Draft Report

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A DRAFT RESOURCE MANAGEMENT PLAN FOR THE LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA AND MIGRATORY BIRD SANCTUARY

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Canadian Wildlife Service
Prairie and Northern Region
Conservation and Protection
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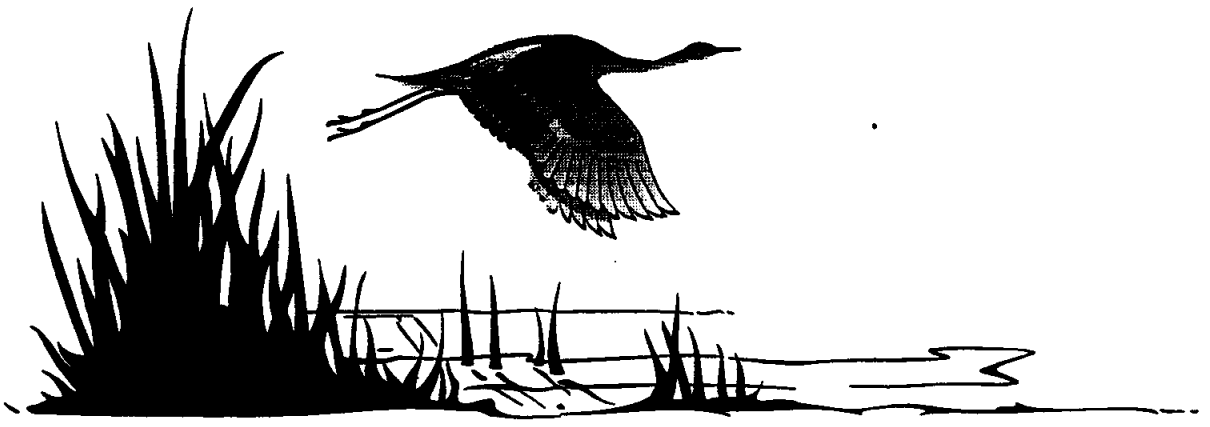
LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA

INTRODUCTION



1.0 INTRODUCTION

For over a century, Last Mountain Lake has been officially recognized as a special place for wildlife and was the first federal bird sanctuary reserved in North America. The original 1025 ha of land were set aside on the 8th of June, 1887 by Sir John A. MacDonald on the recommendation of Edgar Dewdney.

Last Mountain Lake is an important migratory stopover for hundreds of thousands of birds travelling across the Great Plains, between their northern breeding grounds and their southern wintering grounds. Two main factors contribute in attracting such a wealth of birdlife to the area: its excellent habitats; and, its strategic location in the heart of the central flyway of North America.

Over 270 species of birds have been recorded at Last Mountain Lake during migration. Up to 50,000 cranes, 400,000 geese and several hundred thousand ducks may be observed when migration peaks. Although less conspicuous, scores of songbirds, shorebirds and birds of prey spend from a few days to a few weeks every year in the area. Birds travelling through at least 25 different countries, from Arctic Canada to Argentina, use Last Mountain Lake's rich habitats.

The National Wildlife Area (NWA) is also an important breeding ground for at least 100 species of birds, many of which are unique to the prairie region. Up to 9 species of shorebirds, 43 species of songbirds and 13 species of ducks nest within the boundaries of the NWA. Some of the most interesting breeders include the Western Grebe, American White Pelican, American Avocet and Wilson's Phalarope.

Last Mountain Lake also provides appropriate habitat for nine of Canada's thirty species of vulnerable, rare, threatened and endangered birds as classified by the 'Committee on the Status of

Endangered Wildlife in Canada' (COSEWIC) in 1993. These are the Caspian Tern, Peregrine Falcon, Piping Plover, Whooping Crane, Burrowing Owl, Ferruginous Hawk, Loggerhead Shrike, Cooper's Hawk, and Baird's Sparrow. Colonial nesters such as pelicans, cormorants, gulls, terns and grebes are also particularly dependent upon the statutory protection afforded by the NWA. These birds nest in mixed colonies on several islands of the lake or on floating platforms of vegetation in the marsh and are very sensitive to disturbance during the breeding season.

The importance of the Last Mountain Lake National Wildlife Area (LMLNWA) has been recognized on a number of occasions. These honors include designation as the following:

- 1970 - International Biological Program (IBP) site
- 1982 - Wetland of International Importance especially as waterfowl habitat
- 1990 - National Historic Site
- 1994 - Western Hemisphere Shorebird Reserve Network regional site

Wildlife conservation is the primary purpose of the LMLNWA. This is achieved through protection of wildlife species as well as through protection, enhancement, and restoration of their habitat. The Canadian Wildlife Service achieves these goals with cooperation from other wildlife or resource agencies as well as interested non-government organizations.

Many procedures have been developed to enhance the NWA for wildlife and minimize the impacts of human activities. However, certain activities are possible within the NWA provided that they do not damage the habitat or threaten the welfare of wildlife species using the area.

Unless specifically stated otherwise, general reference to the Last

Mountain Lake National Wildlife Area includes the Migratory Bird Sanctuary (MBS) throughout this resource management plan.

2.0 OBJECTIVES, STRATEGY AND GOALS

2.1 Objective

The Last Mountain Lake National Wildlife Area (LMLNWA) will be managed for the conservation and maintenance of the unique wetland and upland habitats of the north end of Last Mountain Lake and their associated wildlife species.

2.2 Strategy

The LMLNWA has been greatly influenced by man's activities although a wilderness core of native habitat remains unscathed. The underlying policy guiding management will be to maintain and enhance the areas' wildness and to expand the wilderness core beyond its present boundaries to coincide with those of the entire NWA. The CWS will strive to encourage the natural, dynamic forces of nature to occur wherever possible with limited interference by man.

Where the physical and biological balance of the National Wildlife Area (NWA) has been upset by the activities of man, a variety of management actions including rehabilitation, restoration and protection, may be implemented to counteract their adverse effects. These actions may include such things as the use and/or suppression of fire; removal of exotic vegetation; utilizing native plant species to provide habitat suitable to endemic species; wetland development and water manipulation; and the reintroduction of species which formerly occurred at Last Mountain Lake.

2.3 Goals

1. To manage and conserve the natural resources of the LMLNWA in a manner consistent with the Canada Wildlife Act, its Wildlife Area Regulations, the Migratory Birds Convention Act and the terms of the Agreement between Canada and Saskatchewan for the Establishment of the Last Mountain Lake National Wildlife Area.

2. To manage the LMLNWA from an ecosystem perspective. Inherent in this approach is the gathering and compiling of baseline data on all pertinent ecological parameters. Monitoring programs will be developed to update, and add to, baseline information and to evaluate the impact of past, present, and future human activities on the ecology of the NWA. The CWS will support research projects to this end as well as those that may be applicable to wildlife conservation in other areas.

3. To support and participate in conservation initiatives which are consistent with the approved resource management plan, such as the North American Waterfowl Management Plan, Wetlands of International Importance under the Ramsar Convention, and the Western Hemisphere Shorebird Reserve Network.

4. To foster compatible management of the natural resources of the LMLNWA and greater ecosystem through ongoing meetings with public interest groups, other government agencies, and individuals having an interest in Last Mountain Lake.

5. To heighten the public's understanding of the nature of the LMLNWA and to gain additional support for the conservation of wildlife and its habitat in the Canadian prairies. This will include providing limited opportunities for wildlife-oriented and appreciative activities designed to enhance public

awareness of the LMLNWA and which are consistent with the approved resource management plan. This will include the direction of ecotourism on the area in a manner that will benefit surrounding communities without compromising the ecological integrity of the LMLNWA.

3.0 CANADIAN WILDLIFE SERVICE MANDATE

The mandate for management of the NWA and MBS by the Canadian Wildlife Service is derived from the following Acts and Agreement:

3.1 Canada Wildlife Act

The Canada Wildlife Act (CWA), passed in 1973, is the legislative mandate which enables the Canadian Wildlife Service (CWS) to undertake its habitat program across Canada. The CWA authorizes establishment and management of National Wildlife Areas for the purposes of wildlife conservation, research and interpretation. All management of NWA's must be consistent with these purposes and conform to the legislation and its regulations. The CWA and its Wildlife Area Regulations are presented in Appendix I.

3.2 Migratory Birds Convention Act

The Migratory Birds Convention Act (MBCA), passed in 1917, is the legislative mandate which empowers the CWS to manage and protect migratory birds across Canada. The MBCA enables Canada to establish and administer the Migratory Bird Sanctuary (MBS) system. All management of MBS's must be consistent with the purposes prescribed in the Act and conform to the legislation and its regulations. That MBCA and the pertinent Sanctuary Regulations are presented in Appendix II.

3.3 Terms of the Agreement to Establish the National Wildlife Area

On the 5th of June, 1987, Canada and Saskatchewan signed an agreement for the establishment of the Last Mountain Lake National Wildlife Area with each party dedicating lands for that purpose. Through the terms of this agreement, federal Migratory Bird Sanctuary status will continue on the northern most waters of Last Mountain Lake.

Under the terms of the agreement (Appendix III) which legally bind Canada, the purpose of the area is defined. All activities must reflect a wildlife conservation objective and must be compatible with the primary purpose - to protect and enhance lands for wildlife.

4.0 MANAGEMENT POLICY

4.1 Areas Administered

At the present time the CWS operates two NWA's in the Last Mountain Lake district: Last Mountain Lake and Stalwart, the latter being acquired in 1969 for waterfowl nesting and feeding purposes. As the Stalwart NWA is an integral part of the Last Mountain Lake ecosystem, it is the intent of the CWS to integrate the management of Stalwart with that of Last Mountain Lake. Such a step will facilitate management administratively, biologically and for public use. From the standpoint of practical operations, working integration has already occurred.

The LMLNWA comprises all uplands (including points, islands, roads, road allowances) and wetlands on the area excluding the land covered by the waters of Last Mountain Lake. From time to time lands may be added to the NWA for conservation purposes. The Last Mountain Lake MBS includes all remaining lands covered by the

waters of Last Mountain Lake plus certain portions of the NWA including the islands, lake shore and some adjacent upland (Table 1).

Management of the NWA and MBS will be done in a complimentary and uniform manner to ensure consistent conservation programs apply to the entire area.

4.1.1 Administration

The CWS administers the Last Mountain Lake and Stalwart NWA's (Figure 1) and the Last Mountain Lake MBS from the Last Mountain Lake NWA Headquarters (Figure 2). The Area Manager resides at this location year round.

The CWS maintains support facilities and equipment at the NWA Headquarters in order to deliver wildlife conservation, research, protection, area maintenance and visitor services on the NWA. The CWS is responsible for maintaining and operating all facilities and improvements on the area including roads, trails, buildings, signage, fences (boundary and internal), gates, and visitor use facilities.

In order to facilitate administration of the NWA and improve visitor services, the CWS has built a permanent office at the headquarters site. It houses resource material such as a small library and plant collection, a laboratory, and is capable of accommodating meetings with visitors and other users of the area.

TABLE 1. AREAS ADMINISTERED BY THE CANADIAN WILDLIFE SERVICE AT LAST MOUNTAIN LAKE AND STALWART TO MARCH 1991

Last Mountain Lake National Wildlife Area		
	Last Mountain Lake Unit	9547 hectares
	West Unit	195 hectares
	Saline Creek Unit	325 hectares
	East Unit	455 hectares
TOTAL		10522 hectares
Last Mountain Lake Migratory Bird Sanctuary		
	Waters of Last Mountain Lake	465 hectares
	Land (part of NWA also)	4271 hectares
TOTAL		4736 hectares
Stalwart National Wildlife Area		
	North Unit	hectares
	Centre Unit	hectares
	South Unit	hectares
TOTAL		1525 hectares

Any inquiries regarding the NWA or MBS should be directed to:

The Area Manager
Last Mountain Lake National Wildlife Area
Canadian Wildlife Service
P.O. Box 280
Simpson, Saskatchewan S0G 4M0

Telephone: 306-836-2022

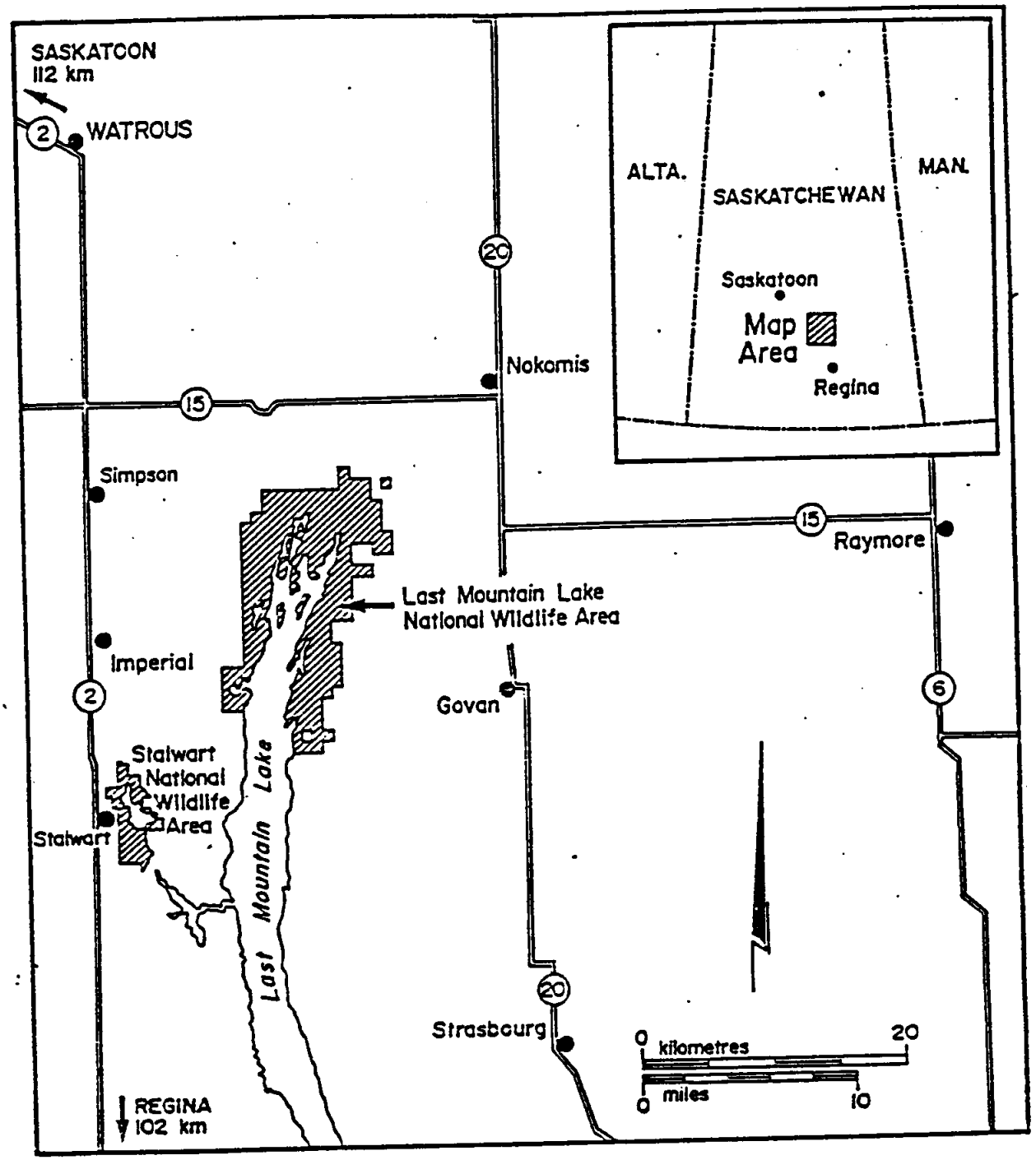


Figure 1. Location of the Last Mountain Lake and Stalwart National Wildlife Areas.

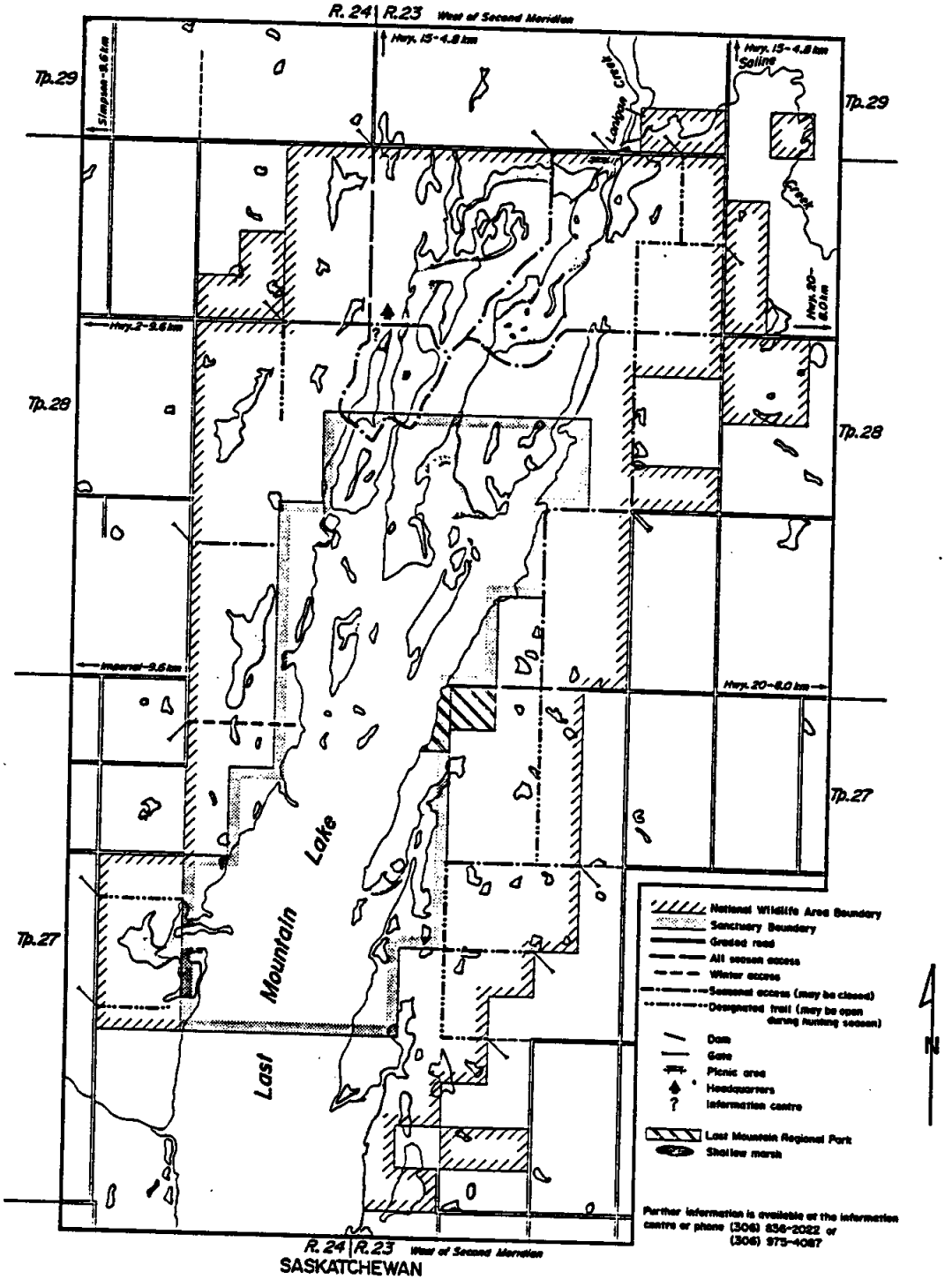


Figure 2. Last Mountain Lake National Wildlife Area and Migratory Bird Sanctuary Boundaries.

4.2 Enforcement Policy and General Regulations

In accordance with the CWA and its Wildlife Area Regulations certain restrictions exist on the NWA for the benefit of wildlife and its environment. Permits may be granted for specific activities and these activities may only be carried out in accordance with the permit conditions. Notices will also be used to inform the public of activities that are allowed on the NWA. Unless a permit is granted, or notices to the contrary are posted (at the Information Kiosk at the Last Mountain Lake NWA headquarters, in local newspapers, or at designated sites on the NWA boundary), the following activities are prohibited:

- hunting or fishing,
- possessing any firearm, bow and arrow or any instrument that could be used for the purpose of hunting,
- possessing any wildlife, carcass, nest, egg or a part of any of those things,
- cutting, picking, removing or wilfully damaging any vegetation,
- carrying on any agricultural activity, grazing livestock or harvesting any natural or cultivated crop,
- allowing any domestic animal to run at large,
- swimming, picnicking, camping or carrying on any other recreational activity or lighting or maintaining a fire,
- using or operating a boat, aircraft or any other vehicle,
- destroying or molesting wildlife or carcasses, nests or eggs thereof,
- removing, defacing, damaging or destroying any artifact, natural object, building, fence, poster, sign or other structure,
- carrying on any commercial or industrial activity,
- disturbing or removing any soil, sand, gravel or other material,

- dumping or depositing any rubbish, waste material or substance that would degrade or alter the quality of the environment, or,
- entering into any National Wildlife Area where notice prohibiting such entry has been given.

For the purposes of the administration of the CWA and the Wildlife Area Regulations, Wildlife Area Officers possess the powers of a police constable. Designated conservation officers and the Royal Canadian Mounted Police are also authorized to enforce the CWA. Wildlife Area regulations will be universally enforced. When necessary, charges will be laid.

Signs are maintained along NWA boundaries. To accommodate seasonally accepted activities on parts of the NWA such as wildlife viewing, hunting, fishing and boating, "public notice signs" are posted in the Information Kiosk. People planning to visit the NWA are advised to stop at the Information Kiosk to register and determine what parts of the NWA are open to the public and what activities are permitted.

Within the Migratory Bird Sanctuary, in accordance with the MBCA and its regulations, the following activities are prohibited all year round:

- hunting any wildlife species,
- possessing any migratory bird (alive or dead), their nests or eggs,
- disturbing migratory birds, their nests or eggs,
- possession of any firearm or other hunting device,
- allowing any dog or cat to run at large.

Sanctuary regulations will be universally enforced. When necessary, charges will be laid.

Last Mountain Lake and Stalwart NWA's are patrolled on a regular basis throughout the year by federal and provincial enforcement officers. Signs are maintained along MBS boundaries.

4.3 Environmental Review

In 1995, the Canadian Environmental Assessment Act (CEAA) was proclaimed. The CEAA addresses the need for environmental review pursuant to certain federal obligations. All activities carried out by the CWS on the NWA will comply with this legislation.

4.4 NWA In Relation to Other Regional Planning

The CWS will contribute to all regional planning activities which may have an effect on the ecology of the NWA and MBS.

Saskatchewan is promoting the Last Mountain Lake MBS and NWA as a tourism destination point. As benefits from tourism accrue to local communities, CWS supports efforts to have tourism projects planned and operated at the local level. These projects will provide visitor services to the NWA, including day visits for organized tours, private auto tours, nature hikes, tour guides and wildlife viewing and related information. The CWS reserves the right to restrict these activities if they are deemed to be of a nature (or frequency) that will result in unnacceptable impacts to wildlife and/or habitat.

CWS has actively participated in many water management and conservation programs including the Qu'Appelle Implementation Program. CWS will seek continued participation in such programs which have direct and indirect impacts on the NWA and MBS and their resources.

By participating in federal, provincial and municipal planning activities, the CWS will ensure that the conservation requirements

of the NWA and MBS are taken into consideration and that management programs on the NWA have minimum impact on surrounding communities.

4.5 The NWA and MBS in Relation to the Last Mountain Regional Park

The CWS will not duplicate visitor services in existence within the Regional Park such as accommodation, camping, boat launching, swimming, and major day use facilities.

Currently developed and planned public information programs on the NWA include the Information Kiosk, Observation Tower, nature walks, Driving Tour, information signs, brochures and teachers/school kits all of which compliment existing Regional Park facilities.

The CWS will work with the Regional Park Superintendent, Authority and staff to ensure that recreational activities within and emanating from the Regional Park are compatible with the legal, conservation and management requirements of the NWA and MBS.

4.6 Ducks Unlimited Projects and Developments

The CWS and Ducks Unlimited Canada (DUC) have entered into long term agreements to cooperatively manage several wetland basins within the NWA for wildlife conservation. Since 1982 the CWS and DUC have used a standard agreement to cover all wetland development projects on NWA lands across Canada. Each agreement contains a site specific management plan covering; project objectives, design, construction, water management, related habitat enhancement work (island construction, level ditching, pond construction, upland cover planting) and supporting technical information. Water levels are managed to benefit waterfowl, migratory birds and other wildlife and take into consideration conservation of threatened and endangered species on the area. Each management plan will be updated as necessary.

4.7 Agriculture

The CWS recognizes the important role agriculture has played in the settlement and development of prairie Canada, and in particular the people who settled in the Last Mountain Lake district. A combination of factors including low soil quality, droughts, pests and the market place have rendered lands in the NWA unsuitable for intensive, sustainable modern agriculture. Today, with the establishment of the NWA, agricultural activities have a secondary, supporting role to meet the primary objective of wildlife conservation on these lands. As the resource management plan is implemented, primary agricultural activities will be reduced or phased out on the NWA.

All agricultural activities will be consistent with the resource management plan and require a NWA permit which is issued on a one year or part year basis.

4.7.1 Haying and Grazing

Haying and grazing are considered to be wildlife management tools which may be employed by the CWS to meet desired wildlife conservation objectives. For example: rotational grazing may be used to reduce or increase habitat diversity to meet specific habitat needs of a wildlife species; haying may be used to reduce risk of wild fire in visitor use areas, or create buffer zones around native grassland restoration sites.

Haying and grazing activities on NWA lands will be subject to strict soil, water and wildlife conservation restrictions to minimize their impact on the environment.

4.7.2 Drought

Drought has a devastating impact on the prairie environment and

profoundly affects all life caught in its grip, including wildlife. Where, in the opinion of the CWS, a drought of significant regional or national importance occurs, a one year action plan will be developed by CWS staff which is consistent with the resource management plan. Based on established policy, the action plan will:

(a) protect wildlife habitat and wildlife species depending on the NWA currently and in the future,
(b) protect existing third party conservation commitments on a provincial, national and international level currently and in the future,
(c) protect existing agreements with NWA permit holders within the limits of the available resource currently and in the future.

It is possible that drought occurrence could increase if the climate warming trend continues. The impacts of frequent or prolonged drought on wildlife, the NWA, and the prairie ecosystem would cause severe stress on the entire ecological region.

4.7.3 Crop Damage Control Program

The crop damage control program on the Last Mountain Lake and Stalwart NWA's operates under a federal-provincial agreement covering prevention activities in areas of high annual crop damage. Lure crops grown on the NWA's are intended to feed cranes, geese and ducks each autumn until crops are harvested from adjacent private farmlands. Each lure crop is capable of feeding thousands of birds over many days if left undisturbed. Costs of growing the lure crops are a small fraction of the value of crops benefitting from this protection. Major portions of the NWA are closed each year from late summer into autumn to accommodate this important program.

4.7.4 Exotic Weed and Pest Control

Exotic species are non-native plants and animals. Their most important impact on the NWA ecosystem is the disruption of natural communities or competition with indigenous species. Where, in the opinion of the CWS, competition from exotic species will disrupt the native species, or cause undue hardship for surrounding landowners, attempts will be made to control or eradicate the introduction. Any exotic or feral domestic animal found on the NWA will be removed when feasible. The eradication of long established exotics such as Starlings is not considered feasible.

It is the policy of the CWS to use biological control methods (e.g., insects) and natural management techniques (e.g., fire) before using chemical pesticides. Use of pesticides must be pre-authorized by CWS toxicologists and be supervised by CWS staff. Use of pesticides on the NWA will be restricted to limited areas and in accordance with the resource management plan.

4.8 Fire

Prairie grasslands evolved with fire as one of the dominant natural agents, influencing the diversity of plant and animal species and shaping their adaptations for survival. The CWS has developed a comprehensive fire management plan which establishes baseline criteria for implementing controlled fires (prescribed burns) for the NWA. Those prescribed burns and wild fires (set accidentally or by lightning) which meet required conservation goals will be permitted to burn within defined areas and times.

Every effort will be made to extinguish all wild fires which do not meet conservation goals and/or endanger human life and property. Consequently, open fires are not permitted on the NWA.

CWS staff have considerable experience in conducting and controlling prescribed and wild fires. Fire fighting equipment is located at the NWA headquarters for emergency use. The Area Manager is the designated "Fire Boss" during all emergency fire situations on the NWA and he should be notified immediately if a wild fire starts. If municipal fire fighting departments are requested to fight a wild fire on the NWA, every attempt should be made to contact the Area Manager prior to responding to the call except where human life and property are in immediate danger.

5.0 PUBLIC ACTIVITIES

5.1 General

All public activities authorized on the NWA will be in accordance with the Canada Wildlife Act and the Wildlife Area Regulations. The NWA is open to the public during daylight hours. While certain public activities are normally authorized by "public notice" on the NWA, special closures may occur whenever necessary over part or all of the NWA for purposes of conservation. In the interest of public safety, all persons using the area are advised to register at the Information Kiosk before each visit to familiarize themselves with current regulations. The Information Kiosk is open during daylight hours and contains detailed information on all public use of the NWA and MBS.

5.2 Hunting

Hunting has been a tradition in the Last Mountain Lake area for many decades. The CWS intends to maintain that tradition in accordance with policies that are consistent with sound resource management.

Migratory game bird hunting, upland game bird hunting and big game

hunting are permitted only on those portions of the NWA which are open to such hunting, and are subject to Federal and Provincial regulations, season dates and bag limits and NWA regulations, unless otherwise posted at the Information Kiosk. CWS may implement special area closures or restrict season dates as conditions warrant. For example, portions or all lure crop areas may be closed to waterfowl hunting to alleviate crop depredation to nearby private cereal crops in years of delayed harvest.

5.3 Sport Fishing and Boating

Last Mountain Lake is one of the most productive lakes in Saskatchewan, making it very attractive to sport fishermen throughout the entire year. With the regional park located on the lakeshore within the boundaries of the MBS and NWA, boating and water skiing are also popular. All boat operators are advised to avoid disturbing wildlife especially nesting colonial birds on the islands and shallow bays in spring and summer and resting birds in summer and fall. CWS is considering establishing protective buffer zones around sensitive nesting and staging areas in the sanctuary which would limit boat access in these areas. Should conflicts arise between sport fishing activities and/or pleasure boat use and important wildlife uses, enforcement of existing legislation will be increased and if necessary additional restrictions will be imposed.

Public boat launching facilities are available only at the Regional Park. There is one other designated road access to the lake within the NWA. Located on the west side, it is open on a seasonal basis when its use does not conflict with wildlife conservation programs on the area.

Winter sport fishing takes place on Last Mountain Lake. Provincial fishing regulations require that all fishing shelters be removed from the ice by a specified date each spring. Shelters may not be

stored on the NWA at any time unless authorized by the CWS.

5.4 Vehicle Use within the NWA

Use of any on or off-road vehicles within the NWA will be limited to a system of designated roads and trails, throughout the year or as authorized by special "public notice" or NWA permit. Restriction of vehicle use is required in order to protect wildlife habitat and sensitive areas (research sites, lure crops) minimize disturbance to wildlife (nesting birds, wintering white-tailed deer) and for public safety. The most current information on vehicle use within the NWA can be found at the Information Kiosk (summer) or the Headquarters (winter).

5.5 Photography, Hiking and Nature Observation

Non-consumptive activities such as photography, hiking and nature observation are encouraged. A public information program consisting of an Information Kiosk, Driving Tour, nature trails, Observation Tower and brochures is presently in place (see Section 9.0 - Public Information Program). Public information programs are generally open only during the spring, summer and fall seasons.

Public cooperation is essential to keeping environmental impacts to a minimum. Should negative impacts occur for any reason, the CWS will evaluate the impact to determine if visitor programs need to be modified.

5.6 Other Uses and Activities

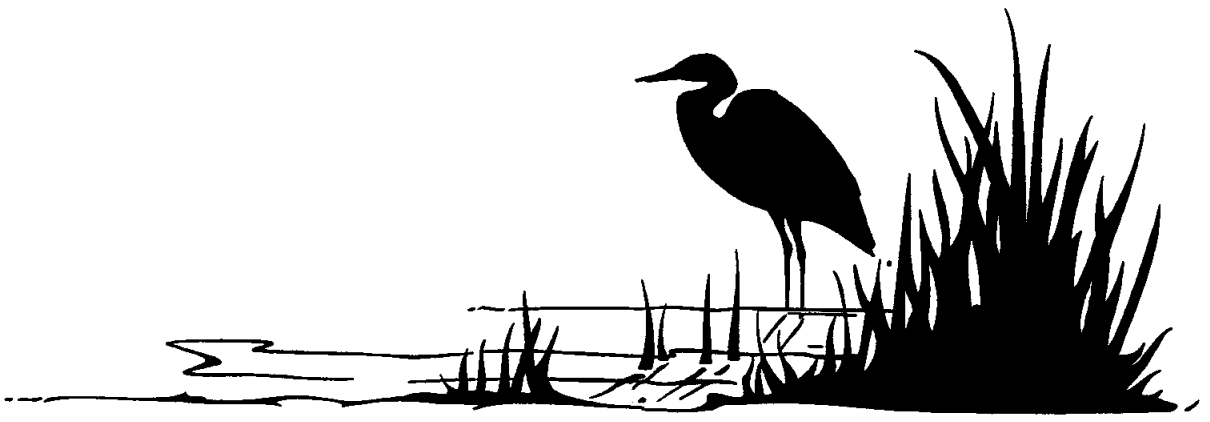
Other uses consistent with this resource management plan and the Canada Wildlife Act and regulations may be allowed if they are determined to have a neutral or positive effect on wildlife, wildlife habitat and NWA programs.

6.0 HISTORICAL AND CULTURAL ARTIFACTS

The removal, disturbance of and/or tampering with any artifact from the NWA is prohibited by the Wildlife Area Regulations and provincial legislation. If an artifact is discovered the information should be passed on to the Area Manager.

LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA

BIOLOGICAL MANAGEMENT



7.0 BIOLOGICAL MANAGEMENT

7.1 Biological Studies by CWS Habitat Staff

All studies conducted by CWS Habitat staff or its contractors will be directed towards obtaining information that can be applied to:

(a) protection and management of the wildlife populations and wildlife habitat of the NWA and MBS; and,
(b) public information programs for the Area.

Examples of these include information gathered on: environmental quality (meteorological, water, soils); abundance, location, interactions and habitat requirements of flora and fauna; and wildlife management techniques - especially those with broad application.

Collection of baseline data will be continued as an ongoing program to update or to fill gaps in the existing information.

7.2 Monitoring of NWA Resources

Monitoring of habitat conditions and wildlife populations will be conducted at Last Mountain Lake on an ongoing basis in order to:

(a) assess the overall environmental quality of the area for a range of wildlife species with particular emphasis on those species that depend upon the area for a critical part of their annual cycle or are considered rare, threatened, or endangered;
(b) assess the health of the native plant communities;
(c) assess the impact of management practices or public activities on the NWA and MBS.

The CWS will cooperate with other agencies or groups in the

monitoring of habitat conditions on areas contiguous to the NWA including activities or actions that may impact directly or indirectly upon the fauna and habitat of Last Mountain Lake.

7.3 Monitoring Impacts of Public Use

In order to ensure that future public programs do not detract from the wildlife value of the NWA, visitor impact will be closely examined. By regularly observing the public's impact on habitat and wildlife populations, it will be possible to make remedial changes in the format of the public program when and where necessary.

7.4 Research Conducted on the NWA

Research will be encouraged and research publications will be compiled into a list which will be available to individuals interested in studying Last Mountain Lake. Information gaps will be identified and given highest priority for future studies.
In order to avoid environmental disturbance and subject redundancy, an approval process has been formulated. Permission to conduct research on the NWA may be granted under these guidelines. Priority will be given to studies that have direct implications for the management of the NWA or that form part of the overall CWS mandate. Other research is not discouraged. This process will be applied uniformly to all researchers seeking to work on the NWA and MBS.

Permission under the Wildlife Area and/or Sanctuary Regulations to undertake research may be given subject to the following conditions:

(a) applications to undertake research must be submitted to the Area Manager, Last Mountain Lake National Wildlife Area, Canadian Wildlife Service, P.O. Box 280, Simpson,

Saskatchewan, S0G 4M0 at least 60 days prior to commencement of the project;

(b) all applications for research must be accompanied by a written proposal which will clearly state objectives, duration, amount of collecting (if any), number of participants, location where work is to be undertaken, and any environmental impacts anticipated.

(c) applications must include information on whether alternate study sites are available and whether alternate study techniques could be used to minimize expected impacts of the work.

(d) research applications will be reviewed by a recognized Animal Health Care Committee, and subject to the federal environmental review process;

(e) no research shall start without authorization and, if necessary, a permit issued under the Wildlife Area Regulations, and/or the Sanctuary Regulations;

(f) all researchers must conform to regulations in effect regarding the NWA and the MBS;

(g) all researchers will provide the CWS with one interim (annual) and one final report on the research results and two copies of final manuscripts (theses, presentations, publications) arising from the work.

The CWS may suggest changes in the project, at any time, in order to comply with the resource management plan. Projects or studies will not proceed until these changes are made.

Applications should be submitted well in advance to ensure the necessary reviews and permits are completed.

7.5 Availability of Information to the Public

Most data gathered on the resources of the NWA are unpublished. Internal reports are written and they may be read by interested parties on advance request at the CWS office in Saskatoon or the

LMLNWA headquarters.

7.6 North American Waterfowl Management Plan (NAWMP)

The NAWMP was developed by Canada and the United States of America to restore waterfowl populations and habitat to normal productive levels. Federal wildlife lands can make a significant contribution to achieving the goals of the NAWMP. The LMLNWA has long been recoginzed as a major waterfowl staging area. Its critical importance as a refuge for waterfowl during drought has only recently been documented. In the fall of 1989 peak counts of four species of geese reached a record of over 400,000 birds, and in the spring of 1990 duck nesting reached record levels.

Existing conservation programs on the LMLNWA will be compatible with the NAWMP wherever possible. New programs initiated under the NAWMP on the NWA will focus on habitat enhancement including; wetland management, upland cover rehabilitation and protection, and restoration of nesting, moulting and staging areas.

7.7 Rehabilitation and Restoration Programs

The Prairie Conservation Action Plan (PCAP) outlined the urgent need to protect wildlife resources in prairie Canada. The LMLNWA will make a significant and continuing contribution to the goals and objectives of PCAP through the resource management plan.

The LMLNWA has been greatly modified by human activity. Dams on the south end of the lake and upstream from the NWA have changed the natural water regimes. On the uplands, agriculture (including grazing, haying, cultivation), non-native plant invasion, vehicle travel, litter and other activities have contributed to the alteration of the NWA environment. Some of the damage has been magnified by natural processes such as drought and erosion.

It is the intent of the CWS to maintain Last Mountain Lake in as natural a condition as is practical. Where serious damage has occurred owing to the activities of man, the CWS will attempt to stabilize or reverse this trend by implementing restoration and rehabilitation programs.

Certain programs, such as prescribed burning and water level drawdowns and reflooding, must be implemented at specific times to achieve the desired long-term benefit. In some cases the CWS expects short-term and localized impacts on wildlife and habitat. However, these are not expected to negatively affect any species' overall population or survival.

Some wildlife species which formerly occurred on the NWA are no longer known to breed there. Where feasible, attempts may be made to reintroduce a wildlife species or to augment a population whose survival may be precarious.

A program of intensive wetland management is currently underway on several wetland basins on the NWA (Table 2, Figure 3). This cooperative program with Ducks Unlimited seeks to manipulate water levels (to mimic naturally occurring wet-dry cycles) to achieve a variety of productive wetland plant and animal communities which

TABLE 2. PRIMARY AND SECONDARY BASINS (IMPOUNDMENTS) MANAGED FOR WILDLIFE ON THE LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA BY THE CWS AND DUCKS UNLIMITED

PROJECT NAME	FLOODED ACRES (ACRE FEET)	(FULL SUPPLY LEVEL)	GEODETIC LEVEL RANGE (FEET)	OPERATING KILOMETER (MILES)	SHORELINE CONTROL STRUCTURES	CONST. DATE
Primary						
A-1	630.9 (1297.0)	1618.27 (105.0)	97.0 to 107.0	11.1 (6.9)	1,4,5,7	1970
A-2	181.4 (229.7)	1620.27 (107.0)	105.0 to 107.0	4.7 (2.9)	2,5,6,8	1985
B-1	85.3 (178.4)	1620.27 (107.0)	103.0 to 107.0	2.7 (1.7)	2,4,5,8	1985
B-2	22.0 (15.7)	1616.77 (103.5)	Flow through	1.6 (1.0)	Natural	1970
C	245.2 (727.6)	1611.77 (98.5)	92.0 to 99.5	10.3 (6.4)	2,4,5,8	1970
D	201.5 (922.8)	1609.77 (96.5)	91.7 to 97.5	4.5 (2.8)	2,5,8	1970
E	109.3 (401.8)	1609.77 (96.5)	92.5 to 97.2	4.5 (2.8)	2,5,8	1970
Water-town	175.0 (488.0)	1614.5 (101.23)	1612.0	5.19 (3.2)	6,8	1986

PROJECT NAME	FLOODED ACRES (ACRE FEET)	(FULL SUPPLY LEVEL)	GEODETIC LEVEL RANGE (FEET)	OPERATING KILOMETER (MILES)	SHORELINE CONTROL STRUCTURES	CONST. DATE
Shields	404.3 (N/A)	100.0	96.5 to 100.0	16.0 (10.0)	4,5,7	1955
Portion on NWA	100.0 (N/A)	100.0	96.5 to 100.0	1.6 (1.0)		
Secon-dary						
Simpson	114.2 ( )	1610.47	N/A	5.3 (3.3)	3,5,7	1970
Alfred	7.5 ( )	1606.27 (93.0)	N/A	1.0 (0.6)	5,6	1970 1986
Murfitt	75.0 ( )	1611.77 (98.5)	N/A	1.9 (1.2)	5,6	1970
Danis	21.0 (49.9)	N/A (99.0)	N/A	1.6 (1.0)	5,6	1952

Key to water management techniques: (1) radial gate, (2) screw gate, (3) drop culvert, (4) stop logs - variable crest, (5) earthen dam, (6) fixed crest spillway - no drawdown outlet, (7) electric pump capacity, (8) portable pump capacity - pads.

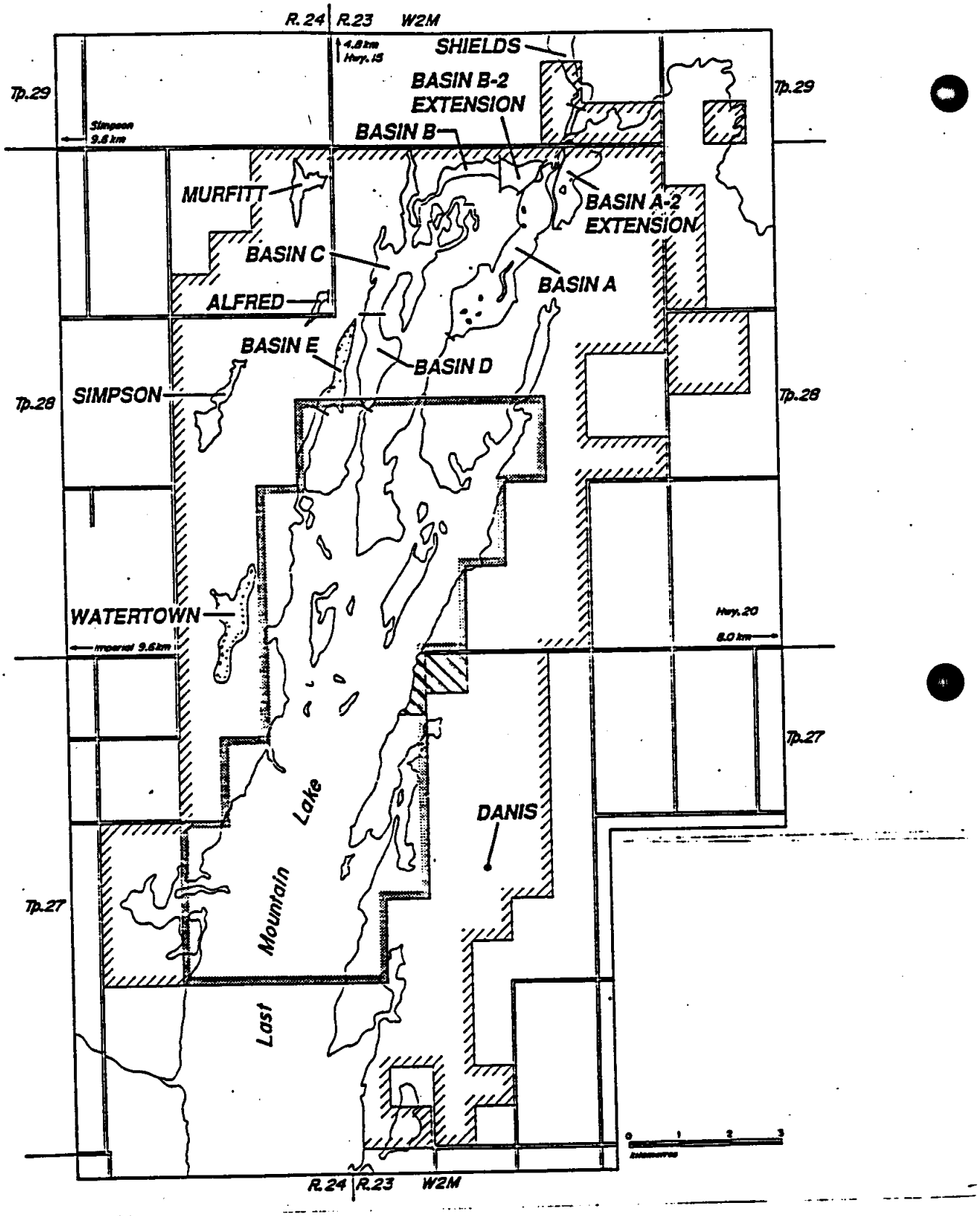


Figure 3. Location of Ducks Unlimited (Canada) Projects.

benefit wildlife throughout the year. Sensitive wetland microhabitats are protected from such developments. Attempts are being made to keep developments as unobtrusive as possible. The main basin ('A') is the site of several demonstration wetland management techniques: nesting and loafing islands, level ditching, point cut-off, dense nesting cover, artificial nesting structures and major water control structures.

Native upland habitat will be managed to maintain its quality and diversity. Prescribed burning will be an important management tool used to rejuvenate and maintain these areas. Disturbed upland sites will be managed more intensively to restore native plant communities. In some cases successive prescribed burning will be all that is necessary; in other cases reseeding native plant species will be required.

First priority will be given to conservation of existing native habitats; second priority will be to consolidate fragmented native habitat areas; and third priority will be to enlarge the native habitat areas on the NWA.

7.8 Rare, Threatened and Endangered Species

Last Mountain Lake supports a number of prairie Canada's rare plants and animals, some in significant numbers (Table 3). The LMLNWA contains a unique combination of diverse habitats and because of that, supports remarkably varied plant and wildlife communities. Because of the tenuous existence of many of those species, all management work or development will be reviewed to ensure detrimental effects upon rare or threatened species are minimized.

7.9 Bird Management

The thrust of the CWS bird management program will be to maintain

or improve the existing habitat conditions at Last Mountain Lake and, in general, will not be single species-oriented. There are, however, some species or groups of birds that require special attention. Examples include rare species, staging waterfowl and water birds, and colonial nesting birds which are highly susceptible to human disturbance. Every attempt will be made by the CWS to minimize disturbance to breeding populations and important staging areas. For example, access to the islands of Last Mountain Lake during the colonial bird breeding season is restricted.

Studies which contribute to our knowledge and conservation of species of birds, such as banding and surveys, will be encouraged on the NWA where existing programs allow. The CWS will collaborate whenever possible with the government of Saskatchewan and other interested agencies and groups in monitoring bird populations at Last Mountain Lake and district.

Maintaining the value of Last Mountain Lake as a major prairie staging area for waterfowl, Sandhill Cranes and shorebirds will be an important consideration in all long range management programs on the area.

Several nesting species endemic to the northern prairie have suffered declines in population but are not yet considered rare: LeConte's Sparrow, Marbled Godwit, Sprague's Pipit and Franklin's Gull are among these. Management programs at Last Mountain Lake will take the habitat requirements of each species into account wherever possible.

TABLE 3. SPECIES OF SPECIAL CONSERVATION CONCERN ON THE LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA (RECORDED IN THE DISTRICT AFTER 1930).

	SPECIES	STATUS - CANADA	STATUS-LML NWA	AUTHORITY
PLANTS[1]	Pink-flowered Onion	Rare	Local	Harms (1978)
	Golden Current	Rare	Local	Maher et al. (1979)
	Racemose Milk-vetch	Rare	Local	"
	Crowfoot Violet	Rare	Local	"
	Few-flowered Aster	Rare/ Widespread	Local	"
	Upland White Goldenrod	Rare	Local	Harms (1978)
FISH	Bigmouth Buffalo	Vulnerable	Common	COSEWIC[2]
AMPHIB-IANS	Leopard Frog	Rapid Decline	Rare	Holroyd et al.(1991)
BIRDS	American White Pelican	Delisted (1987)	Breeds-regular	COSEWIC
	Cooper's Hawk	Vulnerable	Migrant-regular	"
	Ferruginous Hawk	Threatened	Breeds-irregular	"
	Peregrine Falcon	Endangered	Migrant-regular	"
	Greater Prairie Chicken	Extirpated	Reported 1940[3]	"
	Whooping Crane	Endangered	Migrant-regular	"

[1]The Canadian status of several species remains to be clarified; status codes may reflect a compromise between provincial and national "rarity".

[2]Committee on the Status of Endangered Wildlife in Canada (1991 Report).

[3]See "Section 12.0 A Summary of the Biological Resources": for details on these references.

	SPECIES	STATUS - CANADA	STATUS-LML NWA	AUTHORITY
	Piping Plover	Endangered	Breeds-regular	"
	Burrowing Owl	Threatened	Breeds-irregular	"
	Caspian Tern	Vulnerable	Breeds-irregular	"
	Loggerhead Shrike	Threatened	Breeds-regular	"
	Baird's Sparrow	Threatened	Breeds-regular	"
MAMMALS	Long-tailed Weasel	Threatened	Uncommon	"
	Black-footed Ferret	Extirpated	Reported-1932	"

7.10 Other Wildlife Species

Resource inventories on a variety of individual species or species groups will be conducted on a continuing basis throughout the LMLNWA. This work will establish bench marks from which change can be measured. Studies will be repeated at periodic intervals to help detect potential adverse impacts on the habitat of Last Mountain Lake and its wildlife populations.

As with migratory birds, the thrust of the CWS program will be to maintain or improve habitat conditions rather than having a specific species orientation. Rare, threatened or indicator species may be identified for specific study.

7.11 Potential Impacts from Off-site Development

Development activities occurring off the property managed by the CWS could have adverse consequences upon the NWA. For example, water diversion projects within the watershed could alter spring run-off quantity and quality to the area.

The CWS will attempt to ensure that projects which may have an adverse effect upon Last Mountain Lake will be subject to adequate environmental screening. Representation will be made to local and provincial governments when appropriate. Where appropriate, projects will be referred to the federal environmental review process.

The CWS will participate with the government of Saskatchewan and other groups in a collective attempt to ensure sound environmental management in the Last Mountain Lake district.

8.0 INHOLDINGS

8.1 Regional Park

The Last Mountain Regional Park was established in 1961 by the Province of Saskatchewan on land originally removed from sale and settlement in 1887 and reserved for the MBS. Prior to that date the area had been used by local people and the Saskatchewan Wildlife Federation (Fish and Game League) as an informal summer recreation area. This area is included within the MBS.

Today the regional park has expanded to approximately 121 ha including:

1. NW 1/4 Sec. 32 - Twp. 27 - Rge. 23 - W2M (approximately 65 ha).
2. Ptn. SE 1/4 Sec. 31 - Twp. 27 - Rge. 23 - W2M (LSD 7 and 8 and those portions not covered by the lake - approximately 24 ha).
3. Ptn. NE 1/4 Sec. 31 - Twp. 27 - Rge. 23 - W2M (not covered by the lake - approximately 32 ha).

Facilities include cottages (privately owned on leased lots), camping sites, a golf course, laundromat, confectionery store,

playground, developed beach, boat launching site, maintenance area and refuse pit.

Because the regional park is the major source of recreational activity within the NWA and MBS (boating, fishing, walking, ATV traffic and hunting activity all emanate from the regional park) it is in the best interests of both the regional park users and the CWS to act in close cooperation with each other to ensure the long-term conservation of the Last Mountain Lake NWA and MBS.

8.2 Mineral Rights

Under the terms of the agreement Saskatchewan has agreed not to develop or exploit any mines and minerals which are owned by the province, within, upon or under the NWA, excluding SW quarter of 23 - Twp. 28 - Rge. 24 - W2M (minerals alienated).

Mineral rights under cottage lots purchased by CWS are in some cases still privately owned. Since CWS controls surface access - it is likely no conflict will arise.

Gravel reserves belonging to the Rural Municipality of Wreford within a portion of NW 32 - Twp. 28 - Rge. 23 - W2M are exhausted. Gravel on NWA lands adjoining the reserve will no longer be used except for wildlife conservation purposes.

9.0 PUBLIC INFORMATION PROGRAM

The public information program for the Last Mountain Lake NWA will strive to heighten the public's understanding, appreciation and support for the conservation of wildlife and wildlife habitat and for the management programs carried out on the area. Signage will direct visitors to the Information Kiosk, which is the focal point for basic information services.

The public information program for the NWA and MBS is self guided, and consists of several elements: displays, brochures, Observation Tower, nature trails, Driving Tour and information signs (Figure 4).

10.0 PLAN IMPLEMENTATION

10.1 Public Consultation and Government Agency Liaison

The terms of the agreement and the designation of Last Mountain Lake NWA under the Canada Wildlife Act clearly set out the manner in which the NWA is to be managed (see CWS mandate, section 3.0).

Consultation with people interested in its cultural history, with sportsmen's groups, naturalists' organizations and various other groups and individuals who have demonstrated interest in Last Mountain Lake will be ongoing. Workshops on specific issues may be held when required. Liaison and workshops with the informal 'Friends of Last Mountain Lake' network will be continuous.

Close liaison between government and resource agencies is essential if the NWA and the surrounding environment is to be effectively managed. Duplication of effort must be avoided and the coordination of activities achieved. For those reasons the CWS will continue its close links with Saskatchewan Environment and Resource Management and Ducks Unlimited who have become the ad hoc advisory working group and who have resource interests at Last Mountain Lake.

When necessary the CWS will meet with those agencies to address resource questions. Should the issues involved require further examination and expertise, the CWS will seek advice beyond the

Figure 4. Points of Interest on the Last Mountain Lake National Wildlife Area.

working group. Such a group will be known as a Wildlife Area advisory committee and will be appointed to address specific questions and have a fixed tenure.

10.2 Plan Review and Evaluation

The CWS has developed the Draft Resource Management Plan based upon experience gained during a lengthy period of managing the area and its resources, in addition to consultation with numerous interested individuals and groups over the years.

Copies of the Draft Resource Management Plan will be circulated to interested groups and individuals who have demonstrated interest in the LMLNWA. CWS staff will meet with interested groups and individuals to discuss the plan and solicit comments. If public interest warrants, one or more open house weekends will be planned to provide additional public input. Submissions will be invited and all comments will be considered in the review of the draft plan.

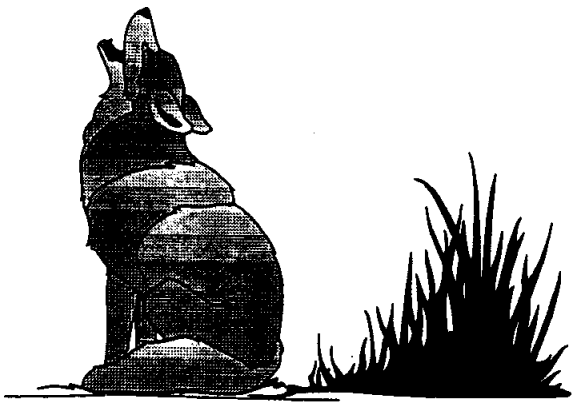
The CWS will then prepare a revised Resource Management Plan for submission to the Minister of the Environment for Canada for final approval.

The Resource Management Plan will be subject to the federal environmental screening process as required by Canadian law, prior to its final approval. It will also be sent to interested parties requesting a copy.

Evaluation of all activities on LMLNWA will be ongoing, and those activities can be restricted if, in the view of CWS, undue damage has occurred to the environment of the NWA .

LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA

HISTORIC BACKGROUND



11.0 HISTORIC BACKGROUND

On June 8, 1887, the Government of Canada created the first bird sanctuary in North America by reserving the islands and shores at the north end of Last Mountain Lake, Saskatchewan, as breeding grounds for wildfowl. The establishment of the bird sanctuary was only the beginning of a long struggle to develop wildlife protection in Canada, the achievement of which we can all be proud.

11.1 Buffalo and the Fur Trade

When Henry Kelsey crossed the western plains in 1690, the native peoples there were still living a nomadic life. By the mid-1700's the fur trade was expanding rapidly into the interior, pushed by competition between trading companies and the near depletion of furs in the east. Many Assiniboine and Cree Indians soon became dependent on the fur trading companies for a supply of European goods. The Indian lifestyle had begun a rapid change.

Henry Youle Hind, a University of Toronto Professor, was sent on an exploring expedition to the area in 1858 as a result of increasing government interest in the settlement of the plains. Hind visited the Touchwood Post and noted the new importance of Last Mountain Lake. A fishery had been established in November of 1854 which provided the fort with an ample supply for winter consumption. Hind also mapped Last Mountain Lake and described the landform surrounding it, including "Last Mountain", the hills 16 kilometers east, which were a landmark for early traders.

Although Fort Qu'Appelle (established in 1852) became an important fur trade centre, the Assiniboine, Cree, Sioux and Metis also visited wintering posts such as Last Mountain House, which was established on the east shore of Last Mountain Lake (across from Lumsden Beach) in 1869. A year later the Hudson's Bay Company sold "Ruperts Land" to the new Dominion of Canada. The deciding factor

in the fate of Last Mountain House, and many similar trading posts, was the great decline of the buffalo. Isaac Cowie, a clerk at the post 1869-70, reported on one of the last large herds of buffalo at the north end of the lake: "They blackened the whole country, the compact, moving masses covering it so that not a glimpse of green grass could be seen, the earth trembled day and night, as they moved in billow-like battalions over the undulations of the plain".

It is estimated that 60 million bison once roamed the Great Plains of North America, however, their demise was swift. By 1879, the great herds were gone from Saskatchewan and by 1884 only scattered animals remained.

A new era was beginning on the prairies. The Canadian government continued nation building, and began plans to settle the west. It had only taken 200 years from the appearance of the Europeans on the plains, for man to emerge as an ecological dominant and for the European economic system to effect major changes in an ecosystem that apparently had been in a relatively steady state for thousands of years.

11.2 The Railway, Settlement, and the Bird Sanctuary

Although the Elbow-Touchwood Hills trail (remnants of which are still evident on the area) and the Last Mountain-Fort Qu'Appelle trail provided some access to the Last Mountain Lake area, travel was long and arduous.

The idea of a railway across the nation became popular; and throughout the 1870's surveyors and scientists were sent west to find suitable routes.

John Macoun was a botanist sent in 1879 to study the flora and fauna of the plains. Macoun camped near Last Mountain Lake on the largely unspoiled and unsettled land and made note of the

multitudes of bird life found there.

Fortunately, Macoun was not alone in recognizing the importance of the area for bird life. By 1883 the Canadian Pacific Railway was stretching across the plains; a company, calling itself the "Qu'Appelle Long Lake and Saskatchewan Railroad and Steamboat Company" built a railway from Regina to Craven in 1886. The possible consequences of the railroad and the accompanying settlement caused the Lieutenant governor of the North-West Territories, Edgar Dewdney, to write in March 1887 to Thomas White, Minister of the Interior, saying:

> "The reports of the probable extension of the Long Lake Railway this summer has drawn some attention to the land in that neighbourhood. I think it would be very desirable to reserve the islands near the north end of the lake ... these islands are the favourite breeding grounds for almost all the different varieties of wildfowl we have in the North-West, from pelicans to snipe ... the shores of the islands are literally covered with eggs in the breeding season."

As a result, on 8 June, 1887, Sir John A. MacDonald and 13 members-in-council set aside approximately 2,534 acres (1,025 ha) of land, including the islands, peninsular land and 11 miles of shoreline. Since sanctuaries in other provinces were not established until 1920, this act was indeed a remarkable accomplishment.

Settlement was quick to follow the railway. In 1902 an Englishman, William Pearson, was impressed with the possibilities offered by Last Mountain Lake. Shortly after, he formed the William Pearson Company and bought up much of the land between the hills east of Davidson on the west side of the lake and the Last Mountain-Touchwood Hills on the east side, Pearson christened the area "Last Mountain Valley"; and a vigorous advertising campaign led to the rapid development of the area. Not surprisingly, his pamphlets

praised the wildlife of the lake area, including the abundant fish, fowl and deer.

In 1906, Pearson commissioned several freight barges and steamers to carry freight, home seekers and other travellers to various points along the lake. Lumber yards, elevators, shipping docks and towns sprang up along the shore. The most notable point at the north end of Last Mountain Lake was the townsite of Watertown.

The completion of roads and branch railway lines, such as the Regina-Bulyea line completed in 1911, soon brought the steamboat era to an end. The last survivor was the "Qu'Appelle", a passenger steamer capable of carrying 200 people up and down the lake for "picnic and pleasure parties"; the Qu'Appelle was pulled up on the beach in 1913.

Within a few short years the land had been transformed from a wilderness of prairie into thriving farms and towns. With less land available for homesteading a conflict arose over the reserved lands of the bird sanctuary that threatened the sanctuary's existence.

In March 1911, 21 settlers in the area signed a petition at Nokomis asking that two sections of peninsular land included in the sanctuary be thrown open for homestead entry. Before the petition was acted upon, one of its signers made an active protest of his own against the bird reserve. In 1908, E.O. Taylor applied to homestead a parcel of land that was part of the reserved land. He was advised that his entry could not be allowed to stand, but he appears to have gone into residence upon the land and made application for patent on the 17 November, 1911. In 1912, the minister of the Interior decided that the lands are to be allowed to stand as they are for the present, but finally in 1913 he recommended that since Taylor had completed his required settlement duties on a portion of the bird reserve, he should be granted

patent for the quarter section. Fortunately for the sanctuary, such cases were few and most of the land was retained for wildfowl. Even as late as 1919, settlers made inquiries about the land, and requests for boundary adjustments were continually turned down. The sanctuary survived the settlement crisis.

11.3 Development of the MBS and NWA

In Gordon Hewitt's "Protection of Birds" report in 1916 he mistakenly believed that Canada possessed no government bird sanctuary. The reserved lands of 1887 were remembered, however, when the Migratory Bird Convention Act (MBCA) was passed in 1917. Migratory birds were recognized as an international resource, the protection of which would require federal intervention to set up international and interprovincial cooperation.

Under the MBCA, the Governor General in Council was given authority to make all necessary regulations to protect migratory game, insectivorous and nongame birds inhabiting Canada at any time during the year, and to appoint game officers.

In 1920 regulations were passed that governed bird sanctuaries and prohibited the killing and molesting of birds, the destruction of their nests or eggs, and the carrying of firearms or appliances for killing birds on sanctuary land. On 26 July 1921, the sanctuary was expanded to include the entire water area of the lake as well as certain small islands and land areas. At this time, administration of the sanctuary was carried out by the federal National Parks Branch in Ottawa. To ensure that all the new laws were followed, early policing of the sanctuary was conducted by the Royal Canadian Mounted Police, provincial game guardians, or volunteer game guardians acting without pay.

In 1930, the sanctuary lands were turned over to the provinces under the Natural Resources Transfer Agreement. The Province of

Saskatchewan agreed to preserve the Last Mountain Lake Bird Sanctuary, and administered it until 1951. From the National Parks Branch in 1947 came the Canadian Wildlife Service, which was given the administration of the sanctuaries across Canada.

In 1946 agriculturalists pressured the authorities to amend the Natural Resources Transfer Agreement. Bird Sanctuaries and public shooting grounds could be dismantled.

In 1948 and 1949-60 Last Mountain Lake Bird Sanctuary was inspected for suitability for a waterfowl refuge, and then to determine whether adjacent land should be released for sale. J.D. Soper, the Dominion Wildlife Officer for the prairie provinces, concluded that at Last Mountain Lake only one half section of land had been dried out excessively and made untenable. All of the other land was retained. Many of Saskatchewan's other federal sanctuaries were either discontinued or newly established without land areas. In 1951, the boundaries of the sanctuary and the administration again changed to include the present day boundaries, administered by the CWS.

In 1957 the CWS collected data on the physical characteristics of the Last Mountain Lake Bird Sanctuary and the amount of migratory bird and public utilization. Once more, the area was evaluated as excellent grounds for a sanctuary where public use could be compatible with the protection of wildlife. The area that had been operated as a beach since 1954 by the Govan-Nokomis Fish and Game League was enlarged for development as a regional park and incorporated in 1961. The open shoreline was transformed over a period of years into a treed park with a beach, playground, boat launch, golf course and camping facilities and cottage development.

During the 1960's, management efforts were increased by the CWS. Conflicts between agriculture and wildlife protection continued. Increased agricultural use of the lands adjacent to the sanctuary

reduced the quality and quantity of wildlife habitat. Crop depredation by waterfowl and sandhill cranes became a major problem. From 1960 to 1963, CWS biologists conducted research on control of crop damage. The CWS and the Wildlife Branch of the Saskatchewan Department of Natural Resources cooperated to design a permanent management scheme for the area. As a result, negotiations began in 1966 with local farmers for the purchase of land around the north end of the lake; by the end of 1967 approximately 5,260 ha had been purchased by the CWS.

The Last Mountain Lake Wildlife Area was selected in 1970 as part of the International Biological Program, a world-wide research plan concerned with the examination and inventory of the remaining natural ecosystems of the world (Figure 5). The once forgotten sanctuary had become part of an international conservation plan.

In early 1971 Canada and Saskatchewan signed a Memorandum of Understanding which dedicated the federal lands which had been acquired and 3,230 ha of provincial lands to wildlife conservation. This created the first cooperative wildlife area in Canada, to be known as the Last Mountain Lake Wildlife Management Unit. Since 1968 the Canadian Wildlife Service has employed an Area Manager who lives on the management unit all year.

Last Mountain Lake was given further recognition in 1982 when the Migratory Bird Sanctuary and Wildlife Management Unit lands were designated under the Ramsar Convention on Wetlands of International Importance especially as waterfowl habitat.

The year 1987 was designated a year of wildlife conservation in Canada with the focal point being the centennial celebrations of the Migratory Bird Sanctuary at Last Mountain Lake. Non-government conservation groups played a lead role in making the theme "Wildlife 87 - Gaining Momentum" a huge success.

Figure 5. International Biological Program Site.

To celebrate 100 years of wildlife conservation in Canada, over 160 projects were listed in the "Wildlife 87" calendar of events.

On June 5, 1987, the Honourable Tom McMillan, Minister of the Environment for Canada, and the Honourable Colin Maxwell, Minister of Parks, Recreation and Culture for Saskatchewan signed an Agreement for the Establishment of Last Mountain Lake National Wildlife Area. Under this agreement provincial crown uplands totalling over 3,200 ha were transferred to Canada to be included in the NWA. His Royal Highness The Duke of Edinburgh, Prince Philip was witness to the agreement.

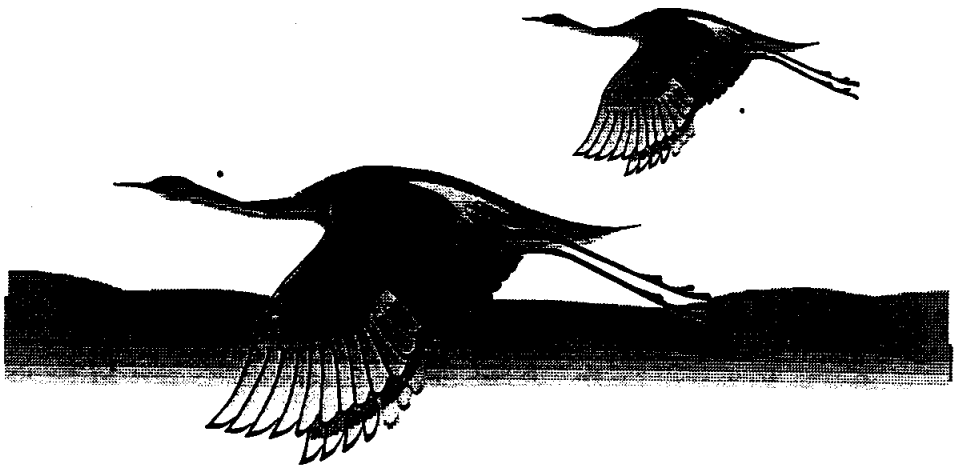
In 1989 the Minister of the Environment, on recommendation of the Historic sites and Monuments Board of Canada designated Last Mountain Lake Bird Sanctuary a site of national historic significance as the first federally designated wildfowl preserve on the continent. The Canadian Parks Service proceeded with the official commemoration and Plaque unveiling at Last Mountain Lake on June 9, 1990. The inscription reads:

> "On the recommendation of Edgar Dewdney, Lieutenant-Governor of the North-West Territories, this sanctuary was set aside in 1887 for the protection of wildfowl, the first such reserve on the continent. It was established as a federal migratory bird sanctuary four years after Parliament passed the Migratory Birds Convention Act of 1917. Internationally recognized, this wildlife area is a migration stopover point in the spring and fall for hundreds of thousands of waterfowl, cranes and countless smaller birds, and a summer nesting area for over 100 species, including several that are rare."

Since its conception in 1887, the bird sanctuary has evolved and grown into one of the premier NWA's in Canada, containing over 15,000 ha (37,000 acres) of lake, uplands and wetlands, including the 4,795 ha (11,840 acre) bird sanctuary.

LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA

SUMMARY OF BIOLOGICAL RESOURCES



12.0 SUMMARY OF BIOLOGICAL RESOURCES

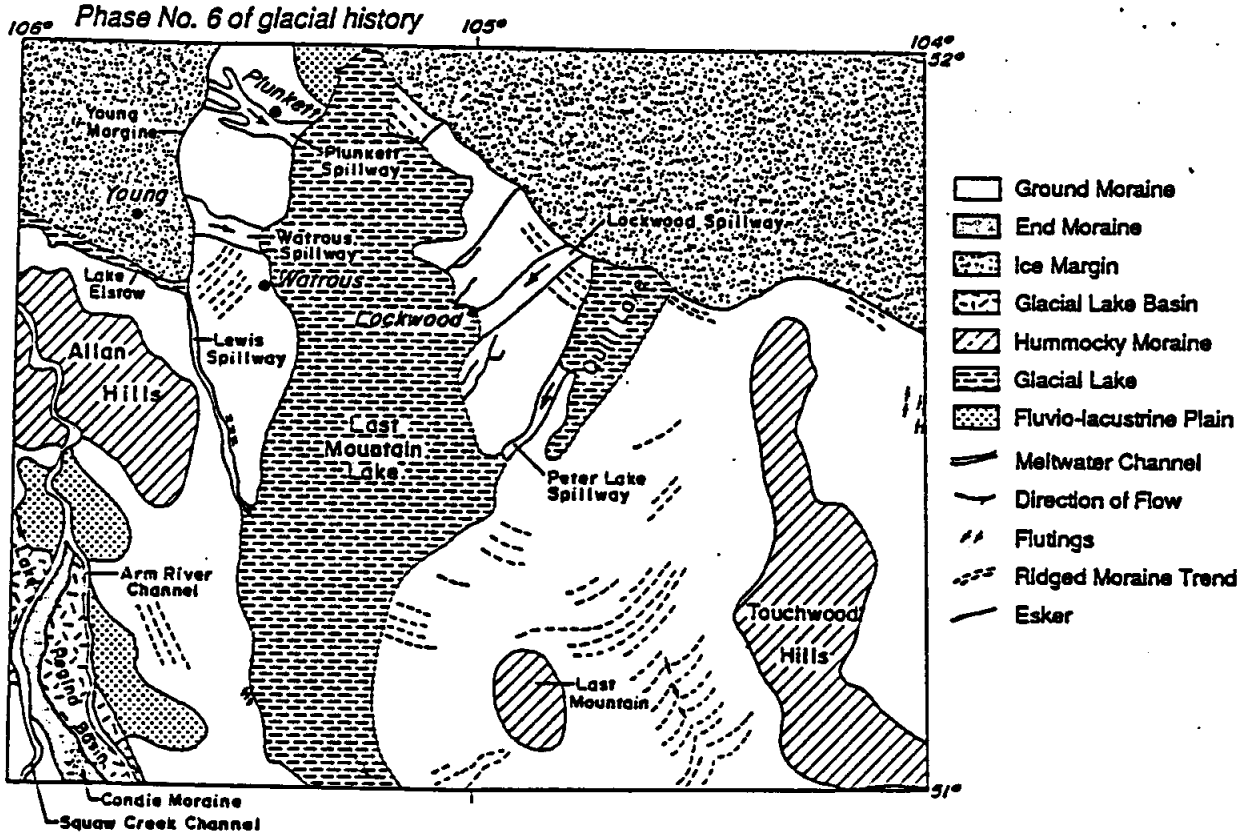
12.1 Physiography and Soils

Last Mountain Lake is the largest of eight lakes in southern Saskatchewan's Qu'Appelle Drainage System. The lake is 85 km long, 2-4 km wide in its northern reaches and forms part of the longest tributary of the Qu'Appelle River. The lake acts as a reservoir, buffering the lower Qu'Appelle from spring floods.

The region has been glaciated three times (Greer and Christiansen 1963). During the most recent glacial period, the Wisconsin - about 11,000 years ago, ice completely covered the area. Glacial meltwater, flowing into the Qu'Appelle Spillway, carved the channel which presently contains the southern third of the lake. A major lobe of the glacier rested over the Last Mountain Lake Lowland between the Allan Uplands and the Touchwood Hills. As this receded an ice marginal lake (Glacial Last Mountain Lake) formed reducing the meltwater erosional effects (Figure 6). This accounts for the low relief surrounding the northern two thirds of the present lake.

An outwash fan-delta formed in the region north of Last Mountain Lake as a result of additional glacial meltwater from the north: water from Glacial Lake Elstow came to Last Mountain Lake via the Lewis Spillway and, after further glacial withdrawal, through the Watrous Spillway (Figure 6).

Two glacial landforms resulted - the Glacial Last Mountain Lake Basin and the Watrous Spillway (Figure 6). The Basin topography is flat to undulating with a relief of 1.5 to 9 m. Eskers rise up to 9 m above the lake plain. The most prominent esker in the NWA runs north east from the lake in the vicinity of 'McFadyen's Point' (Sections 7,8 and 17 Tp27 R23 W2). The lacustrine (lake origin) sediment varies from a third of a meter of lag (material left behind) sand and gravel over pre-existing till knobs to 1.8 m of



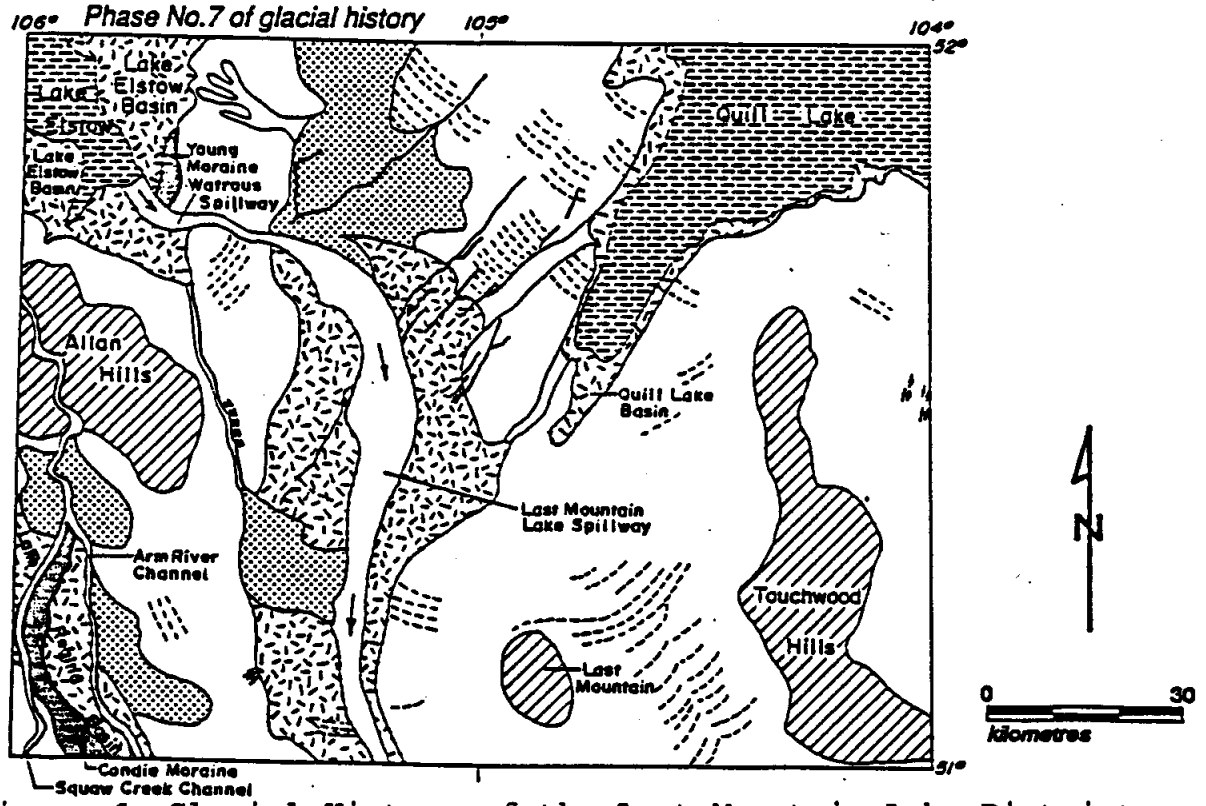


Figure 6. Glacial History of the Last Mountain Lake District.

fine sand and silt in pre-existing swales. The region surrounding the northern portion of the lake is an eroded till plain of the Watrous Spillway formation. Glacial meltwater flow and wave erosion in the glacial lake carried away the finer sediments leaving coarse material in lag deposits.

This portion is also flat to undulating but relief is only in the range of 1.5 to 3 m. The sediment is less than 1.5 m thick and consists of boulders, cobbles, pebbles, and sand. In some areas deposits of sand and gravel are up to 4.5 m thick.

The islands are also lag deposits of rock and sand. Point and island morphology continues to change with fluctuating lake levels, ongoing erosion and deposition, and ice push.

Wet meadows, temporary wetlands and several large alkaline semi-permanent wetlands occur in the shallow swales of both landforms.

Soils in the Last Mountain Lake region have developed primarily under native grassland vegetation over a period of several thousand years since the last glaciation. Most of the soil surrounding the lake is alkaline fine sandy loam (Mitchell et al. 1944). This is a Dark Brown light textured soil on sandy glacial lake-alluvial deposits. These light, alkaline soils are unsuited to raising cereal crops. The 'Sailor's Bay' area (portions of townships 27 and 28 range 23) is covered by a mixture of Dark Brown medium to heavy textured loams on silty glacial lake or undifferentiated till deposits (Mitchell et al. 1947).

The Last Mountain Lake Basin is a major area of groundwater discharge. The presence of saline soil in much of the discharge area has been attributed to the evapotranspiration of the upward moving groundwater concentrating salts at the surface (Greer and Christiansen 1963). A number of springs occur in the vicinity of

the northern-most reaches of the lake.

12.2 Climate

The Last Mountain Lake area is subject to extreme temperatures and a low rainfall regime. Average temperatures for the past 12 years are -16.8°C in January and 18.7°C in July. Average annual precipitation (1976 to 1987) has been 34.7 cm with more than half received in May through July. The number of frost free days is about 110. The ice free period is six and a third months (Smith 1976). Wind is a predominant climatic and limnological feature. Prolonged winds increase surface water evaporation, desiccation of soil and plants, and promote soil drift. In winter, unvegetated areas may be blown clear and subjected to wind erosion while snow accumulates in areas of substantial cover or relief. Winds promote mixing of the shallow lake waters which prevents formation of a thermocline and increases oxygenation (Smith 1976).

12.3 Water Levels and Water Chemistry

Last Mountain Lake receives water from several sources; directly from precipitation, local runoff, regulated inflow at the south end from the Qu'Appelle River system and several creeks. At the north end, water flows into the lake from Lanigan and Lewis Creeks. Lewis Creek has an effective drainage basin of 129.5 square km and annual inflow of 1,180,000 cubic m (from 1972 to 1984) with extremes of flow from nil (in 1977) to 5,860,000 cubic m (in 1974) (Environment Canada 1985a). Lanigan Creek effectively drains an area of some 423.7 square km. It is controlled at several places along its length, hence it is difficult to evaluate normal flows. In years of average or better runoff, flows are adequate to fill reservoirs along its length and contribute to the lake.

The most recent limnology survey was conducted in 1974 (Smith 1976). Full Supply Level (F.S.L.) is 490.1 m above sea level at

Rowan's Ravine. Lake levels are influenced by precipitation, evaporation and the manipulation of several control structures. Levels have varied considerably over the post-settlement period. The Prairie Farm Rehabilitation Act (PFRA), Agriculture Canada built a dike and control structure at Valeport (the southern outlet of the lake) over the period 1939 to 1941 to control water levels which had been declining since 1928 (Soper 1942, Smith 1976). The 1941 level was the lowest recorded to that date (487.5 m) and after a slight recovery, sank to 487.4 m in 1946. Thereafter levels rose and in the early fifties high water levels greatly reduced several islands in the Sanctuary (Houston 1962). The maximum level recorded was 492.2 m in 1955. Lake level records from Rowan's Ravine for the period 1966 to 1985 show summer water levels vary an average .4 m between years (Environment Canada 1985b, 1986, 1987). Low and high August lake levels during this 20 year period differed by 1.5 m.

The shallow northern portions of the lake contain shoals. The actual depth in the Regional Park vicinity was 2.8 m in 1974 (Smith 1976). South of the NWA the lake is as deep as 30.8 m. There is virtually no thermocline in the shallow north end. Oxygen levels are lower at lake bottom but sufficient to support life. The lake is moderately alkaline with pH ranging from 8.6 to 8.8 at the surface and 8.4 to 8.8 at the bottom. Cations are sodium, magnesium, calcium and potassium with sulphate the predominant anion. The high ion levels in the lake are due to surface runoff and groundwater discharge. Total hardness in 1974 was 552 ppm. Total dissolved solids have varied from a high of 3098 ppm in the dry summer of 1939 to a low of 1770 ppm in 1974. Portions of the lake within the NWA are more turbid than the deeper section further south. Turbidity is high in May, following runoff (Lanigan Creek peaks April 10-30 and Lewis Creek March 31 to April 18), and declines through to the end of June when it increases as algal blooms occur.

12.3.1 Water Level Management

Water levels of several basins on the NWA are managed under agreement between the CWS and Ducks Unlimited (Canada) for the benefit of wildlife (Table 2). In order to increase the productivity of wetland plant and animal communities and their value to wildlife, a management regime including asynchronous drawdowns (to simulate drought) and reflooding is planned. This will encourage germination of submergent and emergent vegetation. Most of the basins are being operated within historic water level ranges and are important in maintaining the natural wetland diversity found in the NWA.

With the exception of Watertown and the secondary basins, water management of the northern basins is largely dependent on water runoff down Lanigan Creek (Figure 5). Shields and the downstream Basin A each fill directly from Lanigan Creek. Boychuk (1978) describes the management of each basin in relation to an arbitrary 100.0 foot baseline. Basin A-1 is normally kept relatively high (107.0 FSL) to maintain wetland vegetation and supply other basins with water. Basin A-2 receives water from A-1 via pumping or from Shields via gravity flow. Basin B-1 receives water from A-1 via gravity flow. Water may be passed through but not held in B-2 to Basin C from which water can be directed into either or both Basins D and E. These latter two basins drain into Last Mountain Lake; portable pumps can be used to move water among these basins (C,D,E) and the lake, providing further management flexibility.

Watertown receives its water from local runoff and an electric pump which draws water from the lake and delivers it to the basin nearly 300 meters away. The secondary basins are intended to collect water passively from surrounding runoff and hold it in the uplands, thereby improving its attractiveness to wildlife.

12.4 Vegetation

A preliminary annotated plant list for the area contains 318 species in 58 families (Caldwell et al. 1987). Seven plant species known to occur in the area have been identified as being rare in Saskatchewan (Harms 1978, and Maher et al. 1979). See Table 3 for details. The Western Wood Lily, Saskatchewan's floral emblem, is uncommon. Detailed plant inventories will be needed to complete the plant list and locate plants of special conservation concern.

The NWA is at the interface of Mixed Grass Prairie and Fescue Prairie Ecoregions (Driver 1987). Major influences on the vegetation are low precipitation levels and the light and frequently alkaline nature of the soils. As a result grassland plants do not reach the height and density they might achieve elsewhere in their ranges. Consequently litter accumulates slowly. Aspens and willows are the only native trees and are generally scarce. Shrubs and trees are confined to hollows with sufficient moisture. Uplands comprise about 70 percent of the NWA while wetlands make up nearly 30 percent.

Several undisturbed native grassland complexes exist and are described by Driver (1989). One complex covering about a tenth of the NWA is typical of the higher, drier upland site and it is dominated by Northern Rough Fescue and Spear Grass. Herbaceous species include Golden Bean, Northern Bedstraw, Crocus Anemone, Low Goldenrod, and Bastard Toadflax. Small stands of Western Snowberry may occur. A lowland complex, composed of moisture tolerant species, covers more than 12% of the area. The dominant plants vary with the degree of alkalinity and slope. Mid slope sites see Western Snowberry associated with Smooth Blue Beardtongue, Bastard Toadflax, Early Blue Violet, and Northern Bedstraw. Mid-lower slopes have Northern Rough Fescue , Kentucky Blue Grass and Green Needle Grass. Lower slopes have Kentucky Blue Grass, Northern Reed Grass, Graceful Sedge and Northern Wheatgrass as dominants. The

dominant grasses associated with soil salinity are Salt Grass, Wild Barley and Slender Wheatgrass. Highly saline areas support Salt Grass and Nuttals' Salt-meadow Grass. A third complex is found in wet meadows and is characterized by Wild Barley, Beaked Sedge, Awned Sedge and Spangletop and covers 2% of the NWA. A fourth, associated with alkaline wetlands, covers about 1% of the area. These areas frequently dry out leaving a white alkali flat ringed with Red Samphire, Wild Barley, Nuttals' Salt-meadow Grass, Salt Grass and Sea-Milkwort.

Altered grasslands, which are idled, exist within the native upland and lowland complexes. They occupy 11% of the area and result from earlier agricultural activities such as breaking (and reseeding) and overgrazing (and reseeding or invasion). Quack Grass, Smooth Brome and Kentucky Blue Grass have invaded these grasslands and eliminated or reduced native species in some areas.

Rotational grazing occurs on 7% of the area. Most pastures are of the lowland native complex already described. Overgrazing has led to increases in Blue Grama, Western Wheatgrass, Pasture Sage, and Prairie Selaginella. A little over a third of the pastures are seeded to Crested Wheatgrass.

Twenty-two percent of the area has been seeded to forage species; brome and alfalfa with lesser amounts of Crested Wheat Grass and Intermediate Wheat Grass. Twenty lure crops cover another 4% of the area.

Trees, including planted tree windbreaks and shrub shelterbelts, cover less than 1% of the NWA. The Regional Park contains substantial plantings of trees and shrubs but is not part of the NWA. Native shrubs are mainly Western Snowberry, Wood's Rose and Low Prairie Rose.

Wetland edge vegetation includes sedges and Reed Grass. The most

common emergents are bulrush and cattail. One small but special habitat is the fen complex around the springs in the northern portion of the NWA. The raised bogs surrounding the springs support cattails, sedges and Northern Grass of Parnassus. Wetlands and associated vegetation communities cover nearly 30 percent of the NWA.

Plankton affect water quality and are an essential link in the aquatic food chain. The standing crop of plankton in the north end of the lake was 158.7 kg/ha in 1974 (Smith 1976). Ninety-eight percent of plankton organisms were phytoplankton, the remainder zooplankton. Anabaena, Anacystis and Aphanizomenon are important Blue-green algae species in Last Mountain Lake. Anabaena assumes bloom proportions when the water temperature is about 22°C. In 1974 Anacystis and Aphanizomenon bloomed in the northern part of the lake although the water did not reach the 25°C deemed necessary for this phenomenon (Smith 1976). Blue-green algae blooms reduce recreational use of the lake.

12.5 Mammals

Thirty-three mammal species occur or have been recently recorded at Last Mountain Lake (Jorgenson 1987, CWS unpublished). The Hoary Bat has been recorded west of the NWA at Simpson (Nero 1958) and the Northern Grasshopper Mouse south of the NWA (Anderson 1946). Three species - Grizzly Bear, Wolf, and Bison - have been extirpated in historic times. A Black-footed Ferret was reportedly seen in 1932 (G.M. Sutton fide L.W. Oring 1985).

The White-tailed Jack Rabbit is a conspicuous resident of the NWA but numbers vary considerably. Muskrats are common in the wetlands. Beaver are sighted in the area most years and, when present, have a considerable impact on the few trees near water.

The Coyote and Red Fox both occur in the NWA. Foxes, uncommon in

the past, were common in the early 1980's and had a significant impact on nesting waterfowl and other birds. By 1988 very few foxes were seen as coyotes increased. The Raccoon has expanded its Saskatchewan range and is now fairly common (but rarely seen) in the area. The Striped Skunk is a very common resident. Other mustelids (Ermine, Long-tailed Weasel, Least Weasel, American Mink) are rarely seen. The Long-tailed Weasel has been classed as "threatened" by COSEWIC. The Badger is a permanent resident but is often difficult to observe.

Three species of ground squirrels live in the NWA each preferring a different habitat: Richardson's the short grazed grasslands; Thirteen-lined the taller grasses and Franklin's the shrublands and treed areas.

White-tailed deer are common residents and one of the most easily seen mammals on the NWA. Winter population counts have varied from 32 in 1975 to 340 in 1994. Deer concentrate on the area during the winter months. Pronghorns, recorded almost annually in recent years, are more typically found in arid grassland regions to the south.

Fourteen Christmas Mammal Counts have averaged seven species with five to fourteen species seen (Jorgenson 1987, Harris 1988).

12.6 Birds

There are records for 266 species in the NWA and its immediate vicinity. Records for Broad-winged Hawk, Black-necked Stilt, Western Sandpiper, White-breasted Nuthatch, Eastern Bluebird, Northern Mockingbird and Chestnut-sided and Blackburnian Warblers have been added since 1987 (Dale 1987). About 200 species probably pass through the area annually, some occurring in such small numbers as to be undetected most years (Table 4). Other species appear irregularly or accidently. The Greater Prairie-Chicken and

TABLE 4. STATUS AND OCCURRENCE OF BIRD SPECIES IN THE LAST MOUNTAIN LAKE NATIONAL WILDLIFE AREA AND VICINITY

ANNUAL SPECIES	NUMBER OF SPECIES	IRREGULAR SPECIES	NUMBER OF SPECIES
Resident (breeding)	8	Extirpated	1
Migrant (breeding)	95	Migrant (breeding)	2
Migrant	70	Migrant and Summer	41
Summer	16	Winter	7
Winter	12	Accidentals	14
TOTAL	201	TOTAL	65

Whooping Crane have been extirpated as breeding species.

12.6.1 Migration

Last Mountain Lake is a major staging area for waterfowl, Sandhill Cranes and other waterbirds in both spring and fall. The numbers vary considerably depending on water conditions and weather. The spring migration is shorter and usually less dramatic with weather influencing its timing and duration and in some years the birds barely seem to stop. Fall migration is almost always spectacular. Birds begin building up throughout August with more species and bigger flocks arriving daily. In years when drought concentrates migrants into major waterbodies, witnessing the return flight to the roost is an awesome experience. In 1989 over 400,000 geese, uncounted ducks and fifty thousand cranes occurred at the northern extreme of the lake at the peak of migration joining other waterbirds already present (CWS unpublished).

Over the entire fall migration period it is expected that the total number of waterbirds using the north end of Last Mountain Lake numbers over one million. Species of water birds which stop over at Last Mountain Lake in impressive numbers are many. Migrant grebes congregate on the lake, and ten to twelve thousand Double-crested Cormorants have been reported in fall. Several thousand Tundra Swans break their journey to rest and feed in the fingers and basins. Over 400,000 geese (Canada, Greater White-fronted, Snow and Ross') may be present during the peak of fall migration. It is an important staging area for dabbling ducks with single flocks of sixty to seventy thousand Mallards being reported on several occasions. Geese and dabblers rest in the shallows of the fingers or basins and fly to lure crops or fields outside the NWA to feed each morning and afternoon. Large rafts of Lesser Scaup, Canvasback and Redheads use the lake, bays, and basins. Other common diving ducks during migration are Bufflehead and Common Goldeneye with mergansers, Ring-necked Ducks and White-winged Scoters present in lower numbers.

Last Mountain Lake is renowned for its congregations of Sandhill Cranes. As many as 50,000 roost in the Sanctuary at one time and several hundred thousand may use the Last Mountain Lake-Quill Lakes region each autumn. Fall migration begins as early as late July when several hundred non-breeding adults arrive. Numbers build through August and peak late in the month or in September. Family groups arrive last. The departure of Sandhill Cranes is determined by weather and available food. An early harvest by local farmers minimizes crane crop depredation, but food in the form of waste grain and insects is still available in harvested fields. Cranes roost in shallow portions of the fingers, near some islands and in alkaline basins. They may fly considerable distances to feed once lure crops and agricultural lands adjacent to the NWA have been utilized. Spring flocks are usually smaller and the birds more spread out.

Last Mountain Lake-Kutawagan is one of seven major staging areas for the Whooping Crane (Johns IN PRESS). Birds have been sighted in 17 of 23 years since resident staff have monitored the area. Most are fall sightings of singles or pairs. Birds have stayed on the NWA for several weeks at a time.

Herons and ibises characteristically wander early in their life cycle. This habit has led to their colonizing new areas and expanding their ranges. White-faced Ibis, Great, Snowy and Cattle egrets are now recorded at Last Mountain Lake with some regularity.

Shorebirds migrate through Last Mountain Lake almost continuously from spring to fall. There is a brief lull in early to mid-June when few migrants are present. Large flocks are occasionally recorded (15,000 Red-necked Phalaropes, 10,000 Sanderlings) but the area's greatest value may be that it supports a variety of species. Last Mountain Lake may provide initial appreciable energy sources for southbound arctic waders (Colwell et al. 1988). Mudflats and shallows for peeps and waders are available in the fingers, some basins and shallow wetlands near the lake. Stony beaches and points attract Ruddy Turnstones and Red Knots. Surveys conducted in 1984 from May to August show the number of migrant shorebird species present varied from 7 to 14 per week and averaged 10 (Colwell et al. 1988). CWS data (based on casual observations not a structured survey) from May through August of 1988 indicate at least 7.4 migrant species were observed per day (range 2 - 14).

Gulls and terns congregate during migration adding to the numbers of breeding and immature birds that use the beaches, islands and marshes. Large feeding flights of Franklin Gulls heading out from the lake are not uncommon but numbers may have been greater historically. An estimated one million Franklin Gulls fed on grasshoppers in the Liberty area, south of the NWA, in June 1933 (Bradshaw 1934).

The steeper slopes flanking the southern parts of the lake and the land/water interface create thermals followed by migrant hawks. Migrant shorebirds and passerines provide food for falcons (particularly Merlins and Peregrine Falcons) and accipiters. Eagles congregate in the trees near the lake shore on the NWA.

Trees are scarce in the district and stands of trees, especially those near water, attract migrant thrushes, vireos, warblers and sparrows.

12.6.2 Breeding

A total of 105 species have recent breeding records at Last Mountain Lake. The Great Blue Heron, Cooper's Hawk, Mountain Bluebird, and Common Nighthawk have old breeding records. Several species are suspected breeders based on their continued presence in suitable habitat. The Lark Bunting and Orchard Oriole do not appear to either occur or breed annually. They erupt when the correct blend of environmental conditions occur here and in their normal range. Six breeding species are listed by COSEWIC, the Caspian Tern as rare, the Ferruginous Hawk, Burrowing Owl and Loggerhead Shrike as threatened and the Piping Plover as endangered. Caspian Terns were confirmed as breeding in 1978 (Caldwell and Jorgenson 1979). At least one pair, and probably two pairs, breed annually. Ferruginous Hawks nest in a P.F.R.A. pasture adjacent to the NWA but hunt over the area. Burrowing Owls occur irregularly and prefer grazed grassland. About 30 pairs of Loggerhead Shrikes utilize old farmsteads and shelterbelts as nest sites. Territorial Piping Plovers have been located at five shallow alkaline wetlands and on the lake's shoreline in recent years. Breeding was confirmed at two sites. Nine pairs and two non-territorial males were observed in 1988. This species is adapted to pioneering recently exposed mud flats and beaches - an adaptation to fluctuating water levels and variable food supplies. Baird's Sparrows nest commonly in the native grasslands and

adjacent tame grasslands within the NWA.

Several hundred pairs of Canada Geese and thirteen species of duck breed in the area. Nest searches conducted in hayfields and a small amount of native habitat in 1988 found Blue-winged Teal was the most prevalent nesting dabbler and Lesser Scaup the most common diver. Nest searches of a wider variety of habitat, conducted in 1990, indicated relatively high nest success with the major nesting species being Gadwall, Lesser Scaup, Blue-winged Teal, Northern Pintail, Northern Shoveler, and Mallard. Some species like White-winged Scoter appear to nest almost exclusively on islands.

Colonial nesting species have had mixed success in the MBS. Last Mountain Lake is a traditional site for nesting American White Pelicans (Macoun and Macoun 1909) and Double-crested Cormorants (Lewis 1929), gulls and Common Terns. Declining lake levels of the thirties and grazing of islands by livestock led to complete abandonment of the islands but breeding colonies reestablished in the forties (Soper 1942). In 1951 and 1953 high water levels forced pelicans and cormorants to shift from the island off 'Imperial Beach' to 'Perry's Point' and the island off its tip (Houston 1962). After breeding with minimal success in 1954, pelicans failed to breed from 1955 to 1972 and again failed until 1984 (Hatfield 1973, Nernberg 1985). Limited success in 1987 was followed by production of 96 chicks in 1988 and over 200 chicks in 1989 at a new site - an island off Watertown (CWS unpubl.). Cormorants have had an intermittent breeding record since the 1955 flood. There were some failure years in the sixties and no breeding occurred in 1977-78. Breeding effort increased from 38 nests in 1979 to 411 in 1985 (CWS unpubl., Roney and Hlaady 1986) and continue to be successful. Changing water levels and human disturbance were blamed for colonial nesting failures in the fifties (Houston 1962). Recent breeding success coincided with lower water levels in the lake. Low water reduced human activity (boating and fishing) near nesting islands and increased the

surface area of the islands. Ring-billed Gulls, California Gulls and Common Terns nest on several islands. Herring Gulls may also breed in the area(Roney 1976, Krystal and Nernberg 1984) though Last Mountain Lake is south of their main breeding range (Godfrey 1986).

A rich avifauna exists in the grassland and marsh habitats of the NWA. There are several Sharp-tailed Grouse leks in the NWA. Breeding Bird Surveys in 1987 and 1988 show endemic species such as Western Meadowlark, Sprague's Pipit and Baird's Sparrow present at all or most grassland stops. Populations of 46 and 39 pairs/100 ha were estimated for Sprague's Pipit and Baird's Sparrow respectively (Dale 1984). These two species require native grassland habitat, have a limited range and may be scarce and declining elsewhere. The Baird's Sparrow is listed as a Threatened Species by COSEWIC (De Smet and Miller 1989). Sprague's Pipit and Baird's Sparrow were detected on only 27 of more than 1800 Breeding Bird Survey Routes in 1977 and the average number detected per Saskatchewan route over a 12 year period was 1.5 and 1.6 respectively (Robbins et al. 1986). Areas such as Last Mountain Lake may be of critical importance to endemic species as agricultural impacts on grasslands continue. Marsh and waterbirds include six species of grebe, American Coot, Sora, Virginia (and probably Yellow) Rails, nine species of shorebirds, Forster's Tern, Sedge and Marsh Wrens, Common Yellowthroat, Sharp-tailed and LeConte's Sparrow, and Red-winged and Yellow-headed Blackbirds.

12.6.3 Moulting

Local waterfowl utilize the lake, basins and several alkaline wetlands to safely pass the critical flightless moulting period (peak extending from mid-July to the third week in August). In drought years other traditional but intermediate depth wetlands go dry and the lake's value for waterfowl increases.

12.6.4 Winter

The winter avifauna is limited but typical of the northern great plains. Twelve species winter regularly and another seven are recorded irregularly. There are nine resident species; (Sharptailed Grouse, Great Horned Owl, Short-eared Owl, Horned Lark, Black-billed Magpie, Grey Partridge, Rock Dove, European Starling and House Sparrow). The latter four are introduced. The Horned Lark, not strictly resident, can usually be found year round. Fifteen Christmas Bird Counts averaged 3400 individuals (range of 200 to 14 479) of 11.5 species (range of 8 to 15) (Dale 1987, Houston 1988). Much of the variation in numbers of individuals is accounted for by fluctuations in the number of Redpolls and Snow Buntings.

12.6.5 Avian Disease

A survey of 28 Saskatchewan wetlands in 1985 revealed wetland basin soils at Last Mountain Lake contain spores of the toxigenic bacteria associated with avian botulism (Wobeser et al. 1987). The requirements for an outbreak are the presence of bacteria, substrate and conditions for bacterial proliferation and toxigenesis and a method of transferring toxin to susceptible birds. Spores are persistent and most of the latter conditions are met by any marsh (under certain environmental conditions) so a wetland with a history of botulism outbreaks is likely to suffer further episodes. Several known outbreaks have occurred within the NWA but none has been serious (either large or of prolonged duration).

In 1990 an outbreak of Newcastle Disease in Double-crested Cormorants was discovered at Last Mountain Lake. It was part of a much larger outbreak extending across Alberta, Saskatchewan and Manitoba which was responsible for mortality in American White Pelican, cormorants and probably gulls. The infectious organism

appears to be one of several viral strains which may vary in strength.

The expertise of staff at the Western College of Veterinary Medicine in Saskatoon is relied upon to diagnose and aid in the control of any wildlife disease outbreaks in the NWA.

12.7 Reptiles and Amphibians

No research on the herpetofauna has been conducted. To date, observations indicate that modest populations of 6 species, typical of the northern great plains, occur at Last Mountain Lake. These are: Tiger Salamander, Canadian Toad, Striped Chorus Frog, Wood Frog, Leopard Frog and Plains Garter Snake. The array of shallow wetlands and native uplands provide important breeding and feeding habitats for these species. Numbers of garter snakes encountered in some spring and fall seasons suggests that there are hibernacula in the area. Considerable concern is being voiced around the world that some amphibians are declining at alarming rates due to environmental changes. At least one species in Saskatchewan - the Leopard Frog - has gone from common to rare in recent years as a result of unknown causes.

12.8 Fish

The fingers and the shallows of the northern portion of the lake provide spawning and "nursery" habitat for many species of fish. The high productivity and well oxygenated waters of Last Mountain Lake combine to produce the second highest crop of fish (catch/gang net) available in any of the Qu'Appelle Lakes (Smith 1976). Eighteen species of fish have been recorded in Last Mountain Lake (Atton and Merkowsky 1983). Only nine species are common. The Emerald Shiner was the most common fish in seine samples but Cisco, Walleye and Whitefish dominated gill net catches (Smith 1976). Cisco and Whitefish are less numerous in the shallow northern

portion of the lake. Both species are commercially fished in winter south of the NWA. Whitefish fry were released annually for many years and after populations crashed in the early forties commercial fishing was closed from 1945-1960. Bigmouth Buffalo have been commercially fished in summer: nets are typically set across shallow inlets or leads are employed to direct fish into shallow water where they are caught. The Qu'Appelle system is one of the few places they are found in Canada and Last Mountain Lake in particular has a high population of Bigmouth Buffalo. COSEWIC has designated this species as vulnerable (Goodchild 1990). White Sucker populations are highest in the northern portion of the lake. Carp were first noticed in the lake in 1964 (Smith 1976) and appear to have become well established. Their effect on the health of populations of Bigmouth Buffalo and Northern Pike is uncertain.

The main sport fish in the lake are Walleye, Perch and Northern Pike. Walleye, Pike and Perch are concentrated in many parts of the lake including the northern portion. The northern end of the lake is extremely popular with recreational fishermen especially in the spring and winter. Shallow areas near shore and the islands are favoured by fishermen. People and boats may disturb colonial nesting bird species.

12.9 Invertebrates

No research has been done on terrestrial invertebrates. Casual observations have resulted in a list of 31 butterflies (Anweiler field notes). Anyone who has walked the area in May, June or July is aware that there are a host of insects, many of which bite (wood ticks, mosquitos).

The most recent limnological survey of Last Mountain Lake included sampling stations in the northern portion of the lake (Smith 1976). Zooplankton, consisting mainly of rotifers and copepods, made up less than 3% of all plankton. The standing crop of all plankton

was 158.7 kg/ha, considerably less than the 549 kg/ha found in 1951 (Atton and Murray 1952). The smaller standing crop was attributed to the high water conditions of 1974.

The bottom fauna was dominated by chironomids, gastropods, and amphipods. The standing crop of bottom fauna was 87.6 kg/ha - highest of any lake examined in Saskatchewan. Shallow waters have higher biomass so the north end is presumably more productive than the lake as a whole. Wind forces contribute to high productivity by oxygenating the water and bringing food in contact with the bottom fauna. Chironomids, gastropods, and oligochaetes numbers were all higher than those found in previous studies (Thompson 1941, Atton and Murray 1952). This was attributed to increased eutrophication of the lake in the interim.

The high productivity of the waters in terms of plankton, aquatic plants and invertebrates contributes to the area's attractiveness to wildlife.

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