



VANCOUVER AVIAN RESEARCH CENTRE

2010 YEAR END REPORT

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1.0 INTRODUCTION

The Vancouver Avian Research Centre (VARC) is a registered not-for-profit society (#S-56377) dedicated to wild bird research and conservation.

VARC conducts year round bird monitoring, banding and research in the Lower Mainland of Vancouver to identify causes of avian population change, and aids in formulating management actions to reverse these declines in order to maintain stable or increasing populations. Its mandate is to share this information with local, provincial and federal organizations and contribute to habitat conservation efforts throughout the lower mainland, province and country. Habitat loss and degradation is the major cause of bird population declines and is the single largest factor affecting migratory birds crossing increasingly fragmented landscapes.

VARC's main field station is in Colony Farm Regional Park, a 647 acre park consisting in part of old field habitat which is unique in the lower mainland of Vancouver. The park is managed by MetroVancouver (MV) who are developing and implementing a sustainability plan for the park to integrate sustainable food systems, wildlife, recreation and community. With 345,000 visitors a year it is one of the busiest parks in the Vancouver Regional Parks system. The banding station is located in the wildlife designated fields known as Wilson Farm North (WFN).

Situated at the confluence of the Coquitlam and Fraser Rivers, Colony Farm Regional Park protects some of the most ecologically diverse lands in the Greater Vancouver Regional District. The avifauna within the region is particularly rich with a total of more than 400 species of birds documented, 250 of which occur annually.

The old-fields and hedgerows at Colony Farm provide habitat for a wide variety of birds including locally rare and uncommon species such as Lazuli Bunting (*Passerina amoena*), Northern Shrike (*Lanius excubitor*), Eastern Kingbird (*Tyrannus tyrannus*) and Western Kingbird (*Tyrannus verticalis*).

In addition to its work in Colony Farm, VARC also operates a winter bird banding training centre at Burnaby Lake Regional Park.

The park is a 740 acre wildlife conservation area managed by MetroVancouver in cooperation with the City of Burnaby and plays an important regional role in ecological and wildlife diversity by providing habitat for resident, breeding and migratory birds.

VARC's winter banding program monitors resident and overwintering birds in the park and is the location for VARC's volunteer training program for those wishing to handle birds and assist with banding operations.

VARC has developed a graduated Volunteer Level Assessment training program which includes net extraction training and ongoing development of ageing and sexing skills.

The purpose of the training program is to ensure that all volunteers are fully trained and evaluated before handling birds and that the welfare of the birds is always the top priority. Training is conducted by experienced, licensed trainers working one on one with trainees in a controlled environment using a limited number of nets and ground traps.

Full details of VARC's Volunteer Level Assessment training program can be found online at: <http://www.birdvancouver.com/volunteer.html>

Mission Statement

VARC's mission statement is to help save breeding and migratory birds from the increasing environmental threats of habitat loss and degradation by safeguarding the places they need to survive.

Goals and Objectives

VARC's primary objective is to safeguard habitat for breeding and migratory birds to ensure their long term survival.

Threats to birds include climatic change and accelerating habitat loss and degradation. Successful conservation requires information on the population status of all species to ensure the survival of endangered birds and to manage common species so they never become threatened.

VARC's focus is to conduct long term, comprehensive bio-monitoring of bird populations to provide scientifically defensible strategies for avian and ecosystem

conservation and to raise awareness of environmental issues, encouraging society at all levels from individual to federal government to be conscientious consumers and to help make a difference. To this end VARC's goals and objectives are to:

1. Conduct long-term monitoring of bird populations in Vancouver's lower mainland;
2. Collect data to contribute to the Centre's permanent research database, to municipal and provincial government and to the Federal Bird Banding Laboratory in Ottawa;
3. Contribute to habitat conservation efforts by identifying areas of high habitat value for birds;
4. Contribute to broader conservation strategies by working with affiliated groups to promote and assist with bird conservation programs;
5. Provide research and volunteer opportunities for students and the general public;
6. Raise awareness of environmental issues through presentations and public events;
7. Inform and edify through demonstrations and visitor services the importance of habitat conservation at local, national and international levels;
8. Host Bird Monitoring and Banding and Bird Identification Workshops for people to learn more about habitat conservation and the birds and habitats of the Vancouver area.



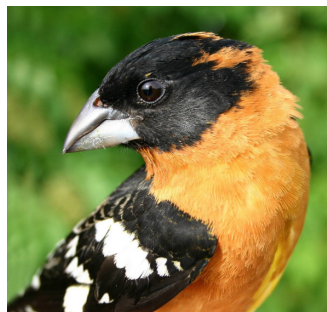
2.0 2010 - SIGFICANT MILESTONES

VARC continued to evolve the banding program during 2010 and achieved a number of significant milestones.

- Structure - VARC was incorporated as a not-for-profit society in April and has received approval from Revenue Canada to become a charitable society with effect from January 1st 2011. This has important consequences for VARC and will allow us to work towards achieving our funding goals for 2011 and beyond.
- Workshops – VARC conducted 3 Bird Monitoring and Banding and 2 Bird Identification Workshops. VARC's Bird Monitoring and Banding Workshop is a 3 day course designed to teach accurate ageing and sexing of North American landbirds in the hand using molt limits and plumage criteria. The banding workshop was supplemented in 2009 with the addition of a Bird Identification Workshop for those wishing to increase their bird knowledge and identification skills. The workshops continued to receive high praise from participants and are a valuable source of funding and volunteers for the banding program. Information on both workshops including full course schedules and testimonials can be found online at: <http://www.birdvancouver.com/workshops.html>
- Funding – Following the success of the 2009 banding program at Colony Farm MV contracted VARC to undertake a further study in 2010 to compare relative abundance, diversity and health of birds between the existing banding station (WFN) and two other areas of the park – the Integrated Management Area known as Wilson's Farm South (WFS) and the Agricultural Area known as Home Farm (HF) and to provide georeferenced data on bird populations and to identify the value of the habitat in each of these areas from an avian perspective.

VARC was also successful in obtaining a small grant from the James L. Baillie Memorial Fund towards the construction of a permanent Banding Pagoda at the Colony farm station.

- Staff – VARC was able to hire a senior biologist Kerry Kenwood as Banding Operations Manager and recruited one additional licensed bander and an intern to assist with banding operations during the year.
- Volunteers - VARC provides research opportunities for students in association with university and college study programs and volunteer opportunities for both trained and untrained volunteers. Approximately 40-50 volunteers are currently involved with the banding program on a regular basis and in excess of 200 volunteers involved on a more casual basis helping with tasks such as net lane clearing, site maintenance, data recording etc. VARC has its own ListServe email group which is used to communicate banding schedules, activities and other required tasks – More than 150 volunteers are currently members of the group.
- Effort - The increased staff and volunteer effort enabled VARC to more than double the banding effort during 2010 and increase net hours to more than 10,500.
- Banding Pagoda – A new building was constructed at the Colony Farm station to provide a better banding environment and act as a banding laboratory to accommodate the increasing numbers of birds processed at the station.



3.0 2011 – GOALS AND VISION

VARC's goals for 2011 are to continue to evolve the banding program towards our long-term vision of creating a professional, year-round banding operation in Vancouver.

- Funding - Secure long-term funding to enable VARC to retain and hire the professional staff to conduct long-term research, species studies and specialized projects.
- Banding Operations - Conduct bird banding and monitoring six days per week during spring and fall migration (April – May and August – October) and four days per week during the breeding season (June – July).
- Acoustical Monitoring of Nocturnal Migrants - Develop an avian bioacoustical monitoring system to aid in population surveys and songbird conservation by recording flight calls of nocturnal migrants at the Colony Farm field station.
- Workshops - Continue to host Bird Monitoring and Banding and Bird Identification Workshops.
- Education & Awareness – Provide public education opportunities through site visits, open days and demonstrations. Raise awareness of environmental issues through public events, speaking and presentations.
- University Programs – To actively encourage students in association with university and college study programs to utilize VARC's resources to complete research projects.
- School / Youth Programs – To engage school and youth programs in field trips to learn more about birds and the environment
- Support MV and MV Events - To support and promote MV at public events, open days, lectures and presentations.
- Twin with international research – Twin VARC with international research stations in the US, Mexico and South America to encourage student exchange and to contribute to international conservation efforts.

4.0 2010 BANDING RESULTS

4.1 Overview

A total of 6,213 new birds were banded of 69 species taking the total of species banded at Colony Farm since spring of 2009 to 78.

	INDIVIDUALS BANDED	NUMBER OF SPECIES	H'	E _H
Wilson Farm North	3693	62	3.299	0.80
Wilson Farm South	1716	47	3.125	0.82
Home Farm	804	43	3.074	0.82
Total Program	6213	69	3.309	0.78

H' E_H INDICES APPLY TO DIVERSITY & EVENNESS

Figure 1 Banding Totals

New species banded for Colony Farm included Band-tailed Pigeon (*Columba fasciata*), Brewer's Sparrow (*Spizella breweri*), Chipping Sparrow (*Spizella passerina*), European Starling (*Sturnus vulgaris*), Indigo Bunting (*Passerina cyanea*), Merlin (*Falco columbarius*), Nashville Warbler (*Vermivora ruficapilla*), Northern Waterthrush (*Seiurus noveboracensis*), Steller's Jay (*Cyanocitta stelleri*), Varied Thrush (*Ixoreus naevius*), House Wren (*Troglodytes aedon*) and Long-eared Owl (*Asio otus*)

Of these, three rare species banded warrant special mention. The Indigo Bunting an eastern rarity was banded at WFN on July 3rd and retrapped there on September 25th indicating it remained in the banding area throughout the breeding season. Indigo Buntings are known to hybridize with Lazuli Bunting where ranges overlap.

The Brewer's Sparrow was banded at HF on June 3rd. Brewer's Sparrow is unusual in having two distinct nesting populations, one in the alpine meadows of the Rocky Mountains of the Yukon (*Spizella breweri taverneri* or *Timberline Sparrow*) and the other in the sagebrush deserts of the western United States (*Spizella breweri breweri*). The *breweri* subspecies is red-listed in BC.

The bird banded at HF was believed to be the *taverneri* subspecies based on plumage and biometric measurements. The bill averages smaller in *taverneri* and exposed

culmen on the bird caught for banding was only 7 mm which would lean towards *taverneri* although differences between the two subspecies are subtle at best. The wing chord suggested this bird was a male although it was recorded as sex unknown.

Two Northern Waterthrush were banded at WFS on August 8th and September 9th respectively. Northern Waterthrush is a rare transient in the Vancouver area.

4.1.1 Range and Habitat, Geographic Variation and Rarity Status:

Indigo Bunting (*Passerina cyanea*)

Range and Habitat

Indigo Bunting breeds from south-eastern Saskatchewan east to New Brunswick, and south to central Arizona, central Texas, the Gulf coast, and northern Florida.

They breed in brushy and weedy areas along edges of cultivated land, woods, roads, power line rights-of-way, and in open deciduous woods and old fields.

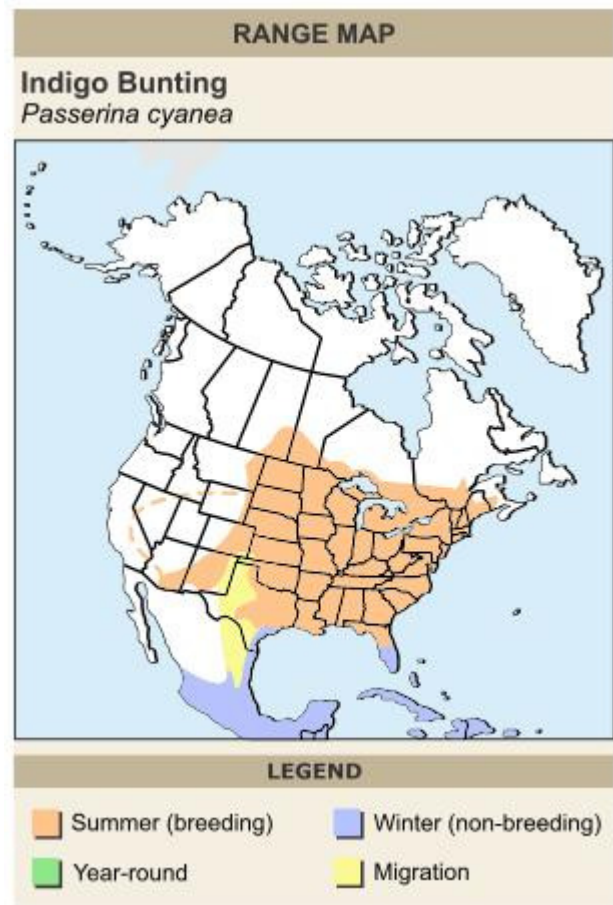
They overwinter in southern Florida and in the Neotropics. Their preferred winter habitat is weedy fields, citrus orchards, and weedy cropland.

Geographic Variation

No subspecies are recognized

Rarity Status (Vancouver area)

10th record for the Vancouver area checklist



Brewer's Sparrow (*Spizella breweri*)

Range and Habitat

Brewer's Sparrow breeds in a variety of habitats, but in the southern parts of their range they prefer big sagebrush and silverberry in short grass. They are also found in mountain mahogany, rabbitbrush, or pinon-juniper woodlands; the northern population is found in subalpine fir and krummholz, and less commonly in balsam willow or dwarf birch habitat, at or above timberline.

In migration they occur in a variety of habitats, including weeds and brush, agricultural, and urban areas. In winter they can be found in creosote brush deserts, mesquite grassland, and in other low, xeric vegetation.



Geographic Variation

Two subspecies are generally recognized: Brewer's Sparrow (*S.b. breweri*) and the Timberline Sparrow (*S.b. taverneri*)

Rarity Status (Vancouver area)

8th record for the Vancouver area checklist

Northern Waterthrush (*Seiurus noveboracensis*)

Range and Habitat

Northern Waterthrush breeds from Alaska and much of Canada south to the northern U.S. Spends winters in the tropics.

Prefers cool, dark, wooded swamps, thickets of bogs, margins of northern lakes, and willow and alder bordered rivers.

During spring and fall migration, often found in thick cover along streams, marshes, and stagnant pools.

Breeds in thickets near slow-moving streams, ponds, swamps, and bogs; in migration and winter, uses a variety of wooded habitats, generally near water, often in mangroves



Geographic Variation

Three subspecies are recognized: (*S.n. limnaeus*) breeding in BC to sw. Alberta: (*S.n. notabilis*) breeding in Alaska to w. Quebec and (*S.n. uliginosus*) breeding in Newfoundland.

Rarity Status (Vancouver area)

Rare transient but annual in small numbers.

4.2 Species Presences and Richness

Bird Study – Combined Banding Totals.

A combined total of 69 species were banded at the 3 study sites:

SPECIES	CODE	SPECIES	CODE
American Gold finch	AMGO	MacGillivray's Warbler	MGWA
American Robin	AMRO	Merlin	MERL
Anna's Hummingbird	ANHU	Nashville Warbler	NAWA
Band-tailed Pigeon	BTPI	Northern Flicker	NOFL
Barn Swallow	BARS	Northern Rough-winged Swallow	NRWS
Bewick's Wren	BEWR	Northern Shrike	NSHR
Black-capped Chickadee	BCCH	Northern Waterthrush	NOWA
Black-headed Grosbeak	BHGR	Orange-crowned Warbler	OCWA
Brewer's Sparrow	BRSP	Pacific Wren (formerly Winter Wren)	PAWR
Brown Creeper	BRCR	Pacific-slope Flycatcher	PSFL
Brown-headed Cowbird	BHCO	Pine Siskin	PISI
Bullock's Oriole	BUOR	Purple Finch	PUFI
Bushtit	BUSH	Red-eyed Vireo	REVI
Cedar Waxwing	CEDW	Red-winged Blackbird	RWBL
Chipping Sparrow	CHSP	Ruby-crowned Kinglet	RCKI
Common Yellowthroat	COYE	Rufous Hummingbird	RUHU
Cooper's Hawk	COHA	Savannah Sparrow	SAVS
Dark-eyed (Oregon) Junco	DEJU	Sharp-shinned Hawk	SSHA
Downy Woodpecker	DOWO	Song Sparrow	SOSP
Dusky Flycatcher	DUFL	Spotted Towhee	SPTO
Eastern Kingbird	EAKI	Steller's Jay	STJA
European Starling	EUST	Swainson's Thrush	SWTH
Evening Grosbeak	EVGR	Townsend's Warbler	TOWA
Fox Sparrow	FOSP	Tree Swallow	TRES
Golden-crowned Kinglet	GCKI	Varied Thrush	VATH
Golden-crowned Sparrow	GCSP	Violet-green Swallow	VGSW
Hairy Woodpecker	HAWO	Warbling Vireo	WAVI
Hammond's Flycatcher	HAFL	Western Tanager	WETA
Hermit Thrush	HETH	Western Wood-Pewee	WEWP
House Finch	HOFI	White-crowned Sparrow	WCSP
House Wren	HOWR	Trail's (Willow) Flycatcher	TRFL
Indigo Bunting	INBU	Wilson's Warbler	IWA
Lazuli Bunting	LAZB	Yellow-rumped Warbler (2 subspecies + unidentified subspecies)	AUWA/MYWA (UYWA)
Lincoln's Sparrow	LISP	Yellow Warbler	YWAR
Long-eared Owl	LEOW		

Figure 2 Species Banded (All Sites Combined)

Bird Study - Banding totals for each of the study sites:

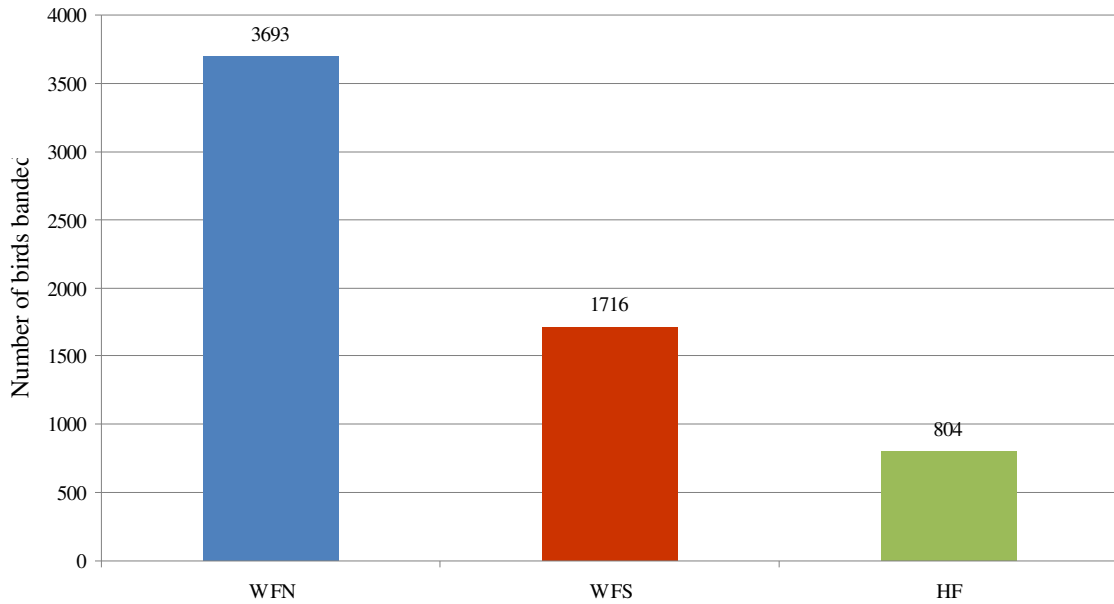


Figure 3 Total Number of Birds Banded at Each Site

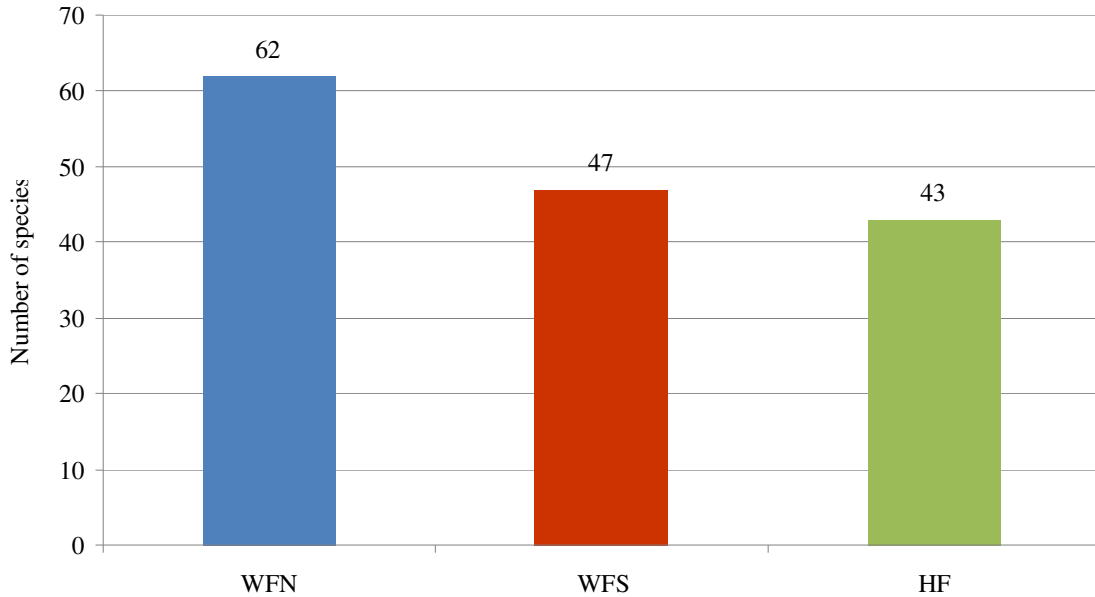


Figure 4 Number of Species Banded at Each Site

The total number of species and individuals banded at WFN was notably higher than the two other study sites due to increased effort at the existing station and should be viewed in conjunction with the net hour data presented below.

4.2.1 Net Hours and Capture Rates

Net hours for each location are presented as the number of nets operated multiplied by the number of hours each net was opened for. Birds per hundred net hours represent the total number of birds captured for each hundred hours of net effort.

Location	Net Hours	Birds per 100 Net Hours
WFN	5,826.1	77.22
WFS	2,554.4	79.66
HF	2,122.0	46.18
Total	10,502.5	59.16

Figure 5 Net Hours

Net hours for WFN were significantly higher than for the two other sites due to the increased ongoing banding effort undertaken at the existing station and greater number of nets (28 versus 10 each at WFS and HF). This was taken in to account when diversity indices were calculated by using Hutcheson (1970) t-test to compare diversity indices between 10 randomly selected nets at WFN and the 10 nets at WFS and HF respectively.

The increased net hours at WFN were reflected in higher overall capture rates (3,693) and greater species diversity (62) than the other locations (See figures 3 & 4).

Net hours for WFS and HF differed by 432 net hours due to the known challenges of siting 10 nets at HF due to the lack of suitable transitional habitat for banding. Initially six nets were operated and then increased after one month to ten to match WFS.

Birds per 100 net hours showed similar capture rates at WFN and WFS and a much lower capture rate at HF. This was also reflected in lower species diversity and lower abundance with HF producing only 47% of the total number of birds banded at WFS.

4.2.2 Most frequently banded species at each of the study sites:

The twenty most frequently banded species at each site were:

Top 20 Species List	WFN	WFS	HF	All 3 combined
Song Sparrow	294	188	87	569
Yellow-rumped Warbler	315	97	1	413
Wilson's Warbler	213	112	76	401
Common Yellowthroat	249	93	58	400
Lincoln's Sparrow	249	84	15	348
Cedar Waxwing.	172	149	26	347
Orange-crowned Warbler	210	53	48	311
American Goldfinch	125	160	25	310
Trail's Flycatcher	138	99	53	290
House Finch	181	54	39	274
Black-headed Grosbeak	134	93	17	244
Savannah Sparrow	138	18	73	229
Swainson's Thrush	110	76	20	206
Purple Finch	144	24	0	168
Black-capped Chickadee	87	61	19	167
Dark-eyed Junco	116	34	15	165
Spotted Towhee	96	36	32	164
American Robin	54	62	35	151
White-crowned Sparrow	49	40	59	148
Red-winged Blackbird	122	0	0	122
Fox Sparrow	80	21	11	112
Yellow Warbler	45	35	25	105
Brown-headed Cowbird	63	8	6	77
European Starling	0	1	14	15
	Signifies that this species was not one of the top 20 species for that site or for combined data			

Figure 6 Top 20 Banded Species List

The most frequently banded species were Song Sparrow (*Melospiza melodia*), Yellow-rumped Warbler (*Dendroica coronata*), Wilson's Warbler (*Wilsonia pusilla*), Common Yellowthroat (*Geothlypis trichas*), Lincoln's Sparrow (*Melospiza lincolnii*), Cedar Waxwing (*Bombycilla cedrorum*), Orange-crowned Warbler (*Vermivora celata*) and American Goldfinch (*Spinus tristis*).

The twenty most frequently banded species were similar at each site with one notable exception. Large numbers of Yellow-rumped Warblers (*Dendroica coronata*) were recorded at both WFN and WFS but were almost absent from HF with just a single bird banded. This is likely due to the fact that Yellow-rumped Warblers prefer open forest and edge habitat to the open grassland habitat represented at HF.

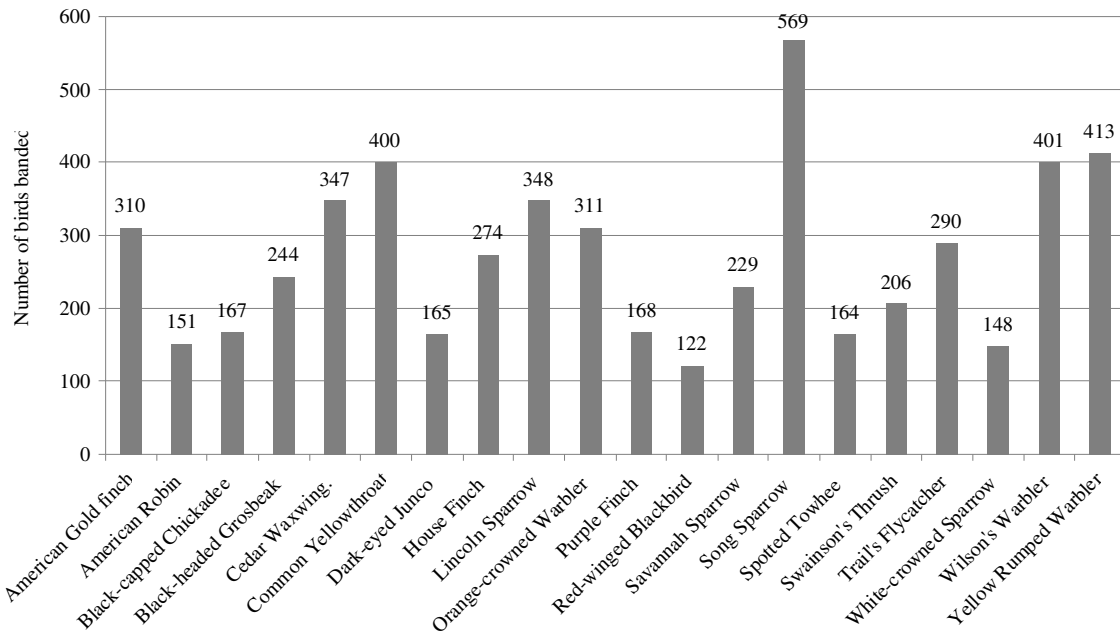


Figure 7 Top 20 Species Banded – all 3 Sites

Savannah Sparrows (*Passerculus sandwichensis*) were abundant at HF and WFN but were scarce at WFS with only 18 banded. This species would be expected in the open grassland habitat at HF but would also have been expected in good numbers at WFS (as they were at WFN) due to suitable adjacent breeding habitat.

The opposite was true with Lincoln's Sparrow (*Melospiza lincolnii*) with 84 banded at WFS, 249 at WFN and only 15 at HF likely due to this species preference for dense shrub cover for nesting.

WFS had slightly higher species richness (47 species) compared to HF (43 species). Species richness was notably higher at WFN (62 species) due to the increased number of nets and net effort at the existing study site as previously explained.

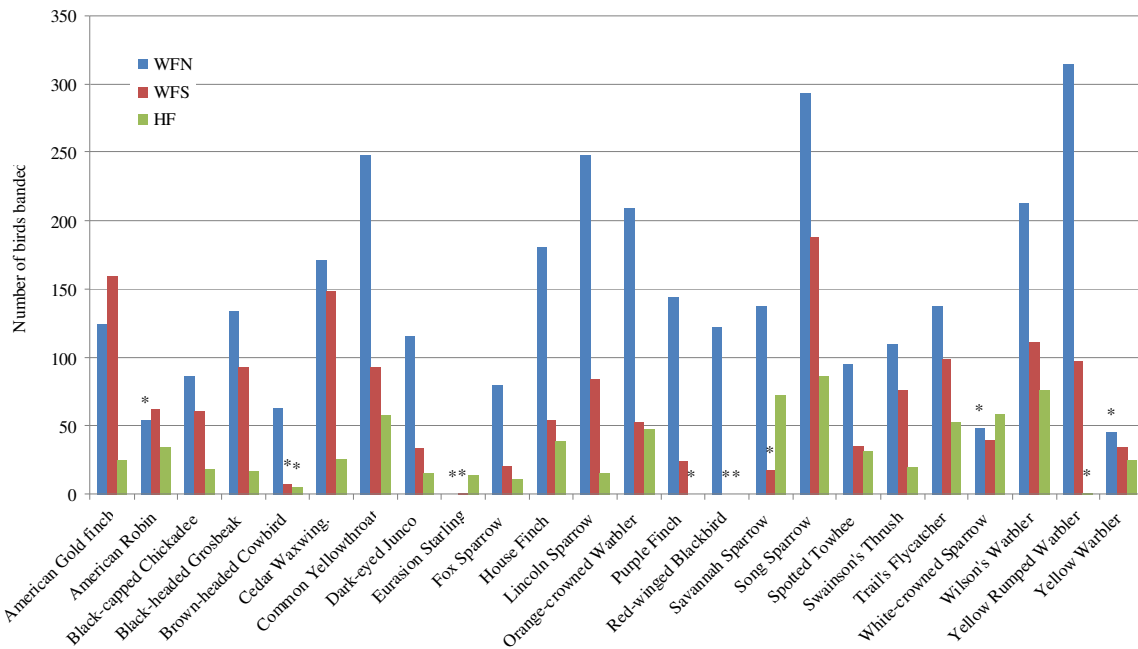


Figure 8 Top 20 Species Banded at Each of the 3 Sites

Top five species weekly abundance was also computed and graphed.

4.3 Relative abundance / Diversity and Evenness

The relative abundance of bird species showed that 80% of the most abundant species were similar at the three sites. Shannon-Wiener and Simpson's diversity indices were used to calculate relative abundance and by comparing diversity as represented by effective numbers of species calculated from their species richness, Shannon index and Simpson index.

Conclusion

For all indices used, Wilson's Farm North showed the highest level of diversity and there was little difference between the diversities of Wilson's Farm South and Home Farm and there was not a huge difference in diversity between the three sites.

The fact that Wilson's Farm North appears to have a higher diversity than the other two sites is likely due to the fact that it was sampled more heavily. That is not to say that it does not have a higher diversity, but the data collected cannot be used to support this which is why the Hutcheson (1970) t-test was used to compare diversity

indices between 10 randomly selected nets at WFN and the 10 nets at WFS and HF as previously mentioned.

In conclusion, all the indices indicate that all sites have a high biodiversity and that there is not a striking difference between the three of them. One reason for this is that a banding study of this nature is extremely thorough, resulting in high species numbers. This is particularly true at WFN where with the density of nets ensures few passerines in the study area escape capture thus producing a high species count.

4.4 Species Health

Species health was measured for both migratory and breeding birds by assessing different physiological indicators.

For migrant birds, body mass and fat scores were recorded to assess a healthy bird's ability to forage successfully enough to deposit fat sufficient to fuel at least one whole night's migration.

Fat is accumulated on a bird in three areas; the furculum (the area between the fused clavicles – the so-called wishbone), the wingpits and abdomen. Each bird caught for banding was assessed for fat by blowing the feathers of the throat to reveal the furculum and scoring fat deposits on scale of 0 -5.

The following tables show fat scores on birds caught for banding for both spring and fall migration for each of the study sites.

Fat Score during Spring Migration

Fat Score	WFN		WFS		HF		Total	
	#	%	#	%	#	%	#	%
0	540	44.48%	151	44.15%	113	55.94%	804	45.73%
1	204	16.80%	60	17.54%	37	18.32%	301	17.12%
2	203	16.72%	61	17.84%	20	9.90%	284	16.15%
3	181	14.91%	44	12.87%	23	11.39%	248	14.11%
4	75	6.18%	22	6.43%	9	4.46%	106	6.03%
5	11	0.91%	4	1.17%	0	0.00%	15	0.85%

Figure 9 Fat Scores during Spring Migration

Fat Score during Fall Migration

Fat Score	WFN		WFS		HF		Total	
	#	%	#	%	#	%		
0	1530	82.26%	688	68.87%	260	76.70%	2478	77.20%
1	195	10.48%	185	18.52%	57	16.81%	437	13.61%
2	73	3.92%	66	6.61%	8	2.36%	147	4.58%
3	43	2.31%	34	3.40%	9	2.65%	86	2.68%
4	12	0.65%	26	2.60%	3	0.88%	41	1.28%
5	7	0.38%	12	1.20%	2	0.59%	21	0.65%

Figure 10 Fat Scores during Fall Migration

During spring migration 54.27% of all birds caught for banding showed fat scores ranging from 1-5. This illustrates the significance of the habitat at CF for migratory birds with more than half of all birds carrying fat loads. During spring migration a large percentage of birds caught for banding are adults (47%) or second year birds (53%) which are more adept foragers having already completed at least one long distance migration.

During fall migration only 22.80% of all birds caught for banding showed similar fat scores. This reduction does not mean the habitat provides less value to fall migrants but reflects the fact that during fall migration a large percentage (88%) of birds caught for banding are dispersing juveniles or hatch year birds which have not yet acquired the foraging skills of their adult counterparts and which consequently show lower fat scores.

4.5 Population Dynamics

The makeup of bird populations in terms of adults versus sub-adults at each of the study sites: (See section 3.0)

4.5.1 Adults vs. Sub-adults

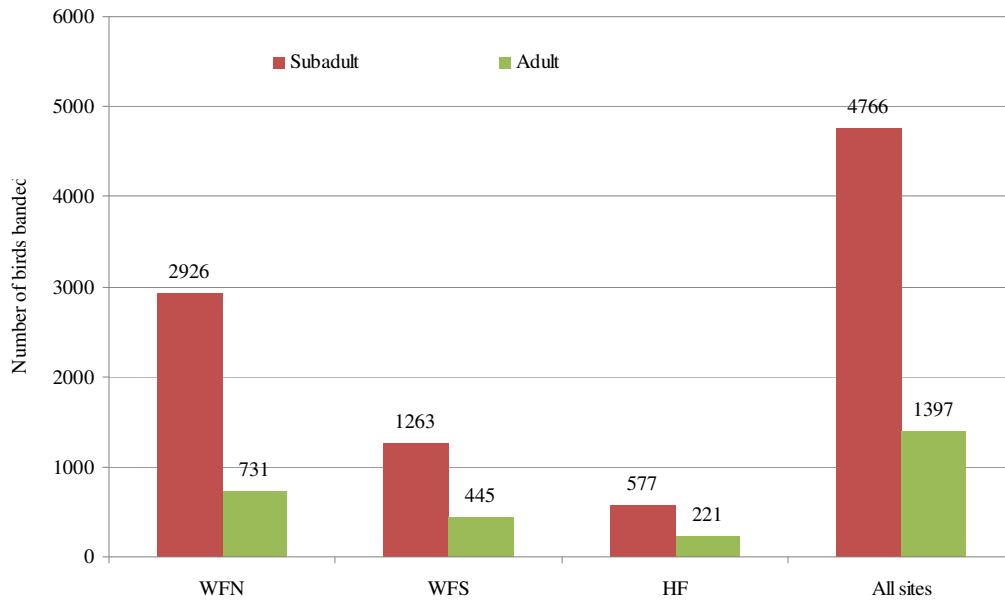


Figure 11 Ages of birds banded at each site and three sites combined

Although the longevity record for a small passerine such as an American Goldfinch (*Spinus tristis*) can be as much as ten years, most small birds live for only a year or two.

The age codes used by the Bird Banding Lab split passerines into four age categories based on the time of year the bird was banded: Hatch Year (HY), After Hatch Year (AHY), Second Year (SY) and After Second Year (ASY).

It should be noted that a SY bird becomes an adult (AHY) bird after its prebasic molt following the breeding season in its *second calendar year*.

For clarification, in this report the definition of an 'adult' bird is an AHY or ASY bird caught for banding versus a HY or SY defined as sub-adult.

The percentage of adults versus sub-adults in the spring is split roughly 50/50 (47% adults vs. 53% sub-adults overall) at each of the study sites.

Spring Migration	WFN		WFS		HF		Total	
Adults	480	45.20%	163	51.75%	87	50.88%	730	47.16%
Sub-adults	582	54.80%	152	48.25%	84	49.12%	818	52.84%
Fall Migration								
Adults	117	7.74%	131	14.22%	69	23.23%	317	11.62%
Sub-adults	1394	92.26%	790	85.78%	228	76.77%	2412	88.38%

Figure 12 Adults vs. Sub-adults during spring and fall migration

The percentages change dramatically in the fall as dispersing juveniles flood in to the park. This is particularly true at WFN where sub-adults make up over 92% of the total birds banded at this time of the year indicating the significance of the habitat for dispersing juveniles.

The totals of adult vs. sub-adult inclusive of birds captured during the breeding season are shown in the following table:

WFN	WFS	HF	All sites	
Subadult	2926	1263	577	4766
Adult	731	445	221	1397
Total	3657	1708	798	6163

Figure 13 Adult vs. Sub-adults (Totals)

4.5.2 Breeding Birds

A total of 48 species were banded during the main breeding season (June and July - see table below). These birds were confirmed breeders based on one of the following:

- a) Census / survey observations
- b) Physiological evidence of breeding characteristics (cloacal protuberances / brood patches)
- c) The degree of skull pneumatization, plumage or soft part coloration indicating a locally hatched bird incapable of sustained flight

The exception was the single Brewer's Sparrow caught for banding at HF on June 3rd, which had no breeding characteristics and was likely a transient.

Species	WFN	WFS	HF
American Goldfinch	x	x	x
American Robin	x	x	x
Anna's Hummingbird	x		
Barn Swallow	x	x	x
Black-capped Chickadee	x	x	x
Bewick's Wren		x	x
Brown-headed Cowbird	x	x	x
Black-headed Grosbeak	x	x	x
Brewer's Sparrow			x
Brown Creeper		x	
Bullock's Oriole	x		
Bushtit	x	x	x
Cedar Waxwing	x	x	x
Chipping Sparrow	x		
Common Yellowthroat	x	x	x
Dark-eyed Junco	x	x	
Downy Woodpecker	x	x	x
European Starling		x	x
Eastern Kingbird	x		
Hairy Woodpecker	x		
House Finch	x	x	x
Indigo Bunting	x		
Lazuli Bunting	x	x	x
Lincoln Sparrow			x
MacGillivray's Warbler	x	x	x
Northern Flicker			x
Northern Rough-winged Swallow			x
Orange-crowned Warbler	x	x	x
Pacific Wren		x	
Pacific-slope Flycatcher	x	x	x
Purple Finch	x	x	
Red-eyed Vireo	x		
Rufus Hummingbird	x		
Red-winged Blackbird	x		
Savannah Sparrow	x		x
Song Sparrow	x	x	x
Spotted Towhee	x	x	x
Swainson's Thrush	x	x	x
Tree Swallow	x		x
Warbling Vireo	x	x	
Violet-green Swallow			x
White-crowned Sparrow	x	x	x

Western Tanager			x
Western Wood-pewee	x	x	x
Willow Flycatcher	x	x	x
Wilson's Warbler	x	x	x
Yellow Warbler	x	x	x
Yellow-rumped Warbler (Audubon's)	x		x
Totals	38	30	34
Total species - combined	48		

Figure 14 Breeding Species



Fully developed brood patch on female Purple Finch (*Carpodacus purpureus*)

4.6 Retraps

During the 2010 banding operations 1,302 birds were retrapped. Birds banded or recaptured on the same day were released without being processed. All other recaptures were brought back to the banding table for processing.

Retraps	
WFN	807
WFS	319
HF	176
Total	1302

Figure 15 Retraps

There were a number of notable retraps both from birds banded at one site and recaptured at another site and from birds banded at WFN in 2009 which warrant special mention:

Cedar Waxwing (*Bombycilla cedrorum*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
229110598	05-25-09	WFN	06-12-10	WFN	
234165540	06-06-09	WFN	06-19-10	WFN	
234165570	06-13-09	WFN	06-17-10	WFN	
234165652	06-26-09	WFN	06-12-10	WFN	
234165732	07-19-09	WFN	07-03-10	WFN	

Lazuli Bunting (*Passerina amoena*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
235144802	06-19-10	HF	07-04-10	WFN	*1
235144980	05-30-10	WFN	06-06-10	WFN	Male - CP 3
235144992	06-20-10	WFN	07-04-10	WFN	*2 Male - CP 3
240175948	08-29-10	WFN	09-04-10	WFN	*3

*1. This bird was a female originally banded at HF on June 19th – She then moved to WFN where she was recaptured four times on July 04, 15, 22, 24. On recapture at WFN she had a fully developed brood patch indicating she bred at this location after moving from HF.

*2. This bird was a male originally banded at WFN on June 6th – He was recaptured three times during July.

*3. This bird was a hatch year (HY) bird banded at WFN on August 29th and subsequently retrapped twice during September.

Black-headed Grosbeak (*Pheucticus melanocephalus*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
97168122	08-20-10	WFS	08-29-10	WFN	
223111724	05-13-10	WFS	08-01-10	WFN	
223111735	05-28-10	WFS	06-19-10	WFN	
223111778	08-09-10	WFS	08-19-10	WFN	
223111783	08-09-10	WFS	09-02-10	WFN	
223111787	08-10-10	WFS	08-29-10	WFN	
236111513	08-29-09	WFN	06-06-10	WFN	
800179020	05-17-09	WFN	05-22-10	WFN	
800179043	05-25-09	WFN	06-06-10	WFN	

800179045	05-25-09	WFN	05-22-10	WFN	
800179050	05-27-09	WFN	07-22-10	WFN	
800179094	07-05-09	WFN	05-22-10	WFN	
800179094	07-19-09	WFN	07-16-10	WFN	
800179114	07-23-09	WFN	06-12-10	WFN	
800179132	07-25-09	WFN	06-20-10	WFN	
800179136	07-25-09	WFN	07-24-10	WFN	
800179185	08-06-09	WFN	07-24-10	WFN	

Willow Flycatcher (*Empidonax traillii*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
259020208	06-03-09	WFN	06-13-10	WFN	
259020303	07-19-09	WFN	07-03-10	WFN	
259020459	07-26-09	WFN	07-16-10	WFN	
260070202	08-01-09	WFN	06-12-10	WFN	
260070202	08-02-09	WFN	08-01-10	WFN	
260070263	08-06-09	WFN	06-13-10	WFN	
260070405	08-15-09	WFN	07-31-10	WFN	
260070405	08-29-09	WFN	07-04-10	WFN	

Savannah Sparrow (*Passerculus sandwichensis*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
231196706	04-29-09	WFN	05-30-10	WFN	
231196753	06-21-09	WFN	06-20-10	WFN	Adjacent net!
231196769	07-05-09	WFN	07-24-10	WFN	
232123303	08-08-09	WFN	08-05-10	WFN	Same net!

Common Yellowthroat (*Geothlypis trichas*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
256023776	05-08-09	WFN	04-18-10	WFN	
256023785	05-09-09	WFN	07-16-10	WFN	
256023790	05-09-09	WFN	05-22-10	WFN	
256023790	04-10-09	WFN	07-03-10	WFN	
256023860	04-24-09	WFN	05-13-10	WFN	
256023870	04-25-09	WFN	09-25-10	WFN	
259020257	06-21-09	WFN	04-25-10	WFN	
259020257	07-19-09	WFN	06-17-10	WFN	

Rufous Hummingbird (*Selasphorus rufus*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
C03777	06-27-09	WFN	05-06-10	WFN	

Swainson's Thrush (*Catharus ustulatus*)

Band Number	Date Originally Banded	Original Location	Date Recaptured	Recapture Location	Notes
225156987	08-15-09	WFN	07-22-10	WFN	Retd. 4 times
225157000	08-16-09	WFN	05-30-10	WFN	Retd. 9 times
229110566	05-21-09	WFN	06-06-10	WFN	
229110567	05-21-09	WFN	06-06-10	WFN	
229110571	05-21-09	WFN	05-21-10	WFN	Retd. 17 times!
229110576	05-23-09	WFN	05-21-10	WFN	Retd. 8 times
234165527	06-03-09	WFN	07-03-10	WFN	

234165550	06-06-09	WFN	05-14-10	WFN	
234165683	07-02-09	WFN	05-21-10	WFN	
234165727	07-19-09	WFN	07-31-10	WFN	
243166147	08-23-09	WFN	07-16-10	WFN	

Retrap data shows the importance of maintaining habitat for returning birds, many of which show enormous site fidelity to nesting areas returning not just to the park or even the general fields from previous years but to specific locations within those fields.

Many retrapped birds were caught either in the same net as the previous year or a net adjacent or close to the original one.

This is especially true with many grassland species such as Savannah Sparrow. Research has shown that the distance moved by these individuals between successive seasons is small; 80% of all the moves being less than 60 metres, which represents the average diameter of their territories. Furthermore, this is true whether or not they are successful breeders with research showing that males remained faithful to the same location despite a string of successive breeding failures within and between seasons. (Bedard et al 1984)

Bird movement between sites within CF can also be significant as can be seen from the retrap data for Black-headed Grosbeaks likely due to ripening fruit on elderberry bushes in different areas of the park.

Retrap data from continuing monitoring and banding studies at WFN will allow us to monitor the survival rates of a wide range of birds. Information on survival rates is vital for effective conservation action and will assist MV in identifying areas of high habitat value for birds.

5.0 BIRD CENSUS AND SURVEY RESULTS

130 species were detected at daily censuses at all three study sites and the weekly surveys conducted at WFN as part of the ongoing banding and monitoring program.

Of these, several species warrant special mention:

12 blue-listed species were detected (WFN station unless otherwise specified):

- Double-crested Cormorant (*Phalacrocorax auritu*)
- American Bittern (*Botaurus lentiginosus*)
- Great Blue Heron (*Ardea Herodias*)
- Tundra Swan (*Cygnus columbianus*)
- Rough-legged Hawk (*Buteo lagopus*)
- Sandhill Crane (*Grus Canadensis*)
- Caspian Tern (*Sterna caspia*)
- Band-tailed Pigeon (*Columba fasciata*)
- Barn Owl (*Tyto alba*) (Home Farm)
- Short-eared Owl (*Asio flammeus*)
- Barn Swallow (*Hirundo rustica*)
- Purple Martin (*Progne subis*)

1 red-listed species was detected:

- Yellow-breasted Chat (*Icteria virens*) (Wilson's Farm South)

1 accidental species was detected:

- Indigo Bunting (*Passerina cyanea*)

Uncommon / rare species detected:

- Ash-throated Flycatcher (*Myiarchus cinerascens*)
- House Wren (*Troglodytes aedon*)
- Northern Waterthrush (*Seiurus noveboracensis*) (Wilson's Farm South)
- Yellow-breasted Chat (*Icteria virens*) (Wilson's Farm South)
- Lazuli Bunting (*Passerina amoena*)
- Indigo Bunting (*Passerina cyanea*)
- Clay-colored Sparrow (*Spizella pallida*) (Wilson's Farm South)
- Brewer's Sparrow (*Spizella breweri*) (Home Farm)
- Vesper Sparrow (*Pooecetes gramineus*)
- Western Meadowlark (*Sturnella neglecta*)

A full list of all species detected during weekly survey and census studies from April 1st – October 31st, 2010 and their listing status is provided below.

Common Name	Scientific Name	Species Code	BC Status	COSEWIC Status
Pied-billed Grebe	<i>Podilymbus podiceps</i>	PBGR	Yellow	
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	DCCO	Blue	NAR (May 78)
American Bittern	<i>Botaurus lentiginosus</i>	AMBI	Blue	
Great Blue Heron	<i>Ardea herodias</i>	GBHE	Blue	SC (Mar 08)
Green Heron	<i>Butorides virescens</i>	GRHE	Yellow	
Tundra Swan	<i>Cygnus columbianus</i>	TUSW	Blue	
Snow Goose	<i>Chen caerulescens</i>	SNGO	Yellow	
Canada Goose	<i>Branta canadensis</i>	CAGO	Yellow	
Mallard	<i>Anas platyrhynchos</i>	MALL	Yellow	
Gadwall	<i>Anas strepera</i>	GADW	Yellow	
Cinnamon Teal	<i>Anas cyanoptera</i>	CITE	Yellow	
Green-winged Teal	<i>Anas crecca</i>	GWTE	Yellow	
Ring-necked Duck	<i>Aythya collaris</i>	RNDU	Yellow	
Wood Duck	<i>Aix sponsa</i>	WODU	Yellow	
American Widgeon	<i>Anas americana</i>	AMWI	Yellow	
Northern Shoveler	<i>Anas clypeata</i>	NSHO	Yellow	
Common Merganser	<i>Mergus merganser</i>	COME	Yellow	
Hooded Merganser	<i>Lophodytes cucullatus</i>	HOME	Yellow	
Turkey Vulture	<i>Cathartes aura</i>	TUVU	Yellow	
Northern Harrier	<i>Circus cyaneus</i>	NOHA	Yellow	NAR (May 93)
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BAEA	Yellow	NAR (May 84)
Cooper's Hawk	<i>Accipiter cooperii</i>	COHA	Yellow	NAR (May 96)
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SSHA	Yellow	NAR (May 97)
Red-tailed Hawk	<i>Buteo jamaicensis</i>	RTHA	Yellow	NAR (May 95)
Rough-legged Hawk	<i>Buteo lagopus</i>	RLHA	Blue	NAR (1995)
Osprey	<i>Pandion haliaetus</i>	OSPR	Yellow	
American Kestrel	<i>Falco sparverius</i>	AMKE	Yellow	
Merlin	<i>Falco columbarius</i>	MERL	Yellow	
Ring-necked Pheasant	<i>Phasianus colchicus</i>	-	Exotic	
American Coot	<i>Fulica americana</i>	AMCO	Yellow	NAR (1991)
Sandhill Crane	<i>Grus canadensis</i>	SACR	Blue	NAR (May 79)

Killdeer	<i>Charadrius vociferus</i>	KILL	Yellow	
Greater Yellowlegs	<i>Tringa melanoleuca</i>	GRYE	Yellow	
Lesser Yellowlegs	<i>Tringa flavipes</i>	LEYE	Yellow	
Wilson's Snipe	<i>Gallinago delicata</i>	WISN	Yellow	
Glaucous-winged Gull	<i>Larus glaucescens</i>	GWGU	Yellow	
Ring-billed Gull	<i>Larus delawarensis</i>	RBGU	Yellow	
Caspian Tern	<i>Sterna caspia</i>	CATE	Blue	NAR (1999)
Rock Pigeon	<i>Columba livia</i>	ROPI	Yellow	
Band-tailed Pigeon	<i>Columba fasciata</i>	BTPI	Blue	SC (2008)
Mourning Dove	<i>Zenaida macroura</i>	MODO	Yellow	
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	ECDO	Yellow	
Barn Owl	<i>Tyto alba</i>	BNOW	Blue	SC (2001)
Long-eared Owl	<i>Asio otus</i>	LEOW	Yellow	
Short-eared Owl	<i>Asio flammeus</i>	SEOW	Blue	SC (2008)
Great Horned Owl	<i>Bubo virginianus</i>	GHOW	Yellow	
Belted Kingfisher	<i>Ceryle alcyon</i>	BEKI	Yellow	
Black Swift	<i>Cypseloides niger</i>	BLSW	Yellow	
Vaux's Swift	<i>Chaetura vauxi</i>	VASW	Yellow	
Anna's Hummingbird	<i>Calypte anna</i>	ANHU	Yellow	
Rufous Hummingbird	<i>Selasphorus rufus</i>	RUHU	Yellow	
Downy Woodpecker	<i>Picoides pubescens</i>	DOWO	Yellow	
Hairy Woodpecker	<i>Picoides villosus</i>	HAWO	Yellow	
Northern Flicker	<i>Colaptes auratus</i>	NOFL	Yellow	
Western Wood-Pewee	<i>Contopus sordidulus</i>	WEWP	Yellow	
Willow Flycatcher	<i>Empidonax traillii</i>	WIFL	Yellow	
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	PSFL	Yellow	
Dusky Flycatcher	<i>Empidonax oberholseri</i>	DUFL	Yellow	
Hammond's Flycatcher	<i>Empidonax hammondi</i>	HAFL	Yellow	
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	ATFL	Accidental	
Western Kingbird	<i>Tyrannus verticalis</i>	WEKI	Yellow	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	EAKI	Yellow	
Northern Shrike	<i>Lanius excubitor</i>	NSHR	Yellow	

Cassin's Vireo	<i>Vireo cassinii</i>	CAVI	Yellow	
Warbling Vireo	<i>Vireo gilvus</i>	WAVI	Yellow	
Red-eyed Vireo	<i>Vireo olivaceus</i>	REVI	Yellow	
Steller's Jay	<i>Cyanocitta stelleri</i>	STJA	Yellow	
Northwestern Crow	<i>Corvus caurinus</i>	NOCR	Yellow	
Common Raven	<i>Corvus corax</i>	CORA	Yellow	
Tree Swallow	<i>Tachycineta bicolor</i>	TRES	Yellow	
Violet-green Swallow	<i>Tachycineta thalassina</i>	VGSW	Yellow	
Barn Swallow	<i>Hirundo rustica</i>	BARS	Blue	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	NRWS	Yellow	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	CLSW	Yellow	
Purple Martin	<i>Progne subis</i>	PUMA	Blue	
Black-capped Chickadee	<i>Poecile atricapillus</i>	BCCH	Yellow	
Bushtit	<i>Psaltriparus minimus</i>	CBCH	Yellow	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	RBNU	Yellow	
Brown Creeper	<i>Certhia americana</i>	BRCR	Yellow	
Bewick's Wren	<i>Thryomanes bewickii</i>	BEWR	Yellow	
House Wren	<i>Troglodytes aedon</i>	HOWR	Yellow	
Pacific Wren	<i>Troglodytes Pacificus</i>	PAWR	Yellow	
Ruby-crowned Kinglet	<i>Regulus calendula</i>	RCKI	Yellow	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	GCKI	Yellow	
Swainson's Thrush	<i>Catharus ustulatus</i>	SWTH	Yellow	
Hermit Thrush	<i>Catharus guttatus</i>	HETH	Yellow	
Varied Thrush	<i>Ixoreus naevius</i>	VATH	Yellow	
American Robin	<i>Turdus migratorius</i>	AMRO	Yellow	
American Pipit	<i>Anthus rubescens</i>	AMPI	Yellow	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	CEDW	Yellow	
European Starling	<i>Sturnus vulgaris</i>	EUST	Exotic	
Orange-crowned Warbler	<i>Vermivora celata</i>	OCWA	Yellow	
Nashville Warbler	<i>Vermivora ruficapilla</i>	NAWA	Yellow	
Townsend's Warbler	<i>Dendroica townsendi</i>	TOWA	Yellow	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	AUWA MYWA	Yellow	

Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	BTYW	Yellow	
Yellow Warbler	<i>Dendroica petechia</i>	YWAR	Yellow	
Northern Waterthrush	<i>Seiurus noveboracensis</i>	NOWA	Yellow	
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	MGWA	Yellow	
Wilson's Warbler	<i>Wilsonia pusilla</i>	WIWA	Yellow	
Common Yellowthroat	<i>Geothlypis trichas</i>	COYE	Yellow	
Yellow-breasted Chat	<i>Icteria virens</i>	YBCH	Red	E (2000)
Western Tanager	<i>Piranga ludoviciana</i>	WETA	Yellow	
Lazuli Bunting	<i>Passerina amoena</i>	LAZB	Yellow	
Indigo Bunting	<i>Passerina cyanea</i>	INBU	Accidental	
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	BHGR	Yellow	
Spotted Towhee	<i>Pipilo maculatus</i>	SPTO	Yellow	
Chipping Sparrow	<i>Spizella passerina</i>	CHSP	Yellow	
Clay-colored Sparrow	<i>Spizella pallida</i>	CCSP	Yellow	
Brewer's Sparrow	<i>Spizella breweri</i>	BRSP	Yellow	
Vesper Sparrow	<i>Poocetes gramineus</i>	VESP	Yellow	
Fox Sparrow	<i>Passerella iliaca</i>	FOSP	Yellow	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	SAVS	Yellow	
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	LISP	Yellow	
Song Sparrow	<i>Melospiza melodia</i>	SOSP	Yellow	
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	WCSP	Yellow	
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	GCSP	Yellow	
Dark-eyed Junco	<i>Junco hyemalis</i>	ORJU	Yellow	
Bullock's Oriole	<i>Icterus bullockii</i>	BUOR	Yellow	
Western Meadowlark	<i>Sturnella neglecta</i>	WEME	Yellow	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	RWBL	Yellow	
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	YHBL	Yellow	
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	BRBL	Yellow	
Brown-headed Cowbird	<i>Molothrus ater</i>	BHCO	Yellow	
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	EVGR	Yellow	
Purple Finch	<i>Carpodacus purpureus</i>	PUFI	Yellow	
House Finch	<i>Carpodacus mexicanus</i>	HOFI	Yellow	

Pine Siskin	<i>Spinus pinus</i>	PISI	Yellow	
American Goldfinch	<i>Spinus tristis</i>	AMGO	Yellow	
House Sparrow	<i>Passer domesticus</i>	HOSP	Exotic	

Figure 16 List of all species detected during weekly survey and census studies



6.0 CONCLUSIONS

The data contained in this report supports a number of initial conclusions which can be drawn from this study:

6.1 The significance of the habitat at CF for migratory and breeding birds

With huge diversity and abundance CF clearly has tremendous value for migratory and breeding birds. The combination of diverse, structurally complex plant communities and the presence of resources – food, water and shelter with high aquatic insect productivity in spring and high insect/fruit production in fall provide an ideal environment for both breeding and migrant birds.

The importance of stopover sites for migratory birds can not be overstated. There are many anthropogenic threats to migrants the most serious of which is continuing habitat loss and degradation particularly for birds crossing ever fragmented urban landscapes such as Vancouver's lower mainland. Research has shown that more than 85% of adult mortality occurs during migration (Sillett and Holmes 2002) and that mortality rates are more than 15 times higher during migration compared to stationery periods. Concerted efforts must therefore be made to identify and protect stopover sites for all groups of migratory birds (waterfowl, shorebirds, landbirds and raptors).

The banding studies have confirmed the significance of the habitat at CF as a stopover site where a fat-depleted migrant can rapidly meet its nutritional needs.

6.2 The value of the habitat at CF for rare and uncommon birds

Colony Farm's location at the confluence of the Coquitlam and Fraser Rivers and its ecologically diverse structurally complex plant communities and the presence of food and water resources has been previously documented in this report. It provides unique habitat and a 'bridge' between interior and coastal habitats and is a magnet for rare and uncommon bird species.

All three sites produced birds we would classify in this 'rare and/or uncommon' category with the greatest diversity at WFN:

Species	WFN	WFS	HF
Dusky Flycatcher	X		
Ash-throated Flycatcher	X		
Lazuli Bunting	X (8 banded)	X (4 banded)	X (7 banded)
Indigo Bunting	X		
Chipping Sparrow	X		
Brewer's Sparrow			X
Clay-colored Sparrow		X	
Nashville Warbler	X		X
House Wren	X		
Long-eared Owl	X		
Eastern Kingbird	X	X	
Northern Waterthrush		X (2 banded)	
Northern Shrike		X	
Yellow-breasted Chat		X	
Gray Catbird (09)	X		
Brown Thrasher (09)	X		
White-throated Sparrow (09)	X		
Western Kingbird (09)	X		

Figure 17 Rare and Uncommon Bird Species

Lazuli Buntings appeared at all three sites and appear to be well dispersed throughout the park. Their preferred habitat is open scrub and thickets and hedgerows along and within fields. All 3 sites had breeding males with cloacal protuberances but only one site (WFN) had a female with a developed brood patch and no sites had locally hatched birds captured which were incapable of sustained flight. WFS had one hatch year (HY) bird. This warrants further study as to whether

some birds are breeding outside the park and foraging within it and the colour banding program initiated this year may well shed some light on this.

The Yellow-breasted Chat at WFS was found in the low dense thickets and brambles along the small dyke/ditch which bisects the banding site. This is perfect 'chat' habitat and would provide excellent nesting habitat in the small saplings and elderberry bushes and impenetrable thicket alongside the dyke/ditch.

The two Northern Waterthrushes were caught at the WFS site in the same area the Yellow-breasted Chat was sighted. These birds prefer similar habitat in thick cover along streams, marshes, and stagnant pools and ditches.

The brushy areas, thickets, hedgerows and scrubby areas at CF offer perfect habitat for many of the rare and uncommon species encountered in the study. Hedgerows are particularly important providing food and shelter for many birds and the ditches and banks associated with hedgerows provide habitat and nesting sites for a wide variety of these species.

6.3 The value of the habitat at CF for dispersing juvenile birds

An analysis of fat scores and the numbers of hatch year vs. adult birds at each site was presented in sections 4.4 and 4.5.1 respectively and showed the huge volume of dispersing juvenile birds which use the park after the breeding season. The high insect/fruit production in fall provides an ideal environment for dispersing juveniles to deposit fat sufficient to sustain the energy demands for southward migration. The banding data provides compelling evidence of the value of the habitat for these dispersing juvenile birds.

6.4 The value of old field habitat for aerial insectivores (swallows)

Swallows are part of the guild* of aerial insectivores. Aerial insectivores have suffered precipitous declines and their plight has gained increasing attention. Research has shown that in the last 20 years the population of Barn Swallow and Bank Swallow has fallen by 70% and Cliff Swallow, Northern Rough-winged Swallow and Purple Martin by over 50%. (Birds Studies Canada 2008)

Without solid insights into the mechanisms that are driving population changes, it is difficult to imagine how the current decline of aerial insectivores can be forestalled, let alone reversed. There is also increasing urgency. VARC's WFN banding data from 2010 showed a huge decline in the capture of swallow species and their numbers compared to 2009.

Species	2009	2010
Barn Swallow	107	6
Bank Swallow	1	0
Cliff Swallow	1	0
Nthn. Rough-winged Swallow	5	0
Tree Swallow	7	7*
Total	121	13

Figure 18 Swallows

* Of the 27 Tree Swallows banded this year 20 were from nest boxes erected for the 2010 season and were excluded from this count as only 7 were captured in nets for comparison with 2009 numbers.

This is of course only one year's comparison data and may have been influenced by weather as swallows tend to feed at higher elevations when high pressure forces insects higher whereas low pressure days force swallows to feed at lower elevations where there is a greater likelihood of capture in mist nets. It does, however, wave a red flag and should be monitored closely.

Although population levels of most aerial insectivores are still sufficiently large enough to allow meaningful scientific study, population trajectories suggest that sample sizes will be much reduced over the next decade or two. To come up with the answers in time, a massive research effort should be considered and the old field habitat at CF provides an excellent opportunity to contribute to these monitoring studies.

(*A guild is a grouping of species sharing a common life-history trait, even though the species themselves may not be closely related).

6.5 Swainson's Thrush (*Catharus ustulatus*) - Molt-Migration Research

The term molt-migration is given to individuals that leave their breeding grounds and head south to find a suitable location to undergo their annual pre-basic molt before continuing southward migration. Unlike other species which molt either on their summer grounds or on their winter grounds, Swainson's Thrushes overlap their molt with migration. Birds may continue to migrate while actively molting or they may initiate and/or complete their molt in an area south of their breeding grounds.

Where arid conditions on the breeding grounds in late summer are not especially conducive to molting, adults routinely migrate substantial distances to special molting areas. In general, their movement away from increasingly drought-stricken breeding habitats is timed for their arrival somewhere in the desert Southwest or Mexico during the period of monsoon rains. The flush of insects associated with these rains constitutes a bumper-crop resource for the energy and protein-demanding molt process.

Research on adult Swainson's Thrushes at CF (all sites) showed that many of the adult birds caught for banding after the breeding season were in flight feather molt suggesting CF could be a special molting area for this species. This phenomenon was reported in last years banding study at WFN – more study is needed.

6.6 Comparison of the three study sites

As previously stated in section 4.3 there was little difference in biodiversity at the three sites with all indices showing similar values. There was however a significant difference in the total number of individual birds banded between the WFS and HF sites.

The number of birds banded at HF was only 46% of the total banded at WFS and birds per hundred net hours at the HF site only 58% compared to WFS.

It would appear that species diversity and numbers at HF are lower particularly in areas which are predominantly covered by reed canary grass (*Phalaris arundinacea*).

Several studies have been done on bird use and productivity in reed canary grass dominated habitats and the results have so far been inconclusive (Eileen Kirsch USGS - 2004 , Greg Spyreas et al - 2010, Brock McMillan & Bradley Cook - 2008)

Some species such as Song Sparrow (*Melospiza melodid*) have been positively associated with reed canary grass cover, while those for other species such as Common Yellowthroat (*Geothlypis trichas*) have not. The only notable finding appears to indicate that the number of species of birds at sites invaded by reed canary suggests that bird diversity is influenced more by structure than plant diversity.

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