



Atlantic Canada CDC Canada Atlantique

Improving baseline knowledge of selected New Brunswick insects:

Dragonflies of the Restigouche River and bees and flower flies of southwestern New Brunswick

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Brachyopa ferruginea - Surveys at in southwestern New Brunswick produced the first provincial record of this flower fly species.

Introduction

Nearly 60% of all species in the Atlantic Maritime Ecozone are insects¹. They are THE major component of biodiversity. Increasingly, some insect species and groups are recognized as being of conservation concern. In the Maritimes, there are five insect species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Special Concern, Threatened, or Endangered, and there are another 17 species that are COSEWIC candidate species.

Some insect groups, such as dragonflies and butterflies, are relatively well-known in the Maritimes. All dragonfly and butterfly species has had its provincial conservation rank assigned through the General Status of Species in Canada program, and new species are infrequently detected. However, even with these relatively well-known groups there are a lot of knowledge gaps, particularly with species ranges, and more surveying is warranted^{2,3}. Many more poorly known insect groups including grasshoppers, leafhoppers, sawflies, bees, yellowjacket wasps, robber flies, flower flies, bee flies, scorpionflies, and several types of beetle are scheduled for their initial General Status of Species in Canada assessment in the next five years. Most species in these groups will be very difficult to assess given the current knowledge, because few have been the focus of targeted surveys. For most of these groups it isn't even known how many species occur in the province, and many recorded species are known from only one or two museum specimens! This is an obvious problem for General Status Assessments, as species that remain undetected are not included on the provincial list, and those that are known only from a couple records go unassessed due to deficient occurrence information.

This report details the results of three subprojects funded by NB WTF. The first is a survey for dragonflies on the Restigouche River, a major waterway that has been undersurveyed in the past. Restigouche River surveys were co-funded by the Canadian Wildlife Federation. The second is a survey of bees and flower flies conducted in southwestern New Brunswick. Being important pollinators, bees and flower flies are of significant conservation interest, and both groups are currently being reviewed for General Status Assessment for the first time. The third is the databasing of the New Brunswick Museum's flower fly collection.

Dragonfly survey of the Restigouche River

Methods

Fieldwork was completed by AC CDC zoologist John Klymko and ecologist Sarah Robinson. The

¹ McAlpine, D.F., and Smith, I.M. 2010. The Maritime Ecozone: old mountains tumble into the sea. *In* Assessment of Species Diversity in the Maritime Ecozone. *Edited by* D.F. McAlpine and I.M. Smith. NRC Research Press, Ottawa, Canada. Pages 1-12.

² Brunelle, P.-M. 2010. Dragonflies and damselflies (Odonata) of the Atlantic Maritime Ecozone. *In* Assessment of Species Diversity in the Maritime Ecozone. *Edited by* D.F. McAlpine and I.M. Smith. NRC Research Press, Ottawa, Canada. Pages 333-369.

³ <http://www.accdc.com/butterflyatlas/About.html>

Restigouche River was surveyed June 28 to July 2, inclusive. Exuvia searches were conducted at 34 sites between Kedgwick River and Tide Head (map 1).

Stretches of river with high potential for exuviae (slow waters below rapids, eddies etc.) were targeted. At each collection site approximately 100m of shoreline was walked and all exuviae encountered were collected. Adult dragonflies were documented as they were encountered. River and shoreline habitat descriptions were recorded for each site.

Identification and specimen processing

Five office days were spent in the laboratory processing and identifying the dragonflies collected. Exuvia were air dried and stored in small plastic containers, as per the New Brunswick Museum's typical practice. Adults were air dried and stored in glassine envelopes.

Results

In the approximately 3,000 exuviae collected, only four common species were found: Riffle Snaketail (*Ophiogomphus carolus*, see figure 1), Northern Pygmy Clubtail (*Lanthus parvulus*), Moustached Clubtail (*Gomphus adelphus*), and Twin-spotted Spiketail (*Cordulegaster maculata*). Riffle Snaketail, found at all sites and frequently seen emerging, was far away the most abundant species (all but 11 exuviae were Riffle Snaketail). The only adult seen, besides emerging Riffle Snaketails, was a single Northern Pygmy Clubtail.

Discussion

While the Restigouche River was found to host few dragonfly species, the surveys still fill a significant gap in the knowledge of New Brunswick dragonflies by thoroughly surveying by an area that has received very little attention in the past. While the species list produced for the river isn't exhaustive, given the number of specimens taken it certainly indicates that the river's fauna is truly depauperate. This is likely due to the swift current and very coarse substrate that dominates most of the river.

The specimens collected will be deposited in the New Brunswick Museum, adding to their extensive Odonata collection. Data will also be incorporated into the AC CDC database where it will be available to conservation biologists.

Bee and flower fly surveys in southwest New Brunswick

Methods

Surveys were conducted in Carleton and York counties in habitats ranging from open bogs to rich hardwood forests (see map 2 for locations). Collecting with aerial nets was conducted by John Klymko and Sarah Robinson on May 25, 26, and 31, and June 7, 8, and 9. Malaise traps were run at locations 3, 4, and 5. At location 3, a site along the Meduxnekeag River in the Meduxnekeag River Nature Preserve (MRNP), a trap was run from May 25 to June 23; at location 4, in the Bell Forest of the MRNP, a trap was from May 25 to June 8; and at location 5,

on a bog mat on provincial crown land at Williamstown Lake, a trap was run June 7-8. The Malaise traps in the MRNP were maintained by Nigel Smith of the MNRP. Pan traps were also used at site 7, along an old railbed that runs through wet forest and wetland north of Lakeville, on May 25 and 26; at location 5 on June 7-8, and at location 3 on May 26.

Identification and specimen processing

Twenty-five days office days were spent in the laboratory processing and identifying the insects collected. Net-collected bees and flower fly specimens were pinned and air dried. Flower flies from Malaise and pan traps were removed from ethanol, pinned, and then dried in a series of ethyl acetate baths. Bees from Malaise and pan traps were washed in a soapy warm water bath and dried with a hairdryer to fluff body hair.

Identification was conducted in-house to the extent possible. Most flower flies were identified to the species level. Most bees were identified to the genus level. Flower fly identifications were verified by world syrphid expert Dr. Jeffrey Skevington of the Canadian National Collection. Species-level bee identification will be completed by Dr. John Ascher of the American Museum of Natural History.

Results

In total 703 flower flies were collected, representing at least 93 species. Of these 17 are new to New Brunswick⁴, and 13 are new to the Maritimes.

Of particular note are *Sphegina lobulifera* and the *Neoscia* species. *Sphegina lobulifera* is previously known from only four Canadian records, all from Quebec. This small species is more likely overlooked than truly rare, but without surveys like the one reported here, the species will continue to go unreported. The genus *Neoscia* has never been reported from the Maritimes. *Neoscia globosa*, *N. metallica*, and *N. distincta* were all collected during the surveys. *Neoscia metallica* was found at three different sites, suggesting the species is fairly common in the region. The *Neoscia* species are the smallest flower flies in the Maritimes, and they appear to have an affinity for wetlands. These two factors are the likely reason the genus has gone unreported until now.

In total 907 bees representing 12 genera were collected. Only the bumblebees (*Bombus*) were identified to species in house.

Lists of the flower flies and bees collected are presented in tables 1 and 2.

Discussion

The dataset produced through these surveys builds on those produced with WTF projects B100-055 (Klymko and Robinson, 2011a) and B300-009 (Klymko and Robinson, 2011b). This larger

⁴ Species list compiled by Dr. Jeffrey Skevington. It is based on flower fly holdings of major North American insect collections. An extensive literature search of Canadian flower flies hasn't been undertaken, but it is not expected to add many species to either the Canadian or New Brunswick species lists (Dr. Jeffrey Skevington, pers. comm.).

dataset of flower fly and bee data will have great influence on the General Status Assessments of these groups on the provincial and national level. Once identifications have been verified the specimen data will be loaded into the AC CDC database where it will be available to conservation biologists.

Results will contribute to the Canadian Pollinators Initiative (CANPOLIN), a five year program involving 26 universities as well as NGOs and government agencies from across Canada (CANPOLIN 2012). It has been launched to address the growing problem of pollinator decline in agricultural and natural ecosystems in Canada, and bees and flower flies are the major focus of the study. Bee and flower fly records will be incorporated into the CANPOLIN observation database, and many of the flower flies will have their DNA barcoded, contributing to the CANPOLIN DNA barcode database. Results will also contribute to the existing knowledge of the flora and fauna of the MRNP.

Databasing the New Brunswick Museum flower fly collection

Katelyn Vandebroek of the New Brunswick Museum spent approximately six weeks databasing the 327 flower fly specimens in the New Brunswick Museum's collection. This collection is of great interest, as more than two thirds of the specimens were collected before 1910. These old specimens provide somewhat of a baseline dataset that may be useful in identifying changes in species abundance.

Now that the collection is databased all the unidentified specimens will be identified by John Klymko. Selected specimens will then be verified by Dr. Jeffrey Skevington of the Canadian National Collection. Once identifications have been verified the specimen data will be loaded into the AC CDC database where it will be available to conservation biologists.

Acknowledgements

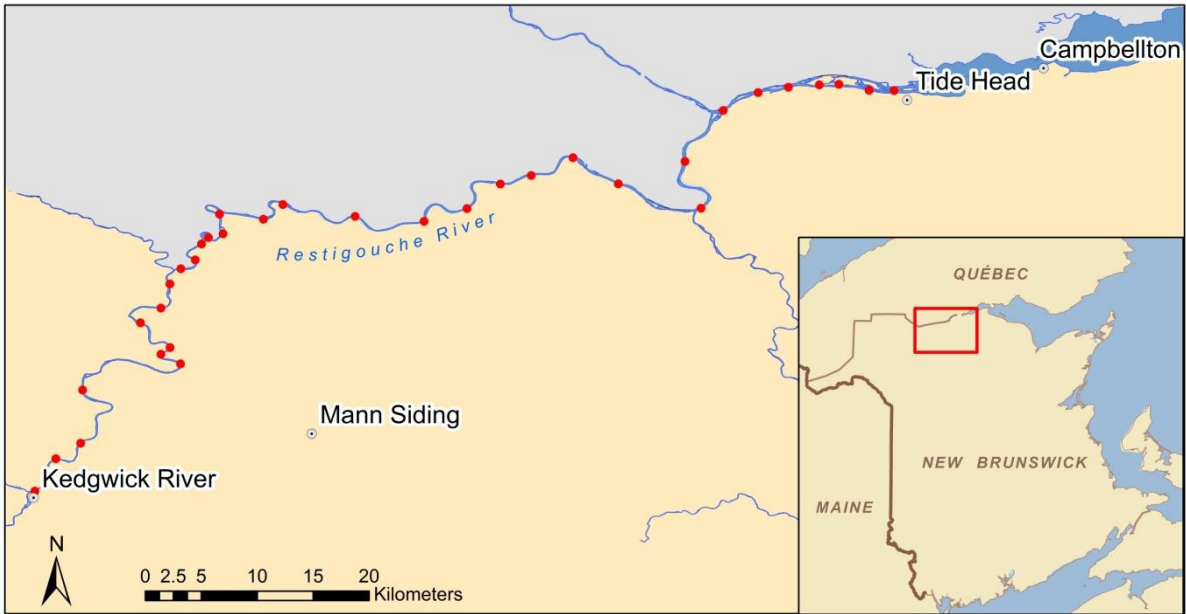
The authors thank George Peabody of the Meduxnekeag River Association for permitting access to the Meduxnekeag River Nature Preserve, Nigel Smith for voluntarily servicing the Malaise traps deployed on Meduxnekeag River Nature Preserve property, Dr. Jeffrey Skevington of the Canadian National Collection for his assistance with flower fly identification, Dr. John Ascher of the American Museum of Natural History for his assistance with bee identification, and Dr. Donald McAlpine of the New Brunswick Museum for coordinating the flower fly databasing.

Works Cited

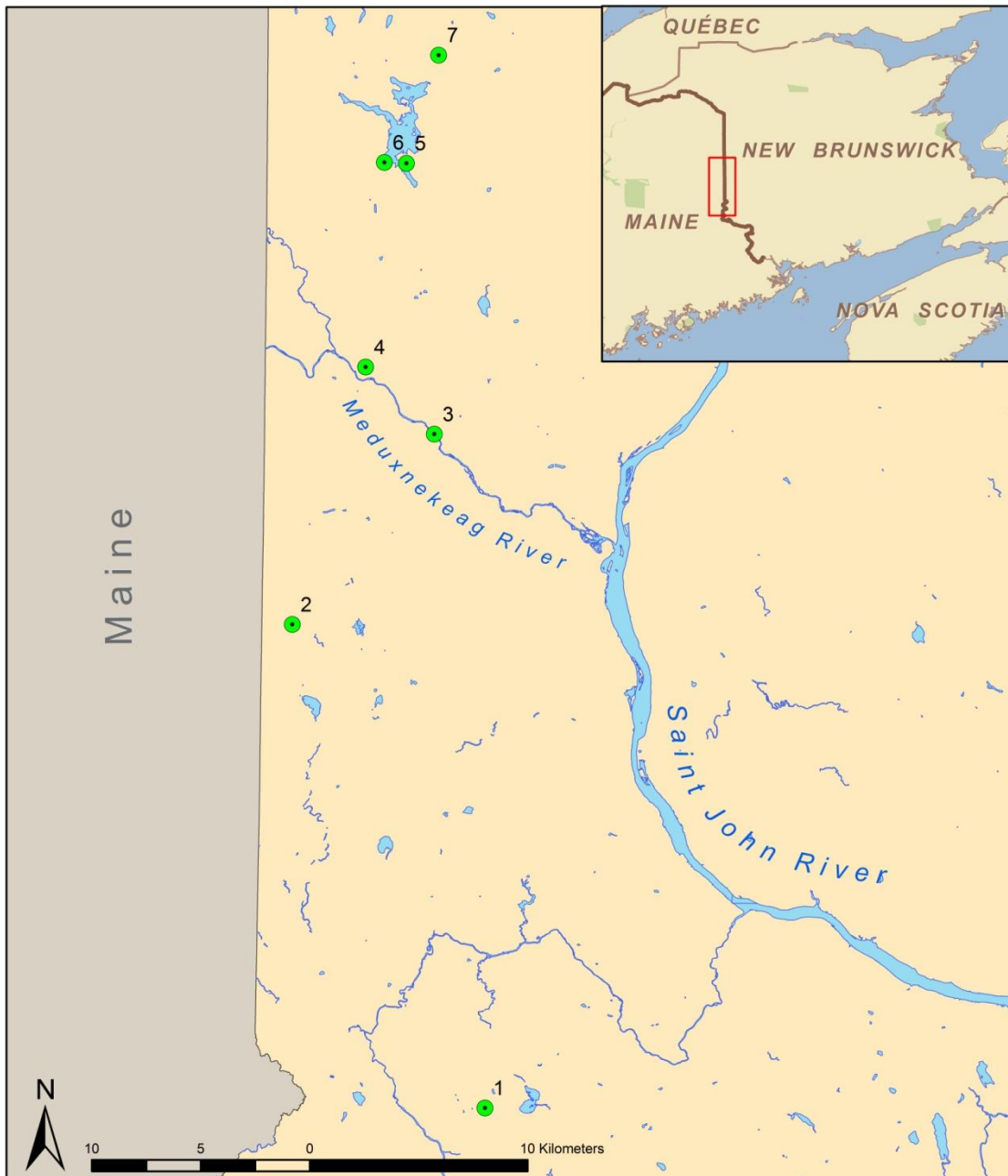
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Map 1. Restigouche River dragonfly collection locations



Map 2: Southwestern New Brunswick flower fly and bee collection locations.

Table 1. Flower flies collected during southwestern New Brunswick surveys.

Flower Flies			
Taxon	New to Maritimes	New to NB	Number collected
<i>Blera analis</i>			2
<i>Blera badia</i>			4
<i>Blera confusa</i>			1
<i>Blera nigra</i>			2
<i>Brachyopa diversa</i>	X		1
<i>Brachyopa ferruginea</i>	X		2
<i>Brachyopa flavescens</i>	X		2
<i>Brachyopa notata</i>			2
<i>Brachyopa perplexa</i>			1
<i>Brachypalpus oarus</i>			4
<i>Chalcosyrphus anthreas</i>	X		3
<i>Chalcosyrphus inarmatus</i>			2
<i>Chalcosyrphus libo</i>			5
<i>Chalcosyrphus nemorum</i>			15
<i>Cheilosia latrans</i>			1
<i>Cheilosia rita</i>			15
<i>Cheilosia subchalybea</i>	X		1
<i>Cheilosia sp.</i>			6
<i>Chrysogaster antitheus</i>			24
<i>Chrysotoxum flavifrons</i>			1
<i>Criorhina mystaceae</i>		X	1
<i>Criorhina nigriventris</i>			1
<i>Dasysyrphus venustus</i>			5
<i>Dasysyrphus sp.</i>			1
<i>Doros aequalis</i>			8
<i>Epistrophe nitidicollis</i>			11
<i>Epistrophe terminalis</i>	X		1
<i>Epistrophe xanthostoma</i>			2
<i>Eristalis anthophorina</i>			1
<i>Eristalis cryptarum</i>			3
<i>Eristalis flavipes</i>			1
<i>Eristalis interrupta</i>			1
<i>Eristalis obscurus</i>			9
<i>Eupeodes lapponicus</i>			2
<i>Eupeodes latifasciatus</i>			2

Flower Flies			
Taxon	New to Maritimes	New to NB	Number collected
<i>Eupeodes latifasciatus</i>			1
<i>Eupeodes perplexus</i>			2
<i>Eupeodes sp.</i>			19
<i>Heringia sp.</i>			8
<i>Hiatomyia cyanescens</i>			1
<i>Lejops sp.</i>			28
<i>Lejota sp.</i>			1
<i>Leucozona americana</i>			1
<i>Melangyna triangulifera</i>		X	1
<i>Melanostoma mellinum</i>			52
<i>Microdon manitobensis</i>			3
<i>Microdon sp.</i>			9
<i>Myolepta nigra</i>			1
<i>Neoascia distincta</i>	X		5
<i>Neoascia globosa</i>	X		4
<i>Neoascia metallica</i>	X		16
<i>Orthonevra anniae</i>			2
<i>Orthonevra pictiventris</i>			1
<i>Orthonevra pulchella</i>			28
<i>Paragus sp.</i>			10
<i>Parasyrphus nigratarsus</i>	X		2
<i>Parasyrphus sp.</i>			2
<i>Parhelophilus laetus</i>		X	2
<i>Parhelophilus obsoletus</i>			2
<i>Parhelophilus porcus</i>			1
<i>Parhelophilus rex</i>			18
<i>Pipiza sp.</i>			6
<i>Platycheirus angustatus</i>			2
<i>Platycheirus confusus</i>			2
<i>Platycheirus granditarsus</i>			3
<i>Platycheirus immarginatus</i>			8
<i>Platycheirus inversus</i>			3
<i>Platycheirus nearcticus</i>			3
<i>Platycheirus quadratus</i>			1
<i>Platycheirus rosarum</i>			5

Flower Flies			
Taxon	New to Maritimes	New to NB	Number collected
<i>Platycheirus scambus</i>			7
<i>Platycheirus sp.</i>			1
<i>Rhingia nasica</i>			10
<i>Sericomyia chrysotoxoides</i>			1
<i>Sericomyia lata</i>			1
<i>Sericomyia militaris</i>			2
<i>Sericomyia transversa</i>			9
<i>Sphaerophoria sp.</i>			55
<i>Sphecomyia vittata</i>			7
<i>Sphegina brachygaster</i>			10
<i>Sphegina flavomaculata</i>			3
<i>Sphegina keeniana</i>		X	3
<i>Sphegina lobulifera</i>	X		1
<i>Sphegina rufiventris</i>			12
<i>Syrpitta pipiens</i>			3
<i>Syrphus knabi</i>	X		1
<i>Syrphus rectus</i>			17
<i>Syrphus ribesii</i>			11
<i>Syrphus torvus</i>			3
<i>Syrphus vitripennis</i>			5
<i>Syrphus sp.</i>			11
<i>Temnostoma alternans</i>			7
<i>Temnostoma balyras</i>			22
<i>Temnostoma barberi</i>			4
<i>Temnostoma excentrica</i>			4
<i>Toxomerus geminatus</i>			6
<i>Toxomerus marginatus</i>			23
<i>Trichopsomyia apisaon</i>			2
<i>Tropidia quadrata</i>			14
<i>Volucella bombylans</i>			2
<i>Xylota confusa</i>			2
<i>Xylota hinei</i>			1
<i>Xylota naknek</i>			5
<i>Xylota ouelleti</i>	X		2
<i>Xylota quadrimaculata</i>			38

Flower Flies			
Taxon	New to Maritimes	New to NB	Number collected
<i>Xylota tuberculata</i>			1
<i>Xylota sp.</i>			1

Table 2. Bees collected during southwestern New Brunswick surveys.

Bees	
Taxon	Number collected
<i>Andrena</i>	209
<i>Augochlora</i>	6
<i>Augochlorella</i>	11
<i>Bombus borealis</i>	14
<i>Bombus citrinus</i>	4
<i>Bombus fernaldae</i>	8
<i>Bombus fervidus</i>	1
<i>Bombus frigidus</i>	3
<i>Bombus impatiens</i>	4
<i>Bombus insularis</i>	3
<i>Bombus rufocinctus</i>	2
<i>Bombus sandersoni</i>	3
<i>Bombus ternarius</i>	15
<i>Bombus vagans</i>	25
<i>Ceratina</i>	24
<i>Halictus</i>	15
<i>Hylaeus</i>	6
<i>Lasioglossum</i>	491
<i>Megachile</i>	2
<i>Nomada</i>	33
<i>Osmia</i>	24
<i>Sphecodes</i>	4