

# Lesser Slave Lake

## IMPORTANT BIRD AREA CONSERVATION PLAN

Fall 2000

by  
Frank Fraser  
for the  
Lesser Slave Lake IBA  
Stakeholders Committee

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## **EXECUTIVE SUMMARY**

### **Important Bird Areas Program**

#### **What is an Important Bird Area?**

The Canadian BirdLife International partners — the Canadian Nature Federation and Bird Studies Canada established the Canadian Important Bird Areas Program, as part of an international effort to identify and conserve sites important to all bird species worldwide.

The goals of the Canadian Important Bird Area (IBA) program are to:

- Identify a network of sites that conserve the natural diversity of Canadian bird species and are critical to the long-term viability of naturally occurring bird populations
- Determine the type of protection or stewardship required for each site and ensure the conservation of sites through partnerships of local stakeholders who develop and implement appropriate on-the-ground conservation plans
- Establish ongoing local involvement in site protection and monitoring

#### **Lesser Slave Lake Region, Globally Significant, IBA**

The Lesser Slave Lake Region, in north central Alberta, has been classified as a globally significant IBA because up to 2% of North America's Tundra Swans (*Cygnus columbianus*) feed and stage on Lesser Slave Lake. Western Grebe nest in one or more colonies, with 400 - 650 active nests on Lesser Slave Lake and greater than 10,000 waterfowl feed and rest on Lesser Slave Lake during the spring and fall migration. The Lesser Slave Lake Region IBA focuses on Lesser Slave Lake Provincial Park, which is home to the Lesser Slave Lake Bird Observatory (LSLBO). The LSLBO is the lead conservation organization developing the LSL IBA Region Conservation Plan. Additional areas in the surrounding agricultural and residential zones will be included as landowner approval is secured. Landowner approval has already been secured for Hilliard's Bay Provincial Park and Lesser Slave Lake Provincial Park. The

landscape surrounding Lesser Slave Lake is a mosaic of agricultural land, homesteads, waterfront cottages, deciduous and mixed woods, and seasonal wetlands.

#### **The Tundra Swan**

Tundra Swans have an estimated North American population of 165,000. The Lesser Slave Lake Region is a critical staging and feeding area. Swans are extremely sensitive to loud traffic, boating and human disturbance. The loss of riparian vegetation along the lakeshore of Lesser Slave Lake is a major concern. The riparian zone provides foraging areas and escape cover. Another concern is the death of Tundra Swans due to poisoning from lead shot deposited in the lakes and marshes during past hunting seasons.

#### **Current Conservation Strategies**

The present Lesser Slave Lake IBA Committee, with representatives from the Lesser Slave Lake Bird Observatory, Lesser Slave Lake Provincial Park, and Alberta Environment, was formed to assist with development of the IBA conservation plan.

Lesser Slave Lake Provincial Park was created in 1966 as a natural heritage site. The provincial park designation, however, only conveys protection to the extreme eastern foreshore and immediate uplands of the lake and not to the neighbouring lake and surrounding shorelines. There are no protective measures in place to protect shoreline habitat on private land; however, since Tundra Swans are listed as a protected species in Alberta, hunting of the species is prohibited. The Lesser Slave Lake Bird Observatory (LSLBO) began conducting migration-monitoring activities on neo-tropical migrants in 1994. The LSLBO, in conjunction with Bird Studies Canada and the Federation of Alberta Naturalists, also conducts a limited census of nesting and staging waterfowl in the Lesser Slave Lake Region.

## Conservation Goals and Objectives

The following conservation goals have been established for the Lesser Slave Lake Region Important Bird Area:

### Education

- Share information throughout the Lesser Slave Lake region about the conservation of Tundra Swan habitat and the effects of disturbance on staging swans. Non-personal media includes a LSL IBA Region Brochure (completed); local, regional, and provincial radio spots and newspaper articles (see appendix 3: IBA Educators Report, Summer 2000); and a three panel display (design completed, fabrication pending) set up in key public areas. Personal services include outreach programs and site specific programs delivered by an IBA Conservation Educator and Provincial Park Interpretive staff.
- Establish a landowner stewardship program to enhance conservation of shoreline habitat (Driftpile First Nations has already expressed interest);
- Provide ongoing information to the public on Tundra Swans and Western Grebes within the Lesser Slave Lake region;
- Participate in the annual Songbird Festival to promote the LSL IBA Region.

### Habitat Protection/Enhancement

- IBA Stewards and IBA Conservation Educator will work with AENV staff to protect undisturbed shoreline habitat (including natural treed buffers, water levels, water quality, etc.). The economic value and ecological benefits of undisturbed shoreline habitat will be discussed with appropriate private landowners, businesses, developers, Municipal Districts and Hamlets. Violations of habitat protection laws will be passed on to local authorities. Stewards and Educator will try to increase public understanding of related regulations.
- Work with government (Alberta Environment, Provincial Parks, Environment Canada) to secure and enhance staging habitat. Possible

strategies include Conservation Easements, Nature Conservancy properties, boater education campaign at marinas, public boat launches, joint boater education programs with AENV Fisheries staff using government vessels, and joint program with AENV Fish and Wildlife staff to survey known and identify new staging areas using fixed wing aircraft, helicopters, and airboat.

### Enforcement

- Support existing management plans for Lesser Slave Lake Provincial Park and Hilliard's Bay Provincial Park and support any new conservation initiatives in the parks;
- Support enforcement of existing regulations preventing the hunting or harassment of protected species.

### Research

- Support the ongoing waterfowl population monitoring of Lesser Slave Lake by the Canadian Wildlife Service, Ducks Unlimited, and Alberta Environment;
- Support the LSLBO Migration Monitoring and Monitoring Avian Productivity and Survivorship (MAPS) programs;
- Partner with Alberta Environment to build a Research/Education Centre for the LSLBO in Lesser Slave Lake Provincial Park. The Alberta government has made a major investment as part of the 2005 centennial celebrations. Further support by other levels of government in Canada and the US, universities, industry, conservation groups, bird clubs, and other interested parties is being actively pursued.
- Lobby stakeholders to support expansion of the LSLBO research efforts on surrounding lands and Lesser Slave Lake.

An ongoing research project (RANA project) on amphibians by the Alberta Conservation Association in Lesser Slave Lake Provincial Park and surrounding area provides information on the health of the aquatic systems.

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## 1. INTRODUCTION

Birds are an integral part of Canada's many varied ecosystems. The beauty and flight of large birds, such as the Tundra Swan, often catch our attention but, more often than not, it is their habitat that is at the greatest risk. Wetlands are severely threatened all across the prairies, and the Lesser Slave Lake IBA Region of north central Alberta is no exception. The expansion of agricultural and residential development has led to habitat loss and increased disturbance for a variety of wetland species.

Tundra Swans have been known historically as a frequent presence in the Slave Lake region. In the past they have been hunted for food and their feathers. The region, which contains a mosaic of boreal forest, wetlands and agricultural land, now supports between 1 and 2% of the North American population of Tundra Swans during the spring and fall migration periods.

The area identified as the Lesser Slave Lake Region Important Bird Area (IBA) includes Lesser Slave Lake and its surrounding watershed. The IBA centers on Lesser Slave Lake Provincial Park, the home of the Lesser Slave Lake Bird Observatory. As word about the IBA spreads throughout the region, additional interested stakeholders will be welcomed into the conservation planning process.

The two primary goals of the Lesser Slave Lake Region IBA are:

1. To help ensure the long-term stability of this staging area through enhanced habitat stewardship;
2. To improve public knowledge, attitudes and behaviour regarding Tundra Swan nesting and staging lakes through education programs centered in Lesser Slave Lake Provincial Park and the LSLBO.

## 2. THE IBA PROGRAM

The IBA program is an international initiative coordinated by BirdLife International, a partnership of member-based organizations in over 100 countries seeking to identify and conserve sites important to all bird species worldwide. Through the protection of birds and habitats, they also promote the conservation of the world's biodiversity. There are currently IBA programs in Europe, Africa, the Middle East, Asia, and the Americas.

Canada's BirdLife International partners are the Canadian Nature Federation (CNF) and Bird Studies Canada (BSC). The Canadian IBA program is a part of the Americas IBA program which includes Canada, the United States, Mexico, and 17 countries in Central and South America.

### **The goals of the Canadian IBA program are to:**

- identify a network of sites that conserve the natural diversity of Canadian bird species and are critical to the long-term viability of naturally occurring bird populations;
- determine the type of protection or stewardship required for each site, and ensure the conservation of sites through partnerships of local stakeholders who develop and implement appropriate on-the-ground conservation plans;
- establish ongoing local involvement in site protection and monitoring;

IBAs are identified by the presence of birds falling under one or more of the following internationally agreed-upon categories:

- sites regularly holding significant numbers of an endangered, threatened, or vulnerable species;
- sites holding an endemic species, or species with restricted ranges;
- sites regularly holding an assemblage of species largely restricted to a biome;
- sites where birds congregate in significant numbers when breeding, in winter, or during migration.

The lead partner for the Alberta Important Bird Area program is the Federation of Alberta Naturalists (FAN). The Alberta program was launched in the spring, 1999, with the hiring of a Community Conservation Planner, (a.k.a. IBA Coordinator). Instrumental to the success of the Alberta program is the Alberta IBA Advisory Committee, animated by members from the Federation of Alberta Naturalists, the Alberta Conservation Association, the Provincial Museum of Alberta, the Canadian Wildlife Service, and the province's Natural Resource Services.

The Alberta IBA Program puts a premium on the voluntary and participatory nature of IBA conservation planning. In this regard, the Program seeks the cooperation and participation of the site's landowners and/or land managers and bird or wildlife agency personnel with an interest in the site. The Program is particularly interested in identifying, supporting, and empowering local, grassroots birders and bird clubs. By supporting these local bird interests, both financially and technically, and by facilitating the participation of local conservationists in the formulation, writing, and implementation of conservation plans for their favourite sites, FAN is working to build local buy-in, ownership, and a commitment to long-term stewardship of the site.

To date, Bird Studies Canada has identified 40 Important Bird Areas in Alberta. At this time, local stakeholder groups are writing IBA conservation plans at over a dozen sites. If you are curious about any of these sites, one-page site summaries for many sites are posted on the IBA Canada website: [www.ibacanada.ca/](http://www.ibacanada.ca/). Additional sites will be listed as they receive the requisite approvals. For more information, please telephone the Alberta IBA Community Conservation Planner at (780) 422-5582, or the FAN office at (780) 427-8124.

### 3. IBA SITE INFORMATION

**Site:** Lesser Slave Lake Region, CAAB003G

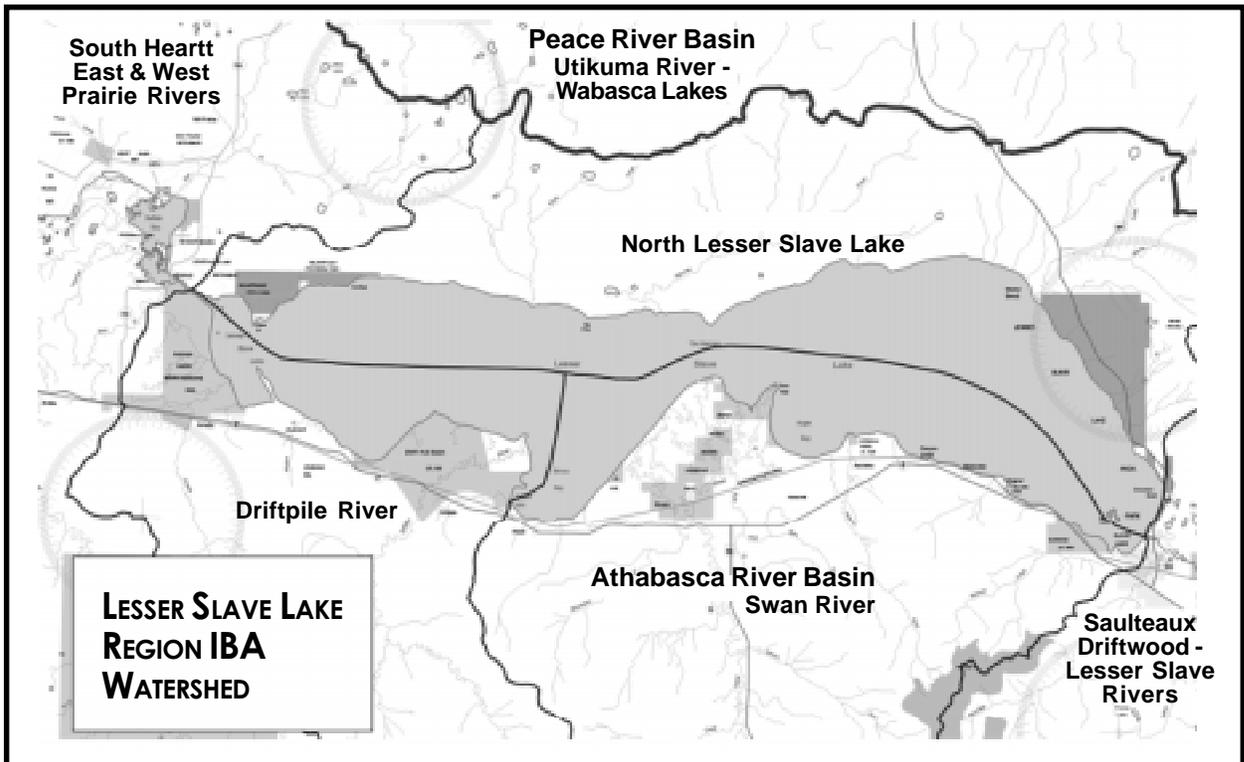
**Location:** 55\_25' N, 115\_35' W

Lesser Slave Lake, in north central Alberta, is one of the largest lakes in the province (See map, pg. below). It played an important role in the colourful history of the fur trade during the nineteenth century, and at present, it is the site of several excellent recreational facilities and one of Alberta's largest commercial fisheries. The lake is situated in very diverse countryside in Improvement District No. 17, about 250 km northwest of the city of Edmonton. Highway 2 from Edmonton runs along the southern shore and Highway 88 skirts the eastern shore. The drive along the southern shore from east to west is spectacular, as one passes through dense woodland and rolling hills, then flat, open prairie. The towns of Slave Lake and High Prairie are the major urban centres in the area. There are two provincial parks on Lesser Slave Lake. Hilliard's Bay Provincial Park is located on the northwest shore, 13 km east of

Grouard. Lesser Slave Lake Provincial Park is located on the northeast shore, 3 km north of the Town of Slave Lake.

The northern shore is inaccessible by vehicle and is deeper, steeper, and often rockier than the shallow southern shore, which contains various marsh communities. Sand dunes are found at the eastern end of the lake. In Lesser Slave Lake Provincial Park, and all around the lake, are hilly mixedwood forests of Trembling Aspen, Balsam Poplar, Balsam Fir, White Spruce and Black Spruce. Three Alberta subregions are represented here: Boreal Forest Dry Mixedwood, Boreal Forest Central Mixedwood and Lower Foothills. At the western end of the lake there is a rich delta leading into Buffalo Bay. Both marsh and swamp habitats are represented here.

#### Lesser Slave Lake Region IBA Watershed



## 4. IBA SPECIES ACCOUNTS

Tundra Swans concentrate in significant numbers at the Lesser Slave Lake Region Important Bird Area (LSLRIBA) (Table 1). On Lesser Slave Lake, flocks of up to 3,500 swans occur in spring and fall (a small portion of these are Trumpeter Swans). This number represents between 1 and 2 % of the North American population of Tundra Swans. Depending on water levels on Lesser Slave Lake, in some years, Tundra Swans can be found all along the south shore, while in other years they concentrate in certain locations, including Nine Mile Point and The Flats near Widewater.

Due to the regional geography, large numbers of migrating landbirds and raptors use the eastern shoreline of Lesser Slave Lake, but it is currently unclear whether significant numbers stopover along this corridor.

### 4.1 Tundra Swan (*Cygnus columbianus*)

#### Description

Their large size readily identifies swans, as do their long necks and all white plumage (young of the year are grayer, particularly around the head and neck). Three swans are regularly found in North America. Tundra Swans (*Cygnus columbianus*) are all white, except for the black bill, eyes, and feet; most show a yellow spot in front of the eye. The Mute Swan (*Cygnus olor*) is an exotic species introduced from Europe and now found in parts of the eastern U.S. and south-eastern Canada. It has an orange bill with a black base and knob in front of the eyes. The Trumpeter Swan (*Cygnus buccinator*) is a native of the interior portions of North America, historically nesting and wintering from the upper Mississippi Valley west and north to central Alaska. The Trumpeter is larger than the Tundra Swan, but they are difficult to separate in the field except by the calls, which are lower pitched in the larger Trumpeter.

**Table 1: IBA species and their percentage occurrence at the global or national level.**

SPECIES	NUMBERS SEEN REGULARLY	SIGNIFICANCE	% of GLOBAL POPULATION
Tundra Swan	> 3,500 nests	Global	~2%
Western Grebe	> 650 nests	Global	>1%
Waterfowl	>10,000	Global	

## Distribution and Abundance

The Tundra Swan is composed of two populations: Bewick's Swan (*Cygnus columbianus bewickii*) of the Old World and the Whistling Swan (*Cygnus columbianus columbianus*)

of the New World. Both nest on the Arctic and subarctic tundra, with the latter nesting from SW Alaska around the Arctic coast, east to Baffin Island and south to Hudson Bay. Both subspecies winter in the North Temperate Zone. Whistling Swans winter in two distinct population segments.

Tundra Swans nesting in western Alaska from the Point Hope and Cape Lisburne region southward to Kodiak Island winter predominately from Washington to California and Utah, with small flocks scattered elsewhere around the west. Birds nesting north and eastward of the Cape Lisburne area into Canada winter along the east coast of the U.S. from southern New Jersey, Delaware and Maryland south to the Carolinas.

#### Migration Behavior

Tundra Swans migrate as family units, with several families and probably some nonbreeding birds combined in a single flock (Bellrose 1980).

#### Fall Migration

During the fall migration, swans make tremendous long-distance flights. Consequently they fly both day and night. Flocks of Tundra Swan routinely overfly the Town of Slave Lake in mid-October. During a four-day period, Oct. 13-17, 2000, more than one thousand swans passed over Slave Lake.

At least two flocks were heard during the late evening around 11pm. Rest stops are infrequent and any one migration area is used by only a small segment of the population and is bypassed by the remainder of the migrants, who fly to other areas. Different areas of Lesser Slave Lake apparently serve a number of segments of the total population of fall migrants.

### **Spring Migration**

The western population of swans begins leaving their central California winter grounds in mid-February, and within three weeks almost all have departed. By early April most have migrated north into Canada. Birds leave their wintering grounds at their lowest body weights, so the importance of acquiring large fat reserves at the spring staging areas is crucial to their survival during the first few weeks after arrival on the tundra.

### **Diet**

Tundra Swans feed largely on the leaves, stems, and tubers of aquatic and marsh plants. They usually feed in water so shallow that immersion of the head and neck is sufficient to enable them to obtain the desired food items. Consequently, conservation of the littoral zone, or shoreline, on Lesser Slave Lake where aquatic vegetation is established is of critical importance.

### **Natural History of Tundra Swans (Petrie, 2000)**

Tundra swans are not colonial nesters and they breed at low densities across vast expanses of the Canadian and U.S. arctic. Both Eastern Population (EP) and Western Population (WP) Tundra Swans were harvested commercially as well as for sport throughout the 1800s and early 1900s. After nearing extinction, tundra swans were given total protection under the Migratory Bird Treaty Act of 1916. Upon receiving this protection, North America's Tundra Swan populations quickly rebounded. By the 1950s and 1960s, the WP had stabilized at 35,000 to 45,000 birds. This steady increase can almost certainly be attributed to the fact that birds began consuming agricultural grains in the 1960s and 1970s. Highly nutritious, digestible and available, cereal grain and

winter wheat consumption on wintering and spring staging areas, probably enables Tundra Swans to obtain higher levels of body fat in a shorter period of time. The net result is an increase in overwinter survival as well as increased reproductive output. In fact, WP swans have been above Pacific Flyway Council (PFC) population objectives every year since 1971, and the population is currently well above the North American Waterfowl Management Plan (NAWMP) objective.

Western populations of Tundra Swans have experienced an even more dramatic increase in numbers throughout the 1990s. The timing of spring has the most pronounced influence on population levels of high-arctic nesters, as they have limited time and endogenous resources to reproduce. A series of early springs can result in substantial population increase, whereas several consecutive late springs can have the opposite effect. The 1990s have been the warmest decade on record, with numerous early springs and late falls. This has probably enabled birds to begin nesting early, which generally results in an increase in the proportion of swans that breed, as well as increases in clutch sizes, nesting success, and fledgling success. The WP has increased from 40,000 birds in 1990, to 120,000 in 1999. If the WP continues to increase at this staggering rate (14.8% annually), the population will double in five years (241,363 swans) and quadruple in ten years (485,467 swans).

The size of wildlife populations is determined by four variables: recruitment into the population, otherwise known as productivity, as well as mortality, immigration and emigration. As there is very limited mixing between the EP and WP and less than 2% of tundra swans winter outside the midwinter survey area, immigration and emigration certainly are not key determinants of WP tundra swan population trends. Therefore, given the rate of population growth of the WP, recruitment has exceeded mortality, on average, for more than 30 years.

The 1998 NAWMP Update lists the population of EP swans as stable and at the level of the Plan objective, whereas the WP is twice as large as the population objective specified in the plan and is continuing to increase.

## 4.2 Western Grebe (*Aechmophorus occidentalis*)

### Status

The Western Grebe is uncommon in Alberta (<1000). There are 21 - 100 breeding occurrences in the province. The Alberta range of this species comprises 39% of its range in Canada and Alberta's supervisory responsibility, Canadian vulnerability, and concern are moderately high (Dunn, E.H. 1997). Trend in population is unknown. Trend in distribution is believed to be stable. Provincially, Western Grebe are ranked as a sensitive species (Yellow A) (Alberta Environment 1996). The Natural Heritage Element Rarity Rank for Alberta is S3B (ANHIC. 1999).

### Status Elsewhere

The Western Grebe breeds in east central Alberta, southern Saskatchewan and Manitoba, in two isolated pockets of suitable habitat in British Columbia, and across much of the western United States (Godfrey, W.E. 1986). The British Columbia CDC (British Columbia Conservation Data Centre. 1998) includes this species on the provincial Red list.

### Threat to Population

The Western Grebe is vulnerable to disturbance of nesting colonies (Biodiversity Conservation Data Centre. 1996). When humans approach the colony, adults will leave their nests exposing the chicks to predators; repeat disturbances can result in a high level of abandonment (Storer, R.W. and G.L. Nuechterlein. 1992). The prevailing threat to grebes this century has been loss of habitat, particularly because of the conversion of shallow lake habitats into agricultural land and the re-allocation of water for other uses. Additional threats include the deleterious effects of pesticides; altered functioning of wetlands because of eutrophication, pollution, siltation, introduction of fish and other predators and competitors; alterations to water levels; and the modern increases in water-based recreation (SSC 1997). Its gregarious behaviour makes it highly vulnerable to oiling mortality in wintering areas (Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992).

### Threat to Habitat

This species nests on large inland water bodies, usually in or very close to water deep enough to swim submerged (Biodiversity Conservation Data Centre. 1996). The Western Grebe is a facultative neotropical migrant (Thomas, R.G.

**Table 2: Colonial nesting waterbirds on Lesser Slave Lake**

Colony Location	Species	Total no. of active nests in most recent survey of each time period; ns = no survey data				
		1960's	1970's	1980's	1990's	2000
Near Joussard	CAGU	Ns	active	ns	0	188
	RBGU	Ns	active	ns	0	140
	COTE	Ns	0	Ns	0	180
	<b>WEGR</b>	<b>Ns</b>	<b>0</b>	<b>ns</b>	<b>0</b>	<b>350</b>
Giroux Bay	<b>WEGR</b>	<b>Ns</b>	<b>400</b>	<b>Ns</b>	<b>Ns</b>	<b>0</b>
Grouard Channel	CAGU	Ns	active	Ns	0	0
	RBGU	Ns	active	Ns	0	0
Grouard	GBLH	Ns	Ns	20	extirpated	extirpated

1994), and may be affected by habitat degradation on its wintering grounds.

### **Colonial Nesting Waterbird Survey**

A colonial nesting waterbird survey was conducted in 2000 by Alberta Environment. A combination of aerial and ground surveys were used to search for colonial nesting birds. The Western Grebe colony in Giroux Bay of Lesser Slave Lake was last surveyed in the 1970's and had 400 active nests (Table 2). In July, 2000 the Giroux Bay colony was abandoned and had no active nests. A new colony of Western Grebe is established near the hamlet of Jousard. Perhaps the Western Grebe colony in Giroux Bay has relocated to the Jousard location. The colony size is similar and is only 16 km west, along the south shore of Lesser Slave Lake, of the original colony. Increased boat activity from Spruce Point Park Marina and Faust may have caused the colony to relocate, but there is also considerable powerboat traffic near the present colony site at Jousard (Alberta Environment, July 2000). Large numbers of Western Grebe nest in several other places along the lakeshore – there are records of 400 nests at Assineau Point, 200 nests at Driftpile Point and 50 nests at Giroux Bay.

### **Description**

Gregarious and easily recognized by its sharply contrasting black and white colouration, thin green-yellow bill and long slender neck. Sometimes called the Swan Grebe, this graceful bird was once a major victim of plume hunters. The courtship display of the Western Grebe is spectacular. During the 'weed dance', the male and female both raise their bodies gently out of the water, stroking each other with aquatic vegetation held in their bills. They turn to each other briefly before exploding into a sprint across the water's surface. Both grebes stand high, feet paddling furiously, with their wings held back and heads and necks rigid, until the dance ends when the pair breaks through the water's surface in a headfirst dive.

### **Distribution and Abundance**

Western Grebe presently breed in medium to large colonies on many fish-bearing lakes of Alberta's

Boreal Forest and Parkland regions, as well as on larger prairie reservoirs (Semenchuk, 1992).

### **Spring Migration**

This species arrives in the spring during the last half of April and early May. The main nesting population of Western Grebe occurs on large lakes within the boreal forest of east central Alberta. Large beds of *Scirpus* and *Phragmites* are preferred nesting habitats (Pinel et al, 1991).

### **Fall Migration**

The latest fall migrants have been recorded from November 6 to 18, with peak numbers occurring during late September and early October.

### **Natural History of Western Grebe**

Western Grebe are colonial nesters and require open water deep enough for diving and with substantial fish populations. The diet consists mainly of small fish and insects. The nest is a mass of decaying vegetation, either floating or built up from the substrate and anchored to emergent or submerged vegetation. Nests are usually well concealed in reeds. Colonies may have thousands of birds nesting in close proximity. After adult Western Grebe leave the nest with their young, they spend most of their time in deep water, far from shore.

### **4.3 Other Significant Bird Species**

The Lesser Slave Lake Region supports over 228 species of landbirds and waterbirds. Waterfowl are abundant during migration. In the delta at the west end of the lake, tens of thousands of ducks have been recorded, and over 60,000 ducks and other waterfowl have died from botulism on at least one occasion (uncertain data). The Canada Land Inventory (Nietfeld et al. 1985) identifies Buffalo Bay and the north shore of Lesser Slave Lake, west of Big Point, as high waterfowl production, staging and moulting areas. A waterbird survey completed over four days in June 1994 showed 5936 waterbirds (ducks=55%, gulls/terns 35.5%). Diving ducks constituted 67% of the total ducks observed. Other birds included 213 western grebes and 81 American white pelicans (Chabaylo and Knight 1997). During the breeding season, numerous other waterbirds are found on Lesser

Slave Lake. Common Goldeneye, Mallard, Common Merganser, Bufflehead, Black Tern, Common Tern and Forster's Tern are just some of the regular breeders. The lake and its associated shoreline provide excellent habitat for breeding Bald Eagles and Ospreys. In August 1997, a survey of the lake and nearby shorelines produced an estimated 72 Bald Eagles.

The Canadian Landbird Monitoring Strategy (Downes, C.M. et al. 2000) identifies a number of bird species that are nationally at-risk and occur in the Lesser Slave Lake Region. These include the American Pipit (*Anthus rubescens*), Tree Sparrow (*Spizella arborea*), Blackpoll Warbler (*Dendroica striata*), Boreal Chickadee (*Parus hudsonicus*), Clay-coloured Sparrow (*Spizella pallida*), Harris' Sparrow (*Zonotrichia querula*), Horned Grebe (*Podiceps auritus*), Snow Bunting (*Plectrophenax nivalis*), White-throated Sparrow (*Zonotrichia albicollis*), and Yellow-billed Loon (*Gavia adamsii*). Some species are known to be local breeders including the Clay-coloured Sparrow, White-throated Sparrow, Boreal Chickadee, and Blackpoll Warbler.

At the provincial level, Alberta has high provincial responsibility for a number of locally occurring birds in the Lesser Slave Lake IBA Region. A technical report, Setting Priorities For Conservation, Research And Monitoring Of Canada's Landbirds (Dunn, E.H. 1997), lists 28 landbirds (see Table 3), either banded or observed at the Lesser Slave Lake Bird Observatory, as nationally at-risk and high composite Provincial responsibility for Alberta. Composite Provincial responsibility ensures that provincial scores reflect national responsibilities.

Species in decline (Badzinski, D.S. et al. March 2000), as documented by the Lesser Slave Lake Bird Observatory, are based on combined spring/fall trend estimates, three species: Least Flycatcher (*Empidonax minimus*), Swamp Sparrow (*Melospiza georgiana*), Ruby-crowned Kinglet (*Regulus calendula*) declined significantly and three species: Pine Siskin (*Carduelis pinus*), White-crowned Sparrow (*Zonotrichia leucophrys*),

Ovenbird (*Seiurus aurocapillus*) increased significantly from 1994-1999 at Lesser Slave Lake. The decline in numbers of Swamp Sparrows at Lesser Slave Lake is likely the result of wet seasons from 1994-1996 followed by dry seasons in 1997 and 1998. **Spring trends**, based on spring population indices, indicated 14 species declined and 23 species increased from 1994-1999 at LSLBO (Appendix B). However, Yellow-bellied Sapsucker (*Syphyrapicus varius*) is the only species that showed a significant decline ( $P < 0.05$ ) in spring population indices. **Fall trends**, based on fall population indices, indicated that 18 species declined and 11 species increased during the period

**Table 3: Alberta Composite Provincial Responsibility**

Sequence Number	Species	Composite Provincial Responsibility
1.	Bay-breasted Warbler	5
2.	Cape May Warbler	5
3.	Clay-colored Sparrow	5
4.	Connecticut Warbler	5
5.	Horned Grebe	5
6.	Le Conte's Sparrow	5
7.	Magnolia Warbler	5
8.	Philadelphia Vireo	5
9.	Sharp-tailed Sparrow	5
10.	Tennessee Warbler	5
11.	Yellow-bellied Sapsucker	5
12.	American Redstart	5
13.	American Tree Sparrow	5
14.	Black-throated Green Warbler	5
15.	Bohemian Waxwing	5
16.	Evening Grosbeak	5
17.	Least Flycatcher	5
18.	Orange-crowned Warbler	5
19.	Pine Siskin	5
20.	Purple Finch	5
21.	Red Crossbill	5
22.	Red-breasted Nuthatch	5
23.	Snow Bunting	5
24.	Canada Warbler	5
25.	Mourning Warbler	5
26.	Palm Warbler	5
27.	White-throated Sparrow	5
28.	Swamp Sparrow	5

1994-1999. Fall trend estimates for White-throated Sparrow (*Zonotrichia albicollis*), Swamp Sparrow (*Melospiza georgiana*), Cedar Waxwing (*Bombycilla cedrorum*), and Common Yellowthroat (*Geothlypis trichas*) showed marginally significant declines ( $P < 0.10$ ) and Least Flycatcher (*Empidonax minimus*) declined significantly ( $P < 0.01$ ). Ovenbird is the only species that increased significantly in the fall at Lesser Slave Lake from 1994-1999.

The surrounding forests are rich in breeding forest birds. Some of the most abundant species are Lincoln's Sparrow, Tennessee Warbler, Mourning Warbler, Rose-breasted Grosbeak, Yellow-bellied Sapsucker and Magnolia Warbler. In all, 20 species of breeding warblers have been recorded in Lesser Slave Lake Provincial Park. During migration the lake acts as a barrier to songbird migration and good concentrations of birds funnel along the eastern edge of the lake. Lesser Slave Lake Bird Observatory, established in 1994, has banded many neotropical migrants. The five most commonly banded species are American Redstart, Least Flycatcher, Yellow-rumped Warbler, White-throated Sparrow and Alder Flycatcher.

## **5. OTHER ELEMENTS OF HIGH CONSERVATION VALUE**

The boreal forest is immensely important to the survival of landbirds throughout the Americas. Up to 75% of the vertebrate life of the boreal forest is composed of birds, which are mostly neotropical migrants, i.e. birds that spend most of their lives in the tropics but migrate to the U.S.A. and/or Canada during our summer, in order to breed. There is mounting concern about the conservation status of boreal forest breeding birds because of the cumulative impact of human disturbance. By conserving the Lesser Slave Lake Region IBA, many landbirds and other creatures will benefit. An ecosystem management approach, at the watershed level, can identify key areas, both terrestrial and aquatic, that must retain fully functional ecological services to preserve the watershed. For example, forested lands that provide water filtration and erosion control services

will be conserved. These forests provide habitat for many interior forest bird specialists and other old growth dependent species.

Amphibians are among the most interesting organisms that live in our province. They are linked throughout their lifecycle to wetlands and water bodies. With a semi-permeable skin, amphibians are extremely vulnerable to any toxins or pollutants in the water. The decline of amphibians worldwide has raised concerns about the quality of the environment, and in Alberta, historical populations and distributions of amphibians were unknown. In response to the lack of data, Researching Amphibian Numbers in Alberta (RANA) was developed and initiated in 1997. The goals of the RANA project are to collect, monitor, and record data detailing the changes in the populations and distribution of amphibians in Alberta over a long period of time. The Lesser Slave Lake RANA pond is located in Lesser Slave Lake Provincial Park.

Lesser Slave Lake is a rich and productive water body. The lake is managed for sport, commercial, and domestic fisheries. The sport fishery for walleye and northern pike has dramatically increased throughout the 90's. The strong walleye population, high profile tournaments, a successful tourism promotion, and less restrictive sport fishing regulations have focused angling attention on Lesser Slave Lake. Consequently, Lesser Slave Lake has emerged as the premier walleye sportfishing lake in the Province, and potentially, in western Canada. Between 1994 and 1999, walleye harvest from Lesser Slave Lake increased by 47% while angling pressure increased by 41%. Due to further restrictions in other Provincial lakes, this trend is expected to continue over the next five years (Alberta Environment, August 2000). The increased fishing pressure will continue to impact other conservation values in the Lesser Slave Lake Region IBA.

## **6. LAND OWNERSHIP AND USE**

### **6.1 Land Ownership**

A high proportion of the land along the north shore of the Lesser Slave Lake Region IBA is crown land. There is a four hundred metre setback, under Protective Notation, on the north shore of Lesser Slave Lake that prohibits agricultural dispositions. Two Forest Management Agreements (FMA) are in place too. Weyerhaeuser is the major FMA holder and TOLKO is responsible for a smaller FMA holding in the eastern end. Alberta Environment, Lands and Forest Service, is the landuse manager for these FMA. Lesser Slave Lake Provincial Park and Hilliard's Bay Provincial Park are located at the east and west ends of Lesser Slave Lake respectively. The south shore of Lesser Slave Lake is primarily Freehold land and First Nations reserves. At present, there are five First Nations reserves on the southern and eastern shores of the lake, and on the outlet, the Lesser Slave River. They are from west to east, the Sucker Creek, Driftpile, Swan River, Assineau River, and Sawridge reserves. When Treaty No. 8 was signed in 1899, the five Cree bands that resided around the lake were regarded as one entity and the land was administered jointly. Thirty years later, each band became a separate body with its own chief and council. In 1984, the total membership of the five bands was 1,743 people, and the reserves covered a total area of 18,800 ha. Near the hamlet of Grouard on Buffalo Bay, members of the Grouard Indian Band live on three reserves: Freeman, Halcro, and Pakashan. About 87 people resided on the 444 ha reserves in 1981.

There are four hamlets, one village, and one town on or near Lesser Slave Lake and adjoining Buffalo Bay: the Town of Slave Lake, the village of Kinuso, and the hamlets of Grouard, Jousard, Faust, Canyon Creek, and Widewater-Wagner (Mitchell 1990).

### **6.2 Land Use**

#### **Historical**

Aboriginal people have occupied the Lesser Slave Lake Region for 5,000 to 12,000 years. A lack of archaeological surveys of the area means little is

known of the lake's aboriginal people. In 1964, J.V. Wright from the National Museum of Man in Ottawa, identified four sites in the region that revealed evidence of prehistoric inhabitation. These include a site within Lesser Slave Lake Provincial Park (Sawyer, G. 1981). The first known European to view Lesser Slave Lake was the famous surveyor David Thompson. According to Thompson's journals the lake was sighted at 9:30am, April 28, 1799. A series of fur trading forts were established around Lesser Slave Lake from 1799 to 1818 and a number of traplines for furbearers still exist in the area. By 1914, when the first train arrived in Sawridge (now Slave Lake), there was a limited agricultural community in the area. Forestry became a force in the area in the 1950's and a significant oil and gas industry began in 1965.

#### **Current**

A large proportion of the land in the IBA is used for grazing, waterfront property, and First Nations Reserves. Forestry activities take place throughout the IBA on private and crown land and continue to expand due to a falldown in wood supply, exploitation of new resources such as aspen poplar for oriented strand board production (OSB), and expansion of existing plants. Oil and gas exploration and extraction takes place throughout the IBA on private and crown land, but oil reserves are estimated to be depleted in 25 years; however, record prices for natural gas supplies has the potential to dramatically increase local drilling for gas. The major communities within the IBA continue to expand, as does the amount of country residential development. Other land uses in the area include recreation and tourism; domestic, commercial and sport fishing; and wildlife conservation and research.

## 7. CONSERVATION MANAGEMENT ACHIEVED AT THE IBA SITE

The Lesser Slave Lake Region IBA is centered on Lesser Slave Lake Provincial Park, which protects the eastern shore of Lesser Slave Lake and extreme western edge of the Pelican Uplands including Marten Mountain. The waters off the park provide feeding and resting areas for waterfowl. Dog Island is also a part of Lesser Slave Lake Provincial Park and provides important bird habitat.

On June 27, 1997, LSLBO Field Assistant, Jason Rogers, conducted a bird census of Dog Island. He reported Red-necked Grebes in the sheltered bays that were probably nesting; Goldeneye hens were commonly seen, one of which was tending to a brood; other water birds observed included a Common Loon, a Western Grebe, two White-winged Scoters, a Bufflehead, a large raft of *Bucephala* ducks, a small flock of Franklin's Gulls, several *Sterna* terns, and a Black Tern. A Bald Eagle nest, containing at least one juvenile, was found near the center of the island. Both adults were seen. The only other non-passerine observed was a male Downy Woodpecker. Tennessee Warbler, Yellow Warbler, Yellow-rumped Warbler, Chipping Sparrow, Song Sparrow, and White-throated Sparrow were common on the island and at least two males from each species were heard singing. Additional breeding evidence included alarm calls as well as a White-throated Sparrow carrying food. A flock of about 30 American White Pelican uses the sheltered bays for resting and a spit on the southeast side of the island for feeding.

At the west-end of Lesser Slave Lake, Hilliard's Bay Provincial Park protects a portion of littoral habitat with important emergent and aquatic vegetation for nesting and feeding waterfowl. A more substantial section lies outside of the park boundaries, to the east, and relies on an existing Protective Notation for conservation management. The extent of landbird use and migration through the park and along the west end of Lesser Slave Lake is not known, but casual observations by Alberta Environment staff indicates a noteworthy passage of passerines.

## 8. IBA STAKEHOLDER GROUP ACTIVITY

The Lesser Slave Lake Region IBA committee includes representatives from the Lesser Slave Lake Bird Observatory. With time, the committee membership will hopefully include representatives from First Nations, various Community and Ratepayer Associations, the Town of Slave Lake and High Prairie, and Weyerhaeuser and TOLKO forest companies. The committee receives technical assistance from the Canadian Wildlife Service and the Natural Resources Service of Alberta Environment. Following is a list of related activities carried out by various stakeholders involved in conservation.

The Lesser Slave Lake Bird Observatory hosts an annual festival with noted conservationists and/or birders as keynote speaker. For example, last year, Candace Savage, author of numerous internationally acclaimed books of natural history and science, including *The Wonder of Canadian Birds*, was the keynote speaker. The festival attracts people from across the province of Alberta and increasing media attention. CBC-TV Edmonton has already committed to covering the 2001 festival and last year, CBC Radio One was on site.

A three-panel display highlighting the Important Bird Areas program and the Lesser Slave Lake Region IBA will be available in early 2001. This display will be used in local malls and other venues including the West Edmonton Mall to draw attention and raise awareness of the IBA program. Other Alberta conservation groups, e.g. Beaverhill Bird Observatory, will be encouraged to use the display too.

In the summer of 2000, the LSLBO used an IBA Community Action Fund grant to hire an IBA Educator. The IBA Educator wrote a series of local newspaper articles on the IBA program and made a number of appearances on local radio to discuss the IBA program and its implications for the region. In addition, the IBA Educator greeted the public at the LSLBO research site on weekends when the most walk-in visitors were expected. The IBA program was a key message delivered to the public. In total, over 750 visitors were contacted over the summer at the LSLBO.

The Canadian Wildlife Service monitors swan populations on Lesser Slave Lake.

Ducks Unlimited Canada oversees implementation of the NAWMP, assists in population monitoring and may acquire key land parcels adjacent to swan habitat when opportunities arise.

Lesser Slave Lake Provincial Park presents interpretive and environmental education programs about swans and other waterfowl, landbirds, and wetlands.

Natural Resources Service, Alberta Environment enforces regulations under the Wildlife Act and applies for land use restrictions adjacent to swan lakes in the green zone.

The Town of Slave Lake actively promotes the Lesser Slave Lake Bird Observatory on its web site and in tourism promotional material.

## **9. OPPORTUNITIES**

The public associates birds with the Lesser Slave Lake area largely due to the presence of the Lesser Slave Lake Bird Observatory over the past seven years. The Great Canadian Parks series shot an episode based on the LSLBO, which has a potential audience of over 1 million. On November 2, 2000, Attractions Alberta launches a new Tourism Showcase. The Calgary Airport Authority and its Attractions Alberta Partners will unveil new exhibits in the domestic arrival area. One new exhibit features boreal forest birds, including the Tundra Swan and Lesser Slave Lake Provincial Park. On average, 8 million travelers pass through the exhibit area. The designation of the Lesser Slave Lake Region IBA site further emphasizes the importance of the area to wildlife and bird conservation in particular. This global recognition will encourage and provide new opportunities for landowners in habitat conservation. It is definitely possible to 'twin' the Lesser Slave Lake Region IBA with other key habitat sites in Alberta and the Americas to increase the profile of bird habitat conservation. The LSLBO is already pursuing a similar scheme to link up with Bird Banding partners in Central America and Mexico.

## **10. THREATS**

### **Disturbance**

The staging population of Tundra Swans on Lesser Slave Lake is vulnerable to increasing residential subdivision/urbanization and recreational cottage development along the south shore. The Municipal District of Lesser Slave River, M.D. No. 124, projects a total build-out population of 2,344 (Hofmann, G. Oct. 2000). This represents a 42% increase over the current population of 990.

Intrusive recreational activities such as boating and shoreline off-highway vehicle use contribute to the disturbance of Tundra Swan staging areas as does car, foot and pet traffic associated with increased country residential development. Commercial, domestic and sport fisherman can disturb staging waterfowl. The sports fishing effort has doubled from 1994 - 1999 (Alberta Environment, August 2000) and Alberta Fish and Wildlife expect the trend to continue over the immediate future.

### **Habitat Degradation**

Violations of waterfront development permits along the south shore and other lakeside areas have increased in recent years (Alberta Environment unpublished data). Unprecedented low water levels in Lesser Slave Lake has allowed waterfront property owners to disk, mow, dredge, and bulldoze exposed vegetative communities. Increased residential development will impact soil erosion control, runoff, and stream ecology (e.g. increased water velocity) with potentially negative results on emergent and aquatic vegetative communities. The water quality of wetlands in agricultural and residential areas is also threatened by the runoff of fertilizers and pesticides.

## 11. CONSERVATION GOALS AND OBJECTIVES

### EDUCATION

1. Share information throughout the Lesser Slave Lake Region IBA about conservation of Tundra Swan, Western Grebe, and Waterfowl habitat and staging areas.

### Key Partners

Lesser Slave Lake Bird Observatory (LSLBO), Alberta Environment (AENV), Lesser Slave Lake Provincial Park (LSLPP), & Ducks Unlimited (DU)

### Action Required

Place IBA and Landowner stewardship displays/info in high traffic areas throughout the region. Establish terms of reference to designate landowners as stewards. Develop information package for stewards including site designation signage. Develop program promotion plan.

### Time Line

Ongoing

2. Establish a landowner stewardship program to enhance conservation of shoreline habitat.

LSLBO, DU, AENV

Ongoing

3. Provide ongoing information on Tundra Swan, Western Grebe, and Waterfowl within Lesser Slave Lake Provincial Park.

LSLPP

As part of the Heritage Appreciation goals in LSLPP. Ongoing Interpretive programs, School programs, and Print material will be provided to the public.

Summer and Fall/2000. Landowner contacts in 2001/2002

4. Participate in the annual Songbird Festival at LSLPP.

SLBO, AENV, LSLPP, Wildbird General Store, Encompass Magazine, CBC-Radio One

1<sup>st</sup> weekend in June annually

### HABITAT PROTECTION / ENHANCEMENT

1. Work to ensure maintenance of undisturbed shoreline habitat(including natural treed buffers, water levels, water quality, etc.).

LSLPP, AENV, DU

Respond to development proposals within the M.D.. Provide shoreline landowners with information on habitat maintenance through stewardship program. Work with "Living By Waters" program. Initiate reclamation where landowners have encroached on buffer zone by lakeshore

Ongoing

2. Work with government and DU to secure and enhance nesting and staging habitat.

Ongoing, involves habitat stewards

<b><u>ENFORCEMENT</u></b>	<b>Key Partners</b>	<b>Action Required</b>	<b>Time Line</b>
1. Support existing management plans for LSLPP and Hilliard's Bay Provincial Park and any new conservation initiatives in the region.	AENV, CWS, DU	Educate landowner stewards on the Report a Poacher program and provide enforcement contact steward information package.	Ongoing
2. Support enforcement of existing regulations preventing the hunting or harassment of protected species.	LSLBO, AENV, DU	Boaters are unaware of federal Migratory Bird Act & Bird Sanctuary status of Dog Island.	Ongoing
3. Work to educate boaters during critical migratory periods.	LSLBO, AENV, DU	Boaters are unaware of federal Migratory Bird Act & Bird Sanctuary status of Dog Island.	2001/Ongoing
<b><u>RESEARCH/ MONITORING</u></b>	LSLBO, Alberta Conservation Association (ACA), AENV, CWS	Raise funds and recruit volunteers to help maintain operations of the LSLBO.	Ongoing
1. Continue population monitoring in LSLPP and expand operations to other sites in the region.	LSLBO, AENV, ACA, University of Alberta	Water Parameters (temp., ph) are taken throughout the research period and the overall health of the aquatic ecosystem is closely monitored over the longterm.	Ongoing
2. Support continued research project on amphibians in LSLPP that provides information on the health of surrounding aquatic ecosystems.	LSLBO, AENV, ACA, University of Alberta	Water Parameters (temp., ph) are taken throughout the research period and the overall health of the aquatic ecosystem is closely monitored over the longterm.	Ongoing

## 12. EVALUATING SUCCESS

The Lesser Slave Lake Region IBA conservation plan will be reviewed on yearly basis and Tundra Swan populations will continue to be monitored. It is hoped that in the next five years at least one habitat steward can be designated for each of the hamlets in the IBA.

## 13. ACKNOWLEDGMENTS

The Important Bird Areas Program is part of the Natural Legacy 2000 program, a nationwide initiative to conserve wildlife and habitats on private and public lands. The Lesser Slave Lake Region IBA committee gratefully acknowledges the financial support of the Government of Canada's Millennium Partnership Program. In addition, we gratefully acknowledge the financial support of the Alberta Conservation Association and the Alberta Ecotrust Foundation. The committee appreciates the technical assistance provided by the Canadian Wildlife Service and Alberta Environment during development of the conservation plan. The committee also thanks the guidance of IBA coordinator, George Newton, and the support of the Federation of Alberta Naturalists.

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## **APPENDIX A: IBA PARTNERS**

### **BirdLife International**

A pioneer in its field, BirdLife International (BL) is the first non-government organization dedicated to promoting world-wide interest in and concern for the conservation of all birds and the special contribution they make to global biodiversity. BirdLife operates as a partnership of non-governmental conservation organizations, grouped together within geographic regions (e.g. Europe, Africa, Americas) for the purpose of planning and implementing regional programs. These organizations provide a link to on-the-ground conservation projects that involve local people with local expertise and knowledge. There are currently 20 countries involved in the Americas program throughout North, Central and South America.

For further information about BirdLife International, check the following web site:

<http://www.birdlife.net/>.

The Canadian Important Bird Areas Program has been undertaken by a partnership of two lead agencies. The Canadian Nature Federation and Bird Studies Canada are the Canadian BirdLife International partners.

### **The Canadian Nature Federation (CNF)**

The Canadian Nature Federation is a national conservation organization with a mission to be Canada's voice for the protection of nature, its diversity, and the processes that sustain it. The CNF represents the naturalist community and works closely with our provincial, territorial and local affiliated naturalists organizations to directly reach 100,000 Canadians. The strength of our grassroots naturalists' network allows us to work effectively and knowledgeably on national conservation issues that affect a diversity of ecosystems and human populations in Canada. The CNF also works in partnership with other environmental organizations, government and industry, wherever possible.

Our approach is open and cooperative while remaining firm in our goal of developing

ecologically-sound solutions to conservation problems. CNF's web site is <http://www.cnf.ca>.

### **Bird Studies Canada (BSC)**

The mission of Bird Studies Canada is to advance the understanding, appreciation and conservation of wild birds and their habitats, in Canada and elsewhere, through studies that engage the skills, enthusiasm and support of its members, volunteers, staff and the interested public. Bird Studies Canada believes that thousands of volunteers working together, with the guidance of a small group of professionals, can accomplish much more than could the two groups working independently. Current programs collectively involve over 10,000 volunteer participants from across Canada.

Bird Studies Canada is recognized nation-wide as a leading and respected not-for-profit conservation organization dedicated to the study and understanding of wild birds and their habitats. Bird Studies Canada's web site is <http://www.bsc-eoc.org>.

### **Federation of Alberta Naturalists**

The Federation of Alberta Naturalists (FAN) is a provincial conservation organization, founded in 1970. FAN is an affiliate of the Canadian Nature Federation and is composed of corporate clubs and individual members. The objectives of FAN are:

- to encourage Albertans to increase knowledge and understanding of natural history and ecological processes;
- to provide a unified voice for naturalists on conservation issues; to promote field meetings, conferences, nature camps, research symposia and other activities;
- and, to promote the exchange of information among clubs and societies.

FAN publishes Alberta Naturalist four times a year.

Phone: (780) 427-8124.

Fax: 422-2663.

Website: [www.fanweb.ca/](http://www.fanweb.ca/).

## APPENDIX B: SELECT BIRD TREND ESTIMATES BETWEEN 1994 - 1999

Estimated annual percentage change in numbers of migratory birds passing through Lesser Slave Lake Bird Observatory between 1994 - 1999, based on linear regression on indices derived from daily estimated totals. The combined spring/fall trend estimates are only presented if the seasons were not significantly different.

Species	Spring	Fall	Combined spring/fall	Difference between spring and fall trends
Yellow-bellied Sapsucker	-19.89*	-	-	
Yellow-shafted Flicker	25.54	-	-	
Alder Flycatcher	-9.1	-12.78	-11.03	n.s
Least Flycatcher	-4.71	-17.31**	-11.51*	n.s
Blue Jay	-	11.08	-	
Brown-headed Cowbird	17.88	-	-	
Red-winged Blackbird	2.96	-	-	
Evening Grosbeak	38.80+	-	-	
Pine Siskin	59.25*	13.36	33.92+	n.s
White-crowned Sparrow	22.21+	23.96	23.11**	n.s
White-throated Sparrow	-1.83	-15.81+		0
Chipping Sparrow	28.34	-	-	
Clay-colored Sparrow	17.29	-	-	
Lincoln's Sparrow	1.13	-14.76	-7.42	n.s
Swamp Sparrow	-24.74	-35.63+	-30.90*	n.s
Rose-breasted Grosbeak	20.20+	19.32	19.74	n.s
Western Tanager	1.62	12.54	7.27	n.s
Tree Swallow	-8.4	-	-	
Cedar Waxwing	-11.98	-18.53+	-15.45	n.s
Red-eyed Vireo	4.64	-0.63	1.89	n.s
Warbling Vireo	-2.45	-	-	
Blue-and-White Warbler	19.67	-0.84	8.27	n.s
Orange-crowned Warbler	-5.18	-2.12	-3.69	n.s
Tennessee Warbler	29.73*	-29.40*	-	***
Yellow Warbler	5.04	-13.71	-	0
Myrtle Warbler	-2.97	22.68	9.80	n.s
Magnolia Warbler	10.61	-2.40	3.81	n.s
Ovenbird	14.47**	13.74**	14.08****	n.s
Northern Waterthrush	4.61	3.80	4.18	n.s
Mourning Warbler	8.24	-2.40	2.42	n.s
Common Yellowthroat	5.91	-18.15+		0
Wilson's Warbler	-11.42	-10.22	-10.81	n.s
Canada Warbler	16.46q	-13.52		0
American Redstart	-0.15	-16.84	-9.02	n.s
American Pipit	-	50.02	-	n.s
Red-breasted Nuthatch	22.12	2.49	11.75	n.s
Ruby-crowned Kinglet	-41.88	-10.70	-27.98+	n.s
Swainson's Thrush	4.64	5.60	5.14	n.s