

## Update on the survey of aquatic insects from Keewatin and Mackenzie project: The predaceous water beetles (Coleoptera: Adephaga: Dytiscidae and Gyrinidae).

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### Introduction

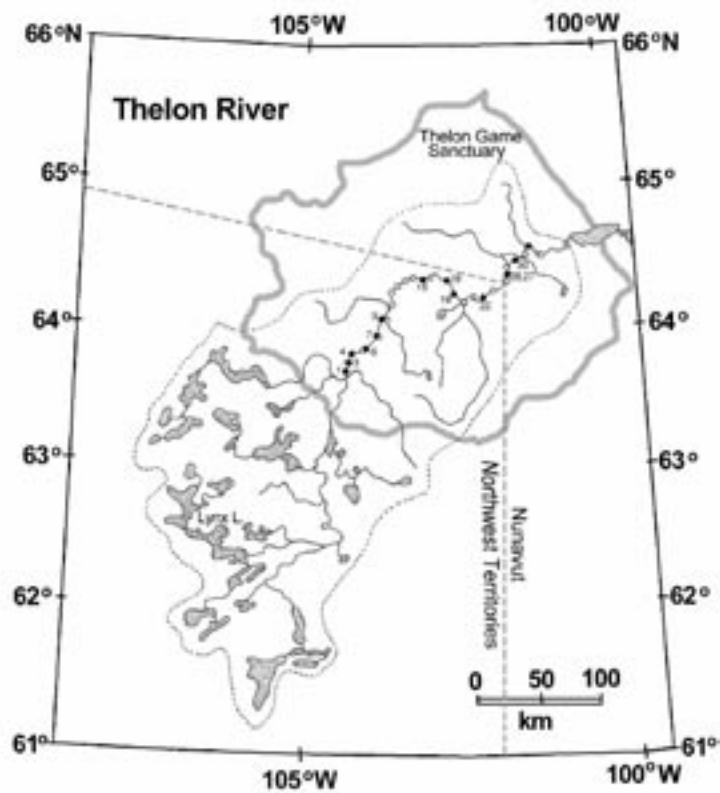
The *Insects of Keewatin and Mackenzie Project* was initiated in 2000 to focus attention on the poorly surveyed part of the arctic zone of the Canadian mainland. The goal of the project was to document insect diversity in and near major rivers in the region between the Mackenzie and Hudson Bay, and the project was considered to be a natural extension of the Survey's Insects of the Yukon initiative (see Danks and Downes 1997). The project has so far consisted of a three collecting expeditions. In the summer of 2000, Survey Scientific Committee members Doug Currie (Royal Ontario Museum) and Donna Giberson (University of Prince Edward Island) were joined by Peter Adler (Clemson University, North Carolina), Brian Brown (Natural History Museum of Los Angeles), and Malcolm Butler (North Dakota State University) on a collecting trip down the Horton River. Team members flew into Horton Lake (see map), paddled 30 – 40 km each day, setting up in a new location nearly every night, and collecting aquatic and terrestrial insects along the river corridor (Currie et al. 2000). In the summer of 2001, Doug Currie and Peter Adler traveled north from Edmonton to Yellowknife and collected black flies from streams along roads in southern NWT. Then in the summer of 2002, we assembled a team for another river trip, this time to the Thelon River (NWT and NU; Currie et al. 2002). Donna Giberson, Doug Currie, and Peter Adler were joined

for this trip by two new team members, MSc students Lisa Purcell (University of Prince Edward Island) and Amanda Roe (University of Alberta) (Currie et al. 2002). Because of the short collecting periods for each trip, the focus of each survey reflected the interests of the individual participants, but specimens captured from mass collecting methods (e.g. aquatic kick and dip sampling, malaise trapping, sweep netting, beating) have been shared with the general entomological community. Here, we report on the predaceous water beetles (Dytiscidae and Gyrinidae) collected along the Horton and Thelon Rivers.

### The Rivers

We selected the Horton River for the first expedition because it was located close to the eastern boundary of Beringia and the relatively well-sampled Mackenzie River valley. In addition, the river flows mainly from south to north, giving us a good latitudinal gradient from 67°30' to 70°00' north latitude. Although the river is usually depicted on maps as being at the edge of the tree line, most of the land around the river had only scattered clumps of stunted spruce, and most of the river flowed through arctic tundra. The Horton River rises to the west of Horton Lake, NWT (see map) and has a drainage basin area of approximately 26,680 km<sup>2</sup> and a total length of  $\approx$  800 km. Expedition members collected over a  $\approx$  600 km stretch from Horton Lake to the Arctic Ocean. The river was clear and swift-flowing for most of

Maps of the Horton and Thelon River watersheds, showing sampling sites. Closed circles represent sites where predaceous water beetles were found, and open circles represent sampled sites where no beetles were collected.



its length but became muddy and meandering in its lower portion. In the upper reaches, the river was characterized by high pH ( $> 8.0$ ) and relatively high specific conductance where it flowed over limestone-dominated substrates. In its lower reaches (in the far northern part of the river), the pH of the river declined to near neutral where it flowed through the region known as the Smoking Hills. This region has lignite and magnesium deposits which spontaneously ignite when exposed to air (for example, during bank slumping in summer), resulting in “smoke holes” as smoke pours from places where the coal is burning underground. The water draining these areas is profoundly affected by the geology, so that the tributaries and ponds in this region can be very acidic (some with pH values  $< 2.5$ ). Thirty-seven sites on or near the river were sampled with a D-frame aquatic net between July 17th and August 8th, 2000, and aquatic invertebrates were picked from the debris on site and preserved in 80% ethanol.

The Thelon River arises near Lynx Lake, to the east of Great Slave Lake (see map). It drains a huge part of the central barrens east of

Great Slave Lake (total area of  $\approx 240,000 \text{ km}^2$ ) and, in contrast to the south-to-north pattern of the Horton River, it flows generally easterly across the main central barrens area. Despite being located several hundred km north of the tree line, a 65 km stretch of the river flows through a dense spruce forest known as the “Thelon Oasis”. Most of the rest of the river flows through open tundra, with a few scattered clumps of spruce dotting the landscape. The river flows  $\approx 900 \text{ km}$  from Lynx Lake to Baker Lake (which drains via Chesterfield Inlet to northern Hudson Bay to the east (see map)). The part of the river covered during this survey (i.e. upstream of Beverly Lake, NU) drains an area of  $71,470 \text{ km}^2$ . Expedition members flew into the junction of the Hanbury and Thelon Rivers and collected along a 325 km stretch of the Thelon located within the bounds of the Thelon Game Sanctuary. Upstream of our sampling area, the river was characterized by large numbers of lakes, waterfalls and rapids, but in the study area, the river meandered over an ancient glacial lake bottom. At this point, the river was wide, slow moving, and dominated by sandy



Paddling on the Horton River past a “smoke hole” in the Smoking Hills

or sand/silt-embedded cobble substrates. Surrounding relief was very low except in a few spots, where low hills, boulders and more rapid flow could be found. The pH and specific conductance of the water in the Thelon River were low, with pH values near 6 and conductivity  $\approx 10 \mu\text{S}/\text{cm}$  for all main river sites. The pH and conductivity values of tributaries and tundra ponds, however, were more variable. Sampling was carried out at 34 sites on or near the river between June 29th and July 11th, 2002.

### Predaceous water beetle collections

Predaceous water beetles were collected from kick samples and dip samples in the river and pool sites of the two rivers. They were collected from only 5 of the 37 sites along the Horton River (corresponding to sampling sites 8, 11, 14, 18 and 23 of the larger Horton River survey; see map); all located in the section of the river which was clear and relatively swift moving. All beetles were collected from the main branch of the Horton River, since no tundra ponds were sampled in this first survey. Predaceous water beetles were also collected from 15 of the 34 Thelon River sites (corresponding to sites 1, 3, 4, 6, 7, 9, 13, 16, 18, 19, 22, 26, 27, 30, and 32 of the larger Thelon River survey; see map). These represented a variety of habitats, from small and large tributaries to the main branch of the river, and also including tundra ponds near the river.

A total of 61 predaceous water beetle specimens were collected during the two expeditions. We recorded 12 species in 6 genera in the family Dytiscidae, including *Oreodytes* (2 species), *Stictotarsus* (1 species), *Hygrotus* (1 species), *Hydroporus* (3 species), *Agabus* (3 species), *Ilybius* (1 species), and *Rhantus* (1 species). Nine of these are holarctic in distribution, and all have also been collected west of the MacKenzie River. There was one individual of one species of the family Gyrinidae (*Gyrinus*) collected from a tundra pond above the Thelon River. These collections

represent an extension of distributions of four species to the northeast within the Northwest Territories and two species to the northwest in Nunavut. For most of the species, though, our collections have allowed us to fill in some apparent distributional gaps between eastern and western populations (based on records given in Larson et al. 2000). Three species were territorial records; one for NWT and two for NU. One of the species collected, *Oreodytes laevis* (Kirby) made up nearly half of the specimens collected, and was found throughout both river systems. This is a lotic species that is known to inhabit mineral substrates along river and lake margins (Larson et al. 2000). Most of the species, however, were collected quite rarely and were represented by single specimens or found only in a single location. It should be noted that predaceous water beetles were only collected incidentally during sampling for other aquatic insects, and this pattern for different species collected in nearly every site examined suggests that intensive collection of aquatic Adephaga in this region would produce many more species than we found.

### References:

- Currie, D.C., D.J. Giberson, and B.V. Brown. 2000. Insects of Keewatin and Mackenzie. Newsletter of the Biological Survey of Canada (Terrestrial Arthropods) 19: 48–51.
- Currie, D.C., D.J. Giberson, and P.H. Adler. 2002. Insect biodiversity in the Thelon Wildlife Sanctuary. Newsletter of the Biological Survey of Canada (Terrestrial Arthropods) 21: 59–64.
- Danks, H.V. and J.A. Downes (Eds.) 1997. Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa. 1034pp.
- Larson, D.J., Y. Alarie, and R.E. Roughley. 2000. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Nearctic Region, with emphasis on the fauna of Canada and Alaska. NRC Research Press, Ottawa, Ontario, Canada. 982 pp.





Donna Giberson and Amanda Roe paddling on the Thelon River



Lisa Purcell sampling the Thelon River (at Thelon Site 4)  
for benthic invertebrates