Examining a Large Reverse Migration of Songbirds off Fish Point, Pelee Island, Ontario

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Introduction

From 26 April to 20 May 2010-2012, as part of my Master's degree research, I conducted daily diurnal surveys monitoring reverse migration (RM) off Fish Point, Pelee Island. On 10 May, James Burrell, Mike Burrell, Brandon Holden, Eric Holden, Jennifer Bock and I observed a large movement of songbirds streaming south overhead off Fish Point. The flight of 5,811 birds on 10 May 2011 was the largest flight observed during my three seasons of spring field surveys (2010-2012). This paper describes and examines this large movement.

RM, as it is used here, refers to the diurnal movement of songbirds in a southerly direction during spring migration (*i.e.*, the opposite direction one would normally expect of a spring migrant in Ontario). Very little has been published regarding RM; documented RM is limited to just a few locations throughout North America and Fennoscandia (Richardson 1978, Alerstam 1978, Richardson 1982, Lindstrom and Alerstam 1991, Akesson 1999, McLaren *et al.* 2000), suggesting it is a localized phenomenon. While RM is known to occur at a limited selection of sites, it has been found to be a relatively common component to the dynamic of spring bird migration in the Point Pelee area and other sand spits along the lower Great Lakes (O'Neill 2006; K. Burrell pers. obs.). RM has

Dickcissel reverse migrating off Fish Point, Pelee Island. 3 May 2012 . *Photo: Brandon R. Holden*

been documented more in the spring than in the fall within the Great Lakes region (Lewis 1939, Gunn 1951).

Two papers have studied RM in the Pelee area examining the role of weather (Lewis 1939, Gunn 1951). Lewis (1939) found that species that were common during RM become increasingly uncommon to completely absent in days following intense RM. Gunn (1951) found that flights generally occurred between one and four hours after sunrise, and were most intense in May. Heavy flights of RM were linked to approaching inclement weather, and it was found that birds commonly will fly against the wind (Gunn 1951).

During my field surveys at Fish Point, close to 50,000 songbirds participating in RM events were documented over the course of three seasons of monitoring, representing impressive counts for several species (K. Burrell unpublished data). Of those species that were identified, a relatively high proportion were species at risk, species noted to be vagrants or unusual species in the Pelee area, indicating that surveys for reverse migrants could be a useful tool for learning about species at risk and vagrant species.

Among the three seasons, spring 2011 stood out as the most interesting. Good influxes of birds on Pelee Island occurred over three distinct periods (25-27 April , 30 April and 6 May) leading up to the large movement on 10 May. Surprisingly, no large movements of songbirds had been observed departing south from Fish Point until 10 May. Leading up to this date, vagrants and other unusual species had been observed relatively frequently (*e.g.*, Eared Grebe (*Podiceps nigricollis*), Glossy Ibis (*Plegadis falcinellus*), Laughing Gull (*Leucophaeus atricilla*), Acadian Flycatcher (*Empidonax virescens*), Kentucky Warbler (*Geothlypis formosa*), Yellow-throated Warbler (*Setophaga dominica*), Henslow's Sparrow (*Ammodramus henslowii*), Summer Tanager (*Piranga rubra*), Dickcissel (*Spiza americana*) and Western Meadowlark (*Sturnella neglecta*) (Glossy Ibis and Henslow's Sparrow are reported in Cranford 2012)).

Methods

From 26 April - 20 May, daily observations were made from the southern tip of Fish Point (N41°43.5', W82°40.3'). Fish Point is located at the extreme southwest corner of Pelee Island in Essex County, Ontario (Figure 1). Pelee Island is situated within the western Lake Erie basin and is part of the Pelee archipelago, constituting the largest island within the basin (Henson *et al.* 2010, Nature Conservancy of Canada 2012).

I structured a standardized fixed point survey similar to those of the Long Point Bird Observatory (Long Point Bird Observatory 2005) and Thunder Cape Bird Observatory (Wojnowski *et al.* 2010) migration monitoring protocols, while also taking into account the methods of Gunn (1951) and Wiedner *et al.* (1992) and my own personal observations.

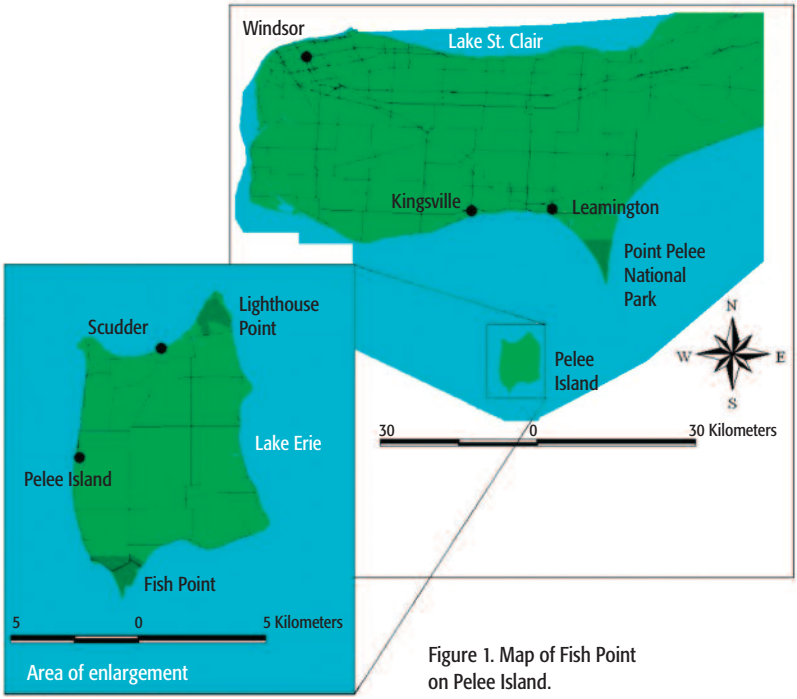

Figure 1. Map of Fish Point on Pelee Island.

I situated myself at the tip of Fish Point, along the edge of the last vegetated bushes. This allowed for an unobstructed view of the sky, while being close enough to identify individual birds. Bird observations were collected during the first three hours (roughly 06:00-09:00) following sunrise, and sometimes extended after the three hours, if the volume of flight warranted more observation.

Birds were recorded as RM only if they were observed to be flying in a persistent southerly direction out over Lake Erie. Birds were identified to species when possible, otherwise each individual bird was assigned an identification as close to species level as possible (*e.g.*, blackbird species). Only songbirds (Passeriformes), excluding swallows, were counted as these species have been shown to actively undergo RM (Lewis 1939, Gunn 1951). Swallows were excluded because they are aerial insectivores and can range quickly over large areas, making it difficult to properly record true numbers of individuals (Kerlinger 1995, Faaborg 2002) and determine whether they are true reverse migrants.

Weather conditions were recorded twice daily (07:00 and 19:00) on site, using a Kestrel 3000 Weather Meter (Pacific Data Systems 2009) portable weather device. Temperature, humidity, wind strength and barometric pressure

were measured using the Kestrel unit while wind direction and percent cloud cover were measured manually. Rainfall data were collected using Environment Canada's historical climate data (Environment Canada 2012).

Results

For nearly a week prior to the evening of 9/10 May, close to no precipitation was recorded on site. Temperatures from 7-9 May were seasonal, ranging from a low of 7.2° C to a high of 18.7°C. Winds overall were light and out of the north throughout the period. Pressure was relatively low (~97-98kpa) and stable (Environment Canada 2012). Thunderstorms began in the evening of 9 May and rolled intermittently through the area in the hours leading up to sunrise on 10 May (sunrise occurred at 06:13).

In the early hours of 10 May, Fish Point (and the rest of Pelee Island) experienced light rain, with light-moderate winds (10-20km/hr) out of the northeast, going east-south-east around 06:00. Temperature was steady overnight through the morning, ranging from 10-13° Celsius. A band of moderate-heavy precipitation went through the area shortly after 05:30; however, this precipitation quickly abated. Pressure slowly decreased throughout the morning, ranging from 99.43-99.20kpa (Environment Canada 2012).

Upon arriving at Fish Point before sunrise, bird activity was relatively subdued, giving the impression that few birds were around. Shortly after sunrise, the wind started to shift more out of the east. Around 06:30 songbird activity started to increase with dozens of birds flying off Fish Point, heading south. Activity continued at this pace, picking up towards 08:00. Shortly after 08:00

Table 1. Warbler species observed on 10 May 2011 to be reverse migrating

SPECIES	TOTAL
Black-and-white Warbler (*Mniotilta varia*)	10
Prothonotary Warbler (*Protonotaria citrea)*	1
Tennessee Warbler (*Oreothlypis peregrine*)	2
Orange-crowned Warbler (*Oreothlypis celata*)	1
Nashville Warbler (*Oreothlypis ruficapilla*)	407
American Redstart (*Setophaga ruticilla)*	45
Kirtland's Warbler (*Setophaga kirtlandii*)	1
Cape May Warbler (*Setophaga tigrina*)	5
Northern Parula (*Setophaga americana*)	13
Magnolia Warbler (*Setophaga magnolia*)	104
Bay-breasted Warbler (*Setophaga castanea*)	7
Blackburnian Warbler (*Setophaga fusca*)	27
Yellow Warbler (*Setophaga petechia*)	67
Chestnut-sided Warbler (*Setophaga pensylvanica*)	54
Black-throated Blue Warbler (*Setophaga caerulescens*)	24
Palm Warbler (*Setophaga palmarum*)	253
Pine Warbler (*Setophaga pinus*)	1
Yellow-rumped Warbler (*Setophaga coronata*)	292
Black-throated Green Warbler (*Setophaga virens*)	31
Canada Warbler (*Cardellina canadensis*)	3
Wilson's Warbler (*Cardellina pusilla*)	1
Unidentified warbler sp.	2516
Total	**3865**

songbirds (predominantly warblers) were observed to be flying off the point at an estimated rate of 20-30 individuals per minute, lasting until 10:30.

A total of 5,811 songbirds was observed flying south, with warblers making up the bulk (67%) of migrants, involving 21 species and a total of 3,865 birds (Table 1). Other neotropical migrants were relatively common throughout the flight, with four non-warbler species representing 8.7% of total migrants (Table 2). Rare and unusual species were detected in this movement. Single Kirtland's Warbler (*Setophaga kirtlandii*), Prothonotary Warbler (*Protonotaria citrea*) (Figure 2; Cranford 2012) and a Summer Tanager were the standouts. Also noteworthy was the relatively high count (84) of Bobolink.

Table 2. Additional neotropical migrants noted on 10 May 2011

SPECIES	TOTAL
Eastern Kingbird (*Tyrannus tyrannus*)	85
Scarlet Tanager (*Piranga olivacea*)	35
Bobolink (*Dolichonyx oryzivorus*)	84
Baltimore Oriole (*Icterus galbula*)	304

Discussion

Weather is a well-known influence on bird migration (Hassler *et al.* 1963, Gauthreaux and Able 1970, Richardson 1978, Bloch and Bruderer 1982), and the event on 10 May is no exception. It appears the relatively high night-time temperatures and light winds helped

Figure 2. Female Prothonotary Warbler reverse migrating off Fish Point, Pelee Island. 3 May 2012. *Photo: Brandon R. Holden.*

create events conducive for a heavy nocturnal migration on the night of 9/10 May. Precipitation that occurred overnight and in the very early morning hours created 'fallout' conditions (Weidensaul 1999), forcing thousands of songbirds onto Pelee Island, likely resulting in the large flight of songbirds reverse migrating off Fish Point the next morning (10 May).

Common explanations for RM do not seem to apply to the movement observed on 10 May, contradicting the hypotheses formulated by Lewis (1939) and Gunn (1951). In the days following this RM event, inclement weather did not form; temperatures stayed at normal levels and no precipitation fell as Pelee Island experienced relatively high pressure and stable conditions (Environment Canada 2012). Birds often reverse migrate when winds are out of the south (Gunn 1951, K. Burrell pers. obs.), and during and after inclement weather conditions; winds during the night of 9/10 May consisted largely of east-northeast winds and weather was calm and uneventful for several days following 10 May.

The flight occurring on 10 May 2011 was the largest RM that took place over the course of my entire study (2010-2012). A total of 5,811 birds was observed, vastly outnumbering the next largest RM event of 3,295 taking place on 30 April 2012 (Table 3). Only six dates have had greater than 2,000 birds participating in RM, signifying the magnitude of the flight on 10 May.

Table 3. Six largest single day counts of reverse migrants during my study (2010-2012)

RANK	TOTAL	DATE
1	5,811	10 May 2010
2	3,295	30 April 2012
3	2,318	3 May 2012
4	2,159	13 May 2012
5	2,089	30 April 2010
6	2,039	5 May 2010

Other days with high counts of RM consisted largely of blackbirds and warblers, similar to the flight on 10 May. It is not surprising that the bulk of the species participating in the flight on 10 May were warblers, as mid-May is typically when the highest numbers of warblers pass through southern Ontario (Hince 1999, Ridout 2010). Similarly, flights during the second half of April typically consist of blackbirds, as these are the most abundant passerines migrating through the region at this time of year (Hince 1999, Ridout 2010). Depending on the time of year, it is likely that the most abundant species group at that time will likely be the most abundant species group taking part in RM. Additionally, it is not surprising that high counts of other neotropical migrants (*e.g.*, Eastern Kingbird and Baltimore Oriole) were also observed on the event of 10 May, given these species' similar migration phenology.

The paucity of information on RM, particularly in the Great Lakes region, and its apparent prevalence during spring and to a lesser extent fall migration (Lewis 1939, Gunn 1951), highlights the importance of the results presented by this study. Research of this nature provides a valuable measure of songbird numbers passing through the Great Lakes region. Much remains to be learned about the relationship between weather and bird migration, particularly with regards to RM. Further study is warranted, particularly at locations where this phenomenon regularly occurs.

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