Spatial and Temporal Distribution and Abundance of Franklin's Gull and other Priority Colonial Waterbirds in the Prairie Provinces

By: Gerard Beyersbergen &
Beverly Gingras
Canadian Wildlife Service

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A Report Submitted to
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by

Gerard Beyersbergen
&
Beverly Gingras
Canadian Wildlife Service
#200, 4999 - 98 Ave
Edmonton, AB T6B 2X3
ph: (780) 951-8670 or 8712

fax: (780) 495-2615
email: @ec.gc.ca

Introduction

The Northern Prairie and Parkland Waterbird Conservation Plan (NPPWCP) highlighted a lack of abundance and distribution information for most waterbird species within the Canadian Prairie Provinces (Beyersbergen *et al.* 2004). There are no regional annual or periodic surveys for waterbirds in Alberta, Saskatchewan or Manitoba, unlike the Breeding Bird Surveys which has adequately monitored many landbird species since 1966 and the Waterfowl Breeding Ground Surveys which have monitored waterfowl populations since 1955. Waterbird studies that have occurred have been infrequent, short-term, and localized, and methods used in historical waterbird surveys have often been imprecise and inconsistent making comparisons among years and/or locations unreliable or impossible.

The Franklin's Gull, *Larus pipixcan*, has been identified in the NPPWCP as a species of "High Concern". More than 75% of the Franklin's Gull breeding distribution is thought to occur in the Canadian Prairie Provinces but very little is known about historic or current population sizes, trends, nesting sites, and local- or landscape-level habitat requirements within this area. However, it is believed that habitat loss and habitat degradation are serious threats to Franklin's Gull (Burger and Gochfeld 1994).

Data gathered in United States National Wildlife Refuges suggest that Franklin's Gulls are colonial breeders that construct floating nests in marshes with extensive emergent vegetation (Burger and Gochfeld 1994). Because the nests are floating, eggs and newly hatched chicks are at risk of flooding from human-induced or natural fluctuations in water level. Entire nesting colonies, ranging from 100s to 100,000s birds, may shift nesting sites from one year to the next depending on habitat conditions and water levels. This seeming lack of year-to-year nest site fidelity makes tracking population numbers difficult.

Colonial waterbirds such as Franklin's Gulls and Western Grebe *(Aechmophorus occidentalis*) are susceptible to large scale die-offs, that is, destruction of an entire colony by a single event (e.g., Wabamum Lake Oil Spill, 2005), because of the concentrated nature of their nesting. The devastation of one colony can have a large impact on regional population abundance. This underscores the importance

of creating spatial (GIS) products and models to predict breeding abundances and distribution of colonial waterbirds within the Canadian Prairie Provinces.

The overall goal of this study is to create models to predict distribution and abundances and GIS products that will be used to predict priority breeding, nonbreeding, and staging habitat of Franklin's Gulls and associated colonial waterbird species. These products will be used to examine overlap between priority waterbird areas and current conservation lands to determine possible benefits for waterbirds; and to identify target areas for future conservation and management efforts. However, model development is hampered because the paucity of data on the distribution and abundance and the local and landscape habitat requirements of this species in the Canadian Prairie provinces. Thus in order to achieve our goal, in the summer of 2005, we conducted pilot surveys for historical colonial sites in Alberta and found 14 active colonies, of 27 historic sites. Also in 2005, as part of our efforts to explore field and statistical methodologies for predicting abundances, we delineated colony boundaries on eight lakes and counted nests on three lakes.

In 2006, with the support granted by the Alberta NAWMP Science Fund, we expanded our study to visit most accessible lakes with historical breeding, nonbreeding and staging records in prairie, parkland, and boreal regions of Alberta and were able to initiate pilot surveys in Saskatchewan and Manitoba. Our specific objectives were to:

1) Determine distribution of colonies, non-breeding, and staging individuals
2) Determine population abundances by establishing methodologies and performing abundance counts on breeding lakes, nonbreeding and staging lakes
3) Collect habitat data at the microhabitat (colony, where applicable) and local (lake) level at lakes with and without colonies, nonbreeding, or staging individuals.
4) Determine use of surrounding landscape by recording locations of feeding Franklin's Gulls within a 30-50 km radius of identified colonies.

Described within this report are the results of our activities in 2006 designed to fulfill the objectives listed above. The focus of this report will be on the results of efforts in Alberta as the support granted from the Alberta NAWMP Science Fund was directed towards those surveys.

Methods

Field Methods

Franklin's Gull Colony Distribution and Abundance
In May 2006, 173 wetlands were surveyed, from vantage points on the shore or from canoes, across Alberta (86 wetlands), Saskatchewan (59 wetlands) and Manitoba (28 wetlands) for presence of Franklin's Gulls and other waterbirds. The inventory focused on lakes with historical records of Franklin's Gull, as well as other accessible and suitable wetlands in those areas. In addition to recording the presence of Franklin's Gulls at each lake, we counted individuals of all other waterbird species observed at each lake. However, the focus was on Franklin's Gulls and we often did not survey the entire lake, therefore counts of other waterbirds observed should be considered minimum estimates.

Also in May, the perimeter of the emergent vegetation beds comprising each colony was mapped for Franklin's Gull colonies on Ferguson, Frank, Manawan, Minor (Kininvie), Moose, Murray (north and south), and Winagami lakes in Alberta. Remaining colonies were either inaccessible or had only relatively small numbers of birds. The colonies were delineated by canoeing or walking around the colony edge and recording a track log with GPS (Garmin Global Positioning System 12XL) receivers in UTM coordinates in datum WGS 84. These track logs were then mapped using the GIS software MapViewer (Version 6), with an overlaid map of 50 m or 100 m geo-reference easting-northing grid, depending on the size of the colony. These grid maps were then used in the field to determine our survey transects for the Franklin's Gull colony nest counts.

We performed nest counts on all eight of the delineated Franklins Gull colonies from July 11 – 27, 2006 to determine nest density and adult abundance. Nest counts with sufficient sampling effort are more accurate than aerial surveys or adult ground counts (Morris 2006). However, nest counts can be very time consuming, depending on the size of and accessibility to the colony. Vegetation type and density as well as water depth influenced how the nest counts were performed.

The 2006 nest counts followed the same methodology refined during nest counts in 2005. Nest counts were carried out only after most Franklin's Gull chicks had fledged, as opposed to during incubation or after hatch, to minimize disturbance to the colony. There was only a narrow window of time available for nest counts, from the earliest stage when most Franklin's Gull chicks had abandoned nests, to the point at which many nests had sunken and were no longer visible. Active Franklin's Gull nests are maintained until fledging but degrade post fledging (Burger and Gochfeld 1994). The rate of degradation has not yet been measured but is most likely dependent on the type of vegetation used in nest building, nest location in the emergent vegetation and depth of water under the nest.

Nests were counted by walking (one observer) or canoeing (two observers) along predefined transects that traversed the colony perpendicular, for the most part, to the water-edge of the vegetation. Transects were generally 100 m apart and ran parallel to each other. The number and length of transects sampled was dependent on the size of the colony. The number of nests observed within 2m, as measured by a 2m length of wood doweling from the center of the observer's body, of either side of the transect was recorded. Observers recorded their nest counts every 50 m along the transect using the GPS receiver to determine the distance traversed. Observers also recorded the vegetation type and density, and percent open water for each 50 m segment. For transects traversed by canoe, the observer in the bow counted nests, while the stern observer maintained the heading and managed the GPS.

To get a rough estimate of adult population size at colonies where nest counts could not be completed in 2006, we performed visual estimates of the total breeding individuals observed.

Habitat Characteristics at Colony and Lake Level

Colony habitat characteristics recorded include emergent vegetation type, density and proportion and water depth. While delineating the perimeter of each colony we recorded the water depth at nests at various locations around the colony (5 locations minimum). As mentioned previously, during nest counts we recorded vegetation type and density, and percent of open water for each 50 m segment.

Habitat characteristics recorded at every lake surveyed, regardless of the presence of Franklin's Gulls included wetland type, water level stage, and vegetation cover type. Shoreline and riparian habitat were described as percent vegetated and the dominant species of vegetation. The location and description of any potential nesting habitat for Franklin's Gull was recorded.

Wetland type identifies the water permanency or duration of flooding of a wetland (Evans and Black 1956, CWS 1989): Type 1 (temporary) wetlands have less than 15 cm of standing water and are usually dry up in the first 3 weeks of spring; Type 3 (seasonal) wetlands have more than 15 cm of standing water and persist longer than 3 weeks, but may be dry at the end of the summer; Type 4 (semi-permanent) wetlands persist into fall in most years, and; Type 5 (permanent) wetlands usually retain water year-round except during cases of extreme drought. Reservoir refers to man-made wetlands that are usually part of an irrigation system and thus water levels are controlled.

The water level stage of a wetland was ranked from 1 - 7, with a dry wetland at Stage 1 and an overflowing wetland at Stage 7 (CWS 1989). Wetland cover type refers to the differences in the spatial relation of emergent vegetation to open water or exposed soil (Stewart and Kantrud 1971). A wetland with cover type 1 has less than 5% of the open water or bare soil. A wetland with cover type 2 has 5 - 95% open water or bare soil and scattered patches or open stands of emergent vegetation, whereas a wetland with cover type 3 has 5 - 95% open water with bare soil surrounded by peripheral bands of emergent vegetation averaging two meters or more in width. Wetlands with cover type 4 have open water or bare soil that is more than 95% of the wetland area.

Landscape Level Use and Characterization
Franklin's Gulls are known to forage up to 50 km away from nesting colonies during the breeding season (Burger and Gochfeld 1994). We used incidental observation and intensive surveying to characterize and determine the extent of use of the landscape surrounding breeding colonies. While traveling to/from colonies we recorded the location and habitat type of any individuals or groups of Franklin's Gulls incidentally observed. We also intensively surveyed along roads for foraging, resting, and flying Franklin's Gulls near the breeding colony at Manawan Lake, 45 km north of Edmonton, and at Frank Lake,11 km east of High River. In June 8 – June 29, 2006 we surveyed along 1,485 km of roadways in an approximate 50 km radius around Manawan Lake and along 420 km of roadways around Frank Lake.

The following information was recorded during each observation: time of day; UTM coordinates and a written description of location using road names and the Alberta Township System; number of Franklin's Gulls observed; gull activity (foraging/resting/flying), flight direction (where applicable); a description of habitat including habitat type (dominant vegetation/crop), land use, and any other notable habitat characteristics.

Habitat type was roughly classified as one of the following: crop (identified where possible), pasture or hayfields, wetlands (including temporary wetlands on flooded fields) or other (along roadways and highways, over farm and urban buildings or unidentified).

Staging areas

Historically important staging areas were scheduled for survey in August 2006; however there was insufficient capacity to conduct these surveys at this time. Observations were made by researchers conducting nest surveys in mid-late July of any Franklin's Gull staging activity in or near the colonies.

Data Analysis

Adult Population Estimates
We used a bootstrapping procedure (Manly 1997) to calculate population estimates, variances and confidence intervals. From the complete set of 50 m transect survey segments we randomly resampled, with replacement, an equivalent number of survey segments. We then calculated the total number of nests and area of these resampled segments. Nest density was calculated by dividing the total number of nests by the total area of the resampled segments. We estimated the total number of nests in the colony by multiplying nest density and colony area. We repeated this resampling procedure 100 000 times, generating an estimate of the number of nests in the colony each time. Our bootstrap estimate of the total number of nests in the colony was the median of these 100 000 resampled estimates. The variance of the 100 000 resamplings is the bootstrap variance of our estimate of the number of nests in the colony. Our bootstrap 95% confidence interval is the 2.5^{th} percentile and 97.5^{th} percentile of the 100 000 resampled estimates.

We multiplied the bootstrap nest estimate by two to calculate adult abundance at each colony. The bootstrap adult population variance is four times the bootstrap variance of nests and the bootstrap adult population confidence limits are double the bootstrap confidence intervals of nests.

Micro (Colony) Habitat Characteristics
For each colony we calculated the range, mean and standard deviation of water depths recorded during the delineation of the colony boundary. To quantify the type and density of emergent vegetation that composed each colony, using the habitat data collected during nest counts, we calculated the percentage of 50 m transect survey segments containing cattail (e.g., *Typha latifolia* L.), bulrush (e.g., *Scirpus acutus* Muhl.,) or grass (e.g. *Zizania aquatica*). We also calculated the percentage of segments with Sparse, Moderate, or High vegetation density.

Local (Lake) Characteristics
To help elucidate the habitat preferences of Franklin's Gulls at the lake scale, we first assigned each lake to a status category based on the use of the lake by Franklin's Gulls (not used, foraging/resting only, or breeding). We then used Chi-square analysis of contingency tables (Zar 1984) to determine if lake use was related to water level stage, cover type, and permanency and/or the presence of extensive emergent vegetation beds. Kruskal-Wallis One-Way Analysis of Variance tests were performed to determine if percentage vegetated shoreline or percentage of treed riparian area differed among lakes with Franklin's Gulls breeding, foraging/resting, or absent. Statistical significance level of $P<0.05$ was used for all analysis.

Landscape Level Use and Characterization
We calculated the total number of Franklin's Gull observations on crop, pasture/hay fields, wetlands and other (along highways or roadways, over farm or urban buildings, or over unidentified lands) upland habitats recorded incidentally and during intensive roadside surveys at Frank and Manawan Lakes. For each lake and for all observations in total, we used Chi-Square tests for Independence (Zar 1984) to determine if Franklin's Gulls differentially used the upland habitats.

Results

Spatial and Temporal Distribution of Multi-Species Waterbird Colonies
Franklin's Gulls were observed breeding on 15, present but not breeding on 34, and absent from 37 of the 86 wetlands surveyed in Alberta in 2006 (Fig. 1, Table 1, Appendix 1). Nine of the 14 lakes with colonies in 2005 had confirmed colonies in 2006. Colonies observed in 2005 on Big Hay, Hay Zama, Stirling, Taber and Upper Therien lakes were not observed in 2006. Surveyed in 2006 but not in 2005, colonies were confirmed on Lesser Slave, Murray – south basin, Stobart, Third and Utikuma lakes. Non-breeding Franklin's Gulls were observed on Jessie Lake in 2005 and a small breeding colony was confirmed in 2006.

Up to six other waterbird species were observed nesting near or within the Franklin's Gull colonies we extensively surveyed in Alberta in 2006 (Table 2). Eared Grebes (*Podiceps nigricollis*) were observed nesting among Franklins' Gulls at every colony we visited (Table 2). Black-crowned Night Herons (*Nyctricorax nyctricorax*) and White-faced Ibis (*Plegadis chihi*) were also nesting in all of the Franklin's Gull colonies in southern and central Alberta.

Of the 59 wetlands visited in Saskatchewan in 2006, Franklins' Gull breeding colonies were confirmed on 11, non-breeding individuals were present on 26, and no individuals were observed on 22 (Fig 1.) Nine of the 28 lakes surveyed in Manitoba in 2006 had one or more colonies, non-breeding adults were observed at two lakes, and Franklin's Gulls were not observed at 17 of the lakes (Fig. 1). In Saskatchewan and Manitoba where 11 colonies were extensively surveyed, Franklin's Gulls were found nesting with Eared Grebes (11 colonies), Black-crowned Night Herons (8 colonies), White-faced Ibis (2 colonies), and Cattle Egrets (2colonies).

The colony identified in 2005 on Hay-Zama Lakes, in the Hay River Lowland ecoregion, is the furthest north of all the Franklin's Gull colonies found in the Prairie Provinces; Utikuma Lake is the next northerly colony and is the only colony found in the mid-Boreal Plains. The remaining colonies in Alberta were found in the grasslands ecoregions (6 colonies), the Aspen Parkland ecoregion (2 colonies), the Boreal Transition ecoregion (2 colonies) and the Peace Lowland ecoregion (4 colonies).

Nest Density and Adult Population Estimates
Nest count survey results from 2005 and 2006 indicate that nest densities and the estimated number of breeding Franklin's Gull adults varied among colonies and between years (Table 3). The largest colony, in terms of breeding adults, surveyed in Alberta in both years was at Frank Lake (Table 3). However the number of adults breeding on Frank Lake was reduced by 30% in 2006 compared to 2005. The estimated number of adults breeding on Moose Lake in 2006 was also less than that estimated for 2005 but nest

density on Moose Lake increased in 2006. Nest density was 3 – 13 times higher on Moose Lake in comparison with all other colonies surveyed in both years (Table 3).

Nest count survey results completed at eight colonies (Table 4) combined with the visual estimates of the remaining eight colonies (Table 4) indicate an estimated 400,000 Franklin's Gulls nesting in Alberta.

Micro (Colony) Habitat Characteristics

Manawan Lake and Frank Lake hosted the largest Franklin's Gull colonies (in terms of total area) and Murray Lake hosted the smallest colonies surveyed in Alberta in 2006 (Table 2). Total colony area also varied between years. The colony area on Frank Lake was reduced in 2006 (111.86 ha) from 2005 (146.24 ha) largely due to a dramatic water level increase late in the summer of 2005 and the subsequent reduction of the emergent vegetation beds. The size of the colony on Moose Lake was also smaller in 2006 (9.37 ha) than in 2005 (12.15 ha) with slightly higher water levels. However, the area of the colony on Minor Lake increased by ~87% in 2006 from 2005 (26.10 ha). The overall area of the cattail bed remained the same over both years but the higher water levels in 2006 on Minor Lake thinned the dense cattail bed providing more emergent vegetation which was suitable for nesting in 2006.

Franklin's Gull colonies were not found in greater than 100 cm or lower than 42 cm of water (Table 5). Mean water depth at the colonies ranged from 62 cm at Murray Lake to 81 cm at Frank Lake. Six of eight of the colonies were in mixed moderately dense beds of cattail, bulrush, and/or grass (Table 5). The Ferguson Lake colony was unique with the majority of nesting habitat believed to be aquatic wild rice grass. The colony on Moose Lake was also unique in that it was located in a uniform, moderately dense bulrush bed (Table 5).

Local (Lake) Characteristics

Almost all (98%) of the wetlands surveyed in Alberta in 2006 were semi-permanent to permanent (including reservoirs) wetlands. Chi-square Analysis revealed that the proportion of semi-permanent lakes, permanent lakes, and reservoirs with breeding, foraging/resting only, or no Franklin's Gulls (see Table 6) was not significantly different ($X^2 = 7.148$, $df = 8$, $p = 0.521$; i.e., lake use was not related to wetland type).

Water levels were high, surface water present to outer edge of the wet meadow zone (Stage 5), for 84% of the wetlands surveyed. Chi-square Analysis revealed that the proportion of recessional (Stage 3) to full (Stage 5) lakes was not significantly different ($X^2 = 1.665$, $df = 4$, $p = 0.797$) among lakes with breeding, foraging/resting only, or no Franklin's Gulls (see Table 6) suggesting that lake use was not related to water level.

The cover type of the wetlands surveyed ranged from wetlands with scattered patches or open stands of emergent vegetation (Cover Type 2; 15 % of wetlands surveyed) and wetlands with peripheral bands of emergent vegetation averaging two meters or more in width (Cover Type 3: 45% of wetlands), to wetlands with very little emergent vegetation (Cover Type 4; 40% of wetlands). Chi-square Analysis revealed that the proportion of Cover Type 2, 3, and 4 lakes was significantly different ($X^2 = 29.447$, $df = 4$, $p < 0.001$) among lakes with breeding, foraging/resting only, or no Franklin's Gulls (see Table 6) suggesting that lake use was related to the amount and configuration of emergent vegetation cover. Breeding and foraging/resting gulls were found on all Cover Type lakes, however breeding colonies were not found on lakes with very little emergent cover and foraging/resting gulls were less likely to be on lakes with scattered patches or open stands of emergent vegetation (Table 6).

Most of the lakes with no or only foraging/resting birds did not have potential breeding habitat, i.e. extensive beds of emergent vegetation, for Franklin's Gulls (Table 6). It is not surprising that the proportion of emergent vegetation beds was significantly different ($X^2 = 30.684$, $df = 2$, $p < 0.001$) among lakes with breeding, foraging/resting, or no Franklin's Gulls

Although the shorelines of lakes with breeding Franklin's Gulls tended to have more emergent vegetation than lakes with only foraging/resting or with no gulls, the difference was not significant ($X^2 = 2.400$, $df = 2$, $p = 0.301$.). In addition, riparian areas were more likely to be treed at lakes were no Franklin's Gulls were observed but again the difference among lakes was not significant ($X^2 = 2.216$, $df = 2$, $p = 0.330$).

Landscape Level Use and Characterization

We recorded a total of 223 upland Franklin's Gull observations at Frank Lake and 219 observations at Manawan Lake. Most observations (93%) were within 30 km of the colonies (see Fig. 2 and 3). We also incidentally recorded a total of 139 observations collected across Alberta. Observations ranged from 1 individual to groups of 2000 but most (~80%) of the observations were groups of 30 or less Franklin's Gulls. Most observations recorded near Manawan (70.3%) and Frank (55.6%) lakes were of Franklin's Gulls flying. The number of total foraging (Manawan = 27.4%, Frank = 31.8%) and resting (Manawan = 0.03%, Frank = 12.6%) observations were similar among both lakes.

Near Frank Lake, foraging and resting Franklin's Gulls were observed more frequently on wetlands/flooded crop fields (Fig. 4a) than any other upland habitat In contrast, near Manawan Lake, foraging and resting Franklin's Gulls were more frequently observed on dry crop fields than any other upland habitat (Fig 4b). It was often difficult to classify the habitat used by flying individuals, but generally near both lakes, Franklin's Gulls were seen flying over dry cropland more frequently than over pasture/hay fields, or wetlands/flooded fields (Fig 4a & b).

The proportion of total observations (all activities combined) was significantly different among upland habitats at Frank Lake ($X^2 = 56.193$, $df = 3$, $p < 0.001$) and at Manawan Lake ($X^2 = 76.909$, $df = 3$, $p < 0.001$). At Frank Lake, Franklin's Gulls were observed more frequently using wetlands/flooded fields than other upland habitat (Fig 4a) where as at Manawan Lake, Franklin's Gulls were observed more frequently using dry crop fields (Fig 4b).

The proportion of total observations in Alberta in 2006 (all activities at all locations, including incidental, combined) was significantly different ($X^2 = 68.914$, $df = 3$, $p < 0.001$) among upland habitats. Franklin's Gulls were less likely to be observed using pasture / hayfields (11% of observations) and more likely to be observed using dry crop lands (36%) than wetlands/flooded fields (26%) or any other upland habitat (26%). However, because we have yet to measure the proportion these habitats encompass on the landscape as a whole, we do not know if proportion of Franklin's Gulls using these wetlands is simply a function of the availability of these habitats within the larger landscape and not the result of habitat preference.

Discussion

In 2006, active Franklin's Gull colonies were observed on 15 of the 86 lakes surveyed in Alberta. Because annual or periodic province wide surveys have not occurred in the past, we do not know if the number of lakes with Franklin's Gull colonies has increased, decreased or remains stable. Records (see Appendix 2) indicate that colonies have been observed at some lakes since at least the 1970's (Egg, Moose and Winagami lakes, the 1960's (Frank and Stobart lakes), the 1950's (Ferguson and Manawan lakes), and earlier (e.g., Big Hay Lake). On the other hand, colonization at some lakes (e.g., Bittern Lake), may be the result of recent habitat creation by conservation groups (Appendix 2). Colonization of northern lakes (e.g. Hay-Zama and Utikuma lakes) may be the result of drought conditions and habitat degradation and loss on the prairie forcing Franklin's Gulls to extend beyond their normal breeding range. This has been documented in other prairie breeding species such as the American Avocet (*Recurvirostra americana*) which were observed nesting in the Peace Athabasca Delta (Beyersbergen, 2004) and Hay Zama Lakes (K. Morton, Alberta Sustainable Resource Development, pers. comm.).

Some satellite lakes (e.g., Jessie and Forsyth lakes) may only occasionally have colonies when conditions at the main lake (e.g., Moose Lake) are not conducive to nesting (Appendix 2). Burger and Gochfeld (1994) indicate that locations of colonies can vary from year-to-year depending on habitat suitability. We

observed examples of this change during our surveys in 2005 and 2006. Colonies in 2005 observed on Big Hay, Stirling, Taber, and Upper Therien Lakes were absent in 2006. In 2005 and 2006 water levels dramatically increased at Cardinal Lake and completely eradicated the bulrush beds that supported a Franklin's Gull colony in 2001 (Hanneman and Heckbert 2001) and in 2002 (Beyersbergen, unpubl. data).

Local (lake) habitat characteristics may influence the distribution of Franklin's Gulls in Alberta. In terms of lake characteristics, Franklin's Gull colonies in Alberta were found only on semi-permanent to permanent natural wetlands with full water levels and on some reservoirs. However, Franklin's Gulls were not found nesting on all of these types of lakes. We found that lake use was related to the amount and configuration of emergent vegetation cover as breeding Franklin's Gulls only nested on lakes with emergent vegetation beds as potential breeding habitat. Almost 80% of surveyed lakes with extensive emergent vegetation had foraging or nesting Franklin's Gulls.

Water level plays a key role in the colonization by Franklin's Gulls on lakes in Alberta. In 2006, Franklin's Gulls did not nest in water less than 42 cm or greater than 100 cm in depth, which is consistent with water depths reported elsewhere (Burger and Gochfeld 1994) and which may be the optimal water level for emergent vegetation growth (Wetzel 1983). Fluctuations in water levels during the breeding season can result in the flooding and destruction of nests, eggs and chicks (Guay 1968, Burger 1974). In 2005, the Franklin's Gull colony on Whitewater Lake in Manitoba was completely destroyed after heavy rainfalls and rising water levels flooded nests and uprooted vegetation supporting nests (R. Bazin, Canadian Wildlife Service, pers. comm.). However, periodic fluctuations in water levels are needed in order to maintain the habitat diversity and productivity of wetlands (van der Valk 2005). Increased precipitation in south-western Alberta during the summer of 2005 resulted in a needed reduction in the density of the emergent vegetation beds in Minor and Frank lakes. Another high water level event in 2006 further reduced the emergent vegetation beds at Frank Lake and lowered Franklin's Gull productivity and will likely result in a smaller colony in 2007.

Micro (colony level) characteristics, (i.e., the type and density of the emergent vegetation) appear to influence the location and density of nests found within the colonies. We found that the majority of Franklin's Gull colonies were in extensive beds of bulrush or cattail although one colony (Ferguson Lake) was dominated by grass. Similar to observations by Burger (1974) at Agassiz National Wildlife Refuge in Minnesota, we found that nests were clumped around the edges of the cattail beds near areas of open water in colonies dominated by dense cattail (e.g., Minor Lake in 2005 and 2006, Manawan Lake in 2006). Franklin's Gulls likely nest at these edges as departure from the nests appears easier where birds are not hampered by dense vegetation. Nest density appeared more homogenous within bulrush beds than within cattail beds. Bulrush beds were generally less dense than cattail beds and did not appear to hamper departure from nests.

The difference between colony types was clearly evident on Moose Lake (primarily bulrush), Manawan Lake (cattail with some bulrush) and Minor Lakes (primarily cattail) in 2006. The nest density on Moose Lake was 8-10 times higher than on Minor Lake and Manawan Lake. The colony on Minor Lake which was 5 times larger in terms of area of the Moose Lake colony supported less than half the adult Franklin's Gulls. In addition, the colony on Manawan Lake encompassed 12 times the area of the Moose Lake colony yet it only supported about 25% more adult Franklins' Gulls.

Habitat at the landscape level may also influence the distribution of Franklin's Gulls in Alberta. Most of the colonies visited were on lakes within landscapes dominated by agriculture. We found that Franklin's Gulls extensively use upland habitats within at least a 30 km radius for foraging and resting. In our study, Franklin's Gulls were observed, often in large groups, in dry or flooded crop fields most likely foraging for invertebrates (e.g., earthworms, cutworms, and grasshoppers). Large flocks of gulls were often observed foraging on freshly tilled soils behind a farmer cultivating his stubble fields. Many authors have noted the ability of Franklin's Gulls to control grasshopper numbers and other crop-damaging insects (Gardner 1927, Bradhaw 1934, DuMont 1941, Nice 1962). Many landowners near Franklin's Gull colonies in 2006 also mentioned the importance of these birds in controlling invertebrate pests. We also found Franklin's Gull foraging, most likely for swarming insects, over wetlands near the breeding colony.

Many of the lakes with colonies are too small in area (e.g. Kininvie Lake, ~300 ha, Manawan Lake ~750 ha) to contain enough food to support colonies up to 80,000 adults and their young. Thus, they must rely on the surrounding landscape to provide most of the food resources required during the breeding season. The exception may be colonies on larger lakes in the northern regions such as the colony on Hay-Zama Lake and on Utikuma Lake. Utikuma Lake is a large (28,800 ha) but shallow (mean depth of 1.7m) wetland in a landscape dominated by muskeg and forest with very little agricultural activity (Mitchell and Prepas 1990). Although we have not surveyed use of upland habitats, we suspect that the Franklin's Gulls nesting on Utikuma Lake are foraging primarily within the lake basin. The Hay Zama Lakes colony is presently quite small but the wetland complex encompasses 50,000 hectares of open water, wet meadows and floodplain woodlots which likely can support a large population (Wright 2001).

Foraging Franklin's Gulls may be an important predator of crop-damaging insects but they may also be an important prey item for owls and raptors (Burger and Gochfeld 1994) including the endangered Peregrine Falcon *(Falco peregrinus*). Enderson (1965) found Franklin's Gulls to be a common pretty item in Peregrine Falcon nests in Alberta in 1964. He found one nest that had only numerous Franklin's Gulls remains. Franklin's Gulls accounted for 76.5% of prey items found in the Peregrine Falcon nest on the Health Sciences Building at the University of Alberta in Edmonton during the summer of 2006 (Dr. G. Holroyd, Canadian Wildlife Service, pers. comm.). Most of the gulls taken were yearlings.

Franklin's Gulls in Alberta are often found nesting in multi-species colonies. Some of theses species observed are considered species of Moderate to High concern (e.g., Eared Grebe, Western Grebe, Black-crowned Night Heron; Beyersbergen *et al.* 2004). Some of the species are quiet secretive when nesting (e.g. Black-crowned Night Herons, White-faced Ibis, and Cattle Egrets). These species could simply prefer the same nesting habitat as Franklin's Gulls or they could be actively be choosing to nest within Franklin's Gulls colonies. Franklin's Gulls are extremely sensitive to disturbance and are quick to respond to predators by swooping and soaring, mobbing, and attacking (Burger and Gochfeld 1994). Thus, other nesting waterbird species may benefit from the early warning and anti-predator behavior of the Franklin's Gulls.

Conclusions

Franklin's Gulls have been identified as a species of high concern in the Prairie Provinces. The majority of the breeding range and possibly population of this species reside in the Prairie Provinces. Thus, it is the responsibility of all governmental and non-governmental conservation organizations to insure the continued survival of Franklin's Gulls.

The Franklin's Gull is an ideal species on which to focus conservation activities. They are the quintessential prairie waterbird: they nest in typical prairie wetlands and forage in grasslands. However they will also colonize suitable habitat in the parkland, boreal transition and in some cases, boreal areas of the Prairie Provinces. They will readily colonize wetlands that have been restored or created as long as the wetland has suitable habitat. They forage within agricultural landscapes and act as a natural control of crop-damaging invertebrates. They are an essential prey species for owls and raptors such as the Peregrine Falcon, and serve as guards for a host of other waterbird species that nest in the same habitat.

Franklin's Gulls should be considered an indicator species of the overall productivity of semi-permanent, shallow wetlands in agriculturally dominated landscapes. The presence of breeding Franklin's Gulls on wetlands indicates that the wetland likely supports many other wetland dependent birds. The presence of Franklin's Gulls colonies on NAWMP support projects, such as Frank Lake, is an indication of conservation success.

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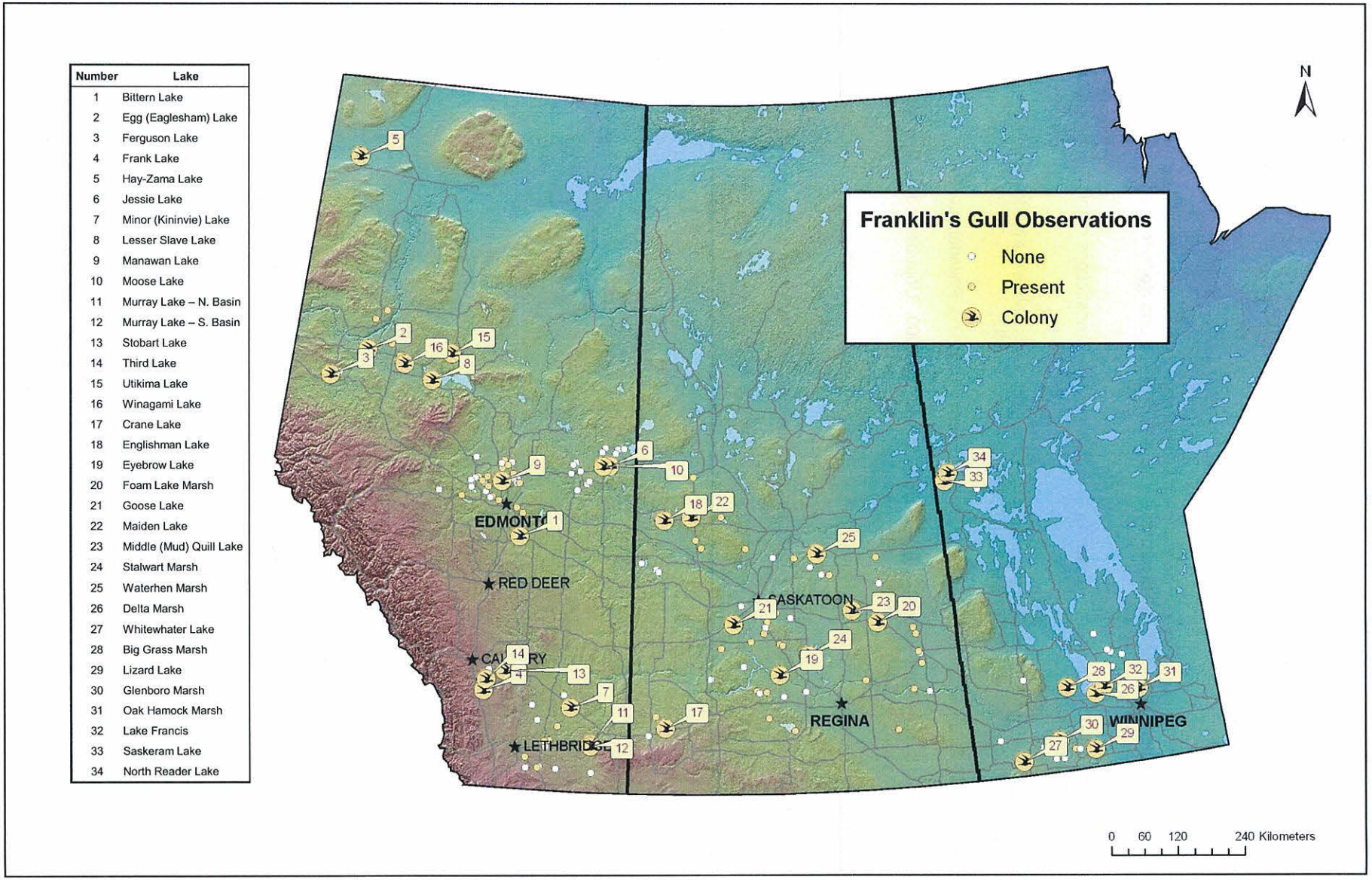

Figure 1. Wetlands in the Prairie Provinces with Franklin's Gulls colonies, foraging/resting, or absent in 2006.

Table 1. Franklin's Gull observations on breeding and non-breeding lakes visited in Alberta in May and June 2006. The 14 lakes with breeding colonies detected in 2005 are indicated. See Appendix 1 for lake locations.

Lake	Franklin's Gulls observed 2006	Presence of colony 2005
Badger Reservoir	0	
Barbara Lake	0	
Big Hay Lake	20	X
Big Lake	16	
Birch Lake	0	
Bittern Lake	**Breeding Colony**	X
Boag Lake	4	
Bridge Lakes (west)	0	
Bunder Lake	0	
Cache Lake	0	
Cardinal Lake	2	
Charlotte Lake	100	
Chip Lake	0	
Clairmont Lake	1000	
Cooking Lake	100s	
Cowoki (Reservoir)	43	
Crane Lake	0	
Crow Indian Lake	0	
Dalemead Lake (Langdon)	0	
Dechaine Lake	14	
Duggans Lake	0	
Eagle Lake	650+	
Edward Lake	0	
Egg (Eaglesham) Lake	**Breeding Colony**	X
Ethel Lake	0	
Ferguson Lake	**Breeding Colony**	X
Fincastle Lake	6	
Forsythe Lake	0	
Frank Lake	**Breeding Colony**	X
George Lake	25	
Gladu Lake	3	
Haley Lake	25	
Hay Zama[1]	present	X
Helliwell Lake	220	
Horsefly Lake Reservoir	0	
Isle Lake	present	
Jessie Lake	**Breeding Colony**	
Kakina Lake	0	
Kimiwan Lake	2000	
Kimura Lake	0	
Kleskun Lake	0	
Lac La Nonne	5	
Lac Magloire	9	
Lac Sante	0	
Landry Lake	0	

Table 1 continued.

Lake	Franklin's Gulls observed 2006	Presence of colony 2005
Leddy Lake	4	
Lesser Slave Lake[1,2]	**Breeding Colony**	
Lily Lake	0	
Lost Lake	0	
Lost Point Lake	0	
Louisanna Lakes North	0	
Lower Therien Lake	0	
Majeau Lake	4	
Manatokan Lake	14	
Manawan Lake	**Breeding Colony**	**X**
Matchayaw Lake	0	
Milk River Ridge	0	
Moose Lake	**Breeding Colony**	**X**
Minor (Kininvie) Lake	**Breeding Colony**	**X**
Muir Lake	0	
Muriel Lake	100	
Murray Lake - North Basin	**Breeding Colony**	**X**
Murray Lake - South Basin[2]	**Breeding Colony**	
Nakama Lake	56	
Nakamun Lake	16	
Oldman Lake	0	
Pakowki Lake	0	
Poplar Lake	1	
Reed Lake	0	
Rush Lake Marsh	0	
Sandy Lake	1000-1500, 15+ yearlings	
Scope (Hays) Reservoir	10	
Shoal Lake	0	
Stirling Lake (Michelson's marsh)	2	**X**
Stobart Lake[2]	**Breeding Colony**	
Taber Lake	3	**X**
Third Lake[2]	**Breeding Colony**	
Tyrell Lake	4	
Unnamed 1	0	
Unnamed 2	1	
Unnamed 3	30	
Upper Mann	0	
Upper Therien Lake	0	**X**
Utikima Lake[1,2]	**Breeding Colony**	
Wakamao Lake	13	
Winagami Lake	**Breeding Colony**	**X**
Total lakes with colonies	**15**	**14**

[1] As reported by staff from Alberta Fish and Wildlife Division.
[2] Lake not checked in 2005

Table 2. Waterbird species observed nesting near or within Franklin's Gull colonies on lakes surveyed in Alberta in 2006.

Waterbird Species	Lake						
	Murray	Frank	Minor (Kininvie)	Manawan	Moose	Winagami	Ferguson
Eared Grebe *Podiceps nigricollis*	1240	5000	88	414	56	101	280
Western Grebe *Aechmophorus occidentalis*	20				41		
Pied-billed Grebe *Podilymbus podiceps*	2	2	1			11	
Red-necked Grebe *Podiceps grisegena*	3				10		
Forster's Tern *Sterna forsteri*		5			16		
Black Tern *Chlidonias niger*	154				5		8
Black-crowned Night Heron *Nyctricorax nyctricorax*	25	24	3	3			
White-faced Ibis *Plegadis chihi*	15	51	3	1			
Common Loon *Gavia immer*					2		

Table 3. Mean nest density, adult population estimates and 95% confidence intervals (CI) for Franklin's Gull colonies surveyed in Alberta in 2005 and 2006.

Lake	Mean Nest Density (per 100m$^{2)}$		Population Estimate		Lower 95% CI		Upper 95% CI	
	2005	2006	2005	2006	2005	2006	2005	2006
Ferguson		3.8		51,037		42,484		60,416
Frank	3.8	3.5	111,414	77,973	98,238	62,485	125,766	94,507
Manawan		2.9		68,600		57,873		79,790
Minor (Kininvie)	4.1	3.5	21,202	33,860	14,958	24,453	28,554	44,236
Moose	25.0	29.2	60,968	54,740	50,532	47,965	70,568	61,631
Murray – North		5.5		3,777		2,045		5,625
Murray – South		9.5		13,491		9,441		17,686
Winagami		2.1		13,045		9,266		17,363
Total			193,584	316,523	163,728	258,018	224,888	383,260

Table 4. Visual estimates of breeding Franklin's Gulls on lakes where nest surveys were not conducted in Alberta in 2006.

Lake	Population Estimate
Stobart	15,000
Utikuma	40,000
Lesser Slave	> 1,000
Jessie	1,000
Egg (Eaglesham)	15,000
Bittern	10,000
Hay Zama	>2,000
Third	1,000
Total	84,000

Table 5. The area (ha), mean (± 1 standard deviation) and minimum and maximum water depth, and type and density of emergent vegetation nesting cover (as represented by the percentage of 50 m survey segments) in Franklin's Gull colonies surveyed in Alberta in 2006.

Lake	Colony Area	Water Depth Mean	Water Depth Min. – Max.	Emergent Vegetation	Vegetation Density
Ferguson	67.00	78 (10)	67 - 90	Grass (67%) Bulrush (32%) Cattail (1%)	Sparse (28%) Moderate (45%) High (27%)
Frank	111.86	81 (20)	55 - 100	Cattail (5%) Bulrush (95%)	Sparse (27%) Moderate (36%) High (37%)
Manawan	117.19	80 (7)	72 - 100	Cattail (85%) Bulrush (15%)	Sparse (33%) Moderate (48%) High (19%)
Minor (Kininvie)	48.85	68 (5)	60 - 75	Cattail (100%)	Sparse (7%) Moderate (41%) High (52%)
Moose	9.37	71 (17)	53 - 100	Bulrush (100%)	Sparse (0%) Moderate (85%) High (15%)
Murray – North	3.46	73 (11)	65 - 80	Cattail (70%) Bulrush (30%)	Sparse (18%) Moderate (59%) High (23%)
Murray – South	7.09	62 (12)	42 - 78	Cattail (63%) Bulrush (37%)	Sparse (0%) Moderate (21%) High (79%)
Winagami	30.55	75 (22)	44 - 100	Grass (16%) Cattail (71%) Bulrush (13%)	Sparse (36%) Moderate (28%) High (36%)

Table 6. Franklin's Gull lake use in relation to characteristics of lakes surveyed in Alberta in 2006. Presented is the percentage of Franklin's Gull breeding, foraging/resting (Present), and absent lakes of various waterbody types (n = 81), with various water level stages (n = 80) and cover types (n = 68) and with extensive emergent vegetation beds present (n = 80). Also included are the mean percentage of shoreline with emergent vegetation (n = 39) and the mean percentage of riparian area with trees/shrubs (n = 31) observed on lakes with breeding, foraging/resting, or no Franklin's Gulls.

Lake Characteristics		Franklin's Gull Use		
		Breeding	Present	Absent
Waterbody: Type				
	Reservoir	23	21	14
	5	46	67	69
	4	31	9	14
	3	0	0	3
	2	0	3	0
Stage				
	3	0	3	3
	4	15	18	9
	5	85	79	88
Cover				
	2	62	3	4
	3	31	45	54
	4	8	52	42
Emergent Beds Present		100	24	18
Mean % Vegetated Shoreline		79	61	65
Mean % Vegetated Riparian		30	37	61

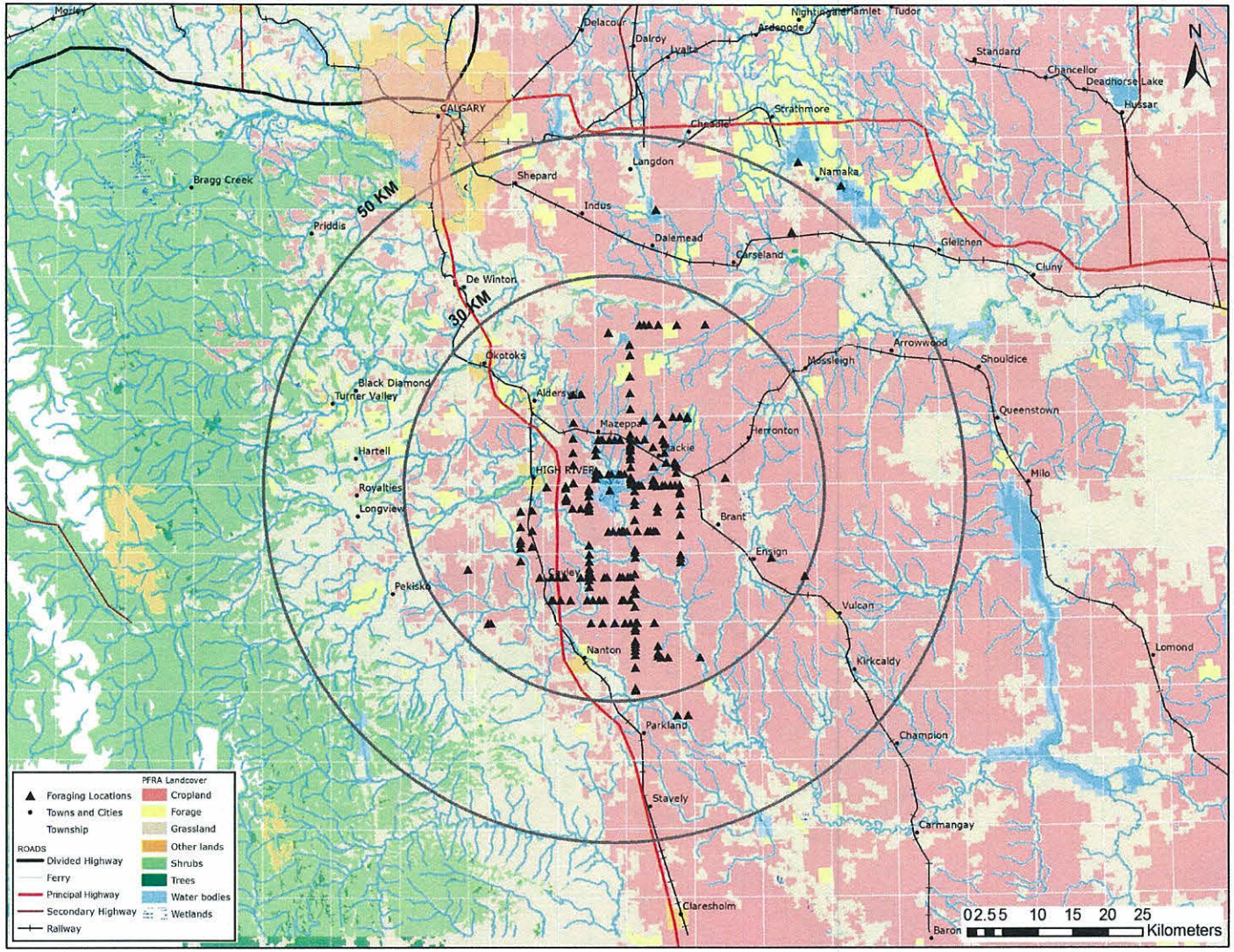

Figure 2. Observation points of a roadside survey in June, 2006 of Franklin's Gulls activities and cover types used within 30-50 km of the Frank Lake colony.

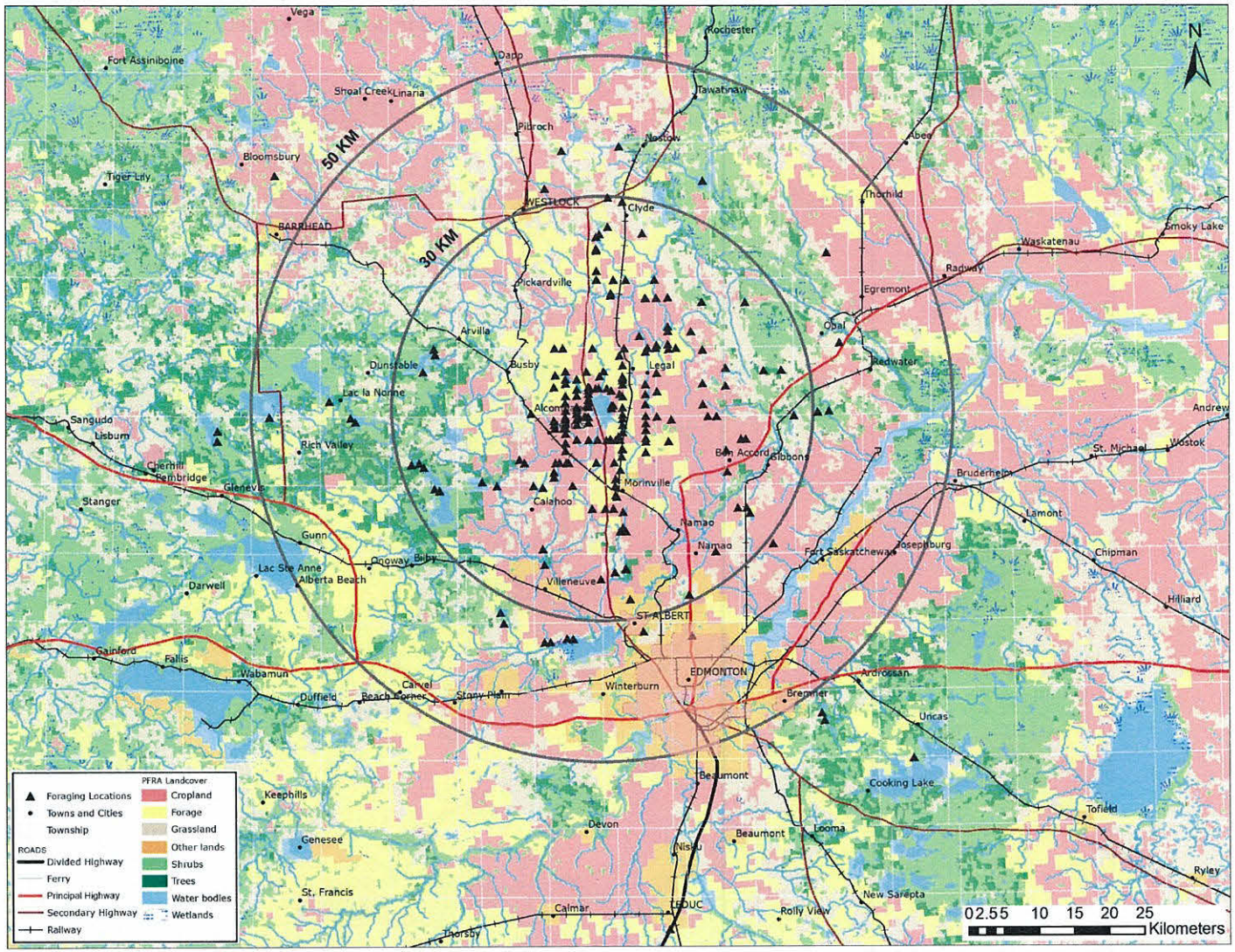

Figure 3. Observation points of a roadside survey in June, 2006 of Franklin's Gulls activities and cover types used within 30-50 km of the Manawan Lake colony

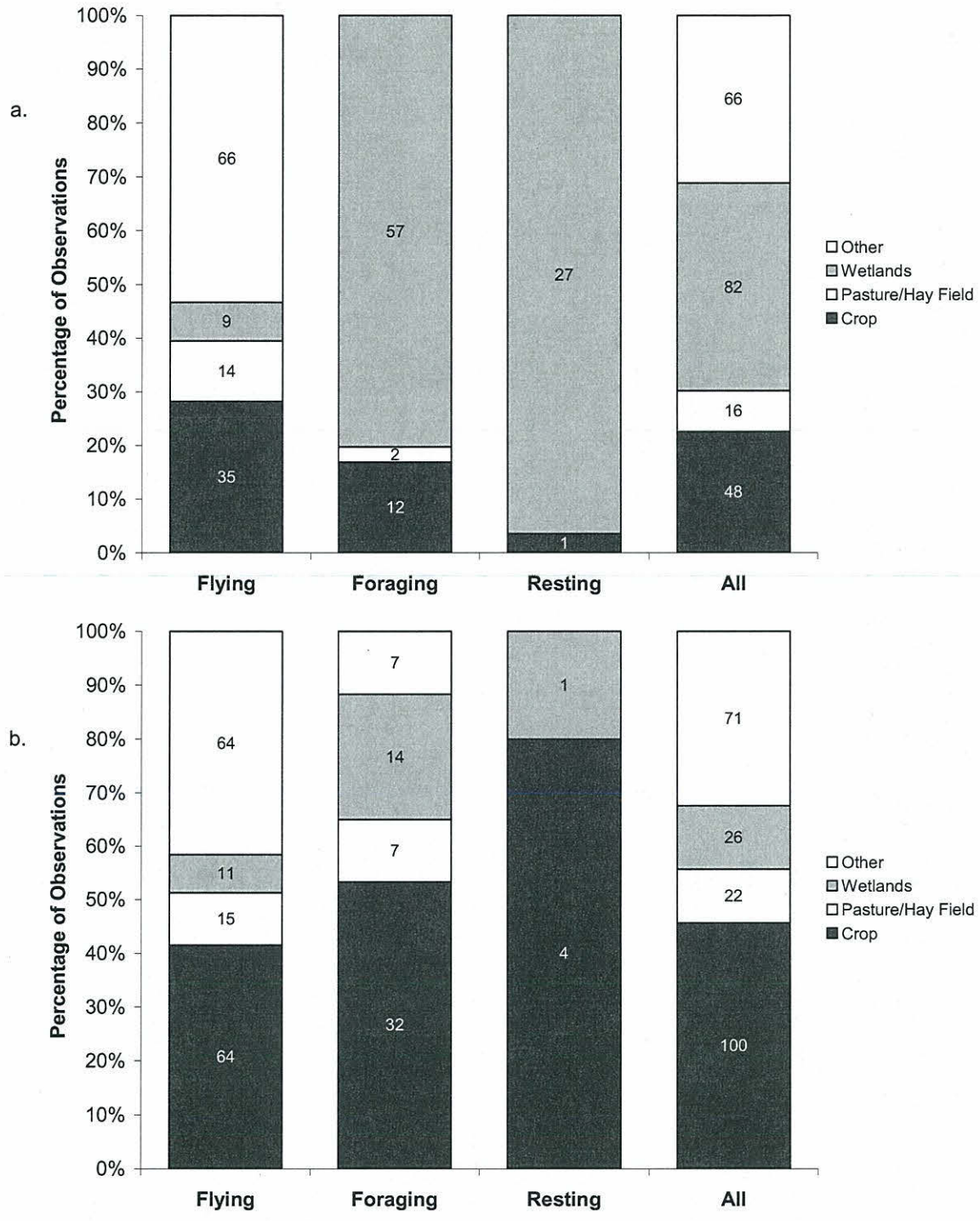

Figure 4. The percentage (and number) of flying, foraging, resting, and all Franklins' Gulls observations on different habitats recorded during roadside surveys in a 50 km radius of Frank Lake (n = 223; a.) and of Manawan Lake (n = 219; b.) Alberta in June of 2006

Appendix 1. The location (latitude and longitude), wetland type[a], water level stage[b], wetland vegetation cover type, and a listing of waterbird species observed on wetlands visited during surveys for Franklin's Gull colonies in Alberta 2006.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Badger Reservoir	50.38194	-112.46148	Reservoir	5	4	American White Pelican, Double-crested Cormorant, White-headed Gull spp.
Barbara Lake	54.52953	-110.86414	4	5	3	Eared Grebe
Big Hay Lake	53.16220	-113.16157				
Big Lake	53.59369	-113.72317	5	4	3	American White Pelican
Birch Lake	53.76640	-114.49852	5			Black Tern, Sora
Bittern Lake	53.05000	-113.08000	5	5	4	
Boag Lake	53.51909	-113.21824	5	5	4	White-headed Gull spp.
Bridge Lakes (West)	54.18887	-113.47831	5	4	3	Black Tern, Common Loon, Great Blue Heron
Bunder Lake	54.28093	-111.67451	5	5	3	Great Blue Heron
Cache Lake	54.10040	-111.78387	5	5	4	
Cardinal Lake	56.24000	-117.75000	5	5	4	Red-necked Grebe
Charlotte Lake	54.25973	-110.60514	2	4	2	
Chip Lake	53.67000	-115.38000	5	5	3	Pied-billed Grebe
Clairmont Lake	55.27313	-118.77363	5	4	4	Eared Grebe, Pied-billed Grebe, Red-necked Grebe
Cooking Lake	53.42000	-113.04000	5	5	3	
Cowoki Lake	50.58907	-111.68962	Reservoir	5	4	Common Loon, Eared Grebe, Great Blue Heron, Red-necked Grebe

Appendix 1 continued.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Crane Lake	54.51780	-110.52150	5	5	4	
Crow Indian Lake	49.36929	-111.78495	5	5	4	American White Pelican, Black-crowned Night Heron, Forster's Tern, Sora
Dalemead Lake	50.91203	-113.62523	Reservoir	5	3	Double-crested Cormorant, White-headed Gull spp.
Dechaine Lake	53.83050	-114.10257	5	5	4	Black Tern. Pied-billed Grebe, Red-necked Grebe
Duggans Lake	54.21675	-113.44798	5	5	3	
Eagle Lake	51.00000	-113.32000	Reservoir	4	4	American White Pelican, Black-crowned Night Heron, Eared Grebe, Forster's Tern, Horned Grebe, Sora, Western Grebe
Edward Lake	54.44509	-110.57504	3	5	3	
Egg (Eaglesham) Lake	55.75369	-117.85604	4	4	2	Eared Grebe, Pied-billed Grebe
Ethel Lake	54.52909	-110.35131	5	5	4	Black Tern
Ferguson Lake	55.27100	-118.81400	4	4	2	Black Tern, California Gull, Double-crested Cormorant, Eared Grebe, White Tern spp.
Fincastle Lake	49.82629	-111.97897	Reservoir	3	4	American White Pelican, Common Tern, Double-crested Cormorant, Great Blue Heron, Red-necked Grebe, White-headed Gull spp.
Forsythe Lake	54.33367	-110.88933	4	3	3	Eared Grebe
Frank Lake	50.57000	-113.72000	5	5	3	Black-crowned Night Heron, Eared Grebe, Forster's Tern, Pied-billed Grebe, White-faced Ibis, White-headed Gull spp.
George Lake	53.95749	-114.08117	5	5	3	Black Tern
Gladu Lake	53.64286	-113.91008	5	5	4	
Haley Lake	54.11366	-113.69393	5	5		Sora

Appendix 1 continued.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Helliwell Lake	54.23912	-113.65046	5	5	3	Black Tern, Eared Grebe, Sora
Horsefly Lake Reservoir	49.72000	-112.07000	Reservoir	5	3	American White Pelican
Isle Lake	53.62326	-114.74509	5	5	3	
Jessie Lake	54.25000	-110.73300	5	5	3	Black Tern, Eared Grebe
Kakina Lake	53.85616	-114.16150	5	5		Black Tern
Kimiwan Lake	55.71621	-116.91176	5	5	4	Sora, Yellow Rail
Kimura Lake	53.95202	-113.24814	5	5		Black Tern
Minor (Kininvie) Lake	50.37233	-111.48615	5	5	2	Black-crowned Night Heron, Eared Grebe, Pied-billed Grebe, White-faced Ibis
Kleskun Lake	55.33500	-118.56400	5	5	3	
Lac La Nonne	53.93968	-114.32388	4	5	3	Black Tern
Lac Magloire	55.88679	-117.18333	5	5	3	Sora. White-headed Gull spp.
Lac Sante	53.83879	-111.58926	5	5	4	
Landry Lake	54.21403	-110.62859	5	5	3	White-headed Gull spp.
Leddy Lake	56.39353	-117.45129	5	5	4	Red-necked Grebe
Lily Lake	53.94913	-113.37219	4	4		Black Tern
Lost Lake	50.14289	-112.30552	5	5	3	

Appendix 1 continued.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Lost Point Lake	53.89087	-113.27527	Reservoir	5		Black Tern
Louisanna Lakes North	50.57207	-111.66639	5	5	4	American White Pelican, Common Loon, Common Tern, Double-crested Cormorant, Red-necked Grebe, White-headed Gull spp.
Lower Therien Lake	53.94376	-111.33347	5	5	4	American White Pelican, Black Tern, Common Loon, Double-crested Cormorant
Majeau Lake	53.92233	-114.41681	5	5		
Manatokan Lake	54.46442	-110.95270	5	5	4	Black Tern, California Gull, Double-crested Cormorant, Horned Grebe, Pied-billed Grebe, Red-necked Grebe
Manawan Lake	53.90820	-113.68185	5	5	3	Eared Grebe, Black-crowned Night Heron, White-faced Ibis, White Tern spp.
Matchayaw Lake	53.71560	-114.09408	Reservoir	4	3	Red-necked Grebe, White Tern spp.
Milk River Ridge Reservoir	49.36424	-112.52725	4	5	4	American White Pelican, Double-crested Cormorant, White-headed Gull spp.
Moose Lake	54.24000	-110.91000	5	5	2	American White Pelican, Black Tern, Common Loon, Double-crested Cormorant, Eared Grebe, Forster's Tern, Great Blue Heron Red-necked Grebe, Western Grebe
Muir Lake	53.62802	-113.95719	5	5	4	Great Blue Heron
Muriel Lake	54.14000	-110.68000	5	5	3	American White Pelican, Black Tern, Common Tern, Double-crested Cormorant, Red-necked Grebe, White-headed Gull spp.
Murray Lake	49.80161	-110.94416	Reservoir	5	2	Black-crowned Night Heron, Black Tern, Common Tern, Double-crested Cormorant, Eared Grebe, Pied-billed Grebe, Red-necked Grebe, Sora, Western Grebe, White-faced Ibis
Murray Lake - South Basin	49.76149	-110.95006	5	5	2	Eared Grebe
Nakama Lake	50.94834	-113.23475	Reservoir	4	4	Eared Grebe, Forster's Tern, Pied-billed Grebe, Western Grebe,
Nakamun Lake	53.88452	-114.21403	5	5	3	American White Pelican, Black Tern, Red-necked Grebe,
Oldman Lake	53.87533	-114.53589	5	5	3	Black Tern

Appendix 1 continued.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Pakowki Lake	49.33000	-110.92000	3	4	2	California Gull
Unnamed (Poplar Lake)	53.50301	-113.21609	5	5	3	
Reed Lake	54.23821	-111.75098	5	5		
Sandy Lake	53.80085	-114.03460	5	5		Black Tern, Great Blue Heron, Sora, Western Grebe, White-headed Gull spp.
Scope (Hays) Reservoir	50.05941	-111.80438	Reservoir	5	4	American White Pelican, California Gull. Common Tern, Great Blue Heron, Western Grebe
Shoal Lake	54.25545	-114.44618	5	5		Black Tern, Sora
Stirling Lake (Michelson's marsh)	49.53529	-112.55642	5	4	3	American White Pelican, Double-crested Cormorant, White-headed Gull spp.
Stobart Lake	50.91152	-113.20655	Reservoir	5	2	American White Pelican, Forster's Tern
Taber Lake	49.80533	-112.10537	Reservoir	5	3	American White Pelican, Double-crested Cormorant, White-headed Gull spp.
Third Lake	50.75111	-113.67511	4	5	2	Black Tern, Sora
Tyrell Lake	49.37545	-112.24689	Reservoir	5	4	American White Pelican, Common Tern, Double-crested Cormorant, Herring Gull, Eared Grebe, Western Grebe, White-headed Gull spp.
Unnamed	54.18618	-113.72552	4	5		Black Tern, Sora
Unnamed	53.89664	-113.19886	4	5		Black Tern, Sora
Unnamed	54.03582	-113.37864	4	5	3	American Bittern, Black Tern, Pied-billed Grebe, Sora
Upper Mann Lake	54.14517	-111.53922	5	5		
Upper Therien Lake	53.98425	-111.27935	5	5	3	

Appendix 1 continued.

Lake	Latitude	Longitude	Wetland type[a]	Water level stage[b]	Vegetation cover type[c]	Other Waterbirds Observed
Wakamao Lake	54.16484	-113.55644	5	5	3	Black Tern, Sora, White Tern spp.
Winagami Lake	55.60393	-116.75068	5	5	3	Eared Grebe, Pied-billed Grebe

a. Wetland type = the water permanency or duration of flooding of a wetland: 3 = seasonal; 4 = semi-permanent, and 5 = permanent.
b. Water level stage = current wetland water levels: 4 = recessional and 5 = full.
c. Vegetation cover type = differences in the spatial relation of emergent vegetation to open water or exposed soil: 2 = 5 - 95% open water or bare soil and scattered patches or open stands of emergent vegetation; 3 = 5 - 95% open water with bare soil surrounded by peripheral 2m+ bands of emergent vegetation; and 4 = open water or bare soil that is > 95% of the wetland area.

Appendix 2

History of Franklin's Gull colonies in Alberta

Introduction

Franklin's Gulls (*Larus pipixcan*) are known to shift colony sites from year to year depending on the habitat suitability of potential breeding lakes (Burger and Gochfeld 1994). Because annual or periodic surveys for Franklin's Gull colonies have not previously occurred in Alberta, it is difficult to determine the relative importance, in terms of colony size and consistency of use, of breeding lakes. Evidence from surveys done in 2005 and 2006 suggests that patterns of lake use by Franklin's Gull in Alberta does change from year-to-year. Franklin's Gull colonies were observed on 14 lakes Alberta in 2005 and 15 lakes in 2006. Nine lakes had colonies present in both years. Four lakes had colonies present only in 2005. However, colonies were not observed in both years on seven lakes (Big, Cardinal, Forsyth, Lac Sante, Nakama, Pakowki, and Reed lakes) which have been considered priority breeding areas for Franklin's Gulls in the past (Poston *et al.* 1990, Important Bird Areas Canada 2004).

Methods

In order to examine the historic use of breeding lakes by Franklin's Gulls, we focused on data collected during Breeding Bird Surveys (BBS). The BBS was initiated, in the United States in 1966 by the United States Geological Survey and in Canada in 1968 by the Canadian Wildlife Service, to track the status and trends of North American Birds (Canadian Wildlife Service 2006). It is a roadside survey with routes chosen using a stratified random design. Each survey route is approximately 39.2 km long and consists of 50 stops spaced at 0.8 km intervals. Routes are run in late May to early July and at each stop in the route a 3-minute, 400-m radius point count is completed by a single observer. Although it has been suggested that the BBS may not be appropriate for monitoring Franklin's Gull trends (Burger and Gochfeld), the survey data does provide an indication of Franklin's Gull presence and relative abundance.

We downloaded from the BBS website (USGS Patuxent Wildlife Research Center 2006) the location coordinates of all the BBS routes in Alberta surveyed at least once since 1968. Using ArcGIS we plotted these routes in relation to locations of Franklin's Gull colonies observed in 2005 and 2006. We found that 10 of the lakes with Franklin's Gull colonies are located within 2 – 30 km of 1 – 3 BBS routes. We then downloaded from the BBS website (USGS Patuxent Wildlife Research Center 2006) the Franklin's Gull data collected during BBS surveys from 1968 – 2005 on the routes nearest to the colonies.

The total number of Franklin's Gulls observed for each year a BBS route was run is presented as an index of Franklin's Gulls presence and abundance at each lake. Because the number of Franklin's Gulls observed is most likely related to the distance the route is from the colony, we could not compare yearly totals between lakes. We supplemented the BBS results with other historical survey or anecdotal published or unpublished data collated from a variety of sources including personal communications.

In addition to examining the history of Franklin's Gull presence on each lake, where possible we also describe the current and historical lake characteristics including water levels, habitat modifications and conservation actions that have occurred at each lake. The following is a summary of these finding focusing on individual lakes with Franklin's Gulls colonies present in 2005 and 2006 but also examining lakes where Franklin's Gulls colonies were historically present but absent in 2005/2006.

Results

Big Hay Lake and Bittern Lake

Bittern Lake is approximately 12 km west, and Big Hay Lake is approximately 25 km north-west, of the City of Camrose. The lakes are approximately 10 km apart. Both lakes are situated in a primarily agricultural landscape including pasture and crop lands with some small stands of trembling aspen (*Populus tremuloides*). During a visit to the lake in 2006, we noted cattle/bison grazing to the shoreline. The north bay of Bittern Lake is separated from the main basin by a dike with a fixed-crest weir constructed by Ducks Unlimited Canada (DUC) (M. Barr, DUC, pers. comm.). Within the north bay is a large bed of bulrush where we observed a colony of ~10,000 (visual estimate) adult Franklin's Gulls in 2005 and 2006. In 2005, we observed several thousand adult Franklin's Gulls in the central portion of Big Hay Lake which we believed to be a colony. Few birds were observed in 2006 and we do not believe this colony existed in 2006. The habitat where the birds were observed in 2005 consisted of open patches of water with a mixture of dense cattail and bulrush.

There are three BBS routes (Hay Lakes, Kingman, and Cloverbar) within 3 – 48 km of both Bittern and Big Hay lakes. A BBS survey was performed on one to all three routes every year since 1990. Because of the close proximity to both lakes, it is impossible to determine exactly where the gulls observed on the BBS transects were nesting. We combined observations from all three BBS routes (using the maximum count at the three routes from each year) and found that Franklin's Gulls have been present near the lakes almost every year since at least 1990 (Fig 1.).

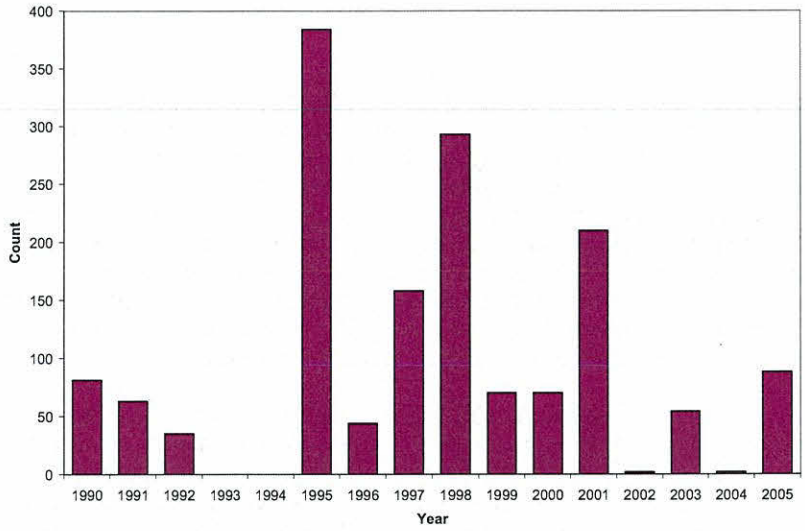

Figure 1. The number of Franklin's Gulls observed from 1990 – 2005 on 3 BBS routes near Bittern and Big Hay lakes.

Franklin's Gulls have been observed on Big Hay Lake prior to 1990. A colony of ~5,000 pairs was seen on the lake in 1931 (Farley 1932). Franklin's Gulls were reported as common on the lake in August 1939 by Soper (1939a). In 1947, a Franklin's Gull egg was collected at the lake (Royal Alberta Museum 2006) and one colony was recorded on the lake in 1958 (Guay 1968). In 1964 – 66, Guay (1968) studied the breeding biology of Franklin's Gulls on a colony of approximately 2,000 pairs.

Past water levels on both lakes have fluctuated. Soper (1939a) reported that Big Hay Lake was entirely dry in August of 1935 and had been for some years. He mentioned that the entire lake area was used for hay or grazing. Conditions had not improved much in 1939 when he found that most of the lake was dry except for a small section in the south east part of the lake which had

low water levels and a dense stand of bulrush. Water levels must have improved by 1957 as a drainage ditch was built to drain Hay Lakes into Bittern Lake (Guay 1968). Guay (1968) reported that water levels dropped two feet after the opening of the ditch and the Franklin's Gulls responded by moving from the south part of the lake to the north part. Guay (1968) also reported that water levels were stable during his study in 1964 – 66. Presently water levels are managed in Big Hay Lake by a fixed-crest weir built by DUC (M. Barr, DUC, pers. comm.). Completed in 1993, the dam affected outflows for the entire basin. The dam permitted water levels to return closer to historic upper levels and causes the wetland to experience more predrainage-like fluctuations and frequencies.

We were unable to find any observations of Franklin's Gulls on Bittern Lake in the literature, but due to the paucity of information on the lake as a whole, it is difficult to determine if the colony on Bittern Lake is a relatively new development or if the colony has existed but gone unreported. Emergent vegetation is lacking in most of the Bittern Lake, most likely due to the alkalinity of the lake. Soper (1939b) noticed this lack of growth and mentioned that there "was never any account for marsh-nesting birds as this type of habitat, in useful amount, is absent from Bittern Lake". Soper (1939b) also reported that water level was down 4 – 5 feet in 1935 and had subsided further in 1939. In 1994, DUC constructed a dike with a fixed-crest weir in the north bay of Bittern Lake (M. Barr, DUC, pers. comm.). The dam did not change the historic upper water level experienced in the bay, but did alter the historic high/low water fluctuations and frequencies thus causing water levels to be higher more often. Disappearance of Franklin's Gulls in the area in 1993 and 1994 (Fig. 1) most likely reflects the disturbance caused by construction of the weirs. The return of Franklin's Gulls in the late 90's to numbers higher than what was seen in the early 90's (Fig. 1) is probably the result of the water control structures put in place by DUC. Drought experienced across the area in 2002 – 2004 likely caused the decline Franklin's Gull observations during that time (Fig. 1).

"Egg Lake"

"Egg Lake" is a small (533 ha), unnamed lake in Northwest Alberta approximately 3 km southeast of the Town of Eaglesham. The lake is situated in landscape currently dominated by agriculture lands and by mixed stands of spruce and aspen. Most of the riparian area surrounding the lake is forested with little to no agricultural activities (Fig. 2). A dense labyrinth of cattail beds interspersed with open water is found throughout most of the lake and in 2006 we observed ~15,000 Franklin's Gulls nesting on the northwest part of the lake (Fig. 3).

Figure 2. View of the northwest part of "Egg Lake", May 2006.

Figure 3. Franklin's Gulls nesting in beds of cattail in "Egg Lake", May 2006.

Franklin's Gulls have been observed in the area during every BBS survey done on the Watino route from 1972 – 1985 (Fig. 4). The route starts approximately 4 km north east of the lake and heads west and south. The route was surveyed 10 times from 1977 – 1985 and has not been surveyed since. Yearly counts varied with peaks in 1974 and 1980-81. We were unable to find any other published or unpublished information regarding any marsh nesting waterbirds on "Egg Lake". In terms of conservation, DUC has a water control structure on crown land at "Egg Lake" that maintains the water level in the lake and a number of Conservation Easements on privately owned land around the shore of the lake (D. Matheson, DUC, pers. comm.).

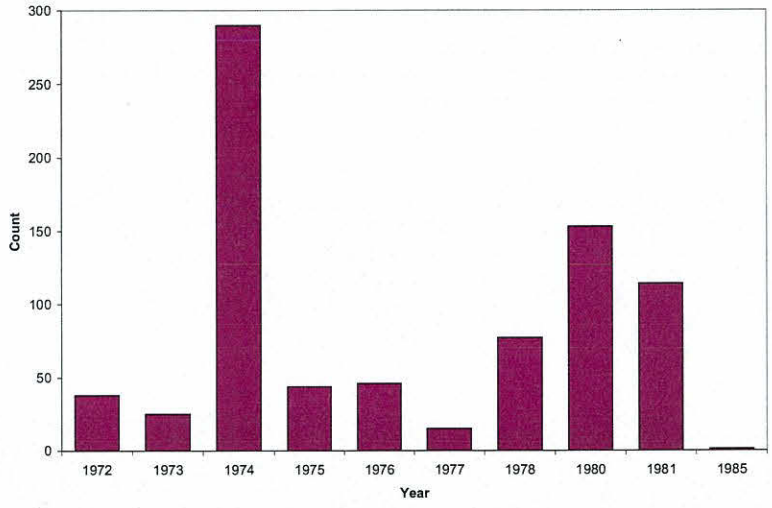

Figure 4. The number of Franklin's Gulls observed from 1972 – 1985 on the Watino BBS route near "Egg Lake".

Ferguson Lake

Ferguson Lake was considered a regionally important breeding lake for Franklin's Gulls by Poston *et al.* (1990). It is a relatively small (265 ha) wetland located approximately 1 km from the Town of Clairmont and 9 km from the City of Grande Prairie. It is located in an agriculture dominated landscape. Most of the riparian area around the lake is vegetated with willow but grazing to the shoreline does occur in the northwest part of the lake (Fig. 5) and the County of Grande Prairie has a landfill site on the west side of the lake (Fig .6). Bulrush and Typha beds are interspersed with open water in ratio of 50:50. In 2005 and 2006, we observed ~51, 000 Franklin's Gulls nesting within the bulrush (Fig. 6) and cattail beds but also nesting in grassy vegetation that we suspect is aquatic wild rice (*Zizania aquatica*).

Figure 5. Ferguson Lake, May 2006. Note the grazed riparian area and crop in the uplands.

Figure 6. A portion of the Franklin's Gull colony on and the landfill near Ferguson Lake, May 2005.

Franklin's Gulls have been observed in the area during every BBS survey done on the Bear Lake route from 1995 – 2001 (Fig. 7). The route starts approximately 25 km northwest of Ferguson Lake and ends approximately 22 km south west. The closest stop on the route to the lake is 16 km west. Yearly counts varied with peaks in 1998 and 1999 (Fig 7). We found few other references to Franklin's Gulls on or near Ferguson Lake. Eggs were collected from the lake in 1962 and adults and sub-adults were collected in 1979 (Royal Alberta Museum 2006). Local landowner (W. Jackson) reported to us that Franklin's Gulls have been nesting on the lakes since at least the 1950's. He recalls seeing the gulls on the lake every year except for on two separate occasions where the lake was drained.

Little conservation action has occurred at this lake in the past. All land surrounding the lake is privately owned. DUC has water control structures on the east and west side of the lake to help maintain water levels (D. Matheson, DUC, pers. comm.). The water quality of Ferguson Lake and therefore the Franklin's Gull colony is threatened by the presence of the active landfill. We noticed garbage (e.g., plastic bags and Styrofoam cups) blowing into the lake. The County has also proposed an expansion of the existing sewage lagoons near Ferguson Lake with no system in place to ensure that water is treated. This untreated waste water could affect the water quality of the lake.

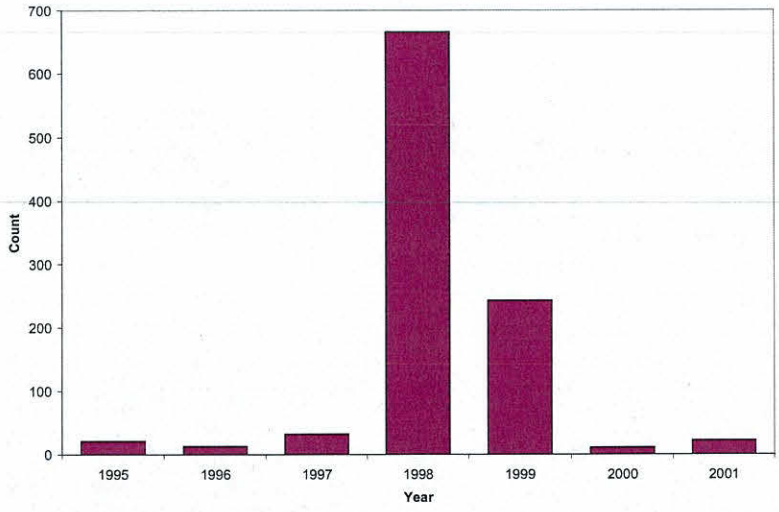

Figure 7. The number of Franklin's Gulls observed from 1995 – 2001 on the Bear Lake BBS route near Ferguson Lake.

Frank Lake

Frank Lake, approximately 6 km east of the Town of High River in southern Alberta, is located in a landscape dominated by agriculture and small wetlands and is recognized as an Important Bird Area (IBA Canada 2004). The riparian areas surrounding the lake include native and non-native grasses. The lake is currently divided into 4 basins. The Franklin's Gull colony we surveyed in 2005 and 2006 was found in the extensive emergent vegetation beds in the north and north east portions of the most northerly basin (Basin 1; Fig. 8). The Franklin's Gull colony on Frank Lake is estimated to be the largest in Alberta (~78,000 adults).

There is one BBS route that starts approximately 17 km south west of Frank Lake and ends approximately 17 km north of Frank Lake. The closest stop on the route to the lake is 2 km west. Franklin's Gulls have been observed on the Mazeppa route during every BBS survey done from 1989 – 2005 (Fig. 9). The BBS data shows that the gulls colonized relatively quickly after the

lake was recharged in 1989; peaking in abundance in 1999. After a 4 year dip in abundance in, likely due to drought conditions throughout most of southern Alberta, numbers appear to hit another high in 2005.

Figure 8. A portion of the Franklin's Gull colony on Frank Lake in May 2006.

Frank Lake was listed as a locally important Franklin's Gull breeding lake by Poston *et al.* 1990 however the lake was dry from 1983 – 1987. Prior to the 1980's, a large colony was observed on the lake in 1971 (Pinel *et al.* 1991) and in 1968 (Sadler and Myer 1976). Franklin's Gulls were likely not present on the lake in the mid 1970's or the 1950's as the lake was flooded at the time or in the 1940's or 1930's when the lake was completely dry (Sadler *et al.* 1995).

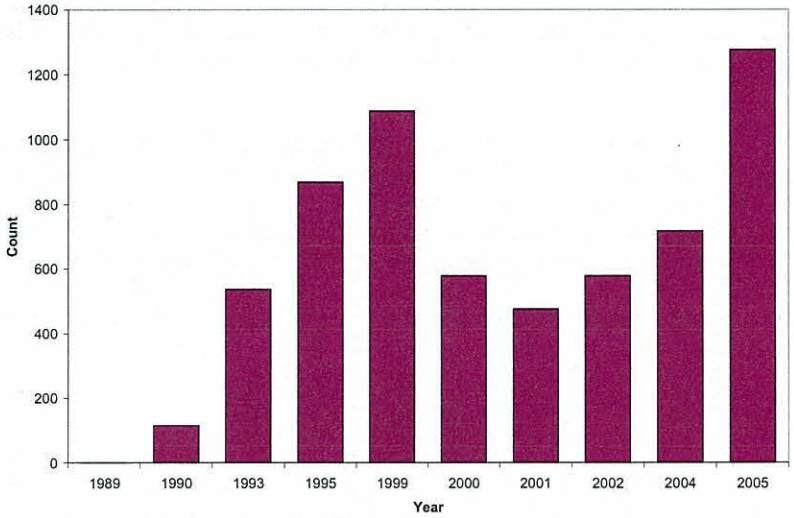

Figure 9. The number of Franklin's Gulls observed from 1989 – 2005 on the Mazeppa BBS route near Frank Lake.

In 1989, DUC partnered with Cargill Ld. and the Town of High River to build a pipeline that would carry a water supply of tertiary waste water to Frank Lake (Sadler et a. 1995). This secure water supply in combination with the weir previously constructed in 1975 and additional diking done by DUC in 1989 resulted in the recharging of water levels and the restoration of the wetland (Sadler

et a. 1995). DUC currently manages water levels on the lake and manages some of the flood-prone uplands adjacent to the lake.

There is a large power-line intersecting the colony on Frank Lake (Fig. 10). While performing nest counts on the lake, we noticed a number of dead gulls directly under the powerline. Mortality counts from the power-line have not been performed so we do not know how many birds die each year due to collision with the line and towers.

Figure 10. Power-lines intersecting the Franklin's Gull colony on Frank Lake, May 2006.

Hay-Zama Wetland Complex

The Hay-Zama Wetland Complex is a series of lakes, flood plains, and river deltas located in a remote area of northwest Alberta about 100 km west of High Level. The complex was designated a Ramsar site in 1982, and 48,600 ha of the wetland complex was recognized as a Wildland Provincial Park in 1999. The complex is also recognized as an Important Bird Area (IBA Canada 2004).

No BBS routes run near Hay-Zama Lake. The first observations of Franklin's Gulls on Hay-Zama Lakes were reported in 1974 (Pinel *et al.* 1991). Approximately 1800 Franklin's Gulls were observed within the complex in 1993 (CWS, unpubl. data). In 2005, ~2,000 Franklin's Gulls were thought to nest at Duck Lake within the complex (K. Wright, Alberta Conservation Association, pers. comm.). It is unknown if this colony was active in 2006 although several hundred birds were observed in the area in late May (K. Wright, ACA, pers. comm.). We were unable to find any other published or unpublished information regarding Franklin's Gulls in the Hay-Zama Wetland Complex.

Lesser Slave Lake

Lesser Slave Lake, one of Alberta's largest waterbodies, is ~300 km north of Edmonton. There is a Provincial Park on the southeast side of the lake that is considered an Important Bird Area (IBA Canada 2004).The Franklin's Gull colony is located on the southwest portion of Lesser Slave Lake near the Town of Joussard. The colony is located in a mixed bed of bulrush and cattail

(Gendron *et al.* 2003). The riparian area near the colony consists of shrubs and pasture land (Gendron *et al.* 2003).

No BBS routes run near the colony on Lesser Slave Lake. Franklin's Gulls were reported as "very common in the Lesser Slave Lake" region in 1964 (Sadler and Myers 1976). A number of Franklin's Gull colonies were observed on Lesser Slave Lake in 1978 and 1979 (Alberta Environment 1979). Eadie (2002) reported seeing "hundreds" of Franklin's Gulls flying over the colony and nesting on floating mats of bulrush in 2002. In 2003, thousands of nesting Franklin's Gulls were reported at the colony (Gendron *et al.* 2003).

Grazing of emergent vegetation near the colony and the disturbance, wave action, and destruction of emergent vegetation by boats have been identified as potential threats to the Franklin's Gull colony on Lesser Slave Lake (Gendron *et al.* 2003). To alleviate some of the grazing issues, a portion of the grazing lease near the colony has been fenced to keep cattle out of the riparian areas but it is not a complete exclusion at this time (R. Arbuckle, Alberta Parks and Protected Areas, pers. comm.).

Manawan Lake

Manawan Lake is a small (~750 ha), shallow lake located 45 km north of Edmonton. It is situated in a landscape dominated by agricultural activities. Riparian vegetation surrounding the lake is comprised of grasses, shrubs and trees. Much of the lake basin is filled with emergent vegetation with comparatively little open water. In 2005 and 2006, a large (~68,000 breeding adults) Franklin's Gull colony was observed nesting in the extensive emergent vegetation bed of cattail with some bulrush in the centre of the lake (Fig. 11).

Figure 11. The cattail beds with nesting Franklin's Gulls at Manawan Lake, May 2006.

There are 2 BBS routes (Calahoo and Pickardville) within 11 – 30 km of Manawan Lake. However, the Calahoo route is also within 12 – 30 km of Big Lake where a Franklin's Gull colony has been observed in the past. Because of the close proximity to both lakes, it is impossible to determine exactly where the gulls observed on BBS transect were nesting. We combined observations from the two BBS routes (using the maximum count observed at either route from each year) and found that Franklin's Gulls have been present near the lake almost every year since at least 1971 (Fig. 12). The number of birds observed varied yearly with a peak in the early 1990's followed by a virtual disappearance of the birds from 1993 – 2001.

Franklin's Gulls were observed nesting at Manawan Lake prior to 1971. Franklin's Gull eggs were collected from the lake in 1953 and 1963 (Royal Alberta Museum 2006). Guay (1968) observed a colony on the south western edge of Manawan Lake in 1963 but not in 1964 as the lake was completely dry.

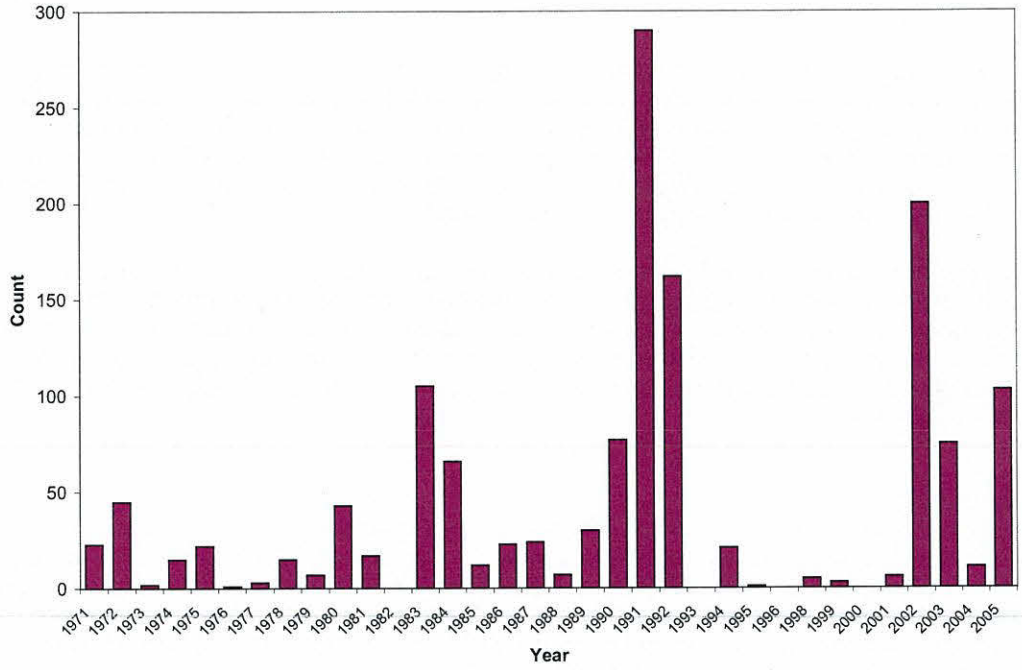

Figure 12. The number of Franklin's Gulls observed from 1971 – 2005 on the Calahoo and Pickardville BBS routes near Manawan Lake.

Prior to 1980's, Manawan Lake had a history of drought and flooding conditions. To address flooding concerns, in 1949 a weir was constructed on the lake though a joint DUC and Alberta Environment project (Alberta Sustainable Resource Development 2005). During the 1970's and 1980's the Province of Alberta purchased the majority of the flood-prone lands surrounding the lake and established Conservation Lands and the lands were then leased back to former

landowners. Water levels began to recede to below normal during the late 1980's and some of the lake basin was used for grazing or cultivated during this time (Alberta Sustainable Resource Development 2005). By 2000, the lake was completely dry. The low numbers of Franklin's Gulls observed in the mid-late 1990's (Fig. 12) likely reflect low water levels in the lake at that time. In 2003, a new fixed-crest weir was installed at Manawan Lake and water levels and Franklin's Gull numbers have since increased. Higher water levels in 2006 thinned and opened up access into the thick emergent vegetation (cattail) beds and likely improved conditions for nesting Franklin's Gulls.

While visiting the lake in 2005 and 2006, we observed some potential threats to the Franklin's Gull colony. Disturbance and destruction of emergent vegetation from grazing and haying does occur at the lake. Also, in July 2006 much of the open water was covered with very thick mats of filamentous green algae (Fig. 13). Young Franklin's Gulls have a very difficult time moving through these thick mats and we noticed carcasses of many young Franklin's Gulls stuck in the algal mats.

Figure 13. Filamentous green algae mats at Manawan Lake, July 2006.

Minor (Kininvie) Lake

Minor Lake, also known as Kininvie Marsh, is a small wetland, located ~33 km from the Town of Brooks. The lake is situated in a landscape composed of agricultural lands and other shallow wetlands. The riparian area around the lake is composed of grassland. Water conditions were quite variable on this prairie wetland and in the 1950s, as part of the Louisiana Lakes project, DUC constructed a dike across part of the marsh dividing it into two parts (T. Sadler, Strathmore, Alberta, pers. comm.). The western section has more permanent water while the eastern section has more variable water levels. They are both fed natural run-off and by irrigation water in August from the Eastern Irrigation District (EID) and are managed by DUC as permanent cattail-hemi-marshes (B. Speers, DUC, pers. comm.). Periodically, the wetland is drown-down in an effort to control expanding cattail growth. Access to the wetland is controlled by the Eastern Irrigation District with cattle grazing the main land use in the area.

We observed ~21,000 Franklin's Gulls nesting within the thick cattail beds that encompassed most of the east section of Minor Lake in 2005 and ~34,000 nesting in 2006. Higher water levels in 2006 thinned the emergent vegetation and provided more suitable nesting habitat within the cattail bed which was similar in size to that in 2005. This colony was also observed in 2004. No BBS routes run near Minor Lake, however, we do know that the colony was active in the early 1980s over a four year period (D. Duncan, CWS, pers. comm.).

Figure 14. The cattail beds with nesting Franklin's Gulls at Minor Lake, May 2006.

Moose and Jessie Lakes

Located 240 km northeast of Edmonton and 3.5 km west of the Town of Bonnyville, Moose Lake is one of the most popular and intensely used lakes in Alberta (Mitchell and Prepas 1990). Almost half of the lake's drainage basin has been cleared for agriculture and urban development; the remaining half is composed of mixed-wood forests (Mitchell and Prepas 1990). Much of the shoreline has been developed but a large portion of the shoreline is Crown land including a Provincial Park on the north shore.

In 2002, a large (10,000+) Franklin's Gull breeding colony was observed in Island Bay, the southwest portion of the lake (CWS, unpubl. data). This area of the lake is shallow (< 2m of water) with dense areas of submergent and emergent vegetation and the Franklin's Gulls were found to build their nests on a thick floating mat of dead vegetation within a moderately dense bulrush bed (Fig. 15). The colony was observed in the same location in 2005 and 2006.

Figure 15. Franklin's Gulls nesting within a bulrush bed at Moose Lake in May 2006.

Jessie Lake is a small wetland bordered to the north by the Town of Bonnyville and agricultural lands to the south. In 2002, a small breeding colony was observed on the lake (CWS, unpubl. data). Franklin's Gulls were observed foraging but not nesting on the lake in 2005 but ~1000 adults were observed nesting in a bulrush bed in the south side of the lake in 2006. The close proximity of the Moose and Jessie lake colonies and the fluctuating use of Jessie Lake may indicate that the gulls nesting on Jessie Lake are those that failed to establish nesting territories on the larger Moose Lake colony.

There is one BBS route that starts ~19 km south of Moose Lake and ends ~14 km northeast of the lake. The closest stop on the route to the lake is 4 km east. Franklin's Gulls have been observed on the Kehiwin Lake route during every BBS survey done from 1972 – 2005 (Fig. 16). The number of birds observed varied yearly with peak observations in 1994. The number of birds observed each year is likely related to the water level of the lake.

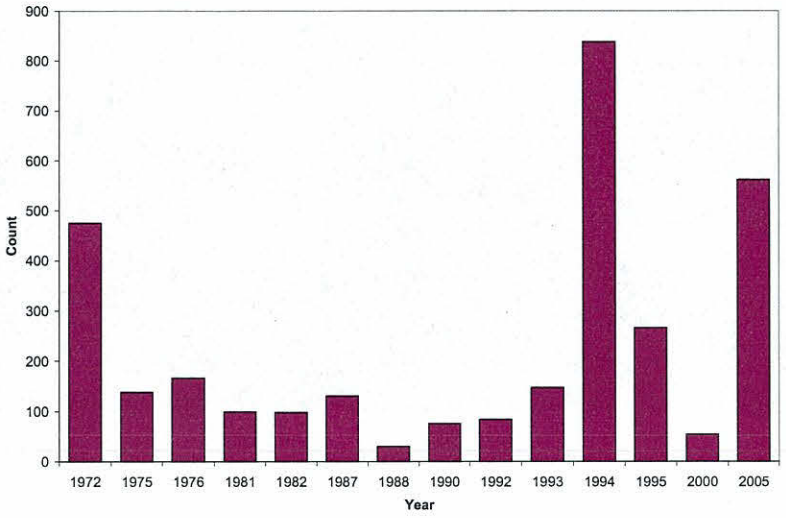

Figure 16. The number of Franklin's Gulls observed from 1972 – 2005 on the Kehiwin BBS route near Moose Lake.

Water levels dropped in 1966 after the failure of a weir and remained relatively constant until the early 1990's when water levels dropped to a record low in October 1993 (Alberta Lake Management Society 2005). Water levels increased in the late 1990's but decreased in 2005 to 1994 levels (Alberta Lake Management Society 2005). Low water levels likely results in the creation of more emergent habitat for Franklin's Gulls on the lake, hence the peaks in Franklin's Gull observations in 1994 and 2005 (Fig. 16).

As mentioned, Moose Lake is a very popular recreational lake. Franklin's Gulls nesting in Island Bay are currently only protected from human disturbance by the shallow nature of the bay. Larger recreational boats are not likely to venture into the bay. However, people with personal watercraft are able to access the bay and could disturb nesting birds as well as destroy nesting habitat. There is currently no active conservation on the Moose Lake colony site but it has been identified in the recent Moose Lake Watershed Management Plan Draft (White et al. 2006) and Alberta Sustainable Resource Development has indicated a possibility of a Protective Notation for the site (C. Found, ASRD, pers. comm.).

Murray Lake

Murray Lake, located 30 km southeast of Medicine Hat, is a reservoir created in 1954 to hold water used to irrigate surrounding agriculture lands. Unlike other reservoirs Murray Lake does not have steep rocky shores. Much of the shoreline is vegetated with cattail and bulrush. The riparian area surrounding the lake is primarily native and non-native grassland with some shrubs. In 2005 and 2006 we observed two Franklin's Gull colonies located in the northwest section of the north basin and the southeast section of the south basin. Both colonies are in beds dominated by cattails (Fig. 17). Grazing to the shoreline does occur at the colony located at the south basin.

There is one BBS route that starts ~15 km northeast of Murray Lake and ends ~20 km southeast of the lake. The closest stop on the route to the lake is 5 km east. Franklin's Gulls were not observed on the Seven Persons route until 1975 and were not observed consistently and in large numbers until the early 1990's (Fig. 18). The number of birds observed varied yearly with a peak in observations in 1994.

Figure 17. Franklin's Gulls nesting within cattail in the north basin of Murray Lake, May 2006.

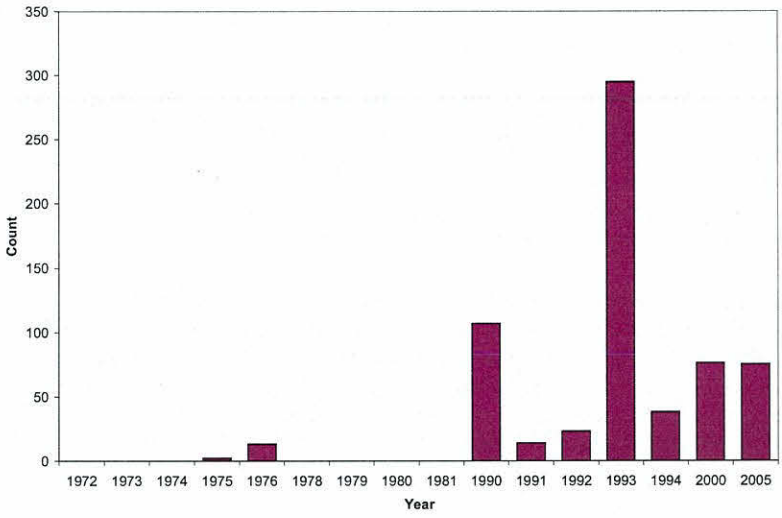

Figure 18. The number of Franklin's Gulls observed from 1972 – 2005 on the Seven Persons BBS route near Murray Lake.

Stobart Lake

Stobart Lake is a small wetland (546 ha), approximately 15 km southeast of the Town of Strathmore, that is entirely contained within the Siksika Indian Reserve. Agriculture lands dominate the surrounding area but Nakama Lake is ~1 km north and the Bow River is ~3 km south of the lake. Grasses with a few shrubs make up most of the riparian vegetation surrounding the lake and much of the shoreline appears to be buffered from grazing and crops. Most of the shoreline is surrounded with emergent vegetation. In 2006, a Franklin's Gull colony was observed in two extensive emergent vegetation beds dominated by bulrush on the southeast and the northeast side of the lake.

No BBS routes run near the colonies on Stobart Lake, but evidence suggests that Franklin's Gulls have repeatedly nested at the lake in the past. Franklin's Gull eggs were collected at Stobart Lake in 1964, 1965, 1966, 1968, 1970, and 1971 (Royal Alberta Museum 2006). In addition, Sadler and Myers (1976) report a colony of ~ 5000 in 1965 and several thousand nesting on Stobart Lake in 1967.

DUC have been working with the Siksika Nation to keep Stobart Lake an important wetland for birds. In 1957, DUC constructed a flume that provided a water source to Stobart Lake (Montgomery 2001). Since then DUC has constructed a number of dams and channels to regulate and supply water to the lake. In 2000, changes were made to the outlet control and channel to improve water circulation and quality. In addition, to address marsh-management goals, a water management agreement was formed between DUC and the Siksika nation (Montgomery 2001).

Utkiuma Lake

Recognized as an Important Bird Area (IBA Canada 2004), Utikuma Lake is a large (28,000 ha), shallow (mean depth of 1.7 m), eutrophic lake located approximately 80 km northwest of the Town of Slave Lake (Mitchell and Prepas 1991). It is situated in a landscape dominated by muskeg and mixed-wood forest with very little agricultural activity (Mitchell and Prepas 1991). Much of the surface area of the lake is covered with bulrush (Mitchell and Prepas 1991). Water levels have been managed by DUC since 1948, when DUC and the Government of Alberta installed a timber weir at the outlet. In 1973, the structure was upgraded to a sheet-pile weir (Mitchell and Prepas 1991).

No BBS routes run near Utikuma Lake. The first observations of Franklin's Gulls on the lake was reported in 2000 (Hanneman and Heckbert 2001). Hanneman and Heckbert (2001) counted 360 Franklin's Gull nests at South Island, 1543 nests at North Island and 2000 nests at East Island. In 2006, ~40,000 Franklin's Gulls were thought to nest in the lake. We were unable to find any other published or unpublished information regarding Franklin's Gulls on Utikuma Lake.

Winagami Lake

Winagami Lake is a large (4670 ha), shallow (mean depth of 1.7 m) and eutrophic lake located in northwest Alberta ~6 km from the Town of McLennan (Mitchell and Prepas 1991). Lake is situated in primarily forested landscape with some agricultural lands to the west and with Kimiwan Lake to the northwest and the South Heart River to the northeast. Over 80% of the shoreline is protected within the Winagami Lake Provincial Park and the Winagami Wildland Park. In 2005 and 2006 we observed Franklin's Gulls nesting in mixed cattail and bulrush beds in the extreme northwest corner of the lake (Fig. 19). In 2006, ~13,000 Franklin's Gulls comprised the colony on Winagami Lake.

There are 3 BBS routes that have been run in the vicinity of Winagami Lake. Minimum distances to the lake from the routes ranges from 5 – 25 km and maximum distances range from 15 km – 40 km. The High Prairie route was only run in 1978, the Winagami route was run periodically from 1981 – 2000 and the Prairie Echo route was only run in 2005. The combined data from all the routes indicates that Franklin's Gulls have been observed in the area around Winagami Lake since at least 1978 (Fig 20) with peaks in observations in 1978 and 1993.

Winagami Lake was listed as a locally important Franklin's Gull breeding lake by Poston *et al.* (1990) but we were unable to find any other published or unpublished information regarding Franklin's Gulls on Winagami Lake. However, prior to 1950 lake water levels were not regulated and water levels would drop low enough to expose large areas of mudflats (Mitchell and Prepas 1991), thus Franklin's Gulls were likely not regularly nesting on the lake. In 1950, a dam was built on the South Heart River to channel water into Winagami Lake. A canal also runs from the northwest corner of Winagami Lake to Kimiwan Lake (Mitchell and Prepas 1991).

Winagami Lake is a very popular recreational lake. Franklin's Gulls nesting in the extreme northwest part of the lake are currently only protected from human disturbance by the shallow nature of the bay (maximum depth of 1 m). Larger recreational boats are not likely to venture into the bay. However, people with personal watercraft are able to access the bay and could disturb nesting birds as well as destroy nesting habitat.

Figure 19. Franklin's Gulls nesting in cattails at Winagami Lake, May 2005.

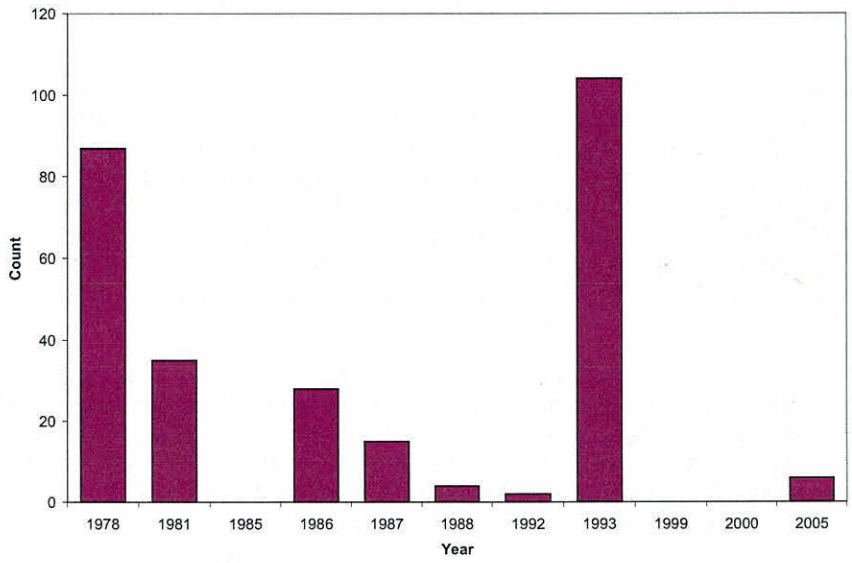

Figure 20. The number of Franklin's Gulls observed from 1978 – 2005 on 3 BBS routes near Winagami Lake.

Stirling, Taber, and Third, Upper Therian lakes
In May of 2005 we observed small Franklin's Gull colonies (≤ 1000 adults) on Stirling, Taber and Upper Therian lakes. Franklin's Gulls were not observed nesting on these lakes in 2006 and there are limited reports of previous Franklin's Gull sightings on these lakes. In 2006, we observed a small colony of Franklin's Gulls on Third Lake which is located about 21 km north of Frank Lake. Because of its close proximity to Frank Lake, it is likely used by Franklin's Gulls which were unable to find nesting habitat in the reduced emergent vegetation beds on Frank Lake. We were unable to find any previous reports of Franklin's Gulls at Third Lake.

Stirling Lake, also known, as Michelson's Marsh, is a small wetland 23 km southeast of Lethbridge. It has some emergent beds of cattail which may support a small colony of Franklin's Gulls depending on yearly water levels in the lake. Water levels appear down in 2006 and we did not see any nesting Franklin's Gulls. We found a colony on the south side of the lake in 2005 and over 200 adults were observed on the lake in 2004 (CWS, unpubl. data). In 1998, the water level of the lake was low and only 20 adults were observed (Cottonwood Consultants Ltd. 2000). However, Stirling Lake was listed as a locally important Franklin's Gull breeding lake by Poston *et al.* (1990).

There is one BBS route that starts ~18 km southwast of Stirling Lake and ends ~33 km southeast of the lake. The closest stop on the route to the lake is 13 km. Franklin's Gulls have been observed on the Kipp Coulee BBS route run from 1992 – 2003 (Fig. 21), but never in great abundance and not in every year.

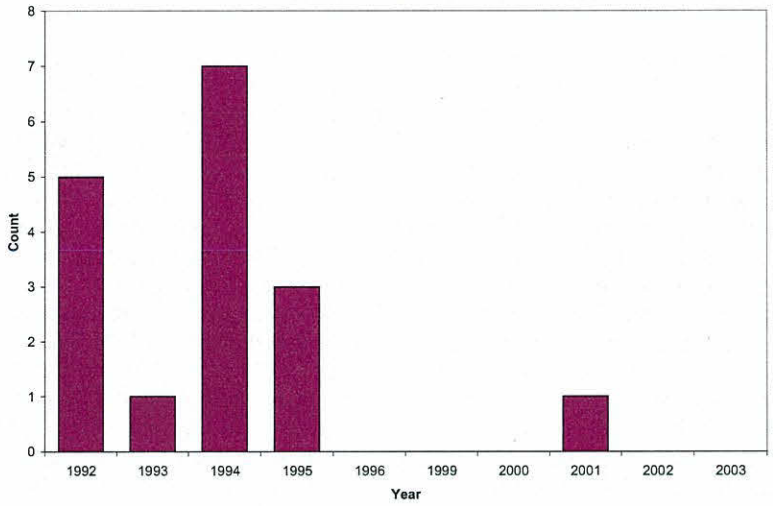

Figure 21. The number of Franklin's Gulls observed from 1992 – 2003 on the Kipp Coulee BBS route near Stirling Lake.

Situated east of the Town of Taber, Taber Lake is a reservoir on which Franklin's Gulls appear to occasionally nest. Extensive beds of cattails are found in the lake. In 2006, Franklin's Gulls appeared to be foraging but not nesting on the lake. In 2005, a colony was observed on the southwest side of the lake and in 2004, 250 adults (CWS, unpubl. data) were observed on the lake. In 1998, 50 adults (Cottonwood Consultants Ltd. 2000) were observed on Taber Lake.

There is one BBS route that starts ~21 km south of Taber Lake and ends ~10 km northeast of the lake. The closest stop on the route to the lake is 3 km. The Horsefly Lake route was run from 1997 – 2001 and Franklin's Gulls were observed Taber Lake every year of the survey (Fig. 22).

There are no BBS routes near Upper Therien Lake (near St. Paul) or near Third Lake (~20 km northeast of High River) and we were unable to find any other published or unpublished information regarding Franklin's Gulls on these lakes.

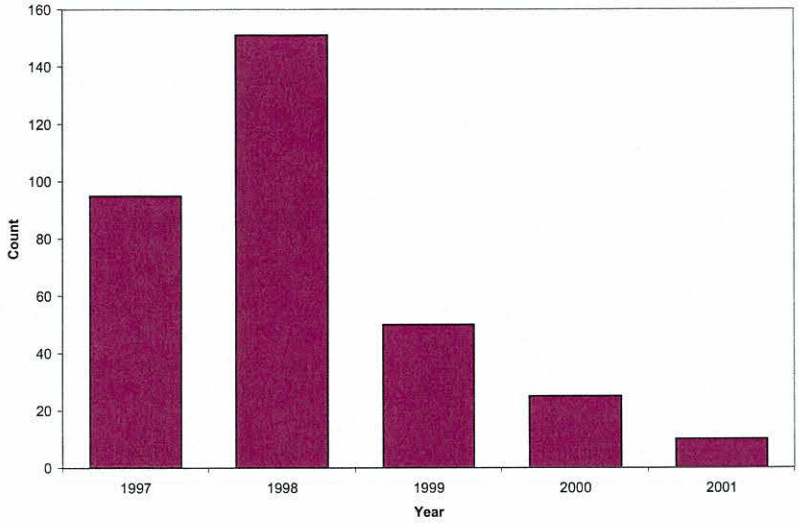

Figure 22. The number of Franklin's Gulls observed from 1997 – 2001 on the Horsefly Lake BBS route near Taber Lake.

Big, Cardinal, Forsyth, Lac Sante, Nakama, Pakowki, and Reed lakes

A number of lakes (Big, Cardinal, Forsyth, Lac Sante, Nakama, Pakowki, and Reed lakes; Poston et al. 1990; IBA Canada 2006) considered priority Franklin's Gull breeding habitat in the past appear to no longer support colonies. Colonies were not on these lakes in 2005 and 2005. Water levels have been too low to support Franklin's Gulls since at least 1997 at Pakowki Lake (~75 km south of Medicine Hat) and on Big Lake (near St. Albert) since 1999 (Lane 2000). Reed Lake (13 km north of Spedden) was completely dry and being used for pasture in both 2005 and 2006. Cardinal Lake (~25 km west of Peace River) experienced significant flooding in 2005 and 2006 which completely destroyed the bulrush beds the Franklin's Gulls were nesting on in 2004. Although we are not sure why Franklin's Gulls appear to have abandoned Nakama Lake (~15 km southeast of Strathmore), we did notice that only a small portion of Nakama Lake had emergent vegetation and 80% of the shoreline had slumping banks when we visited the lake in 2005 and 2006. Forsyth Lake is ~11km northwest of Bonnyville and ~15 km north of the Moose Lake colony. The lake does have some emergent vegetation beds and although it did not have a colony of Franklin's Gulls in 2005 or 2006, we suspect gulls might use the lake when habitat conditions on Moose Lake are not conducive to nesting. We are not sure why the Franklin's Gulls have abandoned Lac Sante (~20 km southwest of St. Paul) but we suspect it is due to the destruction, by natural or man-made causes, of extensive beds of emergent vegetation. When we surveyed the lake we noticed most of the shoreline was rocky with little emergent vegetation. The Western Grebe, *Aechmophorus occidentalis*, colony that was historically present has also abandoned the lake (Found and Hubbs 2004).

Conclusions

Results from BBS surveys and from other published and unpublished sources indicate that Franklin's Gulls have a long history of nesting on many of the lakes with colonies in 2005 and 2006. The repeated presence of nesting gulls on these lakes is likely due to relatively stable water and emergent vegetation conditions. Water management on these lakes appears to play an important role in the stability of these colonies. Satellite lakes that are occasionally used for colonies (e.g., Jessie Lake, Forsyth Lake, Third Lake) may be important habitat for nesting Franklin's Gulls when conditions at the main lake (e.g., Moose Lake) are not conducive to nesting. Lakes where Franklin's Gulls no longer nest are those that are dry, flooded, and/or have little emergent vegetation left. Franklin's Gulls may recolonize these lakes if water and emergent vegetation conditions are allowed to reach appropriate levels and no development has occurred on the lake which could deter use by the gulls.

Franklin's Gull colonies face potential threats on all the lakes visited in 2005 and 2006. Mortality due to power line collisions, reduction in water quality due to sewage or landfills, destruction of nests and nesting habitats due to grazing, shoreline development, recreation, and disturbance by humans were identified as potential threats during our surveys. Steps need to be taken to insure that the threats on the core Franklin's Gull colonies identified in this report are minimized. A substantial portion of the Franklin's Gull global population resides in Alberta during the breeding season and it is important for the conservation of this species that these colonies and wetlands be protected.

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