TEMPORAL AND SPATIAL DISTRIBUTION OF WATERBIRDS ON UTIKUMA LAKE, AB

2000 SURVEYS FINAL REPORT

Submitted by:

M. Gendron, S.A. Smyth, and G.R. Stewart

Ducks Unlimited Canada
#200, 10720 - 178th Street
Edmonton, AB T5S 1L3

May 2001

BACKGROUND

Utikuma Lake is a large (288 km^2), shallow, eutrophic lake located in north-central Alberta (Mitchell and Prepas 1990). It is an important basin for breeding, moulting and staging use for several waterfowl and colonial nesting species. For example, 40 000 canvasbacks (i.e., 20 % of the continental population) moulted on Utikuma Lake in late summer 1975 (Alta. For Ld. Wild. n.d. in Mitchell and Prepas 1990). The lake has been identified as a Key Moulting and Staging Lake in the Alberta 1989 NWAMP Implementation Plan and is deemed regionally important for migratory bird habitat and nesting species and nationally important for moulting and staging ducks (Poston et al. 1990). However, surveys from 1963 to 1981 suggest substantial declines of waterfowl populations in the fall, where only 20 000 birds were observed in 1982 (Holton 1982).

Habitat loss or degradation, or outbreaks of disease in critical concentration areas can have serious consequences for regional waterfowl populations given the propensity for birds to concentrate during molting and staging. For example, botulism outbreaks on Utikuma Lake have become increasingly important since 1990 where associated waterfowl mortality has risen from 7500 in 1990, to 12,000 in 1991, to 21,726 in 1992, to an estimated 300,000 dead birds (mostly waterfowl) in 1998 (Heckbert and Pybus 1999). Yet waterbird use over the last 2 decades is poorly understood. A better understanding of species-specific abundance and distribution of waterbirds on the lake would provide useful information as to which species and areas are more susceptible to avian botulism or other disturbances. This study was designed to document and describe spatial and temporal use by moulting and staging waterbirds on Utikuma Lake.

STUDY DESIGN AND METHODS

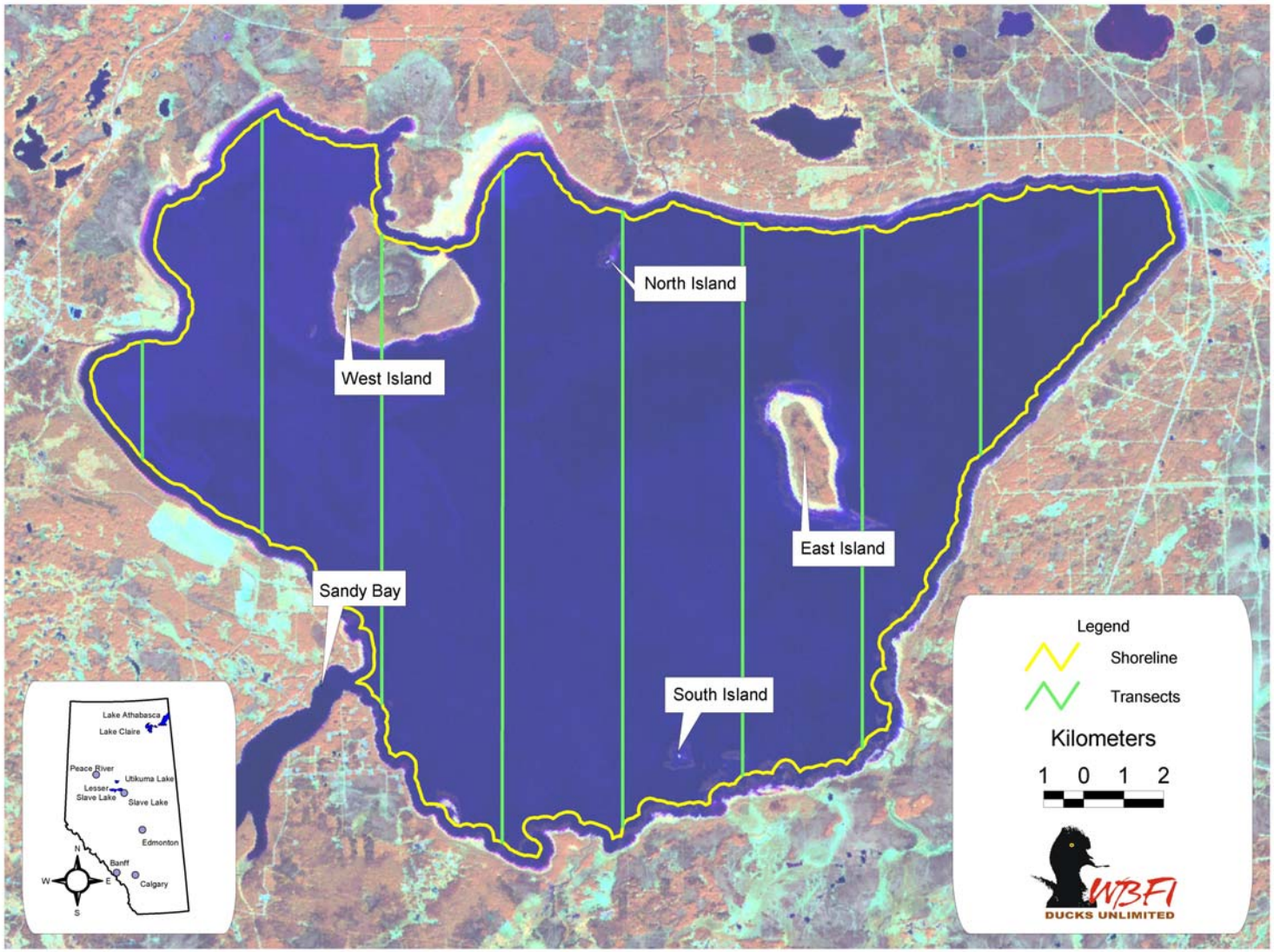
Four fixed-wing aerial surveys were successfully completed in late June, July, early and mid-September; adverse weather conditions (i.e., high winds) prevented the survey crew from completing the fifth scheduled survey in early October (see Appendix I).

A shoreline survey (approx. 125 km) as well as a series of north-south transects oriented along UTM grid lines were flown on three-kilometer intervals running from the mouth of Utikuma River to the east end of the lake (approx. 105 km; see Fig. 1 and Appendix II). All surveys were conducted according to established Standard Operating Practices (SOP's) to ensure consistency between crews on this and other DUC Western Boreal Forest Initiative aerial survey areas. Survey methodology were similar with that employed by the USFWS (U.S. Fish and Wildlife Service / Canadian Wildlife Service 1987) and IWWR/DUC (Pollard et al. 2000). Transects were flown using a Cessna 185 on floats at a ground speed of 160 km/hr at 40 m above ground level with observations recorded for a 150 m survey sample width on each side of the aircraft (300 m total flight path). Surveys were flown with one navigator/ observer sitting beside the pilot and a second observer sitting on the opposite side of the aircraft directly behind the pilot.

We employed a PC based Moving Map display (Fugawi 3 software) to (1) assist the pilot in maintaining predetermined flight transects and (2) allow more precise plotting of waterfowl location data as specific observation locations were geo-referenced by linking observation interval (recorded to the nearest second) with latitude / longitude position generated by simultaneous GPS position identification. All observations were recorded on hand-held cassette recorders using synchronous time stamped intervals with location data generated from the flight-following software. ArcView GIS software (ESRI 1996) was used to summarize and analyze waterbird distributions both temporally and spatially.

Transects endpoints were approximately 300m from the shoreline (on the lake) to avoid overlap and double sampling with the shoreline survey. We applied a 10X correction factor to observations recorded during the transect component of the survey, consistent with the extent of survey coverage. Estimates of total abundance were then derived by adding the corrected estimate from transect surveys to the shoreline observations. Estimates of total waterbird use-days from June 26 to September 20 were generated by integrating estimates of waterbird abundance from the four survey intervals. Waterbird estimates can be considered conservative as no visibility correction factor was applied. This is especially the case for

Figure 1. Shoreline and transect coverage of Utikuma Lake during fixed-wing surveys in 2000.



species such as American green-winged teal and gadwall, which have high visibility factors or adjustments.

RESULTS

Temporal changes in waterbird distribution

The waterbird community on Utikuma Lake was very diverse (Table 1). At least 29 waterbird species were recorded during each survey; the majority consisting of ducks and coots (i.e., from 77% to 96% of total abundance estimates). Waterbird use peaked in late July with >112,000 estimated waterbirds and was fairly constant from late June to early September, but later decreased in mid-September. Relative abundance varied between surveys for most species/waterbird groups (Fig. 2). More unidentified ducks were observed during the 2 middle surveys, probably an indication of more pre-molting and molting birds using the Lake during this period. Diving ducks, consisting mainly of canvasbacks, goldeneye, and bufflehead, were the most dominant group, especially in June and late September with >50% of all waterbirds. Dabbling ducks, mainly mallard and wigeon, and American coots were stable in moderate numbers throughout the survey period.

Over 4500 western grebes were estimated in late June and then gradually declined throughout the study. Double-crested cormorant (>5,000) and American white pelicans (>2,700) abundance also peaked in late June. In addition, >1,800 cormorant nests in a colony on the South Island were estimated using aerial photography. More than 20,000 gulls were estimated in late July, far greater than during the other 3 surveys.

When combining results from all 4 surveys, we estimated **>8.5 million** waterbird use-days from June 26 to September 20 (86 days).

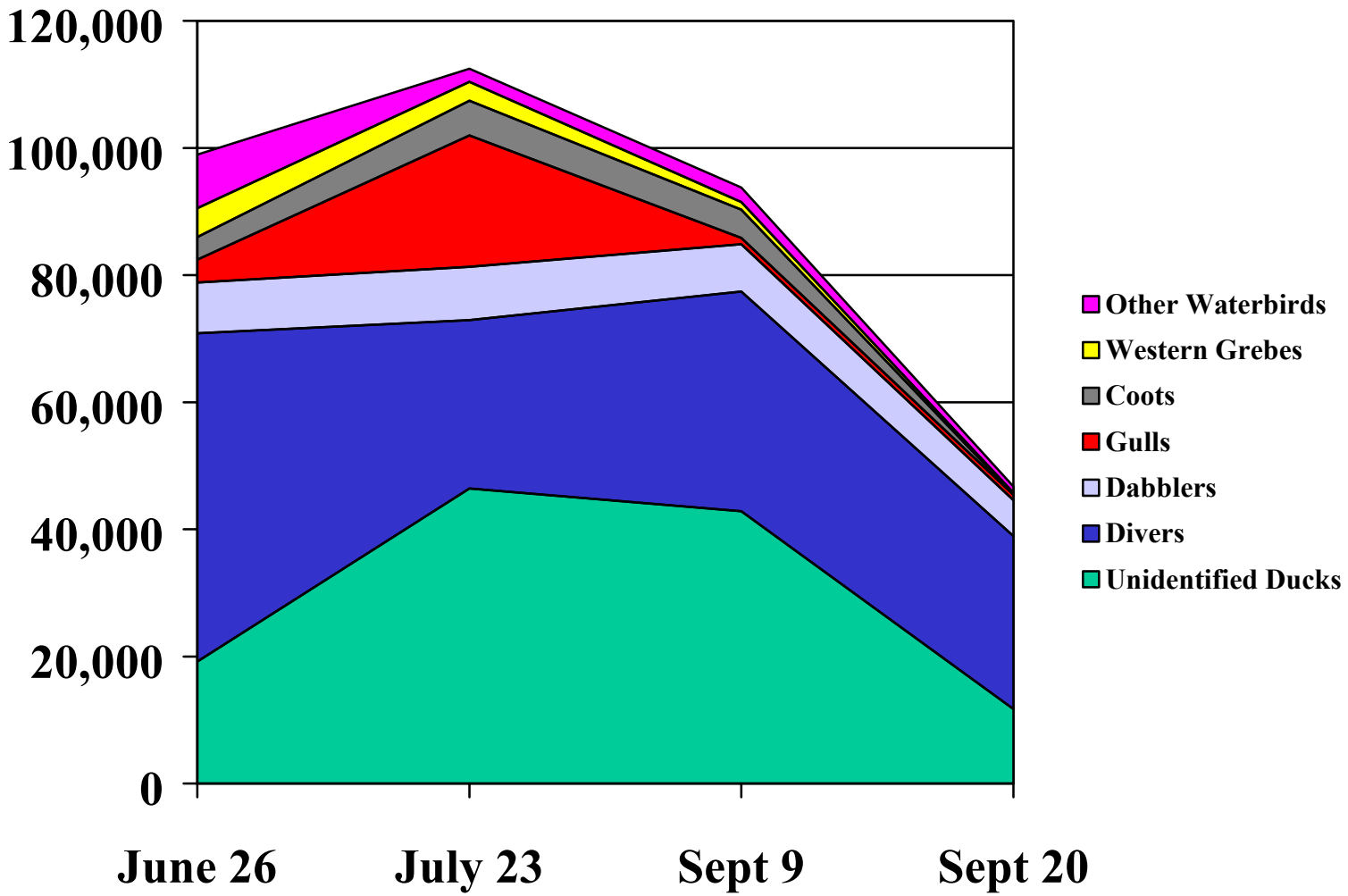
Table 1. Waterbird estimates on Utikuma Lake during 4 fixed-wing surveys in 2000.

SPECIES [1]	June 26	July 23	Sept 9	Sept 20
MALL	4,328	187	688	1,355
GADW	84	100	84	350
AMWI	256	2,150	103	1,234
NOPI			1	
NSHO	30	34	44	17
AGWT			30	
BWTE	668	4	324	50
CANV	2,540	1,514	8,315	1,652
REDH	440	131	1,214	1,139
LESC	138	1,141	730	5,107
RNDU	356	391	1,479	681
GOLD	1,177	707	1,101	34
BUFF	3,597	169	2,233	4,923
RUDU	180	66	250	340
SCOT	141	40	30	243
Merganser			3	30
UNDA	2,626	5,927	4,279	2,513
UNTE			1,931	125
UNDI	43,134	22,335	19,188	13,074
AMCO	3,525	5,487	4,438	108
UNDU	19,149	46,401	42,843	11,708
Total Ducks and coots	**82,369**	**86,784**	**89,308**	**44,683**
CAGO	7	35	91	
TRUS				6
AWPE	2,728	1,348	1,537	718
COLO	103		20	47
DCCO [2]	5,172	50	116	76
GBHE	34	43	47	6
HOGR			20	
RNGR	17	11	5	4
WEGR	4,568	2,945	1,235	226
Grebes	20		163	26
BLTE	35	1		
COTE	19			
Terns	228	127	127	
BOGU		40		
RBGU	10			
Gulls	3,580	20,644	964	854
Shorebirds	52	453	158	102
Yellowlegs	2	6	6	
Total Waterbirds	**98,944**	**112,487**	**93,797**	**46,748**

[1] See Appendix III for species names

[2] Excluding breeding colony on South Island of >1800 nests.

Fig 2. Seasonal abundance of waterbirds on Utikuma Lake in 2000.



Spatial variation in waterbird distribution

Spatial use of Utikuma Lake varied among waterbird species/groups but remained constant (species-specific) throughout the survey period. Dabbling ducks as well as American coots were almost exclusively associated with shoreline habitat (Fig. 3a-d). Diving ducks were predominantly associated with open water (away from shore), yet estimates along the shoreline were similar or greater than those of dabbling ducks. Most unidentified ducks (including coots that were undifferentiated from ducks) were related with shoreline habitat, mainly a result from observations that included a combination of both dabbling and diving ducks. High use areas during most surveys include the northwest region, the south shore, Sandy Bay and surrounding the East Island. Open water was less used during the last survey.

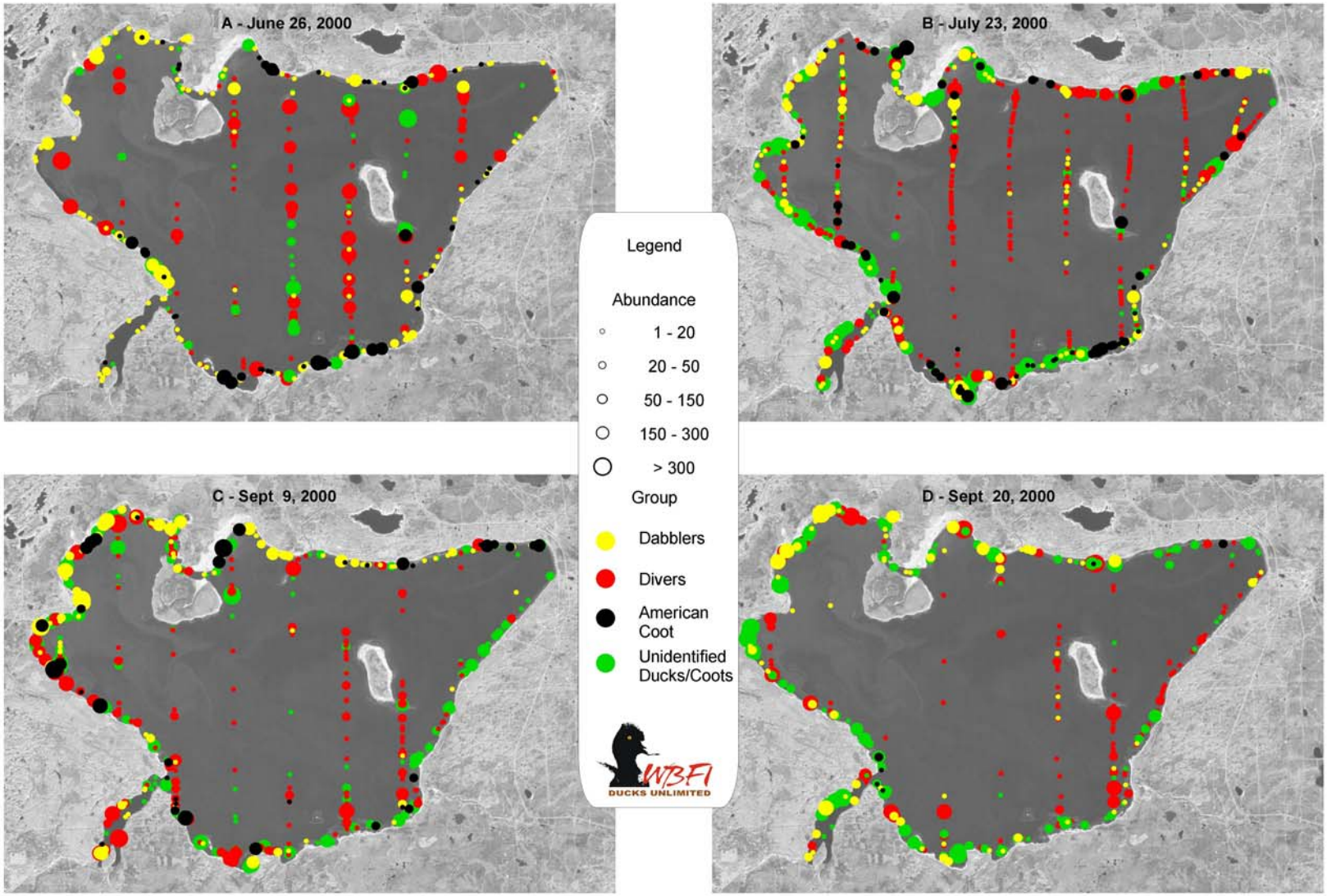
Western grebes were typically observed in small groups (< 5 birds), distributed across the lake on open water (Fig. 4a-d). Cormorants and pelicans were typically observed along or at close proximity of mainland and island shorelines, especially in the northwest region, the North and East Island and Sandy Bay. Observations of gull flocks varied in size; small groups (<10) were recorded along shorelines and open water whereas large groups (typically 50-150, <800) were only associated with shoreline habitat.

DISCUSSION

The number of unidentified birds (>61% of all duck observations during each survey) is indicative of the difficulty of identifying species. As the breeding period diminishes later in the summer, post-fledging and post-breeding (molting/staging) ducks are in their eclipse and / or in mixed-species groups. Survey protocols employed provided a good indication of temporal and spatial changes in bird use across the Lake.

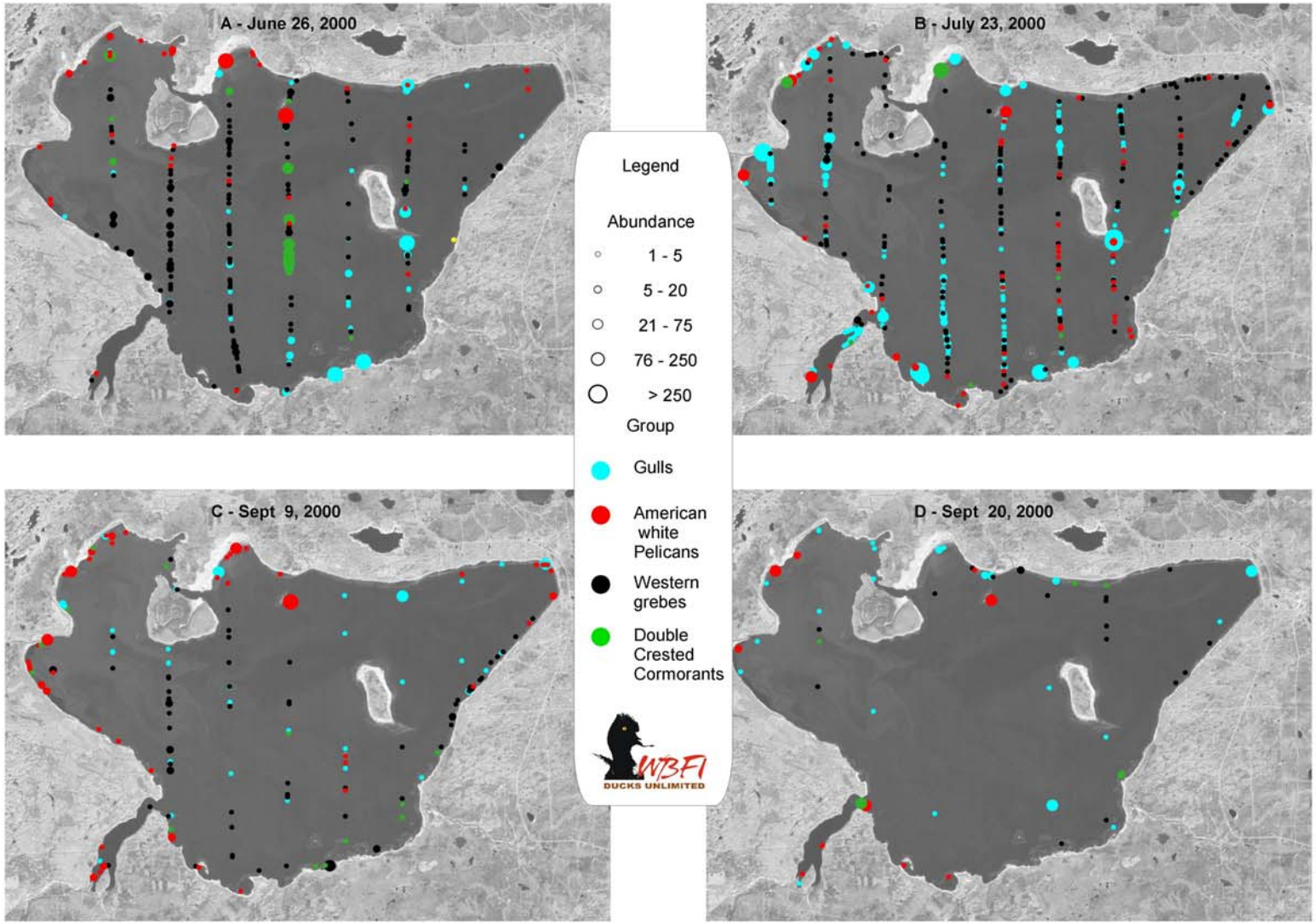
Waterbird use of Utikuma Lake in 2000 was high throughout the survey period, especially during the molting (late June and late July) and early staging (early September) periods. Estimates from previous censuses in the early 1960's (CWS Unpubl. Data) and early 1980's (Holton 1982) had suggested that waterfowl use dramatically declined (Fig. 5). Estimates

Figure 3. Spatial distribution of ducks and American coots during 4 surveys on Utikuma Lake in 2000.



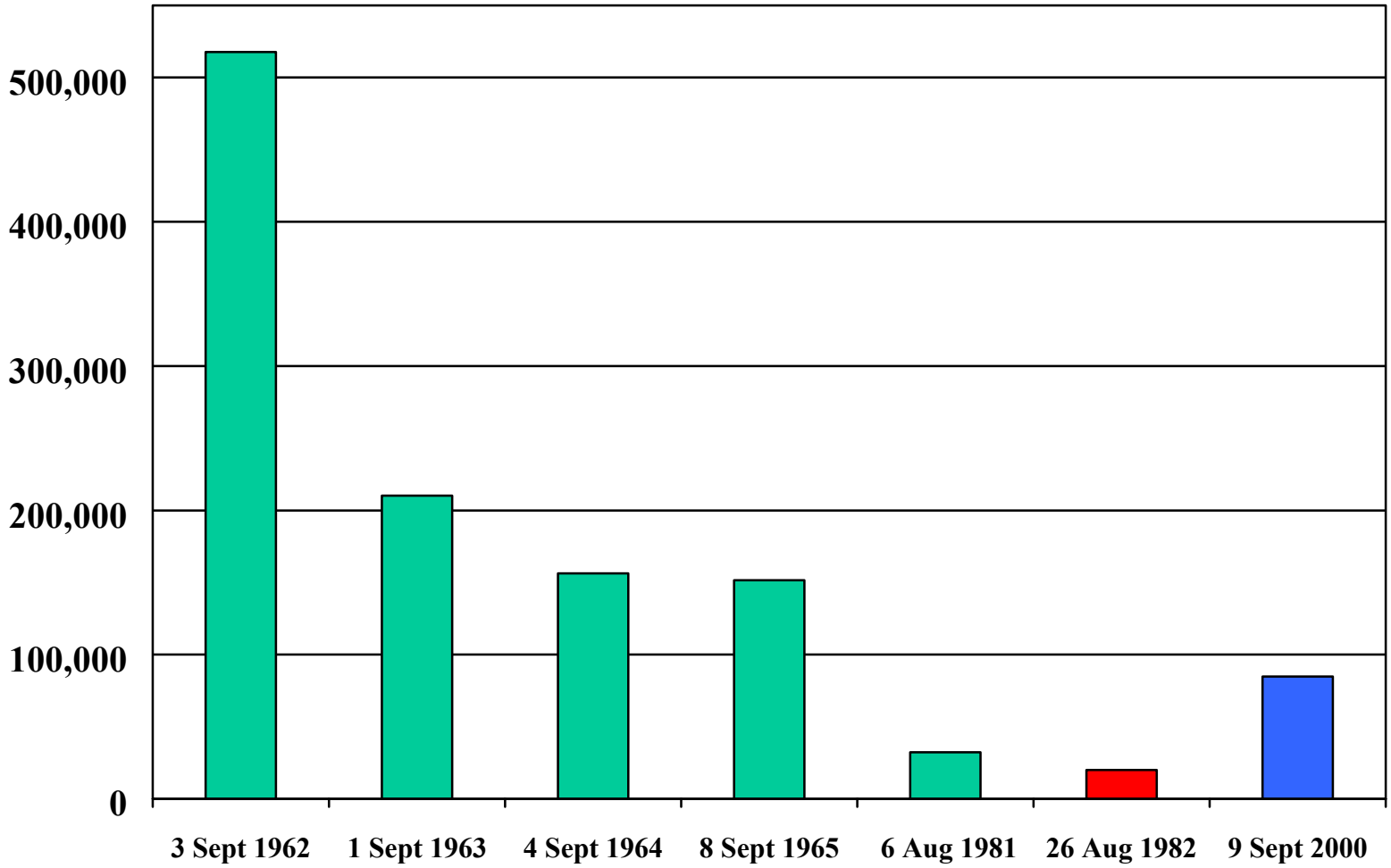
Note: Shoreline observations represent 100% coverage whereas those illustrated on open water represent 10% of the population estimate, consistent with the transect coverage.

Figure 4. Spatial distribution of Western grebes, American white pelicans, gulls, and double-crested cormorants during 4 surveys on Utikuma Lake in 2000.



Note: Shoreline observations represent 100% coverage whereas those illustrated on open water represent 10% of the population estimate, consistent with the transect coverage.

Figure 5. Summary of early fall aerial surveys conducted on Utikuma Lake from 1962 to 2000.



derived from this study suggest that waterbirds have increased from lows recorded by Holton in 1982 but are well below estimates recorded in 1960's.

There are several reasons to explain differences among studies. (1) Survey methodologies (e.g., extent of coverage) and calculation of population estimates may have been different. The lack of detailed methodology from previous studies prevented an adequate comparison of methods used. (2) Waterbird use of an area during late summer and early fall highly varies from day to day as a result of food resources availability and weather patterns. It is possible that such conditions (or other factors) were different during or prior to surveys among studies and related to this, (3) differences in survey dates could also account for among-study variation. Nevertheless, we suspect that trends observed among studies are real and that population levels have increased since the early 1980's. Population levels on Utikuma Lake depend on habitat conditions and waterbird breeding success in areas not only surrounding the Lake (i.e., locally) and, perhaps more importantly, in areas at the regional scale (e.g., population levels in central Alberta, wetland conditions in the prairie region of southern Alberta).

Spatial and seasonal distribution of waterbirds on Utikuma Lake has also been reported previously. Although survey intervals were considerably different, Holton (1982) conducted 5 aerial surveys from August 6 to September 16. While results from his August surveys cannot be compared with this study (none were flown in August during this study), Holton also reported greater numbers of diving ducks in September, when compared to dabblers. Although far fewer ducks were recorded in 1982, estimates from the 2 surveys in September were similar (i.e., Sept 6: 14,563 and Sept 16: 13,974) whereas we reported a decline by nearly 50% (see Table 1). Similar to Holton's study, dabbling ducks were almost exclusively observed along shoreline habitat, in particular in the northwest region of the Lake as well as the north and south shores. In fact, few shoreline areas received little or no duck use in 2000 (Fig 3). Contrary to Holton's work, high numbers of diving ducks were not only recorded in association with shoreline habitat but throughout the whole lake surface area, especially from late June to early September.

Utikuma Lake received little use by shorebirds and geese. It is important to mention that although transect locations were determine randomly, all 4 islands (and associated shorelines) received little coverage. As a result, colonial nesting species, such as cormorants, terns, gulls and pelicans, were under represented in our sample. Indeed, >1,800 cormorant nests on the South Island were estimated from aerial photography on June 26. In addition, an airboat survey of these islands conducted in mid-June confirmed breeding colonies of cormorants (>1,500 nests), Franklin's Gulls (>3,900 nests), Common Terns (>160 nests), and pelicans (>60 nests) (R. Arbuckle, DUC Grande Prairie and M. Heckbert, Alberta Environment, Pers. Comm). Of particular interest are the > 4,500 western grebes we estimated in late June, which is 5.3% of the continental population (B. Eichorst, pers. comm. Wetlands International). Many of these grebes were probably breeders as >850 nests were recorded during the airboat survey.

SUMMARY AND RECOMMENDATIONS

The survey methods and protocols used in this study are repeatable and effective in documenting and describing spatial and temporal use by most molting and staging waterbirds at Utikuma Lake. In future years, all 5 survey dates should be included. To increase the accuracy of use by colonial waterbirds, future work should also include detailed aerial surveys of the 4 islands and their associated shorelines. Subsequent surveys at 1-3 year intervals would help build a cumulative-use database and explain year-to-year variation. This information would be useful in contingency planning for botulism monitoring and clean up.

Utikuma Lake is a regionally significant molting and staging wetland, especially for diving ducks like canvasback, goldeneye and bufflehead. Our estimate of over 8.5 million waterbird use-days ranks it very high, both provincially and nationally (Table 2). Only the Peace-Athabasca Delta has been shown to have higher use (Gendron et al. 2001). Additionally, estimates from other regions were mainly calculated on an annual basis (i.e., 365 days) whereas the survey period for this study was over 86 days only. Utikuma Lake is also an important wetland for breeding waterbirds, in particular colonial nesters.

Table 2. Waterbird use of selected Canadian wetlands.

SITE	DOCUMENTED USE	REFERENCE
Utikuma Lake	>8,500,000 million waterbirds (June 26 to Sept 20, 2000)	This Study
Peace-Athabasca Delta, AB	9,883,284 total waterbird use-days (September 2000)	Gendron *et al*., 2001
	800,164 waterbirds peak count (mid-September 1999)	
	>18,517,723 total waterbird use-days (September 1999)	
Boundary Bay, BC	8,000,000 dabbling duck use-days annually	Baldwin and Lovvorn, 1994
Long Point, ON	8,333,000 waterfowl use-days (1977-78)	Petrie, 1998
	8,117,473 waterfowl use days (1998)	Petrie, 1999
SW Lake Erie	9,521,000 waterfowl use-days (mean 1980-1990)	Prince *et al*., 1992
Lake St. Clair Delta (Can.)	7,087,000 waterfowl use-days (1976)	

Results from this study as well as others strongly suggest that Utikuma Lake certainly qualifies for increased status of protection such as a National Wildlife Area, Migratory Bird Sanctuary or designation as a Ramsar wetland. For example, based on western grebes alone, Utikuma Lake would qualify under the United Nations Ramsar Convention as a wetland of international significance. We recommend that such process be put forward in consultation with landowners and users adjacent to the Lake such as First Nations, Crown and potentially industry.

ACKNOWLEDGEMENTS

Alberta NAWMP kindly provided financial support for this survey program. Special gratitude is extended to Brett Calverley (DU Edmonton) and Reg Arbuckle for consultations and insight provided at various stages of this project. In addition to the authors, Ducks Unlimited Canada staff participating in the delivery of these surveys included Amy Leach (Edmonton), Bruce Pollard (Winnipeg), Al Richard (Edmonton), and Chris Smith (The Pas). Appreciation is extended to pilot Mark Fermelide (Slave Air) who very capably assisted in the survey program.

LITERATURE CITED

Baldwin, J.R. and J.R. Lovvorn. 1994. Habitats and tidal accessibility of the marine foods of dabbling ducks and brant in Boundary Bay, British Columbia. Marine Biology 120: 627-638

Environmental Systems Research Institute Inc. 1996. ArcView spatial analyst: Advanced spatial analyst using raster and vector data. Redlands, CA. 148 pp.

Gendron, M., S.A. Smyth, G.R. Stewart and J.B. Pollard. 2001. Peace Athabasca Delta, AB Waterbird Inventory 2000 Surveys: Final Report. Unpubl. Ducks Unlimited Canada, Edmonton, AB. 24 pp.

Holton, G. 1982. The use of Utikuma Lake by post-breeding ducks. Alberta Energy and Natural Resources. Draft Rep. 64 pp.

Heckbert, M.D. and M.J. Pybus. 1999. Waterfowl disease at Utikuma Lake, 1998. Alberta Environment Natural Resources Service Fish and Wildlife, High Prairie and Edmonton. 30pp.

Mitchell, P. and E. Prepas. 1990. Atlas of Alberta Lakes. University of Alberta Press, Edmonton, Alberta.

Petrie, S. 1998. Waterfowl and wetlands of Long Point Bay and Old Norfolk County: Present conditions and future options for conservation. Norfolk Land Stewardship Council. Simcoe, ON. 182 p.

Petrie, S. 1999. Long Point Waterfowl and Wetlands Research Fund. Mid-Year Update.

Pollard, J.B, M. Gendron, S.A. Smyth, A.J. Richard, and G.R. Stewart. 2000. Peace Athabasca Delta waterbird inventory: 1999 surveys final report. Unpubl. Rep. submitted to BC Hydro, Canadian Heritage-Parks Canada, Canadian Wildlife Service and Alberta Environment. 18pp.

Poston, B., D.M. Ealey, P.S. Taylor, and G.B. MacKeating. 1990. Priority migratory bird habitats of Canada's prairie provinces. Environment Canada, Edmonton, Alberta. 107pp.

Prince, H.H., P.I. Padding and R.W. Knapton. 1992. Waterfowl use of the Laurentian Great Lakes. J. Great Lakes Res. 18: 673-699

U.S. Fish and Wildlife Service / Canadian Wildlife Service. 1987. Standard operating procedures for aerial breeding ground population and habitat surveys in North America. U.S. Dept. of the Interior & Environment Canada

Appendix I. Utikuma Lake fixed-wing survey schedule and personnel.

Date	Pilot	Navigator / Observer I	Observer II	Status
June 26	M. Fermelide	M. Gendron	A. Richard	Complete
July 23	M. Fermelide	B. Pollard	C. Smith	Complete
September 7	M. Fermelide	M. Gendron	A. Leach	Complete
September 20	M. Fermelide	M. Gendron	A. Leach	Complete
October 3	M. Fermelide	M. Gendron	B. Pollard	Incomplete; bad weather

Appendix II. Utikuma Lake survey transect endpoints and distances (UTM)

Transect	Northern Terminus	Southern Terminus	Length (km)
1	11U 612194 E 6199849 N	11U 612192 E 6195636 N	4.2
2	11U 609201 E 6199601 N	11U 609200 E 6192242 N	7.4
3	11U 606235 E 6198875 N	11U 606244 E 6185016 N	13.9
4	11U 603254 E 6198994 N	11U 603254 E 6184331 N	14.7
5	11U 600259 E 6199241 N	11U 600259 E 6183020 N	16.2
6	11U 597263 E 6200597 N	11U 597247 E 6182785 N	17.8
7	11U 594238 E 6200971 N	11U 594237 E 6185235 N	15.7
8	11U 591242 E 6201743 N	11U 591245 E 6190344 N	11.4
9	11U 588252 E 6195964 N	11U 588252 E 6192351 N	3.6
Total			104.9

Appendix III. American Ornithological Union species alpha-codes.

Common Name	Numeric Code	Scientific Name	Alpha-Code
Western Grebe	0010	*Aechmophorus occidentalis*	WEGR
Red-necked Grebe	0020	*Podiceps grisegena*	RNGR
Horned Grebe	0030	*Podiceps auritus*	HOGR
Common Loon	0070	*Gavia immer*	COLO
Ring-billed Gull	0540	*Larus delawarensis*	RBGU
Bonaparte's Gull	0600	*Larus philadelphia*	BOGU
Common Tern	0700	*Sterna hirundo*	COTE
Black Tern	0770	*Chlidonias niger*	BLTE
Double Crested Cormorant	1200	*Phalacrocorax auritus*	DCCO
American White Pelican	1250	*Pelicanus erythrorhynchos*	AWPE
Mallard	1320	*Anas platyrhnchos*	MALL
Gadwall	1350	*Anas strepera*	GADW
American Wigeon	1370	*Anas americana*	AMWI
American Green-winged Teal	1390	*Anas crecca*	AGWT
Blue-winged Teal	1400	*Anas discors*	BWTE
Unidentified Teal	1401	n/a	UNTE
Northern Shoveler	1420	*Anas clypeata*	NSHO
Northern Pintail	1430	*Anas acuta*	NOPI
Redhead	1460	*Aythya americana*	REDH
Canvasback	1470	*Aythya valisineria*	CANV
Lesser Scaup	1490	*Aythya affinis*	LESC
Ring-necked Duck	1500	*Aythya collaris*	RNDU
Bufflehead	1530	*Bucephala albeola*	BUFF
Ruddy Duck	1670	*Oxyura jamaicensis*	RUDU
Canada Goose	1720	*Branta canadensis*	CAGO
Trumpeter Swan	1810	*Cygnus buccinator*	TRUS
Great Blue Heron	1940	*Ardea herodias*	GBHE
American Coot	2210	*Fulica americana*	AMCO
Scoter spp.	n/a	n/a	SCOT*
Unidentified Dabbler	n/a	n/a	UNDA*
Unidentified Teal	n/a	n/a	UNTE*
Unidentified Diver	n/a	n/a	UNDI*
Unidentified Duck	n/a	n/a	UNDU*
Unidentified Grebe	n/a	n/a	Grebes*
Unidentified Gull	n/a	n/a	Gulls*
Unidentified Tern	n/a	n/a	Terns*
Unidentified Shorebird	n/a	n/a	Shorebirds*
Unidentified Yellowlegs	n/a	n/a	Yellowlegs*
Unidentified Merganser	n/a	n/a	Merganser*
Goldeneye spp.	n/a	n/a	GOLD*

* not listed as A.O.U. Alpha-codes