

APPENDIX G

ODONATE SURVEY RESULTS (2012 AND 2013)



**GOLDBORO
LNG**

Odonate Species Taken at the Goldboro LNG Project Area in 2013

Corrigenda

Paul M. Brunelle, Aug. 12, 2013

Underlined flags corrections from the August 8th version, other than minor format corrections.

- * A species not thought to be resident in aquatic sites potentially impacted by the project, though perhaps flying at those sites.
- A first county record for Guysborough County (**13** species).

Conservation concern ranks for Nova Scotia are given in bold. Note that NSDNR Colour Ranks may no longer be current; the website is currently down.

The area within the project locale is given as;

Uplands = bogs and fens north of the highway, east of Sable Road,

Peninsula = ponds and saltmarsh on the peninsula into Country Harbour,

Pipeline = streams crossing the pipeline to the west of the project locale, potential area of water pipeline construction,

Meadow Lake = directly associated with the lake, though not necessarily resident,

Everywhere = generally found at freshwaters throughout the locale,

General Locale = found in the general area, but not associated with any aquatic feature.

41 species have been documented to date, **32%** of the provincial species list of 124 – respectable results for an area with no large lotic water habitats.

<i>Nomen</i>	<i>Common</i>	<i>NSDNR Colour</i>	<i>GS</i>	<i>NatSrv</i>	<i>Area</i>
Suborder Zygoptera	Damselflies				
Family Calopterygidae	Broadwings				
* <i>Calopteryx aequabilis</i> Say 1839	River Jewelwing	Green	4	5	Meadow Lake
* <i>Calopteryx maculata</i> (Beauvois 1805)	Ebony Jewelwing	Green	4	5	Meadow Lake
Family Lestidae	Spreadwings				
<i>Lestes disjunctus</i> Sélys 1862	Northern Spreadwing	Green	4	5	Peninsula Ponds
◦ <i>Lestes forcipatus</i> Rambur 1842	Sweetflag Spreadwing	Undet.	4	4	Uplands
◦ <i>Lestes vigilax</i> Hagen in Sélys 1862	Swamp Spreadwing	Undet.	4	5	Meadow Lake
Family Coenagrionidae	Pond Damselfs				
<i>Argia fumipennis violacea</i> (Hagen 1861)	Violet Dancer	Green	4	5	Peninsula Ponds
<i>Argia moesta</i> (Hagen 1861)	Powdered Dancer	Green	4	5	Meadow Lake
◦ <i>Chromagrion conditum</i> (Hagen in Sélys 1876)	Aurora Damsel	Green	4	5	Uplands
<i>Enallagma civile</i> (Hagen 1861)	Familiar Bluet	Green	4	5	Uplands, Peninsula
<i>Enallagma ebrium</i> (Hagen 1861)	Marsh Bluet	Green	4	5	Peninsula
<i>Enallagma hageni</i> (Walsh 1863)	Hagen's Bluet	Green	4	5	Uplands, Peninsula
<i>Enallagma minusculum</i> Morse 1895	Little Bluet	Yellow	4	4	Meadow Lake
<i>Ischnura posita</i> (Hagen 1861)	Fragile Forktail	Green	4	5	Uplands, Pipeline
<i>Ischnura verticalis</i> (Say 1839)	Eastern Forktail	Green	4	5	Everywhere
<i>Nehalennia irene</i> (Hagen 1861)	Sedge Sprite	Green	4	5	Uplands

Cont..

Nomen	Common	NSDNR Colour	18	NatSrv	1890
Suborder Anisoptera		Dragonflies			
Family Aeshnidae		Darners			
<i>Aeshna canadensis</i> Walker 1908	Canada Darner	Green	4	5	Uplands
<i>Aeshna eremita</i> Scudder 1866	Lake Darner	Green	4	4	Uplands
<i>Aeshna umbrosa umbrosa</i> Walker 1908	Shadow Darner	Green	4	5	Uplands, Peninsula
<i>Anax junius</i> (Drury 1770)	Common Green Darner	Green	4	5	Uplands, Peninsula
<i>Basiaeschna janata</i> (Say 1839)	Springtime Darner	Green	4	5	Meadow Lake
Family Gomphidae		Clubtails			
<i>Gomphus exilis</i> Sélys 1854	Lancet Clubtail	Green	4	5	Meadow Lake
° <i>Gomphus spicatus</i> Hagen in Sélys 1854	Dusky Clubtail	Green	4	5	Meadow Lake
Family Cordulegastridae		Spiketails			
° <i>Cordulegaster diastatops</i> (Sélys 1854)	Delta-spotted Spiketail	Green	4	5	Pipeline
Family Macromiidae		Cruisers			
° <i>Didymops transversa</i> (Say 1839)	Stream Cruiser	Green	4	5	Meadow Lake
Family Corduliidae		Emeralds			
° <i>Epitheca canis</i> (McLachlan 1886)	Beaverpond Baskettail	Green	4	5	Meadow Lake
° <i>Epitheca semiaquea</i> (Burmeister 1839)	Mantled Baskettail	Undet.	5	NR	Meadow Lake
<i>Epitheca spinigera</i> (Sélys 1871)	Spiny Baskettail	Green	4	5	Meadow Lake
° <i>Somatochlora elongata</i> (Scudder 1866)	Ski-tipped Emerald	Green	4	4	Uplands
° <i>Somatochlora tenebrosa</i> (Say 1839)*	Clamp-tipped Emerald	Yellow	4	3	Meadow Lake
Family Libellulidae		Skimmers			
° <i>Ladona exusta</i> (Say 1839)	White Corporal	Green	4	5	Meadow Lake
<i>Leucorrhinia frigida</i> Hagen 1890	Frosted Whiteface	Green	4	5	Uplands
<i>Leucorrhinia glacialis</i> Hagen 1890	Crimson-ringed Whiteface	Green	4	5	Meadow Lake
<i>Libellula pulchella</i> Drury 1770	Twelve-spotted Skimmer	Green	4	5	Peninsula Ponds
<i>Libellula quadrimaculata</i> Linnaeus 1758	Four-spotted Skimmer	Green	4	5	Uplands
<i>Pantala flavescens</i> (Fabricius 1798)	Wandering Glider	Green	4	5	General Area
° <i>Plathemis lydia</i> (Drury 1770)	Common Whitetail	Green	4	5	Uplands
<i>Sympetrum costiferum</i> (Hagen 1861)	Saffron-winged Meadowhawk	Green	4	5	Uplands
<i>Sympetrum internum</i> Montgomery 1943	Cherry-faced Meadowhawk	Green	4	5	Uplands, Peninsula
° <i>Sympetrum obtrusum</i> (Hagen 1867)	White-faced Meadowhawk	Green	4	5	Uplands
<i>Sympetrum semicinctum</i> (Say 1839)	Band-winged Meadowhawk	Green	4	5	Peninsula
<i>Sympetrum vicinum</i> (Hagen 1861)	Autumn Meadowhawk	Green	4	5	Uplands

- An S. tenebrosa female was feeding on the road near the fen – it is not necessarily a resident of that wetland.

...ends...



Odonata Survey September 2012 (Damselflies and Dragonflies): Goldboro LNG Project

Prepared for:
AMEC Earth and Environmental

Paul M. Brunelle
October 18, 2012



On the cover:

Red Head Peninsula, Guysborough County, Nova Scotia,
September 25th, 2012.

Left side (top down):

Enallagma civile (Hagen 1861) – Familiar Bluet, adult male.

Ischnura verticalis (Say 1839) – Eastern Forktail, adult female
ovipositing.

Aeshna u. umbrosa Walker 1908 – Shadow Darner,
recently emerged (teneral) damaged male.

Anax junius (Drury 1770) – Common Green Darner,
young adult male.

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Paul Brunelle spent two field days, September 25th and 26th, surveying for adult Odonata within the Goldboro Industrial Park, near Red Head and the adjacent uplands, Goldboro, Guysborough County, Nova Scotia.

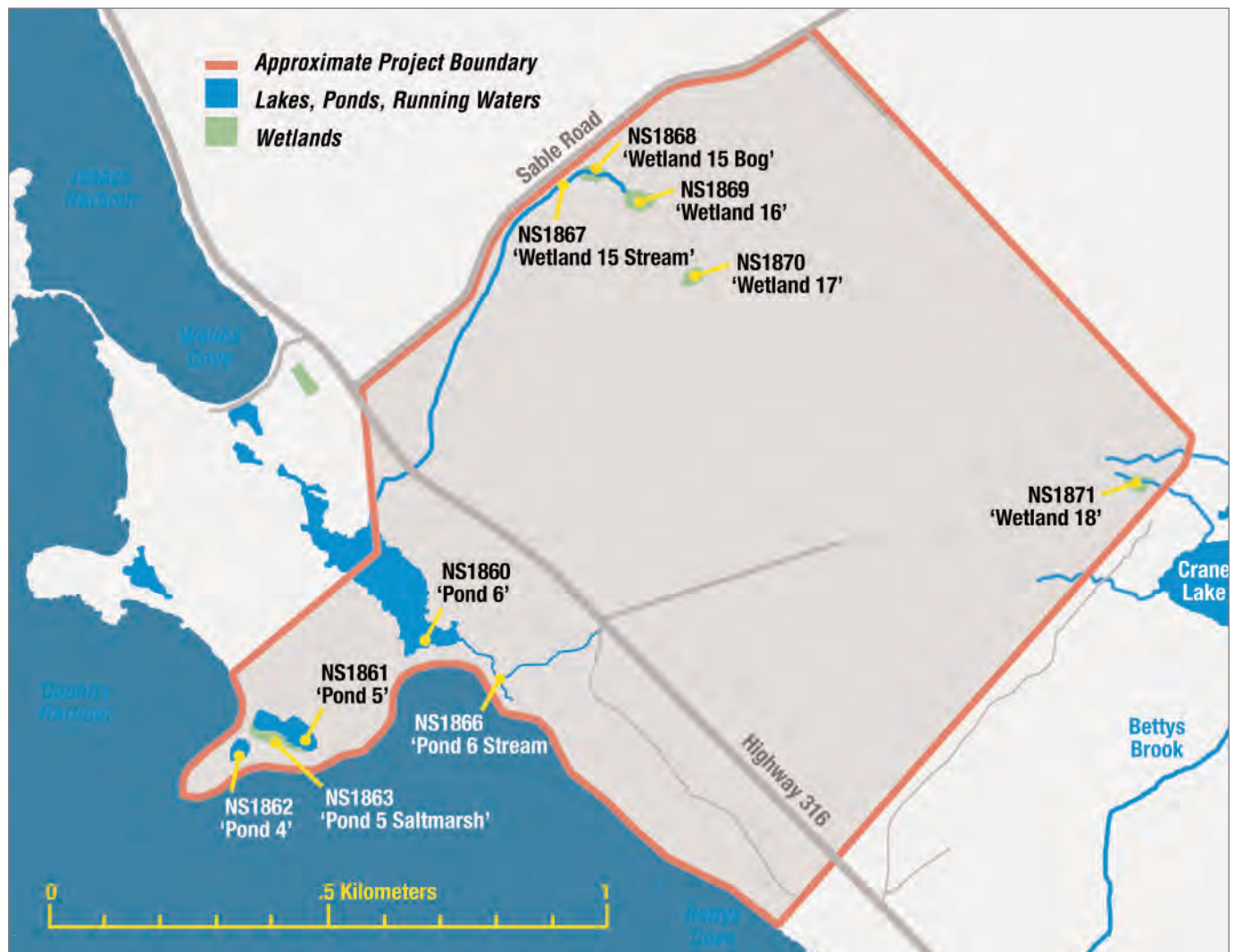
All types of freshwater aquatic habitats identified on the property were sampled.

The 2012 season was an unusually early one for odonate flight, however poor weather from late May to mid-July reduced abundance notably. In addition, the flight period at the survey locale is likely heavily influenced (delayed) by the moderation from coastal weather.

A modest list of twelve odonate species was encountered in the eleven sites sampled.

There is no known prior survey for Odonata in the project area, and Guysborough County itself has been rather lightly surveyed to date.

Figure 1: **Map of the Project Locale**



Survey Tactics

Methodology for survey, curation and documentation followed the ADIP (Atlantic Dragonfly Inventory Program) protocols, which have evolved over the last twenty years, and which reflect current practice in the study of odonates. See Appendix 1.

Habitat Location

After discussions with the client, documentation of a prior, unrelated project's survey was considered, then airphotos of the project region were reviewed and a target aquatic habitat list prepared. This list was confirmed and amended during the field trips.

Each site was given an ADIP identification code beginning with 'NS'.

Field Survey

Personnel

All survey was done by Paul M. Brunelle, though generally in the company of Scott Burley and Marion Sensen (AMEC), who provided some assistance in the course of their other efforts.

Lifestage

Principal survey was for flying adults. Teneral (recently-emerged adults) and exuviae (the abandoned skins of the emerged insects) would have been taken if found. Exuviae collection may present the most effective means of inventory for these habitats, and firmly establishes residence status (see Appendix 1), however field survey must be scheduled carefully to collect this material, and tends to be protracted.

Larval survey can yield excellent information on the residence status of species, however it is decidedly protracted in the field and in the lab.

Adults were captured by net and retained in field envelopes until preserved.

Frequency of Survey

One visit to a water body per year is insufficient to acquire a reasonably complete odonate species list, due to the diverse flight periods of species, however the results of even one trip per year can be suggestive as to the health of the aquatic habitat.

For this project to date, all sites were visited only once.

Diel

Survey was done during the peak periods of adult odonate activity, roughly 10:00 to 17:00.

Weather

The field days chosen had weather suitable for productive surveying for adults – sunny and hot, with no more than moderate winds.

Voucher Specimens

Specimens were taken *pro forma* in many cases, and in all cases where field determination of particular species was considered untrustworthy.

The adult specimens were force-dried in acetone and are stored in clear mylar envelopes with a label giving all identification and accession information.

Each specimen was given a 6-digit ADIP accession number, unique among specimens of odonates taken in Atlantic Canada and northern New England and catalogued in the ADIP (Atlantic Dragonfly Inventory Program) databases. The accession number has an alphabetical suffix which indicates the provenance on which the record is based;

- v vouchered specimen,
- o observed on the wing or perched,
- h determined in the hand then released,
- p photographed, and,
- c indicating that the determination of vouchers has been confirmed by another worker.

The specimens will be deposited at the Nova Scotia Museum of Natural History, Halifax.

Documentation

Photography

General habitat photos were taken during each visit, converted to jpg format, catalogued, and will be tendered to the client for project use if requested.

Determination

Specimen determination was confirmed *pro forma* through the keys of Needham et al. (2000) and Westfall and May (2006), the current authorities on North American Odonata.

Data

Field notes, species observations and specimen details were entered into a Filemaker Pro 8.5 relational database structure, which will be translated into Excel 11.3.5 database form for deposit with the client.

References

Needham, J.G., M.J. Westfall, and M.L. May. 2000. *Dragonflies of North America*. Revised edition. Scientific Publishers, Gainesville, Florida. 940 p.

Westfall, M.J., and M.L. May. 2006. *Damselflies of North America*. Revised edition. Scientific Publishers, Gainesville, Florida. 502 p.

Overview

A very modest diversity of Odonata species was encountered – 12 species (9.8%) of the 122 recorded in Nova Scotia. A further 84 species are considered possible for the habitat types known on the property, and at these latitudes, consequently 12.5% of the potential list of 96 species was taken in 2012.

Twenty-seven records (species/site/date) were recorded, none in great abundance.

The greatest number of species taken at any one site was seven; at ‘Pond 6’ (site NS1860, a barrachois pond), with five at ‘Wetland 16’, (NS1869) being second. Most habitats proved to be sparse in species during the visits.

No species of conservation concern in Nova Scotia were encountered, all species being ranked as ‘green’, indicating secure, by the Nova Scotia Department of Natural Resources, and as ‘4’, also indicating secure, through the National General Status protocols. See Appendix 3 for status definitions.

Sites

Sites are listed by type, then by name (all are arbitrary names at this locale). The wetland ‘names’ are the identifiers used by AMEC, which pertain to studies of a broader subjects base. Because the names are not gazetted they are presented in quotes.

A map of sites is given in Figure 1, page A.02.

In the accounts the ADIP site code is given first.

The sites all fall within 52y2 of the current Nova Scotia mapbook grid, 35a4 in the grid of the previous series of mapbooks, still employed by some authorities, and are within map 11F4 of the National Topographic Information System (NTIS) 1/50,000 maps.

Coordinates are given in decimal notation, followed by them formatted in a manner which facilitates their lookup in the Google Earth web software.

Visits

Only one visit has been made to each site to date, on September 25th or 26th, 2012. Following the date by the time on site and minutes spent are given – note that for proximal sites, the minutes used figure will differ from the time range, due to movement back and forth between the sites. The amount of sky coverage (averaged, the amount of cloud will generally have varied during the visit) are given next, and then the strength of the wind.

During all visits adults (mature and teneral, see Appendix 2) and exuvia were searched for, although none of the latter were encountered.

Species

Species encountered are listed in taxonomic order to family, in alphabetical order by genus and species. The scientific name is first given, followed by the attribution and description date, then the accepted English name, suborder and family.

The ranking by various authorities is then given (see Appendix 3 for details);

NTSV G_ = NatureServe Global Rank,

NGSCDA = National General Status Canadian Rank,

NSDNR = NS Dept. of Natural Resources Colour Rank,

NGSNS _ = National General Status Nova Scotia Rank,

NTSV S_ = NatureServe Nova Scotia Rank.

The number of species encountered at the site is given in red. Following the number of species thought possible as resident (larval development) for the site (except for the ‘Study Area’, site NS1864). This assessment is based on known presence in Nova Scotia, known distribution in the province (for example species known only from the Cape Breton Highlands are not considered possible for the project locale), and specific habitat preferences. See Table 1 for the species considered possible by site.

Records

Records of the species encountered at the site are first given by their ADIP record number, with an alphabetical suffix indicating the provenance of the record (see Appendix 3). The name of the surveyor of record is given, if not P.M. Brunelle.

Lifestage(s) and genders encountered are then given (see Appendix 2 for explanations), followed by the ADIP Residence Status code (RSTAT, Appendix 3), which indicates the degree to which we know or infer that the species is present in the aquatic habitat through the full development of individuals (see Appendix 2), and hence whether the record has conservation significance regardless of the species’ status. A brief explanation of the code is also given.

NS1864

‘Study Area’

This ‘site’ has been defined in order to accommodate any observations of species encountered solely away from aquatic habitats, or otherwise worthy of note.

Only one species was encountered only away from water; any others seen away from water were also recorded at one or more of the aquatic sites.

Location:

45.165083°N, -61.638339°W, (GE: 45.165083N, 61.638339W).

Visits:

September 25, 2012: various times between other site visits, sunny 100%, hot, wind none to moderate.

September 26, 2012: various times between other site visits, sunny 100%, hot, wind none to moderate.

2 Species Encountered.

Pantala flavescens (Fabricius 1798)

Wandering Glider, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355298o, one adult male, the only observed.

RSTAT 10 (not at water).

The individual was foraging over the intersection of Highway 316 and Sable Road on September 25th.

Sympetrum vicinum (Hagen 1861)

Autumn Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355302o, many males in sunlit openings in the woods.

RSTAT 10 (not at water).

Adult males of this species were reasonably abundant in the woods north of ‘Pond 6’ – from which they likely emerged.



NS1863

'Pond 5 Saltmarsh', Red Head Peninsula

This is the only site of its type found within the project area. The actual marsh is very small, but the ponds give every appearance of similar elements in larger saltmarshes, and may have an extensive list.

Location:

45.159421°N, -61.639956°W, (GE: 45.159421N, 61.639956W).

Visit:

September 25, 2012: 13:30 to 14:00 (30 m.),
sunny 100%, hot, wind light to moderate.

1 Species Encountered.

47 Species Considered Possible.

Sympetrum internum Montgomery 1943

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355300v, one adult male of a few observed.

RSTAT 8 (possible, males only at water).



NS1862

'Pond 4', Red Head Peninsula

This is a shallow, algaed, barrachois pond at the west end of the peninsula. It appears to be quite brackish.

No species were encountered during the visit, but may have an extensive list.

Location:

45.159348°N, -61.640981°W, (GE: 45.159348N, 61.640981W).

Visit:

September 25, 2012: 13:15 to 13:30 (15 m.),
sunny 100%, hot, wind light to moderate.

no Species Encountered.

42 Species Considered Possible.



NS1861

'Pond 5', Red Head Peninsula

This is a deep, algaed, barrachois pond at the west end of the peninsula. It appears to be quite brackish.

It is likely viable for odonate larvae of a number of species.

Location:

45.159362°N, -61.639367°W, (GE: 45.159362N, 61.639367W).

Visit:

September 25, 2012: 12:10 to 13:15 (95 m.),
sunny 100%, hot, wind light to moderate.

2 Species Encountered.

50 Species Considered Possible.

Enallagma civile (Hagen 1861)

Familiar Bluet, Zygoptera, Coenagrionidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355279v, one adult male and female of
a few observed.

RSTAT 3 (likely, towing and ovipositing observed).

Sympetrum internum Montgomery 1943

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355300v, one adult male of a few observed.

RSTAT 8 (possible, males only at water).



NS1860

'Pond 6', Red Head Peninsula

This is the largest barrachois pond on the peninsula. It appears to be entirely freshwater, although it probably receives salt water from spill-over during heavy surf.

It receives inflow from 'Wetland 15 Stream' near its northern end, and flows out through 'Pond 6 Stream' near its east end.

It is assuredly viable for odonate larvae of a large number of species.

Location:

45.161016°N, -61.636832°W, (GE: 45.161016N, 61.636832W).

Visit:

September 25, 2012: 10:30 to 12:00, 14:10 to 14:30 (110 m.), sunny 100%, hot, wind none to light.

7 Species Encountered.

59 Species Considered Possible.

***Lestes disjunctus* Sélys 1862**

Northern Spreadwing, Zygoptera, Lestidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355276v, one adult male, the only observed.

RSTAT 8 (possible, males only at water).

***Enallagma civile* (Hagen 1861)**

Familiar Bluet, Zygoptera, Coenagrionidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355273v, two adult males of a few observed.

RSTAT 8 (possible, males only at water).

***Ischnura verticalis* (Say 1839)**

Eastern Forktail, Zygoptera, Coenagrionidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355274v, one adult female, the only observed.

RSTAT 3 (likely, ovipositing observed).

***Aeshna u. umbrosa* Walker 1908**

Shadow Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355282o, two adult males and one adult female of a few observed.

RSTAT 6 (possible, both genders at water).

***Anax junius* (Drury 1770)**

Common Green Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355292o, two adult males, the only observed.

RSTAT 8 (possible, males only at water).

***Sympetrum internum* Montgomery 1943**

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355300v, one adult male of a few observed.

RSTAT 8 (possible, males only at water).

***Sympetrum semicinctum* (Say 1839)**

Band-winged Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355275v, two adult females, of a few males and females observed.

RSTAT 3 (likely, towing and ovipositing observed).



NS1866

'Pond 6 Stream', Red Head Peninsula

This small stream flows to the east from 'Pond 6', through tiny bogs and Typha ponds, into small ponds adjacent to the cobble beach.

It is certainly viable for odonate larvae of a number of species.

Location:

45.160709°N, -61.635273°W, (GE: 45.160709N, 61.635273W).

Visit:

September 25, 2012: 14:30 to 15:05 (35 m.),
sunny 100%, hot, wind none to light.

2 Species Encountered.

50 Species Considered Possible.

Aeshna u. umbrosa Walker 1908

Shadow Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355281v, one adult male of a few observed.

RSTAT 8 (possible, males only at water).

Sympetrum semicinctum (Say 1839)

Band-winged Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355283o, only a few adult males observed.

RSTAT 8 (possible, males only at water).



NS1867

'Wetland 15 Stream', Uplands

This small stream flows from the uplands down to 'Pond 6' along the east side of Sable Road. It is heavily shaded and flowing through mossy boulders through much of its length, then passes through a small bog ('Wetland 15 Bog'), then parallel to the road in what appears to be a partially trenched watercourse.

It is certainly viable for odonate larvae of a number of species; both those of slow waters, and those of primary streams.

Location:

45.168648°N, -61.632926°W, (GE: 45.168648N, 61.632926W).

Visit:

September 26, 2012: 10:00 to 10:50 (30 m.),
sunny 100%, hot, wind none to light,
time overlaps entirely with the surrounding bog.

2 Species Encountered.

49 Species Considered Possible.

Aeshna canadensis Walker 1908

Canada Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 3552860, only one adult male observed.

RSTAT 8 (possible, males only at water).

Sympetrum vicinum (Hagen 1861)

Autumn Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355284v, one adult female, the only observed.

RSTAT 7 (possible, females only at water).



NS1868

‘Wetland 15 Bog’, Uplands

This small pocket bog surrounds ‘Wetland 15 Stream’, near its first approach to Sable Road.

It has no open water other than the stream, and likely houses a short odonate list.

Location:

45.168648°N, -61.632926°W, (GE: 45.168648N, 61.632926W).

Visit:

September 26, 2012: 10:00 to 10:50 (20 m.),
sunny 100%, hot, wind none to light,
time overlaps entirely with the stream.

1 Species Encountered.

50 Species Considered Possible.

***Sympetrum obtrusum* (Hagen 1867)**

White-faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355285v, one adult male, the only observed.

RSTAT 8 (possible, males only at water).



NS1869

‘Wetland 16’, Uplands

This small bog/fen is drained by ‘Wetland 15 Stream’, and may be anthropogenic; forming due to the fine sediments of mine tailings washing into a depression.

It has floating bog at the west side, shallow but fairly extensive open water, and likely houses a moderately long odonate list.

Location:

45.168041°N, -61.631911°W, (GE: 45.168041N, 61.631911W).

Visit:

September 26, 2012: 11:00 to 12:30 (90 m.),
sunny 100%, hot, wind none to light.

5 Species Encountered.

45 Species Considered Possible.

***Ischnura verticalis* (Say 1839)**

Eastern Forktail, Zygoptera, Coenagrionidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355291v, one adult female, the only observed.

RSTAT 3 (likely, ovipositing observed).

***Aeshna u. umbrosa* Walker 1908**

Shadow Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355287v, one adult male of a few observed.

RSTAT 8 (possible, males only at water).

***Sympetrum costiferum* (Hagen 1861)**

Saffron-Winged Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355288v, one adult male, the only observed;
collected dead on water surface by Marion Sensen.

RSTAT 8 (possible, males only at water).

***Sympetrum internum* Montgomery 1943**

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355290o, a few adult males observed.

RSTAT 8 (possible, males only at water).

***Sympetrum vicinum* (Hagen 1861)**

Autumn Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355289o, only one adult male observed.

RSTAT 8 (possible, males only at water).



NS1870

‘Wetland 17’, Uplands

This small bog/fen is drained by ‘Wetland 15 Stream’, and may be anthropogenic; forming due to the fine sediments of mine tailings washing into a depression, and by the impediment of drainage from an old roadbed.

It has floating bog at the north and west sides, apparently deep and fairly extensive open water, and likely houses a moderately long odonate list.

Location:

45.166896°N, -61.630668°W, (GE: 45.166896N, 61.630668W).

Visit:

September 26, 2012: 13:20 to 14:30 (70 m.),
sunny 100%, hot, wind none to light.

3 Species Encountered.

45 Species Considered Possible.

Anax junius (Drury 1770)

Common Green Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355293o, a few adult males observed.

RSTAT 8 (possible, males only at water).

Sympetrum internum Montgomery 1943

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355295o, only one adult male observed.

RSTAT 8 (possible, males only at water).

Sympetrum vicinum (Hagen 1861)

Autumn Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 355294o, only one adult male observed.

RSTAT 8 (possible, males only at water).



NS1871

'Wetland 18', Uplands

This small true bog has a small stream running through its north margin.

It likely houses a moderately long odonate list, particularly in the stream.

Location:

45.163633°N, -61.619994°W, (GE: 45.163633N, 61.619994W).

Visit:

September 26, 2012: 16:10 to 16:45 (35 m.),
sunny 100%, hot, wind none to light.

2 Species Encountered.

51 Species Considered Possible.

***Aeshna eremita* Scudder 1866**

Lake Darner, Anisoptera, Aeshnidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S4.

Record 3552970, only one adult male observed.

RSTAT 8 (possible, males only at water).

***Sympetrum internum* Montgomery 1943**

Cherry-Faced Meadowhawk, Anisoptera, Libellulidae.

NTSV G5, NGSCDA 4, NSDNR Green, NGSNS 4, NTSV S5.

Record 3552960, only one adult male observed.

RSTAT 8 (possible, males only at water).

Table 1A: **Regional Species List**
 Families **Calopterygidae** (Broadwings) and **Lestidae** (Spreadwings)

The region dealt with is Acadia, the Maritime Provinces and the state of Maine.

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Basic Habitat Preferences

Lotic (running waters) obligate.

Peatland obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Status Significance

Bold red indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Subnational Reports

Data is from ADIP, some reports are not yet published.

Site Column Codes

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1,2 = residence (larval)

proven,

3-5 = residence likely, reproductive behaviour,

6-8 = residence possible,

9 = residence unlikely, aquatic habitat not viable for the species.

10 = residence impossible, a non-aquatic record.

Abundance

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed,

B = 2-5 individuals,

C = 6-25 individuals,

D = more than 25 individuals.

Possible Species

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals																		
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island															
Species per Site									2		1		0	2	7		2	2		1	5	3	2
Possibles per site											47		42	50	59		50	49		50	45	45	51
Zygoptera											19		18	17	18		20	20		19	19	19	20
Calopterygidae																	1	1					
Calopteryx																							
C. aequabilis	G5	4	4	G	ME	NB	NS	PE															
C. amata	G4	4	4	G	ME	NB	NS																
C. maculata	G5	4	4	G	ME	NB	NS	PE									•	•					
Hetaerina																							
H. americana	G5	4	4	G	ME	NB																	
Lestidae											5		5	5	4		5	5		7	6	6	7
Lestes																							
L. australis	G5	4	4	G	ME																		
L. congener	G5	4	4	G	ME	NB	NS	PE			•		•	•	•		•	•		•	•	•	•
L. disjunctus	G5	4	4	G	ME	NB	NS	PE			•		•	•	8A		•	•		•	•	•	•
L. dryas	G5	4	4	G	ME	NB	NS	PE													•	•	
L. eurinus	G4	4	4	U	ME	NB	NS	PE													•		•
L. forcipatus	G5	4	4	U	ME	NB	NS	PE			•		•	•	•		•	•			•	•	•
L. inaequalis	G5	4			ME	NB																	
L. rectangularis	G5	4	4	G	ME	NB	NS				•		•	•	•			•					
L. unguiculatus	G5	4	4	G	ME	NB	NS	PE												•			•
L. vigilax	G5	4	4	U	ME	NB	NS				•		•	•	•		•	•		•	•	•	•

Species per Site are those encountered to date, indicated by yellow bars.

Basic Habitat Preferences.
 Lotic (running waters) obligate.
 Peatland obligate.
 Saltmarsh obligate.
 All others are lentic (still or slow waters) or flexible.

See Appendix 3 for status definitions.

Data is from ADIP, some reports are not yet published.

1,2 = residence (larval)
proven,
3-5 = residence likely, repro-
ductive behaviour,
6-8 = residence possible,
9 = residence unlikely,
aquatic habitat not viable
for the species.
10 = residence impossible,
a non-aquatic record.

A = 1 individual observed,
B = 2-5 individuals,
C = 6-25 individuals,
D = more than 25 individuals.

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals																				
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island																	
Zygoptera cont...																									
Coenagrionidae												14		13	12	14		14	14			13	12	13	13
Amphiagrion																									
A. saucium	G5	4	4	G	ME	NB	NS					•										•	•		
Argia																									
A. f. violacea	G5	4	4	G	ME	NB	NS											•	•						
A. moesta	G5	4	4	G	ME	NB	NS																		
A. translata	G5	4			ME																				
Chromagrion																									
C. conditum	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
Coenagrion																									
C. interrogatum	G5	4	2	U	ME	NB	NS																		
C. resolutum	G5	4	4	Rd	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
Enallagma																									
E. annexum	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. aspersum	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. boreale	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. carunculatum	G5	4	5	U	ME	NB	NS	PE						•	•	•									
E. civile	G5	4	4	G	ME	NB	NS	PE				•		•	3B	8B		•	•			•	•	•	•
E. divagans	G5	4			ME																				
E. durum	G5	4			ME																				
E. ebrium	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. exsulans	G5	4	4	G	ME	NB	NS											•	•						
E. geminatum	G5	4			ME	NB																			
E. hageni	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. laterale	G5	4			ME																				
E. minusculum	G4	4	4	Ye	ME	NB	NS	PE								•									
E. pictum	G5	4			ME																				
E. recurvatum	G5	4			ME																				
E. signatum	G5	4	2	U	ME	NB	NS									•									
E. vernale	G4	4	5	U	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•
E. vesperum	G5	4	3	U	ME	NB	NS									•									
Ischnura																									
I. hastata	G5	4	5	U	ME		NS					•													
I. kellicotti	G5	4			ME																				
I. posita	G5	4	4	G	ME	NB	NS					•		•	•	•		•	•			•	•	•	•
I. ramburii	G5	4			ME																				
I. verticalis	G5	4	4	G	ME	NB	NS	PE				•		•	•	3A		•	•			•	3A	•	•
Nehalennia																									
N. gracilis	G5	4	4	U	ME	NB	NS	PE														•			•
N. irene	G5	4	4	G	ME	NB	NS	PE				•		•	•	•		•	•			•	•	•	•

Table 1C: **Regional Species List**
 Family **Aeshnidae** (Darners)

The region dealt with is Acadia, the Maritime Provinces and the state of Maine.

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Basic Habitat Preferences

Lotic (running waters) obligate.

Peatland obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Status Significance

Bold indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Subnational Reports

Data is from ADIP, some reports are not yet published.

Site Column Codes

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1,2 = residence (larval)

proven,

3-5 = residence likely, reproductive behaviour,

6-8 = residence possible,

9 = residence unlikely, aquatic habitat not viable for the species.

10 = residence impossible, a non-aquatic record.

Abundance

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed,

B = 2-5 individuals,

C = 6-25 individuals,

D = more than 25 individuals.

Possible Species

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals																		
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island															
Anisoptera												28	24	33	41		30	29		31	26	26	31
Aeshnidae												5	5	5	6		4	5		6	6	5	6
Aeshna																							
A. canadensis	G5	4	4	G	ME	NB	NS	PE				●					8A						
A. clepsydra	G4	4	4	G	ME	NB	NS																●
A. constricta	G5	4	4	U	ME	NB	NS	PE					●	●	●						●	●	
A. eremita	G5	4	4	G	ME	NB	NS	PE				●		●	●		●	●			●	●	8A
A. i. interrupta	G5	4	4	G	ME	NB	NS	PE				●		●	●		●	●			●	●	●
A. juncea	G5	4			ME	NB																	
A. sitchensis	G5	4	4	G	ME	NB	NS																●
A. subarctica	G5	4	4	G	ME	NB	NS	PE															●
A. tuberculifera	G4	4	4	G	ME	NB	NS	PE				●		●	●		●	●			●	●	●
A. u. umbrosa	G5	4	4	G	ME	NB	NS	PE				●				6B	8B			8B			
A. verticalis	G5	4	4	G	ME	NB	NS											●			●	●	
Anax																							
A. junius	G5	4	4	G	ME	NB	NS	PE				●		●	●	8B					●	8B	
A. longipes	G5	8			ME	NB																	
Basiaeschna																							
B. janata	G5	4	4	G	ME	NB	NS	PE								●	●	●					
Boyeria																							
B. grafiana	G5	4	3	U	ME	NB	NS	PE															
B. vinosa	G5	4	4	G	ME	NB	NS	PE															
Epiaeschna																							
E. heros	G5	4			ME	NB																	
Gomphaeschna																							
G. furcillata	G5	3	3	Ye	ME	NB	NS	PE												●			●
Nasiaeschna																							
N. pentacantha	G5	3			ME	NB																	
Rhionaeschna																							
R. mutata	G4	2	5	U	ME		NS									●							

Table 1D: **Regional Species List**
 Family **Gomphidae** (Clubtails)

The region dealt with is Acadia, the Maritime Provinces and the state of Maine.

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Basic Habitat Preferences

Lotic (running waters) obligate.

Peatland obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Status Significance

Bold red indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Subnational Reports

Data is from ADIP, some reports are not yet published.

Site Column Codes

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1,2 = residence (larval) proven,

3-5 = residence likely, reproductive behaviour,

6-8 = residence possible,

9 = residence unlikely, aquatic habitat not viable for the species.

10 = residence impossible, a non-aquatic record.

Abundance

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed,

B = 2-5 individuals,

C = 6-25 individuals,

D = more than 25 individuals.

Possible Species

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals				Non-Aquatic Site NS1864 'Study Area' only	Saltmarsh Site NS1863 'Pond 5 Saltmarsh'	Pond Sites NS1862 'Pond 4' NS1861 'Pond 5' NS1860 'Pond 6'	Running Waters Sites NS1866 'Pond 6 Stream' NS1867 'Wetland 15 Stream'	Bog/Fen Sites NS1868 'Wetland 15 Bog' NS1869 'Wetland 16' NS1870 'Wetland 17' NS1871 'Wetland 18'
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island					
Anisoptera cont...													
Gomphidae											2	2	4
Arigomphus													
<i>A. furcifer</i>	G5	3			ME	NB							
<i>A. villosipes</i>	G5	3			ME								
Dromogomphus													
<i>D. spinosus</i>	G5	4	4	G	ME	NB	NS				●		
Gomphus													
<i>G. abbreviatus</i>	G3*	4			ME	NB							
<i>G. adelphus</i>	G4	4	4	G	ME	NB	NS						
<i>G. borealis</i>	G4	4	4	G	ME	NB	NS					●	
<i>G. descriptus</i>	G4	4	3	Ye	ME	NB	NS						
<i>G. exilis</i>	G5	4	4	G	ME	NB	NS			●	●	●	
<i>G. quadricolor</i>	G3*	2			ME								
<i>G. spicatus</i>	G5	4	4	G	ME	NB	NS	PE		●	●	●	
<i>G. vastus</i>	G5	4			ME	NB							
<i>G. ventricosus</i>	G3	2	2	Rd		NB	NS						
Hagenius													
<i>H. brevistylus</i>	G5	4	4	G	ME	NB	NS				●		
Lanthus													
<i>L. parvulus</i>	G4	4	4	Ye	ME	NB	NS						
<i>L. vernalis</i>	G4	5			ME	NB							
Ophiogomphus													
<i>O. anomalus</i>	G4	4	5	U	ME	NB	NS						
<i>O. aspersus</i>	G4	4	2	Rd	ME	NB	NS						
<i>O. carolus</i>	G5	4	4	G	ME	NB	NS						
<i>O. colubrinus</i>	G5	4			ME	NB							
<i>O. howei</i>	G3	2			ME	NB							
<i>O. m. mainensis</i>	G4	4	2	Rd	ME	NB	NS						
<i>O. rupinsulensis</i>	G5	4	2	Rd	ME	NB	NS						
Progomphus													
<i>P. obscurus</i>	G5	2			ME								
Stylogomphus													
<i>S. albistylus</i>	G5	4	4	G	ME	NB	NS						
Stylurus													
<i>S. scudderii</i>	G4	4	2	U	ME	NB	NS						
<i>S. spiniceps</i>	G5	4			ME								

Table 1E: **Regional Species List**
 Families **Cordulegastridae** (Spiketail), **Macromiidae** (Cruisers), and
Corduliidae (Emeralds, in part)

The region dealt with is Acadia, the Maritime Provinces and the state of Maine.

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Basic Habitat Preferences

Lotic (running waters) obligate.

Peatland obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Status Significance

Bold red indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Subnational Reports

Data is from ADIP, some reports are not yet published.

Site Column Codes

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1,2 = residence (larval)

proven,

3-5 = residence likely, reproductive behaviour,

6-8 = residence possible,

9 = residence unlikely, aquatic habitat not viable for the species.

10 = residence impossible, a non-aquatic record.

Abundance

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed,

B = 2-5 individuals,

C = 6-25 individuals,

D = more than 25 individuals.

Possible Species

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals				Non-Aquatic Site NS1864 'Study Area' only	Saltmarsh Site NS1863 'Pond 5 Saltmarsh'	Pond Sites NS1862 'Pond 4' NS1861 'Pond 5' NS1860 'Pond 6'	Running Waters Sites NS1866 'Pond 6 Stream' NS1867 'Wetland 15 Stream'	Bog/Fen Sites NS1868 'Wetland 15 Bog' NS1869 'Wetland 16' NS1870 'Wetland 17' NS1871 'Wetland 18'
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island					
Anisoptera cont...													
Cordulegastridae												1	1
<i>Cordulegaster</i>													
<i>C. diastatops</i>	G5	4	4	G	ME	NB	NS					●	●
<i>C. maculata</i>	G5	4	4	G	ME	NB	NS	PE					
<i>C. obliqua</i>	G4	3			ME								
Macromiidae											1	1	1
<i>Didymops</i>													
<i>D. transversa</i>	G5	4	4	G	ME	NB	NS				●	●	●
<i>Macromia</i>													
<i>M. i. illinoensis</i>	G5	4	4	G	ME	NB	NS						
Corduliidae										5	1	6	13
<i>Cordulia</i>													
<i>C. shurtleffii</i>	G5	4	4	G	ME	NB	NS	PE		●	●	●	●
<i>Dorocordulia</i>													
<i>D. lepida</i>	G5	4	4	G	ME	NB	NS	PE			●		●
<i>D. libera</i>	G5	4	4	G	ME	NB	NS	PE			●		●
<i>Epitheca</i>													
<i>E. canis</i>	G5	4	4	G	ME	NB	NS	PE		●	●	●	●
<i>E. cynosura</i>	G5	4	5	U	ME	NB	NS	PE		●	●	●	●
<i>E. princeps</i>	G5	4	3	Ye	ME	NB	NS				●		●
<i>E. semiaquea</i>	G4	5	5	U	ME	NB	NS			●	●	●	●
<i>E. spinigera</i>	G5	4	4	G	ME	NB	NS	PE		●	●	●	●
<i>Helocordulia</i>													
<i>H. uhleri</i>	G5	4	4	G	ME	NB	NS				●	●	●
<i>Neurocordulia</i>													
<i>N. michaeli</i>	G3*	4	5	U	ME	NB	NS						
<i>N. obsoleta</i>	G5	5			ME								
<i>N. yamaskanensis</i>	G5	4			ME	NB							

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Lotic (running waters) obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Bold red indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Data is from ADIP, some reports are not yet published.

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1.2 = residence (larval)

proven,

3-5 = residence likely, reproductive behaviour.

6-8 = residence possible.

9 = residence unlikely,
aquatic habitat not viable
for the species.

10 = residence impossible, a non-aquatic record.

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed.

B = 2-5 individuals,

c = 6-25 individuals.

D = more than 25 individuals.

A bullet (●) in white indicates that the species is thought possible for the site.

[illegible]

Table 1G: **Regional Species List**
Libellulidae (Skimmers, in part)

The region dealt with is Acadia, the Maritime Provinces and the state of Maine.

Species per Site are those encountered to date, indicated by yellow bars.

Possibles per site (see Species, page C.01, for discussion) are given in total, and by order, suborder, and family.

Basic Habitat Preferences

Lotic (running waters) obligate.

Peatland obligate.

Saltmarsh obligate.

All others are lentic (still or slow waters) or flexible.

Status Significance

Bold red indicates a status of conservation concern.

A fraction indicates a status intermediate between the given status and the next status of lesser conservation concern.

See Appendix 3 for status definitions.

Subnational Reports

Data is from ADIP, some reports are not yet published.

Site Column Codes

Residence Status

A bold red number is the ADIP resident status code (see Appendix 3 for explanations).

1,2 = residence (larval) proven,

3-5 = residence likely, reproductive behaviour,

6-8 = residence possible,

9 = residence unlikely, aquatic habitat not viable for the species.

10 = residence impossible, a non-aquatic record.

Abundance

The black letter is the abundance code (see Appendix 3 for explanations).

A = 1 individual observed,

B = 2-5 individuals,

C = 6-25 individuals,

D = more than 25 individuals.

Possible Species

A bullet (●) in white indicates that the species is thought possible for the site.

Taxa	Statuses				Subnationals				Non-Aquatic Site NS1864 'Study Area' only	Saltmarsh Site NS1863 'Pond 5 Saltmarsh'	Pond Sites NS1862 'Pond 4' NS1861 'Pond 5' NS1860 'Pond 6'	Running Waters Sites NS1866 'Pond 6 Stream' NS1867 'Wetland 15 Stream'	Bog/Fen Sites NS1868 'Wetland 15 Bog' NS1869 'Wetland 16' NS1870 'Wetland 17' NS1871 'Wetland 18'
	NatSrv Global	NGS Canada	GS Nova Scotia	NSDNR Nova Scotia	Maine	New Brunswick	Nova Scotia	Prince Edward Island					
Anisoptera cont...													
Libellulidae cont...													
Libellula													
<i>L. cyanea</i>	G5				ME								
<i>L. incesta</i>	G5	4	4	G	ME	NB	NS						
<i>L. luctuosa</i>	G5	4	5	BI	ME		NS						
<i>L. needhami</i>	G5				ME								
<i>L. pulchella</i>	G5	4	4	G	ME	NB	NS	PE					
<i>L. quadrimaculata</i>	G5	4	4	G	ME	NB	NS	PE					
<i>L. semifasciata</i>	G5	2			ME	NB							
Nannothemis													
<i>N. bella</i>	G4	4	4	G	ME	NB	NS						
Pachydiplax													
<i>P. longipennis</i>	G5	4			ME	NB							
Pantala													
<i>P. flavescens</i>	G5	4	4	G	ME	NB	NS	PE	10A				
<i>P. hymenaea</i>	G5	4	3	G	ME	NB	NS						
Perithemis													
<i>P. tenera</i>	G5	4			ME								
Plathemis													
<i>P. lydia</i>	G5	4	4	G	ME	NB	NS	PE					
Sympetrum													
<i>S. corruptum</i>	G5	4	8	U	ME	NB	NS	PE					
<i>S. costiferum</i>	G5	4	4	G	ME	NB	NS	PE					
<i>S. danae</i>	G5	4	3	G	ME	NB	NS	PE					
<i>S. internum</i>	G5	4	4	G	ME	NB	NS	PE		8B	8B	8B	
<i>S. obtrusum</i>	G5	4	4	G	ME	NB	NS	PE					
<i>S. rubicundulum</i>	G5	4	4	U	ME	NB	NS	PE					
<i>S. semicinctum</i>	G5	4	4	G	ME	NB	NS	PE			3B	8B	
<i>S. vicinum</i>	G5	4	4	G	ME	NB	NS	PE	10C			7A	
Tamea													
<i>T. carolina</i>	G5	5	5	U	ME		NS						
<i>T. lacerata</i>	G5	4	2	U	ME	NB	NS						

Given the seasonal nature of Odonata species, and the number of species considered likely resident in aquatic habitats within the project footprint, we recommend two further survey visits of similar duration during the 2013 field season.

The visits would best be scheduled for mid-June and late July or early August.

Following those potential visits, a firm species list could be presented, which will clearly indicate if there are species of conservation concern which must be considered in project planning.

Methodology for survey, curation and documentation follows the ADIP (Atlantic Dragonfly Inventory Program) protocols, which have evolved since the late 1980s, and which reflect current practice in the study of odonates.

Habitat Location

After discussions with the client, airphotos of the project region are reviewed and a target aquatic habitat list prepared. This list is confirmed and amended during the field trip.

Each site is given an ADIP identification code beginning with 'NS', although a unique acronym may be used initially in the field.

Field Survey

Personnel

All survey is done by Paul M. Brunelle unless otherwise noted.

Lifestage

Principal survey is for adults and teneral (the latter are recently-emerged adults), however exuviae (the abandoned skins of the emerged insects) are also collected when found. Exuviae collection may present the most effective means of inventory for these habitats, and firmly establishes residence status (see Appendix 3), but field survey must be scheduled carefully to collect this material, and tends to be protracted.

Larval survey can yield excellent information on the residence status of species, however it is decidedly protracted in the field and in the lab.

Adults are captured by net, and retained in field envelopes until preserved.

Frequency of Survey

One visit to a water body per year is insufficient to acquire a reasonably complete species list, due to the diverse flight periods of species, however the results of even one trip per year can be suggestive as to the health of the aquatic habitat.

Diel

Survey is done principally during the peak periods of odonate activity, roughly 10:00 to 17:00, depending on weather.

Weather

Field days are chosen in which the weather was suitable for encountering adults – sunny and hot, with no more than moderate winds.

Voucher Specimens

Specimens are taken *pro forma* in many cases, and in all cases where field determination of particular species is considered untrustworthy.

The specimens are force-dried in acetone (adults and teneral), air-dried (exuviae) and heat-killed and preserved in 75% alcohol. Adult and teneral specimens are stored in clear mylar envelopes, exuviae and larvae in bottles. Specimens are labeled with all identification and accession information.

Each specimen is given a 6-digit ADIP accession number, unique among specimens of odonates taken in Atlantic Canada and northern New England, and catalogued in the ADIP databases. The accession number as presented in reports has a letter suffix which indicates the provenance on which the record is based;

v = vouchered specimen,

o = observed on the wing or perched,

h = determined in the hand then released,

p = photographed, and,

c = indicating that the determination of vouchers has been confirmed by another worker.

Specimens from Nova Scotia are typically deposited at the Nova Scotia Museum of Natural History, Halifax; those from New Brunswick or Prince Edward Island are usually deposited at the New Brunswick Museum, Saint John.

Documentation

Photography

General habitat photos are taken during each visit, converted to jpg format, catalogued, and will be tendered to the client for project use if requested.

Data

Field notes, species observations and specimen details are entered into a Filemaker Pro 11 relational database structure, which can be translated into Excel database form for deposit the client.

The insect order Odonata is one of the most ancient and widely-recognized groups of insects, adults are identifiable to suborder even by children.

Taxonomy

The suborder Zygoptera comprises the damselflies; very slim, with eyes widely separated on a short head, and wings of similar shape, generally held together over the back when perched.

The suborder Anisoptera comprises the dragonflies; which tend to be larger and more robust, and which hold their differently-shaped fore and hindwings more or less flat out to the side when perched.

History of Study

There has been an extraordinary surge in interest in odonates in the last twenty years, fueled in part by the availability of photographs of these brilliantly-coloured insects and subsequently the publication of field guides, but also by increased interest in rare and endangered species among conservation and government authorities.

In the northeast of North America, this interest was first manifested in the formation of volunteer surveys ADIP (Atlantic Dragonfly Inventory Program) in Atlantic Canada, and MDDS (Maine Damselfly and Dragonfly Survey). Based on these largely volunteer efforts, government and conservation authorities have begun supporting studies, and odonates are now often included in environmental assessments.

Much remains to be done before we have a firm body of knowledge upon which to base assumptions in the region however the 60,000+ records in hand for Acadia (Maritime Provinces and Maine) are a substantial baseline for further work.

Listing

See Appendix 3 for status definitions.

Until recently the NatureServe listing for the Maritime Provinces was not complete on the subnational (provincial) level. Recent efforts by the Atlantic Canada Conservation Data Centre have addressed that.

Recently, the odonates of Canada were assigned statuses in the National General Status structure, as were species in all provinces and territories.

The Nova Scotia Department of Natural Resources uses a system of colour statuses which largely reflects the National General Status definitions.

Significance to Humans

The order is an important component in all freshwater aquatic habitats. As predators high on the aquatic foodchain they consume many organisms we consider injurious, and are prey for many others which we value.

They are, in particular, an important brake on the abundance of the biting insects.

Adults feed efficiently on flying insects, many of which we are not fond of.

Impacts on Odonata

Human impacts on odonates are principally aquatic habitat alteration, and tend to favour the common species over those rarer in the natural environments. On the positive side, we have constructed ponds, reservoirs, bogs and ditches which generally house good lists of lentic (still and slow-water) species. The formation of bogs has been particularly beneficial to northern species. On the negative side, we have greatly altered, and in some cases eliminated, all sizes of lotic (running water) habitats, and as a result have negatively impact many of those species which are obligate to those habitat types.

Direct impacts are confined to collection for scientific purposes and road-kill. The latter can be a powerful impact on species depending upon their flying characteristics, however the former is rarely intense enough to endanger even the most restricted species population. There is no significant commercial trade in odonate specimens.

Lifestages

Odonata are largely aquatic insects, spending their infancy in the water. Unlike many aquatic insects, their larvae breathe the water (rather than taking their breath from the atmosphere) and are hence vulnerable to a degree to changes in water chemistry.

After a maturation period, variable by species, they emerge into the teneral lifestage, leaving the empty shell of the larva behind (called an exuvia). The teneral is soft-bodied and does not generally have the brilliant colours of the adult.

After a period away from the water spent foraging and firming up, they return to their breeding arenas (usually at the appropriate water's edge).

Mature adults may be significantly different in colour and pattern from their tenerals, and in some groups there is marked sexual dichromatism.

Behaviour

Major behaviours observed informed the establishment of residence status (see Appendix 1), and are: *emergence* (a teneral leaving its larval form), *mating* and *towing* (the latter indicative of laying), *laying* (or ovipositing), *males fighting* (indicative of territoriality at a larval habitat), *nuptial* (reproductive behaviour), and *wandering* (an adult thought to be foraging away from its normal larval habitat).

Conservation Statuses

Italic comments are by P.M. Brunelle.

NatureServe Global Ranks

These ranks are assigned for NatureServe by the Atlantic Canada Conservation Data Centre (ACCDC), Sackville, New Brunswick.

<http://www.natureserve.org/explorer/>

- G1** Extremely rare throughout its range (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.
- G2** Rare throughout its range (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
- G3** Uncommon throughout its range, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).
- G4** Usually widespread, fairly common throughout its range, and apparently secure with many occurrences, but the Element is of long term concern (e.g.: a watch list, 100+ occurrences).
- G5** Demonstrably widespread, abundant, and secure throughout its range, and essentially ineradicable under present conditions.
- T** This suffix indicates that there is some taxonomic confusion with the species.
A fraction indicates that the rank is intermediate between two ranks.
- U** Not assessed at this point.

National General Status Ranks – Canada

These statuses are assigned by COSEWIC (Committee on the Status of Endangered Wildlife in Canada).

<http://www.wildspecies.ca/searchtool.cfm?lang=e>

- 1 At risk:** species for which a formal assessment has been completed and it has been determined to be at risk of extirpation or extinction (i.e.: endangered or threatened). Done only for national or subnationals at the national level.
- 2 May be at risk:** species that may be at risk of extirpation or extinction, and are therefore candidates for a detailed risk assessment.
- 3 Sensitive:** species which are not believed to be at risk of extirpation or extinction, but may require special attention or protection to prevent them from becoming at risk.
- 4 Secure:** species which are not believed to be 'at risk' or 'sensitive'.
- 5 Undetermined:** species for which insufficient data, information, or knowledge is available to reliably evaluate their status. *Generally rare where reported.*
- 6 Not assessed:** species known or believed to be present but which have not yet been assessed. *This status is usually applied to recent discoveries.*
- 7 Exotic:** species that have been introduced as a result of human activity.
- 8 Extirpated/extinct:** species no longer thought to be present in the jurisdiction or that are believed to be extinct.
- 9 Accidental/vagrant:** species occurring infrequently and unpredictably, outside their usual range.

National General Status Ranks – Subnationals

For provincial ranks see definitions for Canada above.

NSDNR Colour Ranks – Nova Scotia

These colour ranks are assigned by the Nova Scotia Department of Natural Resources, and closely reflect the National General Status Ranks.

<http://www.gov.ns.ca/natr/wildlife/genstatus/background.as>

- Blue** (Bl in Table 1) = **Extirpated/Extinct:** Species that are no longer thought to be present in the province or in Canada, or that are believed to be extinct.
- Red** (Rd) = **At Risk or Maybe at Risk:** Species for which a formal detailed risk assessment has been completed (COSEWIC assessment or a provincial equivalent)
- Yellow** (Ye) = **Sensitive:** Species that are not believed to be at risk of immediate extirpation or extinction, but which may require special attention or protection to prevent them from becoming at risk.
- Green** (G) = **Secure:** Species that are not believed to be at risk, or sensitive.
- Undetermined** (U) = Species for which insufficient data, information, or knowledge is available to reliably evaluate their status.
- Not Assessed** (U) = Species that are known or are believed to be present regularly, but have not yet been assessed.
- Exotic** = Species that have been moved beyond their natural range as a result of human activity.
- Accidental** = Species occurring infrequently and unpredictably, outside their usual range.

Residence Status

Developed by ADIP, residence status is a metric of the nature of a species' presence in a water body or wetland, based on the degree to which it has been proven or indicated that the larvae of the species have developed successfully to emergence.

Residence Proven

- 1 Emergence recorded;**
 - directly observed,
 - collection of exuvia, or,
 - a teneral on its maiden flight near the site.
 - 2 Larvae collected,** unambiguous determination.
- #### Residence Likely
- 3 Laying observed.**
 - 4 Mating observed.**
 - 5 Reproductive behavior observed;**
 - male display for female,
 - male priming (transferring semen to secondary genitalia), or,
 - male towing female (an indicator of laying).

Residence Possible

- 6 Males and females observed,** at an aquatic habitat appropriate for the larvae of the species.
- 7 Females only observed,** at appropriate aquatic habitat.
- 8 Males only observed,** at appropriate aquatic habitat.

Residence Unlikely

- 9 Not encountered at an appropriate aquatic habitat.**
- Not Resident**
- 10 Not encountered at any aquatic habitat.**

Abundance Codes

Developed by ADIP and MDDS (Maine Damselfly and Dragonfly Survey), these codes are an estimate of the number of individuals of the species seen in each record. The number range is typically used in the site accounts, the letter code in the Regional Species List in this report.

- 1** A 1 individual seen.
- 25** B 2 to 5 individuals seen.
- 6–25** C 6 to 25 individuals seen.
- >25** D more than 25 individuals seen.