CALGARY BIRD BANDING SOCIETY

2000 ANNUAL TECHNICAL REPORT

Canadian Migration Monitoring Network

Prepared

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Custodire avis
Keep watch on birds

Inglewood Bird Sanctuary. Clockwise from top: 1. Typical habitat 2. **Winter Wren** – first Inglewood capture (U-U 22 September) 3. Typical habitat 4. **Common Snipe** – first Inglewood capture (U-U 23 September)










Cominco Natural Area. Left to right, top to bottom: 1. Cattail marsh habitat 2. **Yellow-headed Blackbird** (ASY-M 18 May) 3. **Gray-cheeked Thrush** (SY-M 18 May) 4. **Savannah Sparrow** (ASY-U 16 May) 5. **House Wren** partial albino (AHY-U 17 August) 6. 7. 8. **Northern Parula** (AHY-M 8 September) 9. **Blue-headed Vireo** (AHY-F 25 May) 10. Bumper chokecherry crop (August)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

The Calgary Bird Banding Society (CBBS) was incorporated in March 1995. The main objective of CBBS remains conducting migration monitoring and other banding-based studies at Inglewood Bird Sanctuary (IBS), a federal Migratory Bird Sanctuary. IBS has long been known as an important migration site for Neotropical migrants. Located within 80-km of the Rocky Mountains, the site is an integral component of the Canadian Migration Monitoring Network.

During 2000 CBBS received support from the James L. Baillie Memorial Fund, Petro Canada Volunteer Grant Fund, Canadian Wildlife Service, the Canada Millenium Partnership Fund, and the Calgary Community Lottery Fund.

The fall 2000 migration monitoring program at IBS follows pilot programs in 1992 and 1994 and full fall programs in 1995 through 1999. Twelve mist-nets were operated for approximately 6 hours on 55 of the 61 days between 1 August and 30 September. A total of 3,842 net-hours resulted in 1,262 new bandings of 69 species. Approximately 74% were Neotropical Migrants. Fifty-nine percent of new bandings occurred during August and 47% in September. The IBS MAPS site was operated again in 2000, adding to previous data gathered since 1992. New bandings totaled 92.

2000 marked the first year of migration monitoring at Cominco Natural Area (CNA), approximately 5-km south of IBS along the Bow River. Eight to twelve mist-nets were operated for all 28 days from 8 May to 4 June, and 55 of 61 days from 1 August to 30 September. A total of 1,398 net-hours during spring resulted in 560 new bandings of 34 species, 79% of which were Neotropical Migrants. A total of 3,733 net-hours during fall yielded 1,848 birds of 59 species, of which 61% were Neotropical Migrants. An AHY-M Northern Parula captured on 8 September was a highlight.

Although IBS and CNA are just 5-km apart along the Bow River, interchange of banded birds during fall migration was almost non-existent. Both sites were monitored over an identical period for very similar total net-hours. Significantly more birds were banded at CNA but the number of species was significantly greater at IBS. CNA has a greater percentage of residents in its banding total as well as a greater representation of birds preferring drier habitats.

Monitoring of migrating Northern Saw-whet Owls was conducted at IBS during 2000 on a pilot basis. A triangle of three mist-nets surrounding a call playback lure was in operation on 38 of 53 evenings from 16 September to 7 November. Three Northern Saw-whet Owls were captured between 12 and 21 October. The urban setting of IBS appears to preclude effective monitoring of this species.

Twelve birds banded in previous years were recaptured at IBS and one was recaptured at CNA. A Swainson's Thrush banded during fall migration in 1999 and recaptured this year provided another rare recapture of a migrant year-to-year. Other recaptures included a 6+ years old Hairy Woodpecker not detected since banding in 1995, and a 6+ year old Black-capped Chickadee. Two Yellow-rumped Warblers banded at IBS during fall 2000 were recaptured at CNA, one on the same day and the other 10 days later. In addition, a Baltimore Oriole banded at IBS in 1999 was

recaptured at CNA. A Yellow Warbler banded at IBS in August 1999 was recaptured at the Colorado Bird Observatory 14 days later having traveled at least 1439-km SE. CBBS only became aware of this recovery during 2000.

Trend analysis was undertaken on 26 species which occur as migrants at IBS and are captured in sufficient quantity to allow analysis. Four species evidenced significant change over the evaluation period:

American Robin	– 8.0%/year (p=0.02);
Tennessee Warbler	+13.6%/year (p=0.01);
Yellow Warbler	+ 7.5%/year (p=0.05); and
Baltimore Oriole	- 4.1%/year (p=0.04).

Volunteers and Banders-in-Charge contributed a total of 466 man-days to the banding projects.

Ten mortalities occurred during the mist-netting of 4,921 birds (0.20%), 1 of which resulted from predation by a Black-billed Magpie. In addition, 73 injuries were recorded, most of them minor.

INTRODUCTION

The Calgary Bird Banding Society (CBBS) was incorporated on 22 March 1995 with the following objectives:

- Quantify long-term population trends of Neotropical migratory birds using constant effort mist-netting at Inglewood Bird Sanctuary;
- Promote involvement and expertise in bird banding; and
- Promote conservation of Neotropical migratory birds by fostering public awareness and understanding of Neotropical migratory birds.

Although the primary project of the CBBS is monitoring of migratory birds at Inglewood Bird Sanctuary (IBS) in Calgary, other complimentary projects have also been undertaken:

- a Monitoring Avian Productivity and Survivorship (MAPS) station was established at IBS in 1992 and continued in 1993 and 1995-2000;
- spring banding was initiated in 1997 at Dunbow Road approximately 22-km SSE of the City of Calgary and continued in 1998 and 1999;
- spring and fall banding/migration monitoring was initiated at the Cominco Natural Area (CNA) in 2000;
- colour-banding and relocation of Red-tailed and Swainson's Hawks at Calgary International Airport was initiated in cooperation with the Calgary Airport Authority; and
- a Northern Saw-whet Owl migration monitoring pilot program was carried out at Inglewood Bird Sanctuary in 2000.

One new initiative is planned for 2002: pilot neotropical landbird migration monitoring on the west coast of Costa Rica.

As of 1998 the Calgary Bird Banding Society's Inglewood Bird Sanctuary site is a fully designated member of the Canadian Migration Monitoring Network coordinated and administered by Bird Studies Canada. Establishment of this formal association of migrant monitoring sites across Canada significantly increases the value of the work conducted at each site.

FUNDING AND ACKNOWLEDGEMENTS

Funding for CBBS migration monitoring at IBS during 2000 was provided by:

- a grant through The James L. Baillie Memorial Fund from a contribution by Environment Canada, supplemented with funds raised through the annual Baillie Birdathon ($500);
- funds raised by the CBBS through participation in the Baillie Birdathon (approximately $2,140 net);
- a grant from Canadian Wildlife Service through Mr. Loney Dickson ($2,000);
- a grant from the Petro Canada Volunteer Grant Program ($500);
- a grant through Bird Studies Canada from the Canada Millenium Partnership Fund ($3,000); and
- a grant from Calgary Community Lottery Fund ($8,000).

An additional contribution in kind was made by Environment Canada (Brenda Dale - bander training workshops). Bird bags were kindly provided by Linda Wiggins and Pat Mitchell.

The majority of the funds were used to provide a per diem to Banders-in-Charge (BICs), purchase mist-nets, produce the 1999 annual technical report and cover migration monitoring miscellaneous costs (field data sheets, propane, batteries, film etc.).

Field data forms for migration monitoring were modified from forms designed for the Last Mountain Bird Observatory in Saskatchewan. CBBS acknowledges LMBO's spirit of cooperation in sharing digital copies of these forms for our use.

Thanks to Garry Hornbeck and Shonna Mcleod for critically reviewing an early draft of this report.

MIGRATION MONITORING AT INGLEWOOD BIRD SANCTUARY

Background

Neotropical migrants are birds that breed in the Nearctic biogeographic realm and winter in the Neotropics. The Neotropical migratory bird system involves some 5-10 billion birds of over 150 species (Greenberg 1992). Recent (1978-1988) trends in data from the Breeding Bird Survey indicate that a majority of Neotropical migrants in eastern North America decreased in their population index (Sauer and Droege 1992). Although destruction of tropical forests on the wintering grounds has been implicated in this decline, increasing concern is being raised about the potential effect of accelerated land-use changes on breeding grounds.

Inglewood Bird Sanctuary (IBS) is a federal Migratory Bird Sanctuary known as an important site for migrating passerines. IBS is strategically located within 80-km of the Rocky Mountains (Figure 1) and is a unique and valuable addition to the Canadian Migration Monitoring Network coordinated and administered by Bird Studies Canada. IBS is located within Calgary which greatly facilitates the potential for volunteer involvement. Pilot Neotropical migrant monitoring covering only a portion of the fall migration season was undertaken in 1992 and 1994 while full fall migration monitoring has occurred since 1995. Monitoring songbird population change based on fall mist-netting has been shown to be an effective technique (Dunn *et al.* 1997).

Methods and Study Site

The fall migration of Neotropical migrants was monitored in 2000 at Inglewood Bird Sanctuary (IBS). IBS' 35 hectares includes mature riverine balsam poplar forest known for its number and diversity of songbirds during fall migration. Constant effort mist-netting (i.e. constant number of nets in permanent locations for constant time period each day) and collection of associated morphometric and other data (e.g. age, sex, wing chord, weight, fat reserves, capture net, time of capture) from each bird captured was carried out each day, weather permitting, during fall migration. Twelve 12-m long 30-mm mesh mist-nets were operated in permanent net lanes for approximately 6 hours each day beginning at sunrise. Spring migration is not monitored by request of the IBS manager because of potential adverse environmental impact due to wetter conditions.

Migration monitoring procedures have been developed for IBS based on standardizations outlined in McCracken *et al.* 1993 (A manual for monitoring bird migration), Hagan *et al.* 1994 (Recommended methods for monitoring bird migration) and Hussell and Ralph 1996 (Recommended methods for monitoring bird populations by counting and capture of migrants), modified to accommodate the specific requirements of the IBS site. Net locations and the daily census route are shown on Figure 2.

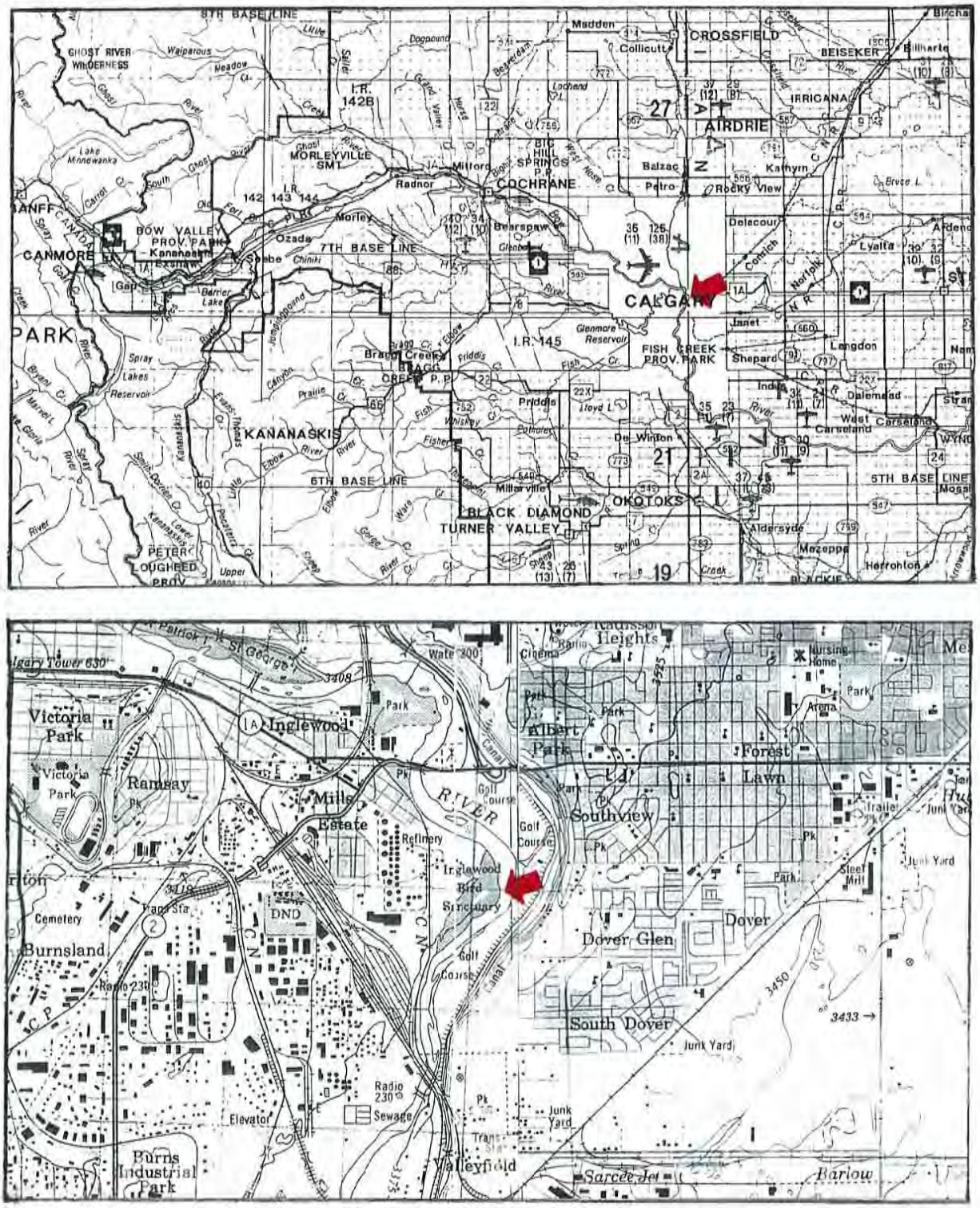


Figure 1. Topographic maps at 1:250,000 (top) and 1:50,000 (bottom) scales showing location of Inglewood Bird Sanctuary in southwestern Alberta. North is up.

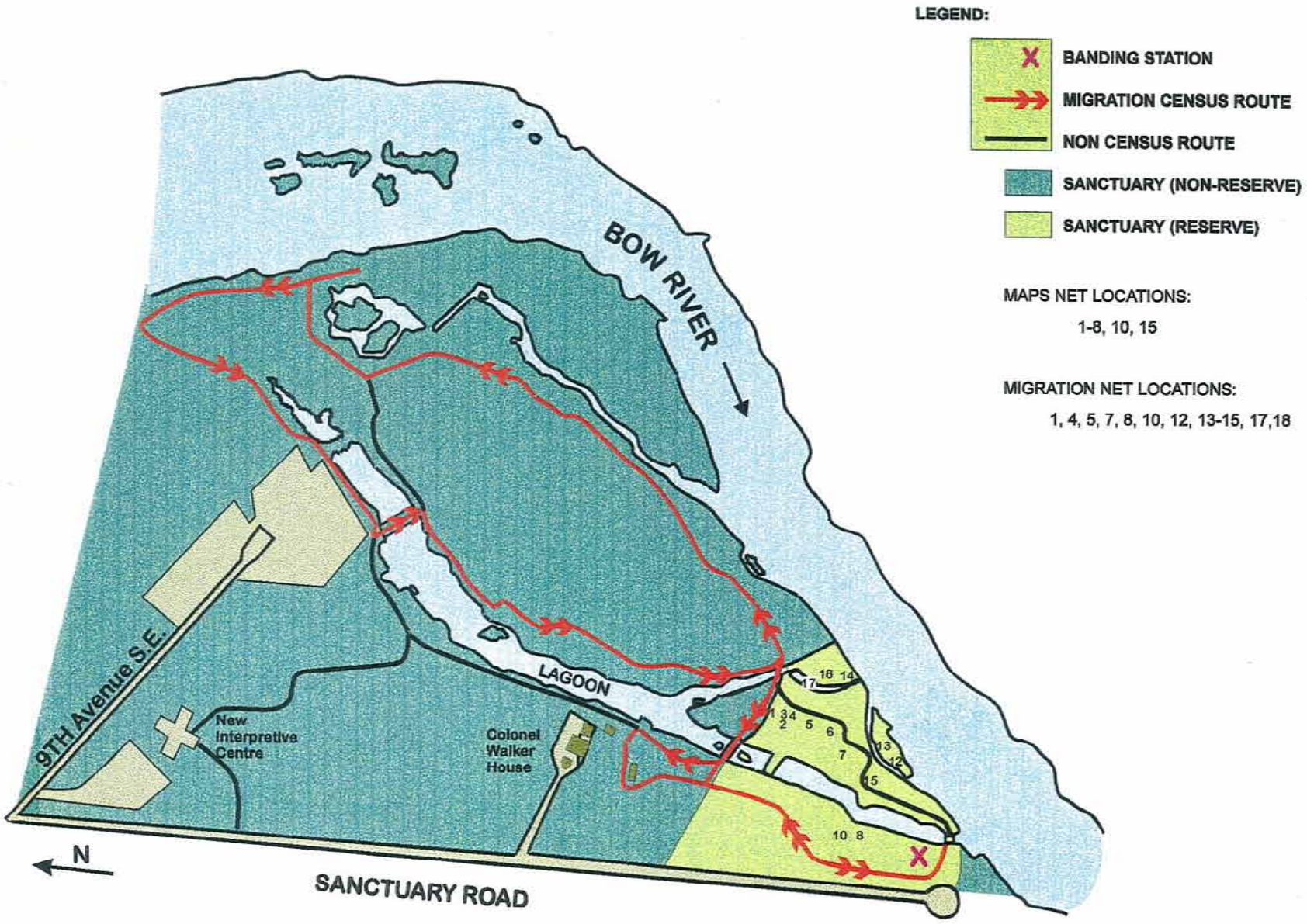


Figure 2. Schematic of Inglewood Bird Sanctuary migration monitoring station

Monitoring Schedule and Coverage

Fall migration monitoring at IBS was conducted from 1 August to 30 September. The monitoring interval was reduced by approximately a week at either end to accommodate parallel monitoring at CNA, both for comparison and economic reasons. In addition to standardized constant-effort mist-netting, a census route was surveyed 2-3 hours from the start of the netting. During 2000, a coverage of 90.2% was achieved. That is, mist-netting occurred on 55 of the 61 target days for a total of 3842 net-hours (Table 1, Figure 3). Inclement weather and/or the unavailability of a BIC resulted in 6 days of the monitoring period without banding.

A daily census was obtained on 50 of the 55 days of mist-netting. A census was not attempted when the number of migrants or volunteer shortage would result in unacceptable risk to captured birds (e.g. excessive holding time).

New Bandings

A total of 1262 new bands were placed on birds of 69 species (Table 2, Appendix 1). Of these, 933 or approximately 74% were Neotropical migrants (Finch 1991). Days on which 40 or more new bandings occurred were 6,7,10,11 and 27 August and 6 September. Approximately 59% of new bandings occurred in August and 41% in September (Figure 3). New bandings at IBS from 1992-2000 are presented in Table 2. The top 20 banded species overall, and by year, are identified in Appendix 2. Species monitored at IBS based on criteria developed by Bird Studies Canada appear in Appendix 3 along with those criteria.

Monitoring was not carried out during the last week of July or the first week of October in order to allow monitoring at the Cominco site both from funding and comparison perspectives. It is planned, however, to resume monitoring during these periods in 2001 and subsequent years.

Mist-netting can add another dimension to understanding the avifauna at a site particularly in detection of rare or elusive species. As in past years several species were banded at Inglewood that are infrequently reported by bird watchers; a Yellow-bellied Flycatcher on 20 August, a Philadelphia Vireo on 1 September, a Winter Wren on 22 September, a Gray-cheeked Thrush on 20 September, Nashville Warblers on 6 and 13 September, and a Bay-breasted Warbler on 16 August.

The *Oporornis* warblers are often difficult to detect and identify by bird watching with binoculars. During 2000, migration monitoring at IBS 3 Connecticut Warblers, 4 Mourning Warblers and 5 MacGillivray's Warblers were banded. A study of differences between Mourning and MacGillivray's Warblers captured at IBS has been underway since 1996. All birds are photographed when initially captured and additional morphometric detail and plumage characteristics documented. Data from Mackenzie Bird Observatory, Delta Marsh Bird

Table 1. Coverage and Capture Rates During 2000 Fall Banding at Inglewood Bird Sanctuary

		Captures					
Date	Net-hours	New Bandings	Recaptures	Escapes	Mortalities	Total	Captures/100 Net-hours
01-Aug	66.3	30	4	6		40	60
02-Aug	66.0	9	1			10	15
03-Aug	72.1	26	6	1		33	46
04-Aug	0.0					0	
05-Aug	0.0					0	
06-Aug	72.1	50	8	1		59	82
07-Aug	73.5	90	8	7	1	106	144
08-Aug	72.2	18	3	3		24	33
09-Aug	72.7	22	2	1		25	34
10-Aug	80.3	55	13	4		72	90
11-Aug	61.8	50	15	27	1	93	150
12-Aug	76.6	38	17	2		57	74
13-Aug	72.0	29	14	2		45	63
14-Aug	72.0	12	7			19	26
15-Aug	73.4	36	9	1		46	63
16-Aug	74.6	32	13	3		48	64
17-Aug	72.1	11	12			23	32
18-Aug	72.2	19	11	1		31	43
19-Aug	73.1	34	11	1		46	63
20-Aug	72.3	29	16	3		48	66
21-Aug	71.9	14	9			23	32
22-Aug	0.0					0	
23-Aug	72.1	14	7	1		22	31
24-Aug	71.7	13	8			21	29
25-Aug	71.3	11	1			12	17
26-Aug	72.5	32	4	2		38	52
27-Aug	71.3	44	5	1		50	70
28-Aug	71.5	7	4			11	15
29-Aug	71.9	12	9			21	29
30-Aug	0.0					0	
31-Aug	73.5	3	2			5	7
01-Sep	73.1	12	6		1	19	26
02-Sep	0.0					0	
03-Sep	48.0	3				3	6
04-Sep	73.0	18	4	2		24	33
05-Sep	70.9	17	7			24	34
06-Sep	61.7	79	5	59		143	232
07-Sep	73.3	24	8			32	44
08-Sep	72.6	20	7			27	37
09-Sep	69.6	17	8	2	1	28	40
10-Sep	71.8	22	8	1		31	43
11-Sep	73.2	19	3			22	30
12-Sep	71.8	32	8			40	56
13-Sep	74.2	23	11			34	46
14-Sep	70.8	24	5	1		30	42
15-Sep	72.9	37	5	1		43	59
16-Sep	71.1	13	3	2		18	25
17-Sep	71.0	11	1			12	17
18-Sep	31.6	4				4	13
19-Sep	34.9	32		2		34	97
20-Sep	73.1	25	5	2		32	44
21-Sep	0.0						
22-Sep	71.6	13	6			19	27
23-Sep	72.8	6	11			17	23
24-Sep	72.2	6	5			11	15
25-Sep	72.0	23	5			28	39
26-Sep	72.6	11	6	1		18	25
27-Sep	72.0	9	3	1		13	18
28-Sep	71.9	1	1			2	3
29-Sep	70.7	11	2			13	18
30-Sep	64.4	10	1	1		12	19
Total	3842	1262	353	142	4	1761	46

Figure 3. New Bandings at Inglewood Bird Sanctuary - Fall 2000

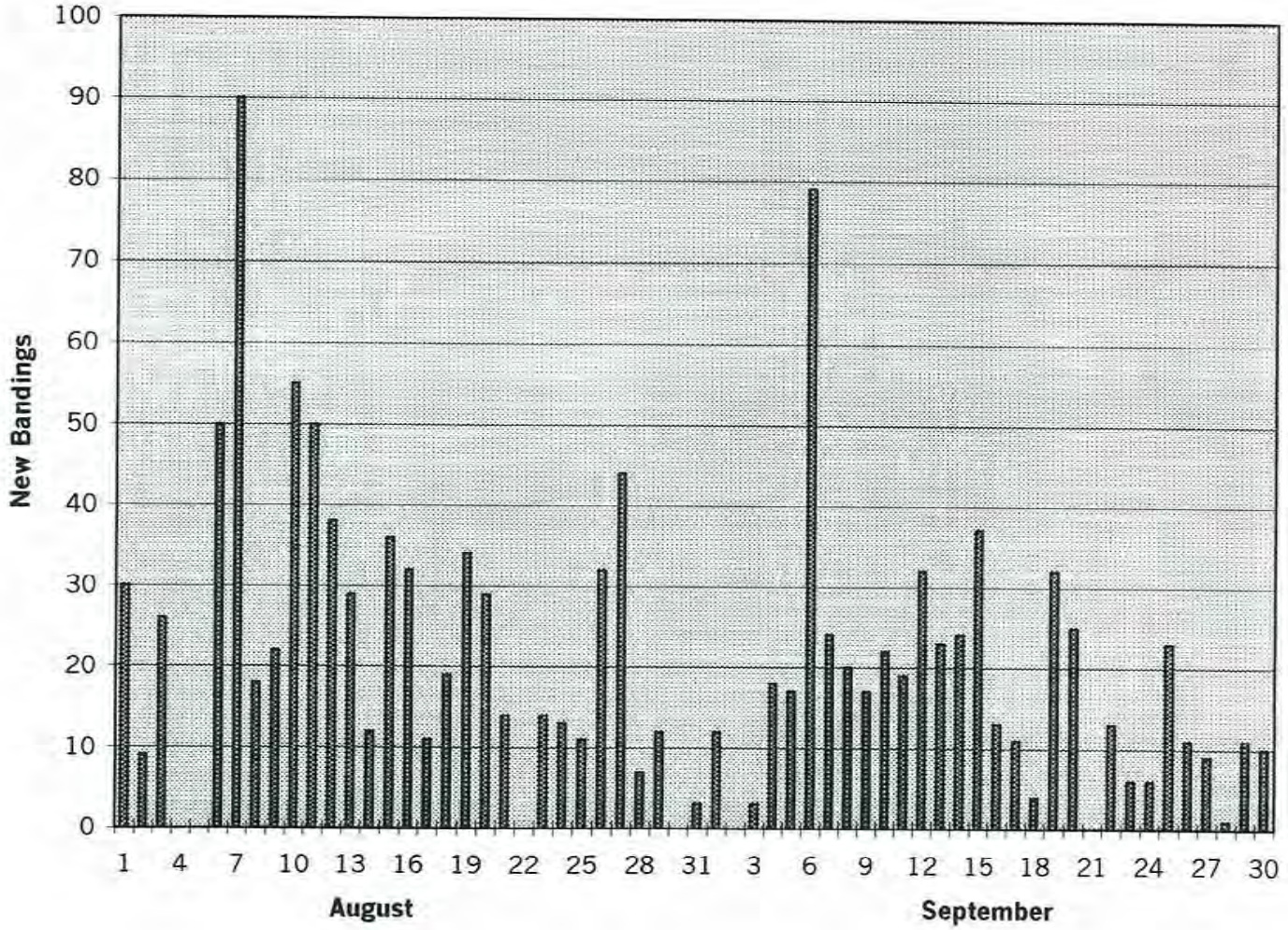


Table 2. New Bandings at Inglewood Bird Sanctuary

Year	1992	1994	1995	1996	1997	1998	1999	2000
Start	03-Aug	18-Aug	01-Aug	31-Jul	31-Jul	25-Jul	26-Jul	01-Aug
Finish	22-Sep	09-Sep	30-Sep	12-Oct	15-Oct	02-Oct	08-Oct	30-Sep
# Days	26	20	54	70	65	61	68	55
Total	841	466	1549	1121	1455	1898	1276	1262
Species	52	48	61	59	64	64	66	68
Net-hours	934	1078	3456.4	4547.2	4608.3	4371.4	4426.3	3842
Bandings/100 Net-hours	90.0	43.2	44.8	24.7	31.6	43.4	28.8	32.8
Wood Duck			1					
Mallard							1	
Sharp-shinned Hawk	2	2		1	5	4	3	1
Cooper's Hawk				1	1			1
Northern Goshawk				1				
Broad-winged Hawk						1		
Solitary Sandpiper	3	2	3	14	13	14	2	8
Spotted Sandpiper		1	2		3	3	2	
Common Snipe								1
Belted Kingfisher	2	2	8	8	6	8	10	7
Yellow-bellied Sapsucker			1					
Downy Woodpecker		1	2	3	5	7	3	9
Hairy Woodpecker								1
Northern Flicker	2	1	4	8	7	3	11	2
Olive-sided Flycatcher	3		3		5	2		2
Western Wood-Pewee	6	4	11	2	33	8	10	7
Yellow-bellied Flycatcher			1				1	
Traill's Flycatcher*	24	16	29	25	50	36	24	40
Least Flycatcher	16	5	16	9	30	14	11	21
Dusky Flycatcher			2	1				
Pacific-slope Flycatcher			1		1			
Eastern Phoebe		1						1
Eastern Kingbird	1	2	7	18	17	19	2	7
Blue-headed Vireo	1		1	1	2			1
Warbling Vireo	8	15	13	18	27	18	8	7
Philadelphia Vireo	1							1
Red-eyed Vireo	3	1	2	4	3	12	2	4
Blue Jay				1				1
Black-billed Magpie			2	1	8	2	2	1
N Rough-winged Swallow					2			
Black-capped Chickadee	9	12	7	17	5	19	10	19
Red-breasted Nuthatch		3		2		4	2	20
White-breasted Nuthatch	1	1	6		4	4	4	5
Brown Creeper	1						1	1
House Wren	3	3	50	45	52	49	33	57
Winter Wren								1
Golden-crowned Kinglet	2		2	1	1	1	2	1
Ruby-crowned Kinglet	3	1	10	18	20	14	5	11
Townsend's Solitaire				1				
Veery	2					1		
Gray-cheeked Thrush	1					1		1
Swainson's Thrush	34	13	17	52	10	28	19	13
Hermit Thrush	4		3	14	6	9	9	4
American Robin	5	11	114	81	81	31	60	32

Table 2. New Bandings at Inglewood Bird Sanctuary

Year	1992	1994	1995	1996	1997	1998	1999	2000
Gray Catbird		1		5	7	6	5	4
Brown Thrasher					3			
European Starling			2					
Bohemian Waxwing							1	
Cedar Waxwing	12	1	42	14	67	11	25	26
Tennessee Warbler	43	5	33	30	52	74	106	167
Orange-crowned Warbler	24	36	177	116	86	207	91	84
Nashville Warbler				1	2	1	1	2
Yellow Warbler	56	19	44	62	137	91	138	89
Chestnut-sided Warbler	1						1	
Magnolia Warbler	9	4	2	2	4	4	2	2
Yellow-rumped Warbler	293	171	496	92	191	638	195	200
Black-throated Green Warbler					1	1	1	
Townsend's Warbler	1				1	2	3	1
Palm Warbler		3	7	4	3	8	7	1
Bay-breasted Warbler			1				1	1
Blackpoll Warbler	17	5	17	8	6	30	5	8
Black-and-white Warbler	4	1	1	2		3		
American Redstart	19	4	3	6	4	20	5	3
Ovenbird	22	6	10	30	11	38	11	11
Northern Waterthrush	22	8	23	56	46	26	41	34
Connecticut Warbler	2	2	4	4	1	3	3	3
Mourning Warbler	4	2	5	10	3	9	1	4
MacGillivray's Warbler	2		3	8	10	6	2	5
Common Yellowthroat		1	6	1	8	10	8	4
Wilson's Warbler	121	68	102	175	119	113	100	167
Canada Warbler	1			2	1	3	1	1
Western Tanager	1	1	12	1	3	2	4	1
American Tree Sparrow			10	3	3	7	2	1
Chipping Sparrow	4	1	29	14	151	27	83	50
Clay-coloured Sparrow		1	1	6	21	37	26	9
Brewer's Sparrow							1	
Savannah Sparrow		1			2			1
Fox Sparrow	1	1	1			2	1	
Song Sparrow		1	9	9	15	18	21	9
Lincoln's Sparrow	9	7	53	28	13	59	48	30
Swamp Sparrow				2		7	3	
White-throated Sparrow	13	11	73	28	39	77	54	18
Harris' Sparrow			1					
White-crowned Sparrow	5	4	20	24	22	21	22	23
Dark-eyed Junco	5	3	15	15	3	10	8	6
Rose-breasted Grosbeak	6				1	3	2	3
Red-winged Blackbird			4				2	
Common Grackle			3					
Brown-headed Cowbird			1	2	2	1		2
Baltimore Oriole	4		21	12	12	8	5	1
Purple Finch		1			2	1	1	2
Pine Siskin					2			
American Goldfinch	3			2	4	2	2	1

*Note: Traill's Flycatcher includes both Willow and Alder

Observatory and Last Mountain Lake Bird Observatory were obtained in 2000 to investigate whether *Oporornis* warblers at IBS may be hybrids. DNA analysis offers another potential avenue of investigation into this issue. Appendix 4 presents a comparison of flat wing – tail measurements, an important interspecific determination criteria, between control and IBS data. The cooperation of these other banding sites in our study is greatly appreciated and CBBS looks forward to additional data and perhaps further insight in future years.

Two other areas of research have involved or have the potential to involve data from IBS. Firstly, banding data were provided to Erica Dunn of CWS as part of a cooperative study on mass gain among migrating songbirds at Canadian stopover sites. Ms. Dunn's analysis provides insight into the quality of IBS as a refueling stop for Neotropical Migrants. A copy of the pre-publication version of her paper appears in Appendix 5. Secondly, techniques are being developed to identify the geographic origin of birds captured at CMMN sites using stable isotopes. This project offers the possibility of confirming the hypothesis that CMMN sites monitor birds from a wide area north of their respective locations. Preliminary results involving 1999 samples from Delta Marsh Bird Observatory and Atlantic Bird Observatory indeed indicate that CMMN stations are capturing birds from a broad area, not simply from a small region close to the station.

Recaptures

Recaptures at IBS totaled 353 of 251 different birds of 38 species. Recaptures were highest in resident species: Black-capped Chickadee 32 recaptures compared to 19 new bandings; and House Wren 59 recaptures compared to 57 new bandings. However some resident species evidence a lower recapture rate suggesting that migrants swell the ranks: Yellow Warbler 12 recaptures compared to 89 new bandings. A few species appear to use IBS for moulting or extended pre-migratory foraging: Northern Waterthrush 27 recaptures compared to 34 new bandings; and Swainson's Thrush 7 recaptures compared to 13 new bandings. Some species do not appear to linger at IBS: Chipping Sparrow 0 recaptures compared to 50 new bandings; Cedar Waxwing 1 recapture compared to 26 new bandings; and American Robin 3 recaptures compared to 32 new bandings.

Year-to-year recaptures from 1992-2000 are presented in Appendix 6. Most year-to-year recaptures occur in the year following banding. However in a few cases birds are recaptured in several subsequent years and occasionally show up for the first time a number of years after banding.

Daily Estimated Totals (DETs)

The daily estimated totals (DETs) represent the total number of birds, by species, detected at the IBS migration monitoring site each day. Each DET incorporates capture data as well as a standardized census and any casual observations made during banding operations. The DETs, after removal of probable and known stopovers (PKS), give an overall description of bird migration. DET is secondary to mist-netting at Inglewood, as a monitoring measure. If high capture rates and/or personnel shortage create a risk to the welfare of the birds, a census (and therefore a DET) is not done. DET data is inputted into the CMMN-DET management program and provided to Bird Studies Canada for trend analysis and other CMMN cooperative projects.

MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS)

Background

The Monitoring Avian Productivity and Survivorship (MAPS) Program is a cooperative effort among public agencies, private organizations, and bird banders of North America. It provides long-term data on population and demographic parameters for target landbird species throughout the continent. The 2000 field season was MAPS 12th year of North American operation.

MAPS utilizes standardized, constant-effort mist-netting during the breeding season at a continent-wide network of stations. Annual regional indices of adult population size and post-fledging productivity are estimated from capture data during the breeding season. Annual regional estimates are made of adult survivorship, adult population size and recruitment into the adult population from capture-recapture data.

North America is divided into eight major regions based on biogeographical and meteorological considerations, and each region has, within it, target species. IBS falls into the Northwest Region whose target species are:

- Dusky Flycatcher;
- Western Flycatcher complex;
- Swainson's Thrush;
- American Robin;
- Warbling Vireo;
- Orange-crowned Warbler;
- Yellow Warbler;
- MacGillivray's Warbler;
- Wilson's Warbler;
- Song Sparrow;
- Lincoln's Sparrow;
- "Oregon" Dark-eyed Junco.

All of these species have been captured at IBS although only American Robin, Warbling Vireo, Yellow Warbler, Song Sparrow, and Lincoln's Sparrow are breeders. MAPS data is provided to the Institute for Bird Populations in Point Reyes, CA where it is integrated with data from the other North American stations.

Objectives

The overall objective of the MAPS Program is to contribute to an integrated avian population monitoring system for selected North American landbirds. The indices and estimates obtained:

- determine annual changes and, ultimately, longer-term trends in population and demographic parameters of target species in each region;
- relate these trends to readily-measured environmental co-variates such as climatic factors, habitat type, and management practice; and
- refine current population models and develop new ones.

Methods

The MAPS Program consists of standardized constant-effort mist netting during the breeding season. The breeding season is considered to extend from May through mid-August and is divided into 10 ten-day periods. Ten 30-mm mist-nets are operated for 6 hours from sunrise on one day in each of the ten-day periods. Mist-netting commences the first ten-day period during which the majority of breeding adults of the target species have established territories and migrant individuals of these species are no longer passing through the area. The operation of the mist-nests must continue for a minimum of three periods in the adult "super-period" and two periods in the young "super-period". For IBS MAPS initiates during period 4 (31 May - 9 June) and coverage entails 7 of the 10 ten-day periods.

An additional requirement is to record the type and distribution of vegetation present at the MAPS station. Because changes in the vegetation at a station can cause changes in breeding populations and demographic parameters, the type and distribution of the vegetation must be described each year.

MAPS Schedule and Coverage

2000 marked the 8th year of the MAPS project at IBS since 1992. Lack of qualified personnel precluded gathering data in 1994. In 2000 a total of 420.8 net-hours were achieved over 7 periods.

Results

The number of each species captured, by date, during 2000 are summarized in Table 3. The number of each species that were banded, recaptured, or escaped before banding are summarized in Table 4 for 2000 as well as seven previous years.

Table 3. Inglewood Bird Sanctuary MAPS Summary - 2000

	New bandings								Total captures							
Date	8 June	16 June	25 June	7 July	19 July	26 July	7 Aug	Total	8 June	16 June	25 June	7 July	19 July	26 July	7 Aug	Total
Western Wood-Pewee							1	1	1						1	2
Traill's Flycatcher							1	1							1	1
Least Flycatcher							1	1							1	1
Warbling Vireo			1				1	2			1				1	2
Black-capped Chickadee		2	1			1		4		2	1			1	1	5
House Wren	2		1			6	6	15	2	1	2	2	1	6	9	23
Hermit Thrush					1			1					1			1
American Robin		1	2	5		3 6		15 14		1	2	8		6	1	18
Gray Catbird	1							1	1							1
Cedar Waxwing	1		2	3			1	7	1		2	3			1	7
Tennessee Warbler							22	22							28	28
Yellow Warbler	1		1				11	13	2		1				12	15
Myrtle Warbler							2	2							2	2
Clay-coloured Sparrow	1							1	2							2
Lincoln's Sparrow	1							1	1							1
Brown-headed Cowbird			1					1			1					1
Baltimore Oriole				1				1			1	1				2
Purple Finch							1	1							1	1
Total Birds	7	3	9	9	1	13	47	90 89	10	4	11	14	2	13	59	113
Total Species	6	2	7	3	1	3	10	19	7	3	8	4	2	3	12	19
Net-Hrs	60.0	57.6	60.0	59.0	62.3	61.1	60.9	420.8	60.0	57.6	60.0	59.0	62.3	61.1	60.9	420.8
Captures/100 Net-Hrs	11.7	5.2	15.0	15.3	1.6	21.3	77.2	21.1	16.7	6.9	18.3	23.7	3.2	21.3	96.9	26.9

Table 4. Inglewood Bird Sanctuary MAPS Summary 1992-2000

	New Bandings							
	1992	1993	1995	1996	1997	1998	1999	2000
American Kestrel			1					
Downy Woodpecker	1	3	1	5	4	1		
Hairy Woodpecker	1	1	1			1		
Yellow-shafted Flicker	1	1	1					
Flicker Intergrade			2				2	
Northern Flicker				2				
Western Wood-Pewee	6	1	1	1	1	2		1
Traill's Flycatcher				3	3		1	1
Least Flycatcher	14	8	3	2	3	4	2	1
Eastern Kingbird	2	1			3	1	3	
Warbling Vireo	7	7	1	4	2		2	2
Red-eyed Vireo	1							
Black-billed Magpie				1	2			
Tree Swallow	3						2	
Bank Swallow	1							
Black-capped Chickadee	5	7	5	9	2	3	5	4
White-breasted Nuthatch	3	4		2				
House Wren	5	11	9	9	13	8	9	15
Veery	2					1		
Swainson's Thrush	10	8	6	4	3	1	4	
Hermit Thrush								1
American Robin	21	6	26	25	23	10	8	15
Gray Catbird	3			1	1	4	8	1
European Starling			1					
Cedar Waxwing	27	8		6	1	9	5	7
Tennessee Warbler	1	6		7	1	3	4	22
Orange-crowned Warbler						1		
Yellow Warbler	20	14	7	2	6	9	24	13
Myrtle Warbler	10					2		2
American Redstart		1						
Ovenbird	3			1		1		
Northern Waterthrush						1	1	
Mourning Warbler	1							
Wilson's Warbler				2		1	1	
Western Tanager		1	3	1	2		4	
Chipping Sparrow		7			1			
Clay-coloured Sparrow		1				6	17	1
Song Sparrow		1		1		1	4	
Lincoln's Sparrow		3	1	2	5	2		1
White-throated Sparrow				2				
Rose-breasted Grosbeak				1				
Common Grackle			1		2			
Brown-headed Cowbird	6				3			1
Baltimore Oriole	3	7	2	8	9	1	2	1
Purple Finch		1						1
American Goldfinch	2	2		1				
House Sparrow	2					2		
Total	**161**	**110**	**72**	**102**	**90**	**75**	**108**	**90**
Species	**27**	**24**	**18**	**25**	**21**	**24**	**20**	**18**

Discussion

As indicated in Table 4, the number of new bandings has fluctuated from year to year. Highlights in 2000 included the first banded Hermit Thrush, only the second banded Purple Finch, and the noticeable absence of Swainson's Thrushes.

The number of migrants detected during MAPS has also varied from year to year. Very few northbound warblers were detected suggesting an early spring migration. The capture of 22 Tennessee Warblers during the last period (7 August), significantly higher than any other year, suggests an early fall migration.

MIGRATION MONITORING AT COMINCO NATURAL AREA

Introduction

The CBBS conducted a spring banding project at a site known as Dunbow Road from 1997 through 1999 on private property south of Calgary. Modest migration at this site along with nearby Deerfoot Trail extension construction beginning in 2000 reduced its attractiveness. An alternative site was identified within the Cominco Natural Area along the Bow River in south Calgary. CBBS was granted permission to monitor migration at this new site in both spring and fall 2000.

Study Site

The Cominco Natural Area (CNA) is the eastern portion of an approximately 136-ha property currently owned by Cominco Ltd., which bought the chemical fertilizer plant and lands in 1946. Deerfoot Trail now separates the riverside CNA from the larger former industrial site. The CNA's other boundaries are Heritage Drive to the north, the Bow River to the east and Southland Park to the south (Figure 4).

There are five major habitat types in the area: aquatic and marginal aquatic habitats; grasslands; disturbed areas; shrub communities; and Balsam Poplar (*Populus balsamifera*) and Aspen (*Populus tremuloides*) woods, as described by Sherrington (1975). The current health of these habitats appears related to the amount of their use by the resident population of White-tailed deer (*Odocoileus virginianus*). The shrub communities are primarily large patches of Chokecherry (*Prunus virginiana*) and Saskatoon (*Amelanchier alnifolia*) that have no branches near the ground and large old willow (*Salix* sp.). Red-osier dogwood (*Cornus stolonifera*), a favourite browse of deer, is abundant across the river and upstream in other city parks and natural areas but virtually absent here.

The diversity of habitat accounts for the variety of bird species encountered during the two monitoring periods in 2000. The two large cattail marshes attract large numbers of Red-winged Blackbirds, Song Sparrows, and ducks. American Robins feed in the disturbed areas. Grassy areas, that include patches of Western snowberry (*Symphoricarpos occidentalis*) and Wild rose (*Rosa woodsii*) support Clay-colored and Savannah Sparrows. Large chokecherry and willow shrubs are ideal for Cedar Waxwing and House Wren nests. Treed areas attract flocks of migrating warblers and Common Grackles during fall. It appears that about 45%, or 29 of the 65 passerines and near-passerines species banded at CNA are possible or probable nesting species.

Most of the CNA has been exposed to limited human use for more than 50 years with some major exceptions. A large canal formerly used as a water inlet source for the Cominco plant bisects CNA and completion of Deerfoot Trail in 1982 created a noisy dissection of the area.

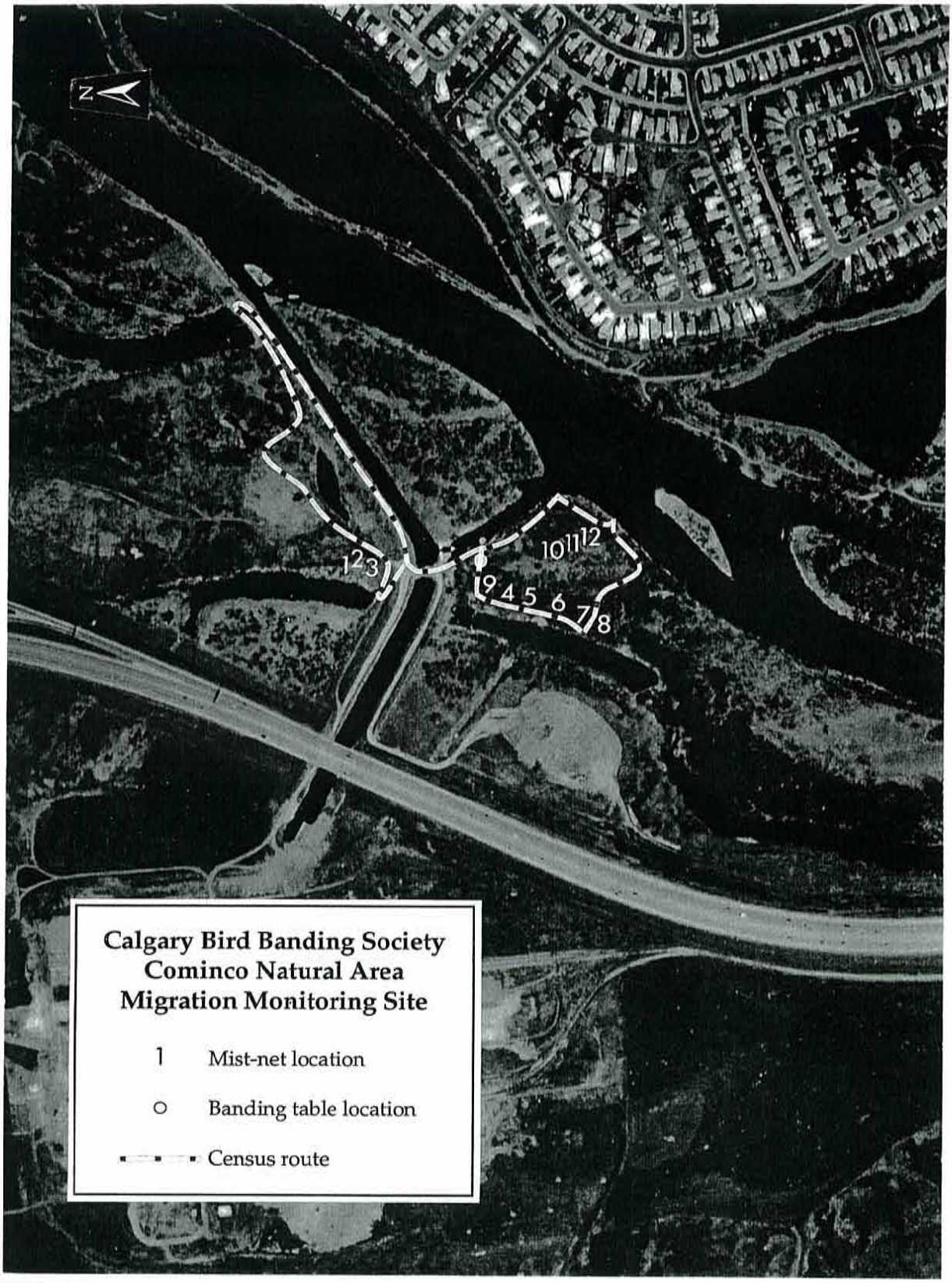


Figure 4. Cominco Natural Area migration monitoring site.

Figure 5. New Bandings at Cominco Natural Area - Spring 2000

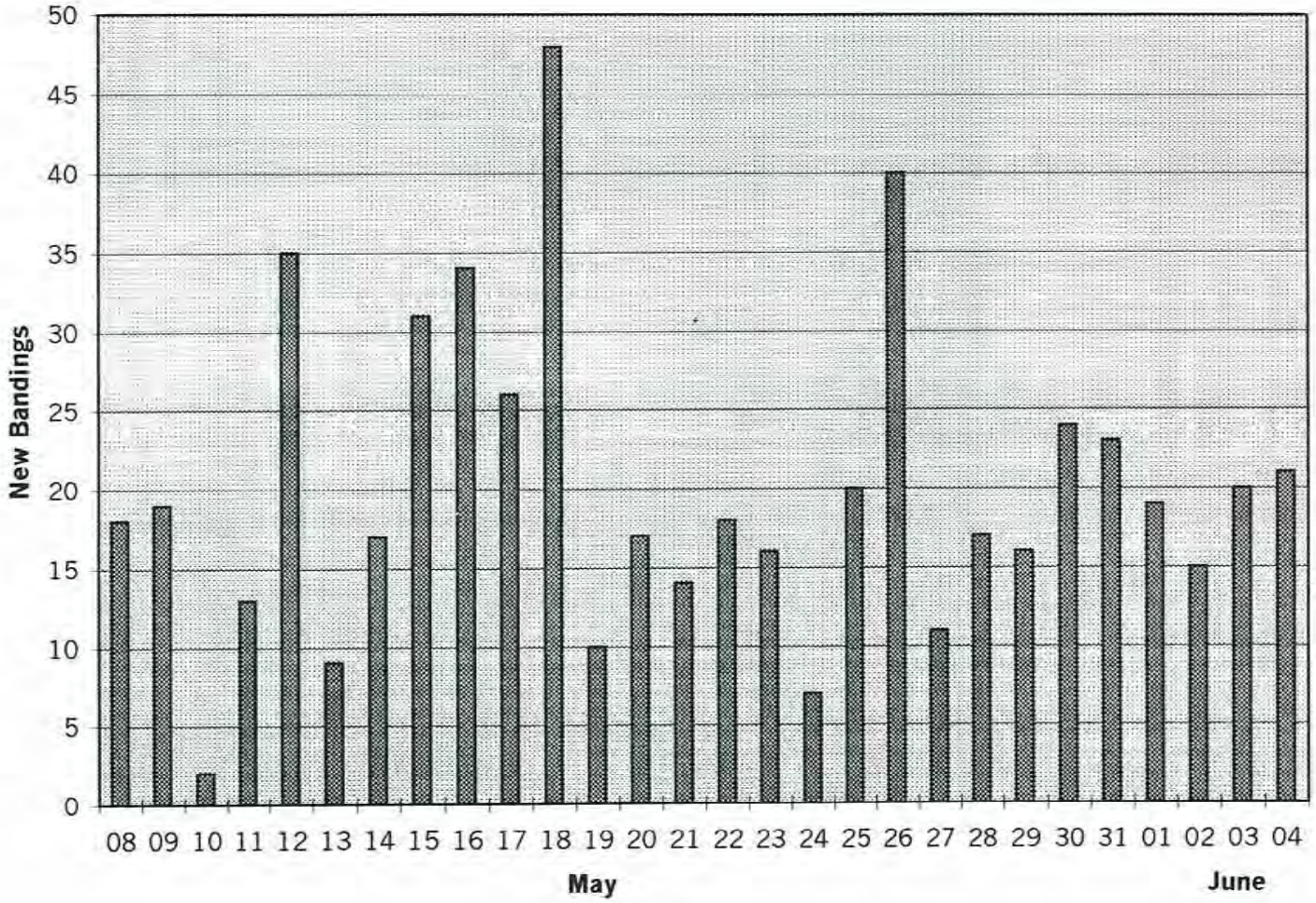


Table 6. New Bandings at Cominco Natural Area - 2000

	Spring	Fall
Start	8-May	1-Aug
Finish	4-Jun	30-Sep
Days	27	55
Total new bandings	560	1848
Net-hrs	1398	3733
New bandings/net-hr	0.40	0.50
Sharp-shinned Hawk	1	3
Downy Woodpecker	3	14
Hairy Woodpecker		2
Northern Flicker	2	
Olive-sided Flycatcher		1
Western Wood-Pewee		13
Alder Flycatcher	16	19
Willow Flycatcher		2
Least Flycatcher	7	45
Eastern Kingbird	4	13
Blue-headed Vireo	1	1
Warbling Vireo	2	16
Red-eyed Vireo	1	0
Black-billed Magpie		5
Tree Swallow	2	0
Barn Swallow		1
Northern Rough-winged Swallow	3	2
Black-capped Chickadee	6	45
Boreal Chickadee		1
Red-breasted Nuthatch		2
White-breasted Nuthatch		3
House Wren	7	79
Ruby-crowned Kinglet		3
Gray-cheeked Thrush	2	
Swainson's Thrush	39	4
Hermit Thrush	1	1
American Robin	16	44
Gray Catbird	12	18
Cedar Waxwing	15	450

Table 6. New Bandings at Cominco Natural Area - 2000

	Spring	Fall
Start	8-May	1-Aug
Finish	4-Jun	30-Sep
Days	27	55
Tennessee Warbler		68
Orange-crowned Warbler	12	37
Northern Parula		1
Yellow Warbler	38	187
Magnolia Warbler		1
Yellow-rumped Warbler	20	400
Palm Warbler		3
Blackpoll Warbler	5	13
American Redstart	2	3
Ovenbird	1	3
Northern Waterthrush	7	7
Connecticut Warbler		1
Mourning Warbler	1	
MacGillivray's Warbler	1	
Common Yellowthroat	15	11
Wilson's Warbler	4	23
Western Tanager	1	1
American Tree Sparrow		3
Chipping Sparrow	86	46
Clay-coloured Sparrow	86	64
Vesper Sparrow		1
Savannah Sparrow	14	15
Fox Sparrow		3
Song Sparrow	12	27
Lincoln's Sparrow	13	9
White-throated Sparrow	1	12
White-crowned Sparrow	9	9
Dark-eyed Junco		11
Rose-breasted Grosbeak		2
Red-winged Blackbird	63	1
Yellow-headed Blackbird	1	
Common Grackle		9
Brown-headed Cowbird	14	3
Baltimore Oriole	7	12
Purple Finch		3
Pine Siskin		10
American Goldfinch	7	62

Although banding at CNA during 2000 was conducted in an intensive and standardized manner, it was still a pilot effort. No unexpected species were banded, but the relative abundance of most species was clearly different from that encountered at Dunbow Road in previous years. Three migrant species, Swainson's Thrush, Yellow-rumped Warbler and Alder Flycatcher, ranked in the top 7 most abundant of the 43 species, based on new bandings. Passerines associated with wetlands and grasslands dominate the banding totals.

New Bandings – Fall

For the two-month period, beginning 1 August, 1848 birds of 59 species were newly banded at CNA (Table 6). Twenty species were banded on 12 September. Approximately 61% of new bandings occurred in August, although the peak was 98 on 6 September. Total captures (new bandings, recaptures, escapes and mortalities) were 2332 (Table 5). That is, 62 birds were caught per 100 net-hours which is a relatively high rate compared to IBS. Neotropical migrant species totalled 36 (61%). The top 20 species are identified in Appendix 8.

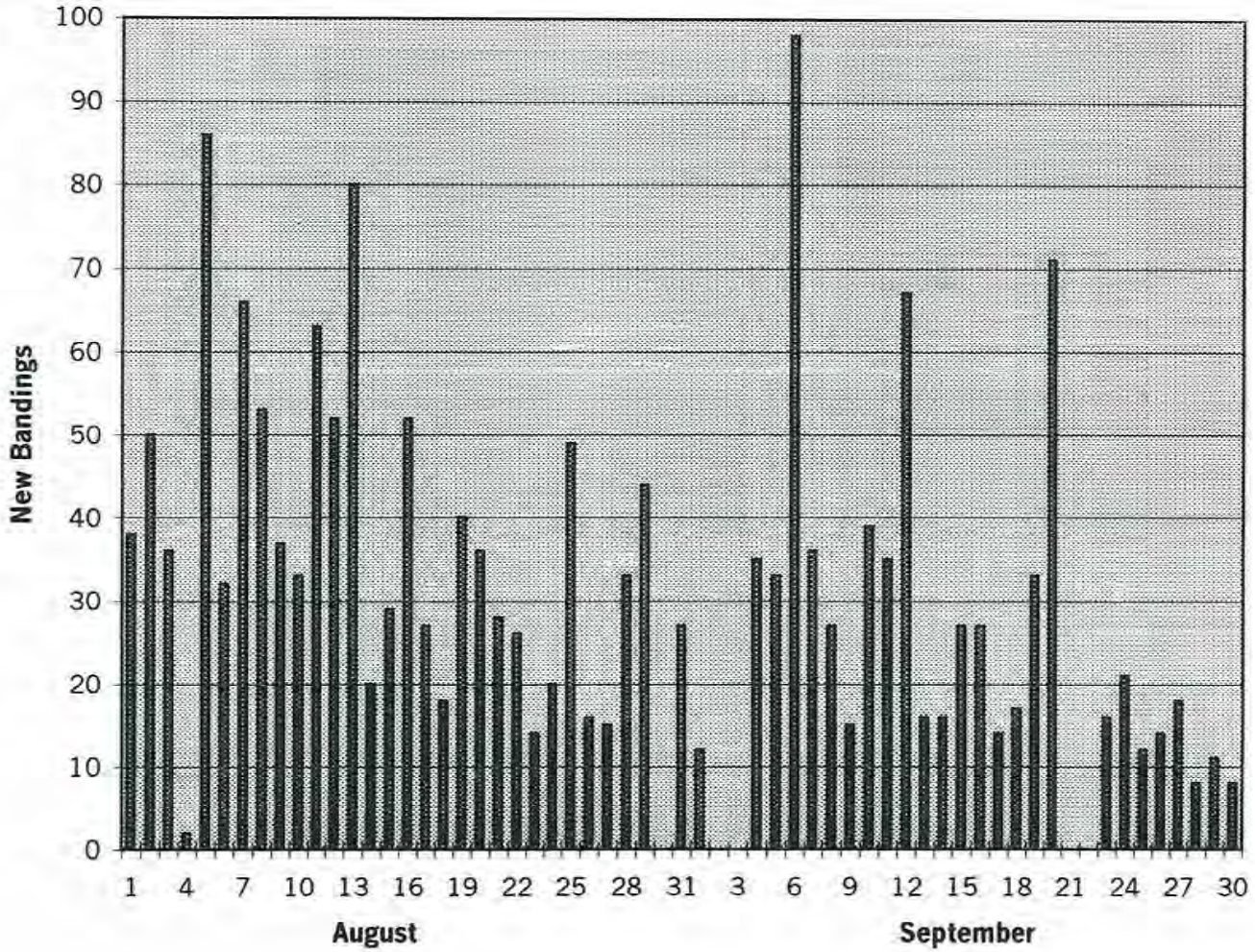
New banding totals demonstrated that spring mist-net locations do not assure captures of similar species or of a relative abundance of those same species in the fall (Table 6). The most dramatic differences occurred in Red-winged Blackbirds and Swainson's Thrushes. Nearly all of the resident blackbirds had left the CNA before fall monitoring began. Swainson's Thrushes were seldom seen during fall.

A bumper chokecherry crop and warm dry weather created ideal conditions for Cedar Waxwings, with a total of 450 new bandings in fall alone. Many of these birds were newly fledged, as demonstrated by their pink bills and short flight feathers. Yellow Warbler fledglings were responsible for most of the 187 fall bandings of this species.

The timing of fall migration shows the influence of the three most common species on new banding totals (Figure 6, Appendix 7). Cedar Waxwings accounted, on average, for 11.6 new bands each day of August banding with peaks on 13 and 16 August. About 75% of Yellow Warblers were banded before 16 August. Yellow-rumped Warblers dominated September band totals. These three species together represented 56% of fall new bands. The summary of new bandings (Appendix 7) shows that Tennessee Warbler, classified as a migrant-only species for our banding stations, was already on-site when monitoring began.

The capture on 8 September 2000 of an AHY-M Northern Parula was the highlight of the season and the first banding of this warbler species in Alberta (M. Gustafson, USGS Bird Banding Laboratory, pers. comm.). In fact, there are fewer than 10 documented sight records for this species in Alberta. A Northern Parula tentatively identified as an adult female was seen at IBS in 1995 (M. Harrison, pers. comm.). Another unusual capture at CNA was a Boreal Chickadee on 15 September.

Figure 6. New Bandings at Cominco Natural Area - Fall 2000



Recaptures

There were a total of 401 recaptures representing 277 different birds of 38 species at CNA in fall. Most were of birds also banded during fall monitoring. Seven species originally banded during the spring monitoring period were recaptured during the fall: Downy Woodpecker (2 records), Eastern Kingbird (1), Black-capped Chickadee (5), House Wren (1), Yellow Warbler (4), Song Sparrow (7), American Goldfinch (1). Some of these birds were captured more than once. There were three recaptures at CNA of birds originally banded at Inglewood Bird Sanctuary (see Significant Recaptures).

Fall monitoring at CNA was undertaken, in part, to discover if migrant species "short-hop" along the Bow River. That is, does a migrating bird get its food (and fat buildup) requirements at one or at a series of locations between migration flights? The small number of same-year recaptures at the nearby (within 5-km; Figure 7) and downstream CNA may indicate that birds that stopover at IBS and CNA confine their food-foraging to those areas, then migrate directly from there. Another possible explanation is that the different habitats at IBS and CNA attract different avifaunal assemblages at the sites during migration notwithstanding the tendency for migrant birds to be less habitat specific during migration than during the breeding season.

Daily Estimated Totals

The daily estimated totals (DETs) represent the total number of birds, by species, detected at the CNA migration monitoring site each day. Each DET incorporates capture data as well as a standardized census and any casual observations made during banding operations. The DETs, after removal of probable and known stopovers (PKS), give an overall description of bird migration. DET is secondary to mist-netting at CNA, as a monitoring measure. If high capture rates and/or personnel shortage create a risk to the welfare of the birds, a census (and therefore a DET) is not done.

CNA versus IBS – Fall Migration

The Cominco Natural Area is approximately 5-km downstream along the Bow River from Inglewood Bird Sanctuary. The fall migration monitoring schedules (1 August through 30 September) and total net hours were essentially identical during 2000. Yet, data based on fall banding totals of newly banded birds shows marked differences. CNA recorded nearly 600 more new bandings (although 10 fewer species) than IBS (Table 7). New bandings per net-hour were substantially higher at CNA (0.50) than at IBS (0.33).

Analysis of the top 20 species at each station based on fall new bandings is another indication of the differences between the two sites (Appendices 2 and 8). Eight of the top 10 species captured at CNA are probable summer residents, at least in part compared to 4 species at IBS. Yellow-rumped, Tennessee, Wilson's and Orange-crowned Warblers are the most common

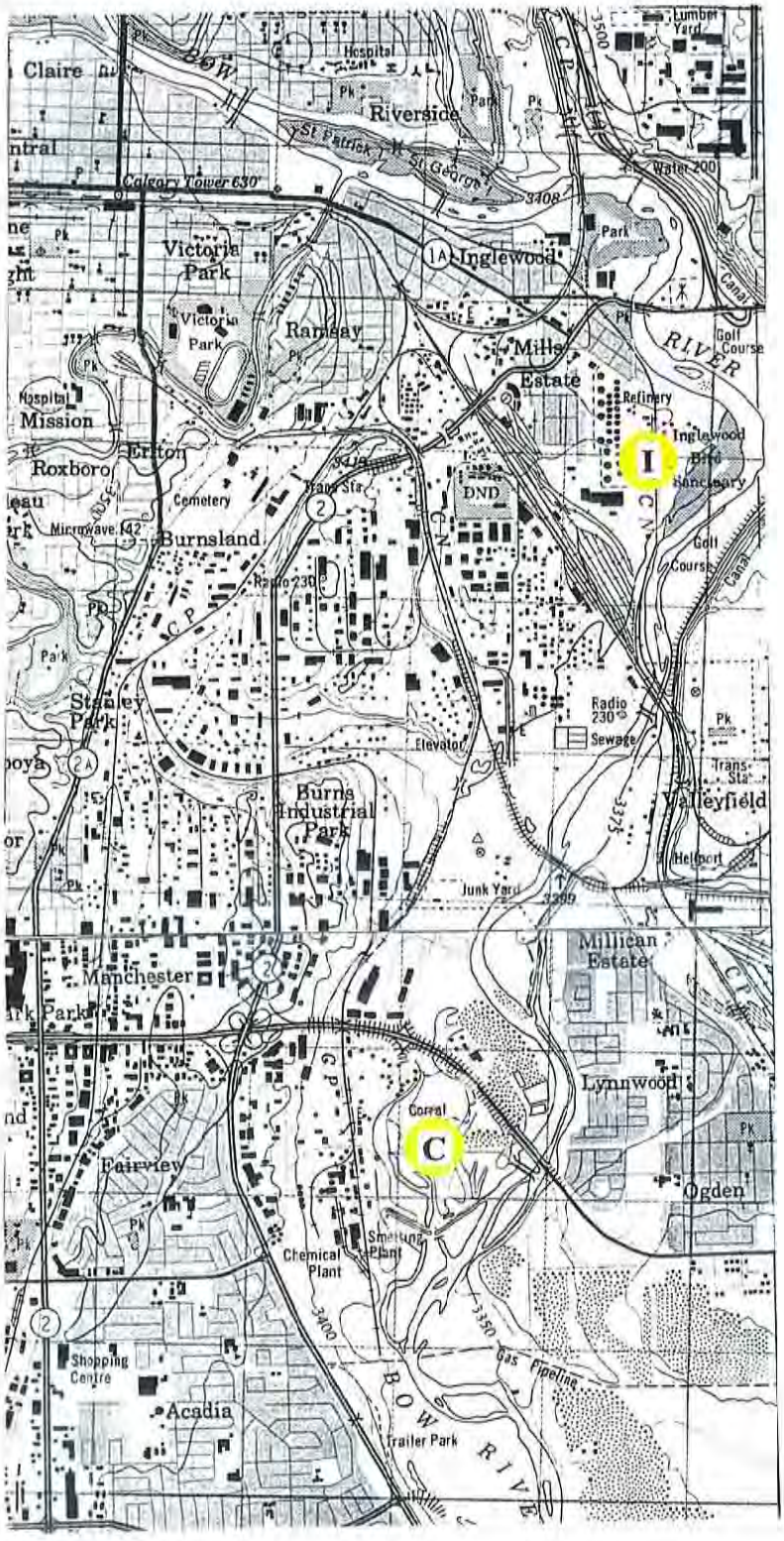


Figure 7. Relative location of Inglewood Bird Sanctuary (I) and Cominco Natural Area (C) 1:50,000 scale (1-cm = 500-m).

Table 7. Comparison of New Bandings at IBS and CNA - Fall 2000

	Total	
	Cominco	IBS
Start	1 Aug	1 Aug
Finish	30 Sep	30 Sep
Days	55	55
Total new bandings	1848	1262
Number of species banded	59	69
Number of species "monitored"	26	20
Net-hrs	3733	3842
New bandings/net-hr	0.50	0.33
Sharp-shinned Hawk	3	1
Cooper's Hawk		1
Solitary Sandpiper		8
Common Snipe		1
Belted Kingfisher		7
Downy Woodpecker	14	9
Hairy Woodpecker	2	1
Northern Flicker		2
Olive-sided Flycatcher	1	2
Western Wood-Pewee	13	7
Alder Flycatcher	19	38
Willow Flycatcher	2	2
Least Flycatcher	45	21
Eastern Phoebe		1
Eastern Kingbird	13	7
Blue-headed Vireo	1	1
Warbling Vireo	16	7
Philadelphia Vireo		1
Red-eyed Vireo		4
Blue Jay		1
Black-billed Magpie	5	1
Barn Swallow	1	
Northern Rough-winged Swallow	2	
Black-capped Chickadee	45	19
Boreal Chickadee	1	
Red-breasted Nuthatch	2	20
White-breasted Nuthatch	3	5
Brown Creeper		1
House Wren	79	57
Winter Wren		1
Golden-crowned Kinglet		1
Ruby-crowned Kinglet	3	11
Gray-cheeked Thrush		1
Swainson's Thrush	4	13
Hermit Thrush	1	4
American Robin	44	32
Gray Catbird	18	4
Cedar Waxwing	450	26
Tennessee Warbler	68	167

Table 7. Comparison of New Bandings at IBS and CNA - Fall 2000

	Total	
	Cominco	IBS
Start	1 Aug	1 Aug
Finish	30 Sep	30 Sep
Days	55	55
Orange-crowned Warbler	37	84
Nashville Warbler		2
Northern Parula	1	
Yellow Warbler	187	89
Magnolia Warbler	1	2
Yellow-rumped Warbler	400	200
Townsend's Warbler		1
Palm Warbler	3	1
Bay-breasted Warbler		1
Blackpoll Warbler	13	8
American Redstart	3	3
Ovenbird	3	11
Northern Waterthrush	7	34
Connecticut Warbler	1	3
Mourning Warbler		4
MacGillivray's Warbler		5
Common Yellowthroat	11	4
Wilson's Warbler	23	167
Canada Warbler		1
Western Tanager	1	1
American Tree Sparrow	3	1
Chipping Sparrow	46	50
Clay-coloured Sparrow	64	9
Vesper Sparrow	1	
Savannah Sparrow	15	1
Fox Sparrow	3	
Song Sparrow	27	9
Lincoln's Sparrow	9	30
White-throated Sparrow	12	18
White-crowned Sparrow	9	23
Dark-eyed Junco	11	6
Rose-breasted Grosbeak	2	3
Red-winged Blackbird	1	
Common Grackle	9	
Brown-headed Cowbird	3	2
Baltimore Oriole	12	1
Purple Finch	3	2
Pine Siskin	10	
American Goldfinch	62	1

migrant warbler species at both locations. Traill's (Alder and Willow) Flycatchers, a species associated with wet habitats, are more numerous in fall at IBS than Least Flycatchers, a species often found in dry areas. Least Flycatchers were much more abundant than Traill's at CNA during fall, indicating the locally dry terrestrial conditions in spite of the wetlands present.

Habitat differences between the two banding locations may account for much of the difference in abundance of captured birds. Most IBS mist-nets are located in a riparian zone of large old balsam poplar with an understory dominated by red-osier dogwood, plus a few are in old river channels next to running water. This habitat mixture is attractive to a wide variety of uncommonly reported migrant warbler species. Three CNA net lanes are located near a cattail marsh and shrubby grassland, while the rest are in upland dry shrubbery interspersed with healthy aspen. The marsh edge and grassland mist-nets captured large numbers during spring monitoring, while upland mist-nets close to the river caught most of the migrants and resident species during the fall.

NORTHERN SAW-WHET OWL MIGRATION MONITORING

During 2000, based on results from eastern North America and particularly at Delta Marsh Bird Observatory in southern Manitoba during fall 1999 a pilot monitoring program for Northern Saw-whet Owls was undertaken at Inglewood Bird Sanctuary.

Methods

Local records, both sightings and recovered specimens, indicate that October is the peak window for migrating Northern Saw-whet Owls. Monitoring was begun 16 September and continued through 7 November. A continuous recording of Northern Saw-whet Owl calls was played at maximum volume in a portable "ghetto-blaster" (kindly donated by Christine Bennett) from the center of a triangle of mist-nets. The triangle was located just west of the Colonel Walker House and consisted of two 12-m 36-mm nets positioned at right angles to each other against the caragana hedge and the line of poplar trees. An 18-m 60-mm net was positioned along the hypotenuse of the triangle formed by the two 36-mm nets. Tape playback commenced approximately 0.5-hrs after sunset and continued for 4-hrs, weather and other factors permitting. Nets were checked every 0.75-hrs by a Bander-in-Charge (BIC) and 1-2 volunteers. Sex, age and morphometric data were collected on all owls captured. Basic weather data (wind direction and speed, sky conditions and temperature) were noted at start and finish each evening.

Results

Monitoring was carried out on 38 (72%) of the 53 evenings between 16 September and 7 November (Table 8). No BIC was available for 9 nights, a film crew was active at the monitoring site for 5 nights and one night was lost due to weather. Three Northern Saw-whet owls were captured within a short window from 12-21 October. All were SY with two sexed as females and one as unknown. One bird was caught at 21:00-hrs while the other two were captured at 23:00-hrs. All three were in the lower 1-2 panels of the mist-nets and each of the three mist-nets caught one owl. Weather conditions on the capture evenings were consistently calm but 2 of 3 birds were caught when the moon was ½ to ¾ full while the other bird was captured during a new moon. Temperatures ranged from +10 to –2 Celsius. Weights of the three owls were 85-, 96- and 107-gm.

Discussion

Inglewood Bird Sanctuary is situated in the center of a large city, Calgary. Although the Bow River offers some habitat to migrating Northern Saw-whet Owls, it is not a continuous vegetated corridor. Our results suggest that there is a Northern Saw-whet Owl movement occurring during fall but that not many owls pass through IBS. A monitoring site outside the city in an area of more continuous and connected forest habitat might yield significantly higher numbers of owls.

Table 8. Northern Saw-whet Owl Migration Monitoring at Inglewood Bird Sanctuary - 2000

Date	Owls
16-Sep	0
17-Sep	0
18-Sep	0
19-Sep	0
20-Sep	rain
21-Sep	0
22-Sep	0
23-Sep	0
24-Sep	0
25-Sep	0
26-Sep	0
27-Sep	0
28-Sep	film crew
29-Sep	film crew
30-Sep	film crew
01-Oct	film crew
02-Oct	film crew
03-Oct	0
04-Oct	0
05-Oct	0
06-Oct	0
07-Oct	no banding
08-Oct	no banding
09-Oct	0
10-Oct	0
11-Oct	no banding
12-Oct	1

Date	Owls
13-Oct	0
14-Oct	0
15-Oct	0
16-Oct	0
17-Oct	0
18-Oct	1
19-Oct	0
20-Oct	0
21-Oct	1
22-Oct	0
23-Oct	0
24-Oct	0
25-Oct	0
26-Oct	0
27-Oct	0
28-Oct	0
29-Oct	no banding
30-Oct	0
31-Oct	0
01-Nov	no banding
02-Nov	no banding
03-Nov	no banding
04-Nov	no banding
05-Nov	0
06-Nov	no banding
07-Nov	0

SIGNIFICANT RECAPTURES

All recaptures of birds banded in previous years are listed below. Several of these significant recaptures are of particular interest. The Hairy Woodpecker banded in 1995 and recaptured for the first time this year illustrates how the absence of recapture does not necessarily indicate mortality. The Swainson's Thrush recapture is the 7th recapture of this species at Inglewood during subsequent migrations (Appendix 6). Swainson's Thrush is not resident at Inglewood nor does it breed in close proximity. In previous years an Orange-crowned Warbler and a Yellow-rumped Warbler were also caught during subsequent migrations (Appendix 6). This level of migration stopover site fidelity is very rare. We are not aware of it being reported by any other CMMN site. Two Yellow-rumped Warblers were the only migrants to be detected at both IBS and CNA during fall 2000. The Baltimore Oriole, a resident species at both IBS and CNA, was banded at Inglewood in 1999 and recaptured at CNA during fall 2000. It is possible that this is also an occurrence of migration stopover fidelity.

Hairy Woodpecker 962-90911 Banded as AHY-F by Grahame Booth at Inglewood Bird Sanctuary on 15 July 1995. Recaptured there on 28 September 2000. At least 6-years old. Had not been detected since 1995.

... 1152-38713 Banded as ASY-M by Grahame Booth at Inglewood Bird Sanctuary on 5 July 1998. Recaptured there on 24 September 2000. At least 5-years old.

Warbling Vireo 3101-89999 Banded as AHY-U by Grahame Booth at Inglewood Bird Sanctuary on 2 August 1999. Recaptured there on 23 August 2000. At least 2-years old.

Black-capped Chickadee 1950-45254 Banded as HY-U by Doug Collister at Inglewood Bird Sanctuary on 6 September 1994. Recaptured there on 17 June and 17 September 1995, 21 September 1996, 5 June and 24-25, 30 September 1999 and 11 Aug 2000. 6-years old.

... 1980-79991 Banded as AHY-F by Grahame Booth at Inglewood Bird Sanctuary on 22 July 1995. Recaptured there 6 times in 1996, twice in 1997, 9 September 1998 and on 4 September 2000. At least 6-years old.

... 2160-19120 Banded as AHY-U by Greg Meyer at Inglewood Bird Sanctuary on 6 August 1998. Recaptured there on 24 August 2000. At least 3-years old.

... 2160-19522 Banded as U-U by Doug Collister at Inglewood Bird Sanctuary on 5 August 1999. Recaptured there on 9 September 2000. At least 1-year old.

White-breasted Nuthatch 1461-31479 Banded as AHY-M by Greg Meyer at Inglewood Bird Sanctuary on 16 August 1998. Recaptured there on 26 July 1999 and 26 September 2000. At least 3-years old.

Swainson's Thrush 1541-17673 Banded as AHY-U by Doug Collister at Inglewood Bird Sanctuary on 16 July 1999. Recaptured there on 3 and 26 August 2000. At least 2-years old.

Yellow Warbler 2160-19766 Banded as AHY-U by Stefan Jungkind at Inglewood Bird Sanctuary on 24 August 1999. Recaptured there on 20 August 2000. At least 2-years old.

... 2160-19700 Banded as HY-F by Stefan Jungkind at Inglewood Bird Sanctuary on 18 August 1999. Recaptured at the Colorado Bird Observatory 22 miles NE of Denver on 1 September 1999. Travelled 1439-km SE (147^0) in 14 days averaging 103-km/day.

Yellow-rumped Warbler 2120-05778 Banded as HY-F by Doug Collister at Inglewood Bird Sanctuary on 16 August 2000 at 0945-hrs. Recaptured the same day at Cominco.

... 2190-10111 Banded as HY-F by Scott Wilson at Inglewood Bird Sanctuary on 27 August 2000. Recaptured at Cominco on 6 September 2000.

Clay-coloured Sparrow 2160-19504 Banded as AHY-U by Grahame Booth at Inglewood Bird Sanctuary on 4 August 1999. Recaptured there on 29 August 2000. At least 2-years old.

... 2160-19679 Banded as AHY-U by Stefan Jungkind at Inglewood Bird Sanctuary on 15 August 1999. Recaptured there on 17 August 2000. At least 2-years old.

Baltimore Oriole 8041-54960 Banded as AHY-F by Grahame Booth at Inglewood Bird Sanctuary on 1 August 99. Recaptured at Cominco on 5 August 2000. At least 2-years old.

TREND ANALYSIS

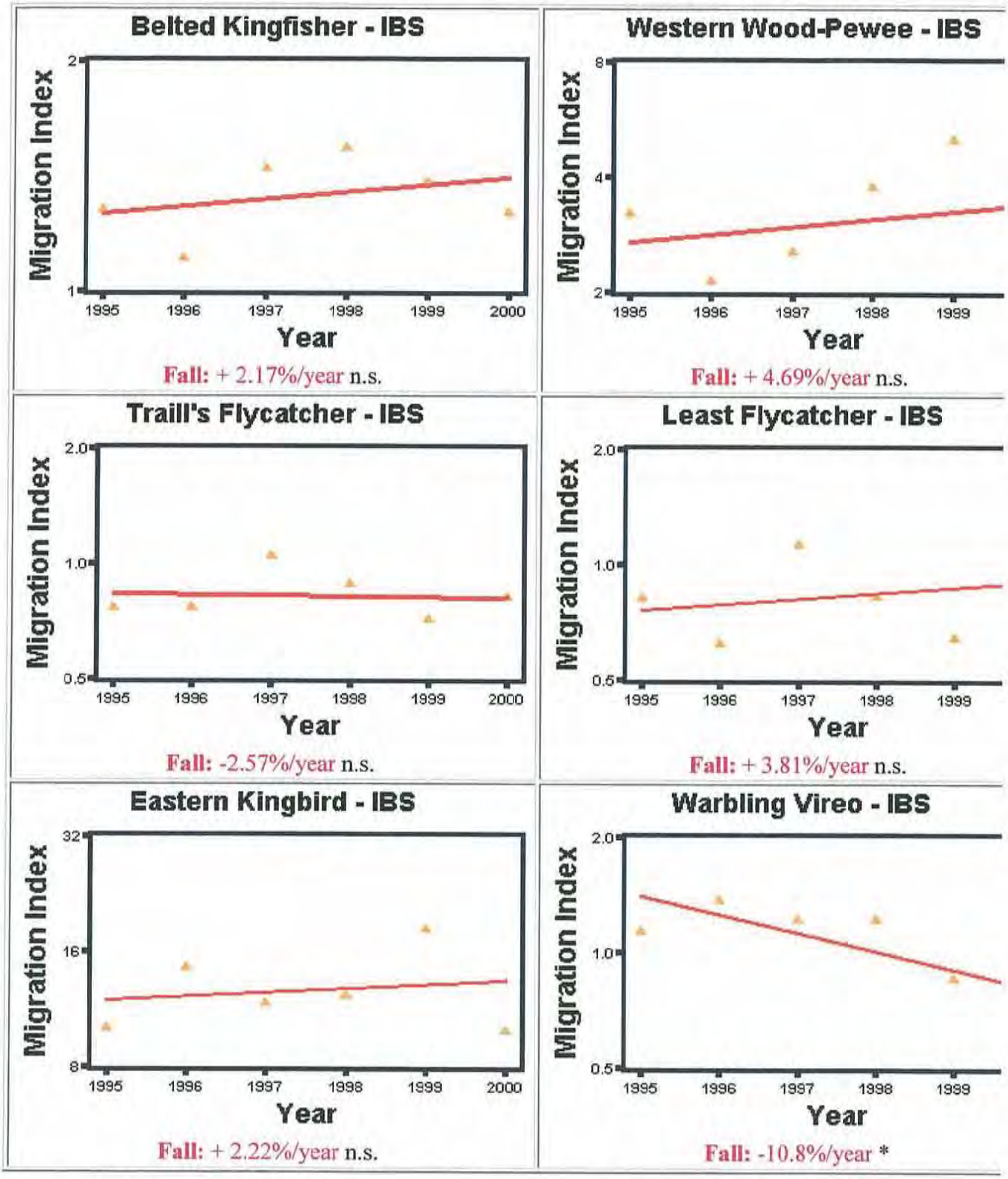
Table 9 presents the results of trend analysis on those species which are monitored according to the criteria developed by Bird Studies Canada (Appendix 3). Trend analysis is based on total captures from 1995-2000 and represents the results of simple linear regression within Microsoft EXCEL. Daily captures were log-transformed, summed and normalized by dividing by the number of days monitored within the species' "window" of migration as inferred from the overall 1995-2000 capture data. Captures on days when monitoring did not occur were left as 0. Actual confidence level (P) is indicated. Note that scientific investigation normally requires a P level of <0.05 and preferably <0.01 in order to consider results significant. Due to net-lane inconsistencies year-to-year several species could only be analyzed using a subset of the data. Although the trends with low P values are likely real, the cause behind them is unclear. Only time and comparison to other CMMN stations will indicate whether significant trends are due to changes in regional populations or to other confounding variables such as weather or habitat change in and around IBS.

Bird Studies Canada

Études d'Oiseaux Canada

Bird Population Indices

CANADI
MIGRAT
MONITC
NETWOI



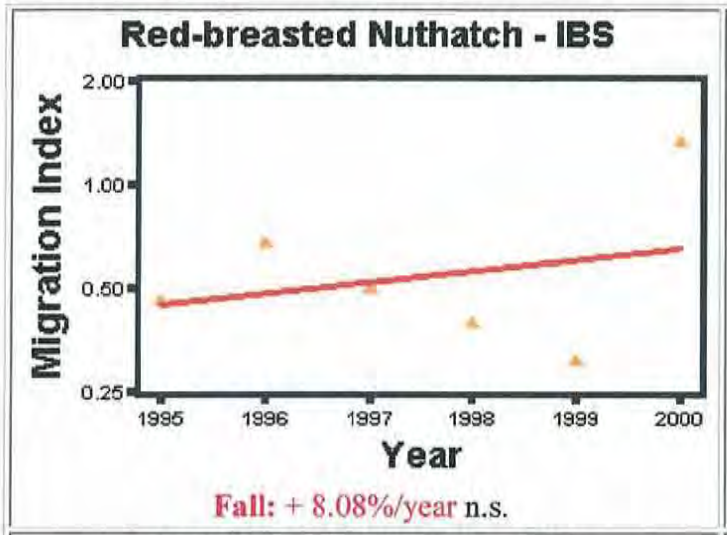
Legend: Station names: **BBO**: Beaverhill Bird Observatory; **DMBO**: Delta Marsh Bird Observatory; **IBS**:

Bird Studies Canada

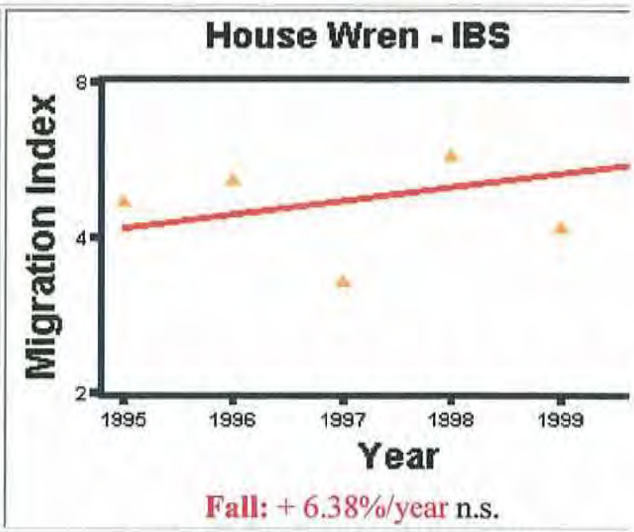
Études d'Oiseaux Canada

Bird Population Indices

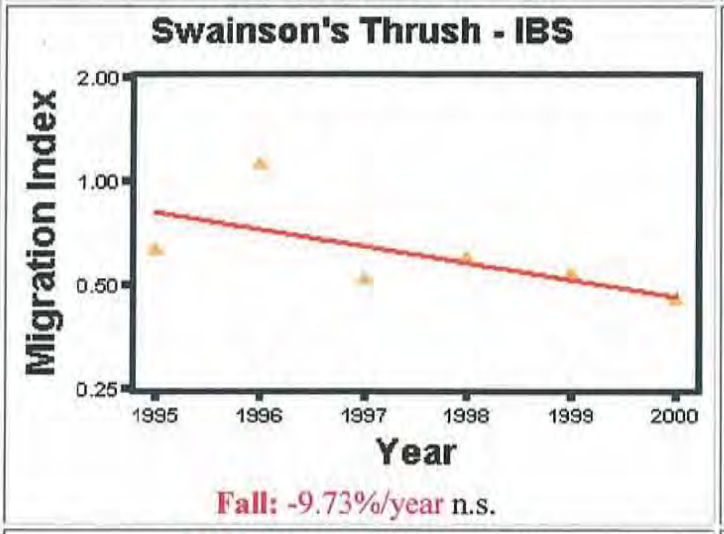
CANADI
MIGRAT
MONITC
NETWOI



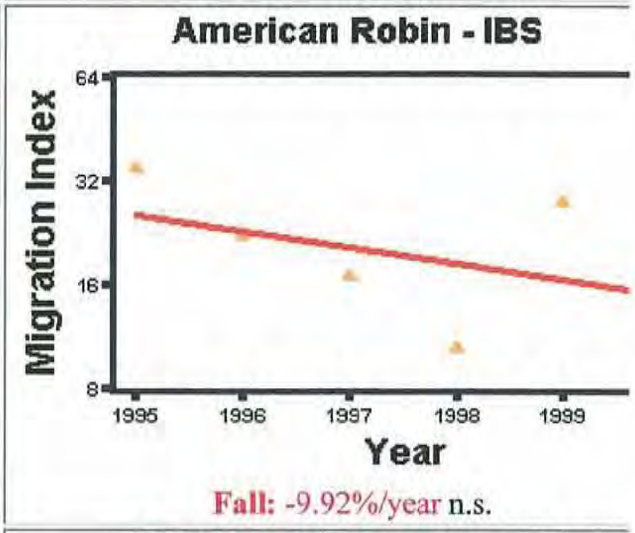
Fall: + 8.08%/year n.s.



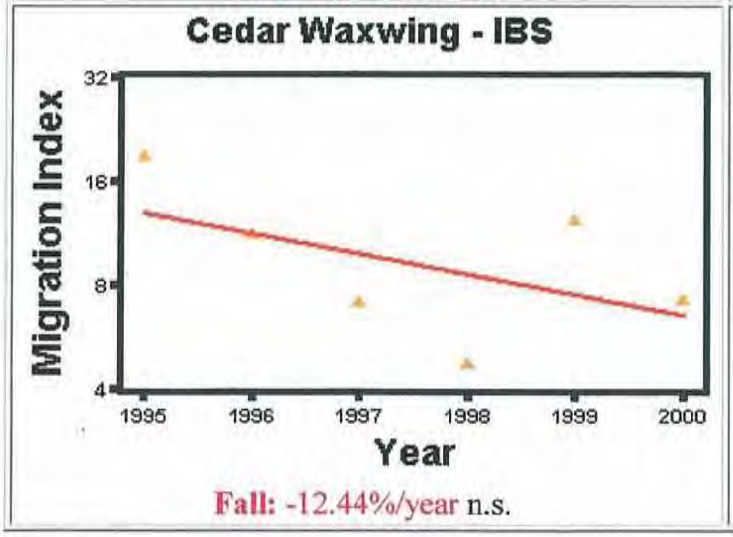
Fall: + 6.38%/year n.s.



Fall: -9.73%/year n.s.



Fall: -9.92%/year n.s.



Fall: -12.44%/year n.s.

Fall: + 20.39%/year *

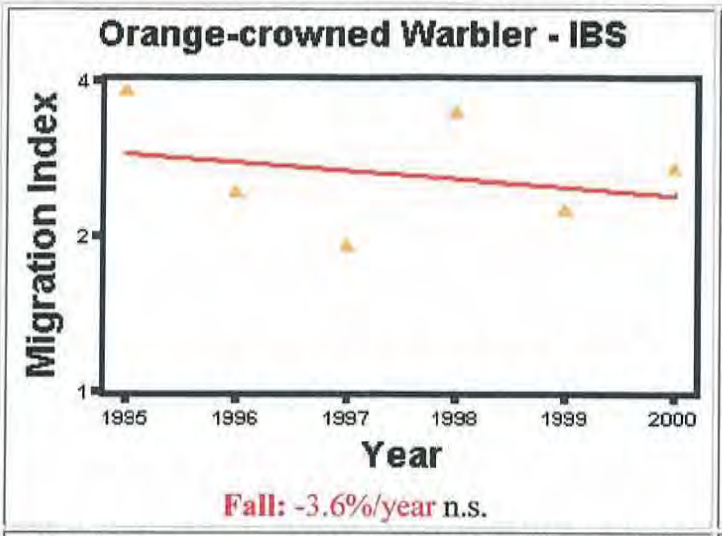
Legend: Station names: **BBO**: Beaverhill Bird Observatory; **DMBO**: Delta Marsh Bird Observatory; **IBS**:

Bird Studies Canada

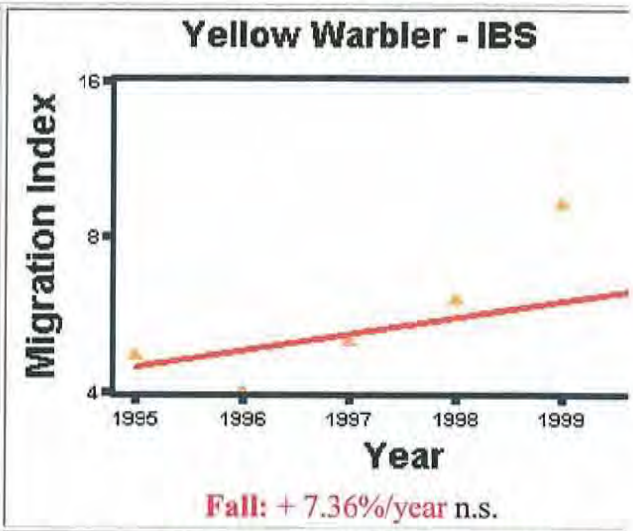
Études d'Oiseaux Canada

Bird Population Indices

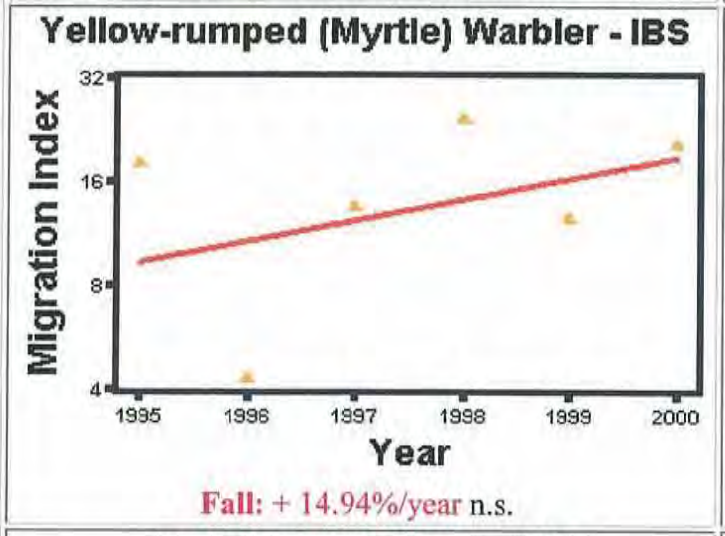
CANADI
MIGRAT
MONITC
NETWOI



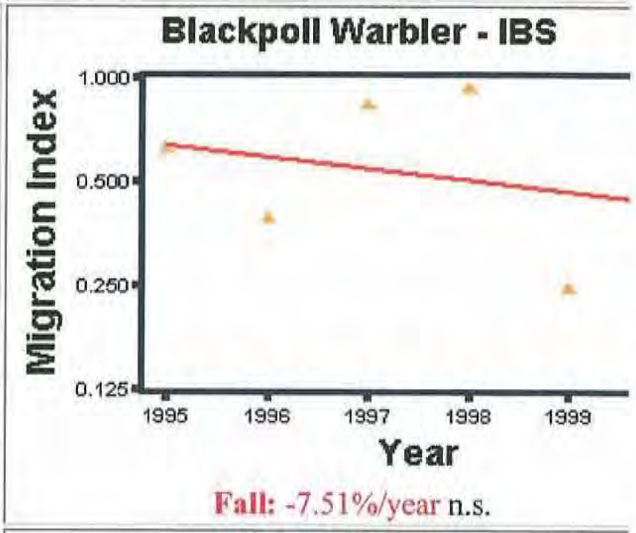
Fall: -3.6%/year n.s.



Fall: + 7.36%/year n.s.

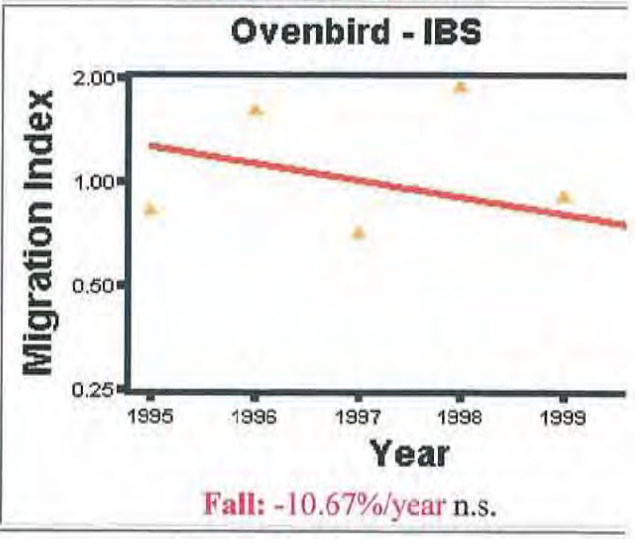


Fall: + 14.94%/year n.s.



Fall: -7.51%/year n.s.

Fall: -3.4%/year n.s.



Fall: -10.67%/year n.s.

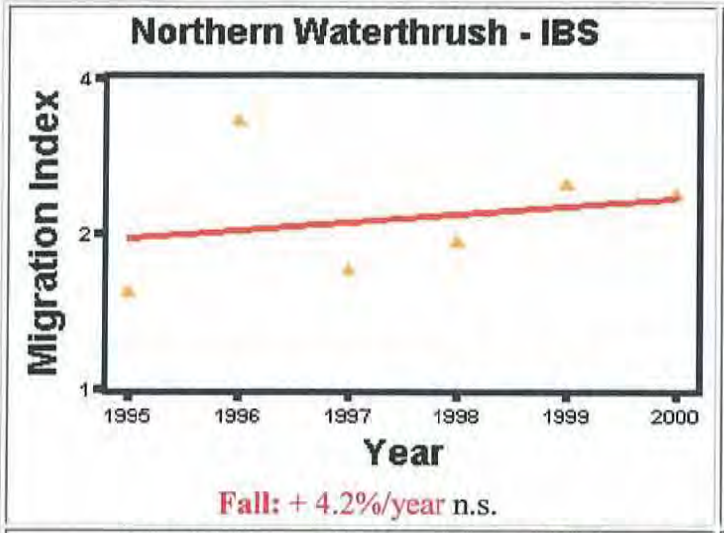
Legend: Station names: **BBO**: Beaverhill Bird Observatory; **DMBO**: Delta Marsh Bird Observatory; **IBS**:

Bird Studies Canada

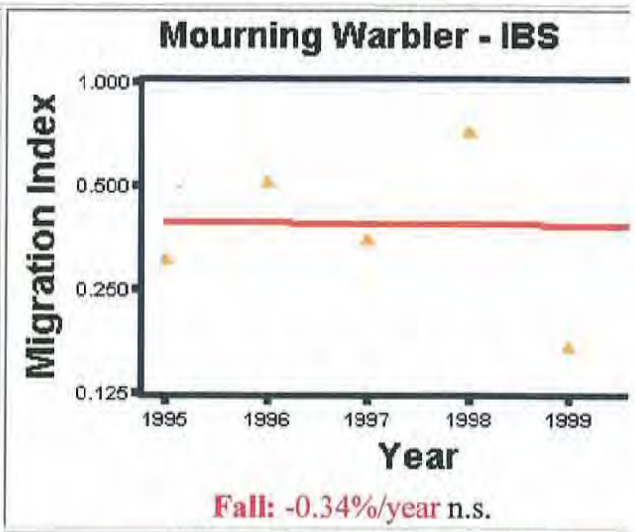
Études d'Oiseaux Canada

Bird Population Indices

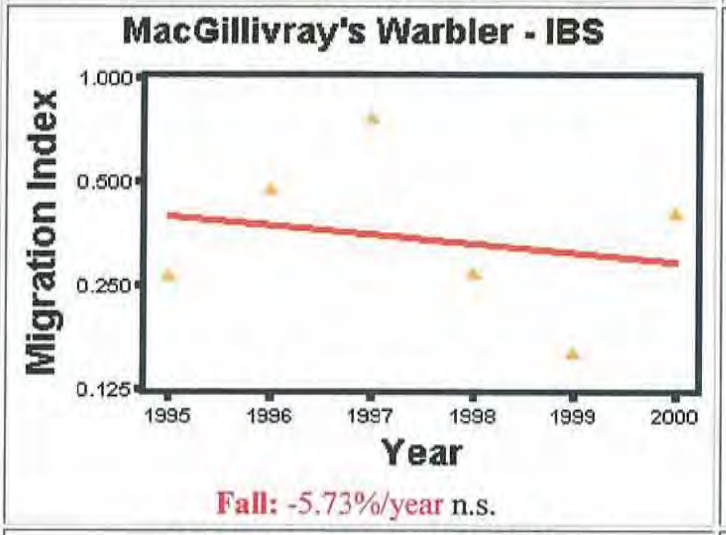
CANADI MIGRAT MONITC NETWOI



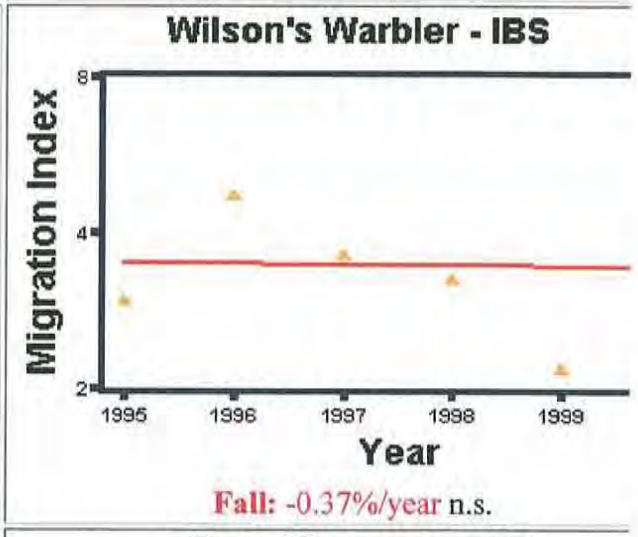
Fall: + 4.2%/year n.s.



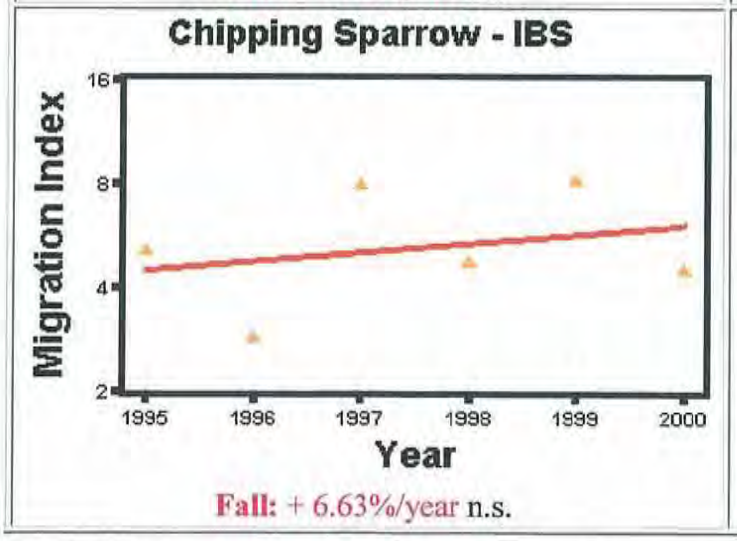
Fall: -0.34%/year n.s.



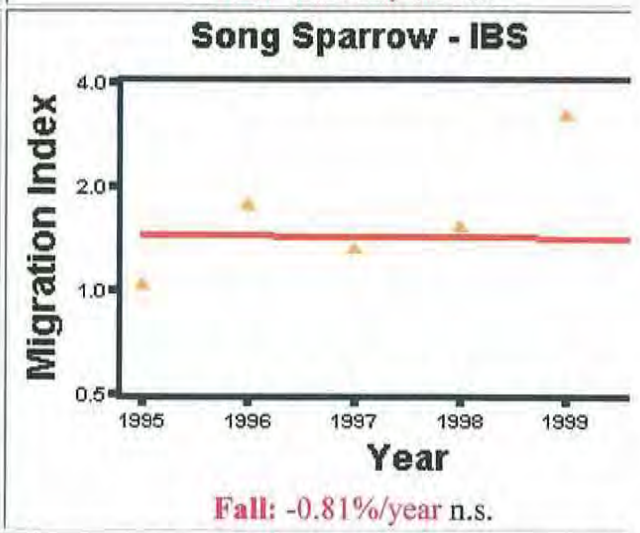
Fall: -5.73%/year n.s.



Fall: -0.37%/year n.s.



Fall: + 6.63%/year n.s.



Fall: -0.81%/year n.s.

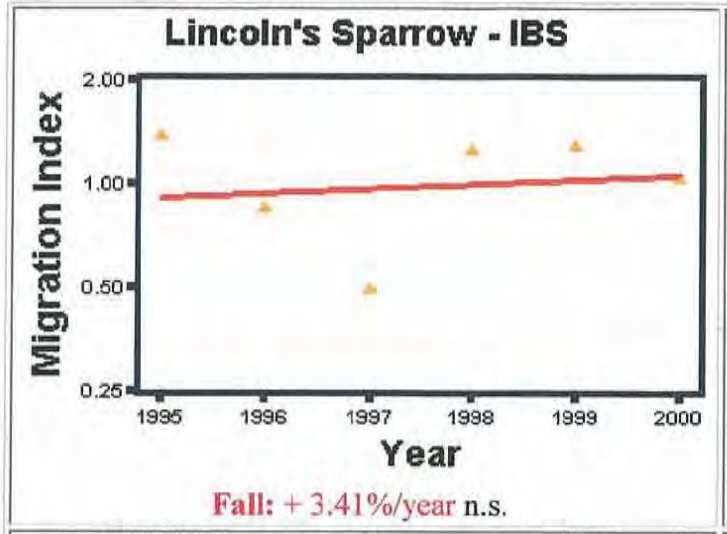
Legend: Station names: **BBO**: Beaverhill Bird Observatory; **DMBO**: Delta Marsh Bird Observatory; **IBS**:

Bird Studies Canada

Études d'Oiseaux Canada

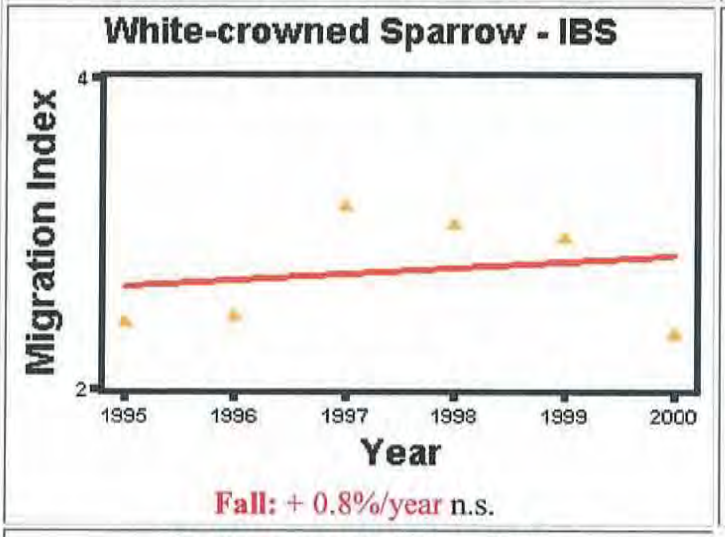
Bird Population Indices

CANADI
MIGRAT
MONITC
NETWOI

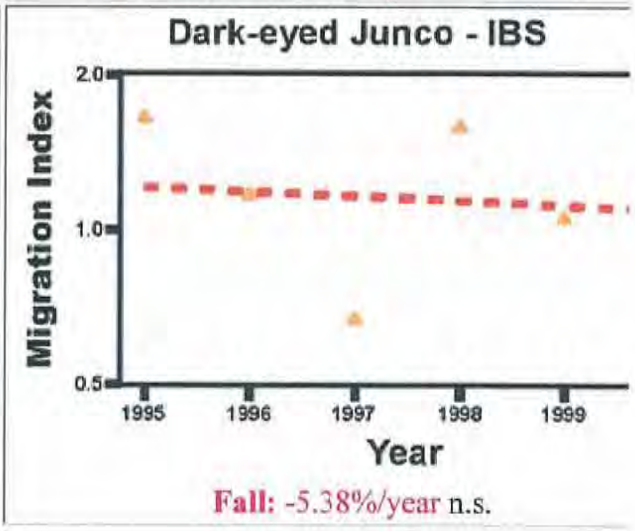


Fall: + 3.41%/year n.s.

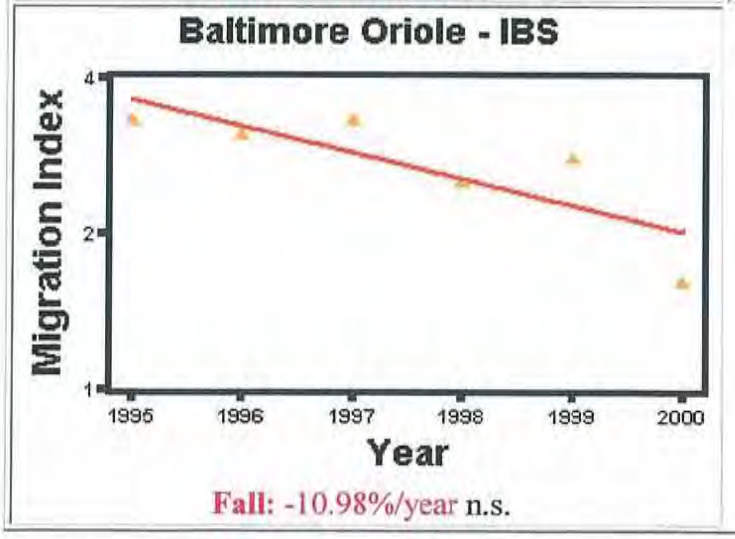
Fall: -4.18%/year n.s.



Fall: + 0.8%/year n.s.



Fall: -5.38%/year n.s.



Fall: -10.98%/year n.s.

Legend: Station names: **BBO**: Beaverhill Bird Observatory; **DMBO**: Delta Marsh Bird Observatory; **IBS**:

Table 9. Trend Analysis of Monitored Species at Inglewood Bird Sanctuary 1995-2000

Species	Analysis Interval	Trend	P
		% per year	value
Solitary Sandpiper	1996-1998, 2000	- 1.8	0.45
Western Wood-Pewee	1996-2000	+ 5.6	0.93
Traill's Flycatcher	1995-2000	+ 0.5	0.86
Least Flycatcher	1995-2000	+ 0.9	0.73
Eastern Kingbird	1995-1998, 2000	+ 0.3	0.92
Warbling Vireo	1995-2000	- 2.2	0.28
House Wren	1995-2000	0.0	0.99
Ruby-crowned Kinglet	1995-2000	- 1.3	0.66
Swainson's Thrush	1995-2000	- 2.8	0.39
American Robin	1995-2000	- 8.0	**0.02**
Cedar Waxwing	1995-1998, 2000	- 0.1	0.98
Tennessee Warbler	1996-1998, 2000	+13.6	**0.01**
Orange-crowned Warbler	1995-2000	- 4.1	0.64
Yellow Warbler	1995-2000	+ 7.5	**0.05**
Yellow-rumped Warbler	1996-2000	+12.8	0.59
Blackpoll Warbler	1996-2000	+ 0.4	0.94
Ovenbird	1996-2000	- 5.5	0.34
Northern Waterthrush	1996-1998, 2000	- 3.8	0.32
Wilson's Warbler	1995-2000	+ 1.6	0.64
Chipping Sparrow	1996-1998, 2000	+ 3.5	0.81
Clay-coloured Sparrow	1996-1998, 2000	+ 3.2	0.69
Song Sparrow	1995-1998, 2000	+ 0.4	0.77
Lincoln's Sparrow	1995-2000	- 0.6	0.89
White-throated Sparrow	1995-2000	- 4.6	0.50
White-crowned Sparrow	1995-2000	- 0.2	0.74
Dark-eyed Junco	1995-2000	- 3.2	0.13
Baltimore Oriole	1995-2000	- 4.1	**0.04**

PERSONNEL

Volunteers

Volunteer participation in all of the CBBS projects continues to be the key to the success of research efforts. Banding at IBS is done in an area of the sanctuary designated "reserve" and off-limits to the public. The Area Manager has made it a condition of operation that no more than 3 people are in the reserve at one time, in order to minimize impact. Thus, on any given day, a Bander-in-Charge and up to 2 volunteers carry out the banding.

Without donated time, primarily by members of the Calgary Bird Banding Society, the high degree of success achieved would not have been possible. Sincere appreciation is extended to all of the volunteers listed in Table 10 who donated approximately 8 hours on each day indicated.

Banders-in-Charge (BIC)

No salaried staff are involved in any CBBS projects. However, a daily per diem and travel allowance (for out-of-town banders only) is offered to all Banders-in-Charge (BIC). This arrangement provides an incentive for qualified individuals to assume the BIC duties and imposes accountability on the BIC to complete field data sheets and input data to computer files. No per diems are paid until all duties of the BIC, including data entry, have been fully discharged. The per diem established by the general membership for the 2000 field season was $100/day.

Table 10. Bander-in-Charge and Volunteer Effort 2000

Bander-in-Charge/ Volunteer	Cominco Migration Monitoring				Inglewood Bird Sanctuary					
	Bander-in-Charge		Vounteer		Bander-in-Charge			Vounteer		
	Spring	Fall	Spring	Fall	MAPS[3]	Fall MM	Owl MM	MAPS	Fall MM	Owl MM
Christine Bennett			4	2					4	1
Grahame Booth		1[2]			2[2]	4[2]	4[1]			
Doug Collister	3[1]	2[1]	1			2[1]	3[1]			5
Sarah Deakin			6							
Ross Dickson	17[2]	34[2]	1	1						1
Ami Gemmel								1	10	
Garry Hornbeck				8			3[1]			1
Mary Huston			4	6						
Bryan Isaac			1							
Clive Jackson			1							
Scott Jubinville				2					1	4
Dwight Knapik				2				1	3	
Jennifer Lane			3	2					2	2
Steve Lane			5	2					9	1
Shonna McLeod			5	2			13[1]	4	19	2
Greg Meyer	7[2]	18[2]	1		3[2]	14[2]		1		
Pat Mitchell			6	7			9[1]		1	3
Chuck Newyar				2						1
Alexandra Oakwood			1					2	2	7
El Peterson			10	10				1	2	2
Gwen Smiley			3	1					1	
Don Stiles			3	10					2	
Bill Taylor			3	3					7	1
Barry Trakalo			1							1
Catherine Watson			4	4					1	5
Catherine Watson-McDonald			4	8			5[1]	1	4	2
Linda Wiggins			1	1					3	1
Bruce Wilson			3						8	
Scott Wilson					1[2]	35[2]	1[1]			1

Notes 1. Donated
2. Received per diem
3. Final MAPS day was during fall MM

MORTALITIES AND INJURIES

It continues to be a goal of the CBBS to achieve as low a rate of casualties as possible during all banding projects. Casualties here refer to all injuries, minor and serious, including fatalities. Our objective is to come as close to zero as possible.

Table 11 presents all casualties during the 2000 migration monitoring and MAPS projects. Note that the number captured, by species, is only given where that species experienced injury or mortality. Mortality rates for all CBBS banding projects is declining, probably due to the increasing skill level of volunteers (Figure 8). This is very encouraging and hopefully levels of mortality will remain as low or lower than the 0.20% experienced in 2000. The injury rate in 2000 was 1.48% compared to 1.66% in 1999. This modest improvement is welcome but it is our hope that further declines in injury rate will occur in future years. Increases through 1997 were in part due to an increased awareness of banding personal to record even slight abrasions. In other words, the data pre-1998 likely underestimates the rate of injury. In spite of apparent improvement the CBBS continues to review each casualty to determine potential for reduction or avoidance of similar occurrences in the future.

Figure 8. Casualty Rates for All Banding Projects

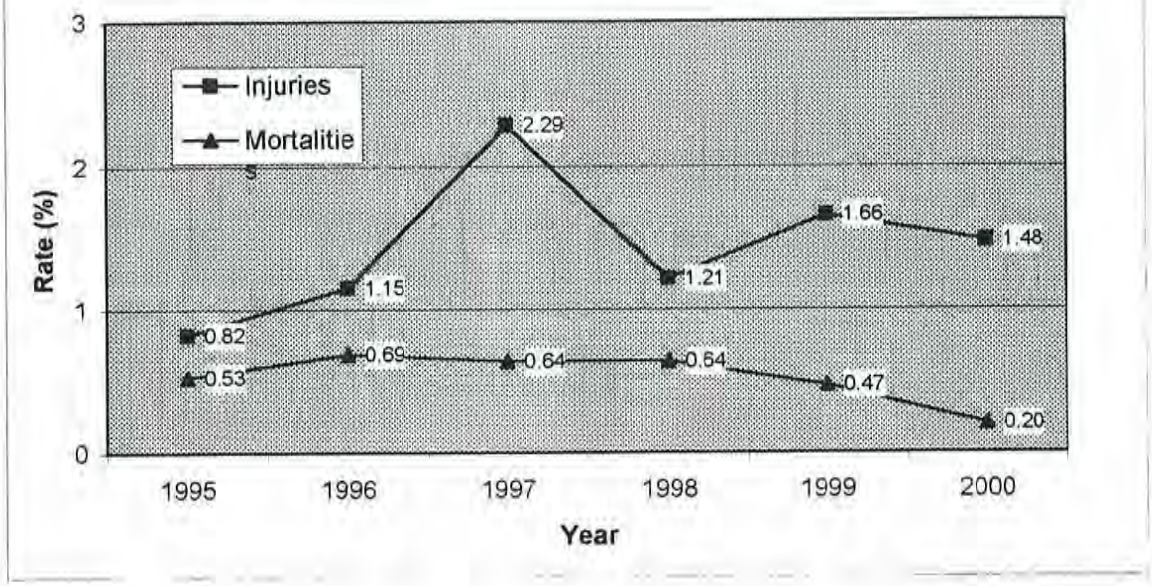


Table 11. Injuries and Mortalities Sustained During CBBS 2000 Research

Species	Number Captured	Injuries		Mortalities	
		Number	Type	Number	Type
Solitary Sandpiper	9	1	wing strain		
Downy Woodpecker	50	1	mouth		
Least Flycatcher	86	1	wing strain		
Black-capped Chickadee	214	3	cut	1	dead in net
		1	wing strain		
		1	shock		
House Wren	292	2	shock		
		1	cut		
		1	wing abrasion		
		3	wing strain		
Swainson's Thrush	80	1	wing strain		
		1	wing abrasion		
American Robin	132	5	mouth		
		5	wing abrasion		
		1	wing strain		
Gray Catbird	51	2	wing strain		
		1	cut		
Cedar Waxwing	552	1	mouth	1	dead in bag
		2	cut		
		4	wing abrasion		
		12	wing strain		
Tennessee Warbler	333	1	cut	1	dead in net
		1	broken leg		
		1	wing abrasion		
Orange-crowned Warbler	174	1	mouth		
Yellow Warbler	407	1	wing abrasion		
Yellow-rumped Warbler	804	5	cut	1	shock
		2	wing strain		
Ovenbird	21	1	cut		
Palm Warbler	4	1	cut		
Connecticut Warbler	7	1	cut		
Common Yellowthroat	36	1	wing abrasion		
Wilson's Warbler	247	2	shock		
Chipping Sparrow	203	1	shock	2	dead in net
Savannah Sparrow	32			1	dead in net
White-throated Sparrow	50	1	wing abrasion	1	dead in net
White-crowned Sparrow	49	1	cut	1	predated in net by magpie
Song Sparrow	69			1	dead in bag
Lincoln's Sparrow	67	1	cut		
Rose-breasted Grosbeak	5	1	broken leg		
Total	**4,921**	**73** (1.48%)		**10** (0.20%)	

REFERENCES

DeSante, D.F., K.M. Burton, P. Velez and D. Froehlich. 2000. MAPS Manual 2000 Protocol. The Institute for Bird Populations. 67 pp.

DeSante, D.F., D.R. O'Grady, K.M. Burton, P. Velez, D. Froehlich, E.E. Fess, H. Smith,E.D. Ruhlen. 1998. The Monitoring Avian Productivity and Survivorship(MAPS) Program Six and Seventh Annual Report (1995 and 1996). *Bird Populations* 4:69-122.

DeSante, D.F., K.M. Burton, and D.R. O'Grady. 1996. The Monitoring Avian productivity and Survivorship (MAPS) Program Fourth and Fifth Annual Report (1993 and 1994). *Bird Populations* 3:67-120.

DeSante, D.F. and K.M. Burton. 1994. The Monitoring Avian Productivity and Survivorship (MAPS) Program Third Annual Report (1992). Bird Populations 2:62-89.

Dunn, E.H., D.J.T. Hussell and R.J. Adams. 1997. Monitoring songbird population change with autumn mist netting. J. Wildl. Manage. 6:389-396.

Finch, D.M. 1991. Population ecology, habitat requirements, and conservation of Neotropical Migratory Birds. USDA Forest Service General Technical Report RM-205.

Greenberg, R. 1992. The nonbreeding season: Introduction. Pages 175-177 *In* Hagan, J.M. and Johnston, D.W. (editors). Ecology and conservation of Neotropical migrant landbirds. Smithsonian Institution Press, Washington. Proceedings of a symposium hosted by Manomet Bird Observatory, 6-9 December, 1989.

Hagan, J.M., K.A. Hobson, D.J.T. Hussell, N. Nur and C.J. Ralph. 1994. Recommended methods for monitoring bird migration. Draft prepared by the Intensive Sites Technical Committee of the Migration Monitoring Council. 22 pp.

Hussell, D.J.T. and C.J. Ralph. 1996. Recommended methods for monitoring bird populations by counting and capture of migrants. Report of the Intensive Sites Technical Committee of the Migration Monitoring Council. 13 pp.

McCracken, J.D., D.J.T. Hussell, and E. Dunn. 1993. A manual for monitoring bird migration. Long Point Bird Observatory, Port Rowan, Ontario. 65 pp.

Sauer, J.R. and S. Droege. 1992. Geographic patterns in population trends of Neotropical migrants in North America. Pages 26-42 In Hagan, J.M. and Johnston, D.W. editors. Ecology and conservation of Neotropical migrant landbirds. Smithsonian Institution Press, Washington. Proceedings of a symposium hosted by Manomet Bird Observatory, 6-9 December, 1989.

Sherrington, P. (editor). 1975. Calgary's Natural Areas: A Popular Guide. Calgary Field Naturalists' Society. 184 pp.

APPENDIX 1

Appendix 1. New Bandings at Inglewood Bird Sanctuary - Fall 2000

Month	August																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Sharp-shinned Hawk																															
Cooper's Hawk									1																						
Solitary Sandpiper															1		3			1											
Common Snipe																															
Belted Kingfisher			1			1	1			1					1											1					
Downy Woodpecker	1		1				1		1	1		1			1			1			1										
Hairy Woodpecker	1																														
Northern Flicker																															
Olive-sided Flycatcher																			1									1			
Western Wood-Pewee							1			1						3				2											
Alder Flycatcher							1		6	1	1	5	1	1	5	5			1		1					1	1		1		
Willow Flycatcher							1		1																						
Least Flycatcher			1				1	1	1					2	1	1	2	1	1	1	1			1		2		1			
Eastern Phoebe																															
Eastern Kingbird	1					1						1	2			1							1								
Blue-headed Vireo																													1		
Warbling Vireo			1				1							1					1								1				
Philadelphia Vireo																															
Red-eyed Vireo																					1						1				
Blue Jay																															
Black-billed Magpie																															
Black-capped Chickadee	1		1			1					1	1						1							1					1
Red-breasted Nuthatch						1										1			3	2	2			1			3				
White-breasted Nuthatch											1																				
Brown Creeper																															
House Wren	7	1	3			3	8	4	2	2	4	3	1	3	1	2	1	3		1	1		3		1	1	1	1			
Winter Wren																															
Golden-crowned Kinglet																											1				
Ruby-crowned Kinglet																															
Gray-cheeked Thrush																															
Swainson's Thrush												1			1								1				1				
Hermit Thrush																															
American Robin	6	1	7			2		3						1	1																
Gray Catbird																			1									2			
Cedar Waxwing	1		5			1	1	1		4	1				10	1			1												
Tennessee Warbler	10	3	2			15	42	6	3	23	15	12	8		3	2	1		4	3	1		2	1		1	2		1		

Appendix 1. New Bandings at Inglewood Bird Sanctuary - Fall 2000

Month	September																													Total
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Sharp-shinned Hawk																	1														0
Cooper's Hawk																							1								1
Solitary Sandpiper				2	1																										1
Common Snipe				1																											8
Belted Kingfisher																													1		1
Downy Woodpecker					1																										7
Hairy Woodpecker																															9
Northern Flicker																															1
Olive-sided Flycatcher																															2
Western Wood-Pewee																															2
Alder Flycatcher	1		1			5																									7
Willow Flycatcher																															38
Least Flycatcher	1					1										1															2
Eastern Phoebe						1																									21
Eastern Kingbird																															1
Blue-headed Vireo																															7
Warbling Vireo				1			1																								1
Philadelphia Vireo	1																														7
Red-eyed Vireo							1												1												1
Blue Jay							1																								4
Black-billed Magpie																	1														1
Black-capped Chickadee										3				1		1	1			1		1			2					1	19
Red-breasted Nuthatch					2		1		1	1	1			1																	20
White-breasted Nuthatch													1												1	1			1	5
Brown Creeper																													1		1
House Wren																															57
Winter Wren																						1									1
Golden-crowned Kinglet																															1
Ruby-crowned Kinglet									1	1				1	2	1		1		2		1			1						11
Gray-cheeked Thrush																				1											1
Swainson's Thrush	2				1	5							1																		13
Hermit Thrush						1	1													1					1						4
American Robin					1			2															1						5	2	32
Gray Catbird	1																														4
Cedar Waxwing																															26
Tennessee Warbler			1	1		1		1					1						1			1									167

Appendix 1. New Bandings at Inglewood Bird Sanctuary - Fall 2000

Month	August																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Orange-crowned Warbler																			1							2	1		2		
Nashville Warbler		2				5	15	1	3	9	14	7	9	1		3	1	5	3	1			3		1				1		
Yellow Warbler																									1						
Magnolia Warbler			3				15			5	8		2	1	6	7	2	2	12	3	3		1	4		8	10				
Yellow-rumped Warbler																															
Townsend's Warbler																															
Palm Warbler																															
Bay-breasted Warbler																1															
Blackpoll Warbler																								1		1					
American Redstart																													1		
Ovenbird								1	1	3	2	6	3		2	1			1				1		1	1			1		1
Northern Waterthrush																			2	1				1		2	2				1
Connecticut Warbler																									1						
Mourning Warbler																									1	1	1				
MacGillivray's Warbler													1			1					1					1					
Common Yellowthroat											1	1		1			1	1	1	5				1	2	7	16	1	3		
Wilson's Warbler															1																
Canada Warbler										1																					
Western Tanager																															
American Tree Sparrow						16			3	1	1		1		1	1		4	1	8	2			3		1	2	1			
Chipping Sparrow		1								2	1									1			1			1			1		
Clay-coloured Sparrow																															
Savannah Sparrow			1			2	1						1	1		1		1													
Song Sparrow																1							1								
Lincoln's Sparrow						1																				2	1	1			
White-throated Sparrow																															
White-crowned Sparrow																															
Dark-eyed Junco						1									1																
Rose-breasted Grosbeak	1	1								1																					
Brown-headed Cowbird																															
Baltimore Oriole	1						1	1																							
Purple Finch																															
American Goldfinch																															
Total	**30**	**9**	**26**	**0**	**0**	**50**	**90**	**18**	**22**	**55**	**50**	**38**	**29**	**12**	**36**	**32**	**11**	**19**	**34**	**29**	**14**	**0**	**14**	**13**	**11**	**32**	**44**	**7**	**12**	**0**	**3**

Appendix 1. New Bandings at Inglewood Bird Sanctuary - Fall 2000

Month	September																													Total
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
																															0
Orange-crowned Warbler				1	1	13	4	2	4		3	5	1	4	9	5	1	1	7	1		1	1	5	1	3	3			2	84
Nashville Warbler						1							1																		2
Yellow Warbler	1			1		3																									89
Magnolia Warbler				1																											2
Yellow-rumped Warbler				1	1	11		3				1	9	9	17		5	1	15	8					15	6			3	3	200
Townsend's Warbler						1																									1
Palm Warbler																													1		1
Bay-breasted Warbler																															1
Blackpoll Warbler						2		2							1							1									8
American Redstart						1								1																	3
Ovenbird				3																2											11
Northern Waterthrush						3		2										1													34
Connecticut Warbler						1	1																								3
Mourning Warbler	1																														4
MacGillivray's Warbler								1																							5
Common Yellowthroat						1								1			1			1											4
Wilson's Warbler	3			5	8	16	8	6	4	14	13	24	4	3	5	5			1	2		2	2		1						167
Canada Warbler																															1
Western Tanager																															1
American Tree Sparrow																									1						1
Chipping Sparrow	1								1										2												50
Clay-coloured Sparrow			1																												9
Savannah Sparrow																							1								1
Song Sparrow																											1				9
Lincoln's Sparrow				1		8	4				1		1	2					1	2		1		1			1	1			30
White-throated Sparrow								1	1	1			3		1					4		2					4				18
White-crowned Sparrow					1	3	2		5	2	1	1		1	2		1		1			2				1					23
Dark-eyed Junco												1	1						3										1		6
Rose-breasted Grosbeak						1																									3
Brown-headed Cowbird																															2
Baltimore Oriole																															1
Purple Finch																															2
American Goldfinch																															1
Total	12	0	3	18	17	79	24	20	17	22	19	32	23	24	37	13	11	4	32	25	0	13	6	6	23	11	9	1	11	10	1262

APPENDIX 2

Appendix 2. Top 20 New Bandings at Inglewood Bird Sanctuary

	Total		2000		1999		1998		1997		1996		1995	
	Rank	Number	Rank	Number	Rank	Number	Rank	Number	Rank	Number	Rank	Number	Rank	Number
Yellow-rumped Warbler	1	1812	1	200	1	195	1	638	1	191	3	92	1	496
Wilson's Warbler	2	776	2	167	4	100	3	113	4	119	1	175	4	102
Orange-crowned Warbler	3	761	5	84	5	91	2	207	5	86	2	116	2	177
Yellow Warbler	4	561	4	89	2	138	4	91	3	137	5	62	8	44
Tennessee Warbler	5	462	3	167	3	106	6	74	8	52	9	30	10	33
American Robin	6	399	10	32	7	60	12	31	6	81	4	81	3	114
Chipping Sparrow	7	354	7	50	6	83	15	27	2	151	20	14	12	29
White-throated Sparrow	8	289	17	18	8	54	5	77	12	39	11	28	5	73
House Wren	9	286	6	57	11	33	8	49	9	52	8	45	7	50
Lincoln's Sparrow	10	231	11	30	9	48	7	59		13	12	28	6	53
Northern Waterthrush	11	226	9	34	10	41	16	26	11	46	6	56	13	23
Traill's Flycatcher	12	204	8	40	14	24	11	36	10	50	13	25	11	29
Cedar Waxwing	13	185	12	26	13	25		11	7	67		14	9	42
Swainson's Thrush	14	139	18	13	17	19	14	28		10	7	52	16	17
White-crowned Sparrow	15	132	13	23	15	22	17	21	16	22	14	24	15	20
Ovenbird	16	111	19	11	20	11	9	38		11	10	30		10
Least Flycatcher	17	101	14	21	19	11		14	14	30		9	18	16
Clay-colored Sparrow	18	100		9	12	26	10	37	17	21		6		1
Warbling Vireo	19	91		7		8		18	15	27	15	18	20	13
Song Sparrow	20	81		9	16	21		18	20	15		9		9
Ruby-crowned Kinglet		78	20	11		5		14	18	20	16	18		10
Black-capped Chickadee		77	16	19		10	20	19		5	18	17		7
Blackpoll Warbler		74		8		5	13	30		6		8	17	17
Western Wood-Pewee		71		7		10		8	13	33		2		11
Eastern Kingbird		70		7		2	19	19	19	17	17	18		7
Baltimore Oriole		59		1		5		8		12		12	14	21
Dark-eyed Junco		57		6		8		10		3	19	15	19	15
Solitary Sandpiper		54		8		2		14		13		14		3
American Redstart		41		3		5	18	20		4		6		3
Belted Kingfisher		37		7				8		6		8		8
Hermit Thrush		36		4				9		6		14		3
Northern Flicker		35		2	18	11		3		7		8		4
MacGillivray's Warbler		32		5				6		10		8		3
Mourning Warbler		31		4				9		3		10		5
Common Yellowthroat		29		4				10		8		1		6
Red-breasted Nuthatch		26	15	20				4				2		

APPENDIX 3

Appendix 3. Monitored Species at Inglewood Bird Sanctuary

	1995-2000			
	Multi-year Mean		Group	
	Number	Frequency	BSC	Baillie
Species				
Solitary Sandpiper	9	7		
Western Wood-Pewee	12	7	A	3
Traill's Flycatcher	34	20	A	1
Least Flycatcher	17	14	A	1
Eastern Kingbird	12	9	C	
Warbling Vireo	15	11	A	
House Wren	48	23	C	
Ruby-crowned Kinglet	13	10	B	2
Swainson's Thrush	23	15	A	1
American Robin	67	22	B	4
Cedar Waxwing	31	10	B	
Tennesee Warbler	77	23	A	1
Orange-crowned Warbler	127	28	A	1
Yellow Warbler	93	24	A	3
Yellow-rumped Warbler	302	35	B	2
Blackpoll Warbler	12	8	A	1
Ovenbird	19	13	A	3
Northern Waterthrush	38	18	A	1
Wilson's Warbler	129	33	A	1
Chipping Sparrow	59	16	B	4
Clay-colored Sparrow	17	11	A	
Song Sparrow	14	12	B	4
Lincoln's Sparrow	39	22	B	3
White-throated Sparrow	48	17	B	2
White-crowned Sparrow	22	13	B	2
Dark-eyed Junco	10	6	B	4
Baltimore Oriole	10	4	C	
Group A	13			
Group B	10			
Group C	3			
Other	1			
Total	27			

CRITERIA USED TO DEFINE AND PRIORITIZE MONITORED SPECIES
(From Bird Studies Canada)

Monitored Species

Mean number banded each year ≥10, and mean number of days each year on which individuals banded ≥5.

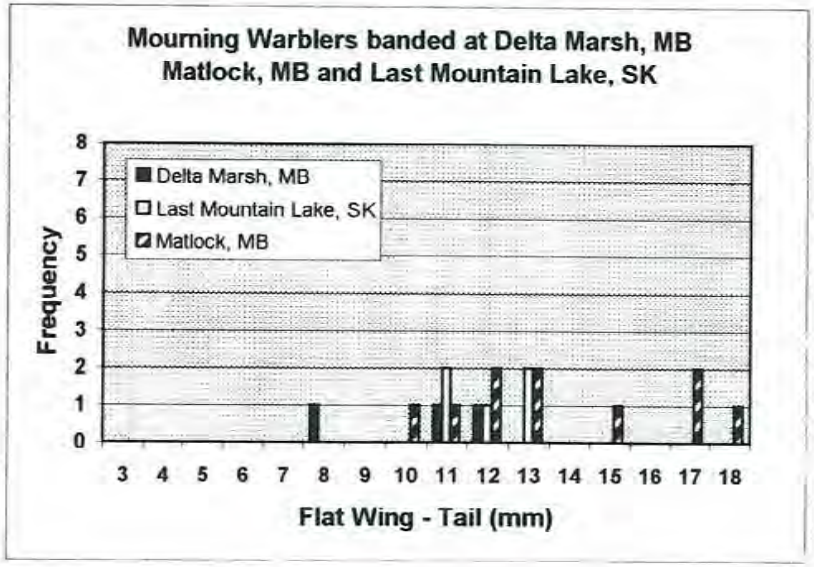
Priority for Migration Monitoring

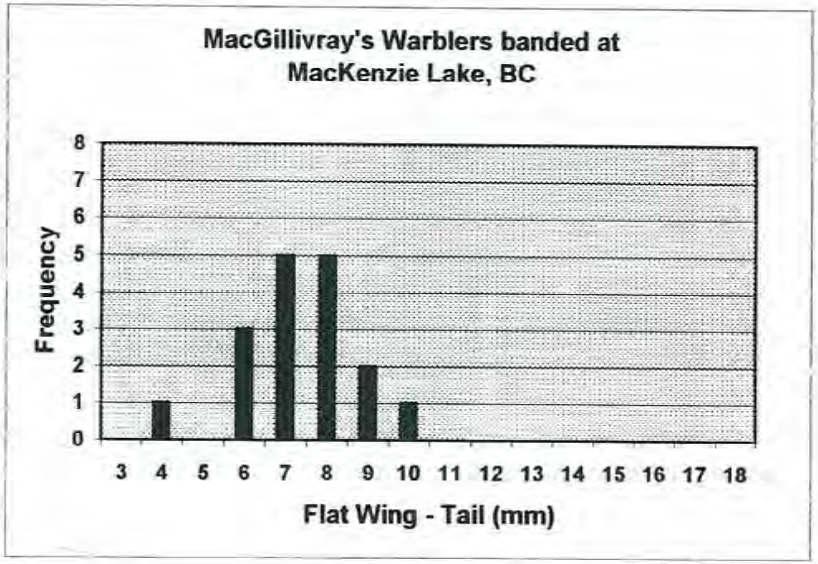
A Those species that have <50% of Canadian breeding range covered by the Breeding Bird Survey and >50% of winter range south of the United States, thereby not covered by the Christmas Bird Count

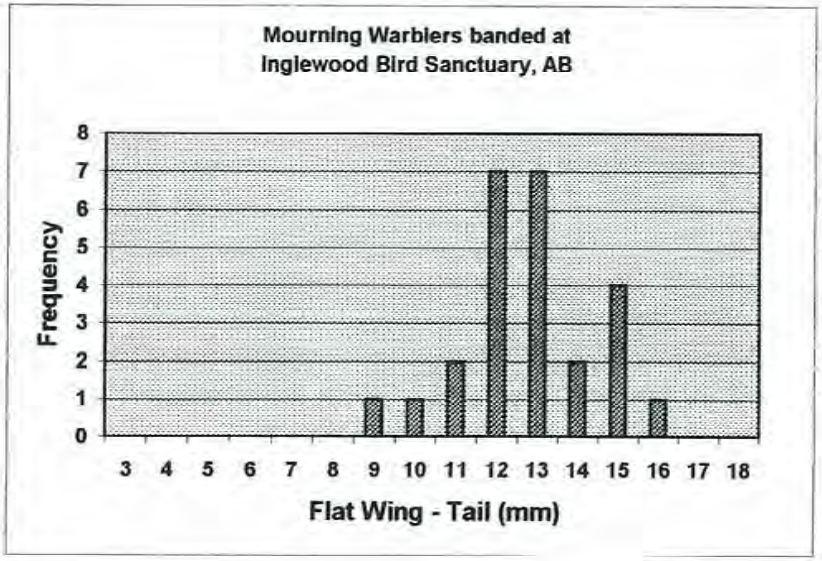
B Those species that have <50% of Canadian breeding range covered by the Breeding Bird Survey but >50% of winter range within the United States, thereby covered by the Christmas Bird Count

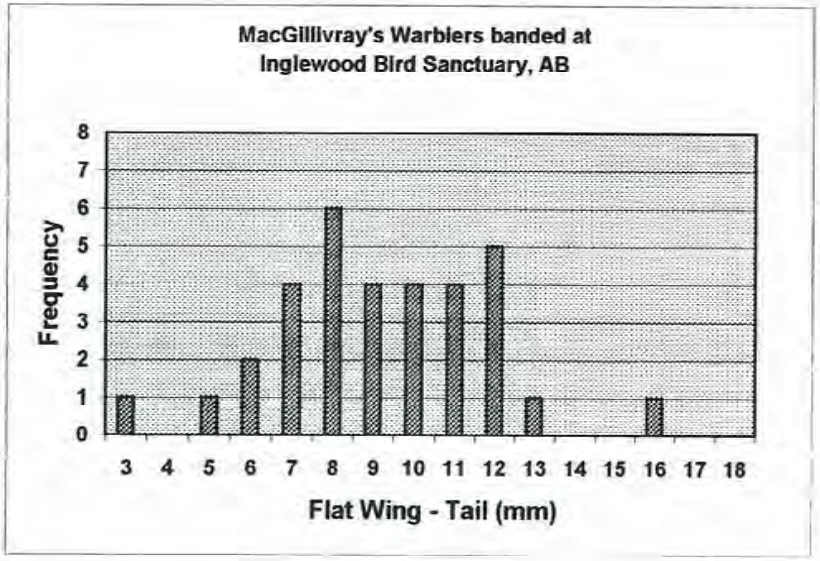
C Those species with >50% coverage of Canadian breeding range by the Breeding Bird Survey and that have a wintering range largely south of the United States

APPENDIX 4


Mourning Warblers banded at Delta Marsh, MB
Matlock, MB and Last Mountain Lake, SK
Delta Marsh, MB
Last Mountain Lake, SK
Matlock, MB
Frequency
0 1 2 3 4 5 6 7 8
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Flat Wing - Tail (mm)


MacGillivray's Warblers banded at
MacKenzie Lake, BC
Frequency
0 1 2 3 4 5 6 7 8
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Flat Wing - Tail (mm)


Mourning Warblers banded at
Inglewood Bird Sanctuary, AB
Frequency
0 1 2 3 4 5 6 7 8
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Flat Wing - Tail (mm)


MacGillivray's Warblers banded at
Inglewood Bird Sanctuary, AB
Frequency
0 1 2 3 4 5 6 7 8
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Flat Wing - Tail (mm)

APPENDIX 5

A CROSS-CANADA COMPARISON OF MASS CHANGE IN BIRDS DURING MIGRATION STOPOVER

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that are never recaptured (Winker et al. 1992, Woodrey and Moore 1997). The average mass of birds captured for the first time increases with time of day at which the birds were captured (Mueller and Berger 1966, Collins and Bradley 1971, King 1976), and this offers another means of estimating mass gain, by determining the slope of a regression of mass on time of day (Winker et al. 1992, Morris et al. 1996, Dunn 2000).

Mass gain from analysis of first captures was previously estimated for 48 species at the three banding stations operated by the Long Point Bird Observatory on Lake Erie, Ontario (Dunn 2000, Dunn in prep.). This 35-km sand spit has an east-west succession of habitats, with an open cottonwood dune habitat and little ground cover at the eastern tip of the point (Area 1), open savannah woodland with grass understory at Area 2 (part way along the point), and with a small mixed woodlot containing shrubby understory and a modest accumulation of leaf litter at Area 3 (near the base of the point). The cooling effect of Lake Erie causes delay in spring plant phenology that is particularly marked at Area 1, and birds generally fared poorly at that site in the spring. Otherwise, Long Point appeared to be a good site for migrants, particularly in fall. Here I report mass gain analyses of 14 species from 15 stations belonging to the Canadian Migration Monitoring Network (CMMN), including the 3 stations at Long Point (Fig. 1). The aim was to determine whether the Long Point results were typical of those from other sites, and whether there were any marked geographic patterns in mass gain at stopover sites across Canada.

METHODS

The 14 target species chosen for analysis (see results) were selected because they are broadly distributed across Canada and large numbers are captured at many CMMN stations.

length falling below the 1st percentile or above the 99th percentile of all measurements taken at that site were excluded, as a means of deleting possible errors in measurement or recording. Data for each species from a given site were further restricted to the species-specific migration period at that site, determined by plotting number of birds weighed against date, and, for species that summer or winter at or near that site, eliminating data outside the dates during which there was a marked build-up to, and drop-off from, a strong seasonal peak in numbers banded. This limitation, and the fact that only first captures were included in the analyses, ensure that locally-breeding or overwintering individuals were excluded to the extent possible.

Dunn (2000, in prep.) used two methods to estimate mass gain: simple regression of size-adjusted mass on time of day at which the bird was captured (after Winker et al. 1992, Morris et al. 1996), and multiple regression of mass on wing length, time of day, date variables and interaction variables between date and time of day (Dunn 2000). The latter method allows investigation of temporal variation in mass gain, but requires larger sample sizes and greater computing and statistical expertise. As results of the two methods do not differ significantly (Dunn in prep. and unpubl. data), the results presented here are from simple regression.

Mass was adjusted for body size by calculating a "Condition Index" (massX10000/wing length^3; Winker et al. 1992), and then performing a simple regression of Condition Index (*CI*) on time of day:

$$CI = b_1 H$$

where H is the time of day that was recorded for each bird (expressed as hours after sunrise, as detailed above). The regression coefficient b_1 is the estimate of hourly change in Condition Index and can be converted to hourly change in mass via the formula: mass change=b_1(wing

resulting threshold value represents the mass a bird must gain in 12 hrs of daylight in order break even energetically over a 24-hr period with no migration.

Existence energy, which is about 30% higher than standard metabolic costs, represents the energy used by caged birds over the course of a day, and includes costs of standard metabolism, specific dynamic action and any activity taking place in the cage (Kendeigh 1970). The existence energy formula over-estimates energy use during hours of sleep alone, but this is counterbalanced to some extent by an underestimation of nocturnal thermoregulatory costs in the natural environment. The threshold values calculated by this means for small passerines and for Swainson's Thrush were close to the estimates of overnight mass loss given by Winker et al. (1992) and Mueller and Berger (1966) that were used as threshold values by those authors. It is also quite close to an experimental value for a bird resting for 12 hours (after a 12-hr flight and having access only to water; Klaassen et al. 2000). Regardless of the means of calculation, it must be kept in mind that this threshold is based on many assumptions and should only be used as a general reference point.

RESULTS

Hourly mass change estimates for each site and season are listed in Table 2. Most (80%) of the 174 estimates represented gains between 0.1 and 1.0% of lean body mass/hr, while half fell between 0.2 and 0.8%. The median value was 0.55% of lean body mass/hr (0.50 in spring and 0.60 in fall).

Table 2 also summarizes the relationship between each mass gain estimate and the threshold value. "O" indicates that mass gain is significantly greater than the threshold value

DISCUSSION

All sites and species showed a range of estimates from low to high mass gain, but confidence intervals were generally large. The low precision of most mass gain estimates can be attributed to numerous factors. For example, there is likely to be tremendous variation in arrival mass, depending on weather conditions influencing the distance and energy cost of the previous night's flight. Heavy birds may be caught at early hours on some days and light birds at later hours on other days--even though both groups might be gaining mass on the days they are present. Moreover, feeding conditions vary from day to day (due to weather, date in season, etc.). Mass gain may be less detectable at sites where banding takes place only for the minimum 6 hr period, such that sampling includes individuals with a relatively narrow range of masses. Large samples are therefore needed to show overall trends, and it should not be a surprise that many estimates are not significantly different from threshold values, or even from zero.

Despite low precision, the majority of estimates were positive and clustered in a relatively narrow range, with median values of 0.50% of lean body mass/hr in spring and 0.60% in fall, well above the median threshold value of 0.28%. Taken together, results in this paper suggest that migrants maintain or gain mass at most stopover sites in southern Canada, in both seasons. The exceptions included 3 stations with low mass gain in spring and one in fall, but most of these had data for only 1 or 2 species (Fig. 2). Those results could be unrepresentative, as many sites with higher medians also had one or two low values. The low mass gain estimates for the tip of Long Point in spring, across many species, is all the more notable now that data are available from so many other sites. The relatively high gains at Delta Marsh in spring also suggest a real difference in site quality.

Few further conclusions can be drawn on differences among mass gain estimates, because the suite of species analysed differed among sites and seasons. However, the low mass gain of Swainson's Thrush at Long Point relative to that of other species appeared not to be general

nocturnal migrants is 50-150 km/day (Dorst 1962, King and Mewaldt 1981, data from short-term band encounters compiled from Brewer et al. 2000). However, single nights of migration over land (no major geographic barriers) may carry small birds more than 500-600 km (based on flight speeds in Dorst 1962, and banding records in Cortopassi and Mewaldt 1965 and Brewer et al. 2000). Thus, stopovers of several days are probably the rule rather than the exception.

At most banding stations, the vast majority of banded birds are never recaptured, giving the impression that stopovers are very short. However, it is unlikely that birds remain for successive days in an area as restricted as that sampled by a banding station, especially if local foraging is poor. For example, telemetry studies showed that Summer Tanagers (*Piranga rubra*) moved over 1 km in a day of stopover (including meanders), ending an average of >350 m from their starting points (Aborn and Moore 1997). Many banders note a tendency for birds to move slowly through a banding area, often in a particular direction (possibly related to migratory direction but probably influenced by local geography, habitat configuration and wind conditions).

Although the stopover times estimated here appear reasonable, it is possible that none of the study sites included here is particularly outstanding for migrants. Most banding stations are established where there are good opportunities for catching migrants, and these may not be the best sites for refuelling. For example, recent studies of weather radar images have shown that migrants in southern Louisiana in spring are concentrated in bottomland forest where few birds can be observed--far from the "hot spots" where migrants are readily seen by birders. Potential for mass gain is presumably greater at sites where birds are concentrating during the day, but it may be difficult for banders to study them at such sites.

Mean mass, fat score and estimated mass gain varied little among the CMMN stations. Migrants passing through southern Canada are near the start (in fall) or end (in spring) of migration, and possibly accumulation of fat stores is kept low to ensure maximally-efficient flight. However, when migrants face an ecological barrier such as the Gulf of Mexico which must be

California. Part II. Western Bird Bander 46:48-51.

Cortopassi, A.J. and L.R. Mewaldt. 1965. The circumannual distribution of White-crowned Sparrows. Bird-Banding 36:141–165.

Dorst, J. 1962. The Migrations of Birds. Houghton Mifflin Co., Boston, MA.

Dunn, E. H. 2000. Temporal and spatial patterns in daily mass gain of Magnolia Warblers during migratory stopover. Auk 117:12-21.

Hussell, D. J. T. and A. B. Lambert. 1980. New estimates of weight loss in birds during nocturnal migration. Auk 97: 547-558.

Hussell, D. J. T., and J. Woodford. 1961. The use of heligoland trap and mist-nests at Long Point, Ontario. Bird-Banding 32:115-125.

Kendeigh, S. C. 1970. Energy requirements for existence in relation to size of bird. Condor 72:60-65.

King, J.R. and L.R. Mewaldt. 1981. The average rate of travel by migrating White-crowned Sparrows, *Zonotrichia leucophrys gambelii*, in spring. N. Amer. Bird Bander 6: 98-100.

King, R. 1976. Daily weight changes in migrant Yellow-rumped Warblers. N. Amer. Bird Bander 4: 172-173.

Klaassen, M., Å. Kvist and A. Lindström. 2000. Flight costs and fuel composition of a bird migrating in a wind tunnel. Condor 102: 444-451.

Morris, S. R., D. W. Holmes, and M. E. Richmond. 1996. A ten-year study of the stopover patterns of migratory passerines during fall migration on Appledore Island, Maine. Condor 98:395-409.

Mueller, H. C. and D. D. Berger. 1966. Analyses of weight and fat variations in transient Swainson's Thrushes. Bird-Banding 37: 83-112.

Rogers, D. T., and E. P. Odum. 1964. Effect of age, sex, and level of fat deposits on major body

Figure titles.

Figure 1. Location of Canadian Migration Monitoring Network stations contributing data to this study. Station names in Table 1.

Figure 2. Mass change summarized by site. Mass gain values were expressed as the ratio of mass gain to threshold value ("mass change index"), to make results comparable among species of different size and among sites with different suites of species. A value of 1 indicates that the species' mass gain estimate was exactly equal to the threshold value. The box plots indicate the 25th, 50th (median) and 75th percentile values for species at a given site, as well as the mean (diamond symbol). Whiskers indicate the maximum and minimum species values at the site. Sample size is shown at the bottom of the figure.

Figure 3. Mass change summarized by species. Details as in Fig. 2.

Table 2. Estimated mass change by season and locality, and estimated threshold value (see Methods), expressed as % of lean body mass/h. Code indicates interpretation of mass gain.

Species	N	Gain[a]	Threshold[b]	95% CI	Code[c]
Atlantic Bird Observatory: Fall					
American Redstart	274	0.17	0.33	-0.27 to 0.61	?
Blackpoll Warbler	284	0.33	0.29	-0.34 to 1.00	?
Dark-eyed Junco	116	0.25	0.24	-0.49 to 0.99	?
Magnolia Warbler	123	0.05	0.33	-0.69 to 0.79	?
Northern Waterthrush	197	0.63**	0.25	0.18 to 1.08	E
Ruby-crowned Kinglet	96	0.21	0.37	-0.48 to 0.90	?
Swainson's Thrush	115	0.28	0.20	-0.28 to 0.84	?
White-throated Sparrow	137	0.5 6	0.22	-0.31 to 1.43	?
Yellow-rumped Warbler	616	0.42*	0.29	0.06 to 0.78	E
Beaverhill Bird Observatory: Spring					
Least Flycatcher	136	0.02	0.30	-0.67 to 0.71	?
Beaverhill Bird Observatory: Fall					
Least Flycatcher	213	0.73*	0.30	0.09 to 1.37	E
Tennesee Warbler	167	1.09	0.31	-0.10 to 2.28	?
Yellow-rumped Warbler	457	0.67*	0.28	0.15 to1.19	E
Delta Marsh Bird Observatory: Spring					
American Redstart	153	1.42*	0.33	0.28 to 2.57	E
Least Flycatcher	226	1.27**	0.30	0.40 to 2.14	O
Swainson's Thrush	122	0.65	0.20	-0.69 to 1.99	?
White-throated Sparrow	270	1.93***	0.22	1.11 to 2.75	O
Wilson's Warbler	171	1.50*	0.34	0.21 to 2.79	E
Yellow-rumped Warbler	279	1.38**	0.29	0.50 to 2.26	O
Delta Marsh Bird Observatory: Fall					
American Redstart	417	0.62**	0.33	0.16 to 1.09	E
Dark-eyed Junco	274	0.77*	0.25	0.14 to 1.40	E
Least Flycatcher	393	0.29	0.30	-0.18 to 0.75	?
Northern Waterthrush	365	1.24***	0.25	0.63 to 1.85	O
Ruby-crowned Kinglet	236	0.82*	0.37	0.15 to 1.50	E
Swainson's Thrush	264	0.42	0.21	-0.36 to 1.21	?
Tennesee Warbler	1391	-0.05	0.31	-0.35 to 0.25	U
White-throated Sparrow	399	0.72*	0.22	0.05 to 1.40	E
Yellow-rumped Warbler	584	0.49*	0.29	0.02 to 0.95	E
Haldimand Bird Observatory: Spring					
Dark-eyed Junco	258	0.35	0.24	-0.37 to 1.07	?
Magnolia Warbler	241	0.91*	0.33	0.04 to 1.78	E
Ruby-crowned Kinglet	434	0.63*	0.37	0.09 to 1.17	E
Swainson's Thrush	178	0.18	0.20	-0.56 to 0.92	?
White-throated Sparrow	570	0.70**	0.22	0.22 to 1.18	O

Tennesee Warbler	320	0.73***	0.31	0.33 to 1.13	O
White-crowned Sparrow	567	0.33*	0.20	0.06 to 0.60	E
White-throated Sparrow	1248	0.35***	0.21	0.17 to 0.53	E
Wilson's Warbler	282	0.86***	0.34	0.44 to 1.28	O
Yellow-rumped Warbler	3836	0.42***	0.28	0.30 to 0.54	O
Long Point Bird Observatory, Area 2: Spring					
American Redstart	201	1.54***	0.33	0.97 to 2.11	O
Dark-eyed Junco	1455	0.46***	0.24	0.28 to 0.64	O
Least Flycatcher	546	0.72***	0.30	0.38 to 1.06	O
Lincoln's Sparrow	477	0.75***	0.24	0.33 to 1.17	O
Magnolia Warbler	649	0.79***	0.32	0.39 to 1.19	O
Ruby-crowned Kinglet	2149	0.26**	0.36	0.09 to 0.43	E
Swainson's Thrush	286	0.45	0.2	-0.03 to 0.93	?
White-crowned Sparrow	1280	0.27*	0.20	0.05 to 0.49	E
White-throated Sparrow	3778	0.25***	0.21	0.13 to 0.37	E
Wilson's Warbler	254	1.03***	0.34	0.47 to 1.59	O
Yellow-rumped Warbler	807	0.67***	0.28	0.34 to 1.00	O
Long Point Bird Observatory, Area 2: Fall					
American Redstart	769	0.73***	0.33	0.44 to 1.02	O
Blackpoll Warbler	1091	0.46***	0.28	0.21 to 0.71	E
Least Flycatcher	731	0.33*	0.30	0.06 to 0.60	E
Magnolia Warbler	2039	0.65***	0.33	0.46 to 0.84	O
Northern Waterthrush	962	0.44***	0.25	0.16 to 0.72	E
Swainson's Thrush	1270	0.12	0.20	-0.08 to 0.32	?
Tennesee Warbler	837	0.69***	0.31	0.37 to 1.01	O
Wilson's Warbler	309	1.04***	0.34	0.63 to 1.45	O
Yellow-rumped Warbler	282	0.62***	0.29	0.23 to 1.01	E
Long Point Bird Observatory, Area 3: Spring					
American Redstart	657	0.72***	0.33	0.41 to 1.03	O
Dark-eyed Junco	1013	0.46***	0.24	0.24 to 0.68	O
Least Flycatcher	768	0.25	0.30	-0.05 to 0.55	?
Lincoln's Sparrow	692	0.63***	0.24	0.34 to 0.92	O
Magnolia Warbler	3598	0.13	0.32	-0.03 to 0.29	U
Ruby-crowned Kinglet	3654	0.62***	0.36	0.49 to 0.75	O
Swainson's Thrush	655	0.2	0.20	-0.11 to 0.51	?
Tennesee Warbler	405	-0.47	0.30	-0.99 to 0.05	U
White-throated Sparrow	4761	0.73***	0.21	0.63 to 0.83	O
Wilson's Warbler	749	0.84***	0.33	0.48 to 1.20	O
Yellow-rumped Warbler	795	1.11***	0.28	0.78 to 1.44	O
Long Point Bird Observatory, Area 3: Fall					
American Redstart	996	0.98***	0.33	0.75 to 1.21	O
Blackpoll Warbler	445	0.87***	0.28	0.47 to 1.27	O
Dark-eyed Junco	1034	0.72***	0.24	0.45 to 0.99	O
Least Flycatcher	697	0.23	0.30	-0.07 to 0.53	?

Lincoln's Sparrow	138	0.61	0.26	-0.71 to 1.93	?
Ruby-crowned Kinglet	181	2.86***	0.38	1.91 to 3.81	O
Wilson's Warbler	238	1.00**	0.34	0.39 to 1.61	O
Thunder Cape Bird Observatory: Spring					
American Redstart	489	0.08	0.34	-0.29 to 0.45	?
Dark-eyed Junco	595	0.39*	0.24	0.05 to 0.73	E
Magnolia Warbler	375	0.43*	0.33	0.04 to 0.82	E
Ruby-crowned Kinglet	116	1.40***	0.37	0.53 to 2.27	O
Tennesee Warbler	685	0.99***	0.32	0.69 to 1.29	O
White-throated Sparrow	223	0.98***	0.22	0.44 to 1.52	O
Wilson's Warbler	95	1.37***	0.34	0.59 to 2.15	O
Yellow-rumped Warbler	475	0.22	0.29	-0.07 to 0.51	?
Thunder Cape Bird Observatory: Fall					
American Redstart	1632	0.82***	0.33	0.58 to 1.06	O
Blackpoll Warbler	394	0.03	0.29	-0.40 to 0.46	?
Dark-eyed Junco	2672	0.64***	0.25	0.48 to 0.80	O
Least Flycatcher	156	0.57	0.31	-0.12 to 1.26	?
Lincoln's Sparrow	203	0.69*	0.26	0.15 to 1.23	E
Magnolia Warbler	686	0.53**	0.33	0.17 to 0.89	E
Northern Waterthrush	378	0.53	0.25	-0.09 to 1.15	?
Ruby-crowned Kinglet	435	1.10***	0.36	0.76 to 1.44	O
Swainson's Thrush	1014	0.12	0.20	-0.12 to 0.36	?
Tennesee Warbler	870	0.16	0.32	-0.25 to 0.57	?
White-crowned Sparrow	308	0.73***	0.22	0.36 to 1.10	O
White-throated Sparrow	251	0.44	0.22	-0.05 to 0.93	?
Wilson's Warbler	110	1.12***	0.34	0.47 to 1.77	O
Yellow-rumped Warbler	793	0.53***	0.29	0.28 to 0.78	E

[a] Symbols show significance of partial regression coefficient for Hour: * = $P<0.05$, ** = $P<0.01$, *** = $P<0.001$. Significant values show mass gain is greater than zero.

[b] Threshold value, or estimated gain (expressed as % lean body mass/hour) that is required to maintain 24 hour mass balance (see Methods).

[c] Key to codes:

?: Mass change not significantly different from zero or from threshold value ($P<0.05$).

U ("under"): gain is significantly lower than threshold value (even though it may be significantly greater than zero).

E ("equal"): gain is significantly greater than zero, but not significantly different from threshold value

O ("over"): gain is significantly greater than the threshold value.


MNO
LSLBO
BBO
LMLBO
IBS
RPBO
DMBO
TCBO
IPBO
PEPtBO
HBO
LPBO
ABO

Fig. 1

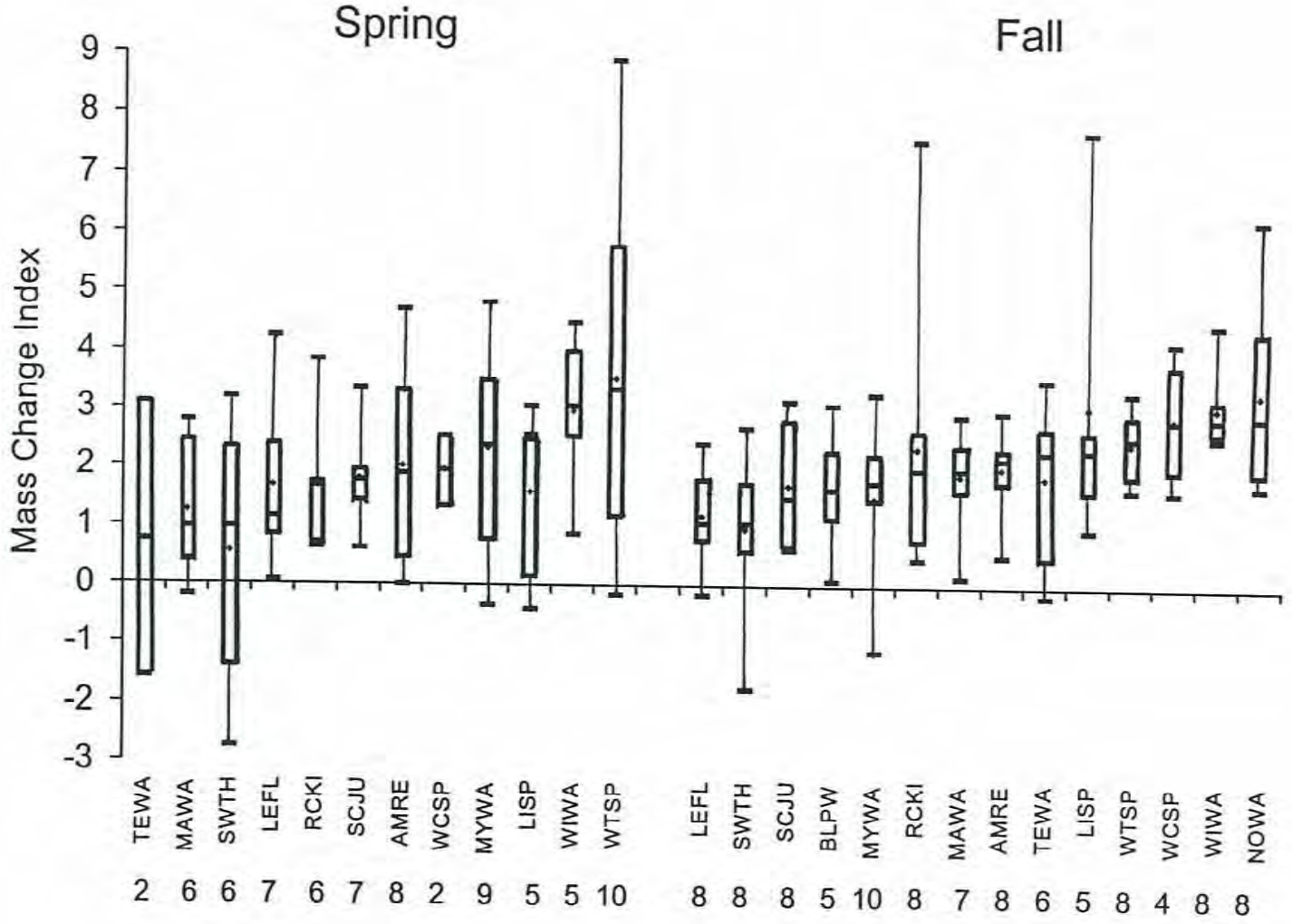
Spring
Fall
Mass Change Index
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
TEWA
MAWA
SWTH
LEFL
RCKI
SCJU
AMRE
WCSP
MYWA
LISP
WIWA
WTSP
LEFL
SWTH
SCJU
BLPW
MYWA
RCKI
MAWA
AMRE
TEWA
LISP
WTSP
WCSP
WIWA
NOWA
2 6 6 7 6 7 8 2 9 5 5 10 8 8 8 5 10 8 7 8 6 5 8 4 8 8

Fig. 3

APPENDIX 6

Year-to-Year Recaptures at Inglewood Bird Sanctuary and Dunbow Road

Species	Band	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000
Belted Kingfisher	1363-70918	IBS			B	r					
Yellow-bellied Sapsucker	8051-65119	Dunbow						B	r		
Red-naped Sapsucker	8041-54901	Dunbow							B	r	
Downy Woodpecker	1451-67033	IBS				B	r	r			
Downy Woodpecker	1461-02314	IBS					B	r	r	r	
Downy Woodpecker	1461-05307	Dunbow						B		r	
Downy Woodpecker	1461-63690	IBS			B	r					
Hairy Woodpecker	0962-90911	IBS				B					r
Hairy Woodpecker	1152-38713	IBS							B		r
Northern Flicker	1453-31301	IBS				B	r				
Least Flycatcher	2050-70767	Dunbow						B		r	
Eastern Kingbird	1451-38640	IBS	B			r					
Eastern Kingbird	1461-63719	IBS					B	r		r	
Eastern Kingbird	1461-63750	IBS						B	r	r	
Warbling Vireo	1910-52290	IBS	B			r	r				
Warbling Vireo	1950-45045	IBS			B	r					
Warbling Vireo	1950-45076	IBS			B		r	r	r		
Warbling Vireo	1950-48110	IBS		B		r					
Warbling Vireo	2050-70837	IBS						B	r		
Warbling Vireo	2050-70961	IBS					B		r		
Warbling Vireo	2161-14605	IBS				B			r		
Warbling Vireo	3101-45254	IBS								B	r
Black-capped Chickadee	1950-45065	IBS			B	r					
Black-capped Chickadee	1950-45186	IBS			B	r	r	r			
Black-capped Chickadee	1950-45254	IBS			B	r	r			r	r
Black-capped Chickadee	1950-45256	IBS			B	r	r				
Black-capped Chickadee	1950-45258	IBS			B	r	r	r	r		
Black-capped Chickadee	1950-45786	IBS					B	r			
Black-capped Chickadee	1980-79991	IBS				B	r	r	r	r	r
Black-capped Chickadee	1990-57154	IBS						B	r		
Black-capped Chickadee	2050-70142	IBS				B		r			
Black-capped Chickadee	2050-70427	IBS					B	r			
Black-capped Chickadee	2050-70849	IBS						B	r		
Black-capped Chickadee	2120-00102	Dunbow						B	r	r	
Black-capped Chickadee	2120-00103	Dunbow						B	r		
Black-capped Chickadee	2120-00105	Dunbow						B	r	r	
Black-capped Chickadee	2120-00107	Dunbow						B	r	r	
Black-capped Chickadee	2120-00109	Dunbow						B	r	r	
Black-capped Chickadee	2120-00110	Dunbow						B	r		
Black-capped Chickadee	2120-00113	Dunbow						B	r		
Black-capped Chickadee	2120-00114	Dunbow						B	r		
Black-capped Chickadee	2120-00117	Dunbow						B	r	r	
Black-capped Chickadee	2120-00124	Dunbow						B		r	
Black-capped Chickadee	2120-00125	Dunbow						B	r		

Year-to-Year Recaptures at Inglewood Bird Sanctuary and Dunbow Road

Species	Band	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000
Black-capped Chickadee	2120-00128	Dunbow						B	r		
Black-capped Chickadee	2120-00197	Dunbow						B	r		
Black-capped Chickadee	2160-18085	Dunbow							B	r	
Black-capped Chickadee	2160-18180	IBS						B	r		
Black-capped Chickadee	2160-18704	IBS							B	r	
Black-capped Chickadee	2160-19059	IBS							B	r	
Black-capped Chickadee	2160-19120	IBS							B	r	r
Black-capped Chickadee	2160-19174	IBS							B	r	
Black-capped Chickadee	2160-19522	IBS								B	r
Black-capped Chickadee	3500-89670	Dunbow						B	r	r	
White-breasted Nuthatch	1461-31479	IBS							B	r	r
White-breasted Nuthatch	1461-84757	IBS				B	r		r		
House Wren	1910-52261	IBS	B	r		r	r	r	r		
House Wren	1950-45790	IBS					B	r			
House Wren	1950-45886	IBS					B	r			
House Wren	1950-48126	IBS		B		r					
House Wren	2060-28447	IBS						B	r		
House Wren	2160-18063	Dunbow							B	r	
House Wren	2160-18082	Dunbow							B	r	
House Wren	2160-19002	Dunbow							B	r	
Swainson's Thrush	1451-67159	IBS					B		r		
Swainson's Thrush	1461-63572	IBS						B	r		
Swainson's Thrush	1461-63682	IBS			B		r				
Swainson's Thrush	1461-63692	IBS			B			r			
Swainson's Thrush	1461-63741	IBS					B	r			
Swainson's Thrush	1461-69595	IBS					B	r			
Swainson's Thrush	1541-17673	IBS								B	r
American Robin	0962-90991	IBS				B		r			
American Robin	0972-30466	IBS				B		r			
American Robin	1142-49046	IBS						B	r		
American Robin	1142-49201	Dunbow						B	r		
American Robin	1142-49212	Dunbow						B		r	
American Robin	1142-49217	Dunbow						B	r		
American Robin	1142-49221	Dunbow						B	r		
American Robin	1152-38703	Dunbow							B	r	
American Robin	1152-38740	IBS							B	r	
Gray Catbird	8041-54948	IBS							B	r	
Cedar Waxwing	1461-63733	IBS					B	r			
Orange-crowned Warbler	2160-18542	IBS							B	r	
Yellow Warbler	1910-52230	IBS	B			r					
Yellow Warbler	1950-45519	IBS				B	r		r		
Yellow Warbler	1950-45878	IBS					B	r	r		
Yellow Warbler	1950-48086	IBS		B		r					
Yellow Warbler	1950-48129	IBS		B		r	r				

Year-to-Year Recaptures at Inglewood Bird Sanctuary and Dunbow Road

Species	Band	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000
Yellow Warbler	1950-48133	IBS		B		r					
Yellow Warbler	1980-79983	IBS				B	r	r	r	r	
Yellow Warbler	1990-57104	Dunbow						B	r		
Yellow Warbler	2050-70144	IBS				B	r				
Yellow Warbler	2070-42756	IBS						B	r		
Yellow Warbler	2120-00181	Dunbow						B	r		
Yellow Warbler	2160-19158	IBS							B	r	
Yellow Warbler	2160-18045	Dunbow							B	r	
Yellow Warbler	2160-18068	Dunbow							B	r	
Yellow Warbler	2160-18077	Dunbow							B	r	
Yellow Warbler	2160-19059	IBS							B	r	
Yellow Warbler	2160-19766	IBS								B	r
Yellow Warbler	3500-89667	Dunbow						B		r	
Yellow-rumped Warbler	1910-52603	IBS	B	r							
Clay-coloured Sparrow	2050-70675	Dunbow						B		r	
Clay-coloured Sparrow	2120-00157	Dunbow						B	r	r	
Clay-coloured Sparrow	2120-00170	Dunbow						B		r	
Clay-coloured Sparrow	2120-00176	Dunbow						B	r		
Clay-coloured Sparrow	2160-18022	Dunbow							B	r	
Clay-coloured Sparrow	2160-18028	Dunbow							B	r	
Clay-coloured Sparrow	2160-18030	Dunbow							B	r	
Vesper Sparrow	1461-05331	Dunbow						B	r		
Vesper Sparrow	1461-31412	Dunbow							B	r	
Lincoln's Sparrow	2161-14607	IBS				B	r				
Brown-headed Cowbird	1461-05333	Dunbow						B	r		
Brown-headed Cowbird	1461-31414	Dunbow							B	r	
Baltimore Oriole	8041-54908	IBS							B	r	
Baltimore Oriole	8051-65131	IBS						B	r		
American Goldfinch	2120-00188	Dunbow						B		r	

B = year banded
r = recaptured

APPENDIX 7

Appendix 7. New Bandings at Cominco Natural Area - Spring 2000

Month	May																							Jun				Total
Day	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	01	02	03	04	
Sharp-shinned Hawk															1														1
Downy Woodpecker	1																			1						1			3
Northern Flicker						1	1																						2
Alder Flycatcher																							3	5	1	1	3	3	16
Least Flycatcher							1									1					1				1	2	1		7
Eastern Kingbird																			1	1	2								4
Blue-headed Vireo																		1											1
Warbling Vireo								1					1																2
Red-eyed Vireo																											1		1
Tree Swallow											2																		2
Northern Rough-winged Swallow																											3		3
Black-capped Chickadee	3			1					1								1												6
House Wren										1	1	1				1					1							2	7
Gray-cheeked Thrush											1													1					2
Swainson's Thrush											6	1	1			3	1		8		2	3	5	1	4	2	2		39
Hermit Thrush		1																											1
American Robin	4	1									1			1		2	1			3			2			1			16
Gray Catbird											1			1	2			2						1			3	2	12
Cedar Waxwing																					2			2	3	1		7	15
Orange-crowned Warbler					2	1			1		2	1	1					1	2				1						12
Yellow Warbler						1			2	4	3		2			2	1	4	5	2	1	1	1	2	3			4	38
Yellow-rumped Warbler	1	2		4	6	2	1				2							1	1										20
Blackpoll Warbler																1		1	1		1			1					5
American Redstart																		1						1					2
Ovenbird																								1					1
Northern Waterthrush								1			1			1	1	2	1												7
Mourning Warbler																			1										1
Common Yellowthroat					1			1	1		1		1	3	2				3						1		1		15
MacGillivray's Warbler																							1						1
Wilson's Warbler					1											1	1			1									4
Western Tanager																		1											1
Chipping Sparrow			2		7		10	18	17	8	7		2	1	3	1			3				5		1		1		86
Clay-coloured Sparrow		3		3	6	1	1	5	6	9	2	2	4	3	3		1	5	11	1	2	2	4	3	3	3		3	86
Savannah Sparrow	3	3							1		2	1						1	2		1								14
Song Sparrow	4			1	1	1							1		2						1		1						12
Lincoln's Sparrow	1	2		1	1		1	2	2	1						1											1		13
White-throated Sparrow																					1								1
White-crowned Sparrow	1	1		1	2	1		2																			1		9
Red-winged Blackbird		4		2	7	1	1	1	2	2	7	4	2	3	3	1		2	2	1	1	4	3	2	2	3	3		63
Yellow-headed Blackbird											1																		1
Brown-headed Cowbird		2			1		1		1	1	5			1						1				1					14
Baltimore Oriole											3		2		1						1								7
American Goldfinch																						1	3	2		1			7
Total	18	19	2	13	35	9	17	31	34	26	48	10	17	14	18	16	7	20	40	11	17	16	24	23	19	15	20	21	560

Appendix 7. New Bandings at Cominco Natural Area - Fall 2000

Month	August																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Sharp-shinned Hawk																															
Downy Woodpecker		3				2	1		1	1			3												1						1
Hairy Woodpecker																						1									
Olive-sided Flycatcher																						1									
Western Wood-Pewee		1	2		1	1	1	1	1		2	2				1															
Alder Flycatcher									2			2		1		2		1	2						1	1			1		
Willow Flycatcher										1																					
Least Flycatcher	1	2	1		1	2	4	4	3	1	2	1	1		1	2			1	1	2		1	2	1	1		1	1		2
Eastern Kingbird					1				1	2			1		1		4			1		1									
Blue-headed Vireo																			1												
Warbling Vireo					2	1						1				1				1		2						1	2		
Red-eyed Vireo																															
Black-billed Magpie									1																1						
Tree Swallow																															
Barn Swallow																			1												
Northern Rough-winged Swallow		1	1																												
Black-capped Chickadee	5	2	1		4	2		4		1				1						2					2			1	1		2
Boreal Chickadee																															
Red-breasted Nuthatch																															
White-breasted Nuthatch																					1										
House Wren	1	5	3		2	3	2	5	2	2	5	1	4	4		3	1	1	4	3	5	1	2	3	1			2	3		
Ruby-crowned Kinglet																															
Swainson's Thrush					1																										
Hermit Thrush																															
American Robin	2	5	3		1	3	2					1				2									1				1		
Gray Catbird	2						1		2			1	1				1				1		1		1		1	1	2		
Cedar Waxwing	12	19	11	2	16	8	22	11	8	10	20	23	40	5	7	31	10	3	3	9	7	13		5	21	7	5	7	4		10
Tennessee Warbler	4		3		17		3	2	4	3	5	1	7	1	2		2	2			1	2	3	2							1
Orange-crowned Warbler																															
Northern Parula																															
Yellow Warbler	3	9	3		23	2	20	12	7	8	17	5	12	7	9	1	3	5	11	5	3	1	2	3	2				4		4
Magnolia Warbler																															
Yellow-rumped Warbler					2	1			1	1			1						1	6	3	2		2	3	5	7	11	18		4
Palm Warbler																															
Blackpoll Warbler																													1		2
American Redstart																1										1	1				

Appendix 7. New Bandings at Cominco Natural Area - Fall 2000

Month	September																												Total
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Sharp-shinned Hawk				1								1																			3
Downy Woodpecker																								1		1					14
Hairy Woodpecker											1																				2
Olive-sided Flycatcher																															1
Western Wood-Pewee																															13
Alder Flycatcher				1		4								1																	19
Willow Flycatcher				1																											2
Least Flycatcher	1			1		3						1																			45
Eastern Kingbird					1																										13
Blue-headed Vireo																															1
Warbling Vireo						3						2																			16
Red-eyed Vireo																															
Black-billed Magpie											1	1																		1	5
Tree Swallow																															
Barn Swallow																															1
Northern Rough-winged Swallow																															2
Black-capped Chickadee												2		3				1						1	3	1	2	1			3	45
Boreal Chickadee															1																1
Red-breasted Nuthatch											1																				2
White-breasted Nuthatch															1														2		3
House Wren						2					3	2		1		2								1							79
Ruby-crowned Kinglet						1												1										1			3
Swainson's Thrush				1		2																									4
Hermit Thrush																												1			1
American Robin				1				1		3		2	1		1			1		1				4		3	2		2	1	44
Gray Catbird	1				1		1																								18
Cedar Waxwing	4			10	7	12		3		8	7	9	4	4		5	3	2		15				3	1			4			450
Tennessee Warbler												1	1			1															68
Orange-crowned Warbler					1	5	1	3	1		2	2			2	3	3	1	1	3				2	3	1			2		1	37
Northern Parula								1																							1
Yellow Warbler	2			2	1			1																							187
Magnolia Warbler	1																														1
Yellow-rumped Warbler	1			10	15	46	23	11	7	22	11	27	9	4	19	15	7	8	31	40				9	6	3	2	4	1	1		400
Palm Warbler												1			1													1			3
Blackpoll Warbler	1			2	1	3	2											1													13
American Redstart																															3

Appendix 7. New Bandings at Cominco Natural Area - Fall 2000

Month	August																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Ovenbird																															
Northern Waterthrush											1	1	3							1									1		
Connecticut Warbler															2	2							1								
Common Yellowthroat															1					1											
Wilson's Warbler																													1		
Western Tanager																															
American Tree Sparrow					3	1		4	1		3	4	2		3	2	3		10	1	1				1						
Chipping Sparrow	2	1	3		1	1	3	6	1	1	2	3	1		1	2		3	1	4	2	1		2	6	1		2	2		
Clay-coloured Sparrow	1																														
Vesper Sparrow					2		1	2			1	3			1		1		1												
Savannah Sparrow																															
Fox Sparrow																															
Song Sparrow	4	2	2		4	2		1		1	1	2	1	1	1	1							1		1						
Lincoln's Sparrow																															
White-throated Sparrow																															
White-crowned Sparrow																															
Dark-eyed Junco					1							1																			
Rose-breasted Grosbeak							1																								
Red-winged Blackbird																															
Common Grackle									1												1		1								
Brown-headed Cowbird			2		2		4				1		3																		
Baltimore Oriole							1										1		1												
Purple Finch																												1			
Pine Siskin																															
American Goldfinch	1		1		2	3		1	1	1	3					1	1	3	3	1	1	1	2	1	6	1		6	2		1
Total	38	50	36	2	86	32	66	53	37	33	63	52	80	20	29	52	27	18	40	36	28	26	14	20	49	16	15	33	44	0	27

Appendix 7. New Bandings at Cominco Natural Area - Fall 2000

Month	September																													Total
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Ovenbird						2					1																				3
Northern Waterthrush						1																									7
Connecticut Warbler				1	1		1							1					1						1					1
Common Yellowthroat						5		4	2	3		2						1		2				1	1					11
Wilson's Warbler																															23
Western Tanager																															1
American Tree Sparrow							4				2	1															1	2			3
Chipping Sparrow																															46
Clay-coloured Sparrow	1			1	3	2	3	1							1																64
Vesper Sparrow																															1
Savannah Sparrow					1	1									1																15
Fox Sparrow												1	1														1				3
Song Sparrow						1																									27
Lincoln's Sparrow							1	1	1			1		1		1	1			1									1		9
White-throated Sparrow														1						3				2		1		1	4		12
White-crowned Sparrow								1			1							1							2		1	1		2	9
Dark-eyed Junco						1						2													2	4	1		1		11
Rose-breasted Grosbeak																															2
Red-winged Blackbird																															1
Common Grackle										3	2	1								3											9
Brown-headed Cowbird																															3
Baltimore Oriole																															12
Purple Finch																															3
Pine Siskin						2			1		1	4								1											10
American Goldfinch				3	1	2			3		2	4								2					1	1					62
Total	12	0	0	35	33	98	36	27	15	39	35	67	16	16	27	27	14	17	33	71	0	0	16	21	12	14	18	8	11	8	1848

Appendix 8. Top 20 New Bandings at Cominco Natural Area

Spring		
Species	Rank	Number
Clay-coloured Sparrow	1	86
Chipping Sparrow	2	86
Red-winged Blackbird	3	63
Swainson's Thrush	4	39
Yellow Warbler	5	38
Yellow-rumped Warbler	6	20
American Robin	7	16
Alder Flycatcher	8	16
Cedar Waxwing	9	15
Common Yellowthroat	10	15
Savannah Sparrow	11	14
Brown-headed Cowbird	12	14
Lincoln's Sparrow	13	13
Orange-crowned Warbler	14	12
Song Sparrow	15	12
Gray Catbird	16	12
White-crowned Sparrow	17	9
House Wren	18	7
American Goldfinch	19	7
Least Flycatcher	20	7
Baltimore Oriole	21	7
Northern Waterthrush	22	7

Fall		
Species	Rank	Number
Cedar Waxwing	1	450
Yellow-rumped Warbler	2	400
Yellow Warbler	3	187
House Wren	4	79
Tennessee Warbler	5	68
Clay-coloured Sparrow	6	64
American Goldfinch	7	62
Chipping Sparrow	8	46
Least Flycatcher	9	45
Black-capped Chickadee	9	45
American Robin	11	44
Orange-crowned Warbler	12	37
Song Sparrow	13	27
Wilson's Warbler	14	23
Alder Flycatcher	15	19
Gray Catbird	16	18
Warbling Vireo	17	16
Savannah Sparrow	18	15
Downy Woodpecker	19	14
Blackpoll Warbler	20	13
Eastern Kingbird	20	13
Western Wood-Pewee	20	13

APPENDIX 9

CALGARY BIRD BANDING SOCIETY
2000 MEMBERSHIP LIST

Christine Bennett
Grahame Booth
Bill Brown
Lily Cesh
Doug Collister
Brian Couronne
Sarah Deakin
Ross Dickson
Ami Gemmel
Dick Graham
Garry Hornbeck
Mary Huston
Brian Isaac
Clive Jackson
Dwight Knapik
Jennifer Lae
Stephen Lane
Shonna McLeod
Greg Meyer
Pat Mitchell
Chuck Newyar
Alexandra Oakwood
Dale Paton
El Peterson
Gwen Smiley
Cyndi Smith
Don Stiles
Ken Symington
Bill Taylor
Barry Trakalo
Catherine Watson
Catherine Watson-McDonald
Sharon Wegner
Linda Wiggins
Bruce Wilson
Scott Wilson

Executive

President - El Peterson
Vice President - Shonna McLeod
Treasurer - Dwight Knapik
Secretary - Garry Hornbeck
Director at Large – Grahame Booth
Annual Report - Doug Collister