Alberta Marsh Monitoring Program

Pilot Year 2002

Lisa Priestley

Bird Studies Canada

Acknowledgements

I would like to thank Bird Studies Canada, Environment Canada, and the Alberta Sport Recreation Parks, and Wildlife Foundation for their funding support. In-kind support from Alberta Sustainable Resource Development and Beaverhill Bird Observatory is also appreciated. Mike Norton (Canadian Wildlife Service), Steve Timmermans (Bird Studies Canada), and Kris Kendell (Alberta Conservation Association) generously provided their expertise in survey techniques for marsh birds and amphibians. Finally, thanks to Chuck Priestley and Bryn Spence for volunteering their time with surveys.

Photo credits: American Bittern, Common Snipe and Pied-billed Grebe by Ann Cook, Manitoba
Website- http://www.birdsofmanitoba.com/
All other photos: Lisa Priestley

Introduction

The development of an Alberta Marsh Monitoring Program is in response to a need to determine status and estimate population trends of marsh birds and amphibians in Alberta. Wetlands across North American appear to be declining and are facing increasing threats from development and pollution (Bird Studies Canada 2001, Conway 2002). The extent of declines of the birds and amphibians that rely on these habitats are relatively unknown.

The purpose of the Marsh Monitoring Program (MMP) is to:

1) gather information can be used to track population trends of marsh birds, frogs and toads over the long-term,
2) determine the distribution of marsh species,
3) to determine habitat associations of marsh birds, and
4) to inform the public about the importance of wetland health, by having them participate in the collection of data.

The goal of this pilot year was to test the MMP protocol and to determine if it is suitable to be used in the prairie provinces (Alberta, Saskatchewan, and Manitoba). If all volunteer-based protocols for monitoring marshes are using the same techniques in all provinces, then the data will be comparable across Canada. The volunteer-based National Nocturnal Owl Survey program uses a standard technique for monitoring nocturnal owls across Canada, but allows for variations in methods within regions and/or provinces (Takats *et al.* 2001).

Status of Marsh Wildlife in Alberta

There are 9 species of marsh birds in Alberta that are listed provincially as *Sensitive* or *Status Undetermined* (Table 1). Many of these species rely on permanent to semi-permanent wetlands. Threats include drainage, consolidation, and cultivation of wetlands, drought, local and uncommon occurrence, and disturbance during nesting. Many of the sensitive species are declining or are suspected of declining throughout Alberta. The Yellow Rail and the Virginia Rail are *Status Undetermined*, that is, there is little information on their distribution, abundance, and trends.

Table 1: Status of Alberta's marsh bird species (Alberta Sustainable Resource Development 2001).

Common Name	Status Rank	Information
American Bittern	Sensitive	-suspected declines
Great Blue Heron	Sensitive	-size and number of colonies declining
Black-crowned Night-Heron	Sensitive	-reliant on marsh habitats
Pied-billed Grebe	Sensitive	-drought related disappearance of small ponds has led to declines of this grebe species; BBS suggests declines
Horned Grebe	Sensitive	-drought related disappearance of small ponds has led to declines of this grebe species; BBS suggests declines
Western Grebe	Sensitive	-local and uncommon in Alberta
American White Pelican	Sensitive	-number of active colonies decreasing
Yellow Rail	Undetermined	-no information to determine status
Virginia Rail	Undetermined	-no information to determine status
Black Tern	Sensitive	-relies on larger marsh/wetlands, declines occuring in Saskatchewan and other areas in U.S.
Sedge Wren	Sensitive	-drought and drainage have degraded nesting habitat

Federally, in the Prairie Pothole Region (BCR 11) of Alberta, many waterbirds are concerned to be *High* to *Medium Priority* (Table 2). Factors such as population trends, low relative abundance, small or isolated breeding distributions, and threats to populations contribute to the status assessment. Nelson's Sharp-tailed Sparrow and Marsh Wren are also species that have limited information.

Table 2. Priority Alberta waterbird species covered by the Northern Prairie and Parkland Waterbird Conservation Plan (Canadian Wildlife Service).

Priority	Colonial Species	Non-colonial Species
Imperilled		Whooping Crane
High Concern	Black Tern	American Bittern
	Franklin's Gull	Horned Grebe
	Western Grebe	Yellow Rail
Medium Concern	American White Pelican	Sandhill Crane
	Black-crowned Night-Heron	Virginia Rail
	Caspian Tern	
	Eared Grebe	
	Great Blue Heron	
Low Concern	Bonaparte's Gull	American Coot
	California Gull	Common Loon
	Clark's Grebe	Pied-billed Grebe
	Double-crested Cormorant	Red-necked Grebe
	Forster's Tern	Sora
	Herring Gull	
	Ring-billed Gull	
	Yellow-crowned Night-Heron	

Some amphibians are also experiencing declines in Alberta. Six of Alberta's eight frog and toad species are listed as *Sensitive*, *May Be At Risk*, or *At Risk* (Table 3) (Alberta Sustainable Resource Development 2001). These declines can be attributed to a number of issues: habitat destruction (including den sites), pollution (fertilizers, pesticides, herbicides, acid precipitation), pathogens, exotic competitors, predators, and road kills (Alberta Sustainable Resource Development 2001).

Table 3: Status of Alberta's frog and toad species (Alberta Sustainable Resource Development 2001).

Common Name	Species	Status Rank
Western Toad	*Bufo boreas*	Sensitive
Canadian Toad	*Bufo hemiophrys*	May Be At Risk
Great Plains Toad	*Bufo cognatus*	May Be At Risk
Plains Spadefoot	*Spea bombifrons*	May Be At Risk
Boreal Chorus Frog	*Pseudacris maculata*	Secure
Wood Frog	*Rana sylvatica*	Secure
Columbia Spotted Frog	*Rana pretiosa*	Sensitive
Northern Leopard Frog	*Rana pipiens*	At Risk

Background of MMP

The MMP was established by Bird Studies Canada and Environment Canada in 1994. Through the efforts of many dedicated and skilled volunteers who survey amphibians, marsh birds, or both, the Marsh Monitoring Program (MMP) contributes to the conservation of wetlands and wetland dependent wildlife in the Great Lakes region. The program was designed to provide information on marsh bird and selected amphibian populations, and to contribute to our understanding of their habitat needs. Along with the essential role played by MMP volunteers, the program receives important support from Environment Canada, the U.S. Great Lakes Protection Fund, the U.S. Environmental Protection Agency, and the Great Lakes 2000 Cleanup Fund. Over the long-term, information gathered by MMP volunteers can be used to track population trends of marsh birds, frogs and toads throughout the Great Lakes region (http://www.bsc-eoc.org/mmpmain.html).

This program is now being developed and adapted for other regions provinces. The protocol will be adapted to suit the species of concern outlined by government agencies in different regions, and will be tested in the first few years, before being implemented across the prairie provinces for volunteers.

Survey Techniques

Most marsh birds are quite secretive, and are troublesome to detect by sight due to the dense habitats they occupy and their crepuscular nature (British Columbia Ministry of Environment, Lands and Parks 1998, Prescott *et al.* 2001, Lor and Malecki 2002). Rails and bitterns, in particular, are infrequently recorded in monitoring programs like the Breeding Bird Survey, and therefore little information on relative abundance and trends is collected (Gibbs and Melvin 1997).

Although many reclusive marsh birds are more likely to be recorded by detecting their calls (Godfrey 1986), vocalizations can also be difficult to record because the birds do not call consistently throughout the night. To increase detection rates, surveys can use taped breeding calls of birds to elicit responses from target species (Glahn 1974, Legare *et al.* 1988), Gibbs and Melvin 1997). Some provincial work has been done in the past with call surveys for amphibians as well (Takats and Priestley 2002), and rails (Prescott *et al*. 2001).

Methods

The marsh bird surveys used a "fixed distance" semi-circular sampling area; surveys were conducted from a central point located on the edge of a 100 meter (110 yard) radius semi-circle sample area. Marsh bird survey stations were separated by at least 250 meters (275 yards).

In order to ensure that data were collected on some important, but shy marsh birds, a 5-minute broadcast tape was played during the first half of the survey. Calls of Yellow Rail, Virginia Rail, American Bittern and Pied-billed Grebe were used, to encourage birds to call back, as they can be quite secretive (Marion *et al*. 1981). Broadcast equipment was a Sony Sport Tape Player Model Number CFS-904. The call survey CD was nine minutes long and consisted of:

Track 1 -5 minutes of silence
Track 2 -30 seconds of Sora
Track 3 -30 seconds of silence
Track 4 -30 seconds of Virginia Rail
Track 5 -30 seconds of silence
Track 6 -30 seconds of American Bittern
Track 7 -30 seconds of silence
Track 8 -30 seconds of Pied-billed Grebe
Track 9 -30 seconds of silence

All species of birds detected were recorded. Additionally, information on when target species were detected was recorded (time of response if in the initial silent listening period, or during/after which sound track). Environmental conditions (temperature, wind speed, cloud cover) were also recorded at each station.

An attempt was made to survey each marsh bird sample station three times in 2002 between May 20 and July 5. Surveys were conducted in the morning and evening to determine when the most number of individuals of target species would be detected. Evening surveys began after 6 p.m. and ended at or before sunset, and morning surveys began a half hour before sunrise and finished by two hours after sunrise. Each station was surveyed for 10 minutes.

Each amphibian survey route was visited on two nights, no less than 15 days apart, during the spring and early summer. The first visit coincided with minimum night-time air temperatures of at least 5°C, and the second visit was on nights when the air temperatures were at least 10°C. Each station was surveyed for 3 minutes and one of three Call Level Codes was used to categorize the intensity of calling activity for each species. Surveys began one half hour after sunset and ended before midnight.

In addition to monitoring the stations for marsh birds or amphibians, the habitat in and around each sample station was measured. A simple sketch map of the various vegetative components and a few questions were completed for each station, and the wetland was classified (Tarnocai 1979).

All data was entered into an Excel spreadsheet, compatible with the Biodiversity Species Observation Database (BSOD) (Alberta Sustainable Resource Development/Alberta Conservation Association).

Study Area

The study areas were located near Edmonton, Alberta in five locations: Ellerslie south of the city (2 sites), Ministik area southeast of city (3 sites), Beaverhills region southeast of the city (2 sites), Elk Island east of the city (3 sites), and the Glory Hills region west of the city (2 sites). In each area all ponds were numbered and two or three random ponds were chosen for surveys (Table 4).

Table 4. Pond names and locations surveyed in 2002.

Sites No.	Name	Latitude	Longitude
1	Gill's Pond	53° 23' 35.9"	113° 27' 20.3"
2	Cawes Lake	53° 23' 36.3"	113° 25' 58.0"
3	Kestrel Pond	53° 22' 1.0"	113° 1' 30.8"
4	Spliced Pond	53° 23' 16.8"	112° 57' 1.2"
5	HW 14	53° 23' 45.6"	112° 58' 25.2"
6	Lindbrook	53° 23' 50.3'	112° 47' 48.6"
7	Amisk	53° 21' 9.7"	112° 33' 2.9"
8	Elk Island Central 1	53° 37' 8.0"	112° 52' 21.4"
9	Elk Island Central 2	53° 39' 7.7"	112° 51' 36.1"
10	Elk Island East	53° 38' 58.7"	112° 46' 38.0"
11	Chickakoo North	53° 37' 40.3"	114° 4' 30.2"
12	Meer Lake	53° 37' 28.6'	114° 6' 0.3"

Results

Overall, the summer of a dry one. Two sites dried completely (Gill's Pond and Cawes Lake), and five site had extremely low water levels by July.

Bird Species

Twenty-nine of the possible 36 bird surveys were conducted (two or three surveys per site). There were 68 species of birds recorded: 10 during migration only, 14 flying over, and 44 associated with the wetlands.

Table 5. Bird species observed/heard during Marsh Monitoring surveys in central Alberta (2002).

Species	Total Number	Number of Sites	Species	Total Number	Number of Sites
Pied-billed Grebe	3	2	Black-necked Stilt**	6	1
Horned Grebe	8	4	American Avocet**	9	1
Eared Grebe	7	5	Lesser Yellowlegs**	14	2
Red-necked Grebe	3	2	Solitary Sandpiper**	3	1
American White Pelican*	10	1	Spotted Sandpiper	3	2
American Bittern	2	2	Pectoral Sandpiper**	17	1
Great Blue Heron	1	1	Stilt Sandpiper**	29	1
Black-crowned Night-heron	2	1	Semi-palmated Sandpiper**	10	1
Canada Goose	34	12	Western Sandpiper**	14	2
Tundra Swan**	80	2	Common Snipe	10	4
Gadwall	11	4	Wilson's Phalarope**	27	3
American Wigeon	7	3	Franklin's Gull	126	2
Mallard	33	12	Ring-billed Gull	14	3
Blue-winged Teal	2	1	California Gull	2	1
Cinnamon Teal	1	1	Black Term	3	1
Green-winged Teal	10	3	Mourning Dove*	1	1
Northern Shovelor	14	5	Great Horned Owl*	1	1
Northern Pintail	4	1	Short-eared Owl	1	1
Canvasback	2	1	Common Nighthawk	4	3
Redhead	9	3	Downy Woodpecker*	3	2
Ring-necked Duck	10	2	Least Flycatcher*	14	11
Lesser Scaup	3	1	Black-billed Magpie	15	10
Bufflehead	9	4	American Crow	17	10
Common Goldeneye	8	3	American Robin*	17	12
Ruddy Duck	8	3	Marsh Wren	9	7
Northern Harrier	3	2	Tree Swallow*	42	9
Red-tailed Hawk*	2	2	Yellow Warbler	12	10
Swainson's Hawk*	1	1	Common Yellowthroat	1	1
American Kestrel*	2	1	Nelson's Sharp-tailed Sparrow	6	3
Merlin	1	1	Song Sparrow*	11	6
Yellow Rail	3	2	Clay-colored Sparrow*	13	11
Sora	10	7	Red-winged Blackbird	38	12
American Coot	18	9	Yellow-headed Blackbird	5	2
Killdeer	6	3	Brown-headed Cowbird*	6	2

* fly-overs ** migration only

Five species were only recorded in the evening surveys: Black-crowned Night Heron, Yellow Rail, Merlin, Great Horned Owl and Short-eared Owl. Eight species of birds of *High* and *Medium Concern* were recorded in higher numbers in the evening surveys (Table 6). Migrants were recorded in both the morning and evening surveys in fairly even numbers.

Table 6. Number of individuals of *high concern* and *medium concern* species recorded during morning surveys and evening surveys.

Common Name	Number in Morning	Number in Evening
American Bittern	1	2
Great Blue Heron	1	1
Pied-billed Grebe	1	3
Horned Grebe	4	7
Eared Grebe	2	6
Common Snipe	2	10
Yellow Rail	0	2
Sora	4	9
Black Tern	1	3
Franklin's Gull	126	50
Nelson's Sharp-tailed Sparrow	1	6

Call playback helped in detecting one of the two American Bitterns, both Yellow Rails, and six of the nine Sora. All three Pied-billed Grebes were detected before the call playback was used.

Amphibians

Four species of calling amphibians were recorded: Boreal Chorus Frog, Wood Frog, Boreal Toad, and Canadian Toad (Table 7). One Tiger Salamander (*Ambystoma tigrinum*) was also observed. Boreal Chorus Frogs and Wood Frogs were recorded in both morning and evening surveys. Boreal and Canadian Toads were only recorded in the evening surveys.

Table 7. Amphibians heard during MMP call surveys (2002).

Species	Number of Ponds	Range of Numbers Observed
Boreal Chorus Frog	12	5 individuals to many
Wood Frog	6	2 individuals to many
Boreal Toad	2	1-5 individuals
Canadian Toad	2	1 individual
Tiger Salamander	1	1 individual

Habitat

All survey sites were classified as 'Prairie Wetlands' (Table 8). Ten of the wetlands were classified as 'Marsh' in a 'Shallow Basin', and two were classified as 'Shallow Water', less than 2 meters in depth (Chickakoo North and Meer Lake) in a 'Shore Marsh' form. Different vegetation types surrounded the sites including: rushes, tall shrubs, hardwoods, and conifers. The morphology of four sites was level (Gill's Pond, Cawes Lake, Kestrel Pond, and HW14), and eight were concave.

Migrating shorebirds were almost exclusively restricted to the level marshes with rushes surrounding them. All the hawks, American Kestrels, and the Great Horned Owl were found in close proximity to forested areas. The Short-eared Owl was recorded at Cawes Lake, which lies next to a farm field.

Table 8. Pond names and locations surveyed in 2002, and their classifications (Tarnocai 1979).

Sites No.	Name	Class	Form	Type	Morphology
1	Gill's Pond	M	SB	rush	level
2	Cawes Lake	M	SB	rush	level
3	Kestrel Pond	M	SB	rush	level
4	Spliced Pond	M	SB	hardwood	concave
5	HW 14	M	SB	rush/tall shrub	level
6	Lindbrook	M	SB	rush/hardwood	concave
7	Amisk	M	SB	rush	concave
8	Elk Island Central 1	M	SB	rush/hardwood	concave
9	Elk Island Central 2	M	SB	rush/hardwood	concave
10	Elk Island East	M	SB	rush/conifer/hardwood	concave
11	Chickakoo North	SW	S	hardwood/tall shrub	concave
12	Meer Lake	SW	S	hardwood/tall shrub	concave

M=marsh, SW=shallow water, SB=shallow basin, S=shore,

All American Bitterns, rails (Sora and Yellow), Marsh Wrens, and Nelson's Sharp-tailed Sparrows were associated with shallow basin marshes with rushes along the edges. A large flock of Franklin's Gulls were seen on HW14 marsh on numerous occasions throughout the summer, and seemed to be using the site as a feeding area. Black Terns were a rare sighting in 2003, but three were located at Elk Island Central 1. Many Horned and Eared Grebes were found during migration at many ponds, but were only found at two shallow water shore marshes (Chickakoo north and Meer Lake) during the breeding season. Pied-billed Grebes were observed in a variety of marsh types including shallow basin and shore with rush, and hardwood vegetation associations.

Wood Frogs were associated with marshes in close proximity to woodlands. Boreal and Canadian Toads were only found at the Elk Island sites, and the single Tiger Salamander was seen at Amisk Creek.

Discussion

Overall, the pilot year for developing the Marsh Monitoring Program in Alberta was successful. Eleven of the thirteen target species of concern were recorded. Low numbers were probably a result of the extremely dry conditions in the Edmonton region in 2002. Environment Canada recorded the third driest year in 117 years (Table 9).

Table 9. Annual statistics for weather from Environment Canada (2002).

Edmonton City Centre Airport 2002					
	2002	**1961-90 Normals**	**Deviation**	**Rank**	**Years of Data**
Annual Mean Temperature (^{o}C)	3.8	3.6	0.2	28 Warmest	117
Total Annual Precipitation (mm)	247.0	461.3	-214.3	3 Driest	119
Total Annual Sunshine (hrs)	2268.5	2297.0	-28.5	35 Sunniest	84

Survey recommendations for the Marsh Monitoring Program include:

1) Conduct surveys for marsh birds and amphibians in the evening to record the highest numbers.
2) Use broadcasts of Bittern, Sora, and Yellow Rail to increase detection rates.
3) Survey sites at least three times to separate migrants from breeders.
4) Collect more information from prairie provinces on monitoring techniques,
5) Collaborate with other monitoring programs being conducted across North America to use a standard survey protocol that will allow for data to be compared.

A large number of volunteers participate in other bird surveys, and can be approached to participate in this type of survey. Volunteers enjoy participating in surveys that are somewhat flexible in timing of visits and allow them to survey near their residence or holiday homes. A volunteer survey is due to be implemented over the next few years, but until a consensus is reached as to a North America-wide survey protocol, the program is on hold.

Literature Cited

Alberta Sustainable Resource Development. 2001. The general status of Alberta wild species 2000. Alberta Sustainable Resource Development, Edmonton, AB. 46 pp.

Bird Studies Canada. 2001. Training kit and instructions for surveying marsh birds, amphibians, and their habitats. 2001 Revised Edition. Bird Studies Canada, Ontario.

Bogner, H.E. and G.A. Baldassarre. 2002. The effectiveness of call-response surveys for detecting least bitterns. Journal of Wildlife Management 66(4): 976-984.

British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory methods for marsh birds: bitterns and rails. Standards for Components of British Columbia's Biodiversity No. 7. 37 pp.

Conway, C. 2002. Standardized North American marsh bird monitoring protocols. Draft Report, University of Arizona, Tucson, AZ. 12 pp.

Gibbs, J.P. and S.M. Melvin. 1993. Call-response surveys for monitoring breeding waterbirds. Journal of Wildlife Management 57: 27-34.

Gibbs, J.P. and S.M. Melvin. 1997. Power to detect trends in waterbird abundance with call-response surveys. Journal of Wildlife Management 61:1262-1267.

Glahn, J.F. 1974. Study of breeding rails with recorded calls in north-central Colorado. Wilson Bulletin 86: 206-214.

Godfrey, W.E. 1986. The birds of Canada. National Museum of Canada, Ottawa, ON. 595 pp.

Legare, M.L., W.R. Eddleman, P.A. Buckley, and C. Kelly. 1999. The effectiveness of tape playback in estimating black rail density. Journal of Wildlife Management 63: 116-125.

Lor, S. and R.A. Malecki. 2002. Call-response surveys to monitor marsh bird population trends. Wildlife Society Bulletin 30(4): 1195-1201.

Marion, W.R., T.E. O'Meara, and D.S> Maehr. 1981. Use of playback recordings in sampling elusive or secretive birds. Studies in Avian Biology 6: 81-85.

Prescott, D.R.C., M.R. Norton, and I.M.G. Michaud. 2001. A survey of yellow and Virginia rails in Alberta using nocturnal call playbacks. Alberta Conservation Association, Edmonton, Alberta. 20 pp.

Takats, L. and C. Priestley. 2002. Alberta amphibian call surveys, pilot year final reports. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species At Risk Report No. 53. Edmonton, Alberta. 28 pp.

Takats, D.L., C.M. Francis, G.L. Holroyd, J.R. Duncan, K.M. Mazur, R.J. Cannings, W. Harris, and D. Holt. 2001. Guidelines for nocturnal owl monitoring in North America. Bird Studies Canada and Beaverhill Bird Observatory, Edmonton, Alberta. 32 pp.

Tarnocai, C. 1979. Canadian wetland registry. In: Proceedings of a Workshop on Canadian Wetlands, a Meeting of the National Wetlands Working Group, Saskatoon SK. By C.D.A. Rubec and F.C. Pollett (eds.). Environment Canada Lands Directorate, Ecological Land Classification No. 12.

Lisa Priestley conducting survey at Cawes Lake.

Appendix A

Sample Marsh Monitoring Program Data Sheets

ALBERTA MARSH MONITORING DATA FORM – BIRDS

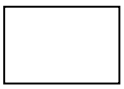
Observer Name:		**Phone: ( )**
Route Name:	**Lat:**	**Long:**

Date:		**Visit # 1 2**
Start Time:		**Finish Time:**
Wind:	**Cloud Cover: /10**	**Temp °C:**
Has habitat changed on route since previous year: Yes _____ No _____		
Remarks:		

Aerial Foragers

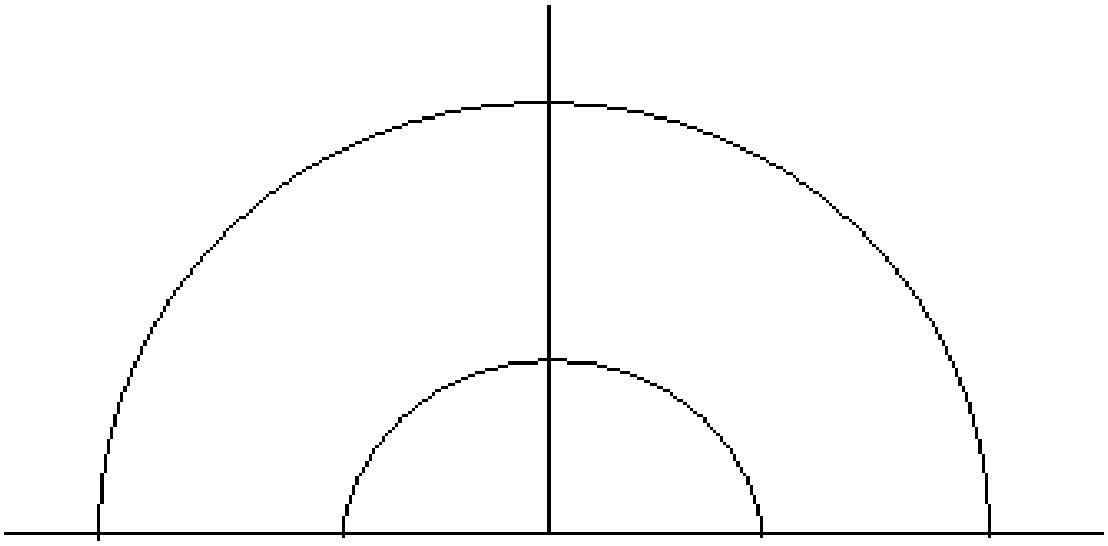
Species	Tally	No.

Station A



Outside or Fly-thrus

Species	Tally	Number



Aerial Foragers

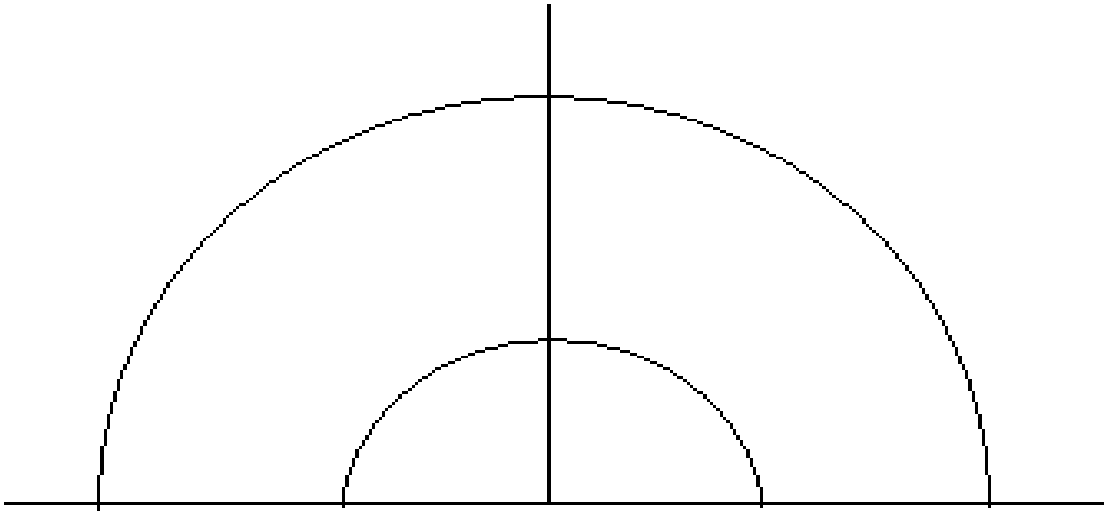
Species	Tally	No.

Station ____

Route Name:

Outside or Fly-thrus

Species	Tally	Number



100 m Focal Point 100 m

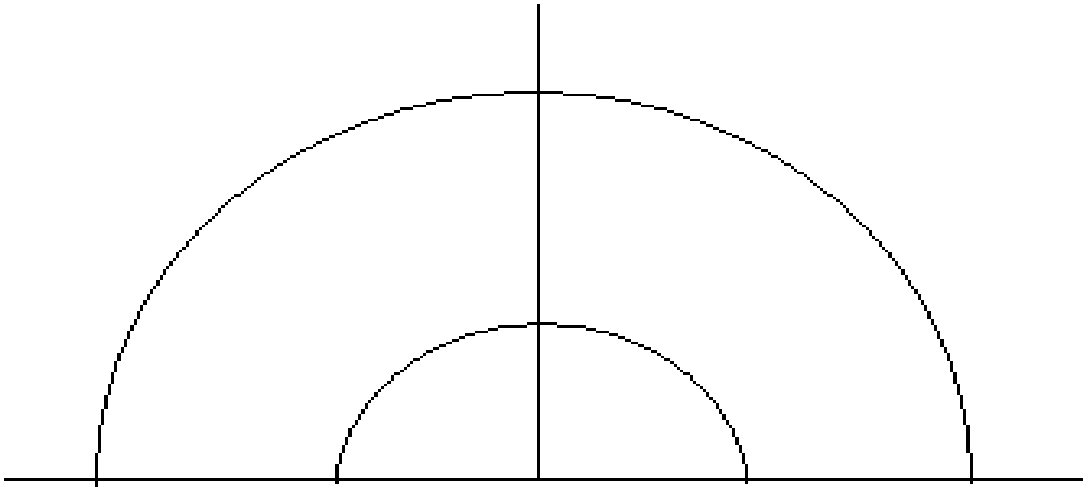
Aerial Foragers

Species	Tally	No.

Station _____

Outside or Fly-thrus

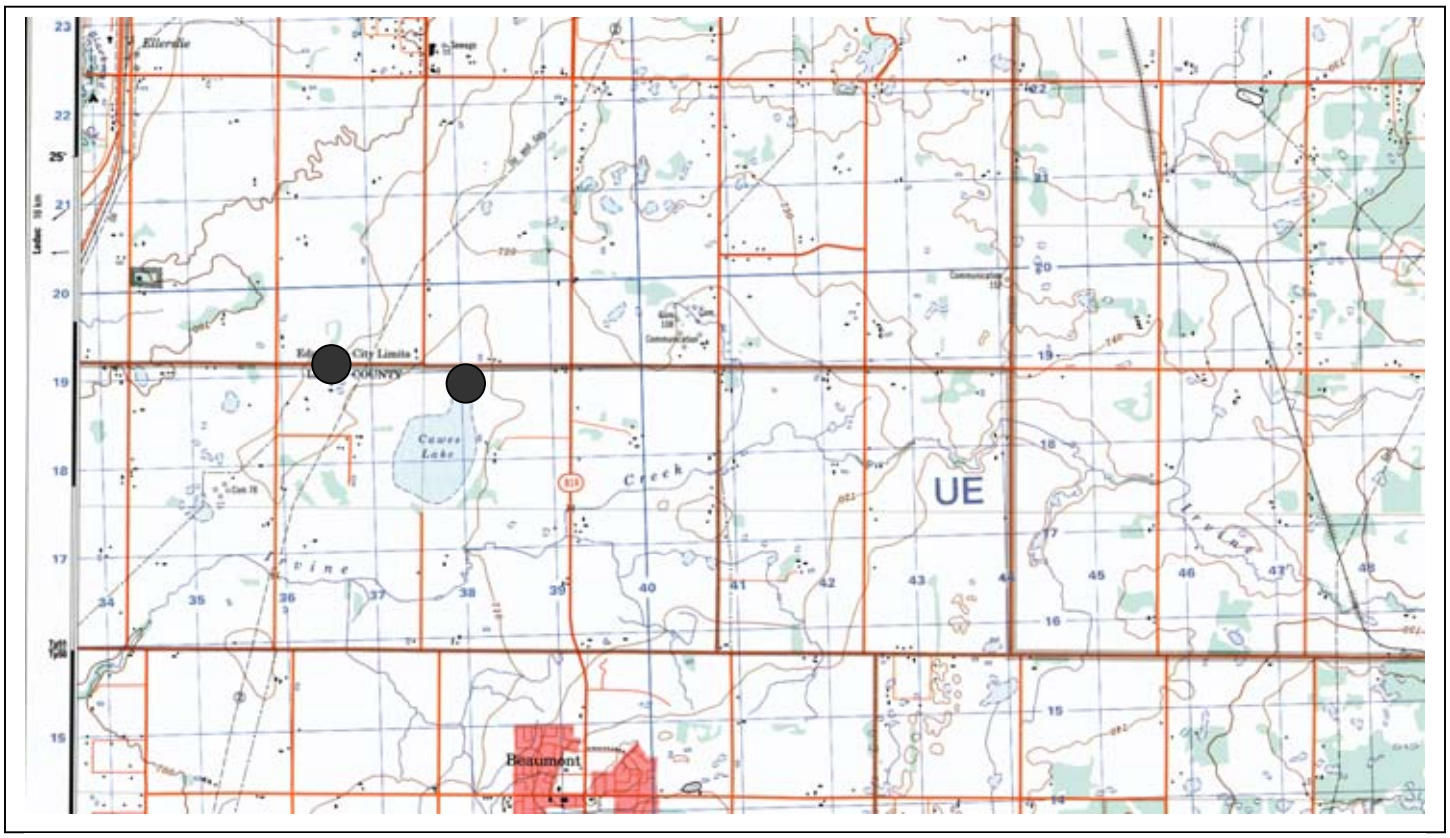
Species	Tally	Number



100 m Focal Point 100 m

Appendix B

Maps and Photos of Pond Locations

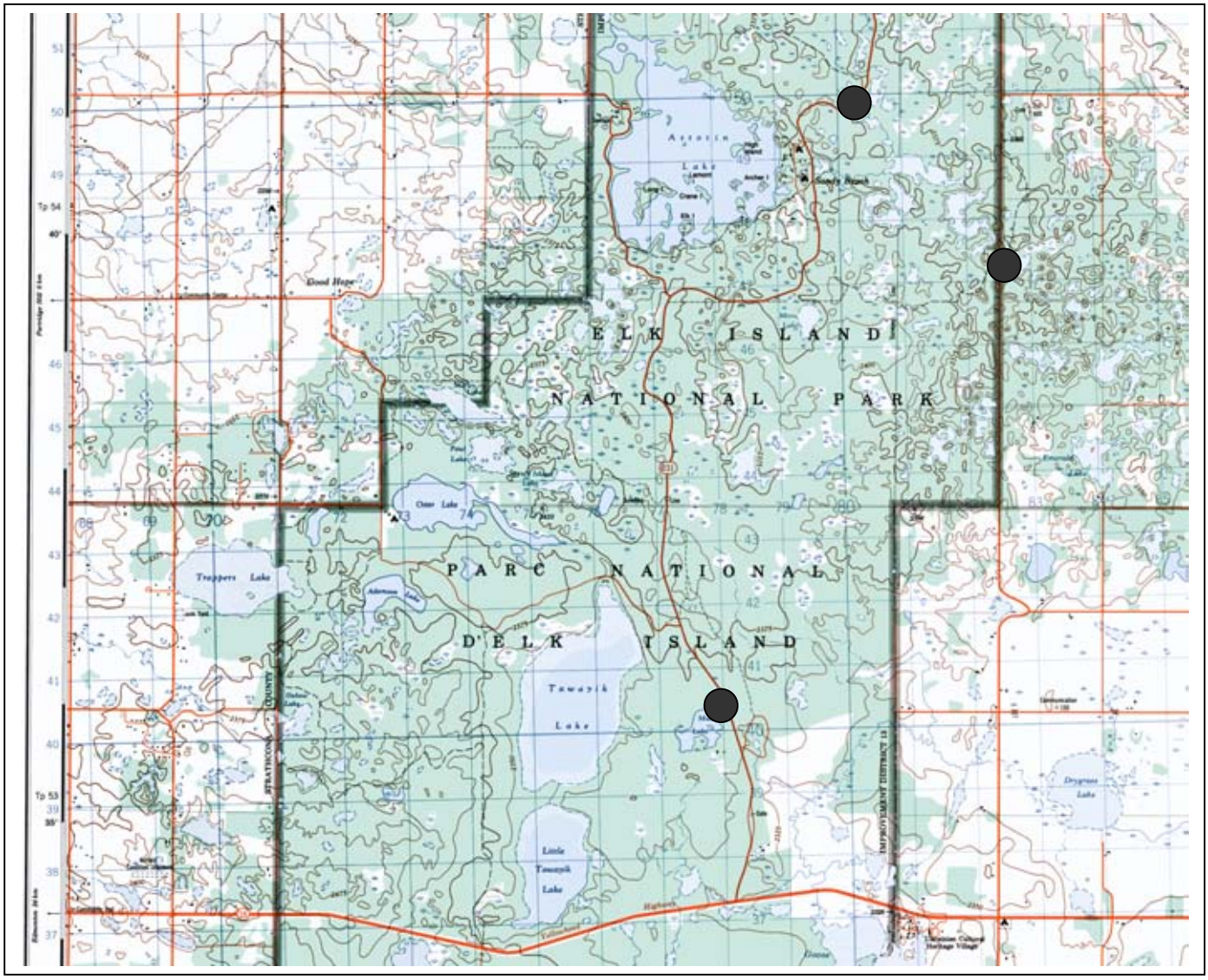


Gill's Pond and Cawes Lake located near Ellerslie, south of Edmonton.

Common Snipe by Ann Cook

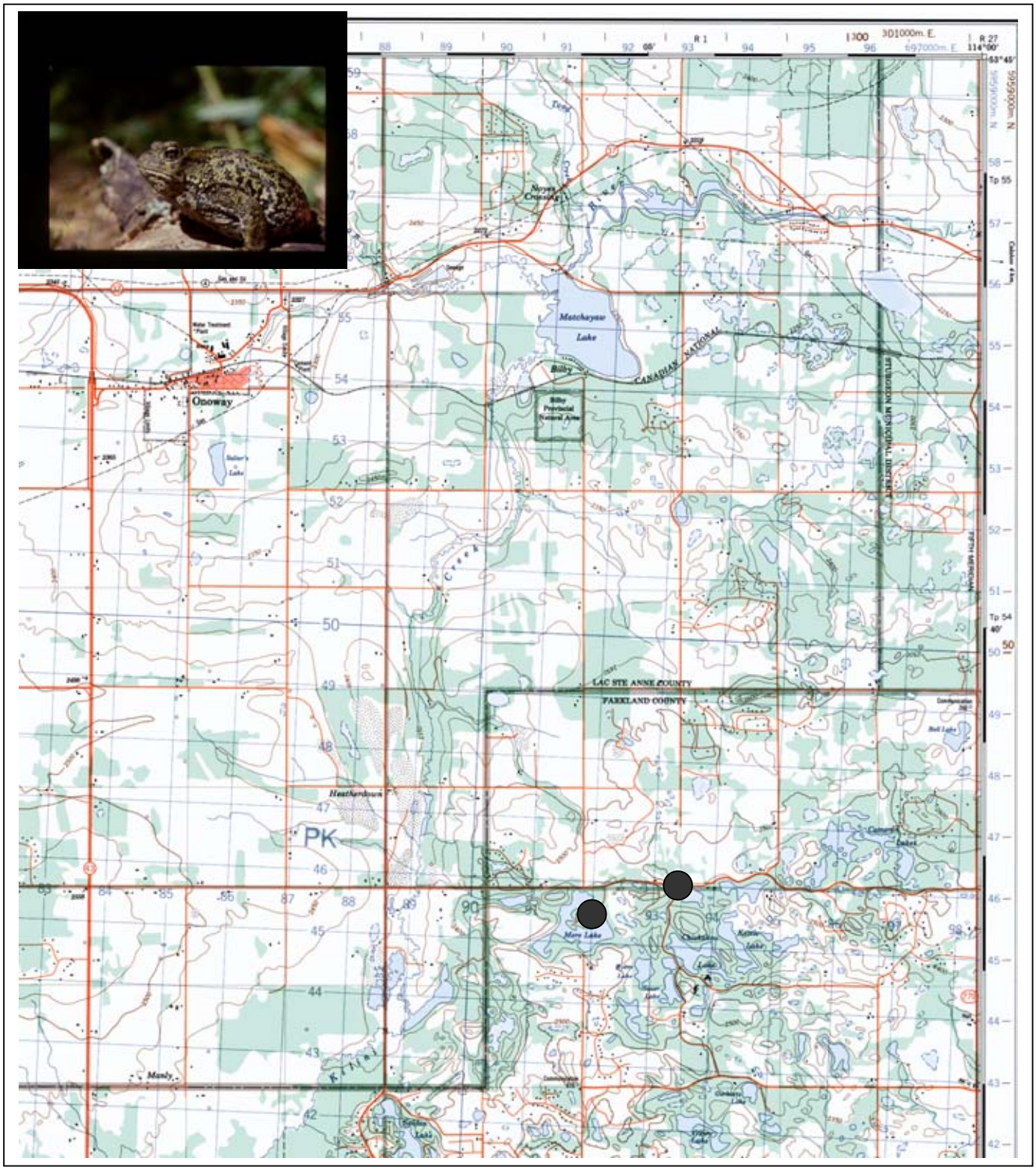
Above: Location of Lindbrook and Amisk Creek Ponds

Right: American Coot in Amisk Pond



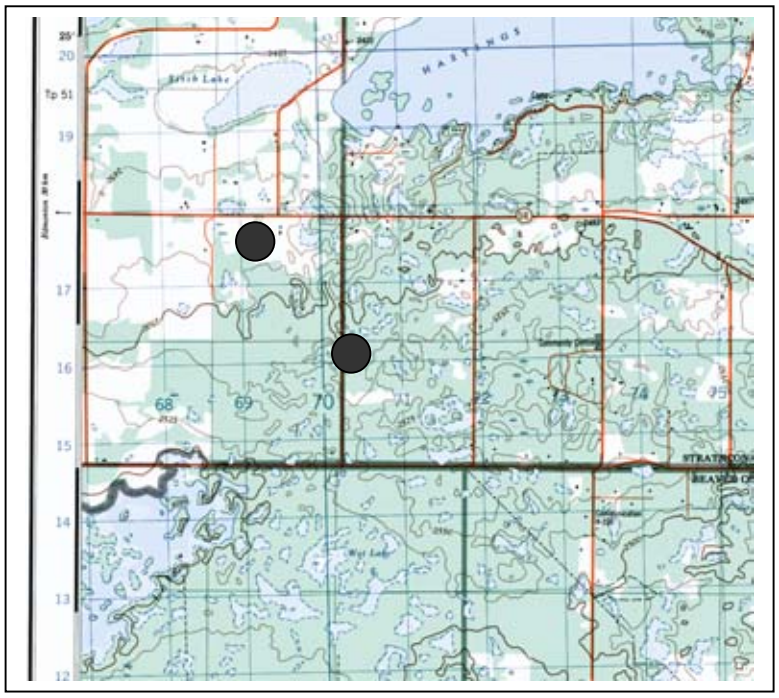
Above: Elk Island National Park map of sites

Right: Elk Island East site



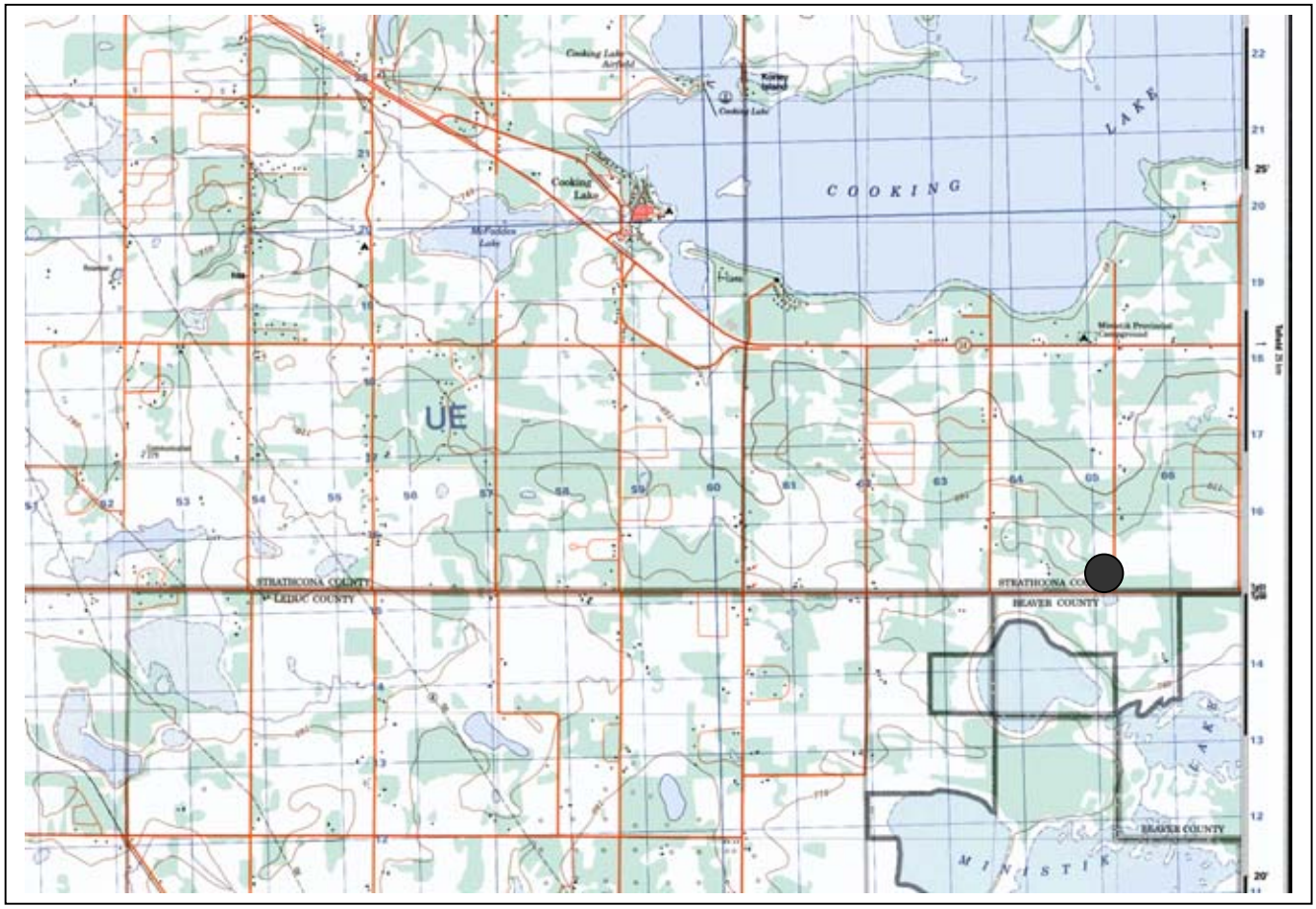
Glory Hills region.

Inset photo of Boreal Toad, a species recorded at this site.



Ministik Area Ponds – HW14 and Spliced Pond above, Kestrel Pond below.

Family of Canada Geese on Spliced Pond



Dry conditions at Cawes Lake (left) and Gill's Pond (right) later in summer.

Later in the summer about the only waterfowl left on some ponds was this new duck species *Rubberus duckus*

American Kestrel that was observed on survey, then caught, banded, and released.