IMPORTANT BIRD AREAS OF CANADA

LES ZONES IMPORTANTES POUR LA CONSERVATION DES OISEAUX AU CANADA

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# COMMUNITY CONSERVATION PLAN

**for the**

# Chaplin, Old Wives and Reed Lakes Important Bird Areas

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Saskatchewan LOTTERIES

Legend (clockwise): 1) pelicans fishing at Reed lake adjacent to the Trans-canada Hwy. (Sect 4.2.10, 8.9). 2) Shallow island on Reed Lake used for nesting by colonial birds (Table 2). 3) Viewing opportunity from road bisecting Reed Lake, Morse lies on distant shore. 4) Isle of bays in Old Wives lake. 5) Raymond Lizée at a Wood river site where permanent cover (alfalfa) was planted by the landowner with conservation easement held by Sask. Wetland Cons. Corp. 6) Interpretive centre at Chaplin, with salt mine in the background. 7) Tundra Swans in Vermillion Hills NE of Chaplin (Sect. 8.2).

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# Executive Summary

This Community Conservation Plan for Chaplin, Old Wives and Reed lakes was prepared as part of Saskatchewan's Important Bird Area (IBA) Program. In this program, special areas are awarded an Important Bird Area designation for conservation purposes if the areas are used by large concentrations of birds, if birds present are at risk, or if the sites represent intact biomes and their natural bird inhabitants with restricted ranges.

The IBA Program was launched initially by BirdLife International in the UK. Today there are BirdLife Partners in over 100 countries. In Canada the national partners are the Canadian Nature Federation and Bird Studies Canada. In Saskatchewan, the conservation component of this program is being delivered by Nature Saskatchewan. Funding partners of the Community Conservation Plan for Chaplin, Old Wives and Reed lakes include Canadian Adaptation and Rural Development Saskatchewan (CARDS), the University of Saskatchewan, Saskatchewan Environment and Resource Management (SERM) and the Canadian Millennium Partnership Program. An IBA dedication ceremony for Chaplin Lake took place in Chaplin on 9 June 2000, as part of Chaplin Tourism Inc. social event. Similar ceremonies are planned for Reed and Old Wives lakes.

Chaplin, Old Wives and Reed lakes lie in a roughly 16000-km2 Wood River watershed in southwestern Saskatchewan. These lakes and many hundreds of ponds mark the edge of the Missouri Coteau upland. The diverse aquatic systems ranging from freshwater to saturated saline water are critical in the lives of many species of shorebirds, waterfowl and terrestrial species. Shorebirds use the sites briefly to refuel while en route from their South or Central American wintering areas to Canadian Arctic breeding grounds. Changes in water quantity and quality influence this semi-arid ecosystem. In years with average snow and rain, the characteristically modest precipitation and high evaporation leads to an alternating wet and dry cycle. In this process invertebrate animals are available to shorebirds in the shallow waters in which they wade, and in the soft mud at water's edge.

Chaplin, Old Wives and Reed lakes satisfy the IBA 'congregatory' and 'threatened' criteria. The lakes are 'globally significant' for nine species, 'nationally' significant for three and one 'threatened.' In addition to these, there are 12 species for which the site is prominent. The three IBAs are covered in a combined plan because their ecosystem is similar, they support similar bird species, they lie in the same watershed no more than 40 km apart, they face similar conservation opportunities and challenges, and they have an overlapping community of people interested in their conservation.

Promising conservation opportunities include a Bird Trails and other nature tourism initiatives, the Chaplin Lake Interpretive Centre, the on site operation of Saskatchewan Minerals, and the range management on Crown and some privately-owned lands. Threats include year-round survival of the migrating birds involved, water levels, water quality, botulism, trampling by cattle, predation, invasion by exotic species, accidents and disturbance.

The objectives that are specified in this plan draw attention to the importance of these lakes for birds, the objectives discourage any disruption of the ecosystem, they recognize that these lakes have little economic value apart form salt mining and brine shrimp harvest, but are critical for wildlife. The plan brings stakeholders together to chart a future course and to intervene in the event of future threats. Specific recommendations involve:

- Maintain or enhance native grasslands or other permanent cover and their sustainable uses around the lakes.
- Strive for equitable distribution of Wood River water flow for Chaplin and Old Wives lakes, recognizing the urgency of sufficient water for shorebirds at Chaplin Lake.
- Use available strategies to maintain or improve water quality in the Wood River and its tributaries.
- Facilitate and manage the sustainable tourism potential in the watershed.
- Assists schools and other organizations in quality nature-related education.
- Continue or increase monitoring of bird numbers and reproduction, and related ecosystem parameters.
- Conduct research in those specific areas that satisfy information needs or relate to future management and potential threats.

# Vision

**Our vision is to celebrate the birds and other natural treasures at Chaplin, Old Wives and Reed lakes and their watershed, by encouraging tourism and nature interpretation, by supporting sustainable land uses in the watershed, and by charting a course that ameliorates threats now and into the future.**

# 1. Introduction

Bird conservation is not 'just for the birds.' In a widely acknowledged and visionary treatment of the causes, human uses and the state of decline of diverse life forms on Earth, E.O. Wilson (1992) suggests that certain species will and should receive special attention. Wilson points out that individual species which may be large and colorful or otherwise charismatic, often are conservation favorites even though they represent a small fraction of living things. Such species, Wilson claims, can motivate conservation at many levels, from individual to government. Since no species exists in isolation from other species or its environment, such conservation efforts already in the first instance serve to protect elements of a functioning life support system. If human economic, cultural and social values are adopted in addition to species and systems concerns, the conservation efforts will come 'full circle' and have gone well beyond the birds.

It is hoped that this report may provide a significant impetus for further conservation by
i) explaining why Chaplin, Old Wives and Reed lakes are "important,"
ii) describing the lakes' ecosystems of which the birds are a part,
iii) reviewing appropriate literature, considering what is known but also speculating as to the potential impact of the what is not known, and anticipating opportunities and concerns across as many elements of the natural system as possible.
iv) outlining opportunities and challenges for conservation and listing potential stakeholders and contact people (Appendix 1).

## 1.1 Why protect birds

Surveys of human values and economic impacts have shown that birds have attracted the attention of many people in Saskatchewan and around the World. In a 1991 survey, 83.3% of Canadians reported that "maintaining abundant wildlife is very or fairly important" (Filion et al. 1993). Globally, 62% of people surveyed in 1990 in 42 countries reported "strong approval" for the ecology movement (Nevitte 1996). These human values are more than wishful thinking to many people. A survey in Saskatchewan in 1996, showed that 74% of the population was involved in indirect nature-related activities (through media, visiting zoos, purchasing art and the like), and 15% of the population participated in trips specifically to view wildlife (http://www.ec.gc.ca/nature.html). These data signal a change in values by which we rank the worth of humans vs. wildlife, an expansion of the "human-animal boundary" (Cartmill 1993). These changing world views represent both a responsibility and an opportunity. It will be the conservation planner's role to help formulate a scenario in which these new opportunities are realized.

This community conservation plan focuses on Chaplin, Old Wives and Reed lakes, in the mixed-grass ecoregion of south-central Saskatchewan (Fig. 1). Soils in the semi-arid gently undulating plain are primarily brown soils typical of grasslands, called Chernozems, a Russian word for the dark-coloured soil of grasslands . The soil parent material is sandy to gravely loam originally re-arranged by moving water, or loam to clay loam glacial till. The watershed subunit includes the Wood River draining into Old Wives and Chaplin lakes. Primary land use on uplands is cereal crop production and grazing.

Important bird resources that occur on the lakes include large congregations of waterfowl and shorebirds, and the nationally and provincially endangered Piping Plover (Charadrius melodus). Because of their rich bird resources and urgent conservation needs, all three lakes are considered globally significant.

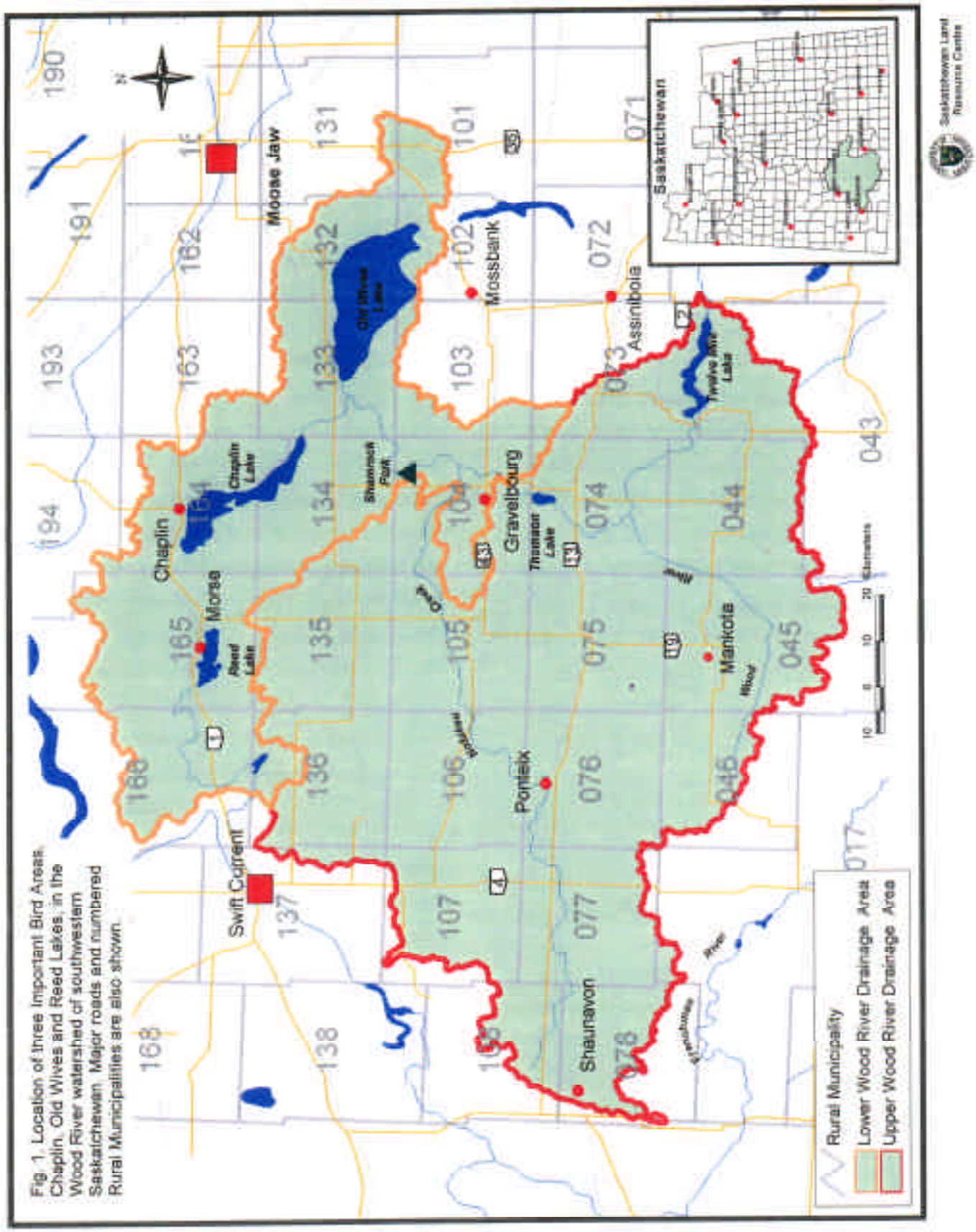



Fig. 1. Location of three important Bird Areas: Chaplin, Old Wives and Reed Lakes, in the Wood River watershed of southwestern Saskatchewan. Major roads and numbered Rural Municipalities are also shown.

## 1.2 Possible approaches to bird protection

Given the critical role which Chaplin, Old Wives and Reed lakes play as a feeding site for migratory birds, the lakes' ability to provide this function should be protected for bird conservation. The birds' use of these areas is not an accident. If this environment is seriously altered, the consequences will be most severe for species that use the lakes for feeding and for safety during migration, and will also negatively affect breeders.

Currently, the lakes provide moulting, roosting and feeding opportunities for waterfowl, and breeding, roosting and feeding for shorebirds. Effective conservation will require considerations of water levels, land use and ecological monitoring of potential changes in surrounding areas. Also, naturally occurring outbreaks of botulism threaten birds and this factor must be studied and managed.

The people of the Wood River watershed exhibit a pattern of lifestyle and land use that is an outcome of complex forces which often change over time. Such forces include personal choices, social and economic necessity, and regulations and incentives. Despite an intensively used agricultural landscape within the watershed, some important portions of the ecosystem are still shared with the birds - after all, the birds are still there today.

The IBA planning process should be sensitive to the complex cultural forces and could enhance bird-people coexistence in three major ways. First, the process aims to bring together all of the major stakeholders and help find opportunities for the future that complement one another. Second, the process recognizes that cooperation can involve compromise. Toward this end, the planning process will be directed toward alternatives that protect ecosystem function and respect a quality of life for the people involved. Third, this process should be vigilant to ensure that any future changes in the region are consistent with bird conservation. Toward this end, the IBA process should enhance or protect an environment which by being healthy for birds will also protect the health of people.

Effective solutions for conservation should include all elements of the system, and in particular the human elements. A participatory, community-based research and management system might be adopted. Kramer's (1986) model of community-based research and action outlines several stages that cannot be skipped: need -> interest -> involvement -> ownership -> commitment -> collaboration. An important characteristic in this process is the sharing of power. Weeks and Packard (1997) have illustrated how several barriers arising from a top-down management style have hampered conservation success.

Every attempt will be made in this project to respond to local issues and to represent the aspirations of the local people, making this endeavor a community-based, and interactive process with wide stakeholder involvement. While local involvement is critically important, 'community' and 'stakeholder' should also be broadly defined. The stakeholders and the community involve the local community first. However, because natural systems are inextricably connected, these obligations extend eventually to all Canadians and in some small sense to all citizens on Earth. In many respects, Canada has a tradition of collective goals with both local and regional input in decision making (Raad and Kenworthy 1998). Furthermore, Canada as a nation participates in international agreements such as the Biodiversity Convention (Anonymous 1995) and many others listed below.

## 1.3 Existing conservation measures

The ecosystems, shorebirds, waterfowl and other birds of Chaplin, Old Wives and Reed lakes owe their persistence in large measure to their own ingenuity but also to past conservation values among people, and legal protection. Historic statutes have been complemented by many direct conservation initiatives which have gained the support of people. Some of the major initiatives that relate to the IBA program are outlined below.

**1.3.1 Federal and provincial acts.** In the late 1800s and early 1900s it became increasingly clear that migratory birds were on the decline. Market hunting was quickly identified as a cause, but the other major cause, habitat loss, was not well recognized. Legislated migratory bird protection passed the United States Senate in 1913. In 1916, Canada and the United States signed the Migratory Birds Treaty. The Migratory Birds Convention Act passed Parliament in 1917. Mexico signed the Migratory Birds Treaty in 1936 (Foster 1978).

The Migratory Birds Convention Act and

its regulations give Environment Canada the authority to protect migratory birds, and control seasons and bag limits for hunted species. Soon after the act passed Parliament, the first Dominion ornithologist was hired. Bird management was under the Parks Branch until the section of the branch administering the act became the Canadian Wildlife Service in 1947.

The province of Saskatchewan brought its legislation quickly into line with the Wildlife Act, as did most of the other provinces. The Canada Wildlife Act of 1973 fostered a partnership in conservation between the federal government, and the provinces and territories.

In addition to its traditional responsibilities in the area of fish, wildlife and parks management, the Government of Saskatchewan has recently passed the Wildlife Act 1997 (replacing the Wildlife Act) to include Species at Risk. The province has also created The Conservation Easements Act and introduced the Representative Areas Network program. The islands of Old Wives and Reed lakes are designated as Provincial Wildlife Refuges, where any approach closer than 100 m to the islands is prohibited during the nesting season (April to September)

**1.3.2 Canadian Biodiversity Strategy.** The authors of the Canadian Biodiversity Strategy defined "biodiversity" as "the variety of species and ecosystems on Earth and the ecological processes of which they are part" (Anonymous 1995). Diversity is broadly defined including genetic and species diversity, diversity in ecological function (e.g. ground water recharge, crop production, soil building/conservation) and diversity among ecosystems (e.g. land-based, water-based).

The goals of the Canadian Biodiversity Strategy are to:

- conserve biodiversity and use biological resources in a sustainable manner;
- improve our understanding of ecosystems and increase our resource management capability;
- promote an understanding of the need to conserve biodiversity and use of biological resources in a sustainable manner;
- maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
- work with other countries to conserve biodiversity, use biological resources in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources (Anonymous 1995).

**1.3.3 Western Hemisphere Shorebird Reserve Network.** (http://www.manomet.org/) This network was created under the urgent recognition that some shorebirds rely on certain strategic sites to complete their spectacular migration. Because of their long-distance flights spanning both hemispheres, the birds cross many national borders. The reserve network was created "...to promote conservation for shorebirds and wetlands through education and by linking sites and local people to cover the birds' life-cycle year-round" (Harrington 1999). The network is based on voluntary agreements, but further protection at a government level may be achieved through National Wildlife Area designation for a shorebird reserve, or through stewardship agreements with landowners (Morrison et al. 1995:4).

Categories by which these reserves are organized are:

- Hemispheric = sites hosting 500,000 shorebirds in a year or more then 30% of flyway population.
- International = sites hosting 100,000 or more shorebirds in a year or more than 15% of a flyway population
- Regional = sites hosting 20,000 or more shorebirds in a year or more than 5% of a flyway population

Between 1986, when the network program was officially launched, and 1995, 31 new sites were officially recognized in 7 countries from Tierra del Fuego to Alaska. The total land base was estimated at 10 million ha of habitat for 30 million shorebirds. Of the 54 candidate sites in Canada, 22 were on the prairies and 9 in Saskatchewan (Morrison et al. 1995). On 29 May 1997, the Chaplin, Old Wives and Reed lakes complex became Canada's second and western Canada's first Western Hemispheric Shorebird Reserve, of "hemispheric" significance. The other Saskatchewan sites, the Quill Lakes and Last Mountain Lake are of 'international' and 'regional' significance, respectively

**1.3.4 Migratory Bird Sanctuary.** The Canadian Wildlife Service manages a network of Migratory Bird Sanctuaries under the *Migratory Birds Convention Act.* The relevant regulations prevent disturbances while the birds are actually present including hunting and egg collecting. This designation does not protect habitat directly, but the Canadian Wildlife Service works closely with other organizations, industry and landowners to achieve this protection. Old Wives Lake had been designated a Migratory Bird Sanctuary at least since 1955 (Nieman and Isbister 1973).

**1.3.5 North American Bird Conservation Initiative.** Conservation plans, including the present one, are wish lists - but not without important functions. They can coordinate the will and strategies between different people/programs. The North American Bird Conservation Initiative is a 'super plan' that attempts to unify various bird conservation initiatives that are narrower in scope (Fig 2).

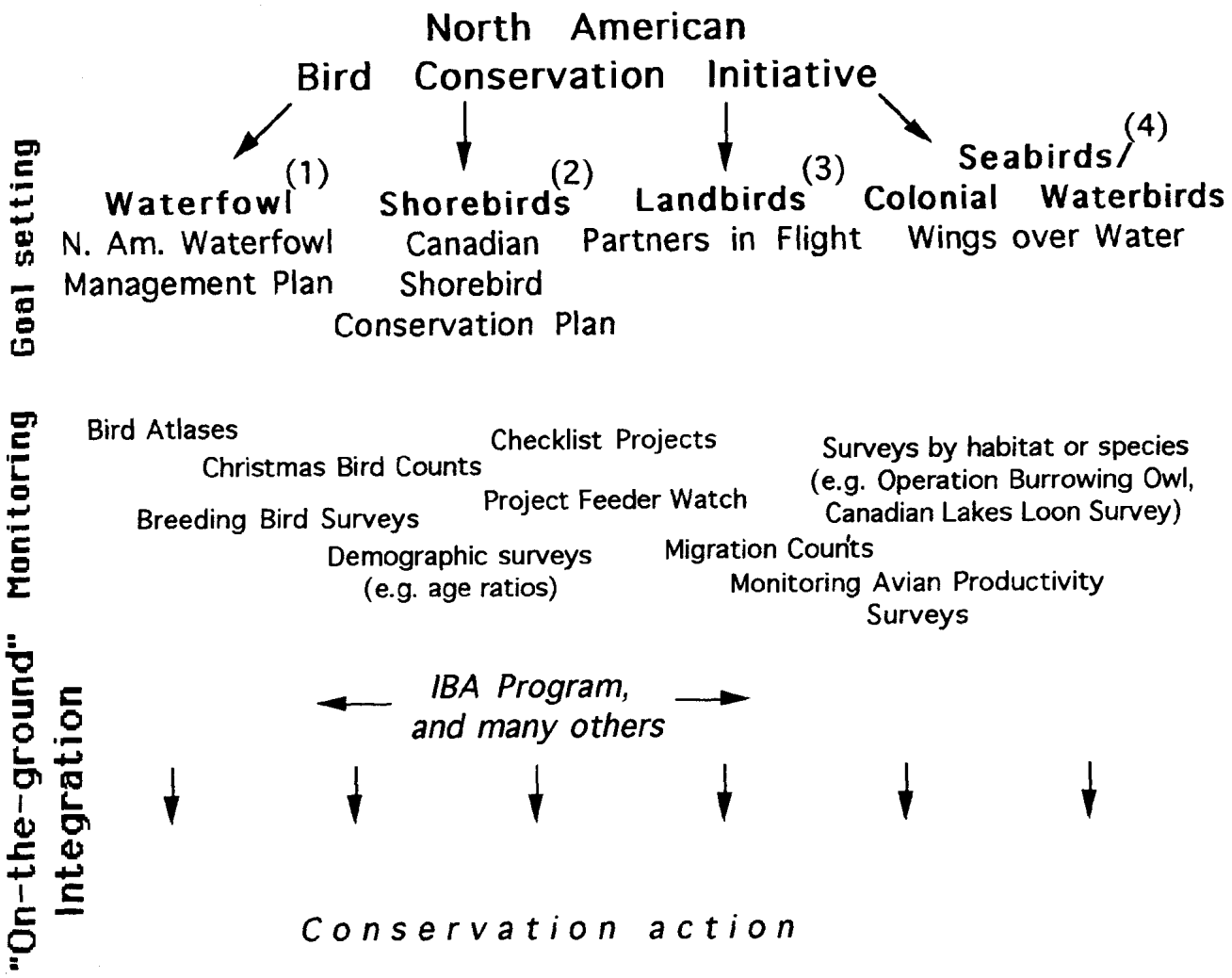



Fig. 2. A schematic diagram to show the relationships among bird conservation plans and strategies. Combined with monitoring strategies, these plans are intended to lead to meaningful action. References: (1) North American Waterfowl Management Plan Committee 1998, (2) Anonymous. 1999, (3) Canadian Landbird Conservation Working Group 1996, (4) in preparation.

**1.3.6 Prairie Canada Shorebird Conservation Plan.** The goals of the Prairie Canada Shorebird Conservation Plan (Gratto-Trevor et al. 2000) are similar to those included in the Canadian Shorebird Conservation Plan. Goals are to:

- acquire sufficient information about population dynamics, population trends, migration and staging strategies, and habitat preferences of prairie Canada shorebirds to make knowledgeable management recommendations;
- sustain and enhance sufficient high quality habitat to support healthy populations in prairie Canada;
- inform the public, decision-makers, and all those involved in land management in prairie Canada about the importance of prairie Canada to shorebirds, and about shorebird species, biology, trends and management; and
- ensure that coordinated conservation efforts (regionally, nationally, and internationally) are in place to address the key conservation priorities for shorebirds in prairie Canada.

Implementation will be encouraged and guided by a management board in cooperation with government and non-governmental organizations. A technical advisory committee was struck to encourage that actions are based on sound ecological knowledge and to address information gaps.

A companion plan exists in the United States. A Mexican shorebird plan was in draft stage at the time of writing (McNight 1999).

**1.3.7 International Shorebird Survey.** The highly migratory nature of shorebirds requires international cooperation. There is a tendency for countries to focus on the birds that breed there and pay comparatively little attention to species that merely pass on migration. The tremendous length of shorebird migrations and the need to "short stop" and find high energy food (Sect. 4.2.4) makes shorebirds vulnerable. Many of the shorebirds are small in body size and therefore have high metabolic demands.

Most conservation actions presuppose effective monitoring of shorebird numbers, the timing of passage and threats. The Manomet Center for Conservation Science in Maine started to organize an international shorebird survey in 1974. To date, this survey has fostered some 50,000 counts at more than 600 strategic sites by more than 900 observers. This survey also formed the basis for the formation of the Western Hemispheric Shorebird Reserve Network. Survey cooperators are asked to census a location of their choice three times per month during the migration period. For more information, the Manomet Centre for Conservation Sciences Centre can be contacted (see Brian Harrington, Appendix 1).

The Saskatchewan Wetland Conservation Corporation is delivering a program called "Linking communities, wetlands and migratory birds" in partnership with Wetlands International-The Americas. Two workshops have been held with many delegates representing different sites (Demoskoff 1999). Saskatchewan Wetland Conservation Corporation also established a TransAmerica Migratory Bird Fund to facilitate research, land management and education (Demoskoff 1999).

**1.3.8 North American Waterfowl Management Plan.** This plan was approved in Canada in 1986 by the Minister of Environment, and in 1994 by Mexico. The plan was envisioned as an extension to the Migratory Birds Convention Act and to coordinate effective management between the three signatory countries, including the United States. The plan was intended to help restore waterfowl populations to 1970s levels, to perpetuate waterfowl habitats, to employ management strategies according to subpopulations or flyway populations, and to incorporate subsistence and recreational hunting into management strategies. The prairie Canada portion of this plan came to be known as the Prairie Habitat Joint Venture (Anonymous 1986, Dickson and McKeating 1993).

In their 1993 analysis of the Prairie Habitat Joint Venture, Dickson and McKeating compliment the program for its achievements in waterfowl management, but they also conclude that more must be done to include species other than ducks. They point toward initiatives that were promising and suggest that multi-species management should be included more often than was usually the case in the early stages of habitat management.

In 1998, this plan was updated to recognize the "changing context of waterfowl conservation" (North American Waterfowl Management Plan Committee 1998). Aspects in need of adaptation include: i) more than 60 million people watch migratory birds and only 3.2 million hunt waterfowl,

ii) the signatory countries are also part of other alliances that create obligations (e.g. the biodiversity convention), iii) initiatives for migratory birds other than waterfowl exist (e.g. Western Hemisphere Shorebird Reserve Network), iv) an increasingly suburban existence and increasing demands for food globally brings new challenges.

Under this waterfowl management plan, Ducks Unlimited Canada operates some 10,000 wetland and upland segments within the Prairie Habitat Joint Venture. Waterfowl and shorebird habitat management are seen as complementary, not exclusive. Many properties are specifically managed for both. "Cooperative partnerships are the key to better shorebird conservation in prairie Canada" (Sadler 1999).

**1.3.9 The Chaplin Heritage Marsh.** Chaplin Lake is one of ten designated Heritage Marshes in Saskatchewan (Sect 1.3.11.1). This designation was launched in 1981 to recognize the historical value and to preserve these important wetlands. The original participants in the program were: the former Saskatchewan Parks, Recreation and Culture, the Saskatchewan Wildlife Federation, Nature Saskatchewan, Ducks Unlimited Canada and Wildlife Habitat Canada.

The Chaplin Heritage Marsh (see Fig. 6 below) in particular was created by their partners with the help of Sask Minerals, Sask Water, the Prairie Farm Rehabilitation Administration and Saskatchewan Agriculture and Food. A diversion was built to channel a portion of the Wood River flow into Chaplin Creek (Sect 1.3.11.1). Where Chaplin Creek enters the south side of Chaplin Lake, a series of earth dikes and control structures were built to impound the water and create a freshwater marsh. Beyond these impoundments the overflow mixes with the saline water of the lake. This has resulted in a 1323 ha freshwater marsh encompassing a portion of the south basin of Chaplin Lake, constructed and managed by Ducks Unlimited Canada for its Heritage Marsh partners.

**1.3.10 Prairie Conservation Action Plan.** The Prairie Conservation Action Plan was an initiative spearheaded by World Wildlife Fund Canada. The plan was released in 1987, Canada's Wildlife Centennial year commemorating the 100th anniversary of North America's first wildlife sanctuary, the Last Mountain Lake National Wildlife Area. The plan's main focus, delivered under "Let's leave some wild in the West," was identifying critical habitat and its threats, preparing status reports for species at risk of extinction, and executing conservation action for these species.

Since the formulation of the Prairie Conservation Action Plan, many named or unnamed and large or small initiatives lead to prairie conservation. Most important was an increasing awareness of the values of native prairie and also awareness of its imminent threats. It was during this time, for instance, that government-subsidized regrassing programs were phased out. New extension programs were created or existing programs brought into line with the increasingly mature perceptions of native prairie and its role in a ranching economy and in the biosphere.

In the late 1990s, the Prairie Conservation Action Plan was re-invigorated through collaborative partnerships in each of the prairie provinces with some cross-coordination. In Saskatchewan, leadership was undertaken by the Saskatchewan Stock Growers Association and Saskatchewan Environment and Resource Management, with headquarters for the plan housed in the offices of the Saskatchewan Stock Growers Association in Regina (www.pcap-sk.org). A coordinating committee includes approximately 20 agencies. Funding partners of the program are: Canadian Adaptation and Rural Development Saskatchewan, Canadian Wildlife Service, Ducks Unlimited Canada, Prairie Farm Rehabilitation Administration (under the National Soil & Water Conservation Program), Saskatchewan Agriculture and Food, Saskatchewan Environment and Resource Management, and the Saskatchewan Wetland Conservation Corporation. Goals are to sustain a healthy native grassland grazing resource, to maintain biological diversity, to promote a sustainable use of the resource and a quality of life for people, and to disseminate quality information.

The change in this scenario from a non-government/government conservationist's initiative to one co-driven by a production sector is a welcome sign of our time. The challenge will be to move from a narrow focus on individual components of the native ecosystem (e.g. rare plants) to incorporate conservation values systematically in the full food production and consumption chain.

**1.3.11 Community pastures.** There is one community pasture near Old Wives Lake and four in the immediate vicinity of Chaplin Lake (see Fig. 6). A two-parts Shamrock Pasture covers 88 km2, a three-parts (South, Larson and Hampton) Valjean Pasture 123 km2 combined, and Old Wives Pasture 57 km2. Other community pastures include the Chaplin Lake Grazing Co-op (7 km2) and the Mount Rumble Grazing Co-op (18 km2).

Community pastures are owned by the Crown, but administered either federally through the Prairie Farm Rehabilitation Administration (Shamrock), or provincially by the Saskatchewan Pastures Program (Valjean, Old Wives). The Community Pastures Program in general receives its funding partly or entirely from the patrons' grazing fees. Local staff (pasture managers assisted by range riders) manage all day-to-day affairs of the pasture, such as livestock care and handling, and facilities maintenance. Stocking rates and the timing of rotations are set jointly by an agrologist and the pasture manager. An advisory board composed of patrons helps by providing local input and may administer parts of the program such as the cattle breeding. In grazing co-ops, a group of ranchers have formed an administrative co-operative and manage all aspects of a pasture. A lease fee is paid by the group. Finally, in this continuum of management styles for crown-owned grasslands, some land is leased directly to the rancher who is expected to observe stocking rates set according to the carrying capacity of the land.

**1.3.11.1 The Saskatchewan Pastures Program.** As summarized by Dale Weisbrot, the Saskatchewan Pastures Program of Saskatchewan Agriculture and Food was established in 1922. Today there are 56 pastures comprising slightly more than 800,000 acres (3,238 km2). The program's mandate is to provide livestock business opportunities while promoting the public objectives of integrated land use and a sustainable resource base. The goals are to provide supplementary grazing and livestock management services to enhance livestock diversification; to improve environmental and agricultural sustainability of Crown Land; and to implement new enterprise opportunities.

The Saskatchewan Pastures Program manages and operates three provincial pastures representing nearly 55,000 acres in the Wood River drainage area. The Old Wives Provincial Pasture (57 km2) and the Valjean Provincial Pasture (123 km2) are in the Lower Wood River drainage area. The Saskatchewan Government established Valjean Provincial Pasture in 1946 and Old Wives Provincial Pasture in 1969. In 1999, 95 individual cattle producers delivered 2,671 cows or heifers with 2,419 calves to these two pastures for summer grazing and care.

Old Wives and Valjean pastures are also wintering stations where clients are provided custom winter-feeding and care for their livestock (calf 'backgrounding' at Old Wives and bull wintering at Valjean). The Saskatchewan Pastures Program also established the Meyronne Provincial Pasture in 1957, which is in the Upper Wood River drainage area. Meyronne Pasture has approximately 10,100 acres (41 km2) and provides summer grazing for 986 adult and 972 calves from 42 producers.

**1.3.11.2 PFRA Community Pastures.** The Prairie Farm Rehabilitation Administration (Sect 6.2, 7.5) operates 87 community pastures covering 9,150 km2, of which 62 are in Saskatchewan. For a fee, close to 4,000 farmers graze over 214,000 head of cattle. Most of the pastures were developed in the late 1930s and early 1940s on cultivated marginal land severely eroded by wind, or on rangeland heavily overgrazed by cattle.

The pasture program's objectives are to protect marginal soils from erosion by maintaining permanent cover on these lands, to help producers with small farms strengthen their operations by allowing them to use these pastures for summer grazing of cattle, to encourage high quality, long-term cattle production by providing a breeding service using over 3,000 good quality bulls, and to manage the rangeland resource to ensure a healthy relationship between soils, plants and animals (PFRA pamphlet entitled Community pastures). The Shamrcok Community pasture adjacent to Chaplin Lake exists in two parts (Fig. 6) and supports 1,400-1,500 cattle each summer. The demand for grazing space is generally high.

**1.3.12 Water use and management in the Wood River watershed.** The Canadian portion of the Great Plains was the last to be settled. Fortunately, the people who directed this settlement were aware of failures further south and attempted to put appropriate management mechanisms in place. Where

water is concerned, these mechanisms dealt with fisheries first and water use soon thereafter.

Before settlement, aboriginal peoples made extensive use of water bodies for fishing, attested to by the presence of fish weirs and other evidence. The first EuroCanadian fisheries regulations were coined in 1892. A fishery slowly expanded on those prairie lakes and rivers that were accessible by trail and eventually by rail. When Saskatchewan became a province in 1905, fish regulatory powers were retained by Ottawa until the signing of the Natural Resource Transfer Act in 1930. Commercial and fishing for food, especially in the early part of the 20th Century, was small in scale but widespread. This fishery declined even though over-harvest seemed not to be a universal cause. For instance the bigmouth buffalo (Ictiobus cyprinellus) was a common source of food for people in need in the thirties in the nearby Qu'Appelle watershed. In autumn 2000, this fish is expected to be officially listed as endangered in Saskatchewan. The recent and continuing decline is attributed to several factors, including water management altering the flood dynamics and an altered water temperature regime affecting spawning (Hlasny 1998).

The Northwest Irrigation Act was passed in 1894. Water flow on the prairies was radically changed. As on other parts of the Great Plains, the resulting loss of biodiversity will likely never be known. According to Knopf and Samson (1997:280) "Prairie streams had a strong riffle/pool structure that resembled more a series of seasonally connected small ponds or lakes during periods of low flow. Size of pools increased and length of riffles generally decreased moving down the drainage; all except the Missouri River periodically may have become intermittent in periods of drought. Today, water diversion and ground water pumping have accentuated the intermittence of these streams on most of the Great Plains."

According to flow data provided by Terry Chamulak, Saskatchewan Water Corporation, water flow at a station on Notukeu Creek was measured for most years since 1914 (Fig. 3). According to these data, there is no evidence of a decline in flow over that time. The drought of the late 1980s seems to be reflected in a reduced flow of 1 m/sec or less over seven consecutive years. Peak flows occur in late winter or early spring (Fig. 4). This illustrates the importance of snow fall and later melt in influencing the amount of water available to fill the lakes.

In the Wood River Watershed, the water cycle includes water input through snow and rain, surface water transport and storage in ponds and lakes, and water export through infiltration through soils into ground water, evaporation from land and

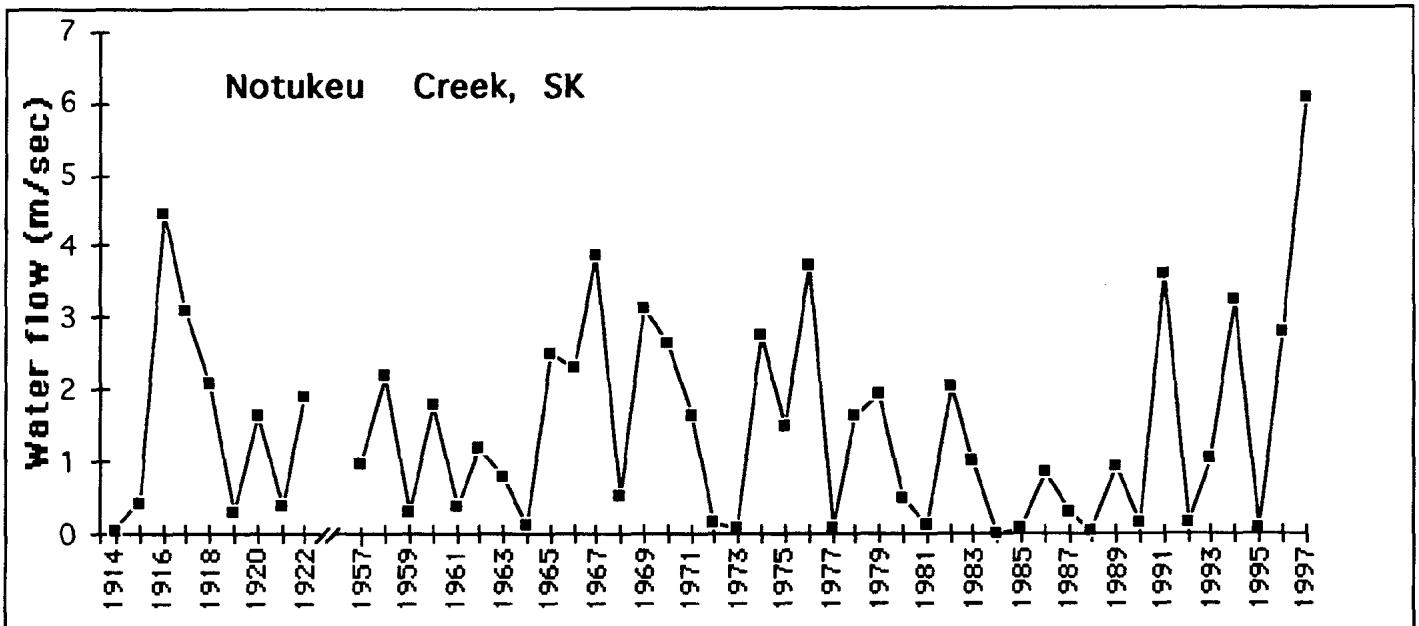



Fig. 3. Fifty-year water flow in Notukeu Creek. Flow was not recorded between 1923 and 1956.

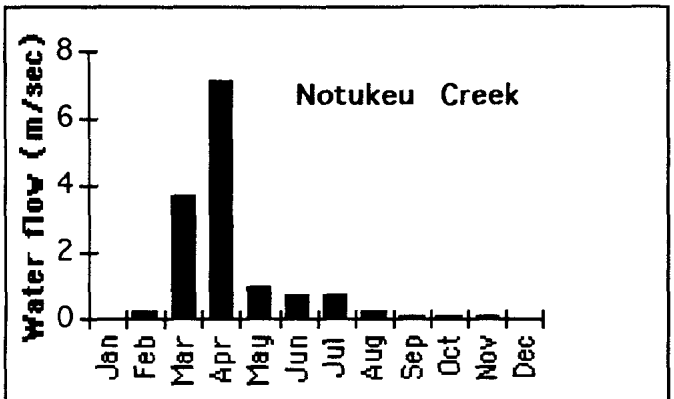



Fig. 4. The distribution of water flow in Notukeu Creek throughout an average year.

water surfaces, and evapotranspiration by plants. Evaporation and transpiration ecological services whereby nature purifies water; nearly all impurities are left behind in this process so that rain forms as perfectly clean water again.

The responsibility for water management lies with Sask Water, whose mission is to "manage, protect and develop the province's water and related land resources for the economic and social benefit of the province" (http://www.saskwater.com/htdocs/catcorpt.htm).

**1.3.12.1 Wood River diversion.** The majority of text in this section was provided by Gregg Brewster, Ducks Unlimited Canada. The importance of Chaplin Heritage Marsh as a potential breeding area for ducks has long been recognized by Ducks Unlimited Canada. The Marsh, located at the south end of Chaplin Lake (see Fig. 6 below), receives its water supply from local run-off and the Wood River Diversion via Chaplin Creek.

In 1958, Saskatchewan Minerals approached Saskatchewan Environment to divert water from the Wood River to maintain their water supply for the sodium sulfate plant at Chaplin. Ducks Unlimited Canada was also interested in maintaining creek channel flows to maintain existing the marsh in the Prairie Farm Rehabilitation Administration (PFRA) pasture at the south end of Chaplin Lake. Ducks Unlimited built the main control and two bridges and rock fords while Saskatchewan Minerals excavated 16 kilometers of Chaplin Creek.

In 1974, Ducks Unlimited negotiated further with Sask Minerals and PFRA for improved marsh management of the southern marshes. The plan called for a double-banked supply channel with nine alternating adjacent basins through the core area of the marsh. However, due to concerns by PFRA over loss of grazing area and by local landowners over increased potential for crop damage and inadequate water supply to fill the basins, the design was altered to three basins with reduced area. Construction was completed by Ducks Unlimited in 1986 and the Heritage Marsh was established.

Water management involves operation by Ducks Unlimited that first allows a water allocation of 7,401 dam cu (6000 acre feet) be conveyed to the Sask Minerals reservoir on Chaplin Lake beginning in March of each year. The remainder of the water supply is used to maintain water levels on the Heritage Marshes that requires 5,551 dam cu (4,500 acre feet). Hydrological studies have confirmed that the total demand of 12,952 dam cu (10,500 acre feet) has an 80% probability of being achieved and/or exceeded for an average year. In years when less than 6,000 acre feet enters the system, Ducks Unlimited is permitted to utilize the available water during the spring and pass it on to Sask Minerals later in the year.

The impact of this diversion on Old Wives water level has been questioned. Water level became a contentious issue for local residents as salts blew off of the dry lake bed onto adjacent farmland. Ducks Unlimited estimated that the proportion of flow that is diverted is only 0.3%. The relevant data are: total annual flow averaged over 1975-1987 is 917,980 acre feet. Total diversion between 1986-1987, after the Heritage Marsh had been created, was 2,765 acre feet.

**1.3.12.2 Reed Lake Diversion**. The text in this section was kindly provided by Bart Oegema of Sask Water. Reed Lake is the terminal lake in a closed drainage basin ( i.e. no outflowing stream). It is fed naturally by Rushlake Creek and the local drainage area around the lake itself (Fig. 5). Rush Lake was another large natural lake in the watershed which received flow from Rushlake Creek and would overflow to Reed Lake. Rush Lake was partially drained by the CPR whose rail line crosses the former lake bed. Complete drainage of Rush Lake occurred in the 1940s with the development of the Rush Lake Irrigation Project, Highfield Reservoir, Herbert Reservoir, the Herbert Irrigation Project, and the Swift Current Main Canal. This canal has been used to augment the natural water

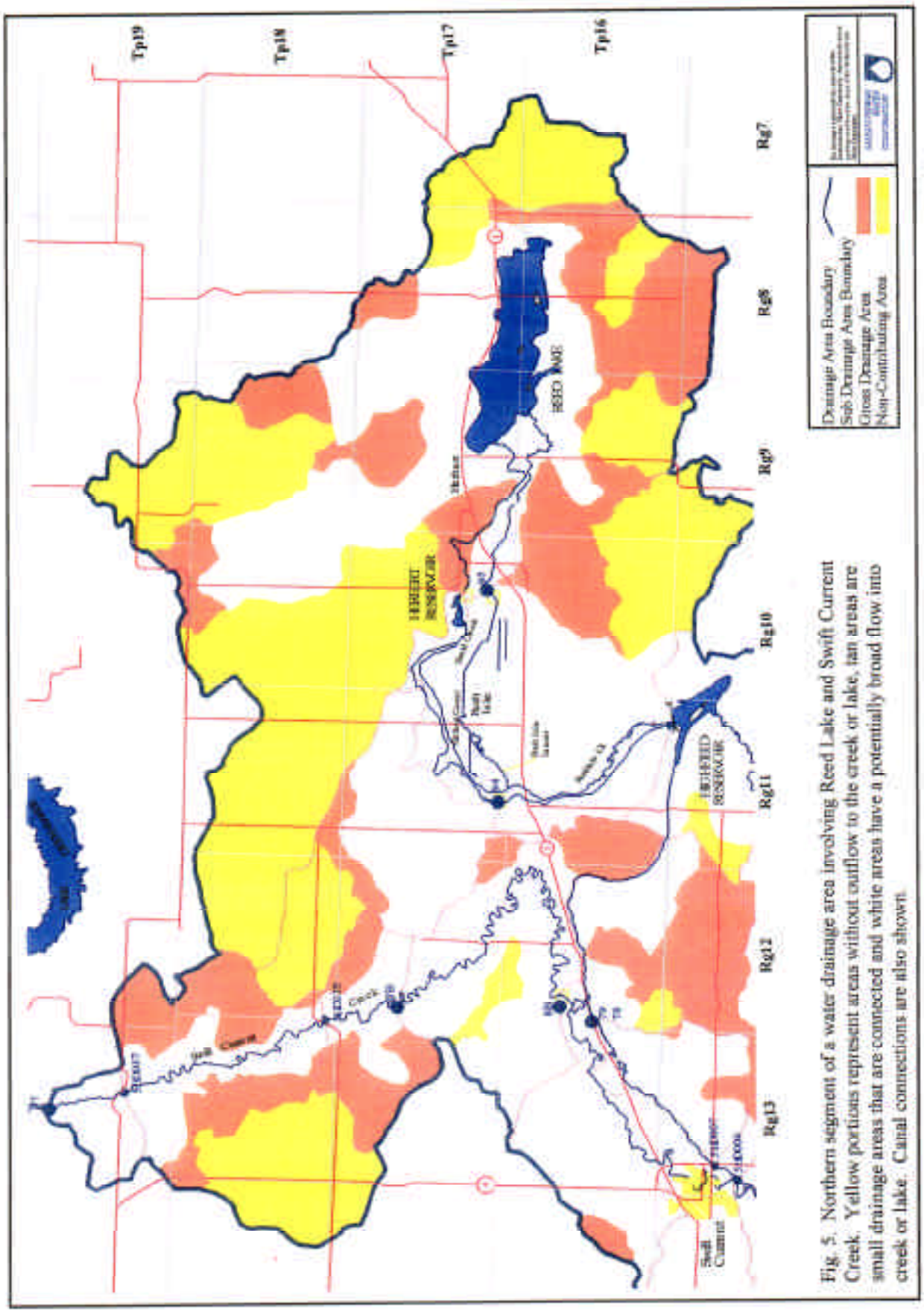



Fig. 5. Northern segment of a water drainage area involving Reed Lake and Swift Current Creek. Yellow portions represent areas without outflow to the creek or lake, tan areas are small drainage areas that are connected and white areas have a potentially broad flow into creek or lake. Canal connections are also shown.

supply of Rushlake Creek to provide water primarily for irrigation, stock watering, domestic, and municipal water supply. The canal originates at the Swift Current Reservoir on Swift Current Creek just south of the city of Swift Current.

Since this development in the 1940s, flows into Reed Lake from the Rushlake Creek/Highfield Reservoir system are either spring runoff flows which exceed the available storage capacity of Highfield Reservoir and other smaller reservoirs in the watershed and are not consumed by the "flood" portion of the Rush Lake Irrigation Project, or are return flows during the irrigation season from the Rush Lake Irrigation Project. Very rarely, a summer rainstorm or series of storms will result in flows on Rushlake Creek which are passed on into Reed Lake.

**1.3.12.3 Drinking water supplies**. In an ecosystem where precipitation is low, the water cycle's cleansing action is reduced, and natural and human-induced impurities are flushed slowly from the surface waters. Therefore, water quality for birds and people needs to be particularly carefully managed (Coote and Gregorich 2000).

There is concern over water supply in Gravelbourg, for example. Downstream from McCleod Creek, and approximately mid-flow within the watershed, lies Thomson Lake. The drainage area that feeds Thomson Lake includes cultivated land close to the shore, in an area with low-moderate erosion potential (Fig. 6). Local residents have reported at least one event when, during pesticide spraying, a strong wind caused dead fish to drift to the leeward shore. Thomson Lake is a favourite site for recreational fishing (Ray Lizée & Louis Stringer, pers. communication).

Thomson Lake also provides drinking water for the 1300 people in Gravelbourg and a few farm sites along the 11 km water pipeline. An aging water treatment facility was replaced in 1997 and the nearly $2 million dollars expended by Sask Water will be recovered through water charges from the community over 20 years.

The banks of the Wood River and creeks are sometimes used as refuse dumps. In many areas, cultivation and chemical use extends right to the margin of the river/creeks, which raised concern regarding chemical runoff.

In a presentation made at a conference in Regina on 17 May 2000, Hans Petersen reported that of the southern Saskatchewan drinking water sources examined, 95.6% failed health guidelines in one or more aspect (Canadian Broadcasting Corporation newscast, 18 May 2000).

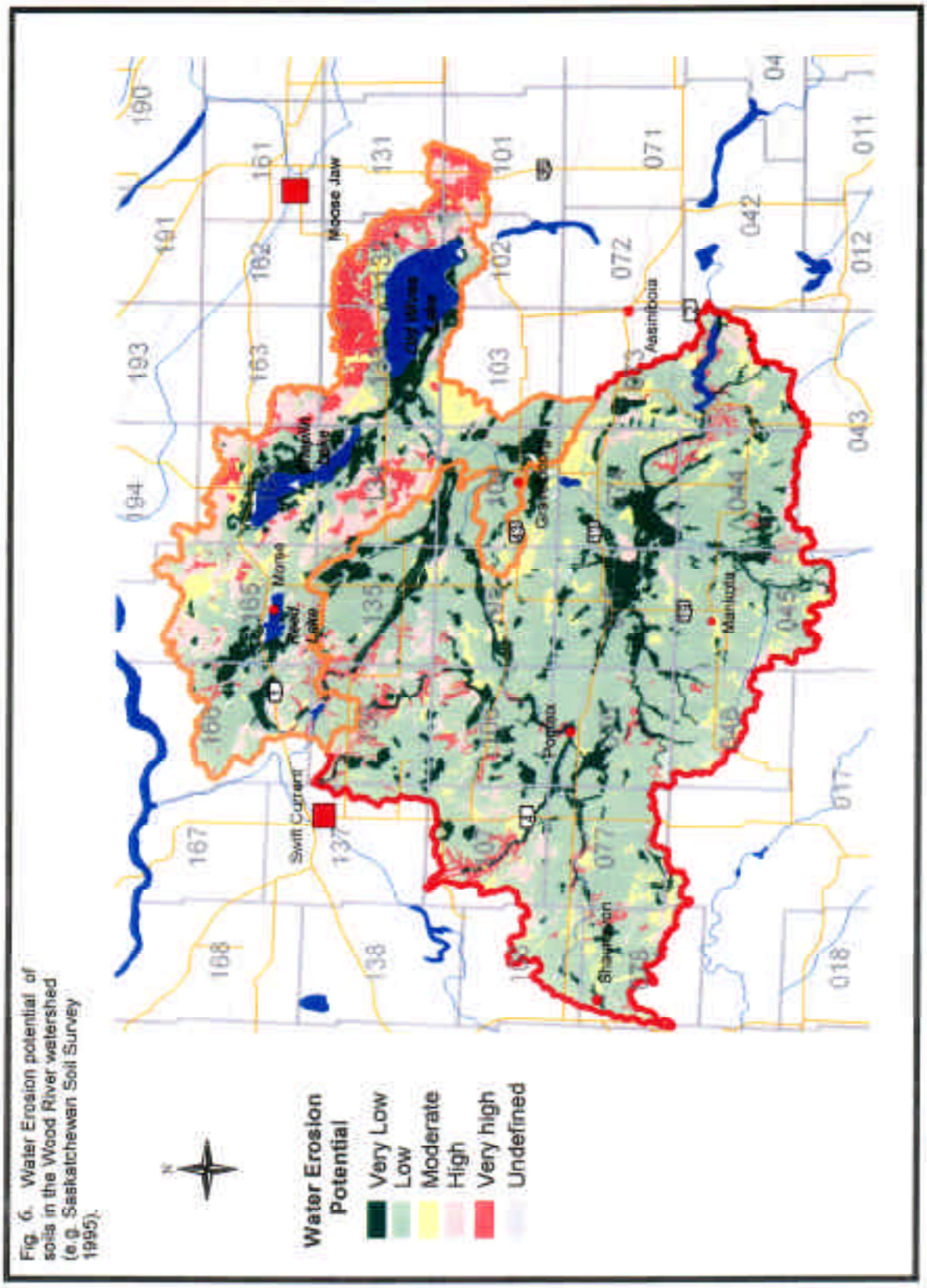



Fig. 6. Water Erosion potential of soils in the Wood River watershed (e.g. Saskatchewan Soil Survey 1995).

# 2. The IBA Program

The IBA program is an international initiative coordinated by BirdLife International (Appendix 2), a partnership of over 100 countries seeking to identify and conserve sites important to all bird species worldwide. Through the protection of birds and habitats, it also promotes the conservation of the world's biodiversity. There are currently IBA programs in Europe, Africa, the Middle East, Asia, and the Americas. The Canadian IBA program is part of the Americas IBA program which includes the United States, Mexico, and 17 countries in Central and South America.

The Canadian BirdLife co-partners are the Canadian Nature Federation and Bird Studies Canada (Appendix 2, http://www.ibacanada .com/html). Bird Studies Canada is primarily responsible for site identification and designation. The Canadian Nature Federation facilitates conservation planning and implementation, working with its provincial partners.

The goals of the Canadian IBA program are to:

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

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

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

## 2.1 IBA Saskatchewan

Nature Saskatchewan is working with the Canadian Nature Federation and Bird Studies Canada to deliver the conservation planning component of this program in Saskatchewan. IBA Saskatchewan was launched on 1 February 1999. During the first two years of this two-to-three year program, approximately 20 sites will be selected for conservation planning. Plans for 16-18 sites will be completed by March 2001. Josef K. Schmutz, who is internationally known for his research and conservation of prairie birds of prey, and who participated in a nationally sponsored interdisciplinary ecosystem and community-based research program, was contracted by Nature Saskatchewan as IBA Community Conservation Planner. In addition, Joe has been appointed as a Research Fellow and taken up residence in the Centre for Studies in Agriculture, Law and the Environment (CSALE), College of Agriculture, University of Saskatchewan.

# 3 IBA Site Information

Chaplin, Old Wives and Reed lakes lie in the roughly 16000-km2 Wood River drainage, north of 49o latitude and west of 105o longitude. The watershed is self-contained and internally drained. Annual precipitation averages 37 cm (Agricultural statistics 1997) with 58 cm annual evapotranspiration due to the semi-arid environment. This results in a water deficit equivalent of 21 cm (Fung et al. 1999). The Wood River watershed lies in the largest area of least precipitation on the Great Plains. This is apparently influenced by atmospheric circulation effects and accentuated by the periodic El Niño effects (Nemanishen 1998).

In the Wood River watershed, there are 35 towns still shown on a road map, most abandoned, reminiscent of a bustling local culture, economy and rich history. The largest centre is Gravelbourg with approximately 1300 inhabitants, Chaplin has 300 people, Morse 300 and Mossbank 400. The watershed harbors roughly 24,000 people, a density of 1 person per 75 ha, which is many times larger than the average of 1 person per 3 ha of habitable land on our planet.

The Wood River and its tributaries (McLeod, Notukeu, Pinto, and Wiwa creeks) join and feed into Old Wives Lake, and via Chaplin Creek into Chaplin

Lake. According to the natural drainage, the Wood River would first fill Old Wives Lake and the overflow would spill into Chaplin Lake. A water diversion structure (see 1.3.12.1) redirects some of the water to Chaplin Lake regardless of Old Wives Lake levels. The Wood River contains native suckers and introduced perch, pickerel and jackfish at densities that make fishing attractive.

The Wood River Watershed lies in the roughly triangular, mixed-grass ecoregion of the southern 68,000 km2 (11%) of Saskatchewan. The southern limit of the watershed lies close to the Montana border. This watershed sits atop the crest dividing the continental watersheds of the Arctic Ocean and the Gulf of Mexico, but participates in neither as it is self-contained without an outflow.

"Wood River"[1]
by Connie Kaldor
"Oh won't you come with me
Where the Wood River flows
We'll watch it meander slowly
As the sky turns from
Red to dark
And as that sun goes down
We'll throw our arms around
Each other and tell the dreams
That are deep in the heart.

Because the heart is bigger than trouble
And the heart is bigger than doubt
But the heart sometimes
Needs a little help
To figure that out.

So won't you come with me
Where the Wood River flows
The little Wood River knows
That it goes to nowhere but
That doesn't stop it going
Or them willows growing
Or all the lovers showing
Their hearts to each other there.

According to Padbury and Acton (1994),

"This ecoregion represents the driest area of the province as evidenced by the absence of native trees and scarcity of wetlands and permanent water bodies. Its diverse landscapes include level, glacial lake plains; dune-covered sandhill areas; the hilly, pothole country along the Missouri Coteau; and the rolling expanses of native grassland and intermittent "badlands" near the United Sates border. The native grasslands are characterized mainly by wheat grasses and spear grasses, and, to a lesser extent, by blue grama grass which gains prominence on extremely droughty soils or under high grazing pressure. Shrub communities composed of snowberry and wolf willow are found in areas of favorable soil moisture. Aspen, which is characteristic in and around moist depressions in the Moist Mixed Grassland ecoregion [to the North], is generally absent here except in valley bottoms and sandhill areas. Pronghorn antelope, white-tailed and mule deer, coyote, jack rabbit, Richardson's ground squirrel, horned lizard, prairie rattlesnake and western painted turtle are typical of the region. The only Canadian population of black-tailed prairie dog is found here. About half of the area is cultivated, with the remainder used for extensive grazing of livestock on native or introduced grasses. Cereals are the main crop on cultivated land, although feed grains, forages and oilseeds are also grown."

A bird list for the Chaplin Lake area includes 288 species. This local list includes essentially all shorebird species (33 species) which either nest or migrate through the prairies. This shorebird richness is likely due to diverse habitat that exists near Chaplin (mixed-grass uplands, saline lake and a recently constructed and managed freshwater marsh) and the importance of the site as a stopover for northern nesting migrants.

The undulating landscape is young geologically speaking. Water and gravity have not yet had enough time since the last big glacial landscaping process to carve a new outlet toward the sea. The flat and low-lying sloughs collect and hold runoff during most springs and early summers. These water bodies gradually dry out through the summer to make for moist mud flats. These moist flats support invertebrates above and below the surface

[1] Connie Kaldor states: "It has been a dream of mine for some time now to do an album of my prairie songs. Not only were many unrecorded but they are near and dear to my heart. The places and people that inspired them are part of my core. These are songs that people request time and time again."

"The Wood River is not a big river racing for the sea, it just comes out of the hills and ends up in Old Wives Lake. But it's a beautiful little river, winding its way across the prairies, and also of note as a local parking spot in the Gravelbourg area' (Connie Kaldor, No date, "Wood River: Home is where the heart is..." Word of Mouth Publishing).

and make for excellent feeding areas for 'pecking' and 'probing' shorebirds (Sect. 4). Once the flats have sufficiently dried, soil invertebrates resume their resting stage and wait for the rejuvenating stimulus of another moist cycle.

## 3.1 Chaplin Lake [2]

At Chaplin Lake (50o 24' N, 106o 49' W), the area of primary importance to shorebirds is the shallow water for feeding, and the shore for feeding and roosting (Fig. 7). Chaplin Lake reaches 2-3 m at its deepest point (Table 1), but most of the lake is much less than 1/2 m deep allowing for large areas where the "wading" shorebirds can reach bottom.

Water depth is managed by Sask Minerals in the west and east portions of Chaplin Lake. These have been separated by dikes for this purpose. Salinity is low (6 g/l) where freshwater enters the lake at the south end, and reaches 214 g/L in some of the reservoirs dammed to facilitate Glauber's salt extraction at the Chaplin Plant (see 6.2.2).

While in some lakes an increase in salinity could be a threat to the system and communities, at Chaplin lake the reverse may be true. Given the special nature of salinity at Chaplin Lake, it may be useful to try and understand how the system came to be so saline.

It is noteworthy that the west portion of the lake is twice as saline as the east portion, and both are many times more saline than the south portion (Table 1). Thus, salinity appears to have a point source, and where the water at this source is contained by dikes, salinity rises dramatically. Gordon Hallborg (pers. comm.) pointed out that unlike some other saline lakes, the salt source at Chaplin is close to the soil surface. It lies between layers of soil close enough to the surface that water can percolate through soil to reach the salt, then dissolve the salt and thus bring it up into standing water.

A plausible explanation for the salt water existence of Chaplin Lake is advanced here. In a N to SE and to S axis (Fig. 8), Chaplin Lake lies in a trough between the Wood Mountain uplands to the south, and the Vermilion Hills to the north. Judging from the salt deposits being so close to the earth surface, it is possible that the salt was drawn up from a salty ground water reservoir below (Fig. 9). As the water from this reservoir continually evaporates near the surface, the salt is left behind. It is generally recognized that the deeper layers of ground water tend to collect more salt because there is more earth for the water to percolate through. The reservoir that is close to the surface at Chaplin Lake may be large and have accumulated its salt from the deep soil layers of the Wood Mountain or Vermilion Hills.

[2] In 1861, Henry Chaplin, a youthful Englishman of ways and means, organized a big game hunt to the western prairies. Although this brief summer adventure is hardly remembered now, Henry Chaplin left his name behind to be perpetuated in a lake and a community of our area (Knight 1970).

Table 1. Physical and chemical characteristics of Chaplin, Old Wives and Reed lakes in the Wood River watershed of southern Saskatchewan. Area of lakes is based on aerial photographs taken in July-Aug. 1970 (Hammer and Haynes 1978). Water samples at Chaplin Lake were taken west of Hwy. 58 (West: 106o 42' x 50o 26'), and east of Hwy. 58 at north (East: 106o 37' x 50o 26') and south ends (South: 106o 36' x 50o 23').

| Lakes | Area ($km^2$) | Maximum depth (m) | Shoreline (km) D/M/Yr total | developed | Salinity[a] sampled | g/L |
|---|---|---|---|---|---|---|
| Chaplin | | | | | | |
| East | 14 | <1 | 25 | 2 | 8/06/71 | 105 |
| South | 27 | 2 | 40 | 2 | 8/06/71 | 6 |
| West | 19 | <1 | 28 | 2 | 16/07/71 | 214 |
| Total | 60 | | 93 | 6 | | |
| Old Wives | 296 | 1 | 90 | 2 | 28/08/71 | 4 |
| Reed | 2b | ? | 6 | 1 | 27/08/75 | 4 |

[a] For comparison, sea water has a salinity of 35 g/l and water is considered 'fresh' with 0.5 g/l or less.
[b] All three lakes can vary substantially in surface area of water, depending on yearly precipitation. For example, Reed Lake when full has a surface area of 37 $km^2$.

Given the use of the lake mainly by shorebirds, the pertinent land ownership from the point of view of direct impact involves the Crown and private landowners. The lake per se up to the high water mark is Crown land. At Chaplin Lake, some of the land and the lake's water is leased to Sask Minerals (Sect. 6.3.3). Beyond the high water mark, lands are administered either by the Pastures Program of Saskatchewan Agriculture and Food, or by the Prairie Farm Rehabilitation Administration (Sect 1.3.11).

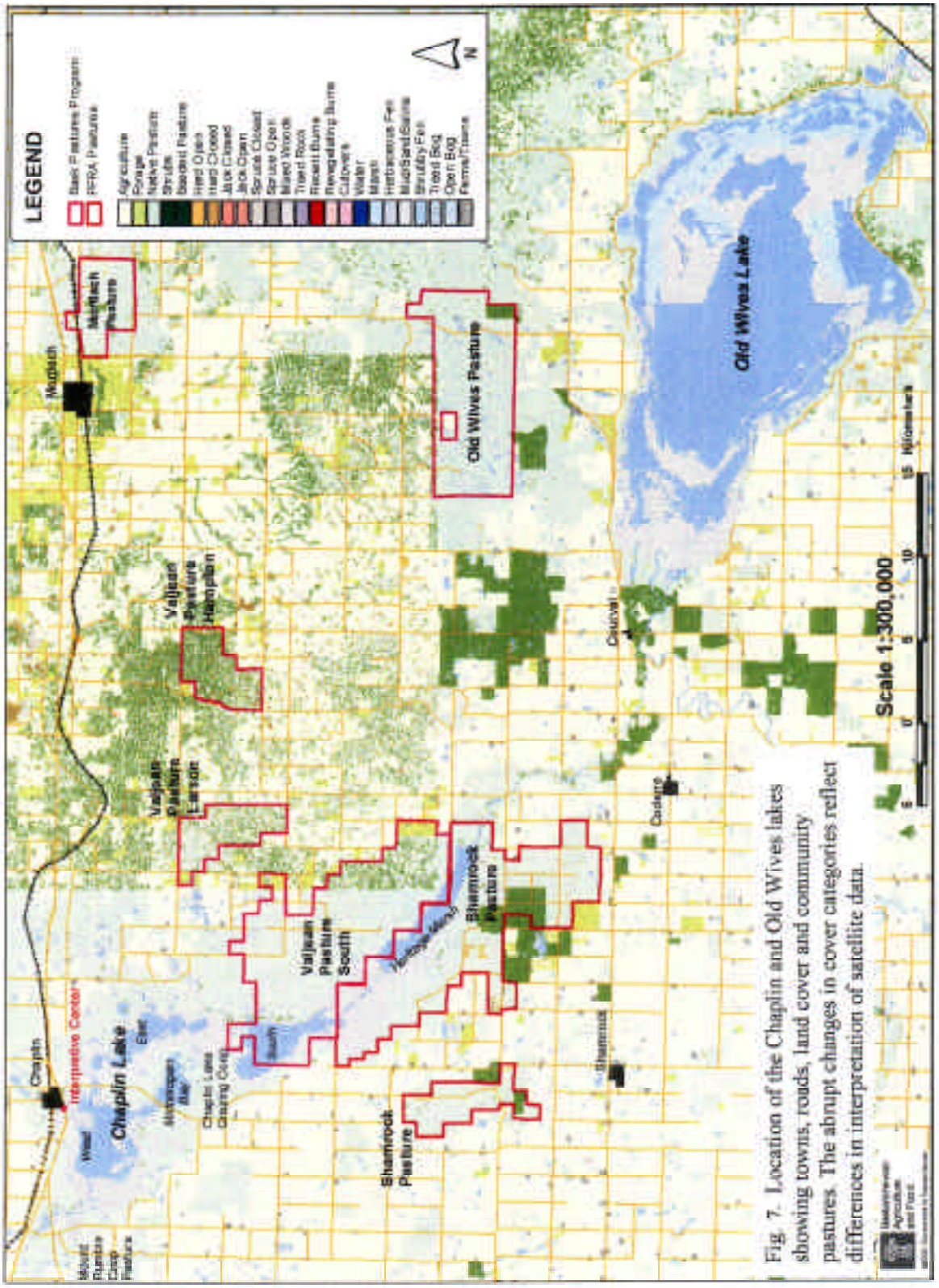



Fig. 7. Location of the Chaplin and Old Wives lakes showing towns, roads, land cover and community pastures. The abrupt changes in cover categories reflect differences in interpretation of satellite data.

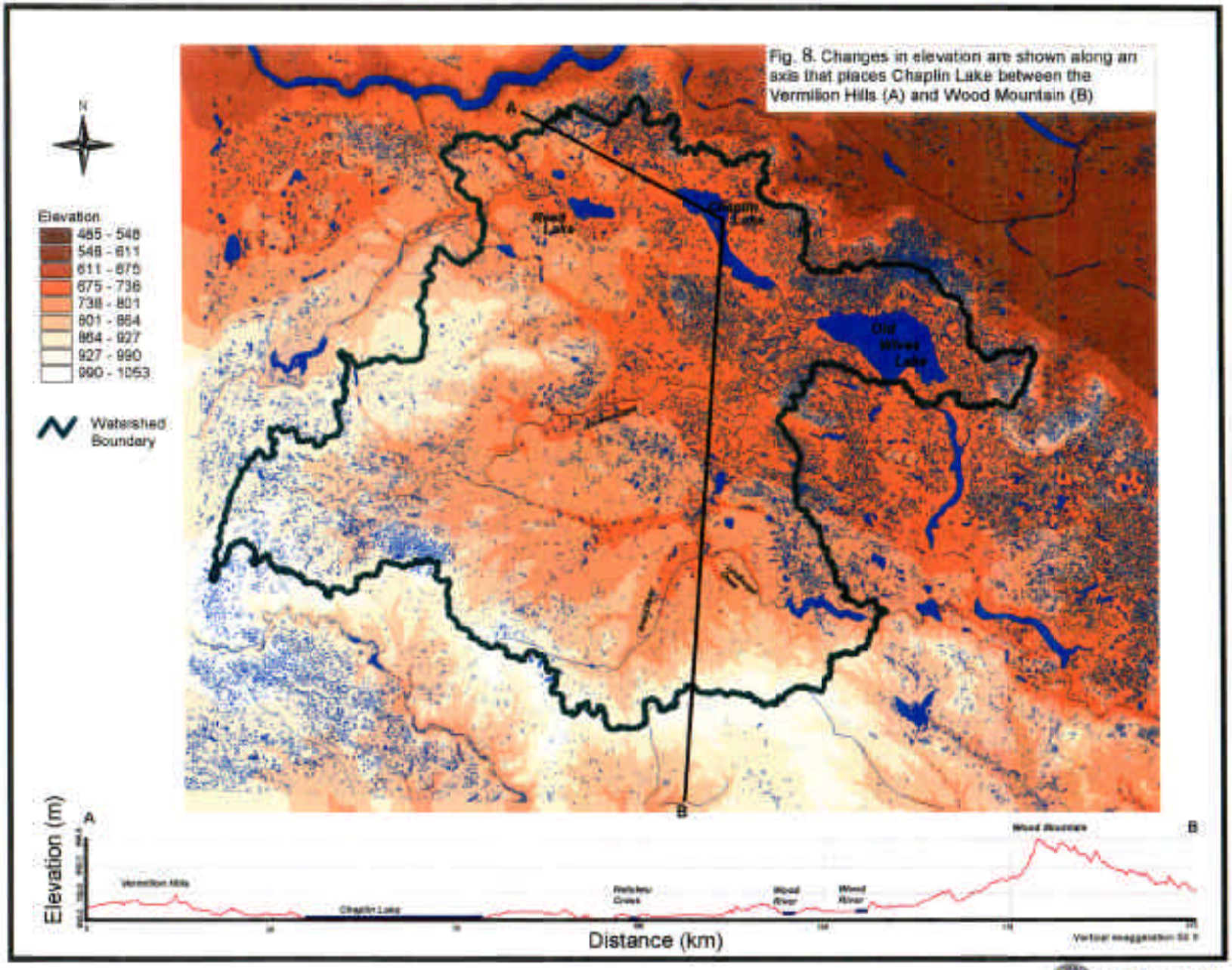



Fig. 8. Changes in elevation are shown along an axis that places Chaplin Lake between the Vermilion Hills (A) and Wood Mountain (B)

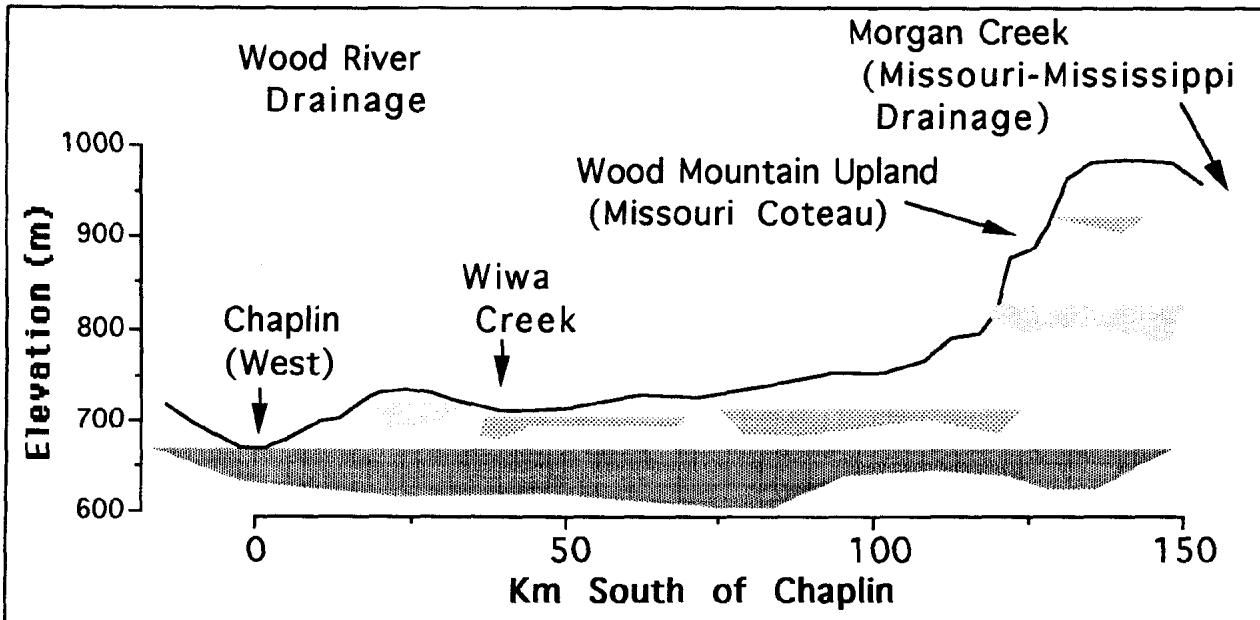
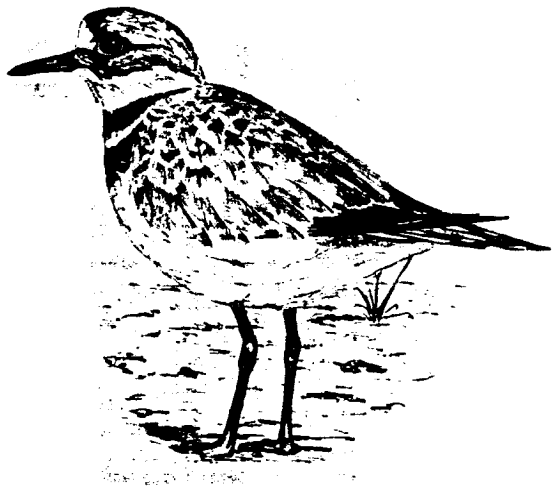



Fig. 9. A possible scenario for the salt water existence of Chaplin Lake, Saskatchewan. See text for explanation.



## 3.2 Old Wives Lake

The lands surrounding Old Wives Lake (50o 6' N, 105o 57' W; Fig. 7)[3] also constitute a mix of private and Crown lands held under a grazing lease, particularly northward. Private land is used for crop production, south- and northward. The west portion of the lake consists of a gently sloping flat where a small drop in water level exposes large areas of mud. The upland portions of these flats that are flooded for the shortest time are Crown land used for grazing and hay production. There is one partially treed island in the Lake, Isle of Bays (see picture collage).

Studies by Robert Nero (e.g. Nero et al. 1958) and Fred Lahrman, from what was then the Saskatchewan Museum of Natural History, started in 1957 and may have been the first formal surveys at Old Wives Lake (Table 2).

Hanson and Smith (2000) compared data on Great Blue Heron colonies over time, including an Old Wives Lake colony. They compared nest counts made in a survey by Vermeer and Anweiler in 1970 to colony monitoring in 1999 obtained in oral or written form from knowledgeable birders. Given some assumptions in methodology, a conclusion was that colonies were largely in the same areas nearly 30 years later, with a tendency for more colonies in the central as compared the southern part of the province. When considering colony size, they found a decline from 27 nests per colony in 1970 to 11 nests in 1999. Regionally, the authors found that Prairie -wide Great Blue Herons had declined in number of nests, while Canada-wide surveys recorded a slight increase. The Isle of Bays colony in Old Wives Lake was included in their analysis. This colony was first reported in 1913 and is apparently faring well, with an increase from 5 nests in 1970 to 22 nests in 1999.

Table 2. Notes taken by George Fairfield during a field trip accompanying Bob Nero to Isle of Bays in Old Wives Lake, on 6 June 1957.

| Birds | Nests | Species |
|---|---|---|
| Viewed from shore | | |
| | 160 | Western Grebe |
| | 10 | Black-cr. Night-Heron |
| | 1 | Forster's Tern |
| On island | | |
| | ? | Western Grebe1 |
| | ~1000 | Am. White Pelican |
| | ~350 | Double-cr. Cormorant |
| | 10 | Canada Geese |
| ~1000 | | Mallard & Canvasback |
| | 7 | Mallard |
| | 6 | Pintail |
| | 1 | Redhead |
| | 3 | Great Blue Heron[1] |
| | 2 | California Gull |
| | ~2000 | Ring-billed Gull |
| | ~650 | Common Tern |
| Flocks on/near island | | |
| | 4 | Ruddy Turnstones |
| | 40 | Sanderling |
| | 13 | Red Knot |
| | ~100 | Red-winged Blackbirds |

[1]Both were nesting on the ground which is unusual for these species.

[3] It is said that those who venture near Old Wives Lake on a windy night will hear the wailing spirits of the Indian women who were massacred there many years before the coming of the white man. Around 1840, a great prairie fire swept across the plains and drove the buffalo herds into the hills of the Missouri Coteau. The Cree Indians, unable to find buffalo in their own hunting territory along the Qu'Appelle valley, were forced to travel over the blackened prairies to the hills southwest of Moose Jaw. But once west of the Moose Jaw river, they were in the hunting territory of the enemy Blackfeet.

The Cree hunting party included a number of women; it was the custom of the Indian hunters to leave the skinning of the carcasses and preparation of the meat to women.

The fire had burned itself out on the gravel ridges of the hills, and the Cree encountered the herds in the grazing country beyond. Soon they had all the meat they needed, and they prepared for the slower homeward journey to the Qu'Appelle valley. Suddenly, a solitary horseman, plumed and painted for war, appeared, and the Cree knew the Blackfoot scout signal led the approach of a war party.

Early that evening, a cavalcade of wild horsemen charged the Cree. The Blackfeet threw themselves down on the far sides of their horses, encircled the Cree at a galloping speed and fired from under the necks of their ponies. The Cree fought them off, and soon the Blackfeet disappeared among the hills.

The Cree caravan halted, and held a council of war. The Blackfeet would be back at daybreak and the Cree encumbered by meat supplies and women knew they were no match for the swift travailing Blackfeet war party. Then an elderly woman came forward with a plan. The Cree were to make camps, and draw the carts together as if preparing for battle. The old squaws who were past child bearing and no longer useful to the tribes would remain in camp and keep the fires burning and the tom-toms beating while the men and young woman slipped away in the darkness.

The plan was carried out, and when the Blackfeet warriors struck at daybreak, they found only the old wives. They were so enraged by their trickery and the loss of anticipated loot, that the old wives were tortured and butchered on the spot. From that day on, the spirits of these old women are said to live on the island in Old Wives Lake, and their mocking laughter, meant for Blackfoot ears, is carried on the winds (Knight 1970).

## 3.3 Reed Lake

Most of the lands surrounding Reed Lake (50o 37' N, 107o 5' W; Fig. 10) are privately owned, leased (west end) or administered by the Rural Municipality of Morse (southeast end). Reed Lake receives its water from the surrounding landscape, and from Rushlake Creek flowing from the west (Sect. 1.3.11.2). There are two small, shallow islends in the lake which are used by birds for nesting and roosting (see picture collage).

The Trans-Canada Highway is located immediately north of Reed lake. Two towns, Morse and Herbert, are located near this lake (Fig. 1). A narrow road bisects Reed Lake near its western end, which provides a great opportunity for viewing (see picture collage).

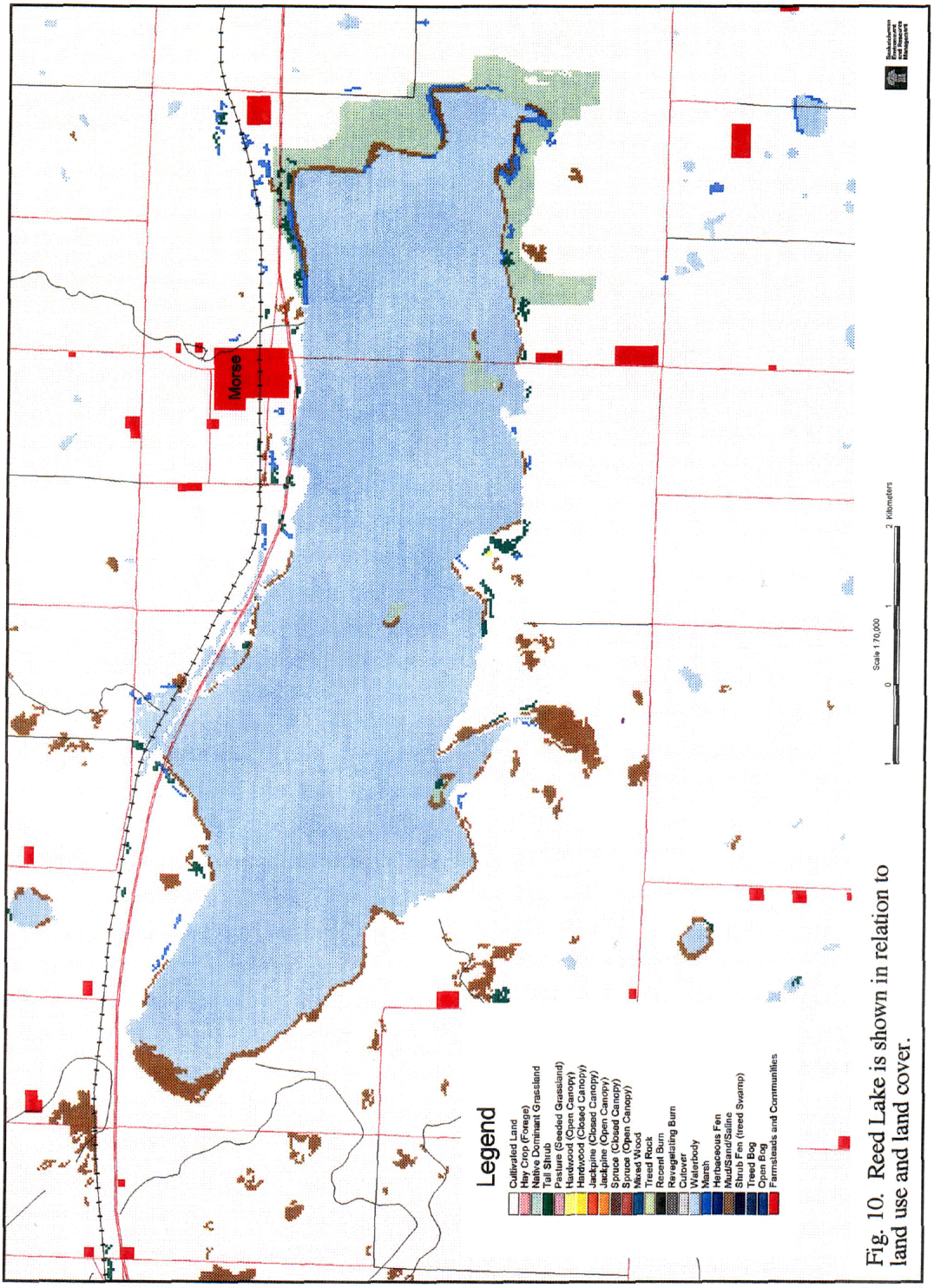



Fig. 10. Reed Lake is shown in relation to land use and land cover.

## 3.4 The birds' food chain

The bird's food sources in Chaplin, Old Wives and Reed lakes are a major attraction. The brine shrimp *Artemia salina* is particularly important.

The majority of the following discussion is based on Hammer (1986). Various observers have pointed toward the brine shrimp as the reason why so many shorebirds stop or reside at Chaplin Lake. This shrimp is a saline lake specialist *par excellence.* It occurs in saline aquatic systems on all continents except Australia and Antarctica. However, Australian wetlands are not devoid of this delicacy, because a closely related genus (*Parartemia* with seven species) fills this same ecological way of life down under.

Brine shrimp and their 26,000 crustacean relatives are invertebrates, animals without backbones that float in the water column (plankton). Commonly known crustacean include crayfish, lobster, shrimp and crabs. Brine shrimp belong to a super group of taxonomically related animals with an estimated 2 million species. More than 80% of all animal species on earth belong to this supergroup. These animals, known as arthropods, have jointed appendages as do the insect members of this arthropod group. The brine shrimp and some notable relatives such as water fleas (*Daphnia*) are very common and hence highly important in the economy of ecosystems. Their small size, up to 1 cm, is no reflection of their ecological importance, which is largely due to their sheer numbers. Females can reach reproductive maturity in 3 weeks and lay over 100 eggs under good conditions. Thus, the turn over from hatching to laying and again to hatching of the next generation is short and several generations can be produced in spring through summer and early fall.

Brine shrimp are aquatic grazers that feed on algae. They have a simple gut for digestion and are most remarkably adapted for their existence in highly saline and warm waters. These shrimp exist in water as wide-ranging in salinity content as from a 10% dilution of sea water to salt water so saturated that salts began to crystallize. However, this existence is not without a precarious edge. Some workers suggested that sodium in high concentrations is not toxic to the brine shrimp except when certain other ions are also present in the ecosystem. For example, in Patience Lake near Saskatoon, where brine shrimp were expected according to local conditions, they were not present. This absence was attributed to the presence of a high proportion of potassium ions compared to sodium. Depending on the types of chemical constituents in water, algal production may be reduced and this could impact brine shrimp production (Dave Gleim, pers. comm.). Thus, in order for Chaplin Lake to continue to serve as a home to so many shorebirds, its chemical and ecological integrity needs to remain intact (Sect 9).

Another environmental factor that impacts brine shrimp is temperature. Their usual response to extremes such a cold or drought is to produce thick-shelled eggs - resting stages while waiting for better times. These eggs are highly resilient and can lay dormant for several seasons, and can be transported by wind or other animals. A tolerance of high water temperatures by the shrimp is fortunate for shorebirds. In waters shallow enough for shorebirds to wade in, water volume tends to be low and surface area high, permitting remarkably rapid fluctuations in temperatures. Bacterial production can be high in warm weather and this favors shrimp and therefore the birds.

A further specialization by brine shrimp to life in saltwater ecosystems is the production of hemoglobin. While most invertebrates employ hemocyanin for oxygen transport in the body, brine shrimp specifically produce the more efficient hemoglobin as an oxygen carrier, as do vertebrates. Under highly saline conditions, the oxygen content of water is decreased preventing many other invertebrates from existing there and giving the shrimp a distinct advantage.

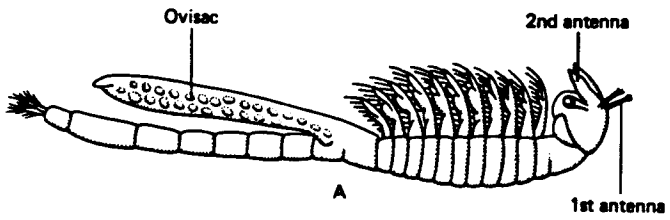
Brine shrimp production is high in spring, benefiting from an oxygen peak derived through the winter's snow and freshwater input into the lake. In some Saskatchewan lakes, shrimp densities peaked in May at 1,361 individuals per litre, in Muskiki Lake in June at 201 individuals, and in Chaplin Lake East in June at 121 individuals. The timing of these peaks coincide with peaks in shorebird migration.

In some studies, brine shrimp showed food preferences. In one study, 10 different genera of bacteria served as food for shrimp and some of these genera were preferred. Two genera were either toxic or contained insufficient energy for shrimp to survive on. At Chaplin Lake, brine shrimp appear

to be undiscriminating. They feed on any organism small enough to be filtered out of the water (Dave Gleim pers. comm.)

Brine shrimp have enemies other than shorebirds. Members of a related group, the copepods, have a predacious freshwater form and its presence apparently precludes brine shrimp. In addition, fish favor brine shrimp as food, but neither the predacious copepods nor fish can tolerate the highly saline conditions, an ecological refuge which the brine shrimp readily calls 'home.'

The interactions outlined above are a simplified sketch of the intricate connections in this saltwater-shrimp-shorebird system, which by most standards can be considered simple. The purpose of the discussion is to point out that even this seemingly robust system has weaknesses. The known vulnerabilities in this system need to be considered as Chaplin Lake experiences future management from a multiple use perspective. Perhaps the unknown vulnerabilities are most serious, and to contend with these a management approach should be conservative with minimum meddling, given the enormous importance of the lake to so many shorebirds each year.



# 4 IBA species information

Of two dozen species of birds that are prominent at Chaplin, Old Wives or Reed lakes, seven species qualify under one or more of the IBA categories, and five of these species are shorebirds (Table 3, see Appendix 3).

The data reported above are based on a series of single day counts, which must be considered a "narrow window" into the importance of these three lakes for shorebirds. For instance, peak counts of Stilt Sandpipers on these lakes during 1994 spring migration totaled a minimum of 11,000 birds. The total North American Stilt Sandpiper population is estimated at 200,000 birds. Given the counts on these three lakes during spring migration, a minimum estimate of 5.5% of the population used the site (Gerry Beyersbergen pers. comm.).

For shorebirds that are still reasonably common and satisfy the IBA criteria, population information for Prairie Canada is as follows. Sanderlings appear to be stable but some surveys indicate a decline in recent years. Baird's and Semipalmated Sandpipers also appear to be stable but this needs to be re-evaluated as more information becomes available (Morrison et al. 1994). Wayne Harris felt that the shorebirds have increased in number in the area, since he started surveys in the 1970s.

Shorebirds make the greatest use of the three lakes during spring migration in May and June. In autumn, there is some use by migrating Arctic nesting shorebirds, but the greatest use at this time is by prairie-nesting shorebirds. Breeders and non-breeders, such as Wilson's Phalaropes at Chaplin Lake, are specially common in the region after fledging, (Table 3; Beyersbergen and Duncan 1997).

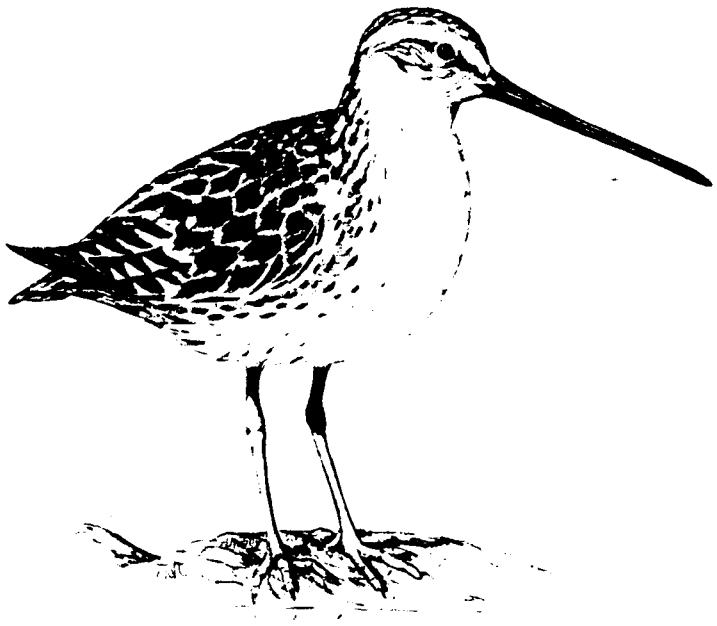


Table 3. Prominent species, the season of main use and species importance ranks at the global (Glob.) national (Nat.), regional (Reg.) or local (Loc.) levels. Species ranked as globally or nationally important satisfy the IBA criteria, as do those threatened by extinction. Numbers of birds are based on counts taken over one or more years in the 1980s and 1990s. Data were taken from the Canadian IBA Database derived largely from surveys conducted in 1993 and 1994 by the Canadian Wildlife Service and the Saskatchewan Wetland Conservation Corporation (e.g. Beyersbergen and Duncan 1995.).

| | Chaplin Lake | | | Old Wives Lake | | | Reed Lake | | |
|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Numbers** | **Use** | **Impor-tance** | **Numbers** | **Use** | **Impor-tance** | **Numbers** | **Use** | **Impor-tance** |
| **Globally significant** | | | | | | | | | |
| Tundra Swan | | | | 1,010 | Autumn | | 5000 | Autumn | Glob. |
| Canvasback | | | | 63,000 | Moult | Glob. | | | |
| Ducks | | | | 34,292 | Moult | Glob. | 6,381 | Moult | |
| Stilt Sandpiper | <11,000 | Spring | Glob. | <11,000 | Spring | Glob. | | | |
| Sanderling | | <55,471[a] | Spring | Glob. | <55,471[a] | Spring | Glob. | | |
| Baird's Sandpiper | <29,862[a] | Spring | Glob. | <29,862[a] | Spring | Glob. | | | |
| Semip. Sandpiper | <29,600[a] | Spring | Glob. | <29,600[a] | Spring | Glob. | | | |
| Piping Plover[b] | 205 | Breed. | Glob. | 42 | Breed. | Nat. | 2 | Summer | |
| Shorebirds | | 62,753 | Spring | Glob. | 44,951 | Spring | Glob. | 11,327 | |
| Spring | Nat. | | | | | | | | |
| Franklin's Gull | | | | 3,000 | Breed. | Reg. | 30,000 | NonBr | Glob. |
| **Nationally significant** | | | | | | | | | |
| Am. White Pelican | | | | 1,933 nests | Breed. | Nat. | 200c | nests | Reg. |
| Snowy Plover | 2 pairs | Breed. | | 1 nest | Breed. | | | | |
| Am. Avocet | 2,685 | Autumn | Nat. | | | | | | |
| **"Threatened"** | | | | | | | | | |
| Burrowing Owl | 1 pair | Breed. | Threat. | | | | | | |
| **Regionally significant** | | | | | | | | | |
| Clark's Grebe | | | | | | | 20c | adults | |
| Great Bl. Heron | | | | 5 pairs | Breed. | Reg. | | | |
| Ring-billed Gull | | | | numerous | Breed. | Reg. | | | |
| Locally significant | | | | | | | | | |
| Western Grebe | | | | 25 nests | Breed. | Loc. | 500[c] | adults | Loc. |
| Black-cr. Night Heron | | | | ≤20 nests | Breed. | Loc. | | | |
| **Other prominent birds** | | | | | | | | | |
| Double-cr. Cormorant | | | | 336 nests | Breed. | | 200[c] | Breed. | |
| Snow Goose | | | | | | | 5,000 | Autumn | |
| Northern Shoveler | | | | | | | 1,100 | Moult | |
| Redhead | | | | | | | 500 | Moult | |
| Red-necked Phalarope | 7,755 | Spring | | | | | | | |
| Wilson's Phal. | 7,100 | NonBr. | | | | | | | |
| California Gull | | | | sever. doz. | Breed. | | | | |
| Common Tern | | | | 140 nests | Breed. | | 100[c] | pairs | |
| Caspian Tern | | | | | | | 4[c] | nests | |
| Gulls/terns | | | | >5,000 | NonBr | | | | |

[a]Numbers reported were for Chaplin and Old Wives lakes combined.
[b]The Piping Plover is also "endangered."
[c]Data provided by Wayne Harris, see also Smith (1999).

## 4.1 Natural history of IBA species

Information sources strongly suggest that Chaplin and Old Wives lakes, and to some extent also Reed Lake, are requisite sites for shorebird migration and reproduction. This is the case even though migrants reside there only briefly. If these sites were taken away or made unsuitable in some way, the impact, by all accounts, would be disastrous for shorebirds.

The review of the natural history of the Semipalmated Sandpiper presented here highlights observations and conclusions made by others to illustrate conservation urgency. The same need also exists for other migrating shorebirds. Semipalmated Sandpipers serve as an example and the same point is not repeated for the other species.

**4.1.1 Semipalmated Sandpiper.** The Semipalmated Sandpiper is small in size, its body fitting easily in a child's hand, but it is large in stature as a migrant. On its upper surface, Semipalmated Sandpipers are gray or light buffy brown with under parts nearly white, with sparse streaks on upper breast. Juveniles have a more obvious white streak over the eye. Semipalmated Sandpipers have black legs and received their name for the incomplete web between their toes. The biology of this species has been summarized by Cheri L. Gratto-Trevor (1992); unless otherwise indicated, this publication will be the source for this review.

Semipalmated Sandpipers breed in the Arctic from Alaska across Canada, and winter along the coasts of Central and South America. Those breeding in the eastern Arctic tend to migrate along the coasts, and many fly a spectacular 3,000-4,000 km non-stop journey from the Bay of Fundy or East Coast sites further north to reach northern South America. Individuals breeding in the central and western Canadian Arctic tend to migrate through the North American interior in spring, but more follow the sea route in autumn. Gratto-Trevor and Dickson (1994) have confirmed this elliptical 'interior-Spring-Atlantic-Autumn' migration using marked individuals. Semipalmated Sandpipers use stars to navigate on migration, combined with the earth's magnetic cues.

In the Wood River watershed, Semipalmated Sandpipers can be expected from late April to June, and again from mid-July to October (Table 4). The breeding activity in Canada's North is much compressed and the sandpipers return south as soon as possible. On their northward migration, males precede females by a few days. Moving southward, females precede males, and adults precede young. Migration is actually much more compressed in time than these data suggest. The largest number of northward migrants at the three lakes in different years were from 1,000-30,000 individuals on 17, 24 and 26 May.

The small and therefore metabolically highly active Semipalmated Sandpipers seem to 'walk an energetic tightrope' on migration and during breeding. For this reason, it is recognized that human encroachment on inland shores and ocean feeding areas is one of the major threats. Because of the large concentrations of birds involved, a very localized influence could have a tremendous negative impact on the population. At each of the 'staging sites,' Semipalmated Sandpipers feed as much as they can with 85 feeding probes per min. Once adequate energy is restored, they depart again, but only during weather favorable for migration. Thus, the bird's stay can be prolonged in inclement weather.

In general, the food types most often recorded include invertebrates that live on or in the soft mud. Thus, the two main feeding strategies are pecking at prey in view, and probing into the mud to 'feel' for food. Visual pecking is particularly common in a receding tide, where animals are left behind and exposed. At Chaplin Lake, Artemia are likely captured by pecking in the shallow water column. In a study of Semipalmated Sandpipers collected at Quill Lakes, Saskatchewan (Alexander et al. 1996), the food found in the esophagus or gizzard of 18 Semipalmated Sandpipers included seeds (15 individuals), fly larvae (18), water beetle larvae (6) and water fleas (1). Based on a review of many studies, the size of invertebrates taken was most often between 2-5 mm, but some were considerably larger. Feeding does not involve swimming or diving. However, newly fledged chicks swim readily and adults too can do so when necessary. This feeding habit requires a narrow range of water depths where Semipalmated Sandpipers can feed.

Although Semipalmated Sandpipers congregate in large numbers on migration and in winter, they are solitary breeders. Males defend territories 1 ha in size immediately upon arrival on the

breeding grounds in late May or June. Often, but not always, these territories are reclaimed in later years.

Another illustration of the 'Semipals' energetic tightrope is egg laying. Females lay their single 4-egg clutch per year within 4-6 days after arrival. They acquire some of the energy for those eggs on migration, but also must obtain a fair portion after arrival. If food is scarce in the breeding area, breeding may be delayed up to two weeks and some females do not breed at all, presumably because they could not obtain sufficient energy.

Male and female Semipalmated Sandpipers incubate equally. Females (91% of pairs in one study) desert the brood and the male between 0-11 days after hatching. This behavior is presumably related to high combined energy demand on migration and for breeding. The desertion gives the female a chance to move to and switch between the best feeding areas available locally, so as to allow her to restore energy quickly to migrate southward again, this time preceding males. Males, and females when present, do not feed the young but guard, guide and brood them. The young feed on their own on small flies and fly larvae. Once the young are large enough to join feeding flocks, males depart southward well in advance of their young. Few if any young breed in their first year, and they remain in South or Central America during the first austral winter of their life.

Breeding densities are low in this species, ranging from 0.1-1.0 pairs/ha. Aerial surveys in South America yielded a total population estimate of adults and juveniles of 2 million birds. An analysis of population trends using data from the international shorebird survey between 1979-91 suggested that populations were stable during that time.

In the late 1800s, Semipalmated Sandpipers were harvested for food and considered good to eat. Numbers of birds apparently declined as a result and began to recover in response to protection through the Migratory Birds Convention Act in 1917. Current threats arise from developments reducing habitat in coastal areas and inland shores. Environmental contaminants also can pose a problem.

**4.1.2 Stilt Sandpiper.** The Stilt Sandpiper (*Calidris himantopus*) is a medium size sandpiper whose slender body, longish (greenish) legs and bill, white rump, and chestnut ear patch distinguish it from other medium or small sandpipers (Godfrey 1986).

'Stilts' winter in central South America, many in Argentina. Some also remain in Central America. They nest on the northern coats of Alaska and Canada eastward to the western coast of Hudson Bay. Stilts migrate both in spring and fall in a narrow band along the eastern edge of the Great Plains (Table 4). Most flocks contain less than 100 individuals but some flocks over 10,000 (Skagen et al. 1999).

Stilt Sandpipers obtain their invertebrate food by collecting it off the shore or water, and by probing in soft mud. They are most commonly seen on those parts of the shore that include wet soil devoid of vegetation to water up to 8 cm deep (Skagen et al. 1999).

**4.1.3 Sanderling.** The Sanderling makes the world seem small. It breeds in the Arctic and high Arctic of North America, Greenland, Europe and Asia, and winters on all three continents of the southern Hemisphere except Antarctica. Sanderlings winter along the Atlantic and Pacific coast of North, Central and South America, from southern BC and Maine on southward (Richards 1988). They seem to be most common on the Pacific coasts in South America in winter (Smith 1996).

The Sanderling is a bit larger than the sparrow-sized Semipalmated Sandpiper and distinctly more chunky in appearance. The short and stout black bill and the black legs are distinct against the pure white under parts of the Sanderling. The rusty head, mantle and breast in breeding plumage facilitates identification in spring. On its upper side, the Sanderling shows a mix of gray and brown, but is rather paler in winter. Sanderlings fly fast and erratic, showing a conspicuous white bar on the wing.

The feeding pattern of the Sanderling is similar to the Semipalmated Sandpiper in that it pecks and probes. The Sanderling's food is also similar, comprised of adult and larval flies, small beetles and burrowing amphipods. Sanderlings lay their four greenish-olive eggs in a scrape near the shores of Arctic lakes, where they take four weeks to hatch. Females often lay and incubate a second clutch while the first is incubated by the male. In these cases, the broods are reared separately. After 2.5 weeks the young can fly and become independent

of their parents. As with Semipalmated Sandpipers, adults leave their breeding grounds as early as mid-July with young following later.

Sanderlings are common migrants in Saskatchewan and can be seen here somewhat longer than other shorebirds. Roy (1996) has observed Sanderlings at various sites from early May to early June, with peaks in late may/early June. Return flights occur between mid-July and mid-October. Groups of up to 50 Sanderlings have been observed in mid-summer for several years in a row at Last Mountain and Luck lakes (Roy 1996).

According to Roy (1996), Sanderlings are most common along the sandy shores of lakes and sandbars of rivers. In the mixed-grass ecoregion this often includes Lake Diefenbaker, the South Saskatchewan River and many saline lakes in the region. Sanderlings appear less frequently on mud flats, and "rarely, if ever, on sloughs unless they have broad, near-dry margins."

On the expansive mud flats of Chaplin and Old Wives lakes, and the attractive brine shrimp ponds of Chaplin, Sanderlings have been seen in large numbers (Table 3). Averages of the 1987, 1993 and 1994, of three surveys carried out by the Canadian Wildlife Service and the Saskatchewan Wetland Conservation Corporation at Chaplin Lake yielded 62,753 Sanderlings per day. These numbers represent nearly one half of the estimated wintering population at the Pacific Coast of South America (Morrison and Ross 1989). Stuart Alexander and Dave Duncan (pers. comm.) examined crop contents of Sanderlings at Chaplin and Old Wives lakes and found that nine birds had eaten mainly brine shrimp and seven mainly shorefly larvae.

**4.1.4 Baird's Sandpiper.** Baird's Sandpiper is slightly larger than a Semipalmated Sandpiper but not as large as a Sanderling. Baird's Sandpiper has a streaked upper breast and unstreaked flanks. Its long wings extend well beyond the tip of the tail when folded. The plumage is quite buffy even into fall. The Baird's Sandpiper carries its long and slim body horizontally.

Baird's Sandpiper is ranked as uncommon on migration. It breeds in the high Arctic, from eastern Siberia across Alaska and Canada, to western Greenland. Baird's Sandpiper winters in South America, south of the equator. Here it occupies diverse habitats from the high Andes to sea level. This relative habitat flexibility is shown throughout the year, when Baird's Sandpiper can be found away from water in moist or even dry habitat. Dry habitat can include the elevated reaches of the coast where it pecks for food rather than probes. It is often seen in small flocks and thus is quite similar to Pectoral Sandpipers (Calidris melanotos) in behavior and ecology.

On migration, the Baird's Sandpiper is also unusual because it stays well inland, flying over the open plains east of the Rocky Mountains and the Andes. Baird's Sandpiper seems to fly over Central America without stopping, and therefore on migration are rarely seen on the coasts. The sandpiper departs from its South American wintering ground in April and early May. Similar to the Semipalmated Sandpiper and Sanderling, Baird's Sandpiper occupies its breeding areas in late May and early June.

Actually, if the Semipalmated Sandpiper and Sanderling tend to fly over Saskatchewan in spring and over the East Coast in fall, sightings in Saskatchewan should be more common in spring compared to autumn. I'm not aware of widespread count data, but Smith (1996) differentiates sightings by spring and fall on a 1:50,000 scale map basis. Starting in 1966, sightings of Semipalmated Sandpiper were reported in spring on 78 map sheets and on 68 (47%) in autumn. Comparable figures for Sanderling and Baird's Sandpiper were 73 and 54 (40%), and 70 and 66 (46%), respectively. This thumb sketch analysis is consistent with the conclusion that more migrants use the eastern rather than central route in fall, especially given that fall migration is more prolonged and involves more individuals because of the added juveniles. Interestingly, the Baird's Sandpiper is not known to use this "clockwise" inland-north, coast-south migration strategy.

During breeding, Baird's Sandpipers occupy more elevated and drier ground than most other sandpipers, near inland lakes but also including dry sand dune habitat. Both males and females participate in the approximately 20 day incubation of 4 eggs, and the 20 day fledgling period. As with other sandpipers, females may abandon the brood earlier than males. Adults leave their breeding ground in late July. They slow their 5 week migration on the northern Great Plains, to restore their energy. They generally are found south of the United States by mid-August, a time when the later

migrating juveniles arrive.

Roy (1996) described Baird's Sandpiper as an "uncommon to fairly common transient." He's usually recorded them in small flocks of 5-30 individuals on lake shores, on mud flats and on the grassy margins of sloughs. Some early sightings were on 4 April and the average of 15 sightings was 10 May, in the "Elbow region." This study area, for a sandpiper, lies barely 20 minutes north of the Wood River watershed. Numbers of individuals, according to Frank Roy's observations, remained fairly stable until the end of May.

In late summer/autumn, the first Baird's Sandpipers appeared in early July and could be seen through September and in some favorable weather years to the end of October.

**4.1.5 Migrating-staging shorebirds in general.** The conservation of sites important for "staging" shorebirds is essential year-round, but there may be special considerations needed during the time that these transients are actually in Saskatchewan. The times of year when Arctic-nesting shorebirds can be expected in Saskatchewan are summarized in Table 4.

The Migratory Birds Convention Act (1917) was clearly a pivotal legal instrument in favor of bird conservation by introducing year-round protection for many species, and regulated hunting including bag limits for others. Shorebirds once were favorite game for market- and presumably also 'sustenance-hunters.' This practice was slow to be regulated through hunting seasons, or closure, and bag limits. According to Alexander Wetmore (in Houston 1999), the Upland Sandpiper and Eskimo Curlew were still on the menu in upper class restaurants in Buenos Aires in 1921. The protection that had been afforded in North America by the Migratory Birds Convention Act was slow to reach countries in Central and South America, where shorebirds reside in winter. In Colombia for instance, the Upland Sandpiper gained protection by law only in 1940 (Houston 1999). In many cases, protection by law satisfied a formal requirement but hunting for sustenance continued, in some cases possibly to this day.

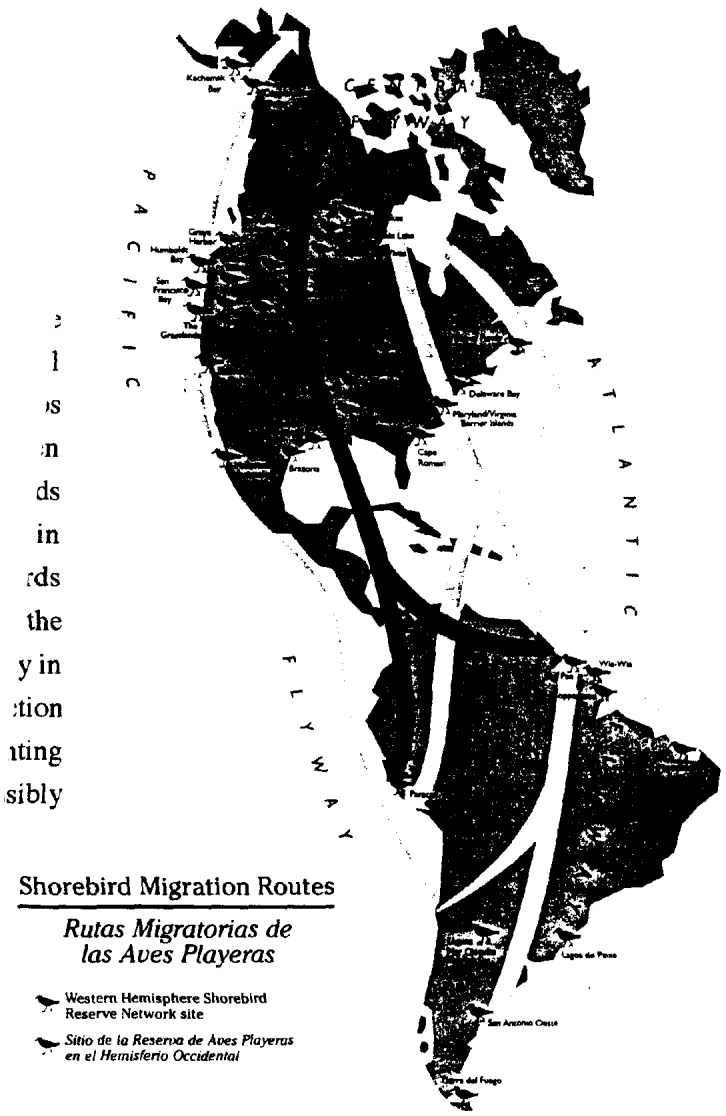


Table 4. Periods of the year when shorebirds nesting in the Arctic can be expected in Saskatchewan, taken from Roy (1996).

| | Spring | | | | Autumn | | |
|---|---|---|---|---|---|---|---|
| Species | Early | Peak | Late | Summer[1] | Early | Peak | Late |
| Stilt Sandpiper | 21 April | 20-31 May | 15 June | 3 July | late July | 17 Oct. | |
| Sanderling | Early May | 20 May-5 June | | 8 | Late July | 15 Aug.-15 Sept. | 30 Oct |
| Baird's Sandpiper | Early May[2] | 10 May | Early June | 8 | Early July | July-Sept. | 2 Nov. |
| Red-n. Phal. | Mid-May | 20 May-7 June | 15 June | 12 | 5 July | 16 July-25 Aug. | 8 Oct. |
| Semip. Sandpiper | 26 April | 15-30 May | | 8 | 27 June | 15 July-20 Aug. | 2 Oct.3 |

[1]Number of 1:50,000 map sheets with summer visitant recorded (Smith 1996).

[2]An unusually early sighting was on 4 April (see Roy 1996).

[3]An unusually late sighting was on 9 Nov. (see Roy 1996).

**4.1.6 Piping Plover.** The ecology of this species has been summarized by Haig (1992). The Piping Plover took the name 'shorebird' literally. It spends virtually its entire life on the beach, at ocean shores, in bays, on inland lakes and rivers, and temporary ponds. It uses primarily the very edge of the water and a narrow upland strip. Bathing seems to be the only time when it gets deliberately wet.

Piping Plovers feed on aquatic and terrestrial invertebrates. At the water's edge, they capture those invertebrates that are vulnerable after having been whipped up by wave action, or left behind in the film of receding water. On the Great Plains, aquatic invertebrates include mostly aquatic insects in the larval stage. The plovers also run down terrestrial insects on the beach and seem not to take them in flight.

To raise their brood, Piping Plovers begin by making a depression in the sand. This inconspicuous depression is then lined with items found nearby, pebbles and sometimes broken shells from snails or clams. The male and female appear ritualistic when they line their nest, tossing items with their bill. During egg laying and the 4-week incubation period the plovers are 'tied' to this spot, but soon after the young hatch, the family is able to move to other areas on the beach. The young fledge at three weeks of age.

In some areas, Piping Plovers apparently can raise a second brood, but this has not been observed in at least two Canadian populations (East Coast, Sabine Dietz and Roland Chiasson pers. comm.; Prairie, Wayne Harris and Margaret Skeel pers. comm.).

Concealment and camouflage are essential features in the Piping Plover's life, especially during nesting. Nests are sometimes near larger objects such as logs or boulders, presumably selecting rough areas which any large animal might avoid. Piping Plovers have many predators of eggs and young, including mammals and birds (Sects. 5.1.2, 5.1.3, 6.2.2, 8.5). Their reliance on shores predisposes the plovers to predation, because these water bodies are visited by many animals in an arid landscape where water bodies can be rare. Human activity also is often concentrated at shores and this can result in conflicts. Rushing storm water sometimes washes away nests, and others are flooded when water levels are drastically altered in reservoirs.

Attempts to protect the declining Piping Plovers have been many. Still, plover numbers on the Great Plains continue to decline. Plovers along the Atlantic Coast are barely maintained through intensive protection measures including limiting human, vehicle or other recreational travel along shores. Plovers of the Great Lakes continue to decline despite protection measures.

In Saskatchewan, Piping Plovers are widely distributed often with few pairs at any one lake. Also, as habitat changes, the plovers are often forced to move to different sites. Suitable Piping Plover habitat is dependent on water fluctuation. If water levels are low for several years in a row, vegetation invades the broad beaches and Piping Plovers move away, apparently due to a shortage of exposed beaches.

One factor which Piping Plovers apparently cue in on when selecting potential breeding areas in spring is the presence of a broad beach or mud flat with water nearby (Skeel and Duncan 1998). This tendency has been particularly problematic at nest-

ing areas at Lake Diefenbaker, 75 km north of Chaplin Lake. Lake Diefenbaker is a large reservoir in the steep-sided South Saskatchewan River valley. The stored water in the reservoir is used for irrigation and electric power generation. Thus, when water is lowest in spring, the beaches sloping upward are wide and attractive, but these beaches constrict during May and June, the wettest period in the region. Thus in many ways, the beaches act as an ecological trap, and many nests are flooded. Some nests have been moved to protect them (e.g. Hjertaas 1998).

Chaplin Lake supports consistently high numbers of Piping Plovers. Here, water levels are also managed and this represents both a conservation opportunity and a responsibility. At the lake's west basin where water levels are specifically maintained to extract Glauber's salt and brine shrimp commercially, the numbers of Piping Plover have been highest, followed closely by the nearby Midtskogen Bay (Fig. 7). In years of water shortages, the south basin tends to be the first to be dry and the east basin second, and these support the lowest numbers of Piping Plovers.

Chaplin Lake and the pothole region of the Missouri Coteau (including Old Wives Lake) are of tremendous importance to nesting Piping Plovers in Saskatchewan. In the most recent Piping Plover census in 1996, 205 Piping Plovers were counted at Chaplin. Similarly, 483 plovers were counted on 30 of a total of 43 Missouri Coteau basins visited (Skeel 1996). The larger lakes and smaller and semi-permanent sloughs thus comprise a mosaic in the landscape. During particularly dry years or very wet years with beaches reduced to narrow strips, shorebirds may be forced to crowd onto the larger lakes. During years with average snow melt and runoff, the birds may move to smaller basins to reproduce and feed, taking advantage of the relaxed competitive conditions when distributed over many wetlands (Sect 8.2).

**4.1.7 Snowy Plover.** The Snowy Plover is a 'citizen of the World' with remarkable reproductive potential. It can be found on the continents of the Americas, Africa and Europe. This white-faced and white-bellied plover with pale brown uppers, and black stripes on head and neck weighs only 30-60 g. The Snowy Plover is similar to the Piping Plover, but the Piping Plover is larger, has orange not blackish legs, and a complete black band on the upper tail. The natural history of the Snowy Plover has been described by Page et al. (1995).

The Snowy Plover has a complicated distribution pattern in North America using inland and coastal areas. It also has overlapping areas for breeding, wintering and year-round occupancy. Snowy Plovers are scattered at the fringe of their breeding range, including the only three Canadian locations Big Quill, Chaplin and Old Wives lakes. The main breeding area includes the Great Plains and in the Rocky Mountain interior. It occurs year-round in central Mexico, and occupies coasts from Washington State to Central America, the coast of the Gulf of Mexico and the southern Bahamas Islands. The location of the southern limit is poorly documented.

Most of the Great Plains populations are migratory except for those in extreme southern Texas. Great Plains birds are presumed to winter on the Gulf Coast. This conclusion is based on two sightings of marked Snowy Plovers from Kansas and an increase in coastal residents each winter. In Colorado, Snowy Plovers arrive in mid-April and depart in mid-July. Snowy Plovers nest on sparsely vegetated and sandy beaches of saline ponds and lakes, and river sand bars. They also nests near dry basins as long as a small seepage is available nearby.

Snowy Plover are terrestrial and aquatic invertebrates. Those residing inland feed most often in water at depths of 1-2 cm, but moist soil is more critical than standing water. Snowy Plovers hunt in the typical plover manner of pausing, looking, running and pecking sighted prey. Probing in soft mud is also used.

Pairs and unpaired males defend territories. Mated individuals can also join feeding flocks for a time. The plover's high reproductive potential comes from the female's readiness to abandon mate and brood within a few days after hatching and to re-mate with a second or even third male, as has been documented on the Pacific Coast. Males there may also re-mate after the male's first brood has fledged. The usual number includes 3 eggs and these are incubated for 27 days.

As is often the case, species which have a high reproductive potential also suffer from considerable predation. Snowy Plovers are prey to mammalian predators (canids and mustelids), raptors, crows and magpies, shrikes, gulls, herons and

egrets. The parents' attempts to protect young from predation includes running away with chicks, crouching, mobbing predators, vocalizing and feigning injury.

Numbers of Snowy Plovers in the United States have been estimated at 21,000 individuals. This is likely below numbers in the late 1800s. Data from Christmas Bird Counts show a significant decline between 1962-84. Mortality sources have included selenium toxicity, collision with stationary objects (e.g. fences), and snaring in discarded fishing lines. Habitat loss has resulted from beach developments and from water management including drainage and flooding. Disturbance on beaches can also be a significant factor.

The occurrence of Snowy Plovers in Saskatchewan is unusual. An early sighting of a Snowy Plover in Saskatchewan was made at Buck Lake, and nesting has been documented in the 1980s at Big Quill, Chaplin and Old Wives lakes. Smith (1996) suspects that these range extensions may be due to prolonged drought in the nesting area nearest to Saskatchewan, the Great Basin of Nevada and Utah.

**4.1.8 American Avocet.** The American Avocet is perhaps one of the most handsome of North American birds. It is sufficiently tame to be observed without flight and is a favorite of photographers. This long-legged, 300 g shorebird has a cinnamon head and neck that becomes light grey in winter, and black wing stripes set off from a whitish-grey body. The natural history of this species was reviewed by Robinson et al. (1997).

Where suitable habitat permits, migratory populations of American Avocets breed throughout most of the Great Plains and the United States inter-mountain west. Some populations are resident year-round along the Pacific and Gulf of Mexico coasts and in central Mexico. Winter residents can be found throughout much of the southern United States and Mexico, particularly the coastal area and slightly inland. Before 1900, American Avocets bred much further north (Great Slave Lake, N.W.T.) than they do now, and also along the Atlantic Coast as far north as New Jersey. This range retraction has been attributed to overhunting. Some range (re-)expansion has been recorded recently, in northern Alberta (G. Beyersbergen and E. Kuyt, pers. comm.) and in Arizona. North of the Wood River watershed, American Avocets are reported as more common now than they were in the 1930s and 1940s (Roy 1996).

In Canada, the American Avocet occupies the prairies and parkland with the North Saskatchewan River forming the northwestern boundary. During drought years, avocets have been recorded further north, in the southern Boreal region of Saskatchewan (Smith 1996). Within this range, avocets frequent saline and flooded fields, being characteristically associated with the bare margins of water bodies. They arrive in southwest Saskatchewan in late April, lay eggs in early May, and rear young in early June (Roy 1996). American Avocets either depart early, in mid-to late July, or redistribute themselves before leaving their nesting areas. Late birds can be seen into September and even October (Roy 1996). After breeding, avocets often join small flocks and these in turn can band together to form flocks of thousands prior to migration.

Foods taken by American Avocets include aquatic invertebrates found in the water column or in sediment, but also opportunistically terrestrial invertebrates, small fish and seeds. Avocets feed mostly in water up to belly depth and, in one study, only 3% were feeding adjacent to the water line where periodic wave action left a film of water. The most common method of feeding is "scything," where a slightly open bill is pushed while walking forward on a muddy substrate, moving the bill from side to side. American Avocets seem to avoid sandy areas, presumably to avoid wear of the bill in this filter feeding method. Other feeding methods include pecking to capture brine shrimp in the water column and snatching of brine flies.

To avoid excessive salt consumption, American Avocets have been observed moving from feeding areas to freshwater seepage ponds to drink. Movement has also been observed from water to land to defecate. About half of the time American Avocets have been observed sleeping/resting on the shore, and half the time in shallow water. Feeding can occur during day or night.

American Avocets are adaptable in their use and defense of space. Feeding areas are defended particularly before and during laying. During incubation a small breeding area is defended. Feeding areas that are distant from breeding areas are defended only while the birds are feeding there. The usual number of four eggs is laid in one of

several possible scrapes, often associated with sparse vegetation near the water's edge. Both parents incubate. Within a day of hatching the family leaves the nest and moves to a feeding area, which can involve swimming when the nest is on an island. When nests are in close proximity, inadvertent brood mixing can occur.

American Avocets exhibit a rich array of displays within and between pairs. Pairs are monogamous during breeding season, and one or both members of the pair may abandon the brood around the time when young gain flight.

Described mortality sources include predation, injuries, botulism and exposure of young during cold storms. Data from breeding bird surveys suggest that avocet populations were stable at least from 1966-94. Soon after the Migratory Bird Treaty was enacted, shooting and trapping became a minor source of mortality. The bioaccumulation of DDT and its metabolites gradually waned after DDT was banned. A subsequent toxic effect was noted, involving bioaccumulation[4] of selenium that was introduced to marshes as a result of irrigation practices in the western United States.

In addition to a water quality threat that is ongoing, American Avocets have suffered from wetland losses that were commonplace. In Saskatchewan, as elsewhere, wetland drainage was a common practice and was subsidized by various levels of government to result in projects of varying size. Although Sask Water's current policy requires a permit for water diversion, "midnight ditching" is still common (Anonymous pers. comm.).

American Avocets breed at Chaplin, Old Wives and Reed lakes. However, the biggest concentrations can be seen there in late summer and early fall, prior to migration.

**4.1.9 Tundra Swan.** The Tundra Swan, formerly Whistling Swan, is one of two native and a third feral swan in North America. Adult Tundra Swans show a yellow spot below the eye and have a concave upper border of the black bill and white head. Trumpeter Swans lack the yellow lore and have a wedge-shaped head. The feral Mute Swan holds its neck more curved than the two natives, and has an orange bill with a black base and black knob. The natural history of the Tundra Swan has been reviewed by Limpert and Earnest (1994).

The current breeding range of the Tundra Swan includes lakes, ponds and river deltas across the northern tundra, from the Aleutian Islands of Alaska to Quebec. In winter, the swans occupy disjunct areas. Swans breeding along the western coast of Alaska winter along the coast and some distance inland from Vancouver Island to central California. In addition, the swans winter inland far from the coast in British Columbia, and the Rocky Mountain states. The northern Alaskan and all of the Canadian breeders winter in a short coastal stretch including the Chesapeake Bay area, from New Jersey to South Carolina.

On the southward migration, Tundra Swans depart from the Arctic in late September in family groups (4 young are common) or small to medium sized flocks (possibly ≥100). Individuals arrive on the Great Plains in October. Once they reach Ontario or Minnesota, they depart in a non-stop flight to reach their wintering quarters about mid-November. One radio-marked individual was clocked at 82 km/h. In mid-March the swans depart again northward, to cross the northern Great Plains in April. Juvenile birds probably separate from their parents after their northward migration to the breeding grounds. Fidelity to wintering areas is high, and here the previous year's offspring may rejoin the new family and recognize their parents. The oldest neck-collared Tundra Swan was 21 years old.

While on migration, Tundra Swans use ponds, lakes and marshes for feeding and resting. They feed on seeds, stems, roots and tubers of submerged and emergent aquatic vegetation. They will frequent fields to feed on waste grain and growing winter cereal crops. Tundra Swans will also consume some animal matter, mainly mollusks.

Populations of Tundra Swans are tracked through annual mid-winter surveys. An average population estimate over three years yielded 87,000 individuals for the eastern and 64,000 for the western population. The swans have benefited from regulated hunting, and have doubled in population size during the 35 years prior to 1989. Shooting is the most common source of mortality of swans once they have fledged. There is currently a regulated hunt of roughly 4,000 Tundra Swans, and an additional take of 5,000 by native peoples.

[4] Also known as biological magnification, an "increasing concentration of relatively stable chemicals as they are passed up the food chain from initial consumers to top predators" (W.T. Keeton & J.L. Gould, Biological sciences, Norton.

A moderate mortality other than through shooting was attributed to ingestion of lead shot and lead fishing sinkers. The greatest threats to Tundra Swans now come from oil and gas extraction in the Arctic, and a continuing loss of wetland stopover sites.

There is one record from Stony Lake (western parkland) of a pair of Tundra Swans breeding in Saskatchewan, from 1973-80 (Smith 1996). Most swans of the eastern population migrate through Saskatchewan (see picture collage), and as many as 20,000 individuals have stopped at one lake (Smith 1996).

**4.1.10 Canvasback.** The Canvasback (*Aythya val - isineria*) is a fast-flying diving duck about the size of a Mallard. The Canvasback's distinctive head shape includes a wedge-shaped bill and head, on a long and stout neck. Males in breeding plumage can be spotted from large distances, where their dark grey back shows off against a cinnamon-brown head and chest. The biology of this species in relation to management has been summarized by Bellrose (1976).

The Canvasback is most at home breeding in the parklands bordering the northern Great Plains, but can be found from South Dakota to Alaska. Canvasbacks leave their Canadian Parkland nesting area gradually in early September-November. Migration proceeds southward in a broad front, but two major corridors guide birds to the Chesapeake Bay area of the Atlantic, and the mid-California region of the Pacific Coast. While most wintering Canvasbacks can be found on the coast, one prominent inland wintering area lies in the central Mexican highlands. Which route is used can vary over years, and brood mates can be found in very different migration corridors. Most Canvasbacks return to their Parkland nesting grounds in April, with a strong propensity to return to previously used nesting areas.

Canvasbacks tend to use large and deep water bodies for feeding, resting and courting, but use smaller and shallower sites for nesting on the prairies. Nests are rarely on land, but are over cattails. The 8-10 eggs are incubated for approximately 24 days in May/June. Canvasback nests are often parasitized by the ecologically similar Redhead (*Aythya americana*), who add their eggs to a Canvasback's clutch.

Once incubation has started, the male Canvasbacks form gradually larger flocks, and moult as early as June. Some females join these moulting flocks, sometimes leaving their two-third grown young to fend for themselves, and others remain on smaller waters. Females do not moult until late July, and become flightless in August for 3-4 weeks. In an early study of food habits in the 1930s, stomach contents revealed 80% plants, and 20% animal matter. Sago pondweed alone formed 30% of the food mass.

In southern Saskatchewan, Canvasbacks arrive early, in mid-April, shortly after Pintail and Mallards (Roy 1996) Depending on wetland availability, a relatively dry Parkland can encourage Canvasbacks to move to ponds on the grasslands (Smith 1996). Of a sample of 17 Canvasbacks banded in Saskatchewan, some were recovered in the province again and some also in 10 states of the U.S., including Atlantic and Pacific Coast states (Roy 1996).

**4.1.11 Ducks.** Of the four pillars of waterfowl management and conservation - habitat protection and enhancement, facilitating reproduction, minimizing losses to disease and regulating harvest - all find some expression in the Wood River watershed. This watershed lies on the southwest edge of the main "duck production" area in Saskatchewan. High salinity, lack of nesting cover or lack of nearby ponds for brood rearing make Chaplin and Reed lakes marginal for ducks. An exception is the Chaplin Heritage Marsh created at the lake's south end in the 1980s (Sect. 1.3.8). However, Old Wives Lake is bordered toward the northeast by the Missouri Coteau, bearing many excellent wetland basins suitable for waterfowl production at least at its edge. This area is ranked regionally important by Poston et al. (1990).

When water levels are sufficient, Old Wives and Reed lakes serve as important staging areas for ducks and geese. These lakes are also used by great numbers of moulting ducks. The region is frequented by many waterfowl hunters each fall. Guiding and outfitting is a source of additional income to several landowners, after the close of harvest each year (e.g. Old Wives Bed & Breakfast 306-354-2512).

**4.1.12 American White Pelican.** The summary provided below is based on Evans and Knopf (1993) except where other authors are cited. This pelican weighs 5-9 kg and relies largely on fish for food. It has few predators once it reaches adulthood and can live to 26 years of age.

The Wood River watershed lies within a large contiguous area where pelicans regularly breed in a band roughly bordering the northeastern fringe of the northern Great Plains, from northeastern South Dakota to northeastern Alberta. In addition to this band, there are eight other isolated pockets of breeding distribution in the western United States and Canada. The birds migrate in flocks as large as 180 birds, mostly to eastern and western coastal areas in Mexico and the southern United States. Although the American White Pelican flies over mountains and deserts on migration, it depends on water and only stops where water bodies are present. Pelicans banded at lakes in Saskatchewan (Crane, Dore, Last Mountain, Old Wives, Quill and Redberry lakes), all used a southeasterly route on migration (Houston 1971). A possible exception was noted for young banded at Old Wives Lake, five of which were recovered in northern Great Plains states and four in Alberta (Houston 1970, 1971).

The American White Pelican is vulnerable to small scale impacts (e.g. disturbance Sect. 8.6) because of their colonial habit. Birds in general can be colonial for a wide spectrum of reasons, ranging from the simple coming together at a desirable habitat feature (e.g. an island), to complex social behaviour where one bird can help rear another bird's young. Coloniality in the American White Pelican nearly covers both extremes.

As island-nesting birds, the pelicans congregate naturally, especially in a landscape where islands are rare. Even though aggregations by pelicans on islands may be largely coincidental, there are added benefits from having pelican neighbours. The young huddle together in tight groups once they are 2-3 weeks old and save body heat, more often at night. When parents arrive, the huddling young return to their nest sites and this is where they are recognized by their parents as the parents' own. Because individual recognition is poorly developed when young are small and immobile, it sometimes happens that the otherwise very protective parents do not assist their displaced young. Any factor that disrupts the normal home-nest-dynamics is serious for the birds. Sometimes a simple disturbance at the nest can cause abandonment (see also Houston 1966). In contrast, when away feeding the pelicans can be quite tolerant of disturbance. The nest is the only site pelicans defend.

During feeding, pelicans are very gregarious and have developed sophisticated cooperative feeding strategies. Feeding pelicans often spread out and with wing-flapping and bill-dipping drive prey into the shallow water near shore where prey is more easily caught. Such drives can be by two groups of pelicans swimming toward each other and can last up to 10 min.

Lakes that contain islands are not always also sufficiently productive for feeding. Pelicans cope with this two-pronged nesting-vs.-feeding demand by flying as far as 60 km to feed. Food is carried in the gullet and regurgitated for the young.

Pelicans eat mostly fish taken in shallow water at day or night. Because pelicans spend little time in feeding areas compared to nesting areas, it is easy to underestimate the importance of those feeding areas. Conservation measures for pelicans should look well beyond those sites where they spend a majority of time, to include feeding areas where they may stay only briefly. Conservation strategies should therefore include a regional view and not a mere site-based concern.

Pelicans are vulnerable to pollutants because they are near the top of an almost entirely water-based food chain. Urban, agricultural and industrial pollutants enter the water sphere easily. Pelicans can bio-accumulate (Sect. 4.2.6) pollutants that take long to degrade, such as persistent organochlorines (e.g. DDT). Rather than passing through an animal's body, chemicals are stored, often in body fat. When fat stores are used later, as during egg laying, these chemicals can be mobilized in amounts sufficient to cause harm (e.g. eggshell thinning leading to egg breakage).

Pelicans appeal to people because of their size and their graceful and coordinated flight. Flight can be in a staggered line, "V" or "J," in which the bird flying behind another takes advantage of the energy savings accrued from flying in the swirl of turbulent air. Flying birds sometimes rise and fall in succession, creating a wave-like effect. Pelicans characteristically alternate wing flapping with gliding (60-75% of low altitude flight). The

shift is initiated by the leading bird and moves back through the line, analogous to a wave.

Some quality educational videos deal with the American White Pelican. "Pelicans and Cormorants: Prairie Scapegoats" was produced by The Nature of Things with David Suzuki and documents Pelican and Cormorant issues on Lake Winnipegosis (Manitoba) including the interactions with the commercial fishery, human disturbances at breeding colonies, impacts of pesticides such as DDT, and interactions with commercial fisheries along the Mississippi Delta. A second video is entitled "Traditions of the Pelican" and was produced by the World Wildlife Fund Canada. This video documents general pelican biology and threats to breeding colonies.

At Old Wives Lake, pelicans were present at least since 1958 when Fred G. Bard banded them there (Houston 1970). The pelicans were monitored by Keith Roney again starting in 1976. A comparison of the number of nests on Old Wives Lake showed a decline in the 1980s and 1990s. Numbers of nests declined from 2,617 to 2,184 between 1982 and 1985 (Roney and Hlady 1986), and to 582 in 1991 (Roney and Longmuir 1993). This decline may reflect local effects for two reasons. Nests of Double-crested Cormorants declined over a longer period including the 1982 to 1985 census (Roney and Hlady 1986). Also, pelican nests at Old Wives Lake declined more than at all 13-16 Saskatchewan colonies combined, where they increased by 15.8% (1982-85) or declined only slightly (1985-91).

**4.1.13 Franklin's Gull.** The Franklin's Gull is a small gull that nests in colonies in marshes on the northern Great Plains. Here it was first collected as part of the Franklin expedition in 1823. Buoyant and pigeon-like in flight, it has been called rosy or prairie dove, rosy because of a pink tinge on the breast that fades after arrival on the breeding ground. Franklin's Gulls have a black head, a grey mantle and a black band near the wing tip. The natural history of this gull has been summarized by Burger and Gochfeld (1994).

Franklin's Gulls breed from Alberta through Saskatchewan and southwestern Manitoba, southward on the Great Plains to South Dakota and Montana. Pockets of breeding populations exist in other states. Franklin's Gulls may have bred in British Columbia. Once freed from reproduction in mid- to late July, Franklin's Gulls undergo extensive dispersal movements, prior to southward migration. Migration proceeds through the southern Great Plains, southward into Mexico. On the West Coast, the gulls follow the shore to reach their wintering grounds in Chile and Peru. They migrate in aggregations ranging from small flocks to numbers over a million. In winter, they often take advantage of waste, for example at fishmeal plants. The Franklin's and Sabine's Gulls (*Xema sabini*) are the only North American gulls that winter south of the Equator.

One Franklin's Gull banded in Saskatchewan was recovered in Chile (Houston 1974). Some individuals scatter widely during post-breeding dispersal, on migration or in winter. Sightings were made on the Atlantic Coast, South American interior, and some as far afield as Hawaii and Europe.

Franklin's Gulls select large prairie marshes where males build a nest platform upon arrival in mid-April. They complete the nest after pairing with the female. Nests are over water on mats of vegetation (cattails, bulrushes, phragmites), muskrat houses or floating debris. Most reported water depths at nest sites were 30-60 cm. While breeding, this otherwise gregarious gull defends territories with distances of 50-200 cm between birds in colonies, and somewhat larger during pair formation. Colonies can include over 100,000 breeding pairs. Both males and females incubate most commonly 3 eggs, brood the young and regurgitate food for their young up to 1 week after fledging. During a 4-month pre-migration dispersal phase, Franklin's Gulls range over an area often 500 km wider than the area in which they breed.

The food taken by Franklin's Gulls poses little or no conflict with human values. Foods include earthworms, grubs, midges and grasshoppers, seeds and other vegetable matter, mice, fish, crabs, snails and other invertebrates. Franklin's Gulls will also visit garbage dumps and other refuse dumps. Because of their small size and habitat use, Franklin's Gulls have been observed only rarely taking ducklings or other young birds. The gulls feed largely over land, but return to the lakes for roosting at night.

Because Franklin's Gulls disperse widely, and may chose different nesting areas between years in

relation to water depth conditions, population monitoring is difficult. In the period 1970-94, the population was estimated as 500,000 gulls. Estimates of trends differ. A reported 7.4% annual decline may have been influenced by the gulls being difficult to census in breeding bird surveys due to the gulls' remote and inaccessible nest locations. The reported decline may be an overestimate, due to gulls dispersing after deserting their nesting areas.

In southern Saskatchewan, Franklin's Gulls arrive in mid April, after California and Ring-billed Gulls. Franklin's Gulls depart in mid-September. They are commonly seen in fields feeding on wire worm and cutworm grubs (Roy 1996). Franklin's Gulls concentrate in Saskatchewan where marshes, shallow lakes, open grasslands and fields prevail, south of the Precambrian Shield. Nesting data are rare for this species, because few of the extensive reed beds have been surveyed (Smith 1996). Houston (1974) terminated banding of Franklin's Gulls to avoid the disturbances this caused when wading through water from nest to nest.

**4.1.14 Burrowing Owl.** The Burrowing Owl is an unusual creature in the way it combines diurnal and nocturnal activity, nesting in burrows below ground and inhabiting treeless plains. Its somewhat comical appearance attracts the attention of people. The natural history of the Burrowing Owl was reviewed by Haug et al. (1993).

The Burrowing Owl is a brown and buffy-white owl, weighing approximately 150 g and standing stilt-like on sparsely feathered lower legs. Burrowing Owls occur only in the Americas. In North America, the northernmost populations are migratory, mid-continent populations exhibit shorter distance movements, and in the southwestern United States, Florida and northern Mexico the owls are non-migratory.

Burrowing Owls frequent dry, grassy and treeless plains where they are almost invariably associated with burrows, mainly of badgers, prairie dogs or ground squirrels. The owls can grow tolerant of human activity and often nest near farms or on vacant ground in cities or towns. Burrowing Owls are monogamous and both participate in the rearing of up to 12 young.

Burrowing Owls are opportunistic feeders, but their main prey includes insects, small mammals and birds. In prairie Canada, small mammals may be an important food source immediately upon arrival in April and through egg laying, at a time when insects are sparse and often inactive. In this way, the availability of mammal prey can influence the number of eggs laid and eventually owlets fledged. Owl families remain together near their home burrow until late August when males tend to move short distances to alternate feeding/roosting areas, followed by females and then by juveniles.

Prairie Burrowing Owls depart in early October, apparently migrating at night during favorable weather. They may stop for one to several days, before they migrate on, eventually reaching their wintering grounds in Texas and presumably adjacent areas in the United States and Mexico.

Once common on the Canadian prairies and in parts of the southern interior of British Columbia, the owls have gradually declined throughout the second half of this century. The major factors that have been implicated in this decline, in part by contributing to an inadequate food supply and reduced reproduction in recent years, include habitat loss and degradation, insecticides, road kills and predation. This owl was listed as threatened in 1978 and endangered in 1995.

In a study of owl survival using radio-telemetry (Clayton and Schmutz 1999), owl mortality was 45% among adults and 55% among juveniles in the 5-month study period alone. Interestingly, mortality rates were approximately the same in two study areas in Alberta and Saskatchewan. In the Alberta area, where a variety of grasslands existed in a ranching area with only 20% cultivation, deaths were largely due to mammalian and avian predators; in Saskatchewan, where grasslands existed in small patches and 90% of the land was cultivated, a similar mortality rate was due to collision with vehicles, predators and presumed starvation combined.

In addition to habitat loss, two major habitat changes have apparently exerted a negative influence on Burrowing Owls. The owls rely on burrows in sparse vegetation for escape habitat. Burrowing mammals, notably prairie dogs, have been eliminated from large tracts of the Great Plains to the owls' detriment. Also, a reduction in prairie fires and fenced areas protecting trees from grazing has allowed trees to expand into what was formerly treeless plain. This has been favorable for avian predators that nest in trees and mammalian predators as concealing cover. A synthesis suggests that

these kinds of changes are widespread throughout the Great Plains ecosystem and impact the owls year-round. These changes may be largely irreversible.

## 4.2 Unusual birds.

**Clark's Grebe** (*Aechmophorus clarkii*) was considered a colour variant of the Western Grebe until it was considered a bona fide species of its own in 1983. Because of this reclassification, its previous status is uncertain. Clark's Grebes have been noted breeding in Saskatchewan at Last Mountain, Turtle and Reed lakes (Smith 1996).

**The Black-necked Stilt** (*Himantopus mex - icanus*) is a large shorebird, nearly the size of an American Avocet, with long neck and legs. The stilt is strikingly marked with white underside from bill to tail and black above.

Black-necked Stilts are normally at home in Mexico ad the southern United States as far north as Utah. Since 1977, however, it has been seen a total of 14 times in Saskatchewan, including Old Wives Lake (Smith 1996). It is not clear whether this range extension by Black-necked Stilts is due to a prolonged drought in the southwestern United States, or a re-occupancy of the Canadian range where it was last recorded breeding in 1894 (Smith 1996).

**The Caspian Tern** (*Sterna caspia*) is a large gull-like tern with a red bill and black 'cap.' It occurs world-wide, but is unusual at Reed Lake (Table 3). It is more at home in the wetter parts of the northern Great Plains, with its breeding range extending in a narrow band from eastern North America into Saskatchewan's aspen parkland and southern boreal forest (Smith 1996).

**Peregrine Falcons** (*Falco peregrinus*) can be spotted during migration when they linger at Chaplin and Old Wives lakes. These fast aerial predators of birds are presumably responding to the high densities of shorebirds there. This species is one of the most notable conservation success stories when it faced extinction world-wide from pesticide poisoning. A combination of legal assault of the pesticide DDT coupled with captive breeding and release into the wild have restored apparently viable populations in Europe and North America (Gallagher 1999).

As Peregrine Falcons are specialists at snatching birds in flight, Ferruginous Hawks (*Buteo regalis*) are specialists at catching ground squirrels, often using a cat-like crouch-and-wait strategy at squirrel burrows. This hawk exhibited a retraction in its breeding range since settlement. Ferruginous hawks have been downgraded in risk status from threatened to vulnerable. Their populations and those of other grassland birds (Houston and Schmutz 1999) are only as secure as grassland habitat is secure in western Canada and on the species' wintering grounds in the southern United States and northern Mexico. According to Wayne Harris (pers. comm.), 5-10 pairs of Ferruginous hawks nest each year on the community pastures near Chaplin and Old Wives Lakes.

# 5. Other elements of high conservation value

Chaplin and Old Wives lakes lie in what is referred to as the Old Wives Plain lying among hills at the northeast edge of the Missouri Coteau. This plain still has a high proportion of native habitat, which is an important element in need of conservation in Saskatchewan.

The Old Wives plain also contains several natural features recorded in the Saskatchewan Conservation Data Centre (Fig. 11, Table 5).

Native plants that are common in the Chaplin Lake area include:

Alkali Cord Grass
Alumroot
Asters
Baltic Rush
Blue Grama
Broomweed
Desert Salt Grass
Dwarf Fleabane
Everlasting
Flodman's Thistle
Golden Bean
Goldenrod
Great-flowered Gailardia
Green Needle Grass
Harebell
June Grass
Lilac-flowered Beardtongue
Locoweed
Low Prairie Rose
Needle and Thread[1]
Northern Wheatgrass
Nuttal's Salt-meadow Grass
Pasture Sage
Pin Cushion Cactus
Plains Reed Grass
Prairie Coneflower
Reflexed Rock-cress
Seaside Arrow-grass
Silver Buffaloberry
Silver Sagebrush
Silverberry
Slender Wheatgrass
Smooth Blue
Thread-leaved Sedge
Beardtonque
Western Sea-blite
Western Snowberry
Western Wheatgrass
Wild Blue Flax
Wild Licorice
Yarrow
Yellow Flax

[1] This characteristic plant and protein rich forage grass is Saskatchewan's newly designated "candidate provincial grass emblem."

Table 5. Species of high conservation value recorded in the Old Wives Lake plain, of Southern Saskatchewan. Provincial status is assigned under the Species-at-Risk section of the Wildlife Act 1997. Federal status is assigned by the Committee on the Status of Endangered Wildlife in Canada.

| Species | Provincial | Federal | Saskatchewan Conservation Data Centre |
|---|---|---|---|
| Moss Gentian (Gentiana aquatica) | | | Rare |
| Six Week's Fescue (Vulpia octoflora) | | | Rare |
| Lotus Milk-vetch (Astragalus lotiflorus Hooker) | Not at risk | | Rare-uncommon |
| Plains Spadefoot Toad (Scaphiopus bombifrons) | | Vulnerable | Rare-uncommon |
| Ferruginous Hawk | | Vulnerable | Common |
| Sage Grouse | Endangered | Endangered | |
| Piping Plover | Endangered | Endangered | Rare-uncommon |
| Long-billed Curlew | Vulnerable | Vulnerable | |
| Forster's Tern | | | Common |
| Burrowing Owl | Endangered | Endangered | Rare |
| Sprague's Pipit | Threatened | Threatened | |
| Olive-backed Pocket Mouse | | | Rare-uncommon |
| Cougar | | | Rare-uncommon |

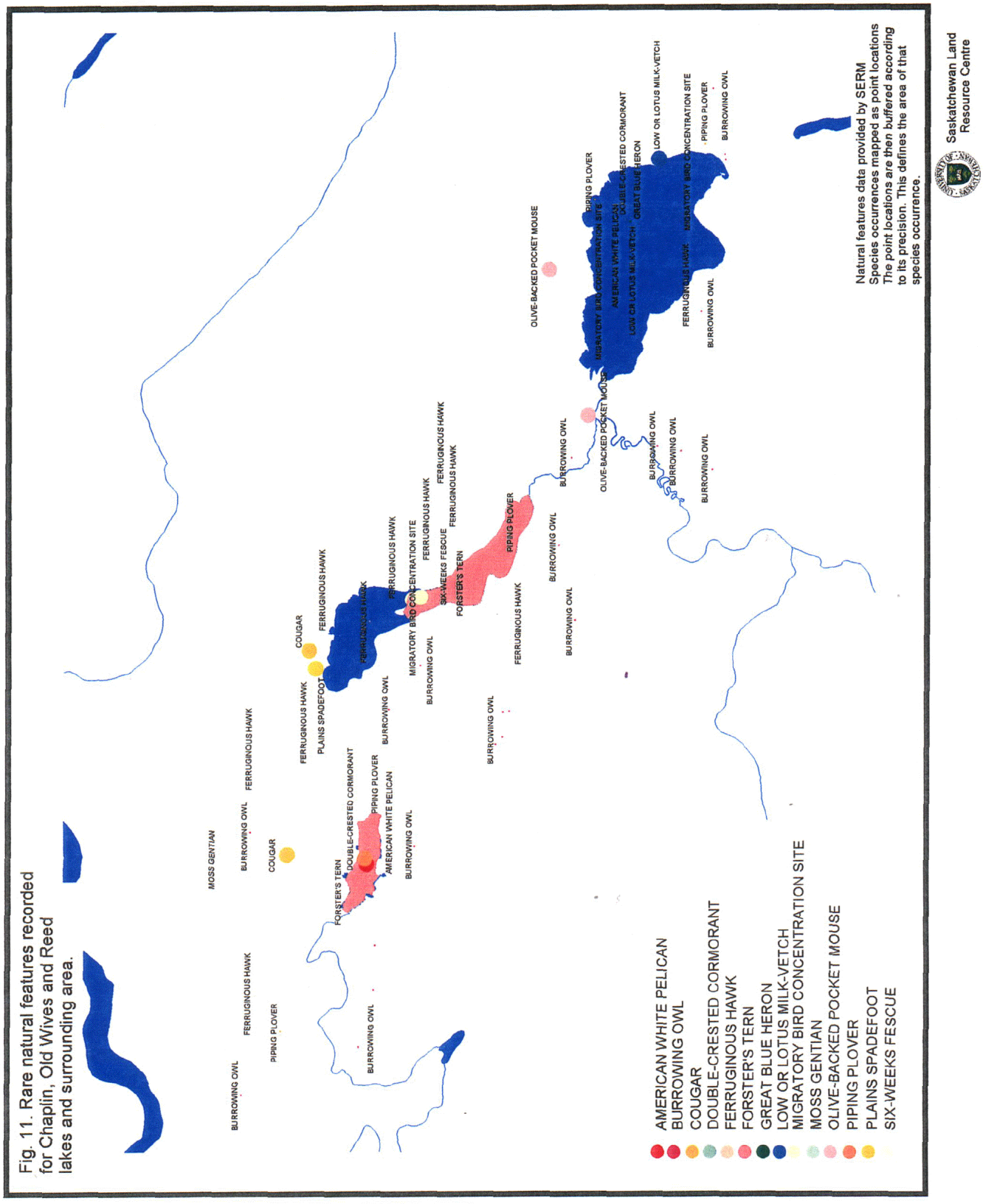


Fig. 11. Rare natural features recorded for Chaplin, Old Wives and Reed lakes and surrounding area.
AMERICAN WHITE PELICAN
BURROWING OWL
COUGAR
DOUBLE-CRESTED CORMORANT
FERRUGINOUS HAWK
FORSTER'S TERN
GREAT BLUE HERON
LOW OR LOTUS MILK-VETCH
MIGRATORY BIRD CONCENTRATION SITE
MOSS GENTIAN
OLIVE-BACKED POCKET MOUSE
PIPING PLOVER
PLAINS SPADEFOOT
SIX-WEEKS FESCUE
Natural features data provided by SERM
Species occurrences mapped as point locations
The point locations are then buffered according to its precision. This defines the area of that species occurrence.
Saskatchewan Land Resource Centre

# 6 Human Context

## 6.1 Land Ownership

The lands surrounding all three lakes tend to be either privately owned or consist of provincially- or federally owned community pastures (Sect. 1.3.11). When privately owned, the dominant land use includes cereal grain, forage and pulse crop production. Some farmers concentrate on few crops, others practice mixed farming including some cattle. The approximate proportions of privately to publicly owned lands immediately adjacent to the lakes are 50% private at Chaplin, 60% private at Old Wives and 95% private at Reed Lake. The approximately 7 $km^2$ Chaplin Heritage Marsh is owned by the Heritage Marsh Partners and managed by Ducks Unlimited Canada (Sect. 1.3.8).

Apart from a usually narrow band of grassland between mud flats and cultivated field, the only large and functional native grasslands immediately adjacent to the lakes are those held under a grazing lease at Chaplin Lake. The other narrow grassland strips bordering the lakes tend to be invaded by exotics (e.g. smooth brome grass), subject to eroded soil deposition by wind, or low in plant biodiversity due to the lack of the diversifying influence of grazing (e.g. Groskorth 1998, Sect. 6.2.2.2.).

## 6.2 Historical land use.

The Wood River watershed is part of a large block of land claimed under Treaty No. 4 which was signed in 1874. The watershed lies close to the eastern slope of Palliser's Triangle, an arid region of southern Saskatchewan and Alberta which Palliser correctly declared as marginally if at all suitable to European-style agriculture. The settlement history for southwestern Saskatchewan was compiled by Potyondi (1995), and this included the Wood River watershed.

When John Palliser traversed the Moose Jaw Creek area in 1858, immediately east of the Wood River watershed, Palliser recorded in his notebook that the "...whole region as far as the eye could reach was covered by buffalo, in bands varying from hundreds to thousands" at an estimated density of 3-4 individuals per KM2. Although bison may have been absent from the Palliser triangle between 5000 and 2500 B.C., and again between 500 to 1300 A.D., these herds clearly had a pervasive ecological influence on this region of the northern Great Plains. These herds apparently practiced on their own schedule the most recently advocated grazing strategy of intense grazing mixed with rest.

At such high densities, bison rapidly denuded the grasslands over which they passed. Some range ecologists speculate that the remaining grasslands in Prairie Canada today may be in better condition on average than grasslands at the time of the bison. Palliser likened their denuding impact to locusts and recorded in his notes his concern for food for the horses after a herd had passed through an area (Potyondi 1995).

Gradually, after the Hudson's Bay Company sent Henry Kelsey to explore the northern prairies in 1691, trading took place by the Hudson's Bay Company and subsidiaries of the rival American Fur Company. Between 1830 and 1880 hunting by Métis became prominent; they traditionally made two military-style expeditions into the region from their permanent settlements in today's southern Manitoba.

The Saskatchewan portion of the Palliser Triangle was occupied by the allied Indian Nations of Assiniboine, Saulteaux and Plains Cree. Potyondi (1995:19-20) writes:

"Isaac Cowie, a young apprentice clerk with the Hudson's Bay company, records the historical richness of the local game and fur resources. In 1868, he traded at his Wood Mountain post for '485 prime buffalo robes, 22 buffalo bosses, 79 buffalo tongues, 21 prime badgers, 1 grizzly bear, 21 red foxes, 132 kitt [swift] foxes, 16 hares (jackrabbits), 3 skunks, 1 wolverine [and] 59 wolves.' Between mid-century and at least the 1870s the Assiniboine dominated this area, although Cowie also mentions trading at Wood Mountain in the Saulteaux (Ojibway) language. To the northwest, Old Wives Lake offered equal abundance. Cowie, visiting an outpost of Fort Qu'Appelle at Old Wives Lake in 1868, said that the post's inventory comprised 90 buffalo robes, 70 buffalo tongues, 5 badgers, 5 red foxes, 20 kitt foxes, 1 lynx and 20 wolves. He also noted that 'the ground seemed to be honeycombed with badger holes.' This northerly country, according to a map drawn by members of Palliser's expedition, was Cree territory."

[5] Where the area is large enough to make the impact of edge low, and where herbivory, predation, dispersal, pollination and other community level processes are able to operate.

Once live bison became scare, their scattered and bleached bones were profitably sent to the 'American' mid-west for their phosphate, required as fertilizer and in sugar refineries. This bony endeavor become especially lucrative after the Canadian Pacific Railway reached the region in 1881.

Determined to find another economic activity for Palliser's Triangle after the loss of the "keystone" bison, the Canadian Government introduced a liberal and attractive grazing lease policy in 1881. The markets had and continued to have dramatic impacts on this frontier economy. For instance, an outbreak of anthrax in Britain lead to import of North American beef. Canadian beef became even more desirable after the British learned of an outbreak of pleuropneumonia in the 'American' herds.

As is often the case in public administration, the design of new initiatives is strongly influenced by prevailing approaches and customs of the time. So it was for prairie settlement. In Sir Wilfried Laurier's second term in office, in the rush to unify Canada right across to the West Coast, he spared no cost to settle the prairies and to achieve an economic integration to solidify Canada's stronghold on the region. In this haste, there was little regard for environmental or sustainability concerns, even if these had been recognized at the time (Potyondi 1995).

The extensive land use and sparse occupation of the grasslands under a ranching economy seemed not to satisfy the eastern Canadian urge to settle and claim once and for all Canada's West.[6] In 1886, a druggist-entomologist-fruit breeder was retained by the Canadian Government to make recommendations on how to best prosper from prairie agriculture. A series of agriculture stations was conceived, and the first, Indian Head near Regina, was established in 1890. The Saskatchewan Department of Agriculture was formed in 1905 and data were gathered. Mixed farming was hailed as the path to success. Settlement and essentially free land was aggressively promoted, such that by 1916 the human population in southwest Saskatchewan had nearly quadrupled in 10 years.

If competition from American ranchers who blatantly ignored Canadian range laws, and a decimating winter of 1906-07 was not enough, the ranching economy of the Palliser Triangle was dealt a final blow with the introduction of the Dominion Lands Act in 1908. This act encouraged farming by allocating extra land, beyond the 160 acres per farmstead as was customary outside of the arid Palliser Triangle.

It soon became apparent that Palliser's doubts about the suitability of the plains to European-style farming was warranted. Severe water limitation was soon recognized and "summer fallowing" was hailed as the technique of choice, growing crops only twice in three, or once in two years. This practice conserved moisture but predisposed the soil to erosion by wind and water. The moisture holding capacity of the soil was further weakened by loss of organic matter that had been accumulated over 10,000 years and halved in 50 years.

The drought of 1918-22 was to be expected at some time as we now know (e.g. Nemanishen 1998), but it was different in that it lasted longer. By 1919, southwestern farmers were farming dust. The economic devastation and the personal pain to many families was enormous. While farmers paid limited attention to the advice by agricultural specialists during the exuberant settlement years, the hardship made them receptive to scientific knowledge. A "Better Farming Conference" in Swift Current in 1920 lead to many extension activities, including a "better farming train" which stopped frequently across the country for experts to deliver advice and answer questions. The Prairie Farm Rehabilitation Administration was conceived at this time and officially created in 1935.

In many ways, settlement of the prairies is not over, but it continues to this very day and beyond. When a new (economic) force came to bear, or when sustainability challenges had to be faced, practices were merely amended reacting to what was in existence. Agricultural research and extension played an important role, as it does today. In the 1920s, summer fallowing was advocated by experts who reached local farmers via the "better farming train." Today, the mode of communication is pamphlets, TV and the internet.

In Potyondi's Chapter entitled "Lessons taught in vain," he concludes that "The more things change... The more they stay the same." One element of "same" relevant to the birds in the Wood River watershed may be the difficulty in accounting for broad (eco)systems-based limitations and the

[6] If history repeats itself, what is today's equivalent to the prairie-settlement-panacea 100 years ago? Is it globalization?

forging of solutions that consider many system elements broadly and holistically. The 'creative tension' between the two strategies of adapting what works on the one hand, and starting fundamentally new, might be more often critically examined. This could be done to advantage in a planning exercise, including this plan.

## 6.3 Current land use.

There is one Indian Reserve, Wood Mountain First Nation, in the extreme southeast of the watershed. The band is Lakota, included in the Sioux linguistic group The Wood River watershed is one of the largest areas in Saskatchewan that was settled by French Canadians.

**6.3.1 Farming.** Of the 12 rural municipalities within crop district 3A-N, 6 are located within the Wood River watershed and these districts include Chaplin and Old Wives lakes. According to 1997 statistics from this crop district, 646,344 acres of land were in wheat, 62,580 in oat, barley or rye, 17,755 in flax, and 49,396 in canola. There were 36,800 beef cows (excluding bulls, steers and heifers), 200 milk cows, 4,900 pigs, and 800 sheep; this does not include specialty crops (e.g. lentils) or specialty livestock (e.g. elk).

**6.3.2 Ranching.** Before the considerable decline of the ranching economy in Saskatchewan's southwest, the Turkey Track Ranch was a major ranch with headquarters on Notukeu Creek. Two other major ranches and some family operations existed near the Wood Mountain R.C.M.P. outpost in the southeast of the watershed.

Although ranching is a minority land use in the watershed as compared to farming, ranching has a much greater potential for conservation than the prevailing factory-without-a-roof style farming. The exceptions to extensive cultivation are low lying and sandy areas near Chaplin and Old Wives lakes, and the 'breaks' of the Wood Mountain and Pinto Butte highlands in the extreme southern part of the watershed. Thus, most of the cattle are held on farms, where they may graze small parcels of land too steep to cultivate, spend their summers on range in community pastures (Sect. 1.3.11), range over stubble fields after harvest picking up waste grain, or are "finished" in feedlots prior to "shipping." Gayton (1991) estimated from 1986 statistics that less than 25% of cattle owners in Saskatchewan derived their primary income from cattle.

In general, and there are clearly exceptions, the contribution to biodiversity of native grasslands on farms is limited because the sites are highly fragmented. Also, when a family's main income is derived from grain production, attention is often diverted from the careful range management needed to sustain both the ranch and grassland life. For instance, fall and winter range "rested" during the summer growing season provides cover for breeding birds requiring mid-high grass cover. There are few large ranches in the watershed. Some exist immediately south of the watershed along the Frenchman River, and most are west near the Cypress Hills.

Gayton (1991) analyzed range condition in Saskatchewan broadly from a variety of agricultural statistics. This indirect approach was apparently necessary because the data recorded even for public lands are insufficient to properly analyze land use, grazing and range vegetation trends. According to this analysis, declining cattle and improved grain prices were linked to a "massive conversion of native rangeland into annual cropland" in the late 1970s and early 1980s (Gayton 1991:107). When grain prices declined again in the late 1980s, more and larger-bodied breeds of cattle exerted increasing pressure on the remaining native and seeded grasslands. Given that native grasslands require an estimated 55 years to return to their original condition, some lands were re-seeded to absorb some of the increased demand for grazing. Still, Gayton concluded that Saskatchewan rangelands were in a deteriorating condition at the time.

Currently, there is no single Public Lands policy for Saskatchewan. However, there are diverse attempts, especially in grasslands, to improve range condition on all public lands. The impetus comes from the recognition that range in good to excellent condition serves as 'drought proofing' for the periodic dry years that are an inevitable part of the ecosystem. Once destroyed, range takes decades to recover.

In a nearly 100-year-old tradition of agricultural extension in Saskatchewan, the Grazing and Pasture Technology Program is a joint government and industry funded program. Interestingly, this program has neither stick nor carrot to affect

grazing strategies. According to Zoheir Abouguendia (pers. comm.), the most effective way to raise a producer's awareness is to have one producer talk to another producer, not 'expert' to producer. This strategy may be fruitfully employed in 'community conservation' planning for IBA. [7]

**6.3.3 Minerals extraction.** In 1948, the Saskatchewan Government established a plant at Chaplin Lake as a Crown Corporation called Saskatchewan Minerals (see picture collage). This corporation was to extract sodium sulfate from Chaplin Lake and, in 1968, from Ingebright Lake. In 1988, Saskatchewan Minerals was purchased by Dickenson Mines Ltd., who also own properties in New Brunswick, Ontario and South Dakota.

Sodium sulfate is used primarily in powder laundry and dishwasher detergent, but also in carpet deodorizer, modified corn starches, textile dying, glass making, kraft paper and mineral in livestock feed. For extraction, Chaplin Lake west of Hwy. 58 is divided into five sections called divisions through dikes, one of which is shown on Fig. 7. During the warm summer months, water is pumped from the lake into five large reservoirs. Here, evaporation takes place and when further facilitated by the cool autumn temperatures, the salts crystallize into what is known as Glauber's salt. The remaining magnesium, chloride, water and impurities are drained back into the lake and the sodium sulfate is stockpiled for gradual purification and dehydration throughout the year. The 145,000 ton annual product is then shipped by rail or truck to markets in North America and the Pacific Rim. At its current rate of production, Chaplin Lake has enough reserves to allow extraction for another 15-20 years (Saskatchewan Minerals no date).

**6.3.4 Oil and gas extraction.** There is apparently limited, if any, oil or gas extraction potential in the watershed. There are, however, at least 700 km of pipelines that cris-cross the watershed for local energy supply or long-distance transport (Fung et al. 1999). There are potential gold deposits at the west end of the watershed, and diamond in the south end (Fung et al. 1999). Nature Saskatchewan has a policy statement on oil and gas exploration, development and delivery, prepared in 1998. Given the considerable impact this activity has, Nature Saskatchewan believes that rather than developing new reserves of natural gas and oil at such rapid pace, governments and industry should emphasize the conservation of energy and alternative energy sources.

**6.3.5 Brine shrimp harvest.** There is a commercial harvesting operation at Chaplin Lake, by Murex Aqua Foods Inc. (or Artemia Canada Inc.). Frozen adult brine shrimp are shipped around the world and serve as aquarium fish food. Also, shrimp eggs are harvested and sold to commercial aqua culture enterprises. There, the 250,000 eggs per gram are encouraged to hatch and are grown to feed fish or shrimp destined for human consumption. Given that the harvest is balanced with the shorebirds' interest in mind, this operation can serve to ensure that conditions at the lake are favorable for Artemia, and serve as a monitor of shrimp population health at Chaplin Lake.

**6.3.6 Tourism[8].** The Wood River watershed lies in the Southwest tourist region. Within the watershed, there are four regional parks, eight campgrounds, and five Bed & Breakfast. Grasslands National Park lies just outside of the watershed to the south. In keeping with a rich tradition, there are 16 local museums and 1 provincial historic site (Sect 7).

[7] In some sense, this may be happening in the Wood River watershed. Observing the involvement of the people of Chaplin and the surrounding community during a "Shorebird ecology and conservation workshop," it was evident that the people had 'bought into' the value of the birds. The enormous bird concentrations there and the international connections which the birds provided had clearly been noticed. This interest was bolstered by a vision to capitalize on the tourism potential which the birds help provide, in an effort to bolster the threatened rural community. If this ecological, social and economic tie can come to fruition, this will be noticed by other communities

[8] "Tourism in Saskatchewan generates $1.14 billion annually for the provincial economy, employs 42,000 Saskatchewan people, and is the province's fourth largest economic sector. By 2010, it is expected to employ 65,000 workers and to generate revenues o $2 billion annually. " (Saskatoon Sun, 4 June 2000, p. 17).

Acairn east of Mossbank, maintained by the Saskatchewan History and Folklore Society Inc., bears the following text: This cairn is dedicated in memory of those who served at No. 2 Bombing and Gunnery School, Mossbank, during World War II.

Between October 28, 1940 and December 15, 1944 the school trained 2,539 air bomber and 3,702 air gunner students of whom 3,493 were Canadians, 1,651 Australian, 755 British and 342 New Zealand airmen.

21 airmen and 1 airwoman died while serving at the school, and 1 construction worker was killed in its making.

The school's proud motto "Aim well — shoot straight" perpetuates the dedication and purpose of these airmen and women to maintain democracy and restore peace throughout the world.

The people of Chaplin and surrounding area have decided to make a concerted effort to develop tourism opportunities that focus on Chaplin Lake and its natural heritage. Chaplin Tourism Inc. started in 1995. An Interpretation Centre was built, which drew 24,000 in 1999.

Shamrock Park (Fig. 1) is an attractive park that is underutilized compared to what it has to offer or can sustain. The park has a swimming pool, confectionery, campground, picnic area and golf course. Thomson Lake Park is a large park with year-round residency, situated around the Thomson Lake reservoir.

## 6.4 Conservation management achieved at the sites

This section highlights activities by some organizations that are active and visible in the watershed. This list is likely far from complete even including Section 1.3. Most of all, this list does not give due credit to the day-to-day choices people make in their own lives that advance - or discourage - conservation one step at a time. One is reminded by the sage advice of unknown origin '...to heed only the important things in live, but to know that all things important are small.'

There are several specific conservation or research projects in place that address all or parts of one of the lakes, or all or parts of the watershed (Table 6), in addition to the programs outlined in Section 1.3. There may be a need to consider how conservation efforts for one group of species may be detrimental to others, in at least two aspects. 1) Given the threat from botulism to ducks and other birds, and the particular importance of Chaplin Lake for shorebirds and tourism, it may be advisable to refrain from any action that increases crowding at Chaplin Lake. This is particularly important for the late summer early autumn periods. 2) Chaplin Lake is one of few strongholds for Piping Plovers. In view of the danger to plovers from gull predation, the creation of islands or water management that creates islands suitable for nesting by California or Ring-billed Gulls should be avoided.

Some organizations and their activities deserve special mention here. Ducks Unlimited

Table 6. Overview of different programs that are in place in parts or all of the Wood River Watershed.

| Conservation measures | Lakes | | | Water-shed |
|---|---|---|---|---|
| | Chaplin | Old Wives | Reed | |
| **Protection for IBA species** | | | | |
| Federal and Provincial Acts (Sect. 1.3.1) | X | X | X | X |
| Migratory Bird Sanctuary | | X | | |
| **Protection for IBA** | | | | |
| Representative Area Network, Sask. Env. & Resource Management (Sect. 1.3.1) | X | X | | |
| Community pastures, Sask. Pasture Program (Sect. 1.3.10) | X | X | | X |
| **Conventions** | | | | |
| Canadian Biodiversity Strategy (Sect. 1.3.2) | X | X | X | |
| W. Hemisphere Shorebird Reserve (Sect. 1.3.3) | X | X | X | |
| **Research, management and monitoring** | | | | |
| Botulism Working Group, Prairie Habitat Joint Venture (Sect. 8.5) | | X | | |
| Nature Conservancy of Canada | | | | X |
| Nature Saskatchewan, Operation Burrowing Owl | | | | X |
| N. American Waterfowl Management Plan Ducks Unlimited Canada (Sect. 1.3.8) | X | | | X |
| Prairie Shorebird Monitoring Canadian Wildlife Service (Sect. 1.3.6) | X | X | X | |
| Saskatchewan Wetland Conservation Corporation | X | X | X | X |

Canada has a long and active presence in the watershed. From the 1950s until the mid 1980s, Ducks Unlimited Canada's activities within the Wood River watershed were based on securing and enhancing permanent wetland habitat for breeding, moulting and staging waterfowl. From the mid 1980s to the present, strategies focused on encouraging land use practices which benefit waterfowl and other wildlife by improving habitat through the provision of upland nesting cover, securement of small wetlands, and by encouraging sustainable land use practices that provide soil and water conservation benefits. Extension program options include winter cereals promotion and development, forage production and management, grazing management, and the provision of "flushing bars" to protect nesting birds from injury during hay cutting. Modified agriculture options include the conversion of cropland to forages and managed grazing. Intensive programs are implemented in areas with the highest capabilities for waterfowl production and include purchase and lease of existing native habitat, hay land, pasture, and cultivated land, which is then converted to nesting cover. Conservation easements and the restoration, enhancement and creation of wetlands are other options included as intensive programs. Policy initiatives that promote sustainable land use and provide wildlife benefits are also being pursued by Ducks Unlimited Canada (Fig. 12).

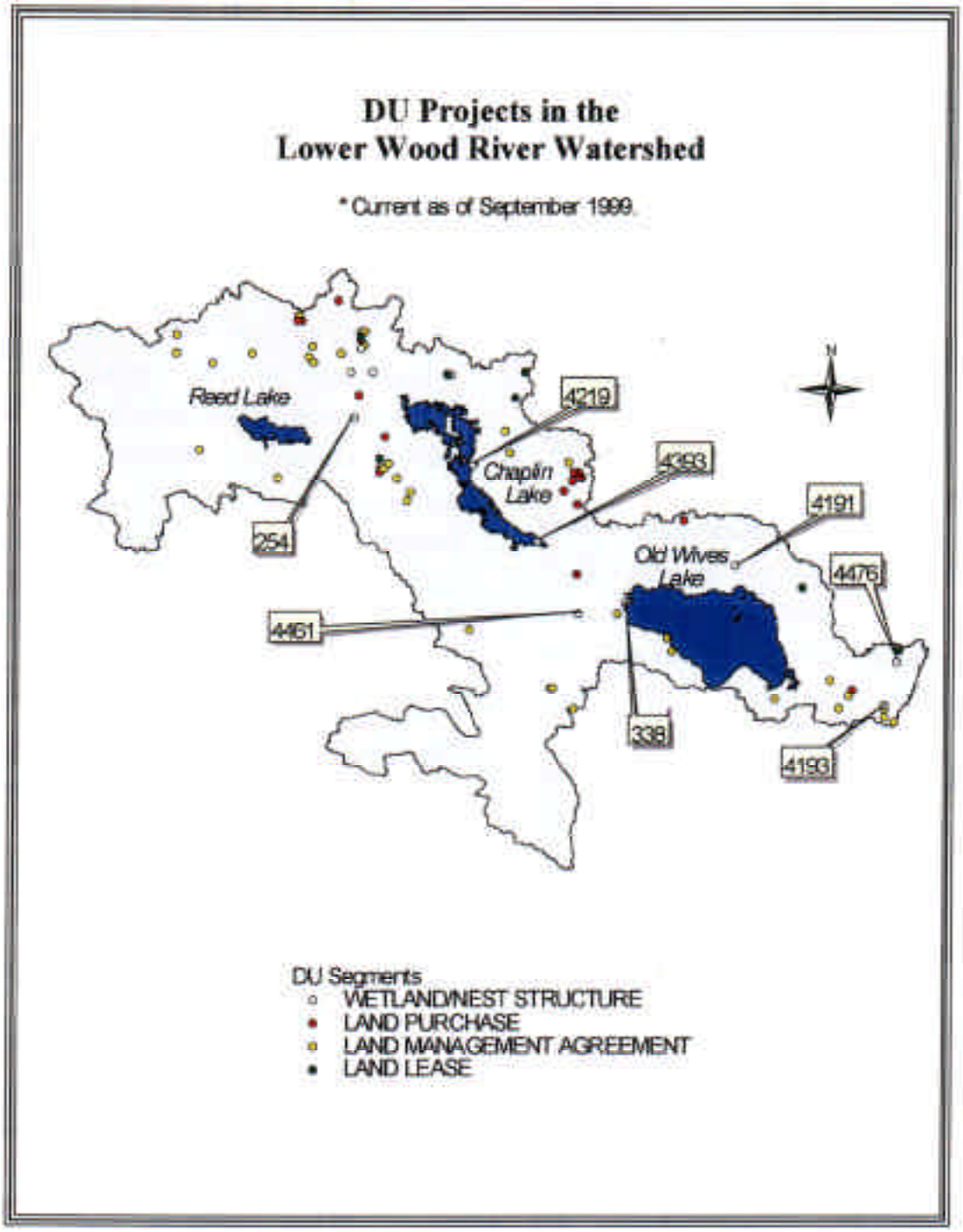
The Saskatchewan Wetland Conservation Corporation is actively working with Towns and RMs to promote tourism opportunities for Chaplin and Reed lakes, and would like to get more involved at Old Wives Lake. "Wetland" also has riparian habitat restoration projects underway at selected sites in the watershed (e.g. Huel 1998, see picture collage). Wetland's mission is "To lead and coordinate the province's wetland conservation initiatives to ensure the sustainability and biodiversity of the prairie environment for people and wildlife."

## 6.5 Stakeholders.

A minimum list of stakeholders is as follows:

Botulism Working Group (Sect. 8.5)
Canadian Wildlife Service (Sect. 1.3.1, 1.3.2, 1.3.4, 1.3.5-7)
Chaplin Tourism Inc. (Sect. 7.1, 7.3)
Dickenson Mines Ltd./Sask Minerals (Sect. 1.3.12.1, 6.3.3, 7.3, 8.3)
Ducks Unlimited Canada (Sect. 1.3.7, 1.3.8, & below)
Murex Canada Inc. (Sect. 6.3.5)
Morse Tourism (Sect. 7.1)
Native Plant Society (Sect. 5)
Nature Conservancy of Canada
Nature Saskatchewan (Sect 4.2.12, Appendix 2)
Sask. Ag. & Food (Sect. 1.3.11, 6.3.1, 6.3.2, 7.5)
Sask. Env. & Resource Manage. (Sect. 1.3.1, 1.3.12.3, 7.2, 7.5)
Sask. Pasture Program (Sect. 1.3.11, 7.4, 8.6)
Sask. Stock Growers Association (Sect. 1.3.10, 6.3.2)
Sask. Tourism (Sect. 6.3.6, 7.1)
Sask. Wetland Cons. Corp. (Sect. 6.4, 7.1)
R.M. of Chaplin (Sect. 8.9)
R.M. of Hillsborough (Old Wives L., Sect 8.9)
R.M. of Morse (Reed Lake, Sect 8.9)
R.M. of Shamrock (Chaplin Lake)
R.M. of Rodgers (Old Wives Lake, Sect. 8.9)
Regional Parks (Sect 6.3.6)
Towns

Fig. 12. Ducks Unlimited Canada Projects in the Wood River Watershed.



# 7 Opportunities

If the birds in the IBA do not exist in isolation of the people, and vice versa, and if people and birds are not independent of the ecosystem, then the aim of this conservation plan will be well served by pointing out those circumstances which can help the combined cause of conservation and quality of human life.

When a local resident and councilor of the R.M. of Morse learned about the IBA goals for Reed Lake, he illustrated the potential that exists for mutual benefit by birds and people. In the short conversation, he shared several important local sentiments: "I've lived here for so many years and never realized that so many kinds of birds use this lake, and that bird watchers will come some distance to visit the lake. If people want to come here, we should make it attractive for them and offer them a quality experience while the town can benefit from the added business."

## 7.1 Bird Trails

Chaplin Lake, combined with Old Wives and Reed lakes, may soon become a major "anchor point" in Saskatchewan's budding Bird Trail network. "Bird Trails" have been established in many parts of the world. In these trails, birds are the theme used to attract visitors and to realize tourism opportunities. Bird watchers have become the largest of nature-loving groups. Bird watchers, or birders, look for birds to identify them as a primary hobby, ornithologists study birds professionally, and naturalists appreciate birds and other living things as members of larger living communities in their environments. The Bird Trail initiative is part of Saskatchewan's Ecotourism strategy, complemented by an Agritourism strategy (Pam Wight and Associates 1998).

In Saskatchewan, 648,000 people aged 15 or older participated in nature-related activities in 1996, for a total of 41 million person-days and an expenditure of $388 million. Wildlife viewing on nature-related trips was reported by 15.1% of Saskatchewan residents (Filion et al. 1991).

Based on experiences in other areas, several requirements enhance a trail's success. Access must be appropriate - Chaplin and Reed lakes abut the Trans-Canada Highway and all three lakes are only 2-3 h from three major cities in Saskatchewan. Opportunities for physical activity should be provided. Information on birds, natural history and other elements should be provided - Chaplin Tourism Inc. operates an interpretive centre now and offers tours along dikes and shores of the lake. Visitors should be tolerated or welcomed by local residents. Guidelines should be drafted to minimize ecological impact. Promotion and marketing should be both effective and realistic. Rewards should be shared with the local community. Services should be available and linkages to other attractions enhance success (Pam Wight and Associates 1998).

## 7.2 Hunting and fishing

While some conservationists hold the need for protecting biodiversity and ecosystems above all else - a cause that needs no justification, others are pragmatic (e.g. Merchant 1992). Given diverse interests and stakes in society, it certainly is easier to mobilize action the greater the supporters.

According to Filion et al. (1993), 22.6% of Saskatchewan residents fish and 6.2% hunt. Both hunting and fishing is practiced in the Wood River watershed. The need for water quality and human health has been outlined (1.3.11.3), and this issue is more pressing when people fish recreationally and take their catch to the table. It is a devastating condemnation of our time that we have allowed pollution to go so far as to make wild-caught fish dangerous to eat - proof of the soiling of the only planet we have.

In addition to using hunters and fishers as allies in the cause to mobilize action, there is a largely unexplored opportunity for community-based conservation. North American-style wildlife management assumes that hunters and fishers need merely to obey regulations and have no role to play beyond that. Instead, hunters and fishers could focus on a given area, and with the guidance of biologists and landowners, could make significant wildlife management contributions. For example, they could reimburse landowners for planting cover strips, for leaving unharvested grain as winter food, and they could help plant shelterbelts. This area-hunter focus is practiced in deer hunting in parts of Wisconsin, with appropriate signage provided by the state.

Canada has a tradition of public ownership of wildlife. A recent erosion of this tradition (White

2000) is of considerable concern to hunters and biologists alike. Hunters cannot pay landowners for the wildlife harvested, but in some cases in Saskatchewan hunters pay indirectly, for access to land. There are some concerns in such a system that need to be carefully negotiated. However, an adaptive-management-style pilot project could be initiated in the Wood River watershed, where pheasant hunting still holds some attraction.

In the watershed, there are some conflicts with hunters. The Wood River watershed was attractive for pheasant hunters in the past, because this southerly location was one of few places in Saskatchewan where pheasants survived the winter. While a province-wide pheasant restocking program had been abandoned in the 1980s, some local releases of pheasants are continuing (e.g. near Ponteix in 1999).

## 7.3 Chaplin Lake Interpretive Centre

The following report was prepared by Josh Bilyk (Projects Manager, Chaplin Tourism Inc., P0 Box 30, Chaplin, Saskatchewan SOH OVO), and presented at the Shorebird Ecology and Conservation Workshop at Chaplin on 25-27 May 1999.

In 1996, the Chaplin Tourism Committee was officially designated as a corporation, comprised of many energetic and goal-oriented individuals from the village of Chaplin. These local people, supported by the Saskatchewan Wetland Conservation Corporation (SWCC), had built the Interpretive Center that fall and officially opened it in the spring of 1997 (see picture Collage). Additional support had also been given for building a lookout tower, interpretive signs, and a short range FM radio station.

The location of the Centre along the Trans Canada Highway gives it excellent potential to be an important tourism area for the province. In 1997 the Interpretive Center hosted approximately 18,000 individuals, and 22,000 the following year. These numbers were reached with minimal advertising and the Centre is now being actively marketed with different tourist groups and a higher volume of traffic is expected in the future.

In the past, the building had been licensed to a local group of entrepreneurs to help run the programs. In 2000, staff will be hired by the Centre and the focus will be to provide more of an educational and interpretive experience. The information provided is about the birds, the salt extraction process used by Sask Minerals, and the commercial brine shrimp harvest. In addition to on-site displays, plans are to create a "traveling" display to be taken to schools.

To enhance these experiences, several other programs have been added to the Interpretive Centre. A horse drawn wagon tour will travel along the shoreline and dike system to allow visitors a closer view of the wildlife that utilizes the lake. Also, in 1999 two interactive CD driven touch-screen computers were located in the Center to heighten the experience of the participants. The CD included information on the Chaplin area, the shorebird species that migrate and breed in the area, and the industries that have benefited from the geology and biology of the area. Finally, a new addition to the Centre was a six-foot replica of an American Avocet. Two local individuals had constructed this giant bird, displayed in front of the Interpretive Centre, and plan to construct a Piping Plover and Sanderling.

Community involvement is key to long term success with this project. Volunteer support has been high in and around the village of Chaplin. Local residents, the Chaplin School, landowners, the Chaplin Tourism Committee, the Village of Chaplin, the local Rural Municipality, Saskatchewan Minerals, Saskatchewan Wetland Conservation Corporation, Ducks Unlimited Canada, Saskatchewan Environment and Resource Management, the Canadian Wildlife Service and the IBA Community Action Fund have supported many of the projects.

The mandate of the Interpretive Centre is to increase awareness to school groups, local landowners and tourists of the importance of the area. Providing a positive and informative experience to these groups is essential in educating these groups on the importance of this area, its wildlife and conservation in general. In order to get full support and ensure success, it is important to include local people and organizing committees to help direct a project of this magnitude. It has been demonstrated that this area is a world class birding site, and that ecotourism generates interest, involvement and awareness.

7.4 Saskatchewan Minerals.

The salt extraction by Saskatchewan Minerals may represent one of the rare examples of how an industry can favor bird conservation without apparently causing an imbalance. An essential element of salt extraction is to maintain reservoirs of increasing salinity where water evaporation takes place. Given the special adaptations by brine shrimp for such conditions, their density is high. The carefully managed evaporation process ensures that a source of food is available for the migrant shorebirds, predictably so each spring and fall. The water management in place ensures that this food is present regardless of the naturally variable water supply in the region.

## 7.5 Range Management.

Of six community pastures in the Wood River watershed, four surround Chaplin Lake (Fig. 7, Sect. 1.3.11). These pastures offer considerable protection to the shores, and excellent upland and some wetland habitat nearby. Without these adjacent uplands, the Chaplin Lake could not support as rich a bird community as it now has (Wayne Harris, pers. comm.). This type of land use also provides ecological services through soil protection and enhancing water quality. In addition, these lands sustain a diverse biological community in a near natural state.

Prairie conservationists are increasingly coming to accept that prairie ecosystem conservation and ranching have much in common (Schmutz 1994, Page 1997, van Tighem 2000). The nature of benefit depends on the grazing management strategies employed. Groskorth (1998) has shown that plant biodiversity in the mixed grasslands of Saskatchewan actually peaked in the "fair" to "good" range categories (Fig. 13). This conclusion was corroborated by Bai et al. (1998) who examined sites in the mixed, moist mixed and aspen parkland ecoregions.

Grassland ecosystems have evolved under the influence of grazers, from the large and once numerous bison to mice (voles) and grasshoppers. For this reason the link between grazing, biodiversity and ecosystem stability is not surprising. While the goals of range management are to maintain good-excellent range condition - to the right of the biodiversity peak - most pastures in practice include nearly the full spectrum of conditions. Despite attempts to achieve even grazing pressure, cattle will overuse some areas (near water, salt blocks or gates) and underuse others. This within-pasture-diversity in range condition is also fortuitous, because some species prefer slightly overgrazed sites (Horned Larks, Richardson's ground squirrels and grasshoppers), and others underutilized sites (mice and voles, Baird's Sparrow). The result is a complex and interdependent prairie ecosystem where human use is an integral part.

The criticisms that have been raised by some against beef 'producers' have been mostly directed at the feedlot segment of the long production chain from cow-calf operator to consumer. Feeding grain to cattle is highly inefficient and costly from an environmental point of view. The feedlot "finishing" process could be much shorter than in prevailing practice. The grassland conservation opportunity arising from a well managed traditional ranch is potentially enormous.

## 7.5 Crown lands.

Crown-owned grasslands represent a conservation opportunity in perpetuity. Here, land uses should be buffered from short-term market signals that could undermine grassland conservation. Crown-owned lands also represent an opportunity for incorporating societal benefits, such as biodiversity conservation, recreation, and land and water quality. The conservation of these lands is critical given how much has been lost.

According to Gayton (1991) the exact area of each of tall-, mixed-, and fescue grasslands and aspen parkland with fescue that remains is unknown. Using Canadian Wheat Board statistics and adding acreage for provincial and PFRA community pastures, he estimated that approximately 11.3 million acres of native rangeland remain in

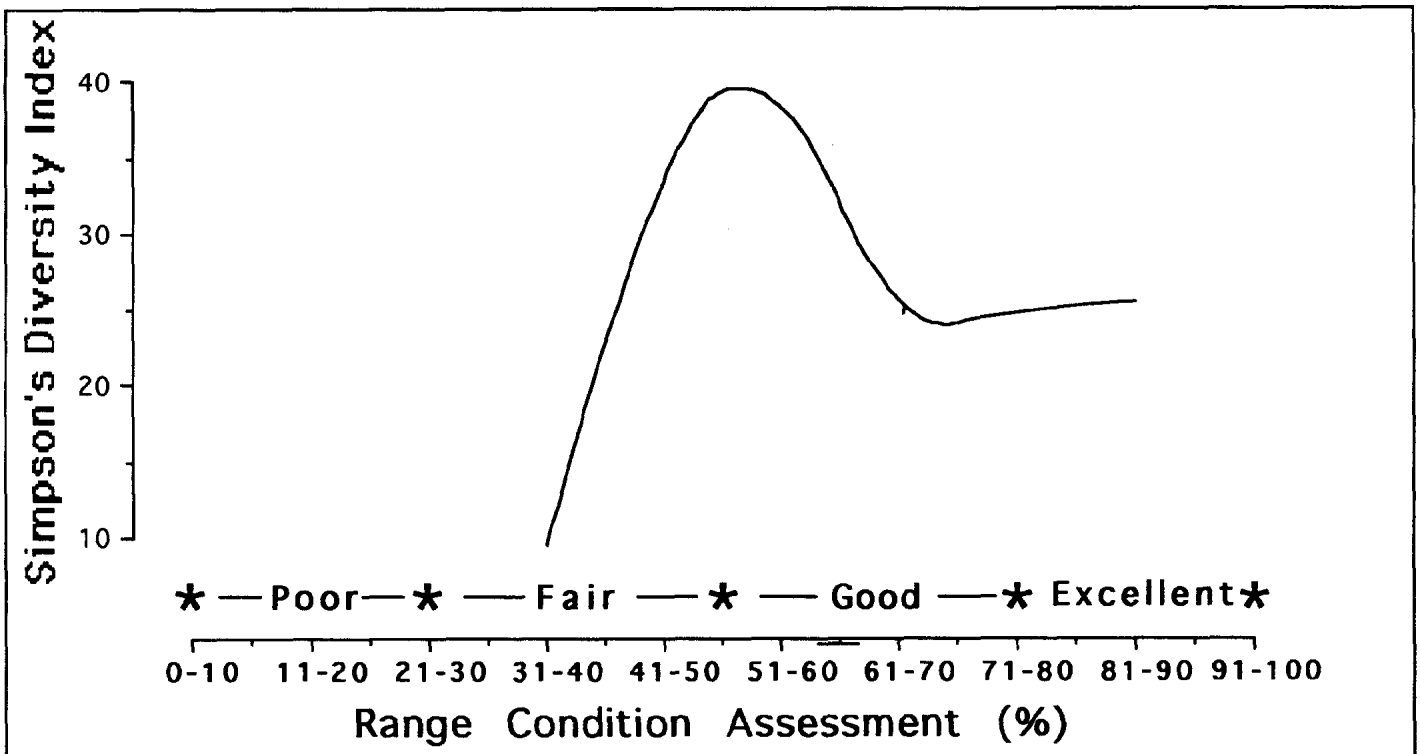



Figure 13. Species diversity estimates from study plots in the Saskatchewan mixed grass ecoregion are compared with a standard method in which range condition is assessed. Although the two methods measure communities slightly differently, the data do show a generally accepted trend of peak diversity under fair to good range condition.

Saskatchewan. This represents only 17% of the provinces original area of grassland.

According to Thornton et al. (1995), "the Saskatchewan government, through Saskatchewan Rural Development [now Saskatchewan Agriculture and Food], owns and administers over 9 million acres (36,423 km$^2$) of Crown land designated as 'agricultural.' Included in those 9 million acres are over 7 million acres of grazing land. Saskatchewan Rural Development estimates that more than 95% of their grazing land are native range. The Prairie Farm Rehabilitation Administration holds title to over 1.3 million acres of Saskatchewan grazing land. They estimate that 80% of their titled acres remain as native rangeland." Together, they administer 68% of Saskatchewan's native grasslands.

Because most of Saskatchewan's extensive grasslands are Crown-owned, public land policy is highly relevant to grassland conservation. Saskatchewan's Wildlife Habitat Protection Act is one tool for protection that includes 3.4 million acres. This Wildlife Habitat Land ensures that the land cannot be sold by the government, but allows oil and natural gas extraction, electrical-, radio-, and telecommunication transmission lines, livestock grazing, haying, and cultivation where the land had been cultivated prior to inclusion in the 1970s or 1980s. This designation only offers nominal protection, but the concern was that more far-reaching protection would not have passed cabinet at the time (Thornton et al. 1995).

Various policies threaten the conservation-minded administration of Crown lands. Lands that are not Wildlife Habitat Land or otherwise encumbered are for sale with the purpose to "improve the equity base for farm operation and agriculture in Saskatchewan" (Thornton et al. 1995). Range improvement assistance may, according to Thornton et al. (1995), reward mismanagement by encouraging overgrazing through the subsequently reduced lease rates. Another option is the conversion of native range to tame pasture. Finally, when the government moved from a land tax based on the land's produc-

tion capacity to one based on the land's market value, taxes on marginal lands increased out of proportion to other lands. This placed pressure on extensive ranchers to recover this extra cost somehow (Panel, Fifth Prairie Conservation and Endangered Species Conference, Saskatoon, 22 Feb. 1998).

Thornton et al. (1995) challenge that the "policy governing the management of federal and provincial grazing lands should be rewritten to reflect public rather than solely agricultural interests." The Saskatchewan Round Table on the Environment and Economy (1991:23) suggested that "Governments and agricultural producers must develop programs and policies to ensure the sustainable use of grazing resources" to

"1. Develop management plans for all grazing lands to ensure sustainable use of grazing resources and to achieve multiple land use objectives.

2. Manage all remaining native rangelands to maintain Saskatchewan's biological diversity. Restore damaged areas to productive rangelands.

3. Retain grazing policies and programs that support retention of native prairie ecosystems."

Saskatchewan Agriculture and Food has created a Crown Land Stakeholder's Forum with the mandate "To provide advice to the Department on agricultural Crown land policy development that helps promote the sustainable and integrated use of Crown land while providing opportunities for diversification and economic growth." This forum was to help draft a new policy to replace land lease legislation coined in the 1960s. The inaugural meeting was held on 9-10 February 2000, followed by a meeting on 12-13 April. The committee overseeing the forum is given a two-year period within which to review accomplishments and make recommendations.

# 8 Threats

## 8.1 Shorebirds year-round.

Many species of shorebirds are facing population declines in North America. Sixteen species of shorebirds are on the decline, 1 is increasing, 15 remain unchanged and 15 have inadequate information to judge (Harrington 1999). In Canada, two thirds of the species of shorebirds show a downward trend (Dickson 1999). Threats that have been identified at a continental level include non-consumptive uses of shores by people leading to disturbances and energy losses by shorebirds, shore developments, shrimp farming, and coastal impoundments (Harrington 1999). For instance, 90% of the coastal salt marsh acreage in the United States has been drained for mosquito management using ditches. In actuality, only about 5% of the drained area actually supported many mosquitoes. Changes are now in place to focus mosquito management more precisely. This represents an example of how knowledge of a species' ecology can save time and effort, and also reduce harm to the environment, through cooperation and conservation (Harrington 1999).

Gonzales and Vega (1999) have outlined how runoff from chemical agriculture, the depletion of shorebird food from shrimp farming, lead shot used in hunting, and wildlife depletion through local consumption have impacted shorebirds along the coast of Sinaloa, Mexico. Sinaloa in particular and Mexico in general provides critical habitat to some short- and long-distance shorebird migrants. It has been estimated that one third of the shorebirds that winter in the Pacific coastal region of North America occur in two bays in Sinaloa. Here, industrial farming and aqua culture have increased rapidly after the North American Free Trade Treaty was signed. Hergott (1999) further outlines, but offers no source for the statistics cited, how shrimp aqua culture in over 50 countries from Thailand to Honduras satisfies increasing European and North American consumer demand, but threatens ecosystems and human social justice. Often an industrial scale shrimp food harvest places pressure on the food chain, and waters are over fertilized with waste. A prominent Indian environmentalist, Vandana Shiva, has calculated that for the 15 harvesting and 50 security jobs created in big scale aqua culture, as many as 50,000 people have their traditional uses of the land and sea impacted. According to Sallaberry (1999), increasing tourism opportunities are encroaching on important staging areas in Chile, where this industry is unregulated.

## 8.2 A Complex of large and small wetlands. [10]

The 22 species of shorebirds that migrate across the prairies to their northern nesting grounds concentrate in spectacular numbers at 18 sites across the prairies, of which Chaplin, Old Wives and Reed lakes are a part. However, countless small wetlands also support many shorebirds. Combined, these modest spots may be of critical importance. While the spectacular staging sites are critical for many migratory species, conservation should not stop there. Management strategies should complement the natural history of the species. For instance, long-distance migrating shorebirds stop and fatten at specific staging areas and then fly non-stop 2,000-3,000 km relying on the fat gained (Harrington 1999). Others, move in a broad front and make frequent stops to re-fuel. This broad-front and frequent-stops type of migration appears to be more prevalent on the Great Plains than along the coastal migration routes east or west (Skagen and Knopf 1993). Also, the species that exhibit this pattern tend to be smaller in size. They cannot store as much fat as larger-bodied shorebirds and also cannot fly as far without replenishing reserves.

According to Alan R. Smith's (1996) bird atlas, sightings since 1966 for all of the three sandpipers mentioned extend over much of southern Saskatchewan. On a map of the province, where any observation within an area on a 1:50,000 map sheet was plotted, there were sightings of Semipalmated Sandpipers on 93 maps, Sanderlings on 85 maps and Baird's Sandpiper on 91 maps. While this method of reporting sightings affords a single sandpiper the same weight as 100, it does illustrate that the birds move over a broad front. This is only to reiterate that our conservation focus should also include the many small wetlands for the benefit of shore-

[10] On 11 June 2000, Michael Williams and Stan Shadick observed 4 Black-necked Stilts at Francis Lake, north of Herbert. Also saw 1 Cinnamon Teal, 47 Red Knot, 3 Baird's Sandpiper and 30+ White-rumped Sandpipers. saw 1 Caspian Tern from the highway at Reed Lake.

birds, for wildlife in general, for recreation and for the ecological services these areas provide.

## 8.3 Water levels.

Beyersbergen and Duncan (1997) point out that declining water levels in the region could remove the episodic flooding that is important in flood plain dynamics. In the absence of flooding, plants may encroach on shorelines. Without a periodic and life-stimulating saturation of the soil with water, invertebrates may remain dormant in their resting stage. Climate change in the medium or long term is a concern.

During the drought of the 1980s, Chaplin Lake had a stable water source due to the sulfate extraction process, but Old Wives Lake and Reed Lake dried up. Thus, water management is both an opportunity but also presents a responsibility for bird-supportive management.

## 8.4 Water quality and health.

In southwestern Saskatchewan, precipitation is so low that impurities are rarely if ever flushed out of the ecosystem via the surface or subsurface water route. Salts, sediments and pollutants accumulate and drinking water for wildlife, livestock and humans is difficult to obtain. It has been shown that cattle gain weight more quickly when afforded good quality water (W. Wilms, Agric. & Agri-Food Canada), and there is no reason to think that this is not also important for birds. In southern Saskatchewan, 44% of the land is treated with pesticides annually, and this too is a serious threat to water quality and the health of people and other animals.

In a study in southern Saskatchewan, Donald et al. (1999) found that in early July the average number of types of pesticides detected in wetlands ranged from 1.8 in areas with less than 21 mm of rain during the previous 15 days, to 3.2 in areas with more rainfall. The high rainfall areas resulted in greater erosion. As many as 60% of the wetlands had at least one pesticide in amounts that exceeded Canadian guidelines for the protection of aquatic life. Lindane and triallate exceeded these guidelines most often (Donald et al. 1999).

The people of Gravelbourg receive their water from a reservoir constructed 11 km upstream on the Wood River. A failing water treatment plant was re-built in 1997 at a cost of $1,898,000 which is to be recovered by Sask Water through water charges over a 20-year period (Appendix 3).

The water has a displeasing taste due to high sulfate and dissolved organic carbon. In the process of chlorination, dissolved organic carbon characteristically gives rise to trihalomethane (Alan Cessna, National Water Research Institute, Saskatoon), which exists in the water above the regulatory limit recommended by Saskatchewan Environment and Resource Management. Sask Water hopes to inject potassium permanganate into the water to reduce those levels.

The water quality report by Sask Water presents data on inorganic ions but not pesticide residues and other complex-structure chemical pollutants. Tests for the presence of pesticides and pollutants in drinking water are very costly to conduct. The water reservoir, Thomson Lake, lies in a low to moderately erosion-prone crop production area (Fig. 6). In at least one instance, a local landowner reported that at a time when pesticides had been applied to nearby fields, strong winds blue dead fish to the shore. This incident has lowered the appeal of Thomson Lake as a fishing spot for local fishers.

Even when funds are available for studies of pesticide exposure through drinking water, the task is difficult at best. Environment and water quality experts in Canada and around the World are given the virtually impossible task of deciding whether a given chemical or practice is safe or not safe. The public demands answers in a simplistic science-based yes-or-no evidence style. This approach is hopelessly mismatched to the complex natural system in which the chemical finds itself. A yes-or-no conclusion is impossible because once a synthetic pesticide leaves the sprayer nozzle, it becomes virtually impossible to track. Furthermore, when a given concentration of a pesticide is studied for impact on a certain life stage (e.g. adult but not embryo) of a plant or animal in the controlled microcosm of a laboratory, this does not automatically reveal its impact on different life stages in nature, its impact under the simultaneous exposure of two or more pesticides, or the impact of multiple exposures (Donald et al. 1999). Detecting effects is furthermore complicated because symptoms of organopesticide exposure, for example,

are often similar and dismissed as the flu; because they selectively impact children (Duehring 1996); and because they can interact in unexpected ways with other body functions (Fairchild 1999).

Given the scenario outlined above, how can a community avoid being paralyzed with uncertainty and concern? From a planning point of view, more and 'better' studies alone are unlikely to contribute new insight. Alternative ways of knowing, combined with community inspired and co-operative solutions, may be more fruitful (e.g. Roberts et al. 1999). Often a simple logic critically applied can be a good guidepost for action. This kind of logic is not only held by experts in research institutions or government offices, but is also in evidence wherever Canadians have a healthy debate.

## 8.5 Botulism.

Botulism is a paralysis caused by a neurotoxin that prevents proper nerve impulse transmission. This neurotoxin protein is one of the most poisonous substances known. The toxin is produced by a group of bacteria that can persist for years in soil. The bacterial spores develop and grow, and during this growth exude the toxin. There are several preconditions that are necessary, but not sufficient in themselves, to cause the outbreak.

Information on botulism has been reviewed by Wobeser et al. (1998), including a description of the impact of this disease on birds, the ecological conditions required for outbreaks to occur, deficiencies in our understanding of the disease, and strategies for management and future research.

Wobeser (1998) summarizes the ecological web which an outbreak must weave in these steps:

- "Spores of toxigenic *Clostridium botulinum* are present.
- Spores 'encounter' suitable substrate.
- Spore growth and toxin production occur.
- Susceptible bird(s) encounter and ingest toxin.
- Bird is intoxicated and dies.
- Spores of toxigenic *C. botulinum* are present in carcass.
- Maggots and other invertebrates develop in carcass.
- Carcass persists until toxin-laden maggots develop.
- Bird(s) encounter and ingest toxin-maggots.
- Birds become intoxicated and die."

Each of these steps may have a certain probability of occurrence, that varies in time such that an overall probability attempts to capture the likelihood of occurrence.

The impact of botulism on wild birds has been particularly dramatic during the last decade, with reports of enormous deaths at the same lakes in western Canada and the U.S. However, botulism is not a new disease, it rises and subsides in a mix of changing preconditions. Some evidence suggests that it has occurred in western Canada for more than 80 years (Wobeser 1998). The form of this disease that affects humans has been known since records were kept by our founding cultures, arising from preserved meats. The particular bacteria that cause botulism in wetland birds seldom if ever causes this disease in humans (Leighton 1999).

The impact of botulism on wild birds has been documented since 1994 at Pakowki Lake in Alberta, Whitewater Lake in Manitoba, and Old Wives Lake in Saskatchewan. The counted or estimated numbers of birds killed at Old Wives Lake alone were 16,000 in 1994, 134,000 in 1996 and 1 million in 1997. Botulism is not restricted to Old Wives Lake in Saskatchewan but also occurs at other sites.

Leighton (1998:135) places this disease in a management perspective in this way:

> "... we must also wonder whether we ourselves have had some hand in these occurrences. Have the 70 and 80 and 90 percent of wetlands in North America that we have drained or otherwise destroyed during this century caused birds to congregate on the remaining marshes in high numbers that favor disease? Have we harried away the scavenging predators that once beat the maggots and bacteria to their prey? And whether we ourselves are guilty or blameless, how should we respond to botulism in wild birds? Although population trends are disturbingly downward, there still are some 80 million ducks in North America, 33 million or so just on the western prairies. We still shoot eight to ten million ducks each year. We might accept a strictly mathematical view that a few hundred thousand or a million ducks dying of botulism each year is, in the context of many millions, trivial. The possible poisoning

of rare animals like the Piping Plover could give us pause, but the precariousness of their grip on life has other more important causes."

Moulting flocks of ducks are particularly vulnerable to botulism poisoning at Old Wives Lake. At this stage in their annual cycle, the ducks concentrate in large flocks which predisposes them to the disease once it has started. Furthermore, the warm conditions in late summer also encourage the cycle of proliferation and death. This is a serious concern, which is being addressed from an information point of view by the Working Group on Avian Botulism. Botulism is a potentially serious problem. This IBA plan should lend support to the Working Group's initiative, and at the same time be vigilant toward bird crowding, further wetland reductions, or any other factors that could aggravate this problem. [11]

Because of its shallow water, its saline condition and therefore impoverished aquatic vegetation, Chaplin Lake is not very attractive for moulting or staging waterfowl. Although the Chaplin Heritage Marsh may bring waterfowl and shorebirds in greater contact, this marsh is largely important for brood rearing and thus botulism may pose a minor threat.

## 8.6 Trampling by cattle.

Cattle gathering in large numbers on beaches can be detrimental to Piping Plovers by altering substrate layers from an even layer of moist soil that attract insects and allows some probing, to ridges of dry soil interspersed with wet foot prints. Also, when foot prints are deep, recently hatched young can fall into them and eventually die (Richardson 1999). In some cases, management efforts have resorted to excluding cattle through selective fencing. This can also be disadvantageous by providing roosting sites for avian predators and altering vegetation structure in time. Perhaps the most effective scheme is to use herd management strategies to minimize impact, such as the timing of grazing, and the re-location of salt blocks, rubbing posts and gates that are favorite gathering sites.

Trampling by cattle at Chaplin Lake is likely a minor threat (c.f. Beyersbergen, and Duncan no date) because a primary nesting area (the west basin) is not used for grazing, and because the highly saline water is not very attractive to cattle. Skeel et al. (1996) identified cattle trampling as a more serious concern at other nesting areas in the region. At Chaplin Lake, the eastern shore may be an area of concern and should be monitored.

The potential harm of cattle trampling was increased during dry years when range cattle were able to walk throughout the dry Old Wives Lake bed. They were walking among the occupied bird nests on Isle of Bays and this should be avoided on this Wildlife Sanctuary.

## 8.7 Predation.

Predation is clearly a natural process, but it's balancing factors can be out of synchrony when ecosystems change. Chaplin Lake is traditionally a dense nesting area for Piping Plovers. Here plovers should continue to have priority for management. Chaplin Lake does not have islands attractive for nesting gulls. Gulls can consume plover eggs and young. A few islands originally built within the Heritage Marsh were removed in February 2000 to discourage gulls from nesting and to reduce the likelihood of botulism outbreaks. These islands apparently were not much used by ducks anyway.

## 8.8 Exotic species.

With the advent of increased transportation around the globe, and intended and unintended imports of species, the "homogenization" of the World's species brings both benefit and harm. This challenge, with examples of serious damage in some cases, is living proof of the validity of community ecology, or of the contention that species rarely exist or function in isolation of other species in the community to which they belong. Species can play an integral part in one community and be a serious pest in another. Given the presence of the Trans-Canada Highway so close to both Chaplin and

[11] This botulinum-host-lake system is vaguely reminiscent of a chaotic system which largely defies simple determinism but is sensitive to elusive initial conditions (e.g. Gleick 1987). Anursery rhyme illustrates a sensitivity by some complex systems to subtle initial conditions as follows: For want of a nail, the shoe was lost. For want of a shoe, the horse was lost. For want of a horse, the rider was lost. For want of a rider, the battle was lost. For want of a battle, the king was lost.

It may be difficult, if not futile, to try to monitor all "nails" for their looseness (or ponds for botulism-favorable conditions), or for the likelihood that a "lost nail" may shift a system into an alternate state (botulism outbreak). Perhaps the best we can do is to plan to have more than one king (many different suitable wetlands).

Reed lakes, the close presence of this transport artery can be an added threat. Leafy spurge is one such threat to local grassland communities.

David Pimentel and others have summarized the dilemma of alien species, as described in the following report (full report available at http://www.news.cornell.edu/releases/Jan99/species_costs.html).

A few bad actors among the more than 30,000 non-indigenous species in the United States cost $123 billion a year in economic losses, Cornell University ecologists estimate.

"It doesn't take many trouble-makers to cause tremendous damage," Cornell University ecologist David Pimentel says of a list that runs from alien weeds (cost: $35.5 billion) and introduced insects ($20 billion) to human disease-causing organisms ($6.5 billion) and even the mongoose ($50 million ). (See accompanying list, "25 Unwelcome Visitors.") Aside from the economic costs, he adds, more than 40 percent of species on the U.S. Department of the Interior's endangered or threatened species lists are at risk primarily because of non-indigenous species.

Pimentel, who presented his findings today (Jan. 24, 1999) at the annual meeting of the American Association for the Advancement of Science (AAAS) in Anaheim, Calif., noted, however, that "most introduced species of plants, animals and microorganisms have become widely accepted and even beneficial participants in our lives."

The researchers also acknowledged that 98 percent of the U.S. food supply comes from such introduced species as wheat, rice, domestic cattle and poultry with a value of more than $500 billion a year.

### 8.9 Accidents.

The Trans-Canada Highway touches points of the shores of both Chaplin and Reed lakes (see picture collage), and a major rail line lies only a few hundred metres away. This poses a threat in the event of a highway or rail accident, particularly if these were to involve a chemical spill. [12]

[12] On 9 June 2000, a semi truck hauling diesel fuel capsized along the Trans-Canada Highway between Chaplin and Reed lakes. The truck caught on fire. Local fire crews could not stop the fire but contained it keeping it from spreading.

8.10 Disturbance.

Increased tourism can bring with it increased disturbance. This needs to be managed. The impact of human disturbance can be to interfere with an animal's occupancy of cover which it occupies to escape from predators or the elements, to reduce an animals feeding time, or to prevent it from breeding. These impacts are often very difficult to detect and thus to avoid. A wildlife viewing code is presented in Appendix 3.

## 9 Conservation Goals and Objectives

"A conservation plan does not conservation make." This conservation plan is no different. It is mere stepping stones in the continuum from conservation goals to conservation action (Fig. 2). A purpose of this plan is to serve as a tool, by providing a description of ecosystem elements which are presumably critical for conserving the IBA birds, the IBA sites, the watershed and the people's quality way of life. The plan also outlines some goals. Some of these are daring in the sense that they go beyond what can be done today or tomorrow, and address pervasive ecosystem factors that are difficult to influence at best. If not here, where can these daring proposals be made? If none of the goals in this plan are pursued, but others are, the purpose of this plan is equally well served.

The term "community-based" conservation plan was well chosen by those who designed the IBA program for Canada. This approach is both visionary and current. With this plan completed, the ownership of the conservation initiative outlined here should now shift to the community with outsiders taking a facilitating role. It is likely that this is the only lasting way to achieve conservation on a broad and meaningful front.

Some of the conservation opportunities outlined had been well underway before this planning exercise started. For instance, Chaplin Tourism Inc. has been active, the Town of Morse is moving in this nature-tourism direction also; Ducks Unlimited Canada has been present; the Saskatchewan Wetland Conservation Corporation has achieved restoration of small segments of the

Wood River; the Grazing and Pasture Technology program has alerted farmers and ranchers of the drought-proofing value of well-maintained native range, and so on. A positive humanist perspective would suggest that every person in the watershed has tried to move causes forward, resisting personal interests and other obstacles in life to varying degrees. This plan hopes to boost these activities by encouraging participants to align their efforts for a greater goal and greater effectiveness.

To facilitate conservation of the described and many other undescribed ecosystem features, the lake and mud flat habitats, the riparian drainage system and the functioning native grasslands, where they still exist, should be protected. Since many of the natural features and ecosystem functions are still in place at the sites, firstly the status quo might be maintained. An immediate second consideration might be the possibility that factors released in the past are still to have an impact in the future. This might include the invasion of exotics in the native ecosystem, climate change effects, and high input agriculture. In the event of such delayed actions, the management for status quo should be appropriately amended.

## 9.1 Management goals

**Goal 1.** Maintain native grasslands where these exist, particularly near Chaplin, Old Wives and Reed lakes for specific species, biodiversity in general and ecosystem health benefits.

**Action 1**. Continue to manage these lands with bird use of the lakes' shores in mind.

**Action 2.** Make biodiversity and ecosystem health considerations explicit in the management goals of the publicly-owned community pastures, in addition to economic considerations (Sect. 7.5).

**Action 3**. Prevent use of the lakes' mud flats and islands by cattle during the bird nesting season, including dry years (Sect. 8.6), through adjustments in grazing rotation and strategic placement of drinking water.

**Goal 2.** Re-establish permanent cover in the erosion prone zones near lakes, river, creeks and ponds, to act as a filter for surface runoff (Sect. 1.3.12.3), to reduce floods, to store moisture and to bolster the landscape's resilience in the event of increased water stress due to climate change.

**Action 1.** Make creative use of community supported agriculture, voluntary stewardship, and economic incentives to re-establish permanent cover (Appendix 4).

**Action 2.** Identify priority areas for permanent cover restoration through GIS and field surveys.

**Goal 3.** Strive for equitable distribution of water for both Chaplin and Old Wives lakes.

**Action 1**. Maintain adequate water coverage on both lakes when possible.

**Action 2.** In the event of extreme water shortages, consider giving priority to Chaplin Lake. Maintaining adequate water depths there has several important benefits including the brine shrimp and their bird consumers, the Chaplin Heritage Marsh, Murex Aqua Foods Inc. and Sask Minerals' salt extraction.

**Goal 4**. Maintain or improve water quality.

**Action 1.** Discourage the dumping of oil, garbage or sewage in prone runoff or ground water recharge areas.

**Action 2.** Encourage the relocation of corrals and other intensive livestock concentration sites away from riparian habitats.

**Action 3.** Use strategically placed permanent cover as a filter for pesticides, fertilizers and natural salts, see Goal 2.

**Goal 5.** Be vigilant to change and adapt management strategies based on research/monitoring results and bird or ecosystem trends.

**Action 1.** The Champion for this plan should take primary responsibility for sharing information and calling meetings of stakeholders to discuss events, opportunities and threats.

## 9.2 Infrastructure goals

**Goal 6:** Facilitate tourism potential involving Chaplin, Old Wives and Reed lakes, local parks and other opportunities in the watershed (Appendix 4). Develop tourism as a quality experience with an educational feature.

**Action 1:** Support ongoing initiatives in Chaplin, Morse, Shamrock Park, Thomson Lake, Gravelbourg and others.

**Action 2:** Encourage Sask Tourism to provide support for the region as originally planned in the Great Trails initiative, by advertising provincially, nationally and internationally, and by pro-

viding information in pamphlet and telephone format that encourages people to visit the region.

**Action 3.** Design signage and stopping facilities along the Trans Canada Highway to advertise local opportunities.

**Action 4:** Design a Festival or other event that can become an annual event at the same time and possibly same place each year. Consider that every region needs both a few attractive events/sites that serve as a drawing card and many smaller quality opportunities that are part of a network of tourism activity.

**Action 5:** Schedule regular workshops that are rewarding and educational. These could serve to encourage local and regional residents to participate in bird monitoring (Sect. 1.3.5).

Action 6: Monitor tourism activities and adapt as necessary to conform to minimum impact, long-term sustainability and overall success and reward for people involved.

**Goal 7.** Manage people such that visitors have a quality experience and feel welcome as guests without undue disturbance of the wildlife, without risking accidents and without damage to existing operations.

**Action 1.** Provide people with politely and well explained do's and don'ts.

**Action 2.** Provide signage to keep people off of dikes when not supervised, and out of pastures.

**Goal 8.** Encourage river and creek (riparian habitat) restoration to protect fish and other wildlife, plant communities, soil erosion and water quality in the region (Appendix 4). Individual residents in towns and rural areas have encouraged a move in this direction and these points of views should be bolstered and action facilitated.

**Action 1:** Design a creative mix of protected sites in a sustainable human food production- distribution- and consumption system whereby the riparian habitat and soil and water conservation are achieved (Appendix 4).

**Action 2:** Outline options and provide support whereby rural municipalities can move toward more effective refuse collection sites and waste recycling and humus production.

**Action 3:** Search for and encourage the adoption of appropriate policies and programs (e.g., permanent cover, livestock fencing, carbon sequestration, conservation easements).

**Action 4:** Identify special sites and/or landowners so inclined to encourage effective protection of many smaller water bodies that are an integral part of habitat and feeding sites for shore- and other birds, and of the water storage, ground water recharge and evaporation/precipitation cycle within the watershed.

## 9.3 Educational goals

**Goal 9:** Provide schools with appropriate resource materials so that teachers can easily incorporate bird and watershed ecology in their program.

**Action 1:** Invite teachers to workshops and other appropriate functions, and schedule these functions to allow teachers to participate.

**Action 2:** Produce lesson plans and/or provide teachers with other "props" to facilitate teaching that is consistent with the conservation planning message entailed in this report and other similar initiatives.

**Goal 10**. Encourage interpretation where possible within the watershed with messages that highlight the opportunities and threats to conservation of birds and other ecosystem components.

**Action 1:** Provide information and interpretive products for the Chaplin and future Interpretive Centers.

**Action 2.** Use local parks for interpretive events and permanent displays.

**Goal 11.** Promote stewardship through education and encourage events, activities or tours that will attract people from diverse backgrounds (local community, ranchers/farmers, naturalist, and food consumers generally) thus promoting healthy exchanges of ideas and common goals.

**Action 1.** Establishing a council (e.g. made up of local landowners, naturalists, teachers) to help local initiatives and create demonstration projects and (example http://www. ontariostewardship.org).

## 9.4 Research and information needs

**Goal 12:** Continue to monitor the timing and extent of use of Chaplin, Old Wives and Reed lakes by birds (see also Gratto-Trevor et al. 2000).

**Action 1.** Agencies with a responsibility for wildlife management should draft a long-term plan for monitoring shorebird use at all three lakes (CWS, DUC, NS, SWCC, SERM).

**Action 2.** Devise a regular and standardized

scheme which is followed by all insofar as possible.

**Goal 13.** Monitor trends in numbers and reproduction by resident breeding birds at Chaplin, Old Wives and Reed lakes, and on selected ponds and upland sites in the lower Wood River watershed.

**Action 1.** Encourage students at universities or in regional colleges to take on these projects. Assist in study design and fundraising.

**Goal 14:** Examine the movement patterns especially of shorebirds at Chaplin Lake. The birds move in and out of the reservoirs, and a better understanding of their movements may provide some insight of what alternate sites they require (e.g. fresh drinking water; Brian Harrington, pers. comm.).

**Goal 15.** Study botulism outbreaks as outlined by the Botulism Working Group.

**Action 1.** Explore preconditions that may influence outbreaks.

**Action 2.** Remain vigilant for and remove dead birds. This removal should be done even if it could be shown that such removal does not slow the spread of disease. The sight of dead and dying birds by visitors may detract from visitation potential.

**Goal 16**: Monitor trends in brine shrimp production at Chaplin Lake.

**Action 1.** Murex Aqua Foods Inc. may have the best data available that show long-term trends in brine shrimp production. Murex Aqua Foods Inc. may be able to monitor shrimp in the future in cooperation with SERM.

**Goal 17.** Study the invertebrate communities at Chaplin, Old Wives and Reed lakes as a critical resource for shorebirds. Document which functional groups may drive community dynamics to better understand the invertebrate communities themselves, to provide a benchmark for future monitoring and possibly to anticipate changes related water dynamics (e.g. global warming) and other changes.

**Action 1.** Encourage students at universities to launch such a project, help design this project and help to raise funding.

**Action 2.** Study the birds' food habits including prey taken, feeding sites, invertebrate densities and the timing of use, particularly by shorebirds.

**Goal 18.** Monitor water quality at the three lakes and of inflow down the Wood River, including salinity and pesticides.

# 10 Evaluating Success

This IBA program is a new conservation program in Canada. In its current form, it was designed with a ten-year vision, to 2008.

The participants of the Important Bird Area program in Saskatchewan and nationally will support this conservation process. These participants and local stakeholders should be ever vigilant for opportunities to support the local initiatives where possible. Most importantly, however, a local "champion" should be identified for each area and perhaps for special goals. It is hoped that these champions will accept some ownership for this initiative and keep the ball rolling, and never cease to be vigilant for threats and for opportunities for conservation support.

Local champions are:

Clem Millars, Chaplin Tourism Committee, for Chaplin Lake

Lloyd & Marjorie Nagel, Hunters Paradise Outfitting, for Old Wives Lake

Louis Stringer & Raymond Lizée, Town of Gravelbourg, for Wood River

Laurie Wilson, Morse Tourism Association, for Reed Lake

# 11 Acknowledgments

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The IBA Advisory Committee members helped select IBA sites for conservation planning: Gregg Brewster, Stephen Davis, Frank Roy, Margaret Skeel and Alan R. Smith.

This specific plan also owes its existence to the local people who have cared and employed good judgment for which the birds are able to reside at the lake today. We are grateful to the person's listed here who have agreed to participate in this conservation planning in their professional or private capacity (see Appendix 1).

This report has been greatly improved by the following people by providing input over the telephone, by attending meetings and by carefully reviewing versions of the manuscript: Gerard W. Beyersbergen, Gregg J. Brewster, Terry Chamulak, Stephen K. Davis, Trevor Dyck, David Gleim, Gordon Hallborg, Brian Harrington, Wayne C. Harris, Jo-Anne Hochbaum, Raymond Lizée, Ian McGilp, Nolan Matthies, Clem Millars, Richard Nagel, Robert W. Nero, Margaret Skeel, Alan R. Smith, Louis Stringer, Dale Weisbrot, Laurie Wilson, and Earl Wiltse.

Darrel Cerkowniak, Sask. Land Resource Centre, Univ. of Sask., and Bill Sawchyn, Sask. Environment and Resource Management, and Ryan Cossitt, Saskatchewan Agriculture and Food produced the maps used in this report. Jeff Keith, Saskatchewan Conservation Data Centre, provided data and the map of threatened species. Terry Chamulak and Bart Oegema, of Sask Water, provided data, text and maps.

Information from the Canadian IBA Database was provided by the Canadian BirdLife International co-partners, Bird Studies Canada and the Canadian Nature Federation. Updated information can be obtained by contacting Bird Studies Canada (see Appendix 2).

# 12 References

Alexander, S. A., Hobson, K. A. Gratto-Trevor, C. L. and Diamond, A. W. 1996. Conventional and isotopic determinations of shorebird diets at an inland stopover: the importance of invertebrates and *Potamogeton pectinatus* tubers. Can. J. Zool. 74:1057-1068.

Anonymous. 1986. North American Waterfowl Management Plan: A strategy for cooperation. Minister of Environment, Supplies and Services Canada, Ottawa.

Anonymous. 1995. Canadian biodiversity strategy: Canada's response to the Convention on Biological Diversity. Minister of Supply and Services Canada, Environment Canada, Ottawa.

Anonymous. 1999. Draft (18 March): Canadian Shorebird Conservation Plan. Canadian Shorebird Conservation Plan Management Board, Canadian Council of Wildlife Ministers, Environment Canada, Ottawa.

Bai Y., Abouguendia, Z. and Redmann, R. E. 1998. Effect of grazing on plant species diversity of grasslands in Saskatchewan. Grazing and biodiversity workshop, Regina. Mar 24.

Bellrose, F. C. 1976. Ducks, geese and swans of North America. Wildlife Management Institute, Stackpole Books, Harrisburg, PA, U.S.A.

Beyersbergen, G., and Duncan, D. 1995. Shorebird abundance and migration at Chaplin, Old Wives and Reed lakes, Saskatchewan. Internal Canadian Wildlife Service Report, Edmonton, AB

Beyersbergen, G., and Duncan, D. 1997. Western Hemisphere Shorebird Reserve Network: Site identification questionnaire.

Burger, J. and Gochfeld, M. 1994. Franklin's Gull (Larus pipixcan). Pages 1-27 in Alan Poole and

Frank Gill Eds., The Birds of North America, No. 116. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Canadian Landbird Conservation Working Group. 1996. Framework for Landbird Conservation in Canada. Canadian Landbird Conservation Working Group, c/o Partners in Flight-Canada, Hull, P.Q.,

Clayton, K. M., and Schmutz, J. K. 1999. Is the decline of burrowing owls *Speotyto cunicularia* in prairie Canada linked to changes in Great Plains ecosystems? Bird Conservation International 9: 163-185.

Coote, D. R., and Gregorich, L. J., Eds. 2000. The health of our water: Toward sustainable agriculture in Canada. Publication 2020/E, Research Branch, Agriculture and Agri-Food Canada.

Demoskoff, G. 1999. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Dickson, H. L. 1999. Shorebirds in the prairies - population status and management issues & challenges. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Dickson, H. L. and McKeating, G. 1993. Wetland management for shorebirds and other species - experiences on the Canadian prairies. Transactions of the 58th North American Wildlife and Natural Resources Conference, p. 370-377.

Donald, D. B., Syrgiannis J., Hunter F. and Weiss G. 1999. Agricultural pesticides threaten the ecological integrity of northern prairie wetlands. Science of the Total Environment 231(2-3):173-181.

Duehring, C. 1996. Pesticides cause multiple chemical sensitivities and other chronic problems. Our Toxic Times, December, p. 22.

Evans, R. M., and Knopf, F. L. 1993. American White Pelican *Pelecanus erythrorhynchus.* Pages 1-20 in Alan Poole and Frank Gill Eds., The Birds of North America, No 172. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Fairchild, W. L. 1999. Does an association between pesticide use and subsequent declines in catch of Atlantic Salmon (*Salmo salar*) represent a case of endocrine disruption? Environmental Health Perspectives 107:349-357.

Filion, F. L., DuWors, E., Boxall, P., Bouchard, P., Reid, R., Gray, P. A., Bath, A., Jacquemot, A., and Legare, G. 1993. The importance of wildlife to Canadians: Highlights of the 1991 survey. Environment Canada, Supplies and Services, Ottawa. See also http://www.ec.gc.ca/nature/survey.htm

Foster, J. 1978. Working for wildlife: The beginning of preservation in Canada. University of Toronto Press, Toronto, ON.

Fung, K., Barry, B. and Wilson, M., Eds. 1999. Atlas of Saskatchewan. University of Saskatchewan, Saskatoon, SK.

Gallagher, T. 1999. Mission accomplished. Living Bird 18(3):8-16.

Gayton, D. V. 1991. Grazing pressure on Saskatchewan Rangelands. Rangelands 13(3):107-108.

Gonzales, M.A., and Vega, X. 1999. Shorebird conservation in the coastal region of the state of Sinaloa, Mexico. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Gratto-Trevor, C. L. 1992. Semipalmated sandpiper Calidris pusilla. Pages 1-19 in Alan Poole and Frank Gill Eds., The Birds of North America, No 6. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Gratto-Trevor, C., Beyersbergen, G., Dickson, L., Erickson, P., McFarlane, R., Raillard, M., and Sadler, T. 2000. Prairie Canada Shorebird Conservation Plan: Draft February 2000. Canadian Wildlife Service.

Gratto-Trevor, C. L. , and Dickson, H. L. 1994. Confirmation of elliptical migration in a population of Semipalmated Sandpipers. Wilson Bull. 106:78-90.

Groskorth, L. 1998. Range condition assessment. Chapter 4 in G. Wayne Pepper and David A. Gauthier, eds. Saskatchewan biodiversity study. Canadian Plains Research Center, University of Regina.

Haig, S. M. 1992. Piping plover Charadrius melodus. Pages 1-17 in Alan Poole and Frank Gill Eds., The Birds of North America, No 2. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Hammer, U. T. 1986. Saline ecosystems of the World. Dr. W. Junk Publishers, Boston, MA, U.S.A.

Hammer, U. T., and Haynes, R. C. The saline lakes of Saskatchewan: II. Locale, Hydrography and other physical aspects. Int. Revue ges. Hydrobiol. 63:179-203. 1978.

Hanson, L., and A. R. Smith. 2000. Great Blue Heron Colonies in Saskatchewan in 1999, a preliminary inventory. Blue Jay 58:81-85.

Harrington, B. 1999. Introduction and a generalized picture of shorebird migrations: The need for management. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Haug, E. A., Millsap, B. A. and Martell, M. S. Burrowing owl (Speotyto cunicularia). In Alan Poole and Frank Gill, Eds., The Birds of North America, No. 61, The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists Union, Washington, D.C. 1993.

Hergott, L. 1998. Shrimp: The deadly cash crop. Saskatchewan Environmental Society Newsletter, Saskatoon, SK, Sept./Oct 1998:3.

Hjertaas, P. 1998. My experience in moving 2 nests of Piping Plovers. Blue Jay 56:147-150.

Hlasny, R. 1998. Status report on the bigmouth buffalo (*Ictiobus cyprinellus*) in Saskatchewan. Fish and Wildlife Branch, Saskatchewan Environment and Resource Management, Regina, SK.

Houston, C. S. 1966. Need for pelican protection. Blue Jay 24:123.

Houston, C. S. 1970. Saskatchewan bird banders - Bard. Blue Jay 28:150-156.

Houston, C. S. 1971. Recent Saskatchewan banding of the double-crested cormorant. Blue Jay 29:74-79.

Houston, C. S. 1974. South American recoveries of Franklin's Gulls and Swainson's Hawks banded in Saskatchewan. Blue Jay 32:156-157.

Houston, C. S. 1999. Decline in upland sandpiper populations: History and interpretations. Blue Jay 57:136-142.

Houston, C. S, and Schmutz, J. K. 1999. Changes in bird populations on Canadian grasslands. Studies in Avian Biology No. 19:87-94.

Huel, D. 1998. Streambank stewardship: Your guide to caring for riparian areas in Saskatchewan. Saskatchewan Wetland Conservation Corporation.

Knight, L. 1970. Newspaper articles. Moose Jaw Times Herald, Moose Jaw, SK

Knopf, F. L. , and Samson, F. B., Eds. 1997. Ecology and conservation of Great Plains vertebrates. Springer Verlag, New York.

Kramer, T. 1986. Mental health and the workplace project: Evaluation Phase II/Phase III. Can. Mental Health Association, Toronto, ON.

Leighton, T. 1999. Trouble in the swamp: An essay on avian botulism. Blue Jay 57:131-135.

Limpert, R. J., and Earnst, S.L. 1994. Tundra swan (Cygnus columbianus). Pages 1-20 in Alan Poole and Frank Gill Eds., The Birds of North America, No. 89. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

McKnight, K. 1999. Developing a shorebird conservation plan for Mexico. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Merchant, C. 1992. Radical ecology: The search for a livable World. Routledge, Chapman & Hall, Inc., New York.

Morrison, R. I. G., Bourget A, Butler R.W., . Dickson H.L., Gratto-Trevor C.L., Hicklin P.W., Hyslop, C. and Ross R.K. 1994. A preliminary assessment of the status of shorebird populations in Canada. Progress Notes No. 208, Canadian Wildlife Service, Ottawa, ON.

Morrison, R. I. G., Butler, R.W., Beyersbergen, G.W., Dickson, H.L., Bourget, A, Hicklin, P.W., Goossen, J.P., Ross, R.K. and Gratto-Trevor, C.L. 1995. Potential Western Hemisphere Shorebird Reserve Network sites for shorebirds in Canada: Second edition 1995. Canadian Wildlife Service Technical Report Series No. 227, Canadian Wildlife Service, Ottawa, ON, 104 p.

Morrison, R. I. G., and Ross, R.K. 1989. Atlas of Nearctic shorebirds on the coasts of South America. Special Publication, Canadian Wildlife Service, Edmonton, AB. 128 pp.

Nature Saskatchewan. 1998. Oil and natural gas exploration, development and delivery: A Nature Saskatchewan perspective. Position Statement, Nature Saskatchewan, Regina.

Nero, R. W., Lahrman, F. W., and Bard, F.G. 1958. Dry-land nest site of a Western Grebe colony. Auk 75:347-349.

Nemanishen, W. 1998. Drought in the Palliser Triangle. Prairie Farm Rehabilitation Administration, Agriculture and Agri-Food Canada, Ottawa.

Nevitte, N. 1996. The decline of deference: Canadian value change in cross-national perspective. Broadview Press, Peterborough, ON.

Nieman, D. J., and Isbister, R. J. 1973. The Migratory Bird Sanctuaries in Saskatchewan. Unpubl. Report, Canadian Wildlife Service, Saskatoon, SK.

North American Waterfowl Management Plan Committee. 1998. Expanding the vision: 1998 update. North American Waterfowl Management Plan, U.S. Department of the Interior, SEMARNAP Mexico and Environment Canada.

Padbury, G. A., and Acton, D.F. Ecoregions of Saskatchewan. Central Survay and Mapping Agency, Regina, Canada. 1994

Page, J. 1997. Ranchers form a 'radical center' to protect wide-open spaces. Smithsonian 28(3):50-56, 58 & 60-61.

Page, G. W., Warriner, J.S. and J.C. and Paton, P.W.C. 1995. Snowy Plover (*Charadrius alexandrinus*). Pages 1-23 in Alan Poole and Frank Gill Eds., The Birds of North America, No. 154. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Pam Wight and Associates. Saskatchewan Bird Trail. Part 1: Framework strategy & Part 2: Community planning guide. Prepared by Pam Wight and Associates for Saskatchewan Wetland Conservation Corporation, Regina, SK, 1998.

Poston, B., Ealey, D. M., Taylor, P. S. and McKeating, G. B. 1990. Priority migratory bird habitats of Canada's prairie provinces. Canadian Wildlife Service, Edmonton, AB.

Potyondi, B. 1995. In Palliser's Triangle: Living in the grasslands 1850-1930. Purich Publishing, Saskatoon.

Raad, T., and Kenworthy, J. 1998. The US and us: Canadian cities are going the way of their US counterparts into car-dependent sprawl. Alternatives 24(1): 14-22.

Richards, A. 1988 Birds of the tideline: Shorebirds of the Northern Hemisphere. Dragon's World Ltd., Limpsfield, U.K.

Richardson, I. M. G. 1999. Predator exclosures: A management technique to increase Piping Plover (Charadrius melodus) reproductive success in the Canadian prairies. M. Sc. thesis, Department of Renewable Resources, University of Alberta, Edmonton, AB, 65 pp.

Roberts, W., MacRae, R. and Stahlbrand, L. 1999. Real food for a change: How the simple act of eating can boost your health and energy, knock out stress, revive your community and clean up the planet. Random House of Canada Publ., Ottawa.

Robinson, J. A., Oring, L. W., Skorupa, J. P. and Boettcher, R. 1997. American Avocet (Recurvirostra americana). Pages 1-32 in Alan Poole and Frank Gill Eds., The Birds of North America, No. 275. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists Union, Washington, D.C.

Roney, K. and Hlady, M. 1986. 1985 census of pelicans and cormorant colonies in Saskatchewan. Blue Jay 44:177-179.

Roney, K. and Longmuir, R. 1991 White pelican and double-crested cormorant nest census in Saskatchewan. Blue Jay 51:106-108.

Roy, J. F. 1996. Birds of the Elbow. Special Publication No. 21, Nature Saskatchewan, Regina, SK.

Sadler, T. 1999. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Sallaberry, M. 1999. Bird banding studies in Chile and Chaplin Lake, Saskatchewan. Presented at the Prairie Canada Shorebird Ecology and Conservation Workshop, Chaplin, SK, 25-29 May 1999.

Saskatchewan Minerals. No date. Answers to ten of the most-asked questions about Saskatchewan Minerals. Chaplin, SK.

Saskatchewan Round Table on the Environment and Economy. 1991. Conservation strategy for sustainable development in Saskatchewan. Public Affairs Branch, Regina, SK.

Saskatchewan Soil Survey. 1995. The soils of Hazel Dell, RM # 335, Saskatchewan. Saskatchewan Centre for Soil Research, University of Saskatchewan, Saskatoon, SK.

Schmutz, J. K. 1994. Endangered prairie birds and the range cow: Opportunities for cooperation. Pages 270-276 in Faisal K. Taha, Zoheir Abouguendia and P. Russ Horton, Eds. Managing Canadian Rangelands for Sustainability and Profitability. Grazing and Pasture Technology

Program, Regina, SK.

Skagen, S K., Sharpe, P. B., Waltermire, R.G. and Dillon, M. B. 1999. Biogeographical profiles of shorebird migration in midcontinental North America. Biological Science Report USGS/BRD/BSR-2000-2003, U.S. Government Printing Office, Denver, CO. USA. 167 pp.

Skeel, M. A., and Duncan, D. C. 1998. Population size and productivity of Piping Plovers at Lake Diefenbaker in relation to water level. Blue Jay 56:137-146.

Skeel, M. A., Duncan, D. C., and Wiltse, E. R. 1996. The 1996 International Piping Plover breeding census - Saskatchewan. Unpublished report, Saskatchewan Wetlands Cons. Corporation, Regina, SK.

Smith, A. R. 1996. Atlas of Saskatchewan birds. Special Publication No. 22, Nature Saskatchewan, Regina, SK.

Skagen, S. K., and Knopf, F. L. 1993. Toward conservation of mid-continental shorebird migrations. Conservation-Biology 7:533-541.

Thornton, F., Bowman, J. and Struthers, D. 1995. Agricultural policy review Part 4: Saskatchewan's Crown land policies. Blue Jay 53:1-14.

van Tighem, K. 2000. Hope on the range: Ranchers and conservationists ride to the rescue of Canada's prairie habitat. Nature Canada 28(2):34-40.

Weeks, P., and Packard, J. M. 1997. Acceptance of scientific management by natural resource dependent communities. Cons. Biol. 11:236-245.

White, Ed. 2000. Values collide on Prairie hunt farms. Western Producer, May 4, p 3 & 78-79.

Wilson, E. O. 1992. The diversity of life. W.W. Norton and Co., New York.

Wobeser, G. 1998. Report to the Prairie Habitat Joint Venture by the Working Group on Avian Botulism. Canadian Cooperative Wildlife Health Centre, Western College of Veterinary Medicine, Saskatoon, SK, 44 pp.

**Appendix 1.** Names, affiliation, contact information and general interests of individuals in connection with the Wood River Watershed IBAs. By letting their name appear here, these individuals have made no commitment beyond agreeing to be contacted when their participation is requested.

**Gerard Beyersbergen,** Canadian Wildlife Service, 4999 - 98 Avenue, Edmonton, AB, T6B 2X3; 780-951-8670 gerard.beyersbergen@ec.gc.ca
Interests: Gerry is a shorebird biologist responsible for monitoring shorebirds in the prairie region.

**Gregg Brewster,** Ducks Unlimited Canada, Box 4465, 1606 4th Avenue, Regina, SK, S4P 3W7; 306-569-0424 g_brewster@ducks.ca
Interests: Gregg is a wetland and waterfowl biologist familiar with for the region.

**Terry Chamulak,** Sask Water, 111 Fairford St. E., Moose Jaw, SK, S6H 7X9; 306-694-3746 tcha@saskwater.com
Interests: Terry is a hydrologist familiar with the region and its water-related issues.

**Trevor Dyck,** Prairie Farm Rehabilitation Administration, Box 1088, Swift Current, SK, S9H 3X3; 306-778-5005 pf21003@em.agr.ca
Interests: Trevor is the Land Manager for PFRA pastures in the region.

**David Gleim,** Artemia Canada Ltd., Chaplin, SK, S0H 0V0, 306-395-2591 murex.sk@sk.sympatico.ca
Interests: Dave is the Manager of Artemia Canada Ltd. and a member of Chaplin tourism.

**Gordon Hallborg**, Sask Minerals, P.O. Box 120, Chaplin, SK, S0H 0V0, Canada; 306-395-2561 saskmin@sk.sympatico.ca
Interests: Gordon is the Chaplin Plant Manager for Sask Minerals with many years of experience and familiarity with shorebirds and community interests.

**Brian Harrington,** Manomet Center for Conservation Sciences, PO Box 1770, Manomet, MA, 02345, U.S.A.; Tel. 508-224-6521 bharr@manomet.org
Interests: Brian is the Center's shorebird biologist responsible for the Western Hemisphere Shorebird Reserve Network

**Wayne C. Harris,** Sask. Env. and Resource Manage., 350 Cheadle Street W., Swift Current, SK, S9H 4G3; 778-8218 wayne.harris.erm@govmail.gov.sk.ca
Interests: Wayne is the Provincial Biologist for the grassland ecoregion and a naturalist with broad knowledge of species and ecosystems.

**Jo-Anne Hochbaum,** Sask. Environment & Resource Manage., 3211 Albert Street, Regina, SK, S4S 5W6; 306-787-2796 joanne.hochbaum.erm@govmail.gov.sk.ca
Interests: Jo-Anne is the Project Coordinator for SERM's Representative Areas Network. Joanne is on leave in 2000 but will return soon thereafter.

**Raymond Lizée,** 518 Main St., Gravelbourg, SK, S0H 1X0; 306-648-3333
Interests: Raymond owns the Electronic Studio Ltd. in Gravelbourg and is also very active in various community initiatives. He is Town Alderman, Chair of the Trans Canada Trail Association and has taken a lead in the Wood River Riparian Restoration project.

**Robert MacFarlane,** Nature Conservancy of Canada, 2022 Cornwall Street, Regina, SK, S4P 2K5; Tel: 306-787-0784 bobm@natureconservancy.ca
Interests: Bob is the Saskatchewan Regional Director for the Nature Conservancy of Canada.

**Ian McGilp,** Tourism Saskatchewan, 101 - 230 22nd Street E., Saskatoon, SK, S7K 0E9; 306-933-5746 ian.mcgilp@saktourism.com
Interests: Ian is in the Product Development Branch of Tourism Saskatchewan with a special interest in tourism in the region.

**Nolan Matthies,** Sask. Wetland Conservation Corp., Rm 202 - 2050 Cornwall Street, Regina, SK, S4P 2K5; 306-787-0726 nmatthies@wetland.sk.ca
Interests: Nolan is a committed birder who works for SWCC. He has been active in facilitating several tourism initiatives at Chaplin and Reed lakes.

**Clem Millars,** C.W. Millars Insurance Agency, P.O. Box 30, Chaplin, SK, S0H 0V0; Tel 306-395-2223
Interests: Clem and his wife Arlene own an insurance agency in Chaplin. They have been the co-founders

of Chaplin Tourism Inc. and are very active in promoting the interests of birds and tourism combined.

**Richard Nagel,** Shamrock Park Committee, Box 68, Palmer, Saskatchewan, S0H 3J0; Tel 306-648-2810
Interests: Richard and his wife Thelma farm near Old Wives Lake. Richard is a board member for Shamrock Regional Park.
**Lloyd and Marjorie Nagel,** Box 308, Mossbank, SK, S0H 3G0; 306-354-7789
Interests: Lloyd and his wife Marjorie farm south of Old Wives Lake. They also operate Hunters Paradise Outfitting, for hunting waterfowl in the area.

**Margaret Skeel,** Nature Saskatchewan, 1860 Lorne Street, Regina, SK, S4P 2L7; 306-780-9273 Fax 306-780-9263 mskeel@unibase.com
Interests: Margaret is the Program Coordinator for Nature Saskatchewan. In this role and with her strong interest in conservation, she helps deliver IBA-Saskatchewan.

**Louis Stringer,** Box 927, Gravelbourg, Saskatchewan, S0H 1X0; Tel. 306-648-2582
Interests: Louis is a lawyer and town councillor in Gravelbourg. He has been an enthusiastic supporter of local and regional community initiatives including tourism.

**Dale Weisbrot,** Sask. Pastures Program, 201 3085 Albert St., Regina, SK, S4S 0B1; 306-787-5013 dweisbrot@agr.gov.sk.ca
Interests: Dale is the Regional Manager for the Sask. Pastures Program. He is a member of the International Wildlife Habitat Committee of the Society for Range Management.

**Laurie Wilson,** Morse, SK, S0H 3C0; 306-629-3287
Interests: Laurie leads the Morse Birding Trail Project and with her husband Marc is promoting various community initiatives around Reed Lake.

**Earl Wiltse,** Sask. Environment & Resource Manage., 3211 Albert Street, Regina, SK, S4S 5W6; 306-787-2889 or 2464 earl.wiltse.erm@govmail.gov.sk.ca
Interests: Earl is SERM's Species at Risk Specialist. He also serves on the IBA advisory Board.

**Appendix 2:** Information on the lead organizations of the IBA Program

**BirdLife International** (Wellbrook Court, Girton Road, Cambridge, CB3 0NA, UK; birdlife@ECNET.ec)

A pioneer in its field, BirdLife International is the first non-government organization dedicated to promoting worldwide interest in and concern for the conservation of all birds and the special contribution they make to global biodiversity. BirdLife operates as a worldwide partnership with one or, in Canada's case, two lead organizations in each country. These organizations provide a link to on-the-ground conservation projects that involve local people with local expertise and knowledge. Since 1993, lead organizations from more than 40 countries have become full BirdLife partners.

Countries with a BirdLife partner or partner-designate in the Americas include Argentina, Belize, Bolivia, Canada, Chile, Ecuador, Paraguay, the United States and Venezuela. Other countries with non-voting representative organizations include the Bahamas, Cuba, El Salvador, Honduras, Mexico and Uruguay.

For further information about the Americas BirdLife Program, check the following web site: <http://www.birdlife1.org.ec/ingles.html>.

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

The **Canadian Nature Federation** (1 Nicholas Street, Ottawa, ON, K1N 7B7; www.cnf.ca)

The Canadian Nature Federation (CNF) is a national conservation organization with a mission to be Canada's voice for the protection of nature, its diversity, and the processes that sustain it. Initially established as the journal Canadian Nature by Reginald Whittemore in 1939, it evolved into a membership organization and became the Canadian Audubon Society in 1948. After consulting with members, the Society assumed a broader conservation mandate and became the Canadian Nature Federation (CNF) in 1971.

The CNF is Canada's voice for the naturalist community and works closely with provincial, territorial and local affiliated naturalists organizations, to directly reach 100,000 Canadians. The strength of this grassroots naturalists' network allows us to work effectively and knowledgeably on national conservation issues that affect a diversity of ecosystems and human populations in Canada. The CNF also works in partnership with other environmental organizations, government and industry wherever possible. CNF's approach is open and cooperative while remaining firm in our goal of developing ecologically-sound solutions to conservation problems.

The CNF's approach is based on the philosophy that natural ecosystems are vital to humans and a healthy planet. Its conservation programs strive to protect Canadian biodiversity. Rather than focus on one species or one region, the CNF's programs ensure all types of landscapes, habitats, animals and plants are protected. Its success comes from a two-pronged strategy of protecting vulnerable ecosystems and promoting ecologically sound land, water, and wildlife management policies.

**Bird Studies Canada and Long Point Bird Observatory** (P.O. Box 160, Port Rowan, ON, N0E 1M0; http://www.bsc-eoc.org)

Founded in 1960 to monitor bird migration, the Long Point Bird Observatory (LPBO) was the first observatory of its type in North America and is still the only one with year-round staff in Canada. LPBO is committed to involving Canadians in the conservation of birds and their habitats. LPBO conducts its national and international programs through Bird Studies Canada.

Since its founding, LPBO's program has grown and developed considerably. Its principle focus is still bird population monitoring and research on bird migration but the Observatory now runs many other programs as well, including education and province-, nation- and continent-wide surveys of bird populations. Amongst these are the Canadian Lakes Loon Survey, Project FeederWatch and educational and site survey work in Latin America, Ivory Coast, and Malaysia. In addition, LPBO conducts research into other aspects of natural history and applied conservation management. The Observatory has a special interest in promoting the participation of amateurs and volunteers in research, believing that many people working together can accomplish a great deal more than

could a few professionals working alone.

These philosophies made the CNF and BSC/LPBO the logical choice to become BirdLife International's Canadian partners in September 1993.

**Nature Saskatchewan** (1860 Lorne Street, Regina, SK, S4P 2L7; www.unibase.com/ ~naturesk )

Nature Saskatchewan is one of the largest conservation organizations in Saskatchewan whose vision is "Humanity in harmony with nature." Nature Saskatchewan was founded in 1949 and has been a reasoned and respected voice in conservation. Nature Saskatchewan's major accomplishments are in the area of education, conservation, research and publication.

Nature Saskatchewan's educational programs include delivery of the *Living by Water Project* in Saskatchewan and Manitoba, BirdQuest and PlantQuest workshops for youth and adults, a scholarship for graduate studies at universities, and sponsorship of nature camps for youth. In the conservation area, Nature Saskatchewan owns and maintains six nature sanctuaries, negotiates and refers conservation easements, and fosters conservation through working with governments and industry.

Research conducted or facilitated by Nature Saskatchewan is through support for monitoring at high priority sites and for threatened species. Nature Saskatchewan is conducting inventories of flora and fauna at its nature sanctuaries. The organization co-manages the Saskatchewan Conservation Data Centre and operates a landowner stewardship program *Operation Burrowing Owl.*

Nature Saskatchewan quarterly publishes an internationally known journal *Blue Jay*, releases special publications on an irregular basis (22 to date),and publishes a quarterly newsletter *Nature Views.*

**Appendix 3.** Web sites dealing with shorebirds and wetlands. (http:// )
North American Wetlands Conservation Council Canada: www.utm.edu./~phertzel/shbird.htm

**U.S. Fish & Wildlife Service Shorebirds Sister School Program**
www.fws.gov.r7enved/sssp.html

**Northern Prairie Wildlife Research Centre:**
www.npwrc.usgs.gov/

**Wetlands International:**
www.wetlands.ca/wia/

**Manomet Centre for Conservation Sciences:**
www.manomet.org/

**Biographical Profiles of Shorebird Migration in Mid-continental North America:**
www.mesc.usgs.gov/shorebirds

**The North American Breeding Bird Survey:**
www.mbr-pwrc.usgs.gov/bbs/

**Wadena Wetlands:**
wsd.inet.wadena.sk.ca/wadena

**Ducks Unlimited Canada:**
www.ducks.ca

**Ducks Unlimited Inc.**:
www.ducks.org

**Saskatchewan Environment and Resource Management:**
www.gov.sk.ca/serm/WWW/INDEX.HTM

**Saskatchewan Conservation Data Centre:**
http://www.biodiversity.sk.ca

**Saskatchewan Wetland Conservation Corporation:**
www.wetland.sk.ca

**Canadian Wildlife Service:**
www.mb.ec.gc.ca

**Saskatchewan Wildlife Federation:**
wbm.ca/wilderness/swf

**Nature Saskatchewan:**
www.unibase.com/~naturesk/

**Saskatchewan Water Corporation:**
www.saskwater.com

**Appendix 4.** Wildlife Viewing Code Of Ethics

As wildlife viewers, our goal is to watch animals behaving in natural ways in their natural habitats. We respect the needs of wild animals for space, natural vegetation, and ecological community. We recognize our responsibility to know the consequences of wildlife viewing .
We follow these guiding principles:

We will view or photograph from a distance that respects the needs of the wildlife, using proper equipment such as binoculars, spotting scopes and telephoto lenses. Before approaching wildlife we will first learn the spatial needs of each species and to recognize their alarm signals.
We will avoid noises or actions that might stress wildlife or cause animals to waste energy in unnecessary flight.
We will be patient, remembering that we are guests in wildlife habitat.
We will not trample or damage vegetation, both for the sake of the wildlife it supports, and for its intrinsic values.
We will not approach animals that are breeding, nesting, brooding or raising young, because parents and young are especially vulnerable at these times. We will learn the places and times to avoid these situations. We will not approach young or baby animals.
We will not feed wildlife, recognizing that feeding usually leads to problems such as unnatural food dependency, habituation to humans, disease or even death.
We will keep pets on a leash around any wildlife, and avoid bringing pets into sensitive wildlife habitat.
We will respect the rules and regulations of protected areas. Trails, roads, closure areas and other management features are designed for safety and welfare of visitors, natural vegetation and wildlife.
We will be respectful of others including property owners, and other wildlife watchers.
We will give back to nature for the gifts of wildlife viewing we receive, through conservation work for wildlife and native vegetation and through helping others learn the ethics of wildlife viewing.

**Appendix 5.** Bird conservation in context: a daring experiment in sustainability.

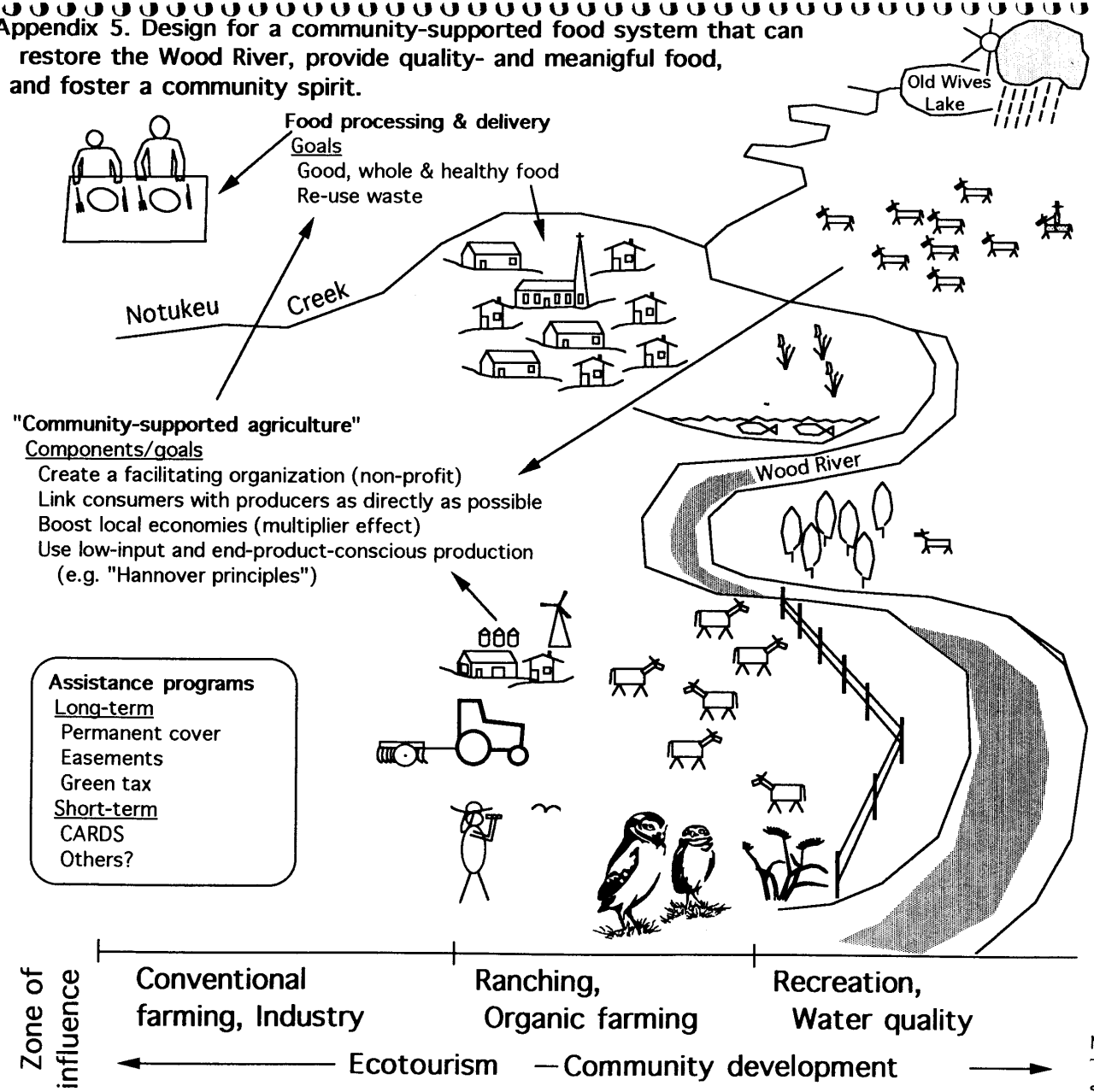
Important Bird Area conservation in southern Saskatchewan is inextricably tied to agriculture, more than to any other industry. The Wood River community-supported agriculture (CSA) model outlined here is one of several holistic options by which conservation, production - in this case food, and a quality of life for people could be achieved (e.g. Society for Holistic Management, http://www.holisticmanagement.org/).

The proposed model aims to integrate conservation and production. Traditional economic paradigms treated biodiversity conservation, pollution clean-up, the green-house effect, human injustice and the like, as "externalities." These externalities did not go away, but their costs were tallied as part of another system, by another department. The "Hannover Principles" offer a checklist as guideposts for sustainability.

Both the agricultural producers and consumers have apparently lost control of a food system that no longer entirely serves both. The proposed Wood River CSA is an attempt to retake control by creating a system that is small and manageable. There are many examples of such systems, including Saskatchewan examples. For instance, some local producers market their product through food cooperatives or directly to consumers. The "Good Food Box" Program in Saskatoon and Regina buys food locally and distributes it to consumers on a contract basis. There are several organic growers associations, and examples of other conservation measures in agriculture exist. What is needed to achieve success in this area is to match social ingenuity to technological ingenuity.

Toward developing a Wood River CSA, Ray Lizée and Joe Schmutz have submitted proposals to Prairie Adaptation Research Cooperative, and to the Saskatchewan Agriculture Development Fund. The project is dubbed the Wood River Riparian Restoration Project. If successful, a person will be hired to initiate this project by inviting consumers to devote their food-purchasing power toward organic or low-input beef grown on permanent cover bordering the Wood River. Cattle will receive a short "finishing" period with grain and forages locally produced. Staggered slaughter and local processing has the potential of supplying beef year-round, reducing food miles, enhancing water quality, enhancing habitat and so on. Field trips will be offered to consumers to show the benefits of the food system and to receive feed-back from consumers in an adaptive management style. An important element of this system is that it remain small. When expansion is desirable, it should spawn more similar community-food cooperatives rather than become another monolithic system out of control. Consumers will be local at first to facilitate fine-tuning, but with identity-preserved transport consumers could be reached elsewhere.

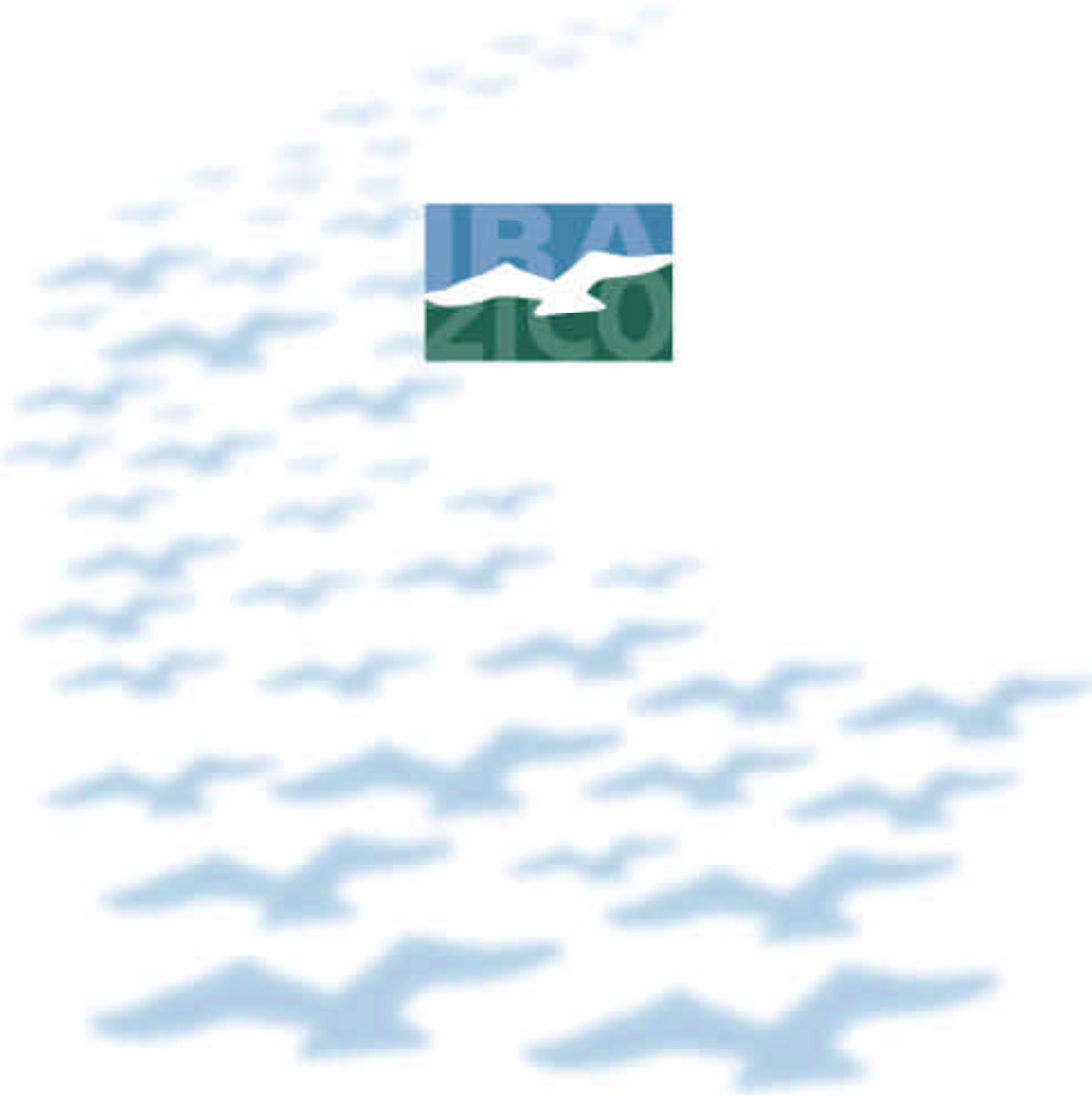
**Appendix 5. Design for a community-supported food system that can restore the Wood River, provide quality- and meanigful food, and foster a community spirit.**




Hannover principles

1. ... for humanity and nature to co-exist in a healthy, supportive, diverse and sustainable condition.
2. ...the elements of human design interact with and depend upon the natural world...
3. ....consider community, dwelling, industry and trade in terms of existing and evolving connections between spiritual and material considerations.
4. Accept responsibility for the consequences of design decisions upon human well-being, the viability of natural systems and their right to co-exist.
5. ...do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of products, processes or standards.
6. ...evaluate and optimize the full life-cycle of products and processes to approach a system without waste.
7. ...human designs should ... derive their creative forces from perpetual solar income.
8. ...no human creation lasts forever and design does not solve all problems ... practice humility in the face of nature.
9. ...encourage direct and open communication between colleagues, patrons, manufacturers and users to link long-term sustainable considerations with ethical responsibility....

McDonough, W. and M. Braungart. 1992. The Hannover principles: Design for sustainability. W. McDonough Architects, New York.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