Ernestown Wind Park

Migratory Butterfly Stopover Area Habitat-use Surveys Report

Prepared by: M.K. Ince and Associates Ltd.

Prepared for: Ernestown Windpark LP

July 18, 2013



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1 Introduction

Site investigations of the Ernestown Wind Park project location determined the presence of two candidate migratory butterfly stopover areas (BMSA01 and BMSA02; see **Figure 1-1**). These candidate habitats were identified as areas that were > 10 ha in size with a combination of field and forest habitats located within 5 km of Lake Ontario. This habitat typically provides butterflies with a location to rest prior to their long migration south. Migratory butterfly stopover candidate habitats are normally fields or meadows with an abundance of preferred nectar plants and woodland edge to provide shelter. **Table 1-1** below presents additional information on the candidate habitats identified during the site investigation.

Table 1-1: D	escription of Ca	andidate Migratory Butterfly Stopover Areas

Feature	Project		Attributes and Composition	Function	Associated Natural
ID	Components within 120 m	Size	ELC Community	Function	Features
BMSA01	Access Road (0m) Collector (0m) Hardstand (0m) Turbine (0m)	98 ha	Woodland communities: FODM7-6 (ELC ID: 35); FODM2-3 (ELC ID: 39); FODM9-4 (ELC ID: 41, 47, 57); SWDM2-1 (ELC ID: 36); and FODM6-1 (ELC ID: 37). Upland cultural meadow and thicket communities: MEMM3 (ELC IDs: 40, 42, 43, 45, 48, 49, 51, 52, 53) and THDM2-4 (ELC ID: 34).	The habitat, a minimum of 10 ha in size with a combination of field and forest habitat present, and located within 5 km of Lake	Woodland (WO04, WO06)
BMSA02	Access Road (0m) Collector (0m) Hardstand (0m) Turbine (0m)	136 ha	Deciduous and coniferous woodland communities: FODM7-1 (ELC ID: 68, 84), FODM7-2 (ELC IDs: 66, 74, 82), FOCM1-2 (ELC ID: 63) and FOCM2-1 (ELC IDs: 64, 71, 72). Upland cultural meadow and thicket communities: MEMM3 (ELC ID: 67) and THDM2-4 (ELC IDs: 76, 78).	Ontario, provides butterflies with a location to rest prior to their long migration south.	Woodland (WO05-4, WO13)

The *Natural Heritage Evaluation of Significance Report* (MKI, 2012) did not report on the outcomes of the evaluation of significance for BMSA01 and BMSA02, due to seasonality constraints and surveys unable to be conducted prior to the submission of the Natural Heritage Assessment. Consequently, BMSA01 and BMSA02 were treated as significant and subject to additional habitat-use surveys to determine significance. This process of treating a habitat as significant and committing to undertake studies prior to construction is outlined in Appendix D of the Natural Heritage Assessment Guide (MNR, 2011).

This report presents the results from the pre-construction habitat-use surveys for BMSA01 and BMSA02.



Figure 1-1: Map indicating location of candidate Butterfly Migratory Stopover Areas at Ernestown Wind Park

2 METHODOLOGY

2.1 Field Evaluations

Detailed methodology for pre-construction surveys to evaluate the significance of BMSA01 and BMSA02 was provided within the *Natural Heritage Environmental Impact Study Report* (MKI, 2012). In August 2012, prior to the commencement of surveys, the Ministry of Natural Resources (MNR) was contacted with a copy of the methodology copied from the *Natural Heritage Environmental Impact Study Report* (MKI, 2012) as well as a map outlining the proposed transect routes.

To summarize, field staff visited identified candidate migratory butterfly stopover areas to observe for the presence of migrating butterflies as well as to evaluate habitat according to the methodology outlined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and *Draft SWH Ecoregion 6E Criterion Schedule* (MNR, 2012). During the initial visit, transects were walked and flagged with tracks recorded on a GPS. Surveys were only conducted on calm day as these were less optimal for migration and provided conditions better for observing butterflies during stopover.

There was one modification made to the methodology presented in the *Natural Heritage Environmental Impact Study Report* (MKI, 2012). Although the methodology indicated that the transect was to be walked twice weekly between August and late October for a total of 20 visits, after discussions with the MNR it was agreed that visits once weekly would be appropriate until it was clear that migrants were arriving in significant numbers, at which point surveys would be increased to twice weekly. As it happened significant numbers of migrant butterflies were never observed. After seven weeks of weekly observations a review of data was conducted by the MNR to assess the need for continuing with the remaining surveys. It was concluded that the remaining surveys were not necessary and the data obtained to that point was sufficient to make appropriate determinations about the butterfly habitats. Please see **Appendix A** for a copy of the protocol reviewed by the MNR and all associated correspondence.

2.2 Analysis

Transect data was extrapolated for each habitat following methodology from Buckland et al. (2008) which calculates density for transect sampling using the following equation:

$$\widehat{D} = \frac{n}{a} = \frac{n}{2wL}$$

where n is the number of butterflies counted of the species of interest, L is the total length of the transect and w is the half width of the transect. Estimated habitat abundance is then calculated by multiplying the total area of the habitat (A) by the density (\widehat{D}) . Total Monarch Use Days (MUD) were then calculated by using the following formula:

$$MUD = A\widehat{D} \frac{d_{season}}{d_{survey}}$$

where d_{season} and d_{survey} are the number of days in the season (90) and the number of days during which surveys occurred (7), respectively.

3 RESULTS

A summary of the pre-construction habitat-use surveys for BMSA01 and BMSA02 at the Ernestown Wind Park Project is provided in **Table 3-1** below. Details on the dates, time, weather conditions during each site visit, as well as the names of each of the investigators is provided.

Table 3-1: Summary of Site Visits

Date Purpose / Habitat Start/ End Time Weather C		Weather Conditions	Site Investigators	
2012-08-30	BMSA01	10:00 AM -	Temp:18°C	Rob Tymstra
		12:30 PM	Cloud Cover:0/10	
			Wind (Beaufort): 1	
			Precipitation: None	
2012-08-31	BMSA02	10:00 AM -	Temp: 21 - 28°C	Rob Tymstra
		12:00 PM	Cloud Cover:10/10	
			Wind (Beaufort): 2 - 4	
			Precipitation: Rain started at 12 PM	
2012-09-06	BMSA01	10:40 AM -	Temp: 26°C	Rhiannon Leshyk
		1:04 PM	Cloud Cover:3/10	
			Wind (Beaufort): 1 - 2	
			Precipitation: None	
2012-09-07	BMSA02	10:05 AM -	Temp: 25°C	Rhiannon Leshyk
		1:30 PM	Cloud Cover:0/10	
			Wind (Beaufort): 0 - 1	
			Precipitation: None	
2012-09-11	BMSA02	11:10 AM –	Temp: 21°C	Rhiannon Leshyk
		3:10 PM	Cloud Cover:7/10	
			Wind (Beaufort): 0 - 3	
			Precipitation: None	
2012-09-12	BMSA01	10:00 AM -	Temp: 20 - 26°C	Rhiannon Leshyk
		12:30 PM	Cloud Cover:0/10	
			Wind (Beaufort): 2 - 4	
			Precipitation: None	
2012-09-19	BMSA01	10:45 AM –	Temp: 10 - 15°C	Rhiannon Leshyk
		1:15 PM	Cloud Cover:0/10	
			Wind (Beaufort): 2 - 3	
			Precipitation: None	
2012-09-20	BMSA02	9:30 AM –	Temp: 15 - 18°C	Rhiannon Leshyk
		11:30 AM	Cloud Cover:1/10	
			Wind (Beaufort): 2 – 3, gusts of 4-5	
			Precipitation: None	

2012-09-27	BMSA01	11:30 AM – 1:55 PM	Temp: 12 - 18°C Cloud Cover:1/10 Wind (Beaufort): 1 – 2 Precipitation: None	Rhiannon Leshyk
2012-09-28	BMSA02	10:15 AM – 12:30 PM	Temp: 12°C Cloud Cover:4/10 Wind (Beaufort): 0 – 1 Precipitation: None	Rhiannon Leshyk
2012-10-02	BMSA02	11:10 AM – 1:20 PM	Temp: 14-15°C Cloud Cover:10/10 Wind (Beaufort): 0 – 1 Precipitation: None	Rhiannon Leshyk
2012-10-03	BMSA01	11:15 AM – 12:50 PM	Temp: 15°C Cloud Cover:10/10 Wind (Beaufort): 0 – 1 Precipitation: None	Rhiannon Leshyk
2012-10-04	BMSA02	10:30 AM – 12:00 PM	Temp: 17°C Cloud Cover:10/10 Wind (Beaufort): 0 – 1 Precipitation: None	Rhiannon Leshyk
2012-10-05	BMSA01	10:45 AM – 12:10 PM	Temp: 17-24°C Cloud Cover:10/10 Wind (Beaufort): 0 – 3 Precipitation: None, rain prior to survey	Rhiannon Leshyk

All butterfly observations made during the site visits can be seen in **Table 3-2** below. Please see **Appendix B** for a copy of all field forms.

Table 3-2: All butterfly observations during pre-construction habitat-use surveys of BMSA01

Species	30/08/2012	06/09/2012	12/09/2012	19/09/2012	27/09/2012	03/10/2012	05/10/2012
Monarch	9	4	0	1	0	1	2
Painted Lady	0	0	0	0	0	0	0
White Admiral	0	0	0	0	0	0	0

Table 3-3: All butterfly observations during pre-construction habitat-use surveys of BMSA02

Species	31/08/2012	07/09/2012	11/09/2012	20/09/2012	28/09/2012	02/10/2012	04/10/2012
Monarch	3	4	4	5	0	0	5
Painted Lady	0	0	0	0	0	0	0
White Admiral	0	0	2	0	0	0	0

Table 3-4: Monarch Use Days (MUD) calculations for BMSA01 and BMSA02

Habitat	BMSA01	BMSA02
n	17	21
<i>L</i> (m)	3338	4073
w (m)	100	100
\widehat{D} (m ⁻²)	2.55E-5	2.58E-5
$A (m^2)$	1.27E+6	1.90E+6
n (adjusted)	32.3	49.0
MUD (days)	416	630

To evaluate each habitat, the *Significant Wildlife Habitat Ecoregion 6E Criterion Schedule* (MNR, 2012) was used. This document states that MUD of >5000 or >3000 with the presence of Painted Ladies or White Admirals is to be considered significant. There were insufficient butterfly observations made during the site visits to meet the requirements for significance for either BMSA01 or BMSA02.

4 Conclusion

There were fourteen site visits made to Ernestown Wind Park for the evaluation of two candidate migratory butterfly stopover habitats treated as significant in the *Natural Heritage Evaluation of Significance Report* (MKI, 2012). Pre-construction habitat-use surveys were conducted in August through October 2013. Some Monarchs and two White Admirals were observed, however, there were insufficient observations of butterflies to meet the requirements for significance. Consequently, the potential negative environmental effects and mitigation measures as well as the environmental effects monitoring plan for BMSA01 and BMSA02, presented in the *Natural Heritage Environmental Impact Study Report* (MKI, 2012), are not applicable to the Ernestown Wind Park Project, as the habitats have been determined to be not significant.

5 References

- M.K. Ince and Associates. 2012. Natural Heritage Evaluation of Significance Report. 133p.
- M.K. Ince and Associates. 2012. Natural Heritage Environmental Impact Study Report. 78p.
- Ministry of Natural Resources. 2012. *Significant Wildlife Habitat Ecoregion 6E Criterion Schedule*. 42p.
- Ministry of Natural Resources. 2011. *Natural Heritage Assessment Guide for Renewable Energy Projects*. 99p.

6 QUALIFICATIONS AND LIMITATIONS

M. K. Ince & Associates Ltd. (MKI) has prepared this report in accordance with its proposal and information provided by its Client. The information and analysis contained herein is for the sole benefit of the Client and save for regulatory review purposes may not be relied upon by any other person.

MKI's assessment was made in accordance with guidelines, regulations and procedures believed to be current at this time. Changes in guidelines, regulations and enforcement policies can occur at any time and such changes could affect the conclusions and recommendations of this report.

The reports, maps and related documents may rely on information provided to MKI by the Client. This information may include but is not limited to manufacturer and construction specifications and other related information. Maps are created using a Geographic Information System (GIS) that compiles records, information, and data from various sources which may contain errors. While we have referred to and made use of reports, maps and geospatial data and specifications prepared by others, we assume no liability for the accuracy of the information contained within.

Maps and documents made available by MKI are not legal surveys and are not intended to be used as such. No original surveying is included as part of these maps. If any contradictions exist between this document and relevant municipal, provincial or federal laws, regulations, codes, or policies, the text of the laws, regulations, codes or policies will be the legal authority.

APPENDIX A - PROTOCOL AND CORRESPONDENCE

- Survey protocol, extracted from Natural Heritage Environmental Impact Study Report, September 28, 2012 (2 pages)
- Email correspondence, August 30, 2013, October 16, 2013 (4 pages)

minimum of 10 subsequent visits will take place to confirm that the site is not a roost. Acoustic stations will be positioned within 10 m of the potential roost with monitoring commencing at dusk.

Acoustic monitoring will be done using modern broadband bat detectors with condenser microphones. The system will allow the surveyor to determine the signal to noise ratio of the recorded signals (i.e. from oscillograms or time-amplitude displays). Microphones will be positioned to maximize bat detection (i.e. situated away from nearby obstacles to allow for maximum range of detection, microphones angled slightly away from the prevailing wind to minimize wind noise). The same acoustic monitoring system will be used throughout the survey. All relevant information on the acoustic equipment will be recorded, including information on all adjustable settings (i.e. gain level), the position of the microphones, dates and times by station when recorded was conducted. Additionally, at each visit field staff will record: date, start time, end time, weather, species observed, number of individuals and behavior in field notes.

Data attained from acoustic surveys will be analyzed to identify species whenever possible. Any unidentified species will be included in analysis and reporting. Collected information will include the total and mean bat passes (i.e. sequence of two or more echolocation calls) per detector hour and per night as a function of bat activity at the survey station.

Species of particular interest (focal species) include: Big Brown Bat, Little Brown Myotis, Eastern Pipistrelle (Tri-coloured Bat), Northern Long-eared Myotis, Eastern Small-footed Myotis, and Silverhaired Bat.

The 2009 *Draft SWH Ecoregion 6E Criteria Schedules* (OMNR, 2009) will be used to evaluate candidate habitat for significance. This document states that a habitat is considered significant with the presence of twenty or more Eastern Pipistrelle (Tri-coloured Bats) or Northern Long-eared Myotis, ≥30 Big Brown Bats, ≥50 Little Brown Myotis or >10 Adult Female Silver-haired Bats.

MIGRATORY BUTTERFLY STOPOVER AREA (BMSA01 & BMSA02)

Field staff will visit identified candidate migratory butterfly stopover areas to observe for the presence of migrating butterflies and will evaluate habitat according to methodology outlined in the *Significant Wildlife Habitat Technical Guide* (OMNR, 2000) and *Draft SWH Ecoregion 6E Criterion Schedule* (OMNR, 2012). Preselected transect routes will be selected within the candidate habitat. Prior to conducting surveys the MNR district office will be contacted to approve transect routes.

During the initial visit, transects will be walked in field and GPS tracks will be recorded. The route will also be flagged where possible with fluorescent tags, so that the route can be followed on subsequent visits.

Surveys will be conducted by an individual experienced in identifying the butterflies of eastern North America, especially focal species (see below). Transects will be walked twice weekly in the fall, from August to late October. In total, 20 visits will be made during fall. No surveys will be conducted during severe weather events such as high winds and/or heavy precipitation, as this can bias results. Surveys will be conducted on calm days, as these are less optimal for migration and provide conditions better for observing butterflies during stopover. All butterflies seen will be recorded and flyovers will be clearly indicated. Surveyors will record the following data at each visit on standardized data forms (see **Appendix A2**):

Date

- Names of people conducting the work
- Time (start and end time of transect; duration of time it took to walk the transect)
- Weather conditions (temperature, %cloud cover, Beaufort wind scale, visibility)
- GPS track of each transect
- Species observed and total number of individuals of each species detected along the transect
- Height estimate
- Flight direction
- Direction and distance from observer

Species of particular interest (focal species) include: Painted Lady, White Admiral, and Monarch (COSSARO: Special Concern).

The *Draft Ecoregion 6E Criterion Schedule* (OMNR, 2012) will be used to evaluate candidate habitat for significance. This document states that a habitat is considered significant if the presence of Monarch Use Days (MUD) during fall migration (Aug/Oct) is >5000 for Monarchs or >3000 with the presence of Painted Ladies or White Admirals.

LANDBIRD MIGRATORY STOPOVER AREA (LMSA01, LMSA02, LMSA03 & LMSA04)

Field staff will visit identified candidate landbird migratory stopover areas to observe for the presence of migrating birds and will evaluate habitat according to methodology outlined in the *Bird and Bird Habitats: Guidelines for Wind Power Projects* (OMNR, 2011) for "stopover counts". Preselected transect routes will be selected within the candidate habitat. Prior to conducting surveys the MNR district office will be contacted to approve transect routes. Transects spaced at least 200 m apart will run north to south within candidate habitat. This will ensure that the majority of the habitat is sampled for the presence of migrating birds.

During the initial visit, transects will be walked in field and GPS tracks will be recorded. The route will also be flagged with fluorescent tags spaced ~20 m apart or within reasonable visual distance, so that the route can be followed on subsequent visits.

Surveys will be conducted by an individual experienced in identifying the birds of eastern North America both aurally and visually. Transects will be walked twice weekly in the spring, from mid-March to late May, and in the fall, from mid-August to late October. In total, 20 visits will be made during fall and another 20 during spring. All surveys will commence at sunrise and continue to no later than four hours after sunrise. No surveys will be conducted during severe weather events such as high winds and/or heavy precipitation, as this can bias results. All birds heard or seen will be recorded and flyovers will be clearly indicated. Surveyors will record the following data at each visit on standardized data forms (see **Appendix A3**):

- Date
- Names of people conducting the work
- Time (start and end time of transect; duration of time it took to walk the transect)
- Weather conditions (temperature, %cloud cover, Beaufort wind scale, visibility)
- GPS track of each transect
- Species observed and total number of individuals of each species detected along the transect



Ernestown: Fall field work, Butterfly and Landbird Migratory Stopover surveys

Thu, Aug 30, 2012 at 12:03 PM

Hi Tom,

Please review Eric's comments and copy me on your reply.

Bonnie Van Tassel, Project Coordinator Horizon Legacy Energy Corp.

801 - 2300 Yonge Street Toronto ON M4P 1E4 Tel 416.864.9977 x 8222 Fax 416.864.9568 bvantassel@horizonlegacy.com

----- Forwarded message ------

From: Prevost, Eric (MNR) <eric.prevost@ontario.ca>

Date: Thu, Aug 30, 2012 at 12:00 PM

Subject: RE: Ernestown: Fall field work, Butterfly and Landbird Migratory Stopover surveys

Hello Bonnie,

I have reviewed the methodology and have the following comments.

The survey routes do not include the entire extent of the habitat. Transects along Taylor Kidd BLVD and the rail tracks would be appropriate to capture the entire extend of the habitat.

Field sheets should include the distance of birds or flocks from the transect line. This data later analyzed, will assist in calculating species densities and abundance at a later date.

Based on the methodologies outlined in MNR's guidelines, behavioural and flight data may not be required for subsequent analysis of significance for the habitats being surveyed.

Should you have any questions or concerns with these comments, please feel free to contact me directly.

Best wishes,

Eric R. Prevost

Renewable Energy

Planning Ecologist

Ontario Ministry of Natural Resources

Peterborough District

300 Water Street

Peterborough, ON K9J 8M5

Eric.Prevost@Ontario.ca

Phone: (705) 755-3134

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From: Bonnie Van Tassel [mailto:bvantassel@horizonlegacy.com]

Sent: August 30, 2012 11:03 AM

To: Prevost, Eric (MNR)

Subject: Fwd: Ernestown: Fall field work, Butterfly and Landbird Migratory Stopover surveys

Bonnie Van Tassel, Project Coordinator Horizon Legacy Energy Corp.

801 - 2300 Yonge Street Toronto ON M4P 1E4 Tel 416.864.9977 x 8222 Fax 416.864.9568 bvantassel@horizonlegacy.com

[Quoted text hidden]



Ernestown Landbird and Migratory Butterfly Stopover Area Data Analysis

Prevost, Eric (MNR) <eric.prevost@ontario.ca>
To: Thomas Bernacki <thomas.bernacki@mkince.ca>

Tue, Oct 16, 2012 at 11:32 AM

Hello Thomas.

Thank you for your email. I have the following points for your consideration.

- Data are currently sufficient to make appropriate determinations for butterfly habitats. No further surveys are required at this time.
- Survey efforts (routes) for LMSA 03 and 04 represent only a portion of the overall habitat. Given that these two habitats have close to 35 species, with a number of days with more than 10 species, it is quite likely that these habitat are significant. The total number of birds seen, may actually be a factor of the area surveyed as abundance is likely density and area dependent within these habitats. Based on the data presented, these habitats could be considered significant. Further discussion on this matter may be of some value.
- I would suggest that continued surveying within all LMSA (with the exception of LMSA 01) continue for the time being and that further consideration be made for how the un surveyed portions of the habitats may contribute to conclusions of significance for these habitats.

Should you have any questions, or wish to discuss with matter in more detail, please feel free to contact me directly.

Best wishes,

Eric R. Prevost

Renewable Energy

Planning Ecologist

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From: Thomas Bernacki [mailto:thomas.bernacki@mkince.ca]

Sent: October 16, 2012 10:41 AM

To: Prevost, Eric (MNR)

Subject: Ernestown Landbird and Migratory Butterfly Stopover Area Data Analysis

Hi Eric,

We have attached a summary of the data collected for candidate landbird and migratory butterfly migratory stopover areas within the

area of the proposed Ernestown Wind Park. Currently, data collected from fall surveys has not confirmed any candidate habitat as significant under the 6E Ecoregion Criteria Schedule. Given that the migratory season is almost over and that studies have not yet confirmed the habitats as significant, we propose that the data collected up to this point is adequate for the fall season and that no further surveys are required this season. We would appreciate feedback on the attached summary as soon as possible so that we can make additional field plans as necessary.

--

Thomas Bernacki, P.Eng.

M.K. Ince and Associates Ltd.11 Cross St., Dundas, ON L9H 2R3

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http://www.mkince.ca

APPENDIX B - FIELD FORMS AND MAPS

- Field Forms, August 30, 2012 through October 5, 2012 (14 pages)
- Transect Map (1 page)

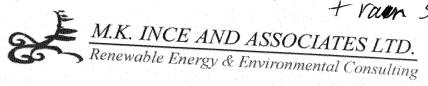
Date:	30 Aug T	Surveyor	r(s): Reb Ty	mstra
Start Time:	10 00	1230	,	Duration of transect:
Eastings:			Station #:	Transect I
Cld. Cover: Bar. Pr.		Wind W-	Temp Range:	18°C 30)

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individua s
Species Individuals Height Estimate Fight Direction (N, S, E, W) Focal Species Focal Species Monarch 9 0-5 m W+3 5-25 m 9 Painted Lady 0 Other Identified Species Other Identified Species Swallowfail 1 3 m S 5 m 1 White Admiral White 12 0-3 m all 5-20 m 12					
Monarch	9	0-5m	W+3	5-25m	9
Painted Lady	0				
White Admiral	O				
		Other Identi	fied Species		
		3 m	3	5 m	1
Eur. Cabbah Whist	2 12	0-3m	all	5-20 m	12
louded Sulphur	2	0-5m	16	510m	2

Bar. Pr. Wind - Sw 2 -> 4 Temp Range: 21 - 28 C	Date: 31 AUG 1 Start Time: 10 ac Eastings: 362873 Cld. Cover: 10090	2 Surveyor(s): RCB 7 12°C 1898128 Station Wind-Sw 2-34 Temp Range	Thack's
---	--	--	---------

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Tot Indivi
		Focal S	pecies		S
Monarch	3	5 m	S,W	5-10 m	
Painted Lady	0				
White Admiral	0				
Mourning		Other Identifie	ed Species)
Cloak Suestion	7	0-3 m		-5 m	
Mark reat spangled	2	0-2m	L!	3 m	7
Exitillary ed Admiral	2	0-1m	W.	1m	2
liceroy	2	0-2m $0-1m$	V	2 m	4
r. Cabbaga		0-2 m	1/	7 m	_2
white	(/	lm		2-10m	//
ent wallowtail			11 3	m	1
Sulphur	2	0-3m	<i>u</i> 5		Z 8

* 3/4 of transect walked gint after wind increased train started



Date: 2072 19-0 e Surveyor(s):	21
Start Time: 0 : 40	Duration of transect: 25hrs.
Eastings:	Station #: SMSRO\
Cld. Cover: 30% wind 1-2 Bar. Pr.	Temp Range: 26°C

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal Spe	cies		
Monarch)III	20 m	W	210 W	4
Painted Lady		MACAGEMENT OF STATES A STATE OF STATES AND A STATES	tanagarina disentropo de este esta esta esta esta esta esta est	acrounding to Comma To Comma Co. Amil (C. Doromoca amil across a successive across a successive across acro	out or out the deal assessment appropriate of death of the particles.
White Admiral			war nee weet taal a tot sakkely waast aan oo to beel aan beel aan oo beel aan beel aan beel aan beel aan beel	easternous view of the authorise and so to be treative and place and an activities and a so the contract of th	and which is the second time and the second
	L.	Other Identifie	d Species	<u> </u>	
SULPHURSP	11 4	⊗	· w·	NIOM	2
CABOATA WHITE	H11+H++H	0	' در ۱	NIOM	16
ORC SUPPLY	1	6	-	1 m	
PINK SUPHIK	11		Constitution.	1-14	2
Tailed Blue		Ò	7	I An	
MOVENCE CLOKIN		10 10	N	110 1	



Date:	2012 - 09- C)7- s	urveyor(s):	RU	
Start Time:	10.05	1.30		Duration of transect:	35 mg
Eastings:				Station #: SMSAGZ	
Cld. Cover: Bar. Pr.	0/0	WWW O	+1	Temp Range: 25%	

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal Spe	cies	No. of the control of	
Monarch					4
Painted Lady	de autoriorio populari confecciona distrato de	gas namen er	American di American di Semanya, ing Semanya, ing Semanya, ing Semanya, ing Semanya, ing Semanya, ing Semanya,	gge gar af Frein om General Company (1985) and each of standard and garden (1986) and an angel of the company	ANNE STATEMENT S
White Admiral				source in the contract section of the contract	
		Other Identifie	d Species		
OKBBRUE WI.	1241 44 44	0	S	5	31
the RoM.	1111 44		<i>N</i> .	Ų:	9
MORNING CLOR	1	0	1)	11	2
Re bookers	(1)	<u> </u>	11)	101/	3
Old Sugnal	. (1		700	b/M	2
					A



MORACIE MHOTE
HTT HAT HAT HAT I

Date: 2012 -09 - 17	Surveyor(s):	2PCIII
Start Time: /D DO End	17 30 7 M	Duration of transect: 25 Hes
Cld. Cover:	WIND 02. GUERSOF 4.	Station #: BWS A Ø
Temp Range: 76° C -216° C.		

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
	Focal	Species	4		
Monarch	Ø			isan meritangan kananggan dan dalam dan kananggan dan kananggan dan kananggan dan kananggan dan kananggan dan San meritanggan dan kananggan dan kananggan dan kananggan dan kananggan dan kananggan dan kananggan dan kanang	saaculla eet taraat oo ka ah
Painted Lady	6		na na maraka Diraha Sirika dina dina dina sa antah banga ka angalah dina sa s	HER PAGE AND HER WAS AND	Seed to the root of the control of t
White Admiral	\$				SSOC CO SYMPHOTORNOS E VISCOIRA COSARIO (CORRESPONDO MONTO
	Other Ident	ified Species	on problems (Materials Constitutions of the Constitution of		26
OLANGI SULPHUR CABBRONE WHITE MORNING CLOAK	Sac Fron	Ø Ø Ø	E E N	10ME 10ME 510MN 21MS	



Mos 26th/12 @ 9:00AM.

Date: $20.2 - 0.1 - 1.1$	Surveyor(s):	QC
Start Time: \\ \\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	3:1080	Duration of transect: 4 hrs.
Cld. Cover:	1NO 0 \$ -3 (gras)	Station #: BMADZ
Temp Range: $2\sqrt{9}$	DA -	

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
	Focal	Species			
Monarch		Ø	5	5-10 M S-	4
Painted Lady	0 -	and the state of t	and and security security and a security and a security security of the securi	A STEELEN STEE	distributive succession of the
White Admiral		Ø	W	5-10 M S	2
	Other Iden	tified Species			
Amelian Coppe		Ø		ZIM E	
Sulther Sp	AHT IN	B	S	10m 4).	9
TANKED BLUE		Ø	and the second s	<1m 5	1
CADRACK WHITE	HI HH THE	8	Ministrative	10mN	15
MICEROY.	1111	Ø	9	5m E.	4
GO ADMIRAL		Ø	N	UMU	
Olanical Sultice	1	Ø	٤	ISMS	



Date: 2012-09-19	Surveyor(s):
Start Time: 0:45	Duration of transect: 2,5 Hz
Eastings:	Station #: Station #:
Cld. Cover: 10 University Bar Pr.	Temp Range: 10°C - 15°C

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal S	pecies		
Monarch	.)	ø	S	5m W	
Painted Lady			MANAGEMAN ORDER SING FOR ANY PROPERTY AND PR	weatherst code assections grave applications at two-to-section and analysis on code of	e entrepe system i som en geden toperates, brothe som entrepe antien entre entre est est
White Admiral			ernimmussa met slav ern dele lauten verskrinda er list enni slæfetærm at delene verskende pag	dientroproteste par and variety ou authorities which is a second of the	Market de 200 de parties et encons de noncratury austropous authorio (n. o.)
	_	Other Identi	fied Species		
MAN COROL	HITTHE	Ø		MMMS	
ORANIA "	li(()	'Ø	5	10m S	4
MORN CLOAK	1	Ø	Peach-o.	5M S	
HALL SHAKEN	#1	B	NE	Day M	le
Common forever Singriman Sp.		Ø	La Exten	In al	3
					20.70

Date: 2012 - 09 - 26	Surveyor(s):	PFO
Start Time: 9:30 AM	nd Time:	Duration of transect:
Cld. Cover:	WIND'S 23 GUSTS OF 4-	Station #: BWSA Ø2
Temp Range: 15°C ー しらし	RAMO Ø	LI) A BIT WINDY BUT WINDY . YUSCLEDTY, CALING TOM WHOYS PAIN THE WORKEND

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
	Focal	Species			·
Monarch	HHT	Ø	FORMINGS)	5-10MG) flushy from asters	5
Painted Lady	· · · · · · · · · · · · · · · · · · ·	wa njeonaliwa na maka maka maka maka maka maka maka	त्तार के प्रकार के प्रकार के प्रकार कर प्रकार के प्रकार के प्रकार के प्रकार कर के प्रकार कर के प्रकार कर के प् प्रकार के प्रकार कर के प्रकार कर के प्रकार कर के प	- Service entire franchist e extractive space and the service space and the service entire space and th	Che Line Cast (Still Lido Lido Ned Ned Cart & the Province Manager (Still Agric.
White Admiral		medicant production and an advantage state of the second state of the second state of the second second second		ing makeng sa mang mang mang mang mang mang mang man	reest for all discontinuous and an experience and an experience and a contract of the contract
	Other Iden	tified Species			
iliceou	Other ident	(X)	$\Gamma \omega$	5m 3	1
CASBAGE WHITE		CX	\ \(\mathcal{Q}\)	5M N	2
Clouded Sugar	Wen	- Q		IMW	7
Olange Surthur	+H (I)	Ø		m 5	8
SULPHUZ S.		Ø	1)processor	CMS	1
					ini ana ang mang panganahana



Date: 26/2-05(-27-	Surveyor(s): (4)
Start Time: End Time:	Duration of transect: 2.25 WS
Cld. Cover: 1/10 WIND8 1-2	Station #: BWSAd
Temp Range: 12°C ー 1分°C	(ALL WOODLAND NOWTH OF RATIL LINE)

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
	Focal	Species			
Monarch	Ø	water from the construction of the constructio	artina konsulutukan desian menangan katalan kata da sebagai kata da sebagai katalan katalan katalan katalan ka	MANOCHINI MENERO MERENDE ENDE ENDE ENDE ENDE ENDE ENDE END	weegkaantingskrike killeges kriss en nataanskrike gebruik ook kanses
Painted Lady	Ø	maria de Antono e es es es es esta graza planación de sociedad de grada de productiva de constituy de la constitución de const		oditszkolutójanuk kirjusztó iszalakkiakiszt kepül szakonokrokkiatakonokkiatakonokkia	agastaratapatapanan periodi asaman periodi periodi periodi ancia encola esperiodi.
White Admiral	6-		SOOD SAGESSANNAGUN STAINNA SEENNAMESE SAGNAN MOOSTSAGES SAGISAAN SAANAAN SA	- Managasting and Managasting and Application of States Selection of the State	Salate Shirt Can Sanga Andrean Sana Andrean Sana Andrean
	Other Iden	tified Species			***************************************
COBBRAGE WHITE	HT 1'	B		1m86	6
Clouded Supper	HT III	Ø		3M5-10MW	9
Sulphur SP	HHHTI	Ø	7	1-10m.N-S.	
Mornholo Clonx	1	Ø	E-3	5-10m E	2
GIANT SWALLOWAIL LARVA		Ø	<u>-</u> -	< lm	2
ORMGE SLEHE	1	Ø		5m SW	
ent for a des Colons at the Philippine of the Autobra 1962 and and 1973 at 1973 at 1975 and 1982 and 1983 at 1 The Colon of the Colon of the Philippine of the Autobra 1982 and 1983 at 1983 at 1983 at 1983 at 1983 at 1983 a					
				S	



LON PRICELY PST

Date: 1012 -05-78	Surveyor(s):
Start Time: 0515 Am End Time:	Duration of transect:
Cld. Cover: UINOS O	Station #:
Temp Range: 12°C	RAINS & (ALL WOODLAND & MEADO SOUTH OF RAIL LINE
	South of Pail Line

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individual
	Focal	Species			
Monarch	Ø	**************************************	tie kanstuuroogamussisten ka kastuusta kuntuuroosa kastuuta kasta kasta ka	mais the six positions ready an artisticated structure films to be well desired and the six of the	Mary Control of Contro
Painted Lady	10	ка (закадомира ма т бока до немочено до немочено розпологи систем из теменове	त्वा ^{च्या} कर प्रमाणी महास्य द्वारा प्रमाणका प्रमाण स्थाप	Postalismus errorcy production and the production of the postalism and the state of the postalism and the post	13 years of Confession State of Confession Sta
White Admiral	H arana en	het gladening men grotte general annahmen men grenninger en dat in men ein den anna eine er er er er er er er	der gewichtliche gewennt gewennt zu der Fried der Annehmen der Annehme	enterent et samme de la grant en en en de product de product de product de production de la production de la c	and and the second seco
	Other Ident	ified Species			
WHILL SP	THE HE HELL		W	5-40MB	17
ASOBOLE WHITE	HT IVI	8	Guarante	Im N	9
INC LOGIO SLEWE		Ø	-	1m5	2
VICTROY	N.	Ø 9 \	- 追	IMWI SME	2
ORDING SURFIR		Ø	- Name of the last	5m W	3
LOVERD SURHIM		, %	***	2m N	1



Date: 2012 - 10 - 03	Surveyor(s):	
Start Time: KAM KNO. 12	2:50 PM Duration of transect:	95 mins see associated
 Eastings:	Station #: BM A Ø I	mares for the
Cld. Cover: 10/10 WN0 % Bar. Pr. 2010 8 Cd	Ø − \ Temp Range: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	CA STATES OF THE

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal S	pecies	**************************************	
Monarch		Ø	W	5m N.	
Painted Lady	0			કારા ભાગ તે કરી છે. તેમાં પહેરા તેમાં આવેલા ભાગ તે કરતા કરે છે. તેમાં અને ભાગ તે કરતા હતા કરતા કરતા કરતા હતા છ તેમાં તેમાં તે	<mark>tikusakken misk takse kakel</mark> eta kerila sa para kerila sa kerila kerila sa
White Admiral	Ø			graphy and manifest and all the detection of the last section of the section of t	delittima State organistic communication in the state of
*		Other Identi	fied Species	<u> </u>	<u> </u>
Char White	HHIII 1	Ø	**************************************	5 MS	8
Supar SP	THY.	Ø	Ľ	10mz	5
ORANGE SURVE		Ø	E	IMC.	3
CLOUDED SLANG		Ø	According to the second	IMN	3
			>		



Date.	2012:10:0	Surveyor	S): KPC OC	-2		
Start Time:	1/:10 AM	LND8 1:20 PM	Du	ration of transect:	130 mms.	see associations for party for
Eastings:			Station #	BMSA	12	hal to
Cld. Cover: Bar. Pr.	10/10	WIND : 0-1 20	Temp Range:]4°c - 15°	C	101/6
Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals	
	* · · · · · · · · · · · · · · · · · · ·	Focal S	pecies	<u> </u>		
	\propto					
Monarch	\mathcal{L}	No.				
Painted Lady	Ø 1			करन्त्र के स्वर्धिक क्षणां वात्र वात्र का कृष्णां का विशेष्ठ के विशेष्ठ करणां स्वरण्यां का विशेष्ठ करणां क्षणा		
White Admiral	Ø				politici que france de la companya d	
		Other Identii	fied Species			
Sucher St.	1	1	Nu	5M N.		0
1 Sumuculay Lago	(A))	Ø		44.6	2	-ON PLICK
ARBAGIE MA		Ø Ø		ZIMS	5,	1)014
Pive - asaco	HUC 111		_ _ W ·	2/M 8	2	
			and the state of t	<u> Produktion (Septembrie) in the set of the particles.</u>		
	Paragraphia					
		[2017] 12일(1917] 12일 - 12일(1917) 12일(1917)				l de la companya de



Date: 2012 - 10 -05	Surveyor(s):	
Start Time: 0'4	Z10 9M	Duration of transect: 95 mm
Eastings:		Station #: 6 SA
Cld. Cover:	MO & Q-3	Temp Range: 7°C -74°C

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal S	pecies	1	
Monarch	η	Ø ' 7 \	MiM	IOMN	2
Painted Lady	Ø			den die gegen das de Generalen von der zugen der den der Stellen der der den der der der der der der der der d	environte su esse atronomo somo somo somo environte environte en este environte este este environte este este e
White Admiral	Ø			and execution to the contract of the contract	
		Other Identii	ied Species		
So mare	11	P		20 m S	2
BOARN WH	14	0)	~	ZONW,	5
COUNTY SURPLY	Ji	Ø		5m W	2
					and the state of t



Date: 2012-10-0+ Surveyor(s):	2FL ides
Start Time: 0 % 30 2.00 8 M	Duration of transect: 90 mins
Eastings:	Station #: BMSAØ2
Cld. Cover: 10/10 WINDS 8-1 Bar. Pr. PAN 8	Temp Range:

Species	Tally of Individuals	Height Estimate	Fight Direction (N, S, E, W)	Direction and Distance from Observer	Total Individuals
		Focal Spe	cies		I.
Monarch	Ж	\$ 10 10 10 1X	6. B. C.	5m kar (8m (su) 20m (8 × 1m ~ 2 m (5)	5
Painted Lady	Ø		an sawa ang congay kanada ng aping and and ang		
White Admiral	Ø				Markey and the state of the sta
		Other Identifie	d Species		
JUSTS OSOGO	#1	O		JM 10-3.	6
as bron With	HT IN III	Ø		5-10MN-S	13
while SP	#	Ø	<u> </u>	loms	5
Slandla: SUPH Joethal (DESCI	U L	8	<u>S</u> .	$\leq m(S)$ $\leq m(\omega)$	
April & control			**		



