Report on Ground Beetles (Coleoptera: Carabidae) Collected in Baxter State Park, Summer, 2013

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ABSTRACT

Four days were spent collecting Carabidae in Baxter State Park in August, 2013. The goal was to document whether any of ten key Arctic relict species previously to be found in the alpine fauna of Katahdin were still present.

Only one of these target species was recovered as a living individual, the species *Cymindis unicolor*. Failure to find specimens of the other species was undoubtedly because insufficient time was available to devote to alpine zone collecting at the Tablelands. However, some 13 additional species have been added to the known fauna of the Park, bringing the total to 84 species. The true Carabid fauna of the Park is undoubtedly over 100 species; numerous habitats have not yet been sampled at all, and most others have not been sampled at all thoroughly.

A proposal to continue work, and to train Park personnel for alpine zone collecting in the 2014 season, concludes the report.

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Introduction

The ability of insects to respond rapidly to environmental change makes them ideal tools for evaluating the rates of such change in the environment. A major recent synthesis of records for the ground beetle fauna of Maine (Coleoptera: Carabidae) showed a number of species appearing in the southern part of the state that previously had been restricted to more southern locales. This led to a question as to whether the boreal and Arctic species of Maine, and particularly those of the alpine zone on Katahdin, were still present in the living fauna on the mountain. Most of the records for these species are based on specimens collected 30-40 years ago, or more distantly in the past.

The species of particular concern are shown in the following table, all previously reported from Mt. Katahdin. In the table, the parenthetical acronyms are for the collections in which the specimens reside: CNC = the Canadian National Collection of Insects and Arachnids in Ottawa, MFS = the Maine Forest Service collection in Augusta, RENC = R. E. Nelson collection (specimens collected in the early 1980s with Park approval), and PRV = a private collection. We have been unable to locate the specimen of *Miscodera arctica* that was reported by Lindroth (1961), but presume it is indeed from Mt. Katahdin.

Table 1. Carabid species of special concern from the Mt. Katahdin fauna.

Genus	species	Township
Amara	*alpina*	Mount Katahdin Twp (CNC, RENC)
Carabus	*chamissonis*	Mount Katahdin Twp (MFS)
Cymindis	*unicolor*	Mount Katahdin Twp (CNC)
Miscodera	*arctica*	Mount Katahdin Twp (?)
Nebria	*gyllenhali castanipes*	Mount Katahdin Twp (MFS, RENC)
Nebria	*nivalis gaspesiana*	Mount Katahdin Twp (PRV)
Pterostichus	*arcticola*	Mount Katahdin Twp (CNC)
Pterostichus	*brevicornis*	Mount Katahdin Twp (MFS)
Pterostichus	*pinguedineus*	Mount Katahdin Twp (CNC)
Stereocerus	*haematopus*	Mount Katahdin Twp (CNC, MFS)

The species *Nebria nivalis gaspesiana* (= *N. gaspesiana* Kavanaugh) is of particular concern. This snowfield-margin predator has disappeared from all of its former range in Labrador, on Newfoundland, and on the Gaspé Peninsula of Québec (D. H. Kavanaugh, California Academy of Sciences, pers. commun. 2013). If it is indeed still to be found on Katahdin, that would be the only surviving population.

To this end, a plan was initiated to search for these species, and to try to determine how many of them were still to be found in the modern fauna of Mt. Katahdin.

Methods

The week of August 5-9 was set aside for field work on the mountain. Accommodations were secured in Millinocket, and entry to the park was made as soon as the Togue Pond gate was unlocked at 6:00 a.m.

Collecting was planned from the outset to include only active specimen capture, by searching under bark on fallen logs, beneath stones and other debris on the ground surface, and (when possible) diurnally active specimens. No pitfall, fight-intercept, or other passive traps were employed, nor were large samples of litter and organic matter (e.g., foliose lichens) collected and screen-sieved for small specimens. I also wore olive drab clothing, including camouflage trousers, in order to minimize my visibility. Planned transects were as follows:

August 5th – North Basin from Blueberry Knoll to the small ponds in the basin.
August 6th – South Turner Mountain.
August 7th – Tablelands on Katahdin.
August 8th – Helon Taylor Trail up Pamola Peak.
August 9th – revisit one of the above sites

Results

August 5th was a day planned for exploring North Basin from Blueberry Knoll to the small ponds in the basin. High wind with mist, fog and occasional cold rain made for very cold conditions with extremely limited visibility, and it was deemed inadvisable to continue to the ponds significantly beyond the end of the trail at the Knoll. A few ants were collected (forwarded on to Dr. Aaron Ellison at Harvard University), and a single carabid was found beneath the bark of a fallen log along the trail from Blueberry Knoll to Chimney Pond. (Tables 2 and 3 show all species collected, and will be found below.)

August 6th was dedicated to climbing South Turner Mountain, in hopes of locating more xeric taxa on its windswept, dry western summit face, or in the krummholtz zone immediately below. This was a moderately successful day. The climbing route was steep but not impossible, and the route short enough that four or five hours could be devoted to active collecting. I was able to collect several species of Carabids as well as some ants and a few beetles from other families that I anticipated I would be able to identify without much difficulty.

August 7th was spent climbing Katahdin to the Tablelands from the Roaring Brook campground trailhead, accompanied by a BSP staff member who joined me at Chimney Pond. This proved to be too long a climb, both in distance and vertical climb, to allow time for adequate collecting; the trails have also deteriorated significantly from what I remember them being like 25 years ago when I last climbed the mountain. Perhaps an hour to an hour and a half was available for collecting, before timing dictated that I needed to start back down to avoid having to descend in the dark. Most stones at Tablelands were also deeply embedded, making collecting difficult without causing significant disturbance to the area; because of the sensitivity of the area, only loose stones lying directly on the surface, or embedded no more than ~ 1 cm., were turned. The wet seep that in the early 1980s had yielded *Nebria gyllenhalli castanipes* was severely trampled by prior hikers, and no longer suitable *Nebria* habitat. All loose stones that had been here in 1983-1985 had also been removed.

August 8th was a day of rain and drizzle. No attempt was made to climb to high elevation; it was assumed trails would be closed, given the weather conditions. A day was thus spent collecting at more lowland habitats, along multiple streams (Avalanche Brook, Sandy Stream, Rum Brook) and around the artificial marsh and wetland that have developed in the Caribou Pit landing area at the park entrance.

August 9th began with a violent thunderstorm that lasted through much of the early part of the day, so after a morning meeting with Jean Hoekwater, I headed back home with no attempt at further collecting.

Figure 1 on the next page shows all collecting localities.

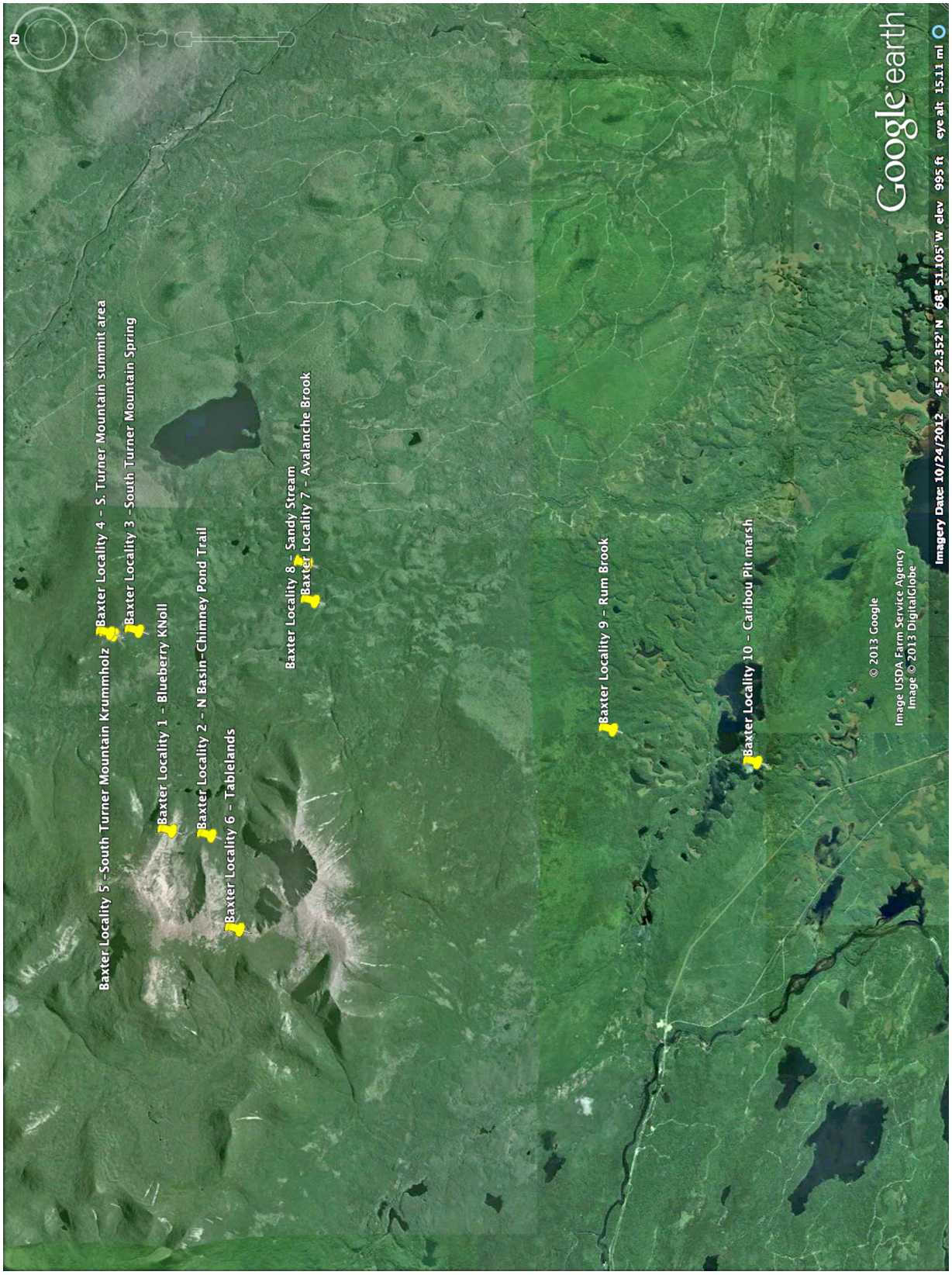

Fig. 1. Google Earth image of Katahdin and localities at which specimens were collected.

The tables below and on the next page show the specimens that were collected at each of the locations shown on the above image, both carabids and non-carabids; numbers are how many individuals of each species were collected at each site.

Table 2. Carabid specimens collected in this study.

Locality Name -> **Carabid Species**	Blueberry Knoll - Chimney Pond Trail	South Turner Mountain spring	South Turner Mountain summit area, sedge tussocks	South Turner Mountain Krummholz Zone	Tablelands at head of Saddle Trail	Avalanche Brook	Sandy Stream	Rum Brook	Caribou pit pond (pond in sand pit)
Agonum aeruginosum Dejean									**30**
Agonum deceptivum (LeC.)									**1**
Agonum fidele Casey									**3**
Agonum piceolum (LeC.)						**1**			
Agonum tenue (LeC.)									**5**
Agonum trigeminum Lth.						**1**			**1**
Amara laevipennis Kirby			**2**						
Amara latior Kirby			**4**						
Anisodactylus kirbyi Lth.									**1**
Bembidion carolinense Casey						**1**	**1**	**7**	
Bembidion concolor (Kirby)						**3**	**4**	**1**	
Bembidion concretum Casey									**2**
Bembidion nigrum Say							**4**		
Bembidion patruele Dejean									**1**
Bembidion quadratulum Notm.					**1**				
Bembidion scopulinum Kirby						**2**	**4**		
Bembidion semistriatum (Hald.)							**1**		
Bembidion versicolor (LeC.)							**1**		
Calathus gregarius (Say)				**1**					
Cymindis unicolor Kirby					**1**				
Loricera pilicornis (F.)								**1**	
Nebria pallipes Say						**5**	**5**		
Notiophilus aquaticus (L.)			**1**						
Platynus decentis (Say)	**1**								
Platynus tenuicollis (LeC.)						**1**			
Stenolophus conjunctus (Say)			**1**						
Stereocerus haematopus (Dejean)					**1**				
Synuchus impunctatus (Say)								**1**	
Trechus apicalis Motsch.						**1**	**3**		
Total # of species per site	**1**	**0**	**4**	**1**	**3**	**8**	**8**	**4**	**8**

Table 3. Non-Carabid specimens collected in this study.

Locality Name -> **Family, genus and species**	Blueberry Knoll - Chimney Pond Trail	South Turner Mountain spring	South Turner Mountain summit area, sedge tussocks	South Turner Mountain Krummholz Zone	Tablelands at head of Saddle Trail	Avalanche Brook	Sandy Stream	Rum Brook	Caribou pit pond (pond in sand pit)
BYRRHIDAE									
Byrrhus pettiti Horn				**1**					
COCCINELLIDAE									
Anisosticta bitriangularis (Say)									**2**
STAPHYLINIDAE									
Brathinus varicornis LeC.		**2**				**3**	**2**		
Tachinus horni Campbell								**1**	
Tachinus scrutator Gemmiger and Harold						**1**			
Total # of species per site	**0**	**1**	**0**	**1**	**0**	**2**	**1**	**1**	**1**

As will be seen in Table 2, only two of the particular target species were encountered, both on the Tablelands of Katahdin: *Cymindis unicolor* and *Stereocerus haematopus*, though this latter was recovered only as a pair of disarticulated elytra from a partial dead specimen. The specimen of *Bembidion quadratulum* at this site was quite a surprise, inasmuch as this is a species whose preferred habitat is *Sphagnum* bogs. I can only presume that the specimen encountered had taken flight and been caught up in winds that delivered it to the summit area of the mountain.

Several small (8-9 mm) black specimens were collected that were thought in the field could have been members of the subgenus *Cryobius* of the genus *Pterostichus* [i.e., *P. (C.) arcticola, P. (C.) brevicornis,* and *P. (C.) pinguedineus*], which were target taxa. Unfortunately, I was collecting without my glasses on – and these turned out to be small species of Elateridae (click beetles). These have not yet been identified. The specimens of *Brathinus varicornis*, an Omaliine Staphylinid, were also collected in habitats that should have yielded small, fast Carabids. (Wet conditions made wearing my glasses here impossible as well – foggy lenses or rain drops made it impossible to see any better with them on than I could see with them off.)

All specimens collected will be deposited with the Maine Forest Service insect laboratory in Augusta. In Table 4, beginning on the page that follows, the entire Baxter State Park fauna is shown, based on known specimens or, for one or two, those with authoritative documentation. In this table, collection abbreviations are as follows: MFS = Maine Forest Service Collection; UNH = University of New Hampshire collection; CNC = Canadian National Collection of Insects and Arachnids, Ottawa; MCZ = Museum of Comparative Zoology, Harvard University; PRV = various private collections; RENC = R. E. Nelson collection.

Table 4. The known Carabid fauna of Baxter State Park. Species records in black are from the Maine Carabid database; those in blue are new additions from this study.

Genus	species	Township
Agonum	*aeruginosum*	T2 R9 WELS (MFS)
Agonum	*deceptivum*	T2 R9 WELS (MFS)
Agonum	*deceptivum*	Mount Katahdin Twp (RENC)
Agonum	*fidele*	T2 R9 WELS (MFS)
Agonum	*gratiosum*	Mount Katahdin Twp (UNH)
Agonum	*metallescens*	Mount Katahdin Twp (CNC, PRV)
Agonum	*piceolum*	Mount Katahdin Twp (RENC)
Agonum	*piceolum*	Mt. Katahdin Twp. (MFS)
Agonum	*retractum*	Mount Katahdin Twp (RENC)
Agonum	*sordens*	Mount Katahdin Twp (RENC)
Agonum	*tenue*	Mount Katahdin Twp (PRV)
Agonum	*tenue*	T2 R9 WELS (MFS)
Agonum	*trigeminum*	Mt. Katahdin Twp. (MFS)
Agonum	*trigeminum*	T2 R9 WELS (MFS)
Amara	*alpina*	Mount Katahdin Twp (CNC)
Amara	*alpina*	Mount Katahdin Twp (RENC)
Amara	*laevipennis*	T4 R9 WELS (MFS)
Amara	*latior*	T4 R9 WELS (MFS)
Amara	*otiosa*	Mount Katahdin Twp (PRV)
Anisodactylus	*kirbyi*	Mount Katahdin Twp (PRV)
Anisodactylus	*kirbyi*	T2 R9 WELS (MFS)
Bembidion	*bruxellense*	Mount Katahdin Twp (CNC)
Bembidion	*carinula*	Mount Katahdin Twp (RENC)
Bembidion	*carolinense*	Mount Katahdin Twp (RENC)
Bembidion	*carolinense*	Mt. Katahdin Twp. (MFS)
Bembidion	*carolinense*	T2 R9 WELS (MFS)
Bembidion	*concolor*	Mt. Katahdin Twp. (MFS)
Bembidion	*concolor*	T2 R9 WELS (MFS)
Bembidion	*concretum*	Mount Katahdin Twp (CNC)
Bembidion	*concretum*	T2 R9 WELS (MFS)
Bembidion	*louisella*	Trout Brook Twp. (Maddison)
Bembidion	*mutatum*	Mount Katahdin Twp (CNC)
Bembidion	*nigrum*	Mount Katahdin Twp (CNC, RENC)
Bembidion	*nigrum*	Mt. Katahdin Twp. (MFS)
Bembidion	*patruele*	T2 R9 WELS (MFS)
Bembidion	*quadratulum*	Mount Katahdin Twp (MCZ)
Bembidion	*quadratulum*	Mt. Katahdin Twp. (MFS)
Bembidion	*rothfelsi*	Trout Brook Twp. (Maddison)
Bembidion	*rusticum*	Mount Katahdin Twp (RENC)
Bembidion	*salebratum*	Trout Brook Twp (CNC)
Bembidion	*scopulinum*	Mount Katahdin Twp (RENC)
Bembidion	*scopulinum*	Mt. Katahdin Twp. (MFS)
Bembidion	*semistriatum*	Mt. Katahdin Twp. (MFS)
Bembidion	*versicolor*	Mt. Katahdin Twp. (MFS)
Bembidion	*wingatei*	Mount Katahdin Twp (RENC)

Blethisa	*julii*	Mount Katahdin Twp (CNC)
Bradycellus	*neglectus*	Mount Katahdin Twp (RENC)
Bradycellus	*nigrinus*	Mount Katahdin Twp (PRV, RENC)
Calathus	***gregarius***	**T4 R9 WELS (MFS)**
Carabus	*chamissonis*	Mount Katahdin Twp (MFS)
Carabus	*nemoralis*	Trout Brook Twp (RENC)
Cicindela	*duodecimguttata*	Mount Katahdin Twp (PRV)
Cicindela	*longilabris*	Trout Brook Twp. (RENC)
Cicindela	*repanda*	Mount Katahdin Twp (PRV)
Cicindela	*tranquebarica*	Mount Katahdin Twp (MCZ, PRV)
Clivina	*fossor*	Mount Katahdin Twp (CNC)
Cymindis	*unicolor*	Mount Katahdin Twp (CNC)
Cymindis	***unicolor***	**Mt. Katahdin Twp. (MFS)**
Dicheirotrichus	*cognatus*	Mount Katahdin Twp (CNC, RENC)
Diplous	*rugicollis*	Mount Katahdin Twp (RENC)
Elaphropus	*granarius*	Mount Katahdin Twp (PRV)
Elaphrus	*clairvillei*	Trout Brook Twp (RENC)
Elaphrus	*olivaceus*	Mount Katahdin Twp (PRV, RENC)
Gastrellarius	*honestus*	Mount Katahdin Twp (RENC)
Gastrellarius	*honestus*	Trout Brook Twp (RENC)
Harpalus	*affinis*	Mount Katahdin Twp (CNC)
Harpalus	*fulvilabris*	Mount Katahdin Twp (PRV)
Harpalus	*indigens*	Mount Katahdin Twp (PRV)
Harpalus	*somnulentus*	Mount Katahdin Twp (CNC)
Loricera	***pilicornis***	**T2 R9 WELS (MFS)**
Miscodera	*arctica*	Mount Katahdin Twp (source ?)
Nebria	*gyllenhali castanipes*	Mount Katahdin Twp (MFS, RENC)
Nebria	*nivalis gaspesiana*	Mount Katahdin Twp (PRV)
Nebria	*pallipes*	Mount Katahdin Twp (RENC)
Nebria	***pallipes***	**Mt. Katahdin Twp. (MFS)**
Notiophilus	*aeneus*	Mount Katahdin Twp (RENC)
Notiophilus	***aquaticus***	**T4 R9 WELS (MFS)**
Omophron	*americanum*	Mount Katahdin Twp (RENC)
Platynus	*decentis*	Mount Katahdin Twp (RENC)
Platynus	***decentis***	**T4 R9 WELS (MFS)**
Platynus	*mannerheimi*	Trout Brook Twp (MFS)
Platynus	***tenuicollis***	**Mt. Katahdin Twp. (MFS)**
Pterostichus	*adoxus*	Mount Katahdin Twp (RENC)
Pterostichus	*adstrictus*	Mount Katahdin Twp (RENC)
Pterostichus	*arcticola*	Mount Katahdin Twp (CNC)
Pterostichus	*brevicornis*	Mount Katahdin Twp (MFS)
Pterostichus	*coracinus*	Mount Katahdin Twp (PRV, RENC)
Pterostichus	*melanarius*	Mount Katahdin Twp (RENC)
Pterostichus	*patruelis*	Mount Katahdin Twp (PRV)
Pterostichus	*pensylvanicus*	Mount Katahdin Twp (MFS, RENC)
Pterostichus	*pinguedineus*	Mount Katahdin Twp (CNC)
Pterostichus	*tristis*	Trout Brook Twp (UNH)
Scaphinotus	*viduus*	Mount Katahdin Twp (PRV)

Scaphinotus	*viduus*	Trout Brook Twp (UNH)
Sphaeroderus	*canadensis canadensis*	Trout Brook Twp (RENC)
Sphaeroderus	*nitidicollis brevoorti*	Trout Brook Twp (specimen loc.?)
Sphaeroderus	*stenostomus lecontei*	Mount Katahdin Twp (UNH)
Sphaeroderus	*stenostomus lecontei*	Trout Brook Twp (CNC, RENC)
Stenolophus	*conjunctus*	Mount Katahdin Twp (PRV)
Stenolophus	***conjunctus***	**T4 R9 WELS (MFS)**
Stenolophus	*fuliginosus*	Mount Katahdin Twp (PRV)
Stereocerus	*haematopus*	Mount Katahdin Twp (CNC, MFS)
Stereocerus	***haematopus***	**Mt. Katahdin Twp. (MFS)**
Synuchus	*impunctatus*	Mount Katahdin Twp (RENC)
Synuchus	***impunctatus***	**T2 R9 WELS (MFS)**
Synuchus	*impunctatus*	Trout Brook Twp (RENC)
Trechus	*apicalis*	Mount Katahdin Twp (RENC)
Trechus	***apicalis***	**Mt. Katahdin Twp. (MFS)**

Discussion and Proposals for Future Work

As can be seen from Table 4, above, the known Carabid fauna of Baxter State Park has been increased by 13 species in this study, and now includes a total of some 84 species. However, the basic goal of the study was not achieved. We can say for certain that *Cymindis unicolor* is still to be found in the fauna of the alpine zone of Katahdin, but the other target species remain unfound.

There undoubtedly are over 100 species of Carabids to be found within the confines of the Park. Numerous specialized habitats have not been sampled at all, or sampled only in preliminary reconnaissance fashion. These would include the deep forest fauna, including in particular the smaller species to be found in deep forest duff habitats, as well as subcortical species. Lacustrine and pond habitats remain essentially unsampled, as are the faunas that will be found in open sandy areas (including the drier portions of Caribou Pit at the Park entrance). There are several species that are known exclusively to be found on beaver lodges and around adjacent ponds. Cold seeps, such as the spring near the trail to South Turner Mountain, should be studied more carefully, although this particular site yielded surprisingly few specimens – and no Carabids at all – in an hour of collecting time.

The time when this study was conducted was a relatively wet period in the summer, and available exposed habitats along streams (e.g., Sandy Stream, Avalanche Brook) were highly restricted and generally limited to rockier banks. Exposed sand flats were not available, but are habitats where additional species of *Bembidion* and other smaller riparian taxa would be expected.

I would be amenable to continuing the study, but principally taking advantage of BSP personnel who regularly visit the summit area to initiate a sampling protocol to seek specimens of the Arctic and boreal relict target species. I will be happy to train personnel in techniques, and to modify traditional protocols as much as necessary to minimize long-term impacts on the fragile alpine zone of the mountain. At the same time, I would be willing to continue sampling at lower elevations, perhaps makng occasional forays into areas above treeline that are not regularly visited by Park personnel (e.g., the lower alpine slopes of Pamola Peak, or in North Basin).

I would be happy to discuss possibilities for continuing this study in the summer of 2014, although I have other commitments that will keep me occupied through mid-July.

Reference cited:

Lindroth, Carl H. (1961) The Ground-Beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska, Part 2. *Opuscula Entomologica*, Supplementum XX:1-200.