FINAL REPORT

INVENTORY OF RED- AND BLUE-LISTED SPECIES, AND IDENTIFIED WILDLIFE IN THE TASEKO MANAGEMENT ZONE, JULY-AUGUST 1996 AND FEBRUARY 1997

Prepared for
BC Ministry of Environment, Lands and Parks
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Prepared by

Lennart Sopuck, Kristiina Ovaska and Ron Jakimchuk

of

RENEWABLE RESOURCES CONSULTING SERVICES LTD.

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EXECUTIVE SUMMARY

Wildlife surveys for Red- and Blue-listed species and other identified wildlife species were conducted from 14 July to 9 August 1996 and from 6-14 February 1997 within the Taseko Management Zone (TMZ) in the Chilcotin Forest District of the Cariboo Region, British Columbia. The objective of the surveys was to provide information on wildlife distribution that would aid in evaluating management options within the context of a management plan that is currently under development for the zone and in implementing the required provisions for wildlife under the Forest Practices Code of British Columbia.

The surveys were aimed at obtaining information on the distribution and habitat use of species of ungulates, carnivores, raptorial birds, songbirds, waterfowl and amphibians at the "presence/absence" level of sampling. The methods consisted of ground-based transects for mammals and birds, songbird point counts, call play-back surveys for diurnal and nocturnal raptors, surveys by boat and helicopter for various mammals and birds, pond and stream surveys for amphibians and waterfowl, and snow-tracking transect surveys for carnivorous mammals. In July-August, the surveys were conducted in various habitats at a total of 37 sampling sites within the three Biogeoclimatic Zones present in the study area (Montane Spruce, MS, Engelmann Spruce-Subalpine Fir, ESSF, and Alpine Tundra, AT). In February, snow-tracking surveys were conducted along transects in the MS and ESSF Biogeoclimatic Zones. Resource Inventory Committee (RIC) standards and manuals were used to the greatest extent possible, and an evaluation of the manuals is presented in a separate report (ref).

The following target species and/or their sign were found during the surveys in July-August: Grizzly Bear, California Bighorn Sheep, Bald Eagle, Great Blue Heron, Barrow's Goldeneye, Sharp-shinned Hawk, Pileated Woodpecker and Spotted Frog. Wolverine and Fisher were confirmed to be present in the study area during snow-tracking surveys. According to local residents, Trumpeter Swan and Northern Harrier also occur in the study area. The following target species may occur in the area but their presence was not confirmed: Western Grebe, Surf Scoter, Oldsquaw, Harlequin Duck, Swainson's Hawk, Short-eared Owl, Northern Goshawk, Brown Creeper, Red-eyed Vireo and Vaux's Swift.

The time of the year for summer field surveys (14 July-9 August) was not optimal for detecting bird species that may use the area during spring and fall migrations or those that had completed breeding and territorial vocalizations, and additional surveys are required.

The following surveys are recommended for 1997: (1) helicopter surveys to obtain more information on habitat use by Grizzly Bear within the TMZ, (2) call “play-back” surveys in likely habitats in early

summer to detect nest sites of the Northern Goshawk, (3) surveys of lakes and wetlands in early spring for the presence of migrating waterfowl, (4) songbird transects and point-counts in riparian habitats to provide baseline data and to detect additional species, and (5) further delineation of Cottonwood and mixed-wood stands that are productive wildlife habitats within the TMZ.

Riparian areas in the Gunn Valley, including those along the Lastman, Tuzcha and Fishem Lakes and the floodplain of the lower Tchaikazan River, along Yohetta Creek and within the Lord River system were identified as key wildlife habitats, because of their relatively high productivity and species diversity, and because of their importance as travel corridors for a variety of wildlife. Cottonwood stands within these areas, although small and scattered, may be particularly important for a variety of wildlife species, such as cavity-nesting birds, tree-nesting raptors, furbearers, bears and ungulates. The identified riparian areas are largely within the Forest Ecosystem Network (FEN) proposed for the TMZ. Superimposing distribution and habitat suitability maps, prepared for individual target species, on the FEN map indicates that the requirements of those species that are associated with riparian or wetland habitats, such as Bald Eagle, waterfowl and amphibians, are reasonably well met. However, the requirements of those species that are wide-ranging, such as the Grizzly Bear and Wolverine, or that are associated with mature forest, such as the Pileated Woodpecker, are met to a varying degree.

Most conflicts between wildlife and human activities, such as logging, are expected to occur in the relatively productive low-elevation areas. Key species in these areas are the Grizzly Bear, Wolverine, Fisher and wetland species, such as waterfowl, songbirds and amphibians. It is critical that habitat areas and travel corridors in the Gunn Valley, and Lower Tchaikazan River and Lord River valleys will be maintained relatively intact.

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We greatly appreciate the contributions of John Russell, Duane Sept and Damian Power of Renewable Resources Consulting Services Ltd., who collected the majority of the field data. Duane Sept and John Russell provided all photographs except those on pages 36-37, which were provided by Kristiina Ovaska.

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1.0 INTRODUCTION

The Taseko Management Zone (TMZ), located within the Chilcotin Forest District, Cariboo Region, in central British Columbia, was established to ensure that human activities in the area, including timber harvesting, will be conducted with sensitivity to all values. A management plan for the zone is currently under development. Knowledge of the distribution and abundance of wildlife and their habitats is required to make informed decisions about management options and to implement required provisions for species at risk and regionally-important or Identified Wildlife under the Forest Practices Code of British Columbia. Such information was not available for most species within the TMZ.

In July 1996, Renewable Resources Consulting Services Ltd. was contracted to conduct wildlife surveys within the TMZ and to prepare species distribution and habitat suitability maps for specified wildlife species. The surveys were to focus on species on the provincial Red- and Blue lists and on other Identified Wildlife. This report presents the results of the surveys conducted from 14 July to 9 August, 1996, and from 6 to 14 February 1997. Species distribution and habitat suitability maps for identified species are presented in a map folio at 1:50,000 scale appended to this report. An evaluation of the Resource Inventory Committee (RIC) manuals used during the study is presented in a separate report.

The specific objectives of the study were to:

(1) Describe the distribution of Red- and Blue-listed wildlife species and Identified Wildlife based on habitat suitability and field observations at the "presence/absence" level.

(2) Describe habitats occupied by the above species at sampling locations.

(3) Record observations of large mammals other than those on the Identified Wildlife list.

(4) Describe habitat and site characteristics for all raptor nests observed.

(5) Record locations of all special wildlife features observed, such as dens, mineral licks and travel routes.

(6) Conduct playback call surveys for accipiters and owls and breeding bird point-surveys.

(7) Conduct snow-tracking surveys with emphasis on Fisher and Wolverine.

(8) Prepare species distribution maps at 1:50,000 scale for target species, based on field data, habitat, and other existing information.

2.0 STUDY AREA

The study area is located approximately 140 km southwest of Williams Lake in the Taseko Management Zone between latitudes of approximately 51° 00' and 51°25' N (Fig. 1). The TMZ is bounded by mountain slopes west of the Gunn Valley in the west, the shores of Taseko Lakes in the east, and the tip of Lower Taseko Lake in the north. In the south, the TMZ includes portions of the Lord, Falls and Tchaikazan Rivers. The TMZ is approximately 110 km long along its north-south dimension, and approximately 30 km in width at its widest point. The focus of the field surveys was to describe habitats within the TMZ, but the species distribution and habitat suitability maps also included areas adjacent to the artificial boundaries of the TMZ.

Much of the study area consists of high elevations and rugged terrain with scattered glaciers at the highest elevations. Elevations range from 1325 m at the Lower Taseko Lake to approximately 2,865 m above sea level. The study area includes portions of the Montane Spruce (MS), Engelmann Spruce - Subalpine Fir (ESSF) and Alpine Tundra (AT) biogeoclimatic zones. The MS zone is the most extensive (Map 1). The subzones within the MS are either unclassified (MSunc) or very dry, very cold (MSxv), and only the very dry, very cold subzone (ESSFxv) is present within the ESSF zone.

3.0 EXISTING INFORMATION

The existing information for the TMZ consisted of the following:

- Map of proposed Forest Ecosystem Networks (FEN) at 1:50,000 scale
- Map of winter and summer ranges of California Bighorn Sheep; about 1:143,000 scale; MELP, Williams Lake Regional Office
- Draft Biophysical Mapping; Chilcotin Ranges Project, NTS Map Sheets 92-0/3,4,5; 1:50,000 scale
- Forest cover and TRIM maps (1:20:000 scale); Aerial photographs (1:30,000 scale)

Fig. 1.

- Consensus Report of the Chilko Lake Study Team (Sept. 1993)
- Fur harvest records 1985-1995
- Fisheries surveys
- Canadian Wildlife Service Waterfowl habitat capability map; 1:50,000 scale
- Ungulate and Grizzly Bear habitat capability maps; MELP; 1:250,000 scale
- 1:250,000 Grizzly Bear habitat capability maps prepared by the BC Wildlife Branch (dated June 1995).
- Wildlife observations made during 1993/1994 helicopter surveys by MELP (Andrew Stewart, Victoria)

In addition to the above sources, information on distribution of different bird species was obtained from Birds of BC, Volumes I and II (Campbell et al. 1990).

4.0 METHODS

4.1 Field Methods

Survey methodology consisted of bird and mammal surveys along transects, songbird point counts at call stations, playbacks of calls of diurnal and nocturnal raptors, amphibian surveys in ponds and streams, snow-tracking surveys of carnivorous mammals, and helicopter surveys. The methodology used adhered to RIC standards for particular target species, whenever these were available. In summer, there were a total of 37 sampling sites (18 in MS, 9 in ESSF and 10 in AT biogeoclimatic zones; Map 2 and Appendix 1). In winter, there were nine transects (7 in MS and 2 in ESSF zones). Opportunistic observations of wildlife were also conducted during travel to and from the sampling sites by boat, vehicles and/or foot. Field surveys for Bull Trout were not conducted.

Bird and mammal transects and point counts:

Bird and mammal surveys were carried out along 800 m transects at sampling sites in the Montane Spruce (MS) and Engelmann Spruce - Subalpine Fir (ESSF) biogeoclimatic zones. In the Alpine Tundra (AT) biogeoclimatic zone, four 100 m transects were established at each sampling site. Shorter transects were used in the AT zone because the habitat units sampled were small. At all sites, each transect was placed in a relatively homogeneous habitat, which was characterized by describing the ecosystem and vegetation on a 12 m-radius plot representative of the habitat. Standardized methodology for ecosystem description was used (Luttmerding et al. 1990), and an Ecosystem Field Form was filled at each sampling site. The location

of each sampling plot was obtained using a portable Global Positioning System (GPS, Garmin 45). A photograph of each plot was also taken.

To conduct a survey, the observers walked slowly along a transect and recorded sightings and signs of birds and mammals. Signs included tracks, trails, faeces, evidence of feeding, excavation or burrowing, beds and nest sites. A listening station was established at every 200 m along each transect in the MS and ESSF zones, and calls of all birds heard during a 5-min period were recorded (RIC 1996a). An attempt was made to conduct the surveys during the optimal time of songbird activity within 4-5 hours of sunrise, but this was not always possible due to logistics of access and time constraints.

Shorelines, ponds and lakes were scanned for waterfowl, shorebirds and other wetland birds whenever sampling sites were established in or adjacent to wetland habitats. The sky was also scanned for raptors whenever suitable observation points were present.

Accipiter and Pygmy Owl Playbacks:

To locate nest sites of diurnal raptors (Pygmy Owl, Sharp-shinned Hawk, Merlin, Cooper's Hawk, Northern Goshawk), calls of these species were broadcasted at three evenly-spaced locations along the transect after the completion of the mammal/songbird survey. The calls were derived from recordings in Western Bird Songs - Peterson Field Guides (Cornell Laboratory of Ornitology - Interactive Audio, 1992) and broadcast using a Sanyo model M-119 cassette tape-recorder with a RadioShack Powerhorn loudspeaker. For each raptor species, the procedure followed that described in RIC (1996b) and consisted of (a) a 5-min baseline listening period, (b) broadcasting a call for 20 s while holding the speaker at breast-height, (c) listening and watching for raptor activity for 30 sec and (d) turning 120 degrees and repeating the procedure. The above process was repeated three times. After a 3-min pause, the entire procedure was repeated for the next species. The calls were broadcast in the order of smallest to largest species (Pygmy Owl, Sharp-shinned Hawk, Merlin, Cooper's Hawk, Northern Goshawk). The playbacks were conducted three times along each transect in the MS and ESSF zones (except once on 4 August 1996; Appendix 2).

Nocturnal Owl Playbacks

Playbacks of nocturnal owl calls were conducted after dark at two locations (northern tip of Lower Taseko Lake and by Lord River at the southern tip of Upper Taseko Lake). The calls of the following species were broadcast successively in the order of smallest to largest species: Saw-whet Owl, Flammulated Owl, Hawk Owl, Long-eared Owl, Spotted Owl, Barred Owl, Great Grey Owl and Great-horned Owl. The procedure followed that described for diurnal raptor call playbacks.

Snow-tracking Surveys for Carnivorous Mammals:

Snow-tracking for carnivorous mammals with emphasis on Wolverine and Fisher were conducted from 6-14 February 1997. Tracks were recorded along nine 2 km long transects, two of which were within the ESSF and seven within the MS biogeoclimatic zone (Map 5). For the purpose of access, the transects were set along existing trapline routes operated by Fritz Dieck.

A GPS recording was taken at the start and end of each transect, and the transects were divided into 200 m sections marked by flagging tape. The following features were recorded for each 200 m long and approximately 25 m wide section: (a) percentage of each habitat type, (b) land form, (c) percentage of coarse woody debris present, and (d) snow depth at the beginning of the section. Based on the dominant vegetation, the following habitat categories were used in the MS zone: (a) Lodgepole Pine dominant, (b) White Spruce dominant, (c) mixed Lodgepole Pine/White Spruce, (d) mixed-wood forest (with 30%-69% deciduous component), (e) deciduous forest (with 70% or more deciduous tree species), and (f) wetland/forest edge. The habitat categories in the ESSF zone were: (a) Whitebark Pine dominant, (b) mixed Whitebark Pine/Subalpine Fir, (c) mixed Whitebark Pine/Lodgepole Pine, (d) mixed-wood forest (with at 30-69% deciduous component), (e) deciduous forest (with 70% or more deciduous species), and (f) krumholtz.

Six of the transects were checked once and three twice during the survey period. Poor snow conditions (crusty, very little new snow during the survey) prevented more frequent checks. All tracks that could be seen from the transect (within a approximately 25 m on both sides of the transect) were recorded. For each species, details of the habitat within 25 m of the tracks were also recorded, including habitat type, land form and an estimate of coarse woody debris.

Field guides by Murie (1975) and Rezendes (1992) were used in the identification of tracks. Under good tracking conditions (1-2 cm of fresh snow on a hard surface) identification is relatively easy. However, in old or deep snow, details, such as shape of pad, size of toes or presence of hair, are often not discernible, and characteristics of the trail (pattern, width and length of stride) must be used. The following criteria were used in the identification of the target species in less than optimal snow conditions:

Marten versus Fisher. The tracks of a male Marten and female Fisher overlap in size, but weight differences between the two can be used in identification. Because the Fisher is much heavier than the Marten, it sinks deeper in the snow. Trails of the Fisher are also wider (about 5") than those of the Marten (about 3"), and the length of the stride also differs between the two species.

Wolverine. In deep snow, wolverine tracks can be identified by the size and weight of the animal. The trail is characteristically erratic in gait, length of strides and width, and it tends to meander. In deep snow, the Wolverine often leaves marks of feet and belly.

Amphibian Surveys:

Amphibian surveys consisted of basic pond surveys for the Spotted Frog along the shore, shoreline and shallow water zone (less than 1 m in depth) of lakes and ponds, and stream surveys for Tailed Frogs in potentially suitable fast-flowing streams. Pond transects that were approximately 100 m long were established in larger wetlands. One or two observers walked on the shore and/or waded in water near the shore and examined the area for adult frogs and larvae (RIC 1996c). Frogs were counted and caught with a dipnet for identification, as needed. Photographs were taken of adults and larvae of each species. In addition to pond transects, observations of frogs were made whenever sampling sites and bird/mammal transects were close to wetlands.

Small, fast-flowing streams were selected for surveys of the Tailed Frog. Two observers searched one or two 5-m sections per stream by examining the banks, water, rocks and bottom substrate for the presence of adults and tadpoles. Larger rocks that could be lifted were removed and piled up either on the bank or the middle of the stream to ensure a thorough search of all available cover objects (RIC 1996d). The searcher held a dipnet downstream from the cover object that was lifted to catch any larvae that might have been dislodged. Water temperature and stream characteristics (substrate, % of pools and riffles, % of crown closure) were recorded at the end of each search, and any removed cover objects were returned to the stream.

Helicopter surveys:

Helicopter surveys to locate large mammals and birds, such as bears, ungulates and raptors and their nest sites, were conducted on 2, 3, and 4 August 1996. The locations of sightings were obtained using GPS. The helicopter was also used to gain access to sampling sites in difficult to access parts of the study site mainly in the Alpine. The helicopter routes (total of 14 hours of flying time, including ferry to and from Williams Lake) are shown in Map 2.

4.2 Analysis of Field Data

Field data were entered into Microsoft Excel spreadsheets that contained the following information: species code, number of observations, date, age, observation type (sighting or sign), UTM coordinates, sample site number, habitat type, biogeoclimatic zone (BEC) and notes. Separate spreadsheets were prepared for Identified Wildlife species and Black Bear (Appendix 5) and for all other species (Appendix 6). Distribution data for each species were summarized by calculating the percentage of transects within each biogeoclimatic zone where the species or signs of its presence were observed. The location of each observation (sighting or sign) of Identified Wildlife Species were plotted on 1:50,000 scale species distribution and habitat suitability maps.

The nomenclature for species (common names, scientific names and species codes) follows that presented in Describing Ecosystems in the Field (Luttmerding et al. 1990).

4.3 Preparation of Species Distribution and Habitat Suitability Maps for Target Species

Habitat suitability maps at 1:50,000 scale were prepared for the following target wildlife species as a set of overlays for the FEN map for the Taseko Management Zone:

- Wetland species: Barrow's Goldeneye, Harlequin Duck, Spotted Frog
- Grizzly Bear
- California Bighorn Sheep
- Wolverine
- Fisher
- Raptorial birds: Bald Eagle, Peregrine Falcon, Golden Eagle, Swainson's Hawk, Short-eared Owl
- Other birds: Pileated Woodpecker, Great Blue Heron
- Bull Trout

Wetland species:

The delineation of wetland areas was based primarily on the mapping units of the Canadian Wildlife Service waterfowl capability map for the Tchaikazan region (CWS 1965) and the examination of aerial photographs (1:30,000 scale). Vegetation and topographic maps and field observations were used to verify boundaries and to assign ratings. For Spotted Frog, small ponds or floodplains with extensive sedges, grasses, low shrubs and emergent vegetation were classified as high suitability, whereas shallow shorelines of lakes with less extensive shoreline vegetation were classified as moderate suitability (Green and Campbell 1984, Leonard et al. 1993). A similar classification system was used for Barrow's Goldeneye, because wetlands with gently-sloping shorelines provide brood-rearing habitat for this species (Campbell et al. 1990). These habitats also contain potential nesting trees, such as large cottonwoods (*Populus balsamifera*) and aspen (*P. tremuloides*). For Harlequin Duck, riparian areas along fast-flowing, clear streams were classified as high capability (Campbell et al. 1990, Goudie 1991).

Grizzly Bear:

For Grizzly Bear, habitat units were delineated primarily from interpretation of 1:50,000 draft biophysical mapping (Chilcotin Ranges Project), field observations and interviews with residents (F. Dieck, M. Hawkridge) and biologists (A. Stewart, C. Schmid). Grizzly Bear habitat capability maps prepared by the BC Wildlife Branch (dated June 1995) at 1:250,000 scale provided a broad overview of the relative quality of habitats across central B.C., but this scale was too small for the resolution required at 1:50,000 scale.

The most important parameter for delineating polygons was the availability of forage in spring, summer and fall. Known or probable travel corridors were also considered. Units with suitable forage, such as moist alpine and subalpine meadows and active avalanche tracks within the ESSF and AT zones and floodplains within the MS zone were classified as high suitability habitats (Fuhr and Demarchi 1990). The habitat/vegetation polygons from the biophysical maps classified as "high" and "moderate" suitability, together with rationale, are shown in Appendix 3. Observations of Grizzly Bears and their sign in 1996 and in previous years by other observers, together with habitat descriptions collected at sampling sites, were used to confirm and refine the above system.

California Bighorn Sheep:

The approximate boundaries of sheep winter and summer ranges were transferred to the base map from an existing, 1:140,000 scale map, which was derived from aerial surveys of sheep over the past 10-15 years (MELP, Williams Lake Office, 1996). Observations of sheep by a local outfitter and during helicopter surveys by A. Stewart (Chilcotin Ranges Project) and RRCS Ltd. were also plotted.

Wolverine and Fisher:

The Wolverine is a habitat generalist, and seasonal prey abundance, rather than particular habitat features, can be used to explain its local distribution (Hash 1987, Dauphiné 1990). Mountainous regions in British Columbia appear to be particularly productive for the Wolverine, and the species can potentially be found in all three biogeoclimatic zones within the TMZ. Unvegetated areas, consisting of talus, rock, glaciers and recently-glaciated areas were classified as low for the Wolverine (habitat classes AT, RS, TAK, ROK, ROW, TAW, RO, GS, GSK, GSW, DG, DGK, DGW in Chilcotin Biophysical Mapping Project, MELP). River valleys that potentially provide an abundant prey base and travel routes within the AT, ESSF and MS zones were classified as high-quality habitat. The remaining habitats in these three zones were considered moderate in quality.

The Fisher is usually associated with forest with old-growth structural characteristics, such as the availability of coarse woody debris, large snags and high degree of canopy closure (Douglas and Strickland 1987, FPC Managing Identified Wildlife Guidebook, 1996; *draft*). However, they may forage within a wide variety of structural stages. Riparian habitats appear to be important for denning and for travel routes. Riparian areas in the MS zone were considered high-quality habitat for the Fisher. The remainder of the MS zone, together with river valleys within the ESSF zone, were considered moderate-quality habitat. The remainder of the ESSF zone was considered low-quality habitat. The AT zone was not considered as potential habitat for the species.

Bald Eagle

Lakes, rivers and fens and their forested shores were classified as high suitability for Bald Eagles, because they provide forage (fish), and perch and nest sites (Campbell et al. 1990). Clear lakes within the study area were considered to be high-quality breeding habitat because of abundant food sources.

Peregrine Falcon and Golden Eagle

Steep, non-forested cliff-faces that provide potential nesting sites for these species (Campbell et al. 1990) were delineated from topographic and terrain/vegetation maps. Potential habitats for the Peregrine Falcon likely occur at lower elevations in the TMZ due to more abundant prey (e.g. shorebirds, wetland birds), whereas both high and lower elevation cliff areas were considered potential nesting habitat for the Golden Eagle.

Short-eared Owl, Swainson's Hawk and Northern Harrier

These birds inhabit grasslands, sedge/willow meadows and open wetlands (Campbell et al. 1990). Open wetland/meadow habitats at lower elevations within the study area were classified as potential habitats for these species.

Pileated Woodpecker

Vegetation units from the draft biophysical maps (Chilcotin Ranges Project) that had a high percentage of older forest age classes (mature and old growth, classes 4-5) were classified as high or moderate suitability habitats for the Pileated Woodpecker based on the preference of the birds for feeding and nesting in large tree diameter trees (Steeger et al. 1996). Mixed-woods and floodplain forests, containing aspen and cottonwood, were given priority over coniferous forests, and areas containing spruce were considered more suitable than those containing pine. Appendix 4 shows the habitat units that were used in the classification.

Great Blue Heron

The Great Blue Heron occurs in a variety of shorelines, including lake shores, rivers, ponds and marshes (Campbell et al. 1990). Shallow shoreline habitats, open floodplains and wetlands at lower elevations were considered potential habitats for the Great Blue Heron.

Bull Trout

Water courses with gradients less than 20%, which provide potential habitat for adult Bull Trout (reviewed in Graves et al. 1990), were indicated within the study area based on an existing stream gradient map (MELP, Williams Lake Office). Potential spawning areas were indicated along streams with gradients less than 3% (Graves et al. 1990). Streams with established beaver ponds were excluded, because Bull Trout prefer clear streams with gravel substrate (McPhail and Baxter 1996). Portions of streams upstream from known barriers were also excluded. Previous field observations of Bull Trout within the TMZ were mapped and stream survey forms from 1980-1982 surveys were examined (data on file, MELP, Williams Lake Office), but no field work for the species was conducted in 1996.

5.0 RESULTS

5.1 Red- and Blue-listed Species and Identified Wildlife within the TMZ

The following target species and/or signs of their presence were observed during the surveys: Grizzly Bear, California Bighorn Sheep, Wolverine, Fisher, Bald Eagle, Great Blue Heron, Barrow's Goldeneye, Sharp-shinned Hawk, Pileated Woodpecker and Spotted Frog (Table 1). A spreadsheet of all observations of the target species is included in Appendix 5.

Target species that were not observed but that were confirmed to be present in the study area based on reports by local trappers and residents are Northern Harrier and Trumpeter Swan. Other possible species include birds that may use the area during spring or fall migration (Surf Scoter, Oldsquaw, Eared Grebe) and birds that may breed in the area (Harlequin Duck, Wood Duck, Brown Creeper, Red-eyed Vireo, Northern Goshawk, Vaux's Swift). Swainson's Hawk and Short-eared Owl may also occur in open wetland and meadow habitats, but because these habitats are not extensive, the study area most likely does not provide important habitats for these species (see Map 7 for habitat suitability).

Table 2 summarizes the status, presence in the study area and survey recommendations for each species of Identified Wildlife within the TMZ. The species listed as unlikely to occur in the study area were identified based on their known geographic distribution and/or habitat requirements. Additional surveys during optimal seasonal periods (e.g. during spring migration or breeding period for the bird species) are required to properly determine the presence of those species listed as possibly occurring in the study area.

5.2 Mammals

Grizzly bear: Grizzly Bears appear to make widespread use of the study area, and observations of their activity (tracks, feces, feeding signs) were made in the MS, ESSF and AT biogeoclimatic zones (Table 1). Most observations were in the ESSF zone, where 67% of the transects contained signs of Grizzly Bear activity. One adult bear was spotted in the AT zone from helicopter on 7 August 1996.

(Photographs)

Table 1. Observations of Red- and Blue-listed species and Identified Wildlife and/or their sign in the study area in July-August 1996 and February 1997. Total number of sampling sites in July-August = 37 (18 in MS, 9 in ESSF and 10 in AT Biogeoclimatic zones).

Species	Type of Observation	BEC Zone	% of transects where species/sign was observed for each BEC zone	Sampling site #'s
Mammals:				
Grizzly Bear	Sighting: 1 bear observed; Signs: fresh tracks, diggings, scats	ESSF, AT, MS	ESSF: 67% AT: 10% MS: Not on transect	ESSF: 468, 310,312, 314, 316, 318 AT: 317
California Big-horn Sheep	Sighting of 1 male	AT	AT: 10%	AT: 317
Wolverine	Sign; tracks on snow transects	MS	3 of 7 snow transects	Transects: 2, 5, 8
Fisher	Sign; tracks on snow transects Sighting of 1 animal	MS, ESSF	MS: 3 of 7 snow transects ESSF: 1 of 2 snow transects	Transects: 2, 3, 6, 9
Birds:				
Bald Eagle	Sightings; 3 nest sites: one nest active in 1996 with 2 fledglings	MS	Not applicable	Not applicable
Great Blue Heron	Sightings: 2 birds Signs: tracks of one bird	MS	Not applicable	Not applicable
Barrow's Goldeneye	Sightings, including two broods and a tree nest	MS	Not applicable	Not applicable
Sharp-shinned Hawk	2 sightings	MS, ESSF	ESSF: 11.1% MS: Not on transect	ESSF: 318
Pileated Woodpecker	Signs: excavations in tree trunks	MS, ESSF	ESSF: Not on transect MS: 22%	MS: 458, 461, 476, 295
Amphibians:				
Spotted Frog	Numerous sightings, including breeding sites with larvae	MS, AT	Found at all 6 sites with pond transects	Pond transects 1-6

Table 2. Target wildlife species confirmed to be present, possibly occurring, likely to occur, or unlikely to occur within the Taseko Management Zone. Species confirmed to be present in the study area are shaded.

Group	Code	Status	Presence in study area	Additional survey requirements
Fish:				
Bull Trout		Blue-listed	Present	Stream surveys in selected areas
Amphibians:				
Tailed Frog	A-ASTR	Blue-listed	Unlikely	
Spotted frog	A-RAPR	Identified species	Present: observations	
Reptiles:				
Rubber Boa	R-CHBO	Blue-listed	Unlikely	
Birds:				
Western Grebe	B-WEGR	Red-listed	Possible during migration	Spring survey
Peregrine Falcon, subspecies *anatum*	B-PEFA	Red-listed	Unlikely	
Gyrfalcon	B-GYFA	Blue-listed	Unlikely	
Great Blue Heron	B-GBHE	Blue-listed	Present: signs and observations	
American Avocet	B-AMAV	Blue-listed	Unlikely	
American Bittern	B-AMBI	Blue-listed	Unlikely	
Sandhill Crane	B-SACR	Blue-listed	Unlikely	
Surf Scoter	B-SUSC	Blue-listed	Possible during spring/fall migration	Spring survey
Bald Eagle	B-BAEA	Blue-listed	Present: observations	
Swainson's Hawk	B-SWHA	Blue-listed	Possible	Spring survey
Short-eared Owl	B-SEOW	Blue-listed	Possible	Spring survey
Flammulated Owl	B-FLOW	Blue-listed	Unlikely	

Group	Code	Status	Presence in study area	Additional survey requirements
Turkey Vulture	B-TUVU	Blue-listed	Unlikely	
Bobolink	B-BOBO	Blue-listed	Unlikely	
Hudsonian Godwit	B-HUGO	Blue-listed	Unlikely	
Lesser Golden Plover	B-LGPL	Blue-listed	Unlikely	
Long-billed Curlew	B-LBCU	Blue-listed	Unlikely	
Short-billed Dowitcher	B-SBDO	Blue-listed	Unlikely	
Oldsquaw	B-OLDS	Blue-listed	Possible during spring/fall migration	Spring survey
Trumpeter Swan	B-TRUS	Blue-listed	Present: observations by local people during spring migration	Spring survey
Red-necked Phalarope	B-RNPH	Blue-listed	Unlikely	
Wandering Tattler	B-WATA	Blue-listed	Unlikely	
Eared Grebe	B-EAGR	Identified species	Possible	Spring survey
Harlequin Duck	B-HADU	Identified species	Possible	Spring survey
Wood Duck	B-WODU	Identified species	Possible	Spring survey
Barrow's Goldeneye	B-BAGO	Identified species	Present: observations	
Northern Goshawk	B-NOGO	Identified species	Possible	Call play-back survey during breeding
Sharp-shinned Hawk	B-SSHA	Identified species	Present: observations	
Cooper's Hawk	B-COHA	Identified species	Unlikely	
Northern Harrier	B-NOHA	Identified species	Present: observations near study area; in TMZ by local people	
Long-eared Owl	B-LEOW	Identified species	Unlikely	
Pileated Woodpecker	B-PIWO	Identified species	Present: signs, sightings local people	
Brown Creeper	B-BRCR	Identified species	Possible	During breeding
Red-eyed Vireo	B-REVI	Identified species	Possible	During breeding
Group	**Code**	**Status**	**Presence in study area**	**Additional survey**

				requirements
Vaux's Swift	B-VASW	Identified species	Possible	During breeding
Mammals:				
California bighorn	M-OVCC	Blue-listed	Present: signs & observation	
Fisher	M-MAPE	Blue-listed	Present: tracks & observations; trapping data	
Wolverine	M-GUGU	Blue-listed	Present: tracks; trapping data	
Grizzly bear	M-URAR	Blue-listed	Present: signs & observations	Helicopter surveys
Badger	M-TATA	Blue-listed	Unlikely	
Hoary bat	M-LACI	Identified species	Unlikely	
Silver-haired bat	M-LANO	Identified species	Unlikely	

Grizzly Bear sign was observed in a variety of habitats, including low-elevation floodplains by Taseko Lake, sedge-willow wetlands and sub-alpine within Whitebark Pine - Sub-alpine Fir - Lodgepole Pine forests, avalanche tracks and alpine meadows. Evidence of feeding on Whitebark Pine nuts cached in squirrel middens (in sub-alpine meadows and mature subalpine forest), sedges (in a willow-sedge wetland) and arrow-leaved balsamroot (*Balsamorhiza sagittata*) was noted. Grizzly Bear tracks were observed on a sandy spit that divides the Lower and Upper Taseko Lakes at the delta of the Tchaikazan River. This area also contained tracks of Moose, Mule Deer and Wolf and is likely an important travel route for large mammals that use habitats both on the east and west sides of Taseko Lakes.

Patches of high and moderate suitability habitats for Grizzly Bear occur throughout the TMZ (Map 3). These include floodplains and valley slopes along the Lord River and its tributary in the south of the study area and along Falls, Tchaikazan and Yohetta Rivers, sub-alpine slopes in the northwest of the study area, low-lying areas in the Gunn Valley, and low elevation slopes along the west side the Lower Taseko Lake. Floodplain habitats and south-facing slopes provide foraging areas for bears and may be especially important in spring due to the early green-up of herbaceous vegetation (MELP 1995). These areas, as observed in the Tchaikazan River Delta, also form potentially important travel routes for the bears. Active avalanche tracks are fairly common in the southern third of the study area and likely provide bears with important summer forage. Lush alpine meadows are relatively scarce, and most alpine areas visited were dry and rocky with steep gradients. However, potentially important alpine meadows are present in the northwest and west-central portions of the study area (Map 3).

Although high- and moderate-quality habitats for Grizzly Bears occur throughout the TMZ, these areas are relatively small and scattered when compared to areas farther west (such as in Tweedsmuir Park region; Map Sheet 92N) and east (Quesnel highland; Map Sheet 93A) according to 1:250,000 Grizzly Bear habitat capability maps prepared by the BC Wildlife Branch (dated June 1995).

California Bighorn Sheep: One male was sighted during a helicopter survey in the AT zone within the delineated summer range of the species. The mid-western part of the TMZ overlaps with a major portion of one of four areas that have been delineated as sheep ranges within the region (Map 4). This area contains both winter and summer ranges of the sheep. Two other sheep habitat areas, one immediately north of the above, the other east of TMZ, abut the study area. The largest of the delineated summer and winter ranges of the sheep is located east of TMZ.

Wolverine and Fisher: Tracks of the Wolverine and Fisher were observed during snow-tracking surveys in February 1997, and a Fisher was sighted at a bait station set up by the local trapper in the Gunn Valley. Wolverine tracks were present along 3 of 7 transects in the MS zone and those of Fisher along 3 of 7 transects in the MS and 1 of 2 transects in the ESSF zone (Table 3). Other mammal species recorded during the snow-tracking surveys were Marten, Ermine, Mink, River Otter, Lynx, Cougar, Wolf, Coyote, Red Fox, Moose, Snowshoe Hare and Red Squirrel. Habitat use by predators (Fisher, Lynx, Coyote, Red Fox) and prey species (Moose, Snowshoe Hare, Red Squirrel) in relation to habitat availability is shown in Fig. 2. An insufficient number of observations existed for the remaining species to determine habitat use.

A total of 11 tracks of the Fisher were found along the transects. These were in a variety of forested habitats: Lodgepole Pine dominant (young and maturing, and mature) and mixed Lodgepole Pine/White Spruce forest in the MS zone and Whitebark Pine/Subalpine Fir Forest in the ESSF zone (Table 4, Fig. 2). The Fisher, together with most other carnivores, was most abundant in young/maturing Lodgepole Pine forest and appeared to use this habitat in excess of its availability. This may have been in response to the abundance of prey species, such as the Snowshoe Hare and Red Squirrel, in this habitat (Fig. 2).

River valleys, including the Gunn Valley, Lord River, Yohetta Creek and Tchaikazan River valleys and floodplains are considered high-suitability habitat for the Fisher due to their relatively high productivity and abundance in prey, and their potential importance as travel corridors (Map 5). In addition, stands of large spruce trees and cottonwoods observed in these areas may provide important denning sites for the species. The field sampling shows that the Fisher is widespread in the Gunn Valley and uses a variety of habitats. However, small sample sizes may account for the lack of observations in deciduous and mixed-wood forests and along wetland edge, all habitats that are potentially important for the Fisher.

Trapping records from the four traplines that overlap the study area indicate that low numbers of Fisher have been caught from 1985 to present (Table 5). The Fisher was caught throughout the study area except in the trapping area in the south between the Lord and Taseko Rivers. Whether this pattern indicates low densities in this area or reduced trapping effort is unknown.

Three sets of Wolverine tracks were observed along transects in the MS zone (Table 4), and an additional three tracks were observed immediately north of the study area in Lodgepole Pine-dominated forest. Along transects in the Gunn Valley, tracks were seen in mixed Lodgepole

(Photographs)

Fig. 2.

Table 3. Wildlife tracks observed during snow-tracking surveys from 6-14 February, 1997, in the Taseko Management Zone. Total number of transects = 9 (7 in MS and 2 in ESSF Biogeoclimatic zones).

Species	Code	Proportion of transects where present	Transect #'s
Wolverine	MGUGU	MS: 3/7	2, 5, 8
Fisher	MMAPE	MS: 3/7; ESSF: 1/2	2, 3, 6, 9
Marten	MMAAM	MS: 3/7; ESSF: 2/2	1, 3, 4, 6, 8
Ermine	MMUER	MS: 5/7; ESSF: 2/2	1, 2, 3, 4, 5, 6, 8
Mink	MMUVI	Not on transect	-
River Otter	MLOCA	Not on transect	-
Lynx	MLYCA	MS: 7/7; ESSF: 1/2	1, 2, 3, 4, 5, 7, 8, 9
Cougar	MFECO	Not on transect	-
Wolf	MCALU	MS: 1/7	8
Coyote	MCALA	MS: 6/7; ESSF: 1/2	1, 3, 4, 5, 7, 8, 9
Red Fox	MVUVU	MS: 5/7; ESSF: 2/2	1, 4, 5, 6, 7, 8, 9
Moose	MALAL	MS: 7/7	1, 2, 3, 5, 7, 8, 9
Snowshoe Hare	MLEAM	MS: 7/7; ESSF: 2/2	1-9
Red Squirrel	MTAHU	MS: 7/7; ESSF: 2/2	1-9

Table 4. Percentage of mammal tracks observed in each habitat type during snow-tracking surveys from 6-14 February 1997. The proportion of each habitat type, based on habitat description within 200 m sections along transects, is also shown.

Species	**Habitat category within the MS Biogeoclimatic Zone**							**Total # of obs. n=68**
	Lodge Pole Pine		**White Spruce 6%**	**Lodge Pole Pine/ White Spruce 25%**	**Mixed-wood forest 6%**	**Deciduous forest 12%**	**Wetland edge 12%**	
	Y[1] 19%	**M[2] 20%**						
Wolverine				33%		33%	33%	3
Fisher	44%	33%		22%				9
Marten	33%			33%			33%	3
Ermine		13%		62%	13%		13%	8
Lynx	31%	3%	3%	29%	7%	12%	14%	59
Wolf							100%	1
Coyote	43%	9%	9%	9%	5%	13%	13%	23
Red Fox	32%	13%		19%	12%	6%	19%	16
Moose	33%		7%	21%	7%	18%	14%	57
Snowshoe Hare	37%	5%	6%	23%	6%	10%	13%	62
Red Squirrel	46%	9%	9%	18%	9%	9%	9%	35

[1]Young or maturing

[2]Mature

Table 4 continued:

Species	Habitat category within the ESSF Biogeoclimatic Zone						Total # of obs. n=20
	Whitebark Pine 15%	Whitebark Pine/ Subalpine Fir 45%	Lodge Pole Pine/ Whitebark Pine 25%	Mixed-wood forest 5%	Deciduous forest 5%	Krumholtz 5%	
Wolverine							0
Fisher		100%					2
Marten	10%	60%	20%		10%		10
Ermine	22%	67%	11%				9
Lynx	50%		50%				2
Wolf							0
Coyote	14%		57%	14%	14%		7
Red Fox	9%	64%	9%	9%		9%	11
Moose			80%		20%		5
Snowshoe Hare	16%	47%	26%	5%	5%		19
Red Squirrel	18%	47%	30%	6%			17

Table 5. Capture records for Wolverine and Fisher from four traplines that overlap the Taseko Management Zone. The traplines are: 0504T001, 0504T002, 0504T003 and 0504T006.

Year	Wolverine	Fisher
1985	2	1
1986-1989	0	0
1990	0	3
1991	0	2
1992	0	0
1993	0	7
1994	0	2
1995/1996*	2	2
1996/1997*	0	5
Total	**4**	**22**

*Data available only for traplines 054T006 and 0504T002

(photographs)

Table 6. Summary of observations of raptor nest sites in the Taseko Management Zone from 14 July-9 August 1996.Tree-H: living tree, Tree-D: snag.

Species	Date y/m/d	Location (UTM)	Nest stage	Adult activity	Young & stage	Nest site description				BEC zone
						Nest type	Support	Tree Diam.	Nest height	
BBAEA	96/7/18	0452550 5683424	Old; used in 1995	None	None	Platform	Tree-H (Lodgepole Pine)	45 cm	10 m	MS
BBAEA	96/8/5	0455620 5687800	Active; B	None	fledglings (2)	Platform	Tree-H (Cotton-wood)	110 cm	30 m	MS
BBAEA	96/8/5	0455830 5687410	Old	None	None	Platform	Tree-H (Cotton-wood)	100 cm	17 m	MS
BBAEA or OSPR	96/8/6	0451950 5679150	Old	None	None	Platform	Tree-D (Lodgepole Pine)	appro. 40 cm	appro. 15 m (viewed from air)	MS

Lake and to Tuzcha Lake (Map 7). Breeding records of Bald Eagles are widely-distributed throughout the province, and previous records exist from areas both north and south of the TMZ (Campbell et al. 1990).

High- and moderate-quality habitats for Bald Eagles are present along the Upper and Lower Taseko Lakes, along the valley and wetlands that extend from Lastman lake to Fishem Lake and along the delta and floodplain of the Lord River (Map 7). The lakes in the Gunn Valley appear to be particularly suitable for the species due to the clarity of water, which facilitates foraging.

Peregrine Falcon: Both breeding and non-breeding birds usually inhabit areas that support an abundant food supply including shorebirds and waterfowl (Campbell et al. 1990). Such a food supply appears not to be present in the TMZ. Although potentially suitable nesting sites are present in many parts of the TMZ (Map 7), the presence of breeding birds is unlikely. Historically, breeding has been reported from river canyons and cliffs bordering large lakes at inland sites as far north as the Chilcotin-Cariboo Basin. Campbell et al. (1990) report historical breeding records just west and south of Williams Lake, but these lower elevation areas are more likely to support larger numbers of shorebirds and waterfowl than areas within TMZ.

Golden Eagle: The Golden Eagle is on the provincial Yellow List and designated as "s4", i.e. a species that is presently secure but may have restricted distribution or perceived future threats. However, the species may be vulnerable because of its sparse distribution, low reproductive potential and specialized breeding requirements. The Golden Eagle should be included in the list of Identified Species, because other raptors, such as Coopers Hawk and Sharp-shinned Hawk, are also included. Two known nest sites of the species are present in the northern part of the TMZ, and two Golden Eagles were sighted during the 1996 surveys (Map 7). Potential cliff-nesting habitat are scattered throughout the study area in the subalpine and alpine zones (Map 7).

Northern Goshawk: No Northern Goshawks were observed during the field surveys, but the presence of this species in the TMZ is likely. The birds breed in a variety of forested habitats, including dense stands of mature coniferous forest, mixed woodlands and deciduous stands of variable size (Campbell et al. 1990). Preferred prey items, including Snowshoe Hare, Ruffed Grouse, Spruce Grouse and squirrels, are found within the study area. Breeding records occur throughout the province and across the Cariboo Forest Region both east and west of the Fraser River. Additional surveys using playbacks of calls are recommended during spring and early summer.

Sharp-shinned Hawk: Two Sharp-shinned Hawks were observed during the surveys (Map 7). The birds breed throughout the province in dense mixed coniferous forests and other forested habitats, usually near water. Breeding likely occurs in the TMZ.

Cooper's Hawk: This species was not observed during the field surveys, and its presence in the study area appears unlikely. The birds are widespread in southern BC below 52° latitude (Campbell et al. 1990). Although breeding is known from north and west of Williams Lake, no such records exist for areas west of the Fraser River above 50.2° latitude, which is well south of TMZ.

Northern Harrier: Northern Harrier was sighted along the road immediately north of the study area, and reliable sighting records by a local resident (Mike Hawkridge, pers. comm.) confirms the presence of the species in the TMZ. However, the birds inhabit open areas, such as wetlands, and the limited extent of such areas within the TMZ greatly restricts their potential distribution (Map 7).

Swainson's Hawk: No Swainson's Hawks were observed within the study area, but several birds were sighted in open pastures along the road west from Williams Lake towards the study area. The birds inhabit relatively open areas, and nesting usually occurs in woodlands or forest groves adjacent to these areas. The Swainson's Hawk might be present in the study area, but the paucity of open habitats limit its potential distribution (Map 7).

Short-eared Owl: Like the Northern Harrier and Swainson's Hawk, the Short-eared Owl inhabits open habitats. It is possibly present in the study area, but potential open habitats are limited in extent (Map 7).

Long-eared Owl: Suitable habitats for Long-eared Owl within the TMZ are very limited. The birds commonly inhabit deciduous woodlands adjacent to open country, including riparian habitats and aspen groves (Michaela Waterhouse, pers. comm.). Such habitats are uncommon and of limited extent in the TMZ. The centre of breeding distribution of this species in the province occurs in the Okanagan Valley (Campbell et al. 1990). Breeding records exist from the Fraser River Valley north to Williams Lake, where the country is more open than in the study area.

Flammulated Owl: The species is unlikely to be present in the study area. Breeding locations appear to be restricted to the Interior Douglas Fir (IDF) Biogeoclimatic Zone, and the centre of the distribution of the species is in the Thompson-Okanagan Plateau (Campbell et al. 1990). Several pairs of the

Flammulated Owl have recently been found from Soda Creek on the Fraser River to Bull Canyon on the Chilcotin River near Alexis Creek in the IDFxm sub-zone (Michaela Waterhouse, pers. comm.). However, the study area is near the upper limits of known elevational range of occurrence for the species (1250 m; Campbell et al. 1990).

Turkey Vulture: This species is unlikely to breed in the study area, and its distribution appears to be confined to the southern extremity of the province (Campbell et al. 1990). Nesting in BC occurs in two areas, along the southern coast and in the Okanagan Valley. Turkey Vultures have occasionally been observed in the Cariboo Region (Chris Schmid, pers. comm.).

5.4 Waterfowl and Grebes

Western Grebe: This species is unlikely to breed in the study area because of the paucity of suitable wetlands. The main breeding distribution of the Western Grebe is located in the prairie provinces, and only four presently-active breeding colonies are known from BC. A breeding colony formerly existed at Williams Lake, but the site was last used in 1964 (Campbell et al. 1990). The study area may be used as a stop-over during migration, and spring surveys are recommended. A Western Grebe was recently observed on Fish Lake, about 9 km north of the study area (Michaela Waterhouse, pers. comm.).

Barrow's Goldeneye: Sightings of the Barrow's Goldeneye occurred at widespread locations within the TMZ. Evidence of breeding was observed at three locations: outlet of Beece Creek near the northern shore of Lower Taseko Lake at the extreme northern tip of the study area (nest site), small lagoon near the western shore of Lower Taseko Lake (brood) and Zero Lake (brood; Map 8). Previous breeding records exist from immediately northwest and west of the TMZ, which is located well within the breeding distribution of this species (Campbell et al. 1990).

In BC, Barrow's Goldeneye breeds in a variety of habitats ranging in elevation from valley bottoms to subalpine and alpine habitats and from farmland to open and closed-canopy forests (Campbell et al. 1990). The presence of suitable nesting sites limits the population growth of these cavity-nesting birds in some areas of the province. Natural nest sites include cavities in coniferous or deciduous trees, such as those excavated by Pileated Woodpeckers. Habitats suitable for breeding and migrating Barrow's Goldeneye are present within the TMZ (Map 8). Suitable breeding habitats occur along the northern shore of Lower Taseko Lake, at the delta of Tchaikazan River, shores of Zero Lake, at the Lord River delta and floodplain

and along the wetland/lake system that extends from Lastman Creek to Tuzcha Lake and to Fishem Lake in the central part of the study area. These same habitats, together with additional shallow water areas along the Upper and Lower Taseko Lakes, could also be used by the birds during migratory periods.

Trumpeter Swan: A local outfitter (Mike Hawkridge, pers. comm.) observed Trumpeter Swans in March and April 1996 in the immediate vicinity of the northern tip of the study area. The birds were observed on ice of small lakes north and south of Onion Lake. A local trapper (Fritz Dieck) observed a Bald Eagle kill a Trumpeter Swan at the north end of Fishem Lake in spring of 1992. The birds may also use Taseko Lakes and the smaller lakes within the TMZ as a stop-over site during spring and fall migrations. However, the TMZ lies to the east of the main migration route of the Pacific Coast subpopulation, which is most likely to be encountered in the study area and which migrates from the wintering grounds along the southern coast through the Francois Lake region and Tagish Narrows, Yukon, to breeding grounds in Alaska. Breeding in the TMZ is highly unlikely, as no breeding records south of 54°N have been recorded in BC (Campbell et al. 1990).

Harlequin Duck: No Harlequin Ducks were observed during the surveys, but the species is potentially present in the study area. The birds breed at scattered locations throughout BC, but no breeding records exist from the vicinity of the study area (Campbell et al. 1990).

Potentially suitable breeding habitat occurs along turbulent rivers, such as the Tchaikazan and Falls Rivers (Map 8) within the TMZ. However, the high sediment load of the glacial streams and rivers could reduce their suitability as breeding areas (Ian Goudie, pers. comm.). The ducks feed largely on blackfly larvae (Simulidae; Goudie 1991), and this food source may be poor or absent in highly turbid water courses, especially within the upper reaches. Stream surveys in early summer are recommended to verify habitat suitability and possible use of these areas by Harlequin Ducks.

Eared Grebe: No Eared Grebes were observed during the surveys. The species may use the study area during spring and fall migration, but breeding is unlikely. Eared Grebes nest in colonies in sheltered marshes, ponds and lakes, which are usually larger than 4 ha in extent and which harbour dense emergent vegetation, such as sedges and bulrushes (Campbell et al. 1990). Although the main breeding area of the species in BC is within the Chilcotin-Cariboo basin, suitable wetland areas are relatively scarce within the study area. The study area is also higher than the maximum elevation above sea level reported for known colonies (1220 m; Campbell et al. 1990). Spring surveys are recommended to determine whether the species uses the area during migration.

Surf Scoter: No Surf Scoters were observed, but the species may use the study area during spring and fall migration. Records of non-breeding Surf Scoters exist throughout the province, but breeding records are few and only from above 56°N, well north of the study area (Campbell et al. 1990). Spring surveys are recommended.

Oldsquaw: No Oldsquaws were observed. Records of non-breeding birds exists from throughout BC, while breeding occurs farther north (Campbell et al. 1990). The species may use the study area during migration, and spring surveys are recommended.

Wood Duck: No Wood Ducks were observed during the surveys, but the species may be present in the TMZ. An unconfirmed breeding record on Tuzcha Lake was obtained from a local trapper (Fritz Dieck). No previous breeding records exist from the study area or its vicinity, although breeding has been reported from northwest and northeast of the TMZ (Campbell et al. 1990). The main breeding distribution of the Wood Duck is located in the southern part of the province, where habitats include mature deciduous forests close to ponds, sloughs and other slow-moving water bodies (Campbell et al. 1990). Because such habitats are limited in extent in the TMZ, the study area is unlikely to provide habitat for the species. Specific surveys for the Wood Duck are not recommended, but the species can be detected, if present, during spring surveys recommended for migratory waterfowl.

5.5 Other Birds

Red-eyed Vireo: The study area is within the breeding range of the Red-eyed Vireo (Peterson 1990), but the species is apparently uncommon in the Cariboo Region (Michaela Waterhouse, pers. comm.). The species was not observed during 1996 surveys, but the timing of the surveys was not optimal. Transect and Point Count surveys are recommended during the spring and early summer when the birds are more conspicuous and singing on territories.

Brown Creeper: The Brown Creeper was not observed during the surveys, but the species may be a year-round resident in the study area. According to Peterson (1990), the study area is located in the northern portion of the geographic distribution of the Brown Creeper. The species can be expected to be infrequent at the lower elevations (1,200-1,500 m) within the ESSF and MS zones and absent in the highest elevations (>1,500 m) present in the study area (Michaela Waterhouse, pers. com.).

Vaux's Swift: No Vaux's Swifts were observed during the surveys. Non-breeding records for the species exist from throughout the southern and central part of the province, although most records are from the south, notably from Vancouver Island, Fraser Lowlands and the Okanagan Valley (Campbell et al. 1990). The breeding distribution of Vaux's Swift in BC is poorly known with only four confirmed records, all of which are from the southern part of the province. However, breeding may occur in the central interior, as suggested by observations of several birds near dead cottonwoods, which may provide nesting sites, near Horsefly Lake (Campbell et al. 1990). Surveys in spring and early fall along lakeshores within the TMZ are recommended.

Pileated Woodpecker: Excavations of Pileated Woodpeckers in snags were observed in MS and ESSF biogeoclimatic zones. The birds were widespread within the MS zone in the study area, and their signs were present on 22% of the transects within this zone (Table 1). The habitats where excavations were observed included deciduous forest on floodplains and fluvial fans, open aspen - pine forest and mature open pine forest.

The Pileated Woodpecker breeds throughout southern BC, and breeding records exist also from areas north of the study area (Campbell et al. 1990). The species most likely breeds in the TMZ, and patches of suitable habitat occur in older forests throughout the study area (Map 9). The largest continuous habitat is located near the middle of the study area and extends from the western shores of Upper and Lower Taseko Lakes west to the edge of the alpine area, including the Tchaikazan River delta and floodplain. Other suitable areas are located east and west of the northern tip of Lower Taseko Lake, west of Lower Taseko Lake towards Tuzcha Lake, north and west of Fishem Lake and on the floodplain and forests east and west of the Lord River (Map 9). Stands of old cottonwoods and spruce that are patchily located in riparian areas, may be particularly important for Pileated Woodpeckers.

Great Blue Heron: Great Blue Heron is present in the study area but appears to be uncommon. Two Great Blue Herons were sighted, and tracks of one bird were observed. The sightings occurred in a wetland north of Tuzcha Lake and on lake shore east of the Lord River Valley (Map 9). A local outfitter (M. Hawkridge) reported sightings along the eastern shore of Lower Taseko Lake. A Great

Blue Heron was also sighted on Fish Lake, about 9 km northwest of the study area (Michaela Waterhouse, pers. comm.).

In the TMZ, habitat suitable for Great Blue Heron is confined to relatively small patches. The highest quality patches are located in the wetlands north of Tuzcha Lake and west of Fishem Lake, as well as in the Tchaikazan River delta and the Lord River delta and valley (Map 9). The Great Blue Heron breeds primarily in the southern part of the province, and no breeding records exist from the TMZ or its vicinity (Campbell et al. 1990).

Sandhill Crane: Sandhill Crane may migrate over the study area, but the area is unlikely to be used for breeding or as an important migration stop-over site. The study area is outside the main migration routes of the species (Campbell et al. 1990). Although breeding records exist from both north and west of the study area and in meadowland habitat in the Puntzi Lake area north of Highway 20 (Michaela Waterhouse, pers. comm.), suitable extensive bogs or marshes are unavailable in the TMZ.

American Bittern: The American Bittern is unlikely to breed in the study area. According to Campbell et al. (1990), the birds breed in wetlands with dense emergent vegetation at low (below 1300 m) elevation valleys and plateaus. Existing breeding records are confined to the low-lying areas east and south of the study area. Although non-breeding American Bitterns may occasionally use the study area, the area is unlikely to be of particular importance for the species.

5.6 Amphibians

Spotted Frog: Spotted Frogs are widespread in the TMZ and were observed at each of the six sites where pond transects were conducted, as well as at other wetland sites. Adults and larvae were located in wetlands in the MS and AT zones (Map 8; Appendix 5). Adults and metamorphosed frogs were usually found along the shoreline or on rocks or floating logs within 1 m from shores with abundant emergent vegetation. On one occasion, a metamorphosed juvenile was spotted in a puddle in the middle of a dirt road.

Based on habitat suitability analysis, the best areas for the Spotted Frog occur in Gunn Valley that extends from Lastman Lake to Fishem Lake in the north of the study area, and in the low-lying areas

(photographs)

(photographs)

along Lord River and lakes south of Lower Taseko Lake in the southern part of the study area. Smaller patches of high suitability habitat also occur elsewhere in the TMZ, such as around Zero Lake (Map 8).

Tailed Frog: No Tailed Frogs were found, but the sampling effort was limited (one or two 5 m sections in 3 streams). The region is outside of the known distribution of the species, and there are no previous reports from the MS, ESSF or AT biogeoclimatic zones (RIC 1996d). Populations occur as far north as the Kitimat area (Green and Campbell 1984). The species may be present in the TMZ.

Western Toad: The Western Toad was not an Identified Wildlife Species, but it is designated as a species of global responsibility (status "g" on the BC Yellow List, March 1995). Population declines have been documented in western USA (Carey 1993).

Western Toads were found at three of the six sites where pond transects were conducted in the MS and AT zones. Thousands of tadpoles were observed in shallow beach pools on the west side of the narrows that separate Upper and Lower Taseko Lakes. Numerous such pools occurred along about a 1.5 km stretch of the beach at this location, and most of them contained toad tadpoles. This area is probably the most important breeding area for the species in the TMZ and may be a source population for a wide area.

5.7 Bull Trout

The Bull Trout is potentially widely distributed within lakes, rivers and streams in the study area. Map 10 summarizes the extent of habitats with gradients less than 20% that are potentially suitable for adults, and potential spawning areas, based on gradients less than 3% and potentially suitable substrates are indicated. The species is confirmed to be present in the stream flowing into Lower Taseko Lake in the northwestern corner of the study area, Lower and Upper Taseko Lakes, Lastman Lake, Tuzcha Lake and its tributary streams, Fishem Lake and its tributary streams and Yohetta Creek (data on file, MELP, Williams Lake Office). Falls on the Tchaikazan and Falls Rivers appear to act as barriers to fish movement (Map 10; data on file, MELP, Williams Lake Office) and render the otherwise suitable, upstream habitats unavailable for fish that seasonally migrate between lake and river habitats. Whether isolated, non-migratory populations of Bull Trout exist upstream from the falls is not known. The following field-inspected sites have good spawning and rearing potential for salmonids, including the Bull Trout: Lastman Lake outlet to Lower Taseko Lake, Tributaries A and B at the south end of Tuzcha Lake and sections of Yohetta Creek (data on file, MELP, Williams Lake Office).

5.8 Other Wildlife Species

Incidental observations of Black Bear, Mule Deer, Moose and Mountain Goat were made during the surveys in July-August 1996 (Table 7; Appendices 5 and 6). Table 7 provides a complete list of other wildlife species, in addition to the identified species listed in Table 1, that were observed during the July-August surveys. Tracks of Marten, Ermine, Mink, River Otter, Lynx, Cougar, Wolf, Coyote, Red Fox, Moose, Snowshoe Hare and Red Squirrel were observed during snow-tracking surveys in February 1997 (Table 3). Bobcats have also been observed along the Lord River Mining Road in the TMZ (Chris Schmid, pers. comm.).

Black Bears appeared to be widespread within the TMZ, and signs of their activity were observed along 61% of the transects within the MS and 22% of the transects within the ESSF zones. One bear was sighted in the MS and another with two cubs in the ESSF zone. Signs of Black Bear activity were found in a variety of habitats, including floodplains, open Lodgepole Pine-Aspen forest, riparian Cottonwood stands and young Pine forest (Appendix 5). On several occasions, feeding signs on spruce and pine cambium and on Cow Parsnip (*Heracleum lanatum*) were noted.

Lynx tracks were found in a variety of habitats mainly within the MS zone during snow-tracking surveys (Table 4), and their abundance appeared to follow that of their main prey, Snowshoe Hares (Fig. 2). Thirteen tracks of the Marten were found, mainly within Whitebark Pine/Subalpine Fir forest within the ESSF zone (Table 4).

Moose were widespread within the MS and ESSF zones of the TMZ (Table 7) and used the area both in winter and summer, based on tracks, droppings and browsing signs. In winter, Moose tracks in the Gunn Valley were found in a variety of habitats but were most common in young and maturing Lodgepole Pine dominated forest (Table 4 and Fig. 2).

Signs of Mule Deer were frequent in the MS and ESSF zones in July-August (present on 89% of the transects), and deer signs were also observed in the AT zone (present on 20% of the transects). Mule

(photographs)

Table 7. Species of wildlife other than target species and/or their signs observed in the Taseko Management Zone in July-August 1996. Total number of sampling sites = 37 (18 in MS, 9 in ESSF and 10 in AT Biogeoclimatic zones).

Species	Code	% of transects where species/sign was observed for each BEC Zone	Sampling site #'s
Mammals:			
Moose	MALAL	MS: 72% ESSF: 67% AT: 10%	MS: 461, 462, 463, 493, 488, 489, 490, 474, 470, 298, 299, 302, 303 ESSF: 310, 312, 313, 314, 318, 319 AT: 309
Mule Deer	MODHE	MS: 89% ESSF: 89% AT: 20%	MS: 461,462,493, 488, 489, 490, 491, 492, 470, 474, 476, 298, 299, 300, 302, 303 ESSF: 468, 312, 313, 314, 315, 316, 318, 319 AT: 309, 311
Mountain Goat	MORAM	AT: 20%	AT: 304, 308
Black Bear	MURAM	MS: 61% ESSF: 22%	MS: 461, 462, 493, 489, 490, 491, 474, 470, 298, 302, 303 ESSF: 318, 319
Wolf	MCALU	MS: 11%	MS: 488, 474
Coyote	MCALA	MS: 17% ESSF: 22% AT: 10%	MS: 488, 491, 299 ESSF: 313, 315 AT: 308
Red Fox	MVUVU	MS: 11%	MS: 488
Lynx	MLYCA	MS: 11%	MS: 491
Pika	MOCPR	MS (not on transect) ESSF: 11% AT: 10%	ESSF: 318 AT: 473
Snowshoe Hare	MLEAM	MS: 72% ESSF: 56%	MS: 461, 462, 489, 49, 492, 474, 470, 476, 298, 299, 300, 302, 303, ESSF: 468, 312, 313, 315, 316
Porcupine	MERDO	MS: 11% ESSF: 22%	MS: 489, 474 ESSF: 468, 315
Beaver	MCACA	MS: 39% ESSF: 11%	MS: 463, 490, 491, 492, 474, 298, 299 ESSF: 468
Red Squirrel	MTAHU	MS: 78% ESSF: 78%	MS: 461, 462, 463, 489, 490, 491, 492, 474, 470, 476, 299, 300, 302, 303, ESSF: 468, 310, 312, 314, 315, 316, 318

Table 7 continued:

Species	Code	% of transects where species/sign was observed for each BEC Zone	Sampling site #'s
Least Chipmunk	MTAMI	ESSF: 22% AT: 10%	ESSF: 312, 318 AT: 311
Bushy-tailed Woodrat	MNECI		
Muskrat	MONZI	MS: 6%	MS: 463
Water Vole	MMIRI	AT: 10%	AT: 475
Heather Vole	MPHIN	AT: 20%	AT: 304, 305
Hoary Marmot	MMACA	AT: 40%	AT: 305, 307, 308, 317
BIRDS: **Waterfowl:** Hooded Merganser	HOME	MS: 6%	MS: 463
Common Loon	COLO	MS: 22%	MS: 463, 492, 476, 299
Mallard	MALL	MS: 11%	MS: 490, 470
Canada Goose	CAGO	MS: 6%	MS: 470
White-winged Scoter	WWSC	MS (not on transect)	
Kingfishers: Belted Kingfisher	BEKI	MS: 6%	MS: 463
Rails:			
Sora Rail	SORA	MS: 6%	MS: 463
Shorebirds & gulls: Spotted Sandpiper	SPSA	MS: 11% AT: 10%	MS: 461, 488 AT: 309
Bonaparte's Gull	BOGU	MS (not on transect)	
Herring Gull	HEGU	MS (not on transect)	
Raptors: Golden Eagle	GOEA	(not on transect)	
Red-tailed Hawk	RTHA	MS (not on transect)	
American Kestrel	AMKE	MS: 6%	MS: 462
Great-horned Owl	GHOW	MS (not on transect)	
Osprey	OSPR	MS (not on transect)	
Species	**Code**	**% of transects where**	**Sampling site #'s**

		species/sign was observed for each BEC zone	
Upland birds:			
Ruffed Grouse	RUGR	MS: 22%	MS: 461, 462, 490, 470
Spruce Grouse	SPGR	MS: 28% ESSF: 22%	MS: 489, 492, 474, 476, 300 ESSF: 314, 315
Willow Ptarmigan	WIPT	AT (not on transect)	
Hummingbirds:			
Rufous Hummingbird	RUHU	MS: 17% ESSF: 22%	MS: 461, 462, 299 ESSF: 314, 318
Woodpeckers:			
Downy Woodpecker	DOWO	MS: 6%	MS: 461
Hairy Woodpecker	HAWO	MS: 6%	MS: 490
Northern Flicker	NOFL	MS: 17% ESSF: 11%	MS: 463, 492, 474 ESSF: 319
Passerine birds:			
Warbling VIreo	WAVI	MS: 22%	MS: 462, 490, 491, 474
Solitary Vireo	SOVI	MS: 6%	MS: 461
Yellow-rumped Warbler	YRWA	MS: 28%	MS: 461, 462, 493, 489, 474, 476, 300, 302
Yellow Warbler	YEWA	MS: 22%	MS: 463, 490, 474, 470
Common Yellowthroat	COYE	MS: 11%	MS: 463, 298
Orange-crowned Warbler	OCWA	MS: 11%	MS: 462, 474
McGillivray's Warbler	MGWA	MS: 6%	MS: 461
Wilson's Warbler	WIWA	MS: 6%	MS: 463
Northern Waterthrush	NOWA	MS: 6%	MS: 490
Dark-eyed Junco	DEJU	MS: 56% ESSF: 11%	MS: 461, 462, 463, 493, 489, 490, 491, 474, 299, 302 ESSF: 468
Ruby-crowned Kinglet	RCKI	MS: 33% ESSF: 11%	MS: 461, 463, 493, 490, 492, 300 ESSF: 468
Golden-crowned Kinglet	GCKI	MS: 17%	MS: 493, 302, 303

Species	Code	% of transects where species/sign was observed for each BEC zone	Sampling site #'s
Clark's Nutcracker	CLNU	MS: 67% ESSF: 78% AT: 40%	MS: 462, 463, 489, 490, 491, 492, 474, 470, 476, 298, 299, 300 ESSF: 468, 310, 312, 313, 314, 318, 319 AT: 308, 309, 311, 317
Cedar Waxwing	CEWA	MS: 11%	MS: 462, 470
Bohemian Waxwing	BOWA	MS: 6% ESSF: 33%	MS: 476 ESSF: 314, 318, 319
Pine Siskin	PISI	MS: 33% ESSF: 22%	MS: 462, 488, 489, 491, 299, 300 ESSF: 312, 318
Varied Thrush	VATH	ESSF (not on transect)	
Swainson's Thrush	SWTH	MS: 33%	MS: 462, 463, 490, 491, 492, 474
Hermit Thrush	HETH	ESSF: 33%	ESSF: 468, 491, 315
Townsend's Solitaire	TOSO	MS: 6% ESSF: 22%	MS: 462 ESSF: 468, 313
Brown-headed Cowbird	BHCO	ESSF: 11%	ESSF: 312
Gray Jay	GRJA	MS: 44% ESSF: 33%	MS: 462, 463, 488, 470, 476, 299, 300, 303 ESSF: 468, 315, 319
Common Raven	CORA	MS: 6%	MS: 463
American Robin	AMRO	MS: 39% ESSF: 44% AT: 10%	MS: 462, 463, 489, 490, 474, 470, 299 ESSF: 468, 312, 314, 318 AT: 305
Red-winged Blackbird	RWBL	MS: 6%	MS: 463
Black-capped Chickadee	BCCH	MS: 39%	MS: 463, 490, 474, 476, 300, 300, 302
Mountain Chickadee	MOCH	MS: 17% ESSF: 44%	MS: 463, 490, 300 ESSF: 468, 310, 313, 314
Red-breasted Nuthatch	RBNU	MS: 22% ESSF: 11%	MS: 490, 474, 470, 300 ESSF: 318
Fox Sparrow	FOSP	MS: 11%	MS: 463, 298
Song Sparrow	SOSP	MS: 17% ESSF: 11% AT: 10%	MS: 463, 488, 298 ESSF: 468 AT: 309
Chipping Sparrow	CHSP	MS: 6% ESSF: 11%	MS: 300 ESSF: 319

Species	Code	% of transects where species/sign was observed for each BEC zone	Sampling site #'s
Golden-crowned Sparrow	GCSP	AT: 10%	AT: 305
Tree Swallow	TRSW	MS: 6%	MS: 463
Violet-green Swallow	VGSW	MS: 6%	MS: 490
Red-breasted Sapsucker	RBSA	MS: 17%	MS: 476, 300, 302
Pine Grosbeak	PIGR	MS: 6% ESSF: 33%	MS: 300 ESSF: 310, 313, 319
Water Pipit	WAPI	AT: 20%	AT: 305, 308
Western Tanager	WETA	ESSF: 11%	ESSF: 318
REPTILES: Western Terrestrial Garter Snake	THEL	MS	MS: Aquatic sample site 1
Common Garter Snake	THSI	MS	MS: Aquatic sample site 1
AMPHIBIANS: Western Toad	BUBO	MS: at 3 of 6 sites with pond transects; AT: (not on transect)	MS: Pond sites 2, 3, 6

Deer were sighted several times during the summer surveys (Appendix 6), and on two occasions a deer was observed swimming across the lake at the narrows between Upper and Lower Taseko Lakes. This location is a seasonal travel route known to local residents. No tracks of the Mule Deer were observed in February, and, according to residents, deer do not use the TMZ in winter.

Evidence of Mountain Goats was observed on 20% of the transects in the AT zone in July-August, and several individuals were sighted. Other mammals observed in summer included Coyote, Wolf, Red Fox, Lynx, Pika and Water Vole (Table 7 and Appendix 6).

Other bird species, in addition to the target species, that were observed during the surveys included the Common Loon, which was present in many lakes, waterfowl (e.g. Hooded Merganser, White-winged Scoter), raptors (Golden Eagle, Great-horned Owl, Osprey), upland birds (Willow Ptarmigan, Spruce Grouse, Ruffed Grouse) and passerine birds (e.g. Warbling Vireo, Yellow-rumped Warbler, Clark's Nutcracker). Great-horned Owls are common throughout the TMZ (Chris Schmid, pers. comm.), and we observed an adult with two recently-fledged young in the Gunn Valley on 19 July. Great Grey Owls also occur in the study area (Chris Schmid, pers. comm.). The Clark's Nutcracker was particularly conspicuous during the surveys in July-August and occurred in all biogeoclimatic zones. This possibly indicates an invasion of this species into the region in response to food availability, such as a good crop of conifer cones. Red Squirrels were also commonly observed. Two species of reptiles, the Western Terrestrial Garter Snake and the Common Garter Snake, were sighted in a wetland (Appendix 6).

5.9 Key Wildlife Areas

Riparian areas contain diverse vegetation and are structurally complex. Therefore, they offer a diversity of productive habitats and act as travel corridors for wildlife (Stevens et al. 1995). Lower elevation riparian areas within the TMZ, in particular, contain habitats ranging from sedge/willow meadows to mature stands of spruce and cottonwoods and were identified as key wildlife areas (Fig. 3). These lower elevation areas are particularly important within the study area that contains extensive uplands where conditions are often harsh.

The most extensive riparian habitats within the TMZ are located in the Gunn Valley that includes Lastman, Tuzcha and Fishem Lakes and the floodplain and delta of the Tchaikazan River. Important

(photographs)

Fig. 3.

riparian habitats also occur along the Yohetta Creek and along the Lord River and its tributary in the south of the study area. These riparian areas provide foraging habitats and travel routes for Moose, Mule Deer, Black Bear and Grizzly Bear, and potentially also for Fisher and Wolverine. Signs of browsing by Moose and foraging by Black Bear were frequently observed in these riparian habitats, and game trails were common. Mineral licks may also occur in riparian areas, such as the one recorded along Yohetta Creek.

Mule Deer were observed swimming across the narrows between the Lower and Upper Taseko Lakes along a travel route known to the local trappers and outfitters, and a well-used game trail with tracks of several species led to the crossing on the west side of the lake (Fig. 3). We also observed tracks of Grizzly Bear in the delta of the Tchaikazan River near this crossing. Another travel corridor was identified at the north end of Lower Taseko Lake. Large mammals probably cross the water near the junction of the Lower Taseko Lake and Taseko River as has been observed for Moose and Mule Deer (Chris Schmid, pers. comm.). Major game trails were found on the lower mountain slopes west of this crossing between a steep-sided mountain and the western shore of the lake (Fig. 3). The trails are likely used by Moose, Mule Deer, California Bighorn Sheep, wolves, bears and other mammals travelling between ranges on both sides of the lake. Movements are restricted to this narrow corridor by very steep terrain to the west and Taseko Lake to the east.

The riparian areas also contained a diversity of birds, including warblers, and potentially provide important nesting areas for migratory songbirds and waterfowl. Wetlands within these areas were inhabited by the Spotted Frog and Western Toad, and the breeding ponds within the Tchaikazan River delta may act as a source area of the Western Toad for much of the TMZ.

Cottonwood and mixed-wood stands were scattered within riparian areas along the Lastman, Tuzcha and Fishem Lakes and along the floodplain and delta of the Tchaikazan River (e.g. vegetation plots 493 and 491). Cottonwoods occur on moist to wet lowlands, floodplains, lake shores and other moist sites, and often delineate highly productive wildlife areas (Parish et al. 1996). Although the stands within the TMZ are relatively small and scattered when compared to those at lower elevations in the Cariboo Region, they are likely to be key habitats. These stands, which occur on low-gradient floodplains and are dependent on periodic flooding, provide foraging habitat for Moose, Mule Deer, Grizzly Bear and Black Bear. Old trees within these stands contain holes suitable for a variety of cavity-nesting species, such as tree-nesting ducks, woodpeckers and owls, and might provide denning sites for the Fisher and Marten. Cottonwoods are also frequently used by Bald Eagles and other raptors as nest sites (two Bald

(photographs)

Eagle nests in this study; Table 6). The areas are also used by a variety of migratory songbirds for nesting and foraging.

Other key habitats include the winter range of the California Bighorn Sheep, located immediately west of Fishem lake and active avalanche tracks/subalpine meadows along the Lord River, Falls River and the tributary of the Lord River within the extreme southeast portion of the TMZ, which provide excellent habitat for the Grizzly Bear (Fig. 3).

6.0 DISCUSSION

6.1 Forest Ecosystem Networks

A 1:50,000 scale map outlining a proposed Forest Ecosystem Network (FEN) has been prepared for the TMZ (MELP, Alexis Creek Office, July 1996; see Map Folio), and the adequacy of this map, based on the habitat suitability maps and key wildlife areas identified during this study, was evaluated. The Forest Practices Code of BC Biodiversity Guidebook (FPC 1995) defines a FEN as a "continuous network of representative old-growth and mature forests (some of which provide forest interior habitat conditions) delineated in a managed landscape" (p. 53). The objective of a FEN is both to provide sufficient habitats to maintain native species and ecosystem processes and to maintain or restore connectivity of these habitats within the landscape.

The Biodiversity Guidelines recommend that, within the MS Biogeoclimatic Zone (all subzones), high connectivity be maintained between upland-upland, upland-stream and upland wetland complexes. For the ESSFxv subzone, the maintenance of high upland-upland and cross-elevational connectivity is recommended. These connectivities are reasonably well represented in the proposed FEN, except that little upland forest is included, especially in the northern and central part of the TMZ. Also, the designation of the subalpine and alpine area between Lower Taseko Lake and Tuzcha Lake as a non-FEN zone is peculiar as several connective zones from this area to riparian FEN areas are shown (see Map Folio).

The proposed FEN includes the riparian areas identified as key wildlife habitats during this study. However, the connection between Zero Lake and Fishem Lake contains a possible bottleneck for movements of large mammals and should be widened at the point where it is the narrowest. Another

possible bottleneck is located between Lastman and Tuzcha Lakes and between the steep-sided mountain slope and Lower Taseko Lake at its north end, which has been identified as an important wildlife travel route.

The proposed FEN meets the requirements of individual target wildlife species to a varying extent. It is best suited for those species that inhabit or seasonally use riparian areas and wetlands, but the requirements of mature forest species, such as the Pileated Woodpecker, are not met as well. Overlaying the habitat suitability maps for individual species on the FEN map indicates that major portions of high- and moderate-quality habitat for the Pileated Woodpecker are located in non-FEN areas. The overlap is prominent in large areas west of the Lower Taseko Lake in the MS zone. For raptors, the proposed FEN contains all major high-quality habitats for Bald Eagle and Osprey. Some potential nesting areas for the Golden Eagle and Peregrine Falcon, especially those between Lower Taseko Lake and Tuzcha Lake, are not within the FEN, but these cliff habitats will not be directly affected by logging, provided that roads are kept away from the base of nesting cliffs. In contrast, most high- and moderate-suitability habitats for Barrow's Goldeneye and Spotted Frog are within the proposed FEN.

For mammals, the delineated summer and winter ranges of the California Bighorn Sheep are largely within the proposed FEN. The most important habitats for the Fisher and Wolverine within riparian areas are also within the FEN. Important alpine and sub-alpine habitats for the Grizzly Bear between the Lower Taseko Lake and Tuzcha Lake are not within the FEN, and a reported Grizzly Bear den site near Falls River is also outside the FEN.

There are inherent problems in designing a FEN that meets the needs of wide-ranging species that use several habitats and are relatively intolerant of human activities, such as the Grizzly Bear. Whether the proposed FEN will be effective for the Grizzly Bear if development takes place in the TMZ, is open to question. The greatest conflicts will occur in low elevation riparian areas used by bears for foraging and travel. Habitat alteration, displacement due to sensory disturbance and mortality due to "problem" bear control are expected to be the major impacts of logging and other human activities on the Grizzly Bear. It is critical that habitats important for movements and seasonal requirements should remain undeveloped. These include the Gunn Valley, and Lower Tchaikazan River and Lord River valleys.

(photographs)

6.2 Target Species not Detected

Several target wildlife species that were not detected during the 1996 field season could be present in the study area. Because the surveys took place relatively late in the season in July and August, those species that are inconspicuous outside the breeding period, such as the Red-eyed Vireo, could have been missed. Also, the relatively large size of the study area, together with time constraints, precluded a thorough sampling of the entire area.

The following Red- and Blue-listed and other Identified Wildlife species may occur in the TMZ: Western Grebe, Surf Scoter, Oldsquaw, Eared Grebe, Harlequin Duck, Wood Duck, Swainson's Hawk, Short-eared Owl, Northern Goshawk, Brown Creeper, Red-eyed Vireo and Vaux's Swift.

6.3 Survey Recommendations

The following recommended surveys address both those target species that were not detected and those that are known to occupy the study area but for which additional information is required:

(1) Grizzly Bear surveys

Additional information is required on habitat use by Grizzly Bears within the TMZ. The surveys should be conducted in preselected areas using a helicopter, and observations from ground vantage points should also be incorporated into the survey. The survey should be carried out in May-June.

(2) Northern Goshawk survey

Call play-back surveys in likely habitats throughout the study area should be carried out in late May-June.

(3) Survey for migrating waterfowl

Spring surveys of larger lakes and wetlands in May using boat or helicopter and ground surveys are recommended for Western Grebe, Surf Scoter, Oldsquaw and Eared Grebe, which may use the study area during the migration periods. Wood Ducks and Harlequin Ducks, which may breed in the study area, could also be located during these surveys. Spring surveys are also recommended for the Trumpeter Swan. Although information from local trappers and outfitters indicate that these birds are

present in the TMZ during the spring migration, the areas used and their extent of use are unknown.

(4) Biodiversity surveys in riparian areas

Transects for mammal sign and songbirds in riparian areas are recommended to identify productive areas and to obtain baseline wildlife data for the TMZ. These surveys could also provide information on target species not found during the 1996 surveys, such as the Red-eyed Vireo. The surveys should be carried out in late May-June and should focus on the larger riparian areas identified as key wildlife areas.

(5) Delineation and Field-truthing of Cottonwood stands

Cottonwood stands were identified as key wildlife areas in the TMZ. They may also be used by target species, such as the Vaux's Swift, that were not detected in 1996. Because of their scattered distribution, these stands cannot be accurately delineated using only existing air photographs. Field-truthing should be conducted to confirm the locations and extent of these stands.

7.0 CONCLUSIONS

The surveys confirmed the presence of a number of Blue-listed species and other Identified Wildlife within the Taseko Management Zone. The species were Grizzly Bear, California Bighorn Sheep, Fisher, Wolverine, Bald Eagle, Great Blue Heron, Barrow's Goldeneye, Sharp-shinned Hawk, Pileated Woodpecker and Spotted Frog. According to residents, Trumpeter Swan and Northern Harrier also occur in the study area. The following species may also occur in the area but their presence was not confirmed: Western Grebe, Surf Scoter, Oldsquaw, Harlequin Duck, Wood Duck, Swainson's Hawk, Short-eared Owl, Northern Goshawk, Brown Creeper, Red-eyed Vireo and Vaux's Swift.

The summer surveys were conducted too late in the season (July - August) for optimal detection of breeding songbirds and waterfowl that may use the study area during the spring and fall migration. Therefore, additional surveys are recommended in 1997. Additional surveys are also recommended for the Grizzly Bear in spring.

Much of the study area is rugged and at high elevations, and these factors limit its suitability for a number of the target species. Riparian areas in the Gunn Valley, along the Yohetta Creek and along the Lord River system, especially mixed-wood stands and sedge/willow meadows, were identified as key wildlife habitats within the TMZ, based on their relatively high productivity and species diversity.

Most conflicts between wildlife and human activities, such as logging, are expected to occur in the relatively productive low-elevation areas. Key species in these areas are the Grizzly Bear, Wolverine, Fisher and wetland species, such as waterfowl, songbirds and amphibians. It is critical that habitat areas and travel corridors in the Gunn Valley, and Lower Tchaikazan River and Lord River valleys will be maintained relatively intact.

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9.0 PERSONAL COMMUNICATIONS

Dieck, Fritz. Trapper, Tuzcha Lake.
Goudie, Ian. Biologist, Canadian Wildlife Service, Delta.
Hawkridge, Mike. Outfitter, Taseko Lake Lodge.
Schmid, Chris. Forest Ecosystem Specialist. MELP, Chilcotin District.
Stewart, Andrew, Biologist, Wildlife Branch, MELP, Victoria.
Waterhouse, Michaela. Biologist, MOF, Williams Lake