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Odonate Surveys on the Tusket, Medway, and Lahave Rivers

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Extra-striped Snaketail (*Ophiogomphus anomalus*), a new species for Nova Scotia. Exuvia of the species were collected at eight sites on the Medway River

Introduction

Great effort has been spent documenting Odonata in Nova Scotia in the past 20 years, largely due to the efforts of Paul Brunelle and contributors to the Atlas Dragonfly Inventory Program (ADIP). As of 2008, there were 10,448 records documenting 122 species¹. There is, however, still much to be learned. Many potential species have yet to be recorded, many rare species are known from only from a handful of records, and many areas have received little attention.

Of all the records that exist in the ADIP database, 90% are of adults. Given the high mobility of adult dragonflies and damselflies, the presence of an adult at a particular site has limited conservation implications unless it is captured in habitat that is suitable for its larval development. Of greater conservation consequence is the collection of exuvia (the shed skins left at the water's edge when a larva emerges and metamorphoses into an adult). Their presence indicates the water body hosts a breeding population, or in conservation terms an element occurrence, of the species. Exuvia also allow for the detection of many elusive species, particularly the clubtails (Gomphidae) where many species spend little time as adults near the water from which they emerged, and shadowdragons (*Neurocordulia*) where adults are fast-flying and crepuscular.

This project involved the surveying of sections on the Lahave (and major Lahave tributaries), Medway, and Tuskent Rivers with high potential for rare species. In total 30km of river was sampled, and 9 evening site visits, targeting shadowdragons, were made. Extra-striped Snaketail was recorded for the first time in Nova Scotia on the Medway River, and new populations of three provincially uncommon or rare species (Orange Bluet, Maine Snaketail, Riffle Snaketail) were discovered at various locations. The discovery of Extra-striped Snaketail is especially significant. The Medway River is one of the best surveyed Nova Scotia rivers, but almost no attention has been paid to exuvia. Detecting the species on the river through exuvia sampling demonstrates the utility of the technique for detecting elusive species, and shows that there is much to be learned about Nova Scotia's Odonata. Extra-striped Snaketail is also often considered an indicator species for Pygmy Snaketail, a COSEWIC-listed dragonfly not known from Nova Scotia.

Methods

Given their potential to host a diverse odonate fauna and rare species, major rivers were targeted for surveying. Based on discussions with NS DNR and Paul Brunelle, sections of the Medway, Tuskent, and Lahave (North and West Branch) Rivers were surveyed.

Day-surveying was done from canoe on stretches of each river (see Map 1). In total 30km was surveyed. Sites within those stretches were selected during surveys (areas immediately below sections of fast water were targeted; they are often the site of mass emergences). Each site consisted of 50-100m of shoreline. At each site habitat and weather conditions were recorded, as per ADIP protocols. All exuvia

¹ Brunelle, P.-M. 2010. Dragonflies and damselflies (Odonata) of the Atlantic Maritime Ecozone. *In* Assessment of Species Diversity in the Atlantic Maritime Ecozone. Edited by D.F. McAlpine and I.M. Smith, NRC Research Press, Ottawa, Canada. Pages 333-369

encountered were collected, as were many adults. Adults that could be identified in the field were recorded.

Evening surveying was conducted at nine locations on the Medway, Lahave, Tusket, and Carleton Rivers and Cold Stream, a small tributary to the Tusket River (Maps 1-6, the Carleton River site [not mapped] is at 44.0064°N, 65.9248°W). These surveys were done at dusk, and specifically targeted shadowdragons. Shadowdragons haven't been recorded in Nova Scotia, but they may have been overlooked because of their crepuscular flight times.

Results

Extra-striped Snaketail was recorded in Nova Scotia for the first time. Three provincially uncommon to rare species (species with S-Ranks S1 to S3S4, S-Ranks defined at <http://www.natureserve.org/explorer/ranking.htm#natsub>) were documented – Orange Bluet, Riffle Snaketail, and Maine Snaketail. Details on these four species are provided below. No shadowdragons were observed during evening surveys.

In total 128 hours (17 person days) was spent collecting, processing, and identifying museum specimens (includes field, travel, and office hours). The surveys were done between June 14 and July 22, 2010 and produced 312 records (species x location) of 48 species and 841 specimens that will be donated to the Nova Scotia Museum (see Table 1 for breakdown of species collected).

Water levels were low (ideal for exuvia collections) in June, the month when half of the site visits were done. Water levels rose dramatically in early July, resulting in poor conditions for exuvia collection for the balance of the site visits. The dates that each stretch of river was visited is given on the maps.

Extra-striped Snaketail (*Ophiogomphus anomalus*)

This species of clear rapid rivers was found at eight sites on the Medway River (Map 2). All records were exuvia, and in total 68 exuvia were collected. The records suggest the species is relatively common in the river for the entire stretch surveyed. It is likely that the occurrence extends beyond this stretch of river, as the habitat up and downstream of the section surveyed is similar to what was surveyed.

There are 300 records of 46 species from the Medway River in the ADIP database, making it one of the best-surveyed rivers in Nova Scotia. However, only nine of the records are of exuvia or larvae. The lack of exuvia surveying is the likely reason that Extra-striped Snaketail has been overlooked until now.

This is a nearly 200km Canadian range extension for this species. The nearest known population is in the Magaguadavic River in Charlotte County, New Brunswick.

Extra-striped Snaketail is often considered an indicator species for Pygmy Snaketail², a COSEWIC-listed species not known from Nova Scotia. In Canada, Pygmy Snaketail is known only from a few locations in

² COSEWIC. 2008. COSEWIC assessment and status report on the Pygmy Snaketail *Ophiogomphus howei* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 34 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

New Brunswick and a single location in Ontario, though there are suitable habitats throughout the Maritimes². The discovery of Extra-striped Snaketail in Nova Scotia further demonstrates the potential for the occurrence of Pygmy Snaketail to occur in Nova Scotia.

Maine Snaketail (*Ophiogomphus mainensis*, S1)

This species of clear rapid streams and rivers was found at six locations on the West Lahave River and one location on the Medway River. Records consisted of two adults and 32 exuvia (both adults from West Lahave River). Maine Snaketail was previously known from three locations in Nova Scotia, including one breeding location on the Medway River at South Brookfield.

Exuvia were found along the entire length of the West Lahave River surveyed, suggesting the species is more widespread on this river than surveys indicate. These records represent a new Nova Scotia population for this species, and the first records for the Lahave watershed and Lunenburg County. The single exuvia recorded on the Medway River was found 18km southeast of the previously documented South Brookfield site. It is unlikely that these two occurrences are part of a contiguous population as they are separated by Ponhook Lake, which is not suitable habitat for this riverine species. Thus the Medway record also represents a new population.

Riffle Snaketail (*Ophiogomphus carolus*, S3)

Another species of clear rapid streams and rivers, adult Riffle Snaketail were found at two locations on the North Branch Lahave River and one site on the West Lahave River. These are the first records for this species on the Lahave watershed.

A total of 43 snaketail exuvia were collected from 16 sites on the North Branch Lahave, West Lahave, and Medway Rivers that are likely Riffle Snaketail. Unfortunately, Riffle Snaketail exuvia are difficult, if not impossible, to distinguish from the exuviae of Rusty Snaketail (*Ophiogomphus rupinsulensis*) and Brook Snaketail (*Ophiogomphus aspersus*). These 43 exuviae will be deposited in the Nova Scotia museum, where they can be revisited by future researchers should new identification techniques be developed.

Orange Bluet (*Enallagma signatum*, S1)

Orange Bluet occurs in a variety of still water situations. It is most active late in the day, making it likely to be overlooked. Orange Bluet was found at two locations, approximately 2.3 km apart, on the Tusket River. A total of 34 individuals were observed, 14 at the upstream site, 20 at the downstream site. Both sites had slow flow with emergent vegetation. Given their proximity they likely represent a single population.

Orange Bluet was first recorded in Nova Scotia in 2001. It is known from four other Nova Scotia locations, including a record from Cumberland County made in September 2010 by AC CDC staff. The Tusket River records represent the first for the watershed and for Yarmouth County. They are nearly 80 km from the nearest known population.

Non-odonate Highlights

Several occurrences of COSEWIC listed species were recorded during the odonate surveys. The most noteworthy was a stand of Redroot (*Lachnanthes caroliniana* – Threatened) found on the Medway River between the mouths of Dean Brook and Murray Brook. The stand of approximately 200 plants are approximately nine kilometers from the nearest plants on Ponhook Lake, and likely represent a new Canadian population (there are two known populations, one centered on Ponhook Lake and one centered on Molega Lake).

Eastern Ribbon Snake (*Thamnophis sauritus* – Threatened) was recorded on the Medway River approximately 3.5km downstream of Bangs Falls. This is eight kilometers from the nearest record, and represents a new Nova Scotia population³.

Conclusions

The 2010 fieldwork on major rivers in southern Nova Scotia has significantly increased our understanding of the distribution and status of several rare dragonfly and damselfly species. The surveys demonstrate that exuvia-based collecting can detect elusive species, and can turn up new species on waterways where adults have been well-surveyed. The occurrence of Extra-striped Snaketail in Nova Scotia indicates appropriate habitat may occur for the COSEWIC Special Concern Pygmy Snaketail in Nova Scotia.

Most importantly findings indicate there is still much to be learned about Nova Scotia's Odonata. Additional fieldwork on large Nova Scotia rivers would certainly produce new locations for rare species, and likely add species to the provincial list. Large Nova Scotia rivers that have received little attention to date include the St. Mary's (15 records, no exuvia), Clyde (41 records, 1 exuvia), Annapolis River (37 records, 1 exuvia), Roseway (5 records, no exuvia), Stewiacke (3 records, no exuvia), Musquodobit (3 records, 1 larva) (ADIP 2010).

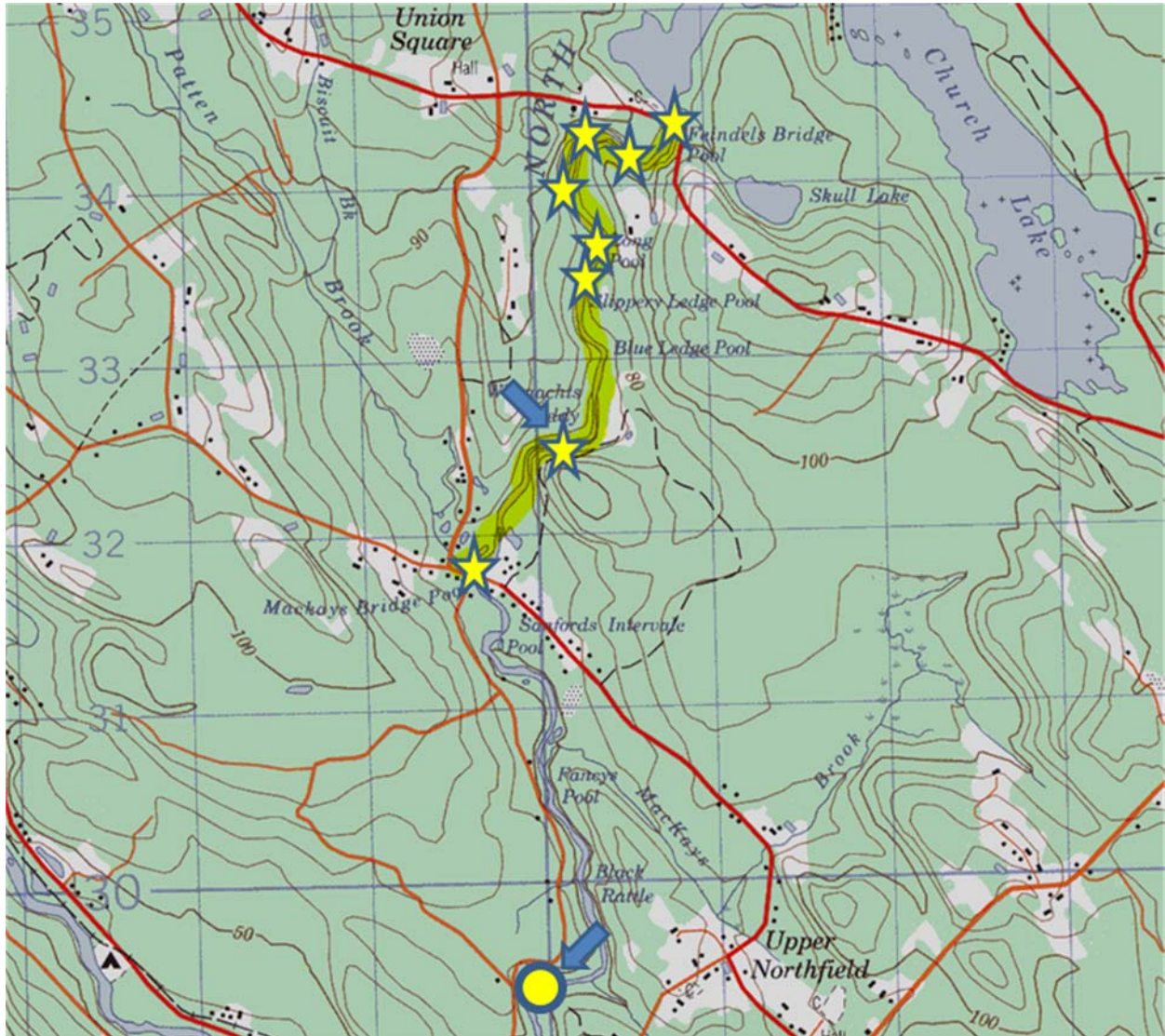
Acknowledgements

Paul Brunelle and Denis Doucet provided instruction on exuvia identification. Paul Brunelle confirmed (and in several instances corrected) specimen identifications.

³ The standard separation distances used by NatureServe to delineate element occurrences produce many distinct populations in the general area of this observation. As more snakes are observed in the area the separation distances can be bridged, and many of the current populations will be merged.

English Name	Scientific Name	NS Rank	Tusket	Medway	North Branch Lahave	West Lahave
River Jewelwing	<i>Calopteryx aequabilis</i>	S5	X	X		X
Ebony Jewelwing	<i>Calopteryx maculata</i>	S5	X	X	X	X
Slender Spreadwing	<i>Lestes rectangularis</i>	S5			X	
Swamp Spreadwing	<i>Lestes vigilax</i>	S5	X	X		
Variable Dancer	<i>Argia fumipennis</i>	S5	X	X	X	
Powdered Dancer	<i>Argia moesta</i>	S5	X	X	X	X
Taiga Bluet	<i>Coenagrion resolutum</i>	S1	X	X	X	
Boreal Bluet	<i>Enallagma boreale</i>	S5		X		
Azure Bluet	<i>Enallagma aspersum</i>	S5	X		X	
Marsh Bluet	<i>Enallagma ebrium</i>	S5	X		X	
Stream Bluet	<i>Enallagma exsulans</i>	S5	X	X	X	
Hagen's Bluet	<i>Enallagma hageni</i>	S5	X	X		
Orange Bluet	<i>Enallagma signatum</i>	S1	X			
Fragile Forktail	<i>Ischnura posita</i>	S5				X
Eastern Forktail	<i>Ischnura verticalis</i>	S5	X		X	
Aurora Damsel	<i>Chromagrion conditum</i>	S5	X	X		
Green-Striped Darner	<i>Aeshna verticalis</i>	S4			X	
Common Green Darner	<i>Anax junius</i>	S5B	X			
Fawn Darner	<i>Boyeria vinosa</i>	S4	X	X	X	
Black-Shouldered Spinyleg	<i>Dromogomphus spinosus</i>	S5			X	
Lancet Clubtail	<i>Gomphus exilis</i>	S5	X	X	X	X
Moustached Clubtail	<i>Gomphus adelphus</i>	S5		X	X	X
Dragonhunter	<i>Hagenius brevistylus</i>	S5	X	X	X	
Least Clubtail	<i>Stylogomphus albistylus</i>	S5	X	X	X	X
Extra-Striped Snaketail	<i>Ophiogomphus anomalus</i>	-		X		
Riffle Snaketail	<i>Ophiogomphus carolus</i>	S3			X	X
Maine Snaketail	<i>Ophiogomphus mainensis</i>	S1		X		X
Twin-Spotted Spiketail	<i>Cordulegaster maculata</i>	S5		X		X
Stream Cruiser	<i>Didymops transversa</i>	S5	X	X		
Illinois River Cruiser	<i>Macromia illinoensis</i>	S5	X	X	X	X
Petite Emerald	<i>Dorocordulia lepida</i>	S5	X		X	
Mantled Baskettail	<i>Epithea semiaquea</i>	SNA	X	X		X
Uhler's Sundragon	<i>Helocordulia uhleri</i>	S5	X	X		X
Lake Emerald	<i>Somatochlora cingulata</i>	S4			X	
Calico Pennant	<i>Celithemis elisa</i>	S5		X		
Dot-Tailed Whiteface	<i>Leucorrhinia intacta</i>	S5	X	X		
Slaty Skimmer	<i>Libellula incesta</i>	S5	X	X	X	
Twelve-Spotted Skimmer	<i>Libellula pulchella</i>	S5B	X			
Four-Spotted Skimmer	<i>Libellula quadrimaculata</i>	S5		X		
White Corporal	<i>Ladona exusta</i>	S5	X			
Common Whitetail	<i>Plathemis lydia</i>	S5		X		
Chalk-Fronted Corporal	<i>Ladon julia</i>	S5	X			
Saffron-Winged Meadowhawk	<i>Sympetrum costiferum</i>	S5			X	
Cherry-Faced Meadowhawk	<i>Sympetrum internum</i>	S5	X			
Band-Winged Meadowhawk	<i>Sympetrum semicinctum</i>	S5			X	
Yellow-Legged Meadowhawk	<i>Sympetrum vicinum</i>	S5	X			

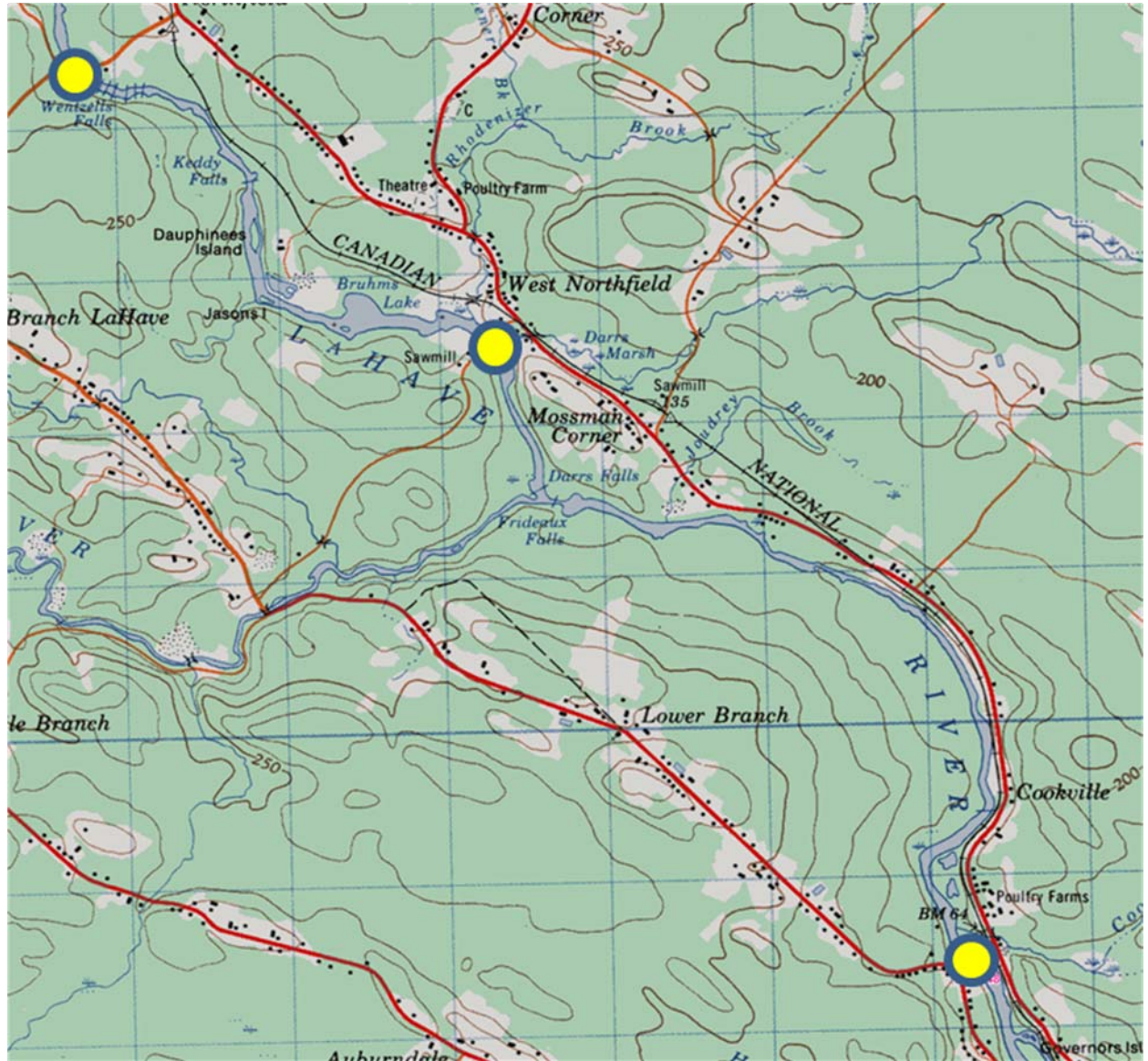
Table 1: Odonata Species recorded on the Tusket, Medway, North Branch Lahave, and West Lahave Rivers. SRank definitions available at <http://www.natureserve.org/explorer/ranking.htm#natsub>.



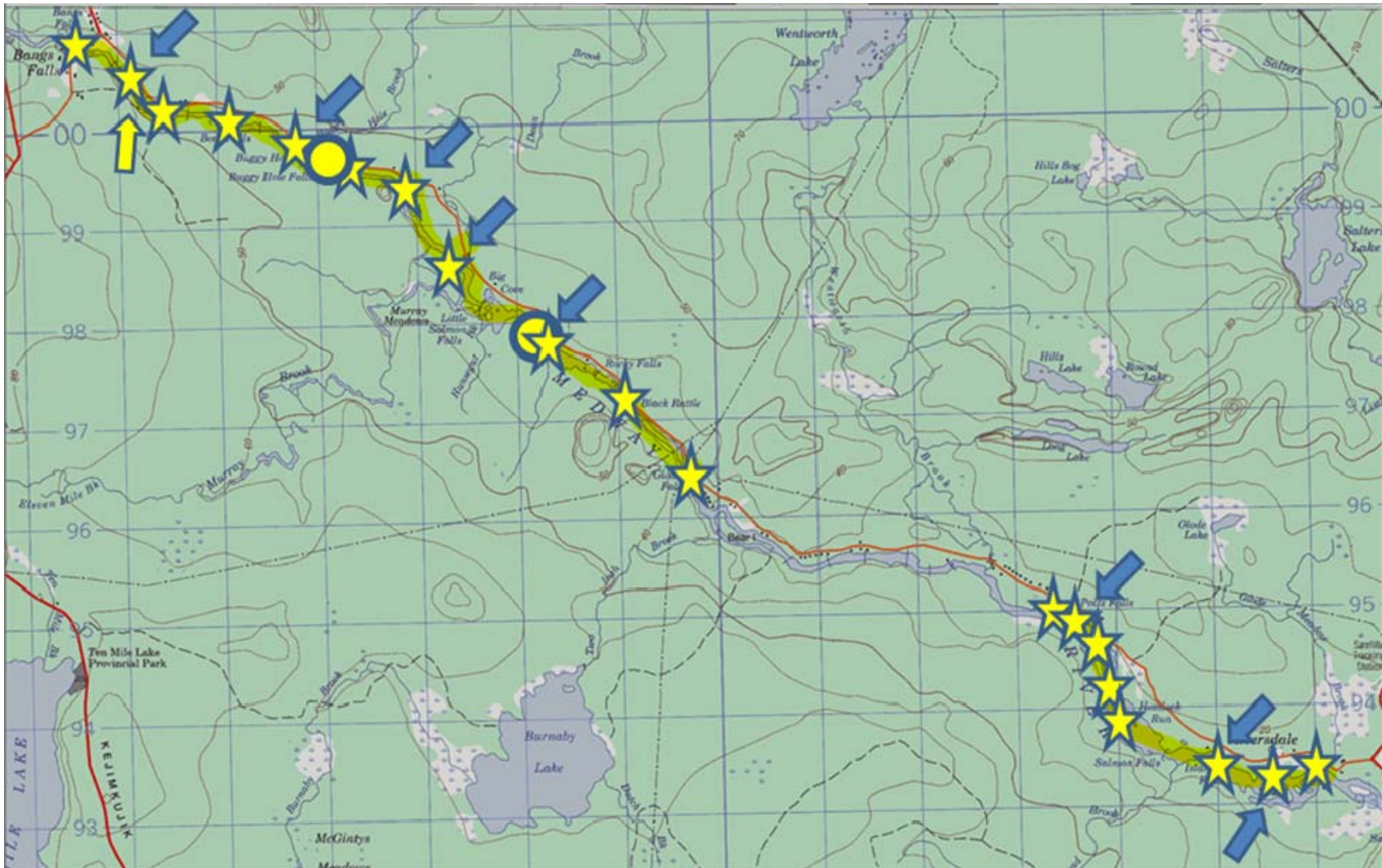
Map 1: Collecting sites on North Arm Lahave River. Yellow track – route paddled. Star – day site. Circle – evening site. Arrow – Riffle Snaketail. Day sites were visited July 23, 2010, evening site visited June 12, 2010. Map grid = 1km.



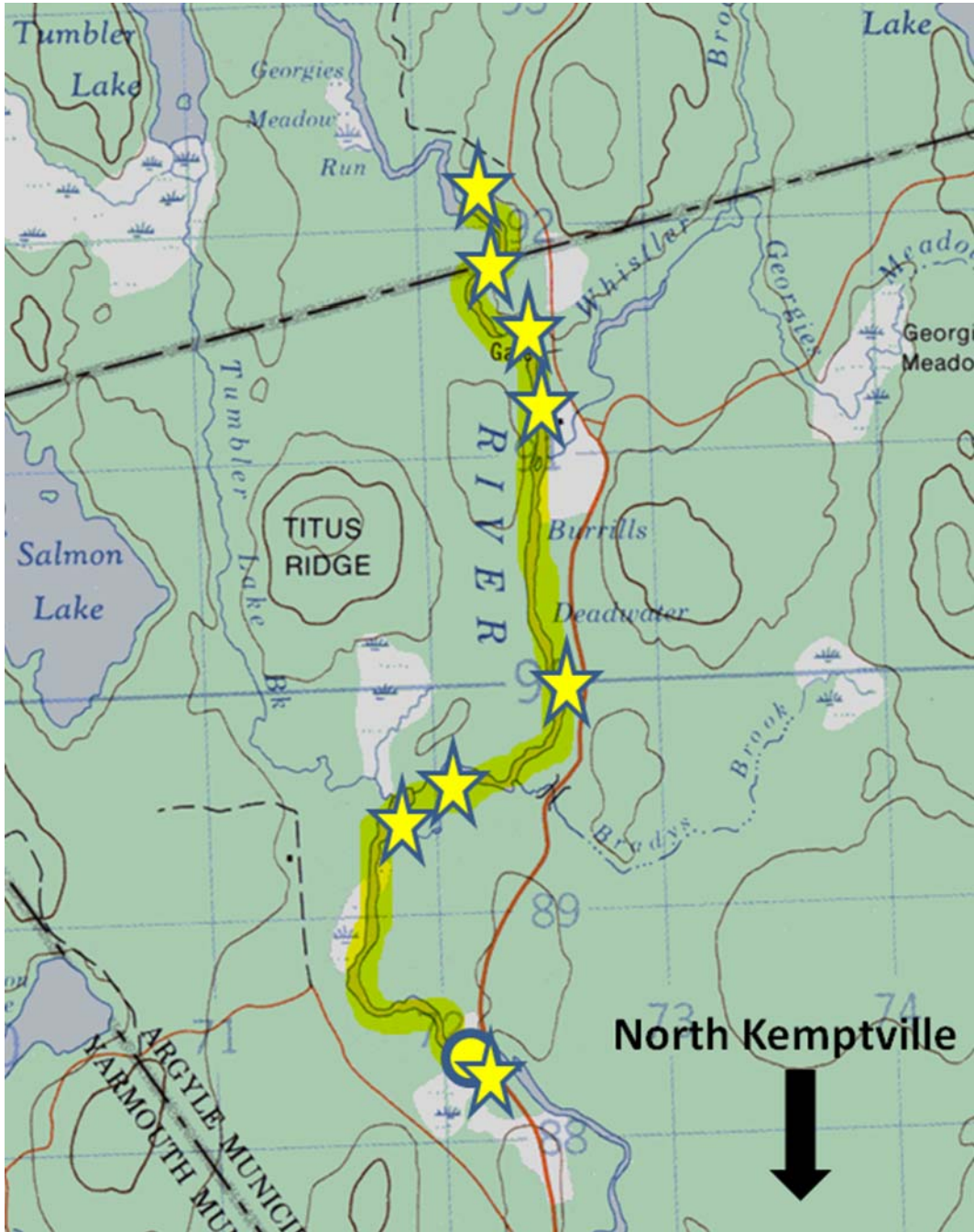
Map 2: Collecting sites on West Lahave River. Yellow track – route paddled. Star – day site. Blue arrow – Maine Snaketail. Yellow arrow – Riffle Snaketail. Day sites visited June 15, 2010. Map grid = 1km.



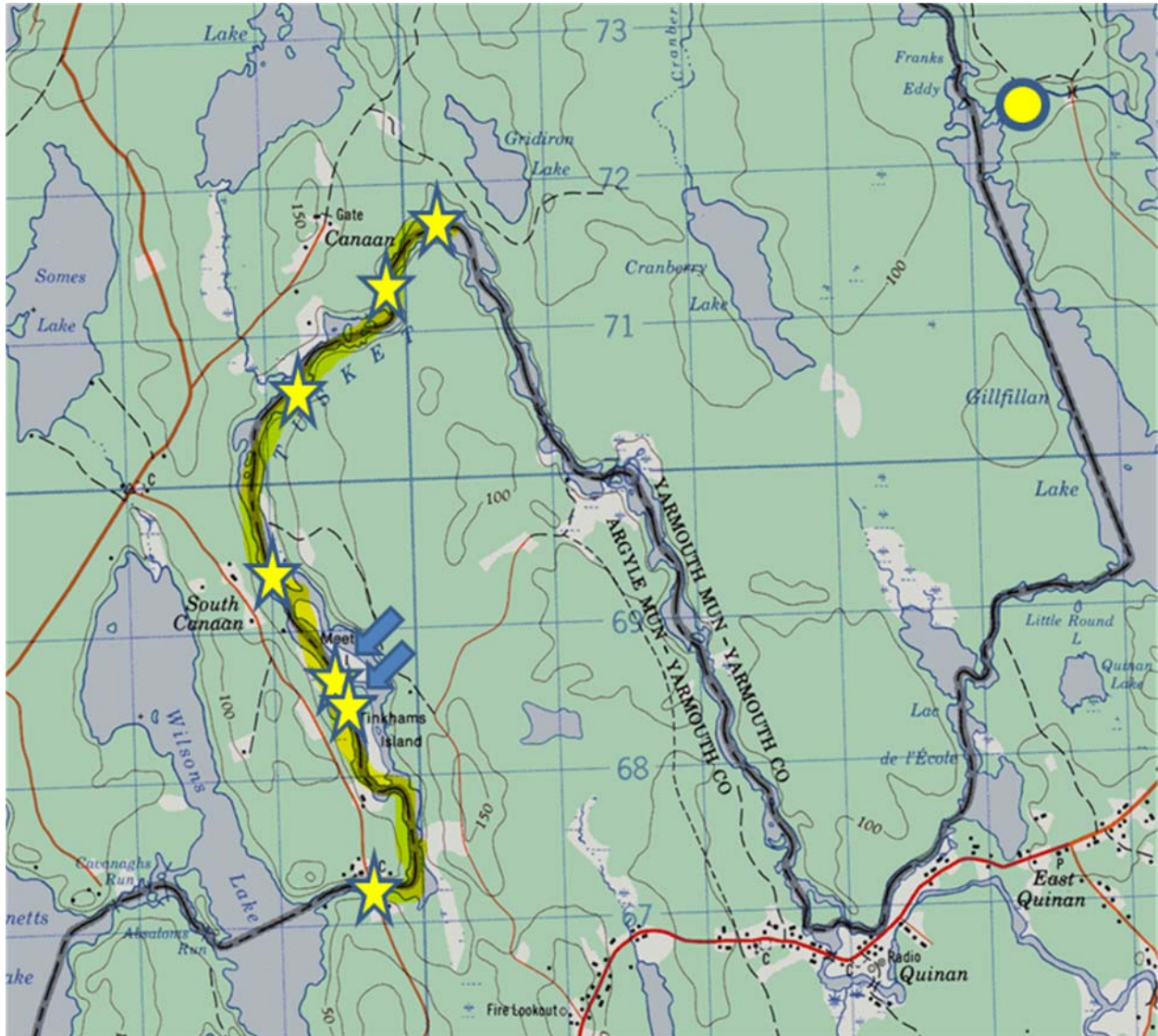
Map 3: Evening collecting sites on Lahave River. Sites visited July 19, 2010 Map grid = 1km.



Map 4: Collecting sites on Medway River. Yellow track – route paddled. Star – day site. Circle – evening site. Blue arrow – Extra-striped Snaketail. Yellow arrow – Maine Snaketail. Day sites on upstream section and night sites visited July 20, 2010, day sites on downstream section visited June 18, 2010. Map grid = 1km.



Map 5: Collecting sites on Tusket River. Yellow track – route paddled. Star – day site. Circle – evening site. Sites visited June 16, 2010. Map grid = 1km.



Map 6: Collecting sites on Tusket River. Yellow track – route paddled. Star – day site. Circle – evening site. Sites visited July 21, 2010. Arrow – Orange Bluet. Map grid = 1km.