpecker (*Dryocopus pileatus*), northern flicker (*Colaptes auratus*), hairy woodpecker (*Picoides villosus*), red-breasted sapsucker (*Sphyrapicus ruber*), northern saw-whet owl (*Aegolius acadicus*), clouded salamander (*Aneides ferreus*) and several species of bats. Wildlife trees that were present showed abundant foraging use by pileated woodpecker, hairy woodpecker, red-breasted sapsucker and northern flicker, although in

most cases evidence of use was not recent. Secondary cavity nesters (i.e. species of ducks, songbirds, bats, raptors) and weak cavity excavators (nuthatches, chickadees) were present, but not common within the study area. These species require the holes and cavities excavated by primary cavity excavators for nesting and rearing young. The preservation and creation of wildlife trees would contribute to the continued use of the study area by wildlife tree dependent species.

Wetlands and small watercourses provide important micro-habitats for wildlife species, in particular amphibian species. Wetlands, small watercourses and seepage sites within the study area likely provide habitat features important to a number of species that occur or have the potential to occur within the study area. Amphibians, such as red-legged frog (*Rana aurora*) and north-western salamander (*Ambystoma gracile*) require wetted areas for breeding and larvae rearing. Small mammals including shrews and mice are often more abundant and diverse in wetlands. These small mammals provide a potential food source for species like the northern saw-whet owl. Wetlands and riparian areas along watercourses also provide important forage and browse for black-tailed deer, Roosevelt elk and black bear. Wetlands associated with forested habitats provide habitat edges that are utilized by other guilds of wildlife. The preservation and creation of wetlands and riparian habitats within the study area is vital to the promotion of wildlife habitat complexity and species diversity within the study area.

Bald eagles (*Haliaeetus leucocephalus*) would be considered transient, to some extent, within the study area. Although there are no known nesting occurrences within the study area, bald eagle were observed on two occasions in the vicinity of Elsie Lake.

The occurrence of small mammal species was determined to a certain extent by the use of track plates. Pine marten appear to be fairly common within the study area. Pine marten, along with many of the species documented during this survey, will likely benefit from any restoration prescription which increases wildlife habitat complexity in the vicinity of Elsie Lake.

At least 10 bat species are known to inhabit Vancouver Island. Bats were observed within the study area during the night surveys. Veteran and large diameter wildlife trees were not common but are present within the study area, particularly below the ravine crest on the Ash River. Those with hollow interiors or cavities would provide excellent roosts for bat species. Bats would also take advantage of open water, cut-blocks, shrub and herb dominated wetlands to forage for insects.

Coarse woody debris (CWD) cover was variable across the study area. Large diameter CWD was fairly rare and the majority of cover was provided by medium (20-50 cm) diameter pieces. Coarse woody debris and large decomposing stumps support insects that are fed on by woodpeckers and other insectivorous birds including chestnut-backed chickadee, red-breasted nuthatch, brown creeper, wrens, thrushes, vireos, warblers and sparrows. CWD provides primary nesting and feeding habitat for wrens. The presence of CWD enhances the horizontal structure of the forest floor providing cover and foraging opportunities for deer mice. The increased capacity of downed woody debris to retain moisture creates favourable micro-habitats for salamanders and frogs. While both salamanders and frogs prefer damp woods, most are shown to utilize dry sites as secondary habitats and CWD is required to provide micro-habitats

within these drier sites. Some amphibians, such as the western red-backed salamander, lay their eggs under CWD.

Evidence of Roosevelt elk use of the study area was limited to the mouth of Ramsay Creek. It is unknown why there was not more evidence of use by Roosevelt elk in the Ash River Watershed. Similar sized watersheds located nearby (i.e. Tsable, Puntledge, Cameron) support significant resident herds of elk. The Ash River Watershed appears to have considerable amounts of appropriate habitat for Roosevelt elk and the lack of elk sign in the study area would seem to indicate that other factors such as poaching or natural predation may be suppressing elk numbers.

Track plating should be conducted during the period from fall to early spring. We do not recommend the use of pre-fabricated cubbies. Track plating / baiting should be combined with remote infra-red camera stations.

# 6.0 PRESCRIPTIONS

The proposed prescriptions involve 7 stages of effort including:

- Planting of selected Elsie Lake shoreline areas,
- Monitoring of wildlife use and wildlife habitat prescriptions,
- Unofficial camping areas site restoration,
- Wildlife tree creation and nest box installation,
- Signage program
- Select sites stand thinning and tending; and,
- Prescribed burning of rafted woody debris

Prescription sites are indicated on Figure 8.

The proposed timing and initiation of the prescriptions listed below is based upon factors such as plant dormancy, instream work windows and target species breeding seasons; actual timing will be dependent upon the date at which funding is secured. However, the proposed timing of the prescriptions listed will likely result in a higher survival rate for plantings and rate of initial use (i.e. nesting boxes) then if delayed to later dates.

Enhanced awareness will be achieved through the use of educational signage at prescription sites (e.g., waterfowl nesting, osprey nest platforms, wetland or off-channel restoration sites). The Hupacasath First Nation will also host an openhouse highlighting the results and prescriptions developed as a result of this study. The Bridge-Coastal Fish and Wildlife Restoration Program's sponsorship of this project will be acknowledged on all public communications. Hupacasath First Nation people will benefit from the proposed project through on site training in various wildlife inventory methodologies, species identification and environmental stewardship.

Areas outside BC Hydro's property boundaries to be treated with the proposed prescriptions will be dependent upon permission from Weyerhaeuser Canada Ltd. A copy of the 2003 proposal: "Bridge Coastal Fish and Wildlife Restoration Program Proposal for Restoration of Wildlife Habitats in the Ash River Watershed" has been sent to Weyerhaeuser Canada Ltd. for their consideration. On private forest-lands, prescriptions and enhancement would only be conducted within 20 m of the high water mark of Elsie Lake. Signage for prescriptions conducted on private forest lands would include acknowledgement for the licensees support of this project.

## 6.1 Riparian Planting

The gathering of local native plant stocks (rooted and cuttings) to be used in riparian planting and site reclamation prescriptions, and continued monitoring of wildlife use (i.e. owl surveys) will be conducted during March and April, 2003. Planting will be conducted in those areas selected during May and June, or as draw-down permits. Cuttings (primarily *Salix spp*.) will be stored in cool north facing locations at high elevations until needed. Planting and technical training will utilize methodologies outlined in Polster (1998). The area treated will be dictated by the budget allotted for this prescription. Accurate measurements will be made of all areas planted. Weyerhaeuser Canada has provided permission to harvest / collect native plants from their property for this project.

**Table 13.** Plant Species to be used in riparian planting and site reclamation prescriptions

| Species Name | Scientific Name |
|---|---|
| **Trees** | |
| Big leaf maple | *Acer macrophyllum* |
| Red alder | *Alnus rubra* |
| Shore pine | *Pinus contorta* |
| Western white pine | *Pinus monticola* |
| Black cottonwood | *Populus trichocarpa* |
| Douglas-fir | *Pseudotsuga menziesii* |
| **Shrubs** | |
| Saskatoon | *Amelanchier alnifolia* |
| Red-osier dogwood | *Cornus stolonifera* |
| Pacific crab-apple | *Malus fusca* |
| Sweet gale | *Myrica gale* |
| Pacific ninebark | *Physocarpus capitatus* |
| Cascara | *Rhamnus purshiana* |
| Nootka rose | *Rosa nutkana* |
| Salmonberry | *Rubus spectabilis* |
| Pacific willow | *Salix lucida* |
| Scouler's willow | *Salix scouleriana* |
| Sitka willow | *Salix sitchensis* |
| Red elderberry | *Sambucus racemosa* |
| Hardhack | *Spiraea douglasii* |
| Common snowberry | *Symphoricarpos albus* |

## 6.2 Campsite Reclamation

The reclamation of camping sites located on B.C. Hydro's property will be conducted in May. This work will require a small amount of machine time to deactivate / block vehicular access to identified restoration sites and to remove burnt vehicles and other waste. The sites will be prepared and hand-seeded with a native grass seed mixture and planted with appropriate shrub and tree species (primarily deciduous) for the soil moisture / exposure conditions at each site. Formal signage will be installed to inform the public of the projects purpose and additional placards will be installed to urge campsite users to stay off reclamation sites. Temporary plastic tape fencing will be used to delineate site boundaries.

## 6.3 Wildlife Trees and Nest Boxes

Wildlife tree creation will be conducted via girdling of select trees during April. Forest cover types surrounding Elsie Lake are primarily second growth young forests where medium to large diameter snags are rare. Identified active wildlife trees will be posted with yellow wildlife tree placards.

Six proposed nest box sites have been identified (figure 8), but more sites may be added depending on budget and time allotted for this prescription, as well as timber licensee permission. Nest boxes will be installed at the same time as wildlife tree creation. Installation of nesting boxes will provide nesting habitats for larger cavity nesting species such as the common goldeneye (*Bucephala clangula*), hooded merganser (*Lephodytes cucullatus*) and western screech owl (*Otus kennicottii*). Nest boxes will be constructed to specifications for each target species. The Hupacasath First Nation will be responsible for maintaining nest boxes in subsequent years. Annual maintenance and clean-out of nest boxes will be conducted in December or January of each year, for the lifespan of the nest boxes.

## 6.4 Stand Modification

Stand thinning and enhancement will be conducted in May or June, dependent upon date of funding. Selected sites along Elsie Lake will be modified to increase production of deciduous tree, shrub and herb layers to mimic lost riparian habitats by thinning, pruning and girdling of suppressed conifers. Girdling of selected small diameter second growth trees will also increase available habitat for primary and secondary cavity excavators and nesters. Thinnings and brush cuttings will be piled to create additional cover habitat for wildlife. Areas outside BC Hydro's property boundaries to be treated with these prescriptions will be dependent upon permission from Weyerhaeuser Canada Ltd. On private forest-lands, stand modification would only be conducted within 20 m of the high water mark of Elsie Lake.

## 6.5 Prescribed Burning

Rafted small woody debris was identified as preventing the establishment of littoral zone macrophyte and riparian plant communities in several areas of Elsie Lake (Photograph 18). Small scale prescribed burning of rafted small woody debris in the sites identified on Figure 8 will be conducted as weather, permits, draw-down and fire season allow. Small woody debris will be moved by hand to brush piles located away from the lake shoreline and burned during the appropriate weather window. The use of small power tools (i.e. chainsaws) will likely be required; all refueling of power tools will be conducted well above the high water mark and non-toxic lubricants will be used in all power tools. It is expected that this prescription will occur in September / October, 2003. Stable large woody debris would not be disturbed.

**Photograph 18.** View of rafted woody debris in shallow bay at northeast end of Elsie Lake

## 6.6 Wetland Creation

Further evaluation of potential sites for creation of wetland habitats by diking and backwatering will be conducted. Issues such as engineering design, siting, sources of permanent groundwater, fish access, potential elevated water temperatures / water quality and ways to reduce construction costs need to be resolved prior to implementation.

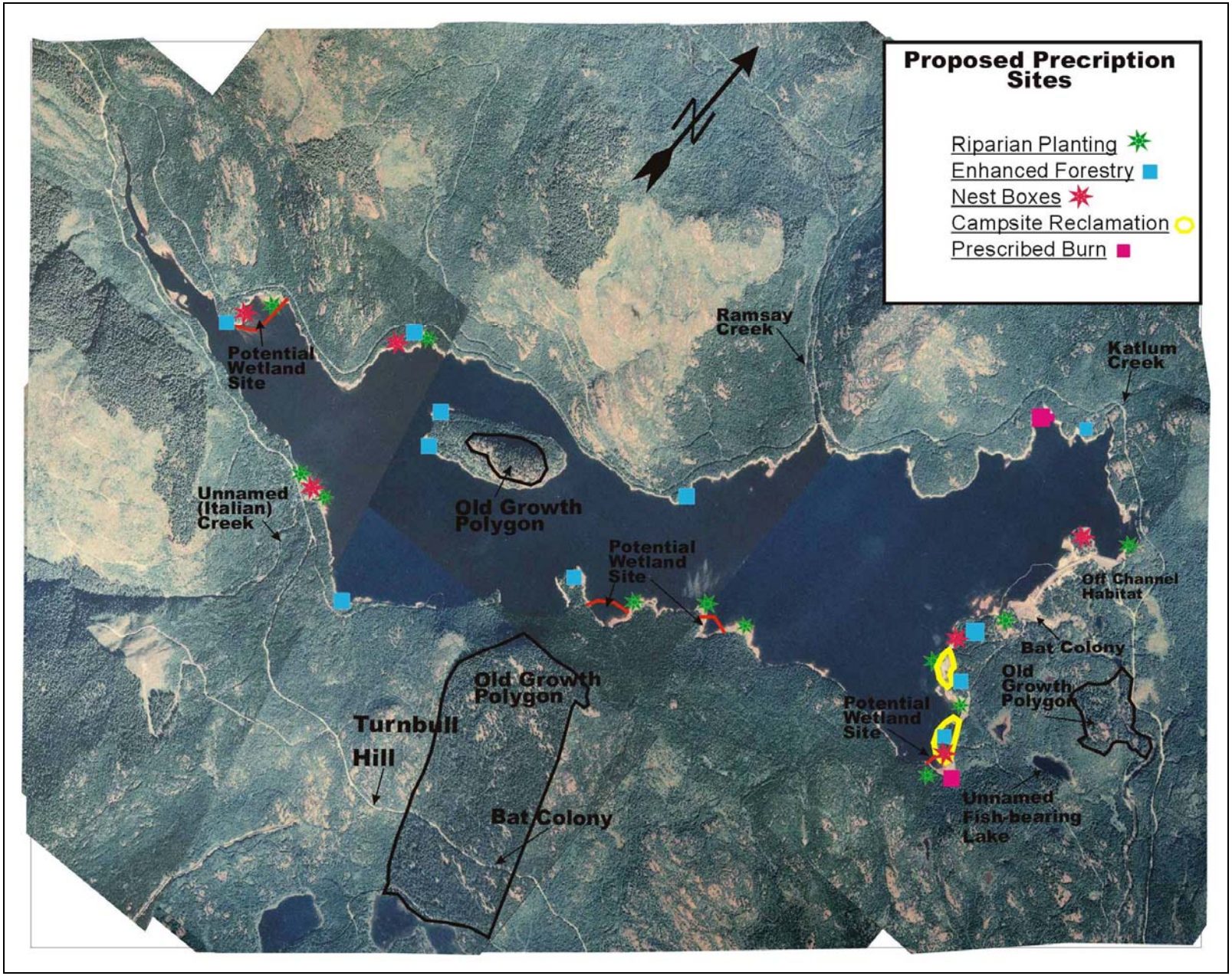



**Figure 8.** Proposed Prescription Sites

## 6.7 Signage

All major signage will be constructed according to the BCRP's Signage and Logo Guidelines. Due to the sensitivity of some prescriptions (i.e. nesting boxes), not all prescription sites will be identified by signage.

It is expected that BC Hydro will produce the signs. Photographs, Figures and text to be used on the signs will be provided by the Hupacasath First Nation and their consultants. The signs will consist of 2 large (30" x 40") and one small (24" x 18") signs (cost approximately $2,960). The small sign's proposed location is at the approach to the southwest side of the saddle dams on BC Hydro property. One large sign is proposed for the approach to the south east saddle dam and the other large sign is to be located at the west end of Turnbull hill at the junction of the logging main and the pump-house access road. The sign locations will be situated such that they do not pose a conflict to public safety or logging truck traffic. The location of signs on private property will require permission from the land-owners.

The BCRP Logo will be provided on all signs in the colours, size, and location indicated in the signage guidelines. Cedar shake kiosks will be purchased on the contract and installed by the Hupacasath and contractors. Layout of the signs is to be provided to BC Hydro for their review and production by August 1, 2003. Signs will be installed complete with 2.5 cm marine grade plywood backing, cedar shake kiosk and concrete embedded posts. Text will include information on the BCRP, project inventory methods, findings and prescription sites with reference to a central orthomosaic figure of the study area showing prescription sites according to a colour coded sidebar legend.

## 6.8 Training and Reporting

As part of the field work, training will be provided to Hupacasath First Nations crew members in a wide range of wildlife/plant inventory methodologies and procedures. These will include wildlife habitat inventory procedures, wildlife capture techniques, plant identification, bio-engineering and surveying. This training will be provided on an ongoing basis during the implementation of field studies. The goal of field supervisors will be to direct, supervise and complete field activities in an accurate and professional manner.

Brief progress reports will be provided to BCRP monthly during the field season. Final reporting (October, 2003 – March 31, 2004) will include as deliverables all data gathered and prescriptions implemented during the project, along with recommendations for any further prescriptions, monitoring or additional studies. Photographs of prescription sites showing implementation and post-construction conditions will be included. All pertinent data and prescription sites will be mapped on 1:20,000 TRIM map base.

## 6.9 Monitoring Plan and Evaluation

Monitoring will occur as an ongoing part of the project for 2003 and will include follow-up field surveys to monitor and photograph prescription site conditions and further document wildlife use of the project area. Field surveys of wildlife use will include: night-time owl surveys, small mammal / amphibian trapping (specifically for rare species presence), breeding bird surveys, and general surveys of wildlife occurrences at prescription sites. Identification of high wildlife use areas will aid in the protection of those areas and refinement of wildlife habitat prescriptions.

Continued monitoring of prescription success and wildlife use in 2004 will be dependent on funding support from BCRP and / or possible funding partners.

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