In order to read the article "The butterfly fauna of Beaverhill Lake" in the sequence submitted by the author, start with page 93, then jump to 100, then go back to 94 and on to 103. Because the page sequence of the published article is so difficult to follow, we will send a copy of the article in the correct sequence to anyone who would like one. Please contact the editors at the address given at the top of the inside front cover of every issue. Please note our email address, as of June 2002, is <leighton@sasktel.net>.

- Anna & Ted Leighton

INSECTS

THE BUTTERFLY FAUNA OF BEAVERHILL LAKE, AB

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Introduction

Thormin published the first list of butterflies at Beaverhill Lake in 1977, based on his personal collections and additional records from H. Coneybeare, A. Wiseley, and L. Goulden.[16] He reported 26 species and suggested that another 14 species not reported at that time were likely to be present. Beaverhill Lake has been the location of several butterfly surveys in recent years. In 1996 and again from 1998 to 2001, Canada Day Butterfly Counts (CDBC, also known as 1JCs, or 4JCs in the United States), were held at Beaverhill Lake. In 2000, the author surveyed part of the area using the method known as the Pollard Walk. [12] This article describes the CDBCs and the Pollard Walk undertaken at Beaverhill Lake and presents a checklist, updated to 2001, for the area.

Beaverhill Lake is located in central Alberta, about 60 km southeast of Edmonton.[5] It is situated within the Aspen Parkland, in a landscape dominated by cultivated land and pastures interspersed with small areas of upland deciduous forest, ponds, mixed grassland, and wetland complexes. A diversity of butterflies is likely to occur at Beaverhill Lake because the natural vegetation surrounding the lake remains fairly undisturbed. Development here is relatively minor, and butterflies from both prairie and boreal ecoregions find suitable habitat around the lake.[5,16]

Methods

Canada Day Butterfly Counts

CDBCs are fashioned after the popular Christmas Bird Count (CBC).[15] They are annual events, held within one month of July 1, and conducted within a 24.1 km (15-mile) diameter circle. The Beaverhill butterfly count circle is centered on the Beaverhill Bird Observatory (53° 23'N, 112° 31'W) (Figure 1) and encompasses the south shore of Beaverhill Lake as well as surrounding farmland, creek and pasture.[9] Volunteers spread out within the count circle to count and identify butterflies to species or as accurately as possible to the lowest confident taxonomic level. Start and end times are recorded along with environmental conditions such as percent sunshine, temperature, and wind direction/speed. Other information is also recorded such as number of observers, number of parties, foot and car party-hours, and foot and car party-miles. Results can be submitted to the North American Butterfly Association for publication in the annual *NABA Fourth of July Butterfly Count Report.*[15]

Pollard Walk

Pollard Walks, first described in 1975, involve weekly surveys over the course of an entire summer (or any time between first butterfly emergence and the last flight), normally conducted by one individual.[12] This method documents information that can be missed by single day counts and provides data sets derived from the same observer over a variety of years. [11]

I conducted 14 Pollard Walks, in the afternoon, over a 16-week span from May 5-August 22, 2000. On one occasion a

Over the five years that counts have been held at Beaverhill Lake (1996,1998-2001), a total of 5460 individuals of 35 species have been recorded, a mean of 1092 individuals per count (Table 1). The five most abundant species are: Northern Crescent (1453), Common Wood-Nymph (414), Clouded Sulphur (247), European Skipper (234), and Cabbage White (151). Species richness has increased with party hours and distance covered, from a low with 11 species (14.5 km over 6 hours), to 21 species (59.9 km and 8.25 hours). Not surprisingly, the number of butterflies seems correlated with number of participants, with 114, 844, 1171, 922, and 2409 butterflies counted by 2, 4, 5, 6, and 8 participants respectively.

Species that were recorded on the CDBC but not on the Pollard walk include Arctic Skipper, Garita Skipperling, Common Branded Skipper, Tawny-edged Skipper, Long Dash, Orange Sulphur, Grey Copper, Bronze Copper, Purplish Copper, Western Tailed Blue, Silvery Blue, Aphrodite Fritillary, Mormon Fritillary, Painted Lady, and Red Admiral. There are several reasons for the difference in species. Many of the skipper species found on various CDBC's require grassy habitat that is more abundant in areas away from the Beaverhill Natural Area. Gray and Bronze Coppers, the former having dependable but isolated colonies and the latter preferring moist habitats where butterflies are not extensively surveyed, were not located on the Pollard walk but occur only occasionally around the lake. As well, an invasion of Painted Ladys into Canada, including to the shores of Beaverhill Lake occurred after the Pollard Walk was done.

FIELD SKETCHES

Perhaps more than anything, the limber shapes of natural forms give them their identity. From the earliest cave artists we have shown a love of such forms, as embodied within what I call their "living lines."

These are the spontaneous lines of motion & sentiment & purpose. Many animals read them They are readily perceived by the human eye; the stills camera does not catch them so well.

The animals remaining from the great extinction/renewals of Earth still show her original vigour. To the affectionate eye of the artist, they foreshadow people, and he delights to draw their unwavering & zestful living lines.

– Comment by Paul Geraghty to accompany initial reproduction of his "field sketches" in the BLUE JAY


May 31 '92 MJ Lift Lock
Paul Geraghty '93
Night Herons
& Cliff Swallows


MJ Lock May 26 '92
© Paul Geraghty '92

July 29 '99 MJ Damwks

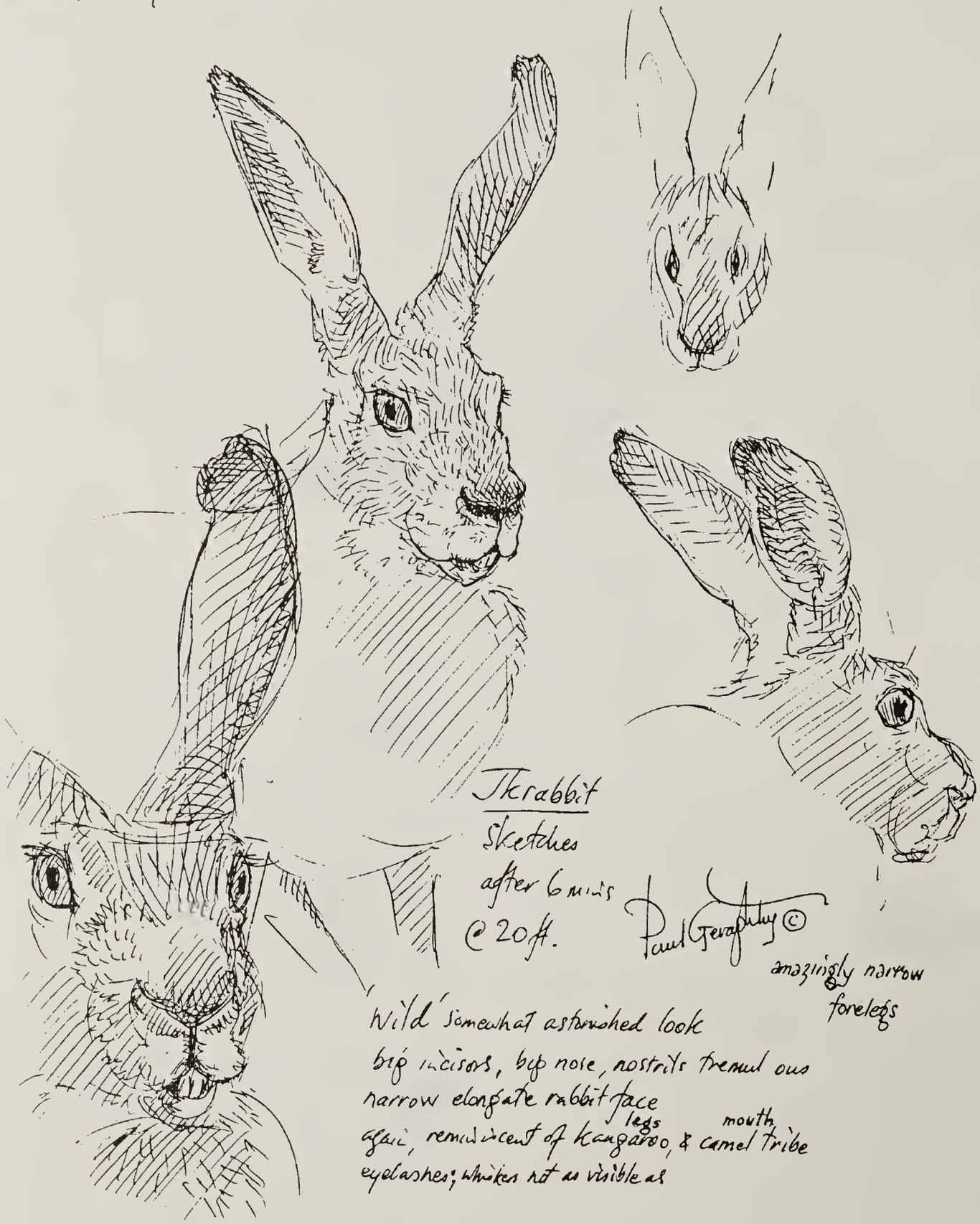

Figure 1. The Beaverhill Butterfly Count circle.
*The * indicates the Beaverhill Bird Observatory, the centre of the circle as well as the start and end point of the Pollard Walk.*

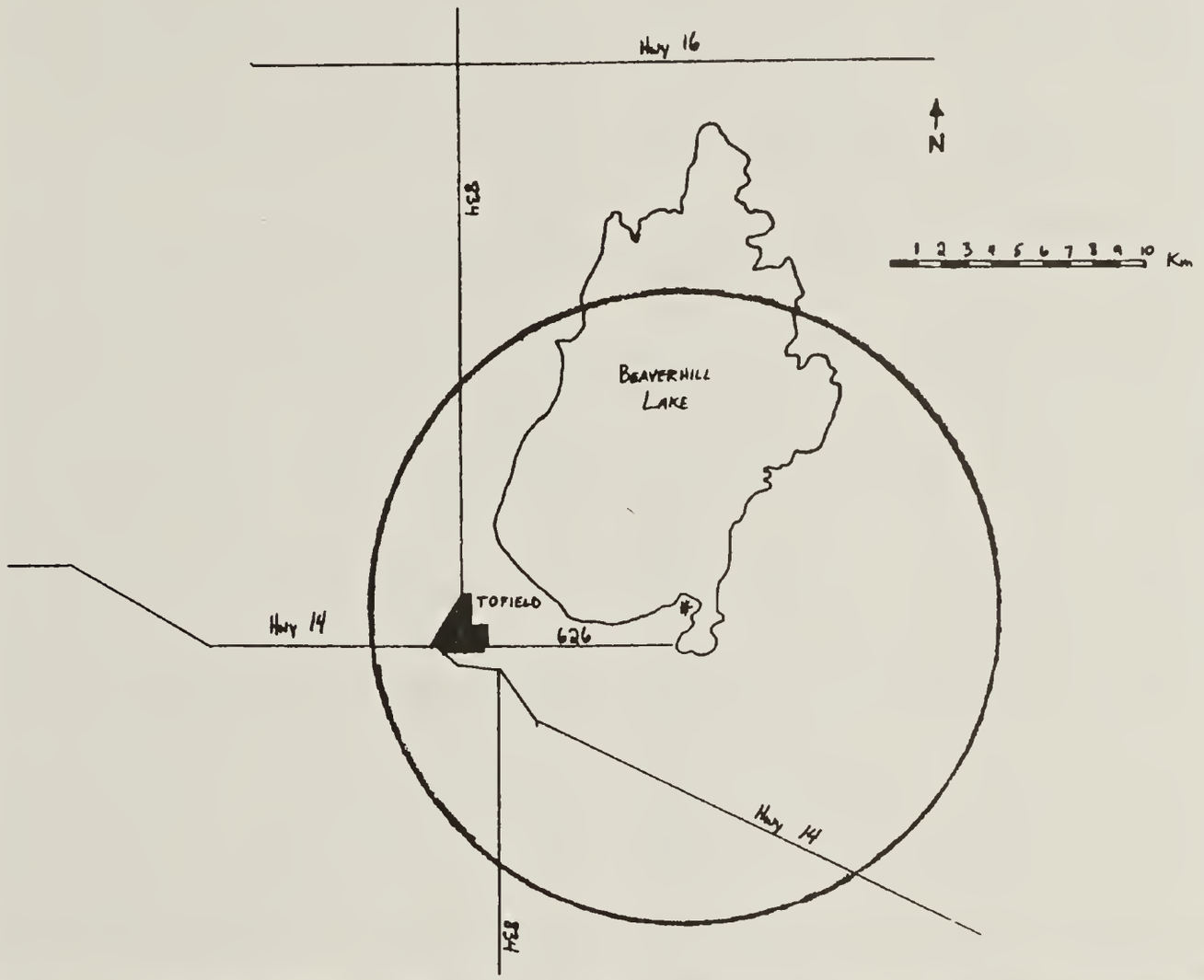

Figure 2. Woods surveyed on the Pollard Walk, August 2000. *Tyler Flockhart*

volunteer conducted the survey with me. The walk took place within the Beaverhill Natural Area, and both started and finished at the Beaverhill Bird Observatory. Dominant vegetation types found within the Beaverhill Natural Area where the Pollard Walk took place include meadows interspersed within upland deciduous forest, willow dominated edge area, open meadows of ungrazed rushes, sedges and grasses, and cattail-bordered wetlands with adjacent open water (Figures 2 and 3).[5] The length of the entire route was approximately 3 km. The same route was walked every 1-2 weeks and was only initiated when the temperature was above 15°C, there was no precipitation and winds were low. The route was walked slowly and butterflies were captured and released after being counted and identified. Those individuals that could not be identified to species were recorded as the most likely species at that particular time of the season from the genus or group in question.[11,14] For each survey I recorded time, temperature, cloud cover, wind speed (Beaufort scale) and wind direction at both the start and end of the walk. For each butterfly encountered, the species was noted, whether it was netted or not, sex (if determinable), wing wear and any additional behaviors or other comments. Pollard's protocol was followed except that I counted butterflies viewable for an unlimited distance as long as the species could be identified, rather than use what Pollard refers to as a "recorder's box".[12]

Results

Canada Day Butterfly Count

Total time for each of the five counts at Beaverhill Lake ranged from 6 to 10 hours with a mean of 8.05 (Table 1). Total time spent on foot was 36.75 hours (91.3%) of the total 40.25 hours. Total distance traveled on each of the counts ranged from 14.5 km to 59.9 km per count, with a mean of 32.9 km. Temperatures ranged between 16.7 and 31.1 °C. The counts have been held between July 13 and August 12; the count date changes almost annually to avoid having multiple counts on the same day and when rescheduling is required to avoid inclement weather. The count has had a variety of count compilers: Cindy Verbeek (1996), Christine Rice (1998), Barb and Jim Beck (1999), Tyler Flockhart (2000), and Richard Krikun (2001).[17, 13, 2, 7, 9]

Figure 3. Open grassland bordered by willows and deciduous forest surveyed on the Pollard Walk, August 2000. ***Tyler Flockhart***

Table 1: CDBC count results 1996 and 1998-2001 [2,7,9,13,17]					
Species	23-Jul-96	18-Jul-98	13-Jul-99	13-Jul-00	12-Aug-01
Arctic Skipper				2	
Garita Skipperling			4	23	
European Skipper		13	35	175	11
Common Branded Skipper					1
Grass Skipper sp.			30	56	
Peck's Skipper			27	4	5
Tawny-edged Skipper			10	5	
Long Dash			11	12	
Skipper sp.		1			
Can. Tiger Swallowtail				1	
Western White	2	8		2	90
Cabbage White	8	15	18	42	68
White sp.		87	5	82	151
Clouded Sulphur		58		13	176
Orange Sulphur	4				7
Giant Sulphur	1				
Pink-edged Sulphur		2			
Sulphur sp.		1753		3	38
Grey Copper			15	1	6
Bronze Copper			1		1
Purplish Copper			2		
Western-tailed Blue			1	1	
Silvery Blue	6		2	25	
Greenish Blue	4	19	16	17	
Blue sp.		12	9	35	
Gr. Spangled Fritillary		31	1	1	24
Aphrodite Fritillary		2			2
Mormon Fritillary					1
Speyeria sp.		21	5	7	21
Meadow Fritillary		2			
Boloria sp.		3	1		
Northern Crescent	66	192	916	245	34
Tawny Crescent				5	3
Satyr Comma	1	2			5
Mourning Cloak		11			3
Milbert's Tortoiseshell		1		1	2
Painted Lady					17
Red Admiral					2
White Admiral	4	3	45	31	
Common Ringlet	10	12	17	49	7
Common Wood-Nymph		161		6	247
Common Alpine	8				
Total individuals	114	2409	1171	844	922
Number of species	11	16	16	21	21
Number of observers	2	8	5	4	6
Number of parties	1	2	3	2	4
Total party hours	6	8.5	8	10	8.25
Hours by foot/car	5.5/0.5	8/0.5	7.5/0.5	9.0/1.0	7.25/1.0
Distance foot/car (km)	12.1/2.4	8.0/12.9	12.9/8.0	32.2/16.1	11.6/48.3
Total distance (km)	14.5	20.9	20.9	48.3	59.9
Sunshine (%)	100	100	98	100	100
Wind (km/hr)	0-8	0-29	24-56	0-24	0-32
Temperature (oC)	21.1-23.9	25.0-27.2	18.9-23.9	25.6-31.1	16.7-26.1

Table 2: Results from Pollard Walk, summer 2000, Beaverhill Lake, Alberta. Shaded area shows when CDBC have been done. Individual CDBC dates are indicated by the vertical lines.

	Species	5-May	13-May	18-May	29-May	31-May	2-Jun	13-Jun	21-Jun	22-Jun	13-Jul	21-Jul	3-Aug	12-Aug	22-Aug	Total
1	Mourning Cloak	2			1	2										5
2	Milbert's Tortoiseshell	2	1								1					4
3	Red-disked Alpine	21	20	10												51
4	Cabbage White		1	2			1				3	5	4	8	12	36
5	Spring Azure	2														2
6	Dreamy Duskywing			2	5	5	1									13
7	Can.Tiger Swallowtail						1	1	2	2						6
8	Greenish Blue				4	12	6	3	16	15	5					61
9	Pink-edged Sulphur				1											1
10	Clouded Sulphur				2	2	5					2	21	5	2	39
11	Common Ringlet					2		1	2	2	4			1		12
12	Grey Comma					1										1
13	Common Alpine						1	2	2	2						7
14	Northern Cresecent										56	75	69	10	5	215
15	European Skipper									1	2	3	4			10
16	White Adminal										6		2			8
17	Tawny Crescent										1					1
18	Western White										1				1	2
19	Great Spangled Fritillary											1	6	3	1	11
20	Common Wood-Nymph											6	102	47	4	159
21	Mustard White												3			3
22	Northwestern Fritillary														2	2

1999/2000 1998 1996 2001

Seventeen individuals in the 2001 CDBC shows how irruptive this species can be.[4]

Pollard Walk

Starting times for the walks varied from 1235h to 1430h while finishing times varied from 1401h to 1651h. The mean total time spent on a Pollard Walk was 1.85 hours with a range of 1.27 to 2.88 hours. Total time spent surveying was 25.88 hours, giving an average of 0.413 butterflies per minute. While both start and end temperatures were recorded, there was little temperature change with a mean average high of 21.3 °C during the surveying time. Average overall cloud was 25.7% over the entire survey, and average wind speed was 2.2 on the Beaufort scale (Beaufort scale 2 = 6-12 km/hr, wind felt on face, leaves rustle).

In the 14 Pollard Walks, 22 species were recorded (Table 2). The 5 most abundant species are Northern Crescent (215), Common Wood-nymph (159), Greenish Blue (61), Red-disked Alpine (51), and Clouded Sulphur (39). Abundance of individuals ranged from 7 to 211 (mean 46.3) while species richness ranged from 3 to 9 species per day (mean 5.4). The highest number of individuals was seen on August 3rd, while the largest number of species was on July 13th, which was also the date of the CDBC at Beaverhill in 2000. (A regular Pollard walk was conducted on July 13th 2000 and these values were added to the CDBC totals for the day.) Abundance of individuals was greatest in the latter part of the summer from mid-July to mid-August, while species richness seemed to vary across much of the survey with the peak being mid-July.

The data in Table 2 suggest that some species show distinct single, double or even triple brood patterns. Clouded Sulphurs appear double brooded with a flight from late May to early June, and also one from the end of July to end of August, while the Cabbage White appears triple brooded, with one brood in early May, one in early June, and a final one starting in mid-July.

The Common Ringlet had an extended flight period that almost appears as a second brood. The main flight appears to be from the end of May to mid-July, while a single individual was recorded in mid-August almost a month after most ringlets had disappeared. This may support the suggestion that there are two broods in Alberta.[4]

Butterfly checklist for Beaverhill Lake

In total, 52 butterfly species have been recorded at Beaverhill Lake; they are presented in Table 3. This up-to-date checklist combines previously published material, CDBC, Pollard walk data, and records from Chris Schmidt who frequents many areas of the lake to collect butterflies. Also included is an additional personal record of Northern Pearly Eye not recorded on any survey, but spotted within the Beaverhill Natural Area, increasing the known Alberta flight dates by four days.[4]

Surveys of the butterfly fauna at Beaverhill Lake reveal similar species composition except for rarities. Thormin reports rarities such as Common Roadside Skipper, Arctic Blue, Variegated Fritillary, Gorgone Checkerspot, and Compton Tortoiseshell, usually with single records.[16] Rarities observed during CDBCs at Beaverhill Lake are Arctic Skipper, Common Branded Skipper, and Mormon Fritillary, while rare butterflies seen during the 2000 Pollard Walk are Pink-edged Sulphur, Spring Azure, and Gray Comma.

Perhaps the most interesting addition to the list of butterfly fauna at Beaverhill is the European Skipper, an introduced species with localized populations. It has been introduced since Thormin's surveys and has colonized the Edmonton area, and seems to be expanding outward.[1,3,4,8,10,16] Probably all European Skippers found in Alberta are part of a continuous, expanding population.[4] Previous to 1996, no records are known of European Skippers at Beaverhill Lake, while count data reveals an increase from 0 butterflies per hour in

Table 3: Butterfly checklist for Beaverhill Lake, Alberta

Species	1977 [16]	1995 [4]	1996 [17] CDBC	1998 [13] CDBC	1999 [2] CDBC	2000 [7] CDBC	2000 Walk	2001 [9] CDBC	2001 *	2001 **
Dreamy Duskywing	X	X					X		X	
Persius Duskywing	X								X	
Arctic Skipper	X					X				
Garita Skipperling					X	X				
European Skipper				X	X	X	X	X		
Common Branded Skipper								X		
Peck's Skipper					X	X		X		
Tawny-edged Skipper					X	X			X	
Long Dash					X	X			X	
Common Roadside Skipper	X	X								
Canadian Tiger Swallowtail	X	X				X	X		X	
Western White	X	X	X	X		X	X	X	X	
Mustard White	X	X					X		X	
Cabbage White	X	X	X	X	X	X	X	X	X	
Clouded Sulphur	X	X		X		X	X	X	X	
Orange Sulphur	X	X	X					X		
Giant Sulphur			X							
Pink-edged Sulphur				X			X			
Grey Copper					X	X		X		
Bronze Copper					X			X		
Purplish Copper	X	X			X					
Western Tailed Blue					X	X				
Spring Azure							X			
Silvery Blue	X	X	X		X	X			X	
Greenish Blue	X	X	X	X	X	X	X		X	
Arctic Blue	X	X							X	
Variegated Fritillary	X	X								
Great Spangled Fritillary				X	X	X	X	X		
Aphrodite Fritillary				X				X		
Northwestern Fritillary	X	X					X			
Mormon Fritillary								X		
Silver-bordered Fritillary		X								
Meadow Fritillary	X	X		X					X	
Gorgone Checkerspot	X	X								
Northern Crescent	X	X	X	X	X	X	X	X		
Tawny Crescent						X	X	X		
Satyr Comma	X	X	X	X				X	X	
Grey Comma							X			
Compton Tortiseshell	X	X								
Mourning Cloak	X	X		X			X	X	X	
Milbert's Tortiseshell	X	X		X		X	X	X	X	
Painted Lady		X						X	X	
West Coast Lady									X	
Red Admiral	X	X						X		
White Admiral			X	X	X	X	X			
Northern Pearly Eye										X
Common Ringlet	X		X	X	X	X	X	X	X	
Common Wood-Nymph		X		X		X	X	X		
Red-disked Alpine		X					X		X	
Common Alpine	X	X	X				X			
Uhler's Arctic									X	
Alberta Arctic									X	

* Chris Schmidt (pers. comm. Jan 10, 2002) records from areas around lake and surrounding woodlots

** Pers. Obs. by author, Lisa Takats and Charles Priestley, 4 individuals found in the Beaverhill Natural Area, July 14, 2000

1996 to a high of 17.5 butterflies per hour in 2000. These data are consistent with surveys conducted at the nearby Redwater sand dunes, which has been surveyed for years.[8] A population now appears to be established in the Beaverhill area. European Skippers have now been recorded on butterfly counts in the past two years around the Edmonton region including Beaverhill Lake, Devon-Calmar, Edmonton, Elk Island, St.Albert-Wagner Bog, Strathcona, Bruderheim, and Kinsella (Barb Beck, pers. comm. October 12, 2001).

Conclusions

CDBCs and Pollard walks compliment each other, and together reveal more information then either could alone.[12] CDBCs are a snapshot of butterfly abundance and species diversity at one point in the summer. Species that are long-lived or remain as flying adults for many months through a variety of environmental conditions will likely always be counted. Others that require particular plants in bloom to feed or strict climatic conditions to emerge as adults are more seasonal in occurrence. If conditions are favorable, those particular species may be the most numerous encountered, while under unfavorable conditions they may be extremely scarce. The Common Wood-nymph is a prime example (Table 1).

Information from CDBC and Pollard Walks can be put to use to gather species lists for particular areas, document species range extensions, better define flight dates and hopefully, be used to determine long-term population fluctuations. Although five years of data are not sufficient to determine strong trends, they do give indications as to those species that are common occurrences, species that require further research, and species that may have population fluctuations.[15]

Anyone who is promoting butterfly conservation will admit that getting people interested in the subject is the first step. As the number of CDBCs per year has been increasing, this seems to be occurring. Alberta is currently the leader in North America with approximately 40 butterfly counts each summer. The next step would be to promote the Pollard Walks to those individuals who are interested in conducting their own research at more specific areas and devoting more time to the cause. Acreage owners, and people with cabins, those in cities who stroll through the river valleys or fields adjacent to their homes are all prime candidates. Perhaps in the long-term these data can be collected and published to the same degree that CDBC are, in a printed record form, and on a continent wide level.

By determining a butterfly list for the Beaverhill Natural Area, I hope to increase awareness of the area's biodiversity and to help recognize the area's biological value. The Beaverhill Natural Area, already a well-known destination for bird watchers, also has potential for butterfly watching. [6]

Acknowledgements

I thank the Beaverhill Bird Observatory which supported and encouraged this research. I also thank Mark Benson for reviewing an earlier manuscript, and Chris Schmidt for access to butterfly records collected at Beaverhill Lake. Lastly, I acknowledge John Acorn, who along with reviewing many manuscripts, provided guidance, support and stimulating conversation.

1. ACORN, J. 1993. Butterflies of Alberta. Lone Pine publishing, Edmonton.

2. BECK, B and J. BECK, *in* Swengel, Ann B., and Paul A. Opler, editors. 2000. NABA Fourth of July Butterfly Counts, 1999 Report. North American Butterfly Association, Morristown, NJ, p. 11.

3. BELICEK, J., N. KONDLA, and T. KRAL. 1989. The European Skipper: New to Alberta. *Alberta Naturalist* 19: 36-37.

4. BIRD C.D., G.J. HILCHIE, N.G. KONDLA, E.M. PIKE, F.A.H. SPERLING. 1995. Alberta Butterflies. The Provincial Museum of Alberta.

5. DEKKER, D. 1998. Prairie Water, Wildlife at Beaverhills Lake, Alberta. The University of Alberta Press, Edmonton.

6. FLOCKHART, D.T.T. 2001. Rare or unusual sightings for Beaverhill Lake, Alberta. 1996-2000. *Blue Jay* 59(1): 33-40.

7. FLOCKHART, T., *in* Swengel, Ann B., and Paul A. Opler, international editors.

2001. 2000 Report NABA Butterfly Counts North American Butterfly Association, Morristown, NJ, p. 11.

8. KONDLA, N.G. 2001. Some noteworthy Alberta butterfly records. *Alberta Naturalist* 30: 70-71.

9. KRIKUN, R., *in* Swengel, Ann B., and Paul A. Opler, editors, in press. 2001 Report: NABA Fourth of July Butterfly Counts. North American Butterfly Association, Morristown, NJ.

10. LAYBERRY, R.A., P.W. HALL, and J.D. LAFONTAINE. 1998. The Butterflies of Canada. University of Toronto Press, Toronto.

11. POLLARD, E. 1977. A method for assessing changes in the abundance of butterflies. *Biological Conservation* 12:115-134.

12. POLLARD, E., D.O. ELIAS, M.J. SKELTON, J.A. THOMAS. 1975. A method of assessing the abundance of butterflies in Monks Wood National Nature Reserve in 1973. *Entomologist's Gazette* 26:79-88.

13. RICE, C., *in* Swengel, Ann B., and Paul A. Opler, editors. 1999. NABA Fourth of July Butterfly Counts, 1998 Report. North American Butterfly Association, Morristown, NJ, p. 12.

14. ROYER, R.A., J.E. AUSTIN, and W.E. NEWTON. 1998. Checklist and "Pollard Walk" butterfly survey methods on public lands. *American Midland Naturalist* 140:358-371.

15. SWENGEL, A.B. 1990. Monitoring butterfly populations using the Fourth of July Butterfly Count. *American Midland Naturalist* 124:395-406.

16. THORMIN, T.W. 1977. The butterflies of Beaverhill Lake. *The Edmonton Naturalist* 5: 160-163.

17. VERBEEK, C., *in* Swengel, Ann B., and Paul A. Opler, editors. 1997. NABA Fourth of July Butterfly Counts, 1996 Report. North American Butterfly Association, Morristown, NJ, p. 11.

Milbert's Tortoiseshell, a common species around Beaverhill Lake in spring and fall.
Tyler Flockhart