

ISSN 1061-3781

BULLETIN OF AMERICAN ODONATOLOGY



Volume 7 Number 1

THE ODONATA OF THE HURON MOUNTAINS, MARQUETTE CO.,
MICHIGAN

5 April 2003

Mark F. O'Brien, Ethan Bright and Michael A. Kielbaso p. 1 - 22

THE DRAGONFLY SOCIETY OF THE AMERICAS

Business address: c/o T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903

EXECUTIVE COUNCIL 2001-2003

President	D. Paulson	Seattle WA
President Elect	R. Beckemeyer	Wichita KS
Immediate past President	M. May	Cranbury NJ
Vice President, Canada	R. Cannings	Victoria, BC
Vice President, Latin America	R. Novelo G.	Jalapa, Veracruz
Secretary	S. Dunkle	Plano TX
Treasurer	J. Daigle	Tallahassee FL
Editor	T. Donnelly	Binghamton NY
Regular member	J. Abbott	Austin TX
Regular member	S. Valley	Albany OR
Regular member	P. Brunelle	Halifax NS

JOURNALS PUBLISHED BY THE SOCIETY

ARGIA, the quarterly news journal of the **DSA**, is devoted to non-technical papers and news items relating to nearly every aspect of the study of Odonata and the people who are interested in them. The editor especially welcomes reports of studies in progress, news of forthcoming meetings, commentaries on species, habitat conservation, noteworthy occurrences, personal news items, accounts of meetings and collecting trips, and reviews of technical and non-technical publications. Articles for publication in **ARGIA** should preferably be submitted as hard copy and (if over 500 words) also on floppy disk (3.5" or 5.25"). The editor prefers MS DOS based files, preferably written in WORD, WORD for WINDOWS, WordPerfect, or WordStar. Macintosh WORD disks can be handled. **ALL FILES SHOULD BE SUBMITTED UNFORMATTED AND WITHOUT PARAGRAPH INDENTS.** Each submission should be accompanied by a text (=ASCII) file. Other languages should be submitted only as text (=ASCII) files. Line drawings are acceptable as illustrations.

T. Donnelly (address below) is the interim editor of **ARGIA**.

BULLETIN OF AMERICAN ODONATOLOGY is devoted to studies of Odonata of the New World. This journal considers a wide range of topics for publication, including faunal synopses, behavioral studies, ecological studies, etc. The **BAO** publishes taxonomic studies but will not consider the publication of new names at any taxonomic level. Enquiries and submission of manuscripts should be made to **BAO** editor T. Donnelly, 2091 Partridge Lane, Binghamton NY 13903. Final submissions (after review) should be made on floppy disk, as above, with illustrations in final form and preferably adjusted to final size.

MEMBERSHIP IN THE DRAGONFLY SOCIETY OF THE AMERICAS

Membership in the **DSA** is open to any person in any country. Dues for individuals in the US, Canada, or Latin America are \$15 for regular membership and \$20 for institutions or contributing membership, payable annually on or before 1 March of membership year. Dues for members in the Old World are \$25.

Dues should be mailed to Jerrell Daigle, 2067 Little River Lane, TALLAHASSEE FL 32311

The **BULLETIN OF AMERICAN ODONATOLOGY** is available by a separate subscription at \$15 for members and \$18.75 for non-members and institutions.

THE ODONATA OF THE HURON MOUNTAINS, MARQUETTE CO., MICHIGAN¹

Mark F. O'Brien, Ethan Bright and Michael A. Kielb

(O'Brien) Insect Division, Museum of Zoology, University of Michigan, 1109 Geddes Avenue, Ann Arbor, MI 48109-1079

(Bright) School of Natural Resources, University of Michigan, Ann Arbor, MI 48109

(Kielb) Department of Biology, Eastern Michigan University, 306 Mark Jefferson, Ypsilanti, MI 48197

ABSTRACT

The Odonata fauna of the Huron Mountains of Marquette Co., Michigan was surveyed during 1996 - 2002. Our survey, combined with specimens from earlier collectors has resulted in a total of 79 species known from the area, which is nearly half of Michigan's known Odonata species. In addition, 9 species are new records for Marquette County.

INTRODUCTION

Few areas of the Upper Peninsula of Michigan have been adequately collected for any group of arthropods. Early collections prior to the 1950s were in more accessible public areas, such as the Porcupine Mountains and other scenic spots, and were largely incidental with regard to Odonata (Hebard 1910, Combs 1917). Byers' (1927) catalog of Michigan species did improve the situation somewhat, and Kormondy's 1958 Michigan catalog laid the groundwork for future surveys. However, Kormondy made only a brief foray into the UP, and there were few other collectors adding to the records. This would change for the better with the formation of the Michigan Odonata Survey (MOS), which sought to more thoroughly survey and catalog Michigan's Odonata fauna. The MOS actually started in the summer of 1996 during the first field trip dedicated to Odonata at the Huron Mountain Club. Mark O'Brien, Mike Kielb, and Ethan Bright brought enthusiasm and ideas to fruition with the formation of MOS, and this report is the culmination of periodic visits funded by the Huron Mountain Wildlife Foundation.

The Huron Mountain region, located in the northwest corner of Marquette Co. on the shore of Lake Superior (Fig. 1), consists of a series of low Precambrian granitic hills (<500 m) interspersed with nine lakes and several large streams. The 245 km² area has a diverse assemblage of wetlands and

forests, much of which lies within the area known as the Huron Mountain Club (HMC), a private preserve. The flora of the Huron Mountains has been catalogued in Wells and Thompson (1976), and detailed descriptions and maps of the area's ecosystems and cover types are included in Simpson et al. (1990). Upland habitats of the HMC vary from dry oak-pine scrub on southward-facing granitic slopes to moist hemlock-maple forest (dominant cover type). Wetland habitats include meandering sandy-bottomed streams, rocky-bottomed streams, lakes with a variety of shoreline habitats, wet meadows, beaver ponds and associated flooded lands, a shrub swamp, and small spruce bog.

Continued support from the Huron Mountain Wildlife Foundation has allowed us to sample a relatively undisturbed area. Although limited timber harvesting takes place at locations adjacent to the preserved sections (the "Reserve Area") of the HMC, protected areas have been relatively undisturbed since the 1920s. The streams and lakes are very clean and are minimally impacted by recreational use of the HMC members. This "pristine aspect" and the fact that the Huron Mountain region contains many habitats found elsewhere in Marquette County, makes the present study a reasonable baseline for future studies on Odonata in the Upper Peninsula of Michigan. The lack of extensive acid bog and poor fen habitats in the Huron Mountains excludes species expected in those habitats from this study.

HISTORY OF COLLECTIONS

The earliest collections from the Huron Mountains were largely incidental and not focused on surveying the dragonfly fauna from the area. T.H. Hubbell, (whose main interest was Orthoptera) took the first recorded specimens of Odonata from the HMC in July 1921, while a guest of F. W. Walker. A.W. Andrews later (in Christy, 1929) included a list of insects from the region in "The

¹ Bulletin of American Odonatology, 7(1): 1-22



Figure 1. The location of the Huron Mountain region in Marquette County, Michigan.

Book of Huron Mountain." Although oriented primarily towards the Coleoptera, his list included several Odonata from the Club. Probably few of these specimens were actually collected, since Andrews remarked in his work that the list was to represent "a typical collection," and few specimens he did collect from the Huron Mountains are vouchered at the UMMZ or any other institution. During a period from 1926-1932, J. N. Lowe of the UMMZ-Fish Division made extensive surveys of the fish fauna of the Upper Peninsula, including nearby locations in Marquette Co., and his catches of larval Odonata are the only reliable records of this fauna from the early part of this century. C. L. Hubbs (1927) and J. S. Rogers (1950), both of the UMMZ, also made collections from the area.

It was not until the 1980s that more odonate specimens would be collected from the region, when David C. L. Gosling and Mark O'Brien began a series of studies on insects of the Huron Mountain region. Incidental odonate collections were also

contributed by W. P. McCafferty (Purdue) during the mid-to-late 1980s during his mayfly survey, and by his master's student S. P. Yanoviak during the early 1990s that included Odonata as part of his thesis work. Only beginning in 1996 with the present study has there been a purposeful effort to sample the region's odonate fauna, and to associate species with particular habitats.

Typical methods were employed for collecting adults and larvae. Aerial insect nets were used for catching adults. Larvae were collected via dip-net, d-frame net and kick-seine. Visual examination of the vegetation, deadfalls and rocks on stream and lake margins provided exuviae for the study. The list that follows includes all known records from the Huron Mountain region. At the time of preparing this paper, nearly 1,000 records and 74 species comprise the basis of this report. Although it is possible that additional new records may be found, we feel that the current study is as thorough as is practicable. It is, however, by no means

considered representative of the fauna of the Upper Peninsula of Michigan, nor a complete list of what may be found in Marquette County. The study does not purport to estimate populations or rarity of species. Our goal was only to document presence or absence of species, and the numbers given primarily represent actual collection records. Obviously, we under-collected some species as adults - and although one may construe that only a few records for a given species constitutes rarity, it could in fact only mean that we did not adequately collect it due to time of visitation, site characteristics and individual prowess at collecting.

AQUATIC HABITATS

The Reserve Area (see Simpson, et al. 1990) of the HMC and adjacent lands owned by the Carroll-Paul Company contain a number of rocky-bottomed, sandy/gravelly margined lakes, small peat-bottomed ponds, small streams, small rivers, and shrub-carrs. One poor fen/bog occurs at the margins of Florence Pond and is a fine example of a Sphagnum/Larch/Black Spruce community. The predominant forest cover is Northern Hardwoods/Hemlock. Simpson et al. (1990) mapped the landscape ecosystems and cover types, and we have noted relevant cover types in the areas most frequently visited.

The Huron Mountains remain largely undeveloped, and, except for some isolated small-scale logging, there is currently little disruption to riparian habitats. Fires remain the only unplanned physical disturbances. Indeed, the HMC has discouraged disruption of lake and stream habitats so that they remain as undisturbed as possible. Motorized craft are not allowed, the exception being Ives Lake.

The Ives Lake area is representative of the recent history of the Reserve Area. It saw much change from its natural condition between 1890 and 1920 as extensive areas were logged and farmed. In 1893 loggers dammed the outlet of Ives Lake, raising the lake level by about six feet to support a log flume that went out the NE end of Ives lake (the River Styx). John M. Longyear, who acquired the property and built the large lodge that now houses researchers at Ives Lake, destroyed the dam in 1895. Since 1900 the Lake has been at or near the level it is today (Wells and Thompson 1976). The old agricultural fields on the west side of Ives Lake are slowly undergoing succession, as former hay fields have been taken over by shrubs and other woody plants.

Although we visited all of the aquatic habitats listed below, there is an emphasis on the region around Ives Lake. The primary reason for this is accessibility. Within a given visit, we could only attempt to collect at a few sites each day, because the travel over the dirt roads within the HMC takes a great deal of time. Thus, we visited some easily accessible sites such as the Pine River and along the Loop Road and Ives Lake Road more often than sites such as Mountain Lake and Lake Ann, which require extensive hiking. One can either elect to spend more time observing/collecting or more time traveling. We make no claims of having sampled all areas equally. However, given the close proximity and similarities in many of the lakes, we feel that Ives Lake is a good representative of the larger lakes in the Huron Mountains.

Of course, there are many instances where we did not collect a specimen at an aquatic habitat. Many of the two-tracks and dirt roads are great places to find adults that are hunting for prey, sometimes several km away from any body of water. The Ives Lake Road that follows the SW side of Ives Lake is an excellent transect of lake margins, old fields, shrub-carrs, beaver meadows and second-growth deciduous woods with a smattering of conifers. As a result, we found that a leisurely walk with a net later in the day often produced some of our best results - several species of *Somatochlora* and *Gomphaeschna furcillata*, for example. On windy days, the lee side of the taller trees ringing Ives Lake were a haven for hawking Epiteca species and aeshnids. We rarely saw odonates in the understory of canopied forest, but edges of woods and ecotones along roadsides were fruitful collecting sites.

The Stone House at Ives Lake is where researchers are housed, and this impressive structure juts out over the lake. As a result, it has always been a great place to search for exuviae, and has yielded some good finds. Similarly, almost every lake has a HMC boathouse, and those structures are also good places to search for exuviae and perched adults.

Lakes and Ponds (Fig. 2) (numbers correspond to sites on map)

1. Ives Lake - (46°50.86'N, 87°50.93'W). Rocky bottomed, with rocky wave swept shores and sandy/mucky shallows at the western end and where Elm Creek flows into the lake. The outflow of Ives Lake, the River Styx, is a rapidly descending stream once used as a log flume that flows into Third Pine Lake. The predominant

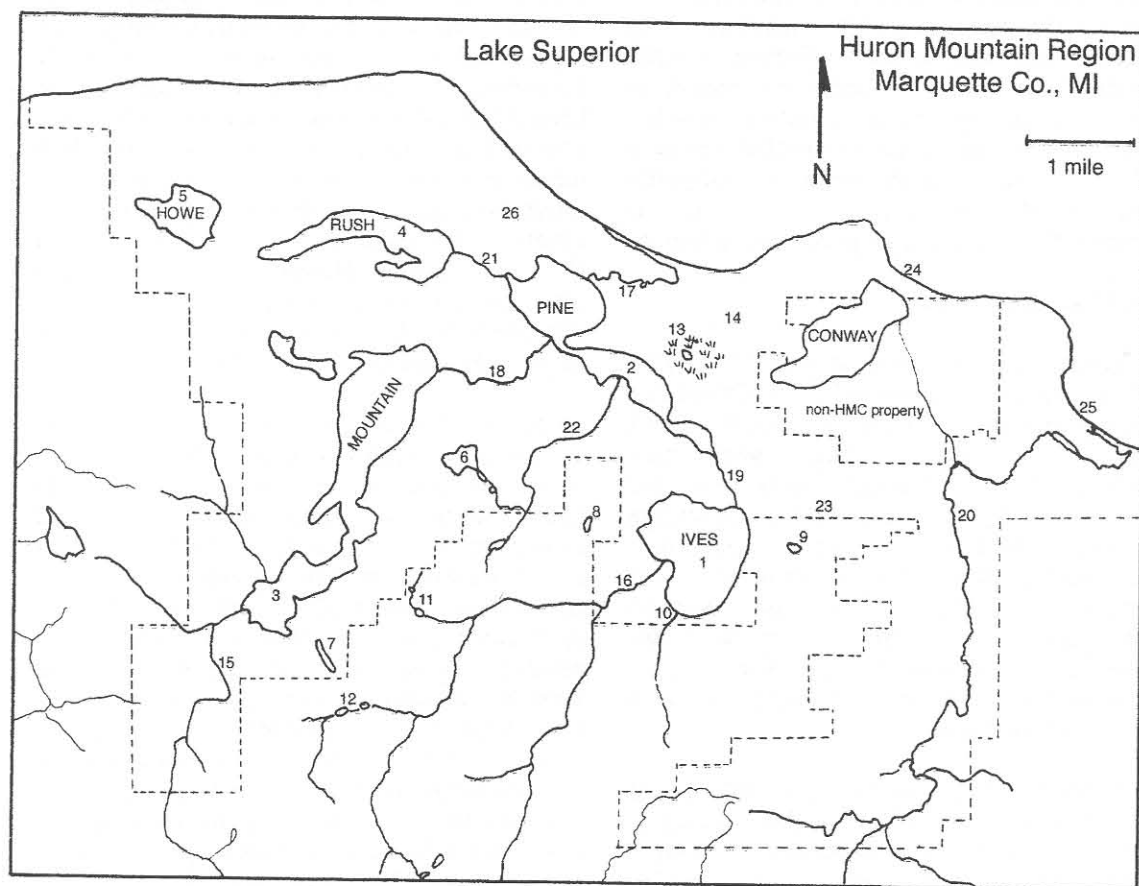


Figure 2. The rivers, streams, lakes and ponds of the Huron Mountains. The Huron Mountain Club property boundaries are indicated within the dashed line, except for the area around Conway Lake. This map adapted from the Huron Mountain Club topographic map version 2.1, 1998. The numbers refer to the sites as listed here and in the text:

1. Ives Lake; 2. Pine Lake; 3. Mountain Lake; 4. Rush Lake; 5. Howe Lake; 6. Trout Lake; 7. Canyon Lake; 8. Florence Pond; 9. Lily Pond; 10. Beaver Dam at Ives Lake Road; 11. Beaver Ponds off Loop Road; 12. Beaver Pond South of Burnt Mountain; 13. Cranberry Bog; 14. Spruce Bog NE of Cranberry Bog; 15. Cedar Creek; 16. Elm Creek; 17. Pine River; 18. Mountain Stream; 19. River Styx; 20. Salmon Trout River; 21. Rush Creek; 22. Fisher Creek; 23. Breakfast Roll; 24. Conway Bay; 25. Salmon-Trout Bay; 26. Fen below the "Skeet Field" N of Rush Lake.

wetland cover type along the margins is Sedge-Cattail, with Alder at the mouth of Elm Creek.

2. Pine Lake - (46°15.58'N, 87°28.80'W). This series of lakes (largest-to-smallest: Pine Lake, Second Pine and Third Pine) have sandy-bottomed substrates with varying amounts of littoral emergent vegetation (Sedge-Cattail), as well as *Nymphaea odorata* and *Myriophyllum*.

3. Mountain Lake - (46°51.63'N, 87°54.85'W). The largest and highest of the lakes in the Huron Mountains. The eastern end is similar to Ives Lake with a combination of wave-swept rocky shores interspersed with sandy shallows in protected spots. The western end largely consists of a combination of sandy shallows with *Scirpus* and *Carex*, and some isolated peat wetland habitats.

4. Rush Lake - (46°53.42'N, 87°54.85'W). Rush Lake is a sandy-bottomed lake with rock outcropping on southern shore, and sandy shallows with peaty wetland habitats on the north shore.

5. Howe Lake - (46°53.53'N, 87°56.92'W). This is a rather shallow, sandy, sandstone-bottomed lake with extensive reed beds along the shoreline.

6. Trout Lake - (46°17.90'N, 87°44.37'W). One of the smallest lakes in the Huron Mountains, Trout Lake is flanked along the NW, NE and SW sides by rocky margins, and the SE end with a well-vegetated shallow bay leading to a beaver impoundment. This end has considerable emergent vegetation, including *Typha*, *Carex* and *Scirpus*.

7. Canyon Lake - (46°50.00'N, 87°55.28'W). This is the most unusual lake in the Huron Mountains. Together with its narrow basin contour, the high cliffs surrounding most of the lake prevent winds from effecting fall and winter turnover, hence it is permanently stratified (Smith 1941). A small boggy area where a small brook flows into the lake extends away from the south end.

8. Florence Pond - (46°51.01'N, 87°52.23'W). This small pond is ringed at one end by granitic rock outcroppings, and the southeastern end by a sphagnum mat interspersed with leatherleaf, black spruce and larch. Substrate is principally deep accumulations of peat with areas of woody debris and living and dead aquatic macrophytes, including *Sparganium* and *Nuphar*.

9. Lily Pond - (46°50.87'N, 87°49.82'W). This pond is ringed by *Myrica gale* and has extensive patches of *Nuphar*, *Potamogeton*, *Pontederia cordata* and *Sparganium*. The pond bottom largely consists of deep accumulations of organic detritus.

10. Beaver Dam at Ives Lake Road - (46°50.35'N, 87°51.29'W). This perennial beaver dam blocks a small stream that flows under Ives Lake Road into the west end of the lake. It is periodically removed when water levels and beaver activity are causing water to flow over Ives Lake Road. However, the flooded area behind the dam has created a myriad of small channels and inlets where aquatic vegetation flourishes as well as many willows and sweet gale. This area has become the breeding ground of several species of *Somatochlora*, *Sympetrum*, and *Aeshna umbrosa*.

11. Beaver Ponds off Loop Road - (46° 50.90'N, 87° 53.42'W). This is a series of beaver ponds, the largest being several hectares in size, which feed into Fisher Creek. The largest pond is ringed with a narrow marshy zone of sedges and cattails.

12. Beaver Pond South of Burnt Mountain - (46° 49.52'N, 87° 55.19'W). This is another large beaver pond, with a large marshy zone surrounding it.

13. Cranberry Bog - (46° 52.40'N, 87° 51.10'W). The so-called Cranberry Bog is a large ericaceous shrub-carr that sits in a depression. In years with large amounts of snow (such as 1995-1996), the depression can fill with water up to meter deep. More often, there is a much smaller permanently wet area on the NW perimeter. During very dry years such as in 1998, the open water may be only about the surface area of a wading pool. Such fluctuations favor species that are able to take advantage of temporary impoundments.

14. Spruce Bog NE of Cranberry Bog - (42° 52.69'N, 87° 50.56'W). This acidic depression area has no open water, save for during occasional high-water years (1996). It is a mature muskeg bog with a dense Ericaceous understory; some tamarack, white pine, red maple and hemlock are found at the bog's margins.

Streams and Rivers (Fig. 2)

15. Cedar Creek - (mouth: 46°50.32'N, 87°56.37'W). This stream drains a large area SW of Burnt Mountain and runs into Mountain Lake. It is moderately fast-flowing stream has numerous riffles, boulder-rimmed pools, and sandy substrate. Turkeyneck falls is at the upper end of this system.

16. Elm Creek - (mouth: 46°50.75'N, 87°51.35'W). Draining a series of wetlands into Ives Lake, Elm Creek is largely a sandy/gravelly-bottomed stream throughout its length. Aquatic vegetation along the last 500m is primarily *Vallisneria americana*, with some patches of *Sagittaria* near the mouth. Overhanging alders are found along many sections.

17. Pine River - (mouth: 46°53.41'N, 87°52.12'W). Drains Pine Lake into Lake Superior. At the upper end, it is shallow and rocky, and by the time it meanders through the HMC Compound, it is wide and deep, with a sandy bottom. *Potamogeton*, *Myriophyllum*, *Sagittaria*, and *Vallisneria* are found along the meandering region.

18. Mountain Stream - (mouth: 46°52.52N, 87°52.70W). Drains Mountain Lake into Pine Lake. At the upper end, Mountain Stream Falls is one of the best (and least seen) waterfalls in the UP. Mountain Stream is generally a fast, rocky torrent for much of its descent down to Pine Lake. A number of pools and riffles surrounded by large boulders make it a real challenge to sample.

19. River Styx - (mouth: 46°51.58N, 87°50.78W). Connects Ives Lake to Pine Lake. This was once used as a log flume as the descent is quite precipitous. Below the falls the stream cuts into its alluvial bed and becomes a slower-moving stream of sandy runs interspersed by gravelly riffles and woody-debris dams, with grassy banks.

20. Salmon Trout River - (mouth: 46°51.85N, 87°46.36W). The upper part of this river flows through a constrained bedrock valley, where a series of fast flowing shoots, falls and a series of pools and riffles. Further downstream, the river enters its alluvial valley, and becomes a sandy-bottomed river interspersed with riffles, gravel bars and woody-debris dams. As it approaches Lake Superior, it meanders, with the mouth appearing to have several outlets to the lake. This lower end also skirts a large and nearly impenetrable black alder swamp.

21. Rush Creek - (mouth: 46°53.01N, 87°53.21W) is a small, shallow creek that connects Rush Lake to Pine Lake.

22. Fisher Creek - (mouth: 46° 52.19N, 87°51.90W) drains Trout Lake and a number of wetlands into Second Pine Lake. This stream is usually quite narrow and shallow, with bottom substrate varying from sandy to gravelly to organic muck in sloughs. We did not find any Odonata along the upper sections.

Other Sites

23. Breakfast Roll - a low granitic knob that rises above Lily Pond, and has an exposed rocky face and summit. There are several wet depressions and pockets of trees and shrubs near the top. Consequently, it seems to be an attractive place for sexually-immature adults to hawk for insects that are blown up the face of the hill.

+

24. Conway Bay - Conway Bay is along the shore of Lake Superior. It is primarily sandy along the beach, but there is an abrupt transition to boreal forest within a few meters from the narrow beach.

Conway Lake is not far off, but that lake is ringed with private holdings, so we did not collect there. There is an open area near the beach that has numerous small balsam firs within it. This area has proved to be an excellent spot for collecting Emeralds and Darners. Whether they are blown there by offshore breezes or are coming in from nearby habitats, is hard to tell. However, the temperature at the Lake Superior shoreline is always cooler than 500m inland. It's possible that on a sunny day this "sink" provides a sheltered warm area for dragonflies to warm up after being blown in from the lake margin.

25. Salmon-Trout Bay - The Salmon-Trout River empties into Lake Superior here, and the wide sandy beach is backed by deciduous woods, which are almost immediately back by a large wooded swamp complex that is nearly impenetrable.

26. Fen N of Rush lake, below the "Skeet Field" - This small seepage fen is spring-fed and lies at the base of a hill below the HMC Skeet Field. It is less than a hectare in area, and is dominated by sedges, with mosses, liverworts, cattails and blue flag iris in abundance. There are several patches of shrubs in small rises, but sedges predominate where there is adequate water. This is the only fen on the HMC.

ABBREVIATIONS- m = male, f = female, L = larvae, E = exuviae, T = teneral adults.

Unless otherwise stated, collections have been made by Mark F. O'Brien and family (MFO), Ethan Bright (EB) and/or Michael A. Kielb and Susan Kielb (MAK). For the sake of brevity, we have not indicated which one of us was the collector, unless additional observations were attributed to one of us. Other collectors as noted in the text are A. W. Andrews (AWA), David C.L. Gosling (DCLG), Theodore H. Hubbell (THH), William P. McCafferty (WPM), J. Speed Rogers (JSR), and Stephen P. Yanoviak (SPY). HMC = Huron Mountain Club (usually used by early collectors). All adult specimens were identified primarily by MFO, with larval identifications by EB.

Institutions: Unless otherwise stated, specimens listed are held at the University of Michigan Museum of Zoology. Other institutions are as follows: PUIC - Purdue Univ. Insect Collection.

All specimens listed are catalogued in the Michigan Odonata Survey Database, available on the Internet at:

<http://insects.ummz.lsa.umich.edu/michodo/ododat>

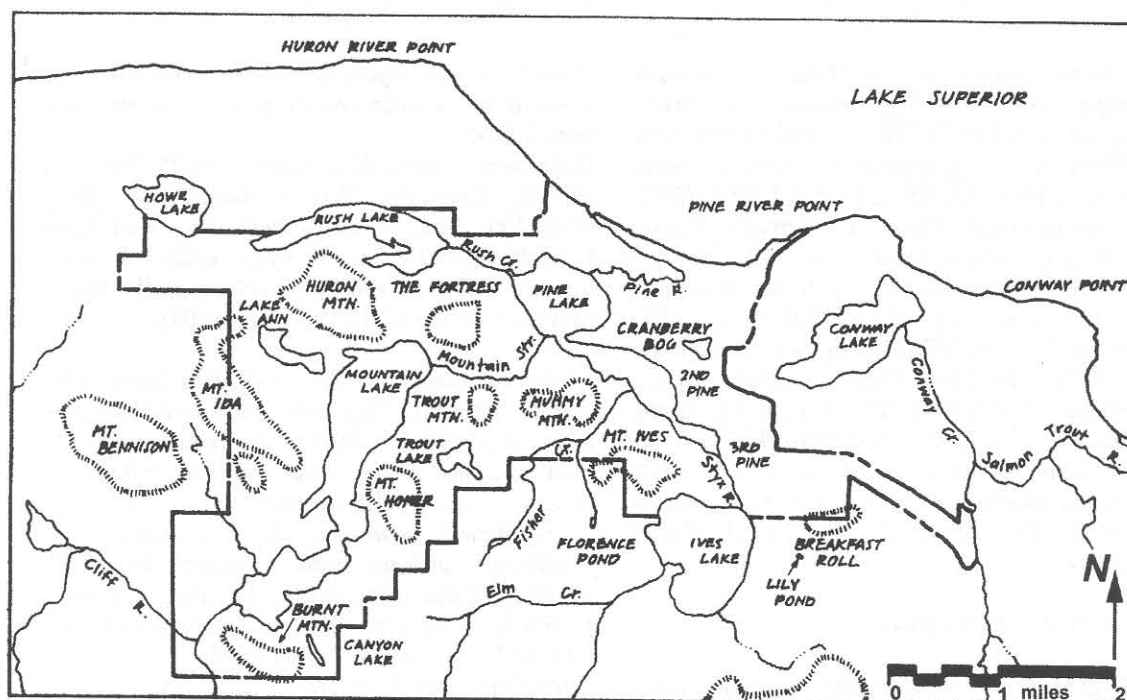


Figure 3. The location of the major peaks within the Huron Mountain Club. The dashed line refers the Reserve Area, as defined by Simpson, Stuart and Barnes (1990). Map redrawn from Simpson, Stuart and Barnes, 1990.

a.html. We base our list of names primarily on the nomenclature used in Paulson and Dunkle (1999).

LIST OF SPECIES

ZYGOPTERA- CALOPTERYGIDAE

Like elsewhere in its range, these damselflies are denizens of streams with overhanging banks to slow-moving areas of rivers with adequate overhanging vegetation are the preferred habitats for these jewel-like damsels. Only two species of *Calopteryx*, the jewelwings, are known from the Huron Mountains.

Calopteryx aequabilis Say - River Jewelwing. This attractive slow-stream species is especially numerous at Salmon-Trout River and Elm Creek. Larvae are frequently found along stream margins beneath undercut banks and among woody debris overlying sandy substrates. The adults are often found side-by-side along the tall vegetation on the banks, with those of *C. maculata*, but males are often seen perched on downed limbs that are on the middle of the Salmon-Trout River.

Collections: Elm Creek, 100m from outlet into Ives Lake - 06/28/1996 [L], 06/30/1996 [L]; Ives Lake, at mouth of Elm Creek - 06/29/1996 [1f]; River Styx, about 200 m downstream of falls near

footbridge - 06/25/1997 [L]; Salmon-Trout River, by gatehouse of HMC - 06/30/1996 [2m], 07/09/2002 [1m]; Salmon-Trout River, at "Raven's Roost" - 05/13/1998 (1L); Salmon-Trout River, upstream from mouth into Lake Superior - 07/02/1996 (very abundant where vegetation was overhanging banks) [2m, 2f].

Calopteryx maculata (Beauvois) - Ebony Jewelwing. This is a widespread and familiar damselfly in the HMC region. We found larvae in the swifter sections of streams and rivers with sufficient overhanging debris and aquatic vegetation for them to cling to. Adults were frequently observed flitting through shaded woods until they reach sexual maturity, when they spent most of their time near oviposition sites along the stream banks. The species seems to peak in abundance by early July, and by late August it is rarely seen.

Collections: Canyon Lake - 06/28/1996 [1f]; Cedar Creek - 07/09/2000 [1m, numerous individuals seen]; Pine River, at bridge - 06/02/1986 (WPM) [L]; Pine River, above bridge - 06/18/1997 [L], 05/11/1998 [L]; Pine River, near bridge - 08/25/1985 [L]; Pine River, downstream of Pine Lake impoundment - 05/11/1998 - [L]; Pine River - 07/13/1950 (JSR) [2m, 1f], 07/14/1998 [1f]; River Styx, above falls by Ives Lake - 05/14/1998 [L];

River Styx, downstream of falls by wooden footbridge - 06/25/1997 [L]; Salmon-Trout River, near mouth 06/21/1997 [1f, L], 06/25/1996 [1f]; 06/27/1996 [1m]; Salmon-Trout River, at main bridge 06/30/1996 [1f], 05/12/1998 [L], 07/09/2002 [1m]; Salmon-Trout River, at "Raven's Roost" 05/16/98 [L]; Salmon-Trout River S of bridge 08/22/2001 [1m, observed]; Mountain Stream - 06/30/1996 [1m, L], 07/16/1998 [1m, 1f], 05/13/1998 [2L], 08/23/2001 [1m, observed]; Rush Creek - 07/16/1998 [1m]; Upper Mountain Stream, near bridge - 08/25/1985 (WPM) [1m, L]; Along trail near Breakfast Roll - 07/01/1996 [1m]; Woods next to Salmon-Trout Bay - 07/02/1996 [1m, 1f]; Unspecified locations in the Huron Mountains - 07/13/1921 (THH) [1m, 1f], 07/15/1921 (THH) [1m, 2f].

ZYGOPTERA- LESTIDAE

Lestids in the HMC area usually are found along the margins of lakes and ponds with reeds and sedges, and throughout areas that are flooded from the onset of snowmelt to mid-summer, e.g. Cranberry Bog (see habitat information above). Cranberry Bog seems to support a diverse assemblage of *Lestes*, and correlating species abundance with varying water levels would be an interesting long-term project.

Lestes congener Hagen - Spotted Spreadwing [County Record]. This Holarctic species flies late in the summer, and consequently we first collected it at HMC in 2001. A resident of boggy margined lakes, and we saw numerous individuals along Florence Pond, which is truly the only bog-margined lake within the HMC.
Collections: Florence Pond and nearby roadside - 08/21/2001 [3m]

Lestes disjunctus disjunctus Selys - Common Spreadwing. Flight period is from mid- to late summer, and is frequently found in permanent wetland areas of the HMC.
Collections: Huron Mountains - 07/11/1921 (THH) [3m]; Florence Pond - 07/16/1998 [1m]; Lily Pond - 08/22/2001 [2m]; Cranberry Bog - 07/15/1998 [1m, 1f].

Lestes dryas Kirby - Emerald Spreadwing. This robust species is found in early summer. According Walker (1953), larvae often develop in pools that dry up before summer's end. Cranberry Bog is just such a habitat. Edges of beaver ponds with abundant cattail at the margins are also another favored habitat. The pools in the fen north of the

Skeet field also appear to be filled with water for much of the summer, and the species was abundant there in 2002.

Collections: Huron Mtn. Club - 06/25/1986 [2f] (MFO); Cranberry Bog - 06/27/1996 [1m], 07/10/2002 [2m, 2f, many seen]; Fen N of Skeet Field 07/09/2002 [2m, 2f, many seen]; Mountain Stream trail - 06/30/1996 [1f teneral]; Huron Mountain Point - 07/17/1921 [1f] (THH).

Lestes eurinus Say - Amber-winged Spreadwing [County Record]. This large and colorful *Lestes* is recorded for the first time from Marquette Co. At least six individuals were observed flying and perching amongst the emergent vegetation in Lily Pond. *Lestes eurinus* is often very localized in distribution, and has been associated with small ponds margined with cattails. The flight season in Michigan is from mid-May to August, with early summer being the peak flight period.

Collections: Lily Pond, 07/12/2002 [1m].

Lestes forcipatus Rambur - Sweetflag Spreadwing. This species is usually associated with temporary ponds, and in 1996 the high water level at Cranberry Bog provided bountiful habitat of this sort.

Collections: Cranberry Bog - 06/27/1996 [1m teneral], 06/27/1996 [5 f teneral]; Spruce Bog NE Cranberry Bog - 07/01/1996 [1f].

Lestes rectangularis Say - Slender Spreadwing. Frequents the marshy edges of Ives Lake and very likely the other lakes as well, especially where lake margins are shaded.

Collections: Ives Lake area - 06/27/1986 [1f], 07/17/1998 [1m], 08/11/1996 [1m]; Rush Creek - in sedgy margins of pool leading into creek - 07/16/1998 [1m].

Lestes unguiculatus Hagen - Lyre-tipped Spreadwing. We have only a few additional specimens in addition to some older records for this species.

Collections: Conway Bay area - 07/11/1920 (AWA) [1m, 1f], 07/19/1920 (AWA) [1m]; Ives Lake - 08/15/1996 [2f].

ZYGOPTERA- COENAGRIONIDAE

This is the area's largest and most diverse family of damselflies, and is found in a variety of habitats in the HMC. Most species in the Huron Mountains are marsh and pond-dwellers.

Amphiargion saucium (Burmeister) - Eastern Red Damsel [County Record]. This little red and black damselfly is primarily a seepage fen resident. We have one specimen from the HMC, collected by MFO in 1986 at a seep area N of Rush lake below the area known as the "skeet field" within the HMC compound. This specimen was not discovered in the UMMZ collection until 2002, prompting a sudden realization that we never sampled this habitat during the Odonata survey work. An additional trip was made during 9-12 July 2002 to resample the site. The seepage fen is spring fed, and supports a sedge-dominant fen with deeper areas containing cattails. While no *A. saucium* were collected in 2002, the site appears to be ideal for this species.

Collections: Huron Mountain Club, fen north of skeet field, 06/26/1986 [1f].

Argia fumipennis violacea (Hagen) - Variable (Violet) Dancer. A.W. Andrews (1920) and T. H. Hubbell (1921) collected the only known records of this damselfly at the HMC until 2002. No exact localities were given other than the Huron Mountains. *Argia f. violacea* breeds in streams and ponds and it is likely that the specimens were collected somewhere near the HMC member's compound. In 2002, the senior author found *Argia f. violacea* at three locations within the Pine Lake drainage - which is interesting, in that we had not seen the species in our previous trips.

Collections: Huron Mountains - 07/08/1921 [1m] (THH), 07/10/1920 [1m] (AWA), 07/12/1921, [1m] (THH); Pine Lake 07/09/2002 [3f]; Pine River above bridge, 07/10/2002 [1m, 1f in copula]; Pine River at Compound 07/10/2002 [1m]; River Styx in lower end towards Pine Lake, 07/11/2002 [1m, 1f].

Argia moesta (Hagen) - Powdered Dancer. This damselfly is very common along the rocky shoreline of Ives Lake in July. Males develop a white pruinosity and are often seen in open sunlit patches of ground not far from the shoreline.

Collections: numerous along rocky shore of Ives Lake - 07/06/2000 - 07/09/2000, 07/13/1998, [4m], 08/17/1993 [1f]; River Styx above falls - 07/13/1998 [1f]; Ives Lake near Stone House - 08/25/1985 [L] (WPM).

Chromagrion conditum (Hagen) - Aurora Damsel. The Aurora Damsel is a fitting name for this colorful, early season species that inhabits spring-fed pools and marshy or backwater areas of streams and small lakes. It is especially abundant where sloughs exist, as seen in the collection records

below. There is a slough leading from Lily Pond, and in 2002 many individuals were seen there.

Collections: Canyon Lake, south end - 06/28/1996 [7m, 3f], 06/20/1997 [1m], 05/15/1998 [L]; Cranberry Bog - 06/27/1996 [1m, 1f]; Edge of beaver pond off Loop Road - 06/28/1996 [1m, 1f], 06/17/1997 [1m, 1f]; Flooded woody swamp near Florence Pond - 06/17/1997 [1m]; Marshy area fed by stream off Loop Rd - 06/20/1997 [1m, 1f]; Salmon-Trout River, marshy area near mouth - 07/02/1996 (abundant in reeds and tall grass) [3m, 1f], 06/26/1997 [1m, 1f]; Lily Pond margins 07/12/2002 [1m, many seen].

Coenagrion resolutum (Hagen) - Taiga Bluet. Found in the HMC area along marshy edges of smaller ponds and embayments of smaller lakes, and not wave-swept margins of larger lakes.

Collections: Beaver pond off Loop road - 06/17/1997 [1f]; Canyon Lake, marshy margin - 06/20/1997 [1f]; Cranberry Bog - 06/27/1996 [1m]; Flooded woody swamp near Florence Pond - 06/17/1997 [1m]; Ives Lake, marshy region - 06/28/1996 [L]; Loop Road near "Chicken Coop," flooded grassy marsh area - 06/20/1997 [2m]; marshy beaver meadow south of Burnt Mtn. - 06/26/1996 [2m]; Salmon-Trout Bay, margins of Alder swamp - 07/02/1996 [4m, 1f].

Enallagma boreale (Selys) - Boreal Bluet. This northern and widespread species is one of the earliest damselfly species to emerge, when in the late spring can be found in lentic systems with emergent aquatic vegetation. It is found in the marshy zones of the lakes and ponds in the Huron Mountains.

Collections: Beaver Pond off Loop Rd. - 06/26/1996 [1m, 1f], 06/17/1997 [1m]; Beaver pond south of Burnt Mtn. - 06/26/1996 [1m]; Canyon Lake - 06/28/1996 [1m], 06/20/1997 [4m], 05/15/1998 [L]; Conway Bay - 06/30/1996 [1m]; Cranberry Bog - 06/27/1996 [2m, 2f], 05/13/1998 [L]; Florence Pond - 05/11/1998 [L], 07/16/1998 [1m]; Ives Lk. - 06/23/1996 [1m]; Lily Pond - 06/25/1996 [1m], 07/12/2002 [1m].

Enallagma carunculatum Morse - Tule Bluet. We found this species in lakes near areas where bulrushes are abundant, where adults perch on rushes in shallow margins. It occurs later in the summer than *E. boreale*.

Collections: Ives Lake - 08/11/1996 [1m], 07/13-15/1998 [2m, 1f], 08/23/2001 [3m], 07/12/2002 [1m]; Upper Pine Lake - 07/16/1998 [2m, 1f], 07/09/2002 [3m, 1f]; HMC, unspecified location - 07/08/1921 (THH) [1m].

Enallagma cyathigerum (Charp.) - Northern Bluet [County Record].

Collections: Conway Bay - 06/18/1997 [2m]; Ives Lake - 06/28/1996 [L]; South of Burnt Mountain - 06/26/1996 [2m].

Enallagma vernale (Gloyd) - Spring Bluet [County Record]. Larvae were found in the permanent open water part of Cranberry Bog, among rushes and floating *Nuphar* overlying deep accumulations of detritus.

Collections: Canyon Lake - 05/15/1998 [L]; Cranberry Bog - 06/27/1996 [1m]; Johnson's Marsh (at the eastern periphery of the Huron Mountain Club property) - 05/17/1998 [2m].

Enallagma ebrium (Hagen) - Marsh Bluet [County Record]. This is a marshy zone species of lakes, and the lone specimen was taken on the W end of Ives Lake.

Collections: Ives Lake - 08/12/1996 [1m].

Enallagma exsulans Hagen - Stream Bluet [County Record]. An inhabitant of rocky, slow flowing streams and small rivers, as well as the marshy zone of sand-bottomed lakes. This species was commonly seen along the margins of Pine Lake.

Collections: First Pine Lake - 07/16/1998 [3m, 2f], 07/09/2002 [1m]; Pine River - 07/14/1998 [1m].

Enallagma geminatum Kellicott - Skimming Bluet [County Record]. This small, dark bluet is usually found in shallow organic-bottomed ponds with emergent *Nuphar*, *Sagittaria* and *Sparganium*. It flies rapidly close to the surface of the water, usually landing on lily pads. Of course, unless one wades out to the lily pads (not always a good idea, even with chest waders), the species is difficult to catch, so that accounts for the only record.

Collections: Lily Pond - 06/29/1996 [1m, others seen on lily pads].

Enallagma hageni (Walsh) - Hagen's Bluet. Hagen's bluet is abundant in Michigan and is the damselfly most often encountered in the Upper Peninsula. We found this species in a variety of lakes and ponds with organic detritus substrates and boggy margins and backwater areas of larger streams, i.e., the Salmon-Trout. One could say that is everywhere in the Huron Mountains.

Collections: Pine River, in slough near compound - 08/23/2001 [1m], 07/10/2002 [1m]; First Pine Lake - 07/16/1998 [1m], 07/09/2002 [3m]; Ives Lake - 08/03/1985 [1f], 06/24/1997 [L], 07/13/1998 [3m],

07/12/2002 [1m]; Lily Pond - 06/29/1996 [1m], 07/15/1998 [3m], 07/12/2002 [4m]; Off Loop Road - 07/13/1998 [1m]; Middle Pine Lake - 07/14/1998 [1m]; Howe Lake - 07/17/1998 [7m, 2f]; Salmon-Trout River, at "Raven's Roost" - 05/16/1998 [L]; Slough, south of Burnt Mountain - 06/26/1996 [1m]; HMC, unspecified location - 07/09/1921 [THH] [1m], 07/14/1921 [THH] [2m], 06/22/1986 [1f]; near Cranberry Bog, 07/10/2002 [3m, 1f].

Enallagma vesperum Calvert - Vesper Bluet [County Record]. This damselfly has been only rarely collected in the Upper Peninsula of Michigan, based upon Michigan Odonata Survey data. The typical habitats of *E. vesperum* are vegetated areas of ponds where macrophytes such as milfoil provide oviposition sites and larval habitat. In the Huron Mountains, it would seem that this species would be more widespread, but to date, we have records from only two sites. The adult specimen was captured on a shrub near the water's edge late in the day.

Collections: Mountain Lake, by "Illiad" - 06/28/1997 [L], Ives Lake, W shore, 07/09/2002 [1m].

Ischnura posita (Hagen) - Fragile Forktail. We first collected this species in 2002 along the bank of the Pine River near the Compound Bridge. There, the river is slow-moving with lots of submerged macrophytes and sufficient emergent vegetation along the banks for adult habitat.

Collections: Pine River at Compound Bridge - 07/10/2002 [1, 1f].

Ischnura verticalis (Say) - Eastern Forktail. We find this species in virtually every pond habitat at the HMC. This mirrors the status of the species state-wide.

Collections: Beaver Pond at Elm Creek - 06/26/1996 [1m]; Canyon Lake - 06/28/1996 [2m], 05/15/1998 [L]; Cranberry Bog - 06/27/1996 [2m, 1f], 07/10/02 [2f, several males seen], 05/13/1998 [L]; Elm Creek - 06/26/1996 [L]; Elm Creek at Ives Lake - 06/17/1997 [1m]; Beaver pond S. of Burnt Mtn., 06/26/1996, [2f teneral]; Pine River shoreline near compound - 08/23/2001 [2m, 3f observed]; Johnson's Marsh - 05/17/1998 [L]; Ives Lake - 06/23/1996 [1m, 1f], 06/26/1996 [1f], 07/02/1996 [L], 06/20/1997 [2f], 07/13/1998 [1m], 08/12/1996 [1f]; Salmon-Trout Bay - 07/01/1996 [1m]; Salmon-Trout River, at "Raven's Roost" - 05/16/1998 [L]; HMC, unspecified location - 07/12/1921 (THH) [1f], 06/22/1986 [1m].

Nehalennia irene (Hagen) - Sedge Sprite. This species is common in the HMC area among margins of ponds and lakes with sufficient upright vegetation where it flies amongst the reeds and sedges (rarely above them). They were quite numerous in the fen north of the Skeet Field, and at the margins of Cranberry Bog.

Collections: Beaver Pond at Elm Creek - 06/26/1996 [3m] (abundant); Cranberry Bog - 06/27/1996 [4m] (abundant), 05/13/1998 [L], 07/10/2002 [3m, 3f]; Florence Pond - 07/07/2000 [1m]; Howe Lake - 07/17/1998 [1m, 1f]; Johnson's Marsh - 05/17/1998 [L]; Lily Pond - 07/15/1998 [3m, 1f] (very abundant) 07/12/2002 [3m, 4f]; South of Burnt Mountain - 06/26/1996 [6m]; Spruce Bog NE of Cranberry Bog - 07/01/1996 [3m]; Salmon Trout River at Bridge - 06/18/1997 [1m, 1f]; Fen N of Skeet Field, 07/09/2002 [3m], 07/12/2002 [1m, 1f]; HMC, unspecified location - 07/11/1921 (THH) [1f], 06/24/1986 [2m, 2f].

ANISOPTERA- AESHNIDAE

Darners are often associated with mid-late summer, when many adults are active. Many observers are familiar with the typical *Aeshnas* seen flying amongst the reeds and sedges bordering lakes and ponds in the Huron Mountains. *Aeshna canadensis* is the most abundant species here. In May, the first darners seen are northerly-migrating *Anax junius*. Later, *Basiaeschna janata* adults are on the wing in early June, and are very common on wave-swept lakes such as Ives, and along streams such as the Pine River.

Aeshna canadensis Walker - Canada Darner. Very commonly found at many ponds and lakes with sedges and reeds in the shallow margins. Adults frequently feed on midge swarms along roads late in the afternoon. Females are frequently seen among sedges laying eggs in the submerged plant stems, and males patrol over the areas where suitable egg-laying habitat is present. It was not uncommon to hear the buzzing of wings hitting vegetation on the west end of Ives Lake as both sexes maneuvered their way through reed beds and sedges, just a few inches from the water. Females of course, were looking for oviposition sites, and males were looking for females.

Collections: Canyon Lake, south end by boggy area - 06/26/1997 [L]; Conway Bay, forest opening near shore - 06/30/1996 [A]; Conway Point, along trail through slash - 07/09/1921 (THH) [1m]; Cranberry Bog - 05/13/1998 [L]; Florence Pond - 05/11/1998 [L], 08/21/2001 [2m]; Ives Lake - 08/12/1996 [A]; Ives Lake, near Stone House - 07/13/1998, 2200

hrs, nearly dark [2f]; Loop Road, at Elm Creek beaver dam - 08/12/1996 [A]; South of Burnt Mountain - 06/26/1996 [A]; HMC, unspecified location - 07/11/1921 (THH) [A], 08/06/1985 [A].

Aeshna constricta Say - Lance-tipped Darner. A late-summer *Aeshna*, usually found in areas where streams slowly wind through marshes or marshy ponds (Walker 1958). We have less data from late August, so it is probable that *A. constricta* is more common than the single record we have. The mouth of Elm Creek may be a suitable larval habitat, as would be the meandering stream in the beaver meadow that feeds into Ives Lake. We would also expect to see it near the mouth of the Salmon-Trout River.

Collection: Ives Lake area- 08/11/1996 [1m].

Aeshna eremita Scudder - Lake Darner. This large *Aeshna* was abundant in August, 2001 at Florence Pond, a boggy-margined lake with lots of *Sparganium*.

Collections: Canyon Lake 07/09/1927 (CLH) [2L]; Florence Pond - 08/21/2001 [5m]; Johnson's Marsh - 06/29/1997 [L]; Marsh, near mouth of Salmon-Trout River by Lake Superior - 07/02/1996 [L]; Trout Lake, marshy area at SE end, 07/09/2000 [4mE, 4fE on emergent vegetation].

Aeshna interrupta Walker - Variable Darner. This species is quite abundant at Lily Pond and Florence Pond. Males cruise and hover over the edges of the pond, and the interrupted stripes on the thorax make them look darker than other *Aeshna* species. Lily Pond and Florence pond both have abundant emergent aquatic vegetation along the edges, as well as *Myrica gale* encroaching over the water.

Collections: Canyon Lake, south end - 06/26/1997 [L]; "Edge of grassy clearing in pine woods near Lk. Superior beach" - 07/10/1921 [THH] [1f]; Elm Creek, ca. 100-200 m from outlet into Ives Lake - 06/28/1996 [2L]; Loop Road, floating dead in beaver pond - 07/13/1998 [1m]; Florence Pond - 05/11/1998 [L]; 07/16/1998 [1m], 08/21/2001 [3m]; Lily Pond - 07/15/1998 [2m] 08/22/2001 [2m]; HMC, probably near Ives Lake - 08/21/1993 [1 m]; Trout Lake, marshy area at SE end, [1 f exuviae]; HMC, unspecified location - 07/11/1921 [THH] [1f], 07/17/1921 [THH] [1f].

Aeshna tuberculifera Walker - Black-tipped Darner. This species prefers bog-margined ponds and lakes (Walker 1958), but has been taken in other fen-like wetlands (EB, pers. obs.). We do not consider this to be a common species at the HMC.

Collections: Cranberry Bog - 05/13/1998 [L]; Lily Pond margin - 08/24/2001 [1m]; S. of Burnt Mtn., off Loop Rd., on vegetation, 07/07/2000 [1f teneral]; HMC, unspecified location - 07/29/1984 [DCLG] [1m], 07/30/1984 [DCLG] [1m], 08/04/1984 [DCLG] [1m].

Aeshna umbrosa Walker - Shadow Darner. Inhabits shaded streams, and some lakes and outlets of beaver impoundments in the HMC area, and is often seen flying in partly shaded areas, unlike most other darners. This is a common species at the HMC, just as it is elsewhere in Michigan.

Collections: Canyon Lake, south end in inlet stream - 06/26/1997 [L], south end - 05/11/1998 [L]; Cedar Creek, South of HMC area - 07/09/1985 [WPM & AWP, PUIC] [1L]; Elm Creek, ca. 100-200 m upstream from outlet into Ives Lake - 06/28/1996 [L]; near Ives Lake - 07/09/2002, [2M, hawking gnats at 21:15 hr along Ives lake Rd.], 08/20/2001 [2f hawking gnats near Stonehouse]; Beaver impoundment outflow on Ives lake Road - 06/27/1997 [L], 08/22/2001 [2m]; Florence Pond - 05/11/1998 [L]; Ives Lake - 08/12/1996 [1F], 08/13/1996 [1F]; River Styx, by wooden footbridge downstream of falls - 06/25/1997 [L], 05/14/1998 [L]; Salmon-Trout River - 06/27/1937 [CLH] [1L], mouth - 06/28/1937 [CLH] [2L], 05/12/1998 [L], at "Raven's Roost" - 05/16/1998 [L], at gate house - 05/12/1998 [L]; Second Pine Lake, on log near boathouse - 07/14/1998 [E]; HMC, unspecified location - 08/02/1984 [DCLG] [1F].

Anax junius (Drury) - Common Green Darner. This species is probably not a permanent resident in this part of the Upper Peninsula; no larvae have been taken from any habitats in the area. In 1998, which had a very early spring, EB found a male *Anax junius* flying at Ives Lake on May 13 (9:30 p.m., nearly dark) and near Lily Pond on May 17. On 07/09/2002, one male was collected on Pine Lake. Our other records (sight records) of this species are on 06/24/1996, 06/29/1996, 07/15/1998 and 08/15/1996 at Ives Lake. Three individuals were seen at Florence Pond on 06/23/1997. Several males were seen patrolling Lily Pond on 15 July 1998 and 12 July 2002. No individuals were seen in late summer or early fall.

Basiaeschna janata (Say) - Springtime Darner. Very common, found along any of the lakes and larger quiet areas of streams (especially with accumulations of woody debris). It is one of the earliest dragonflies to emerge in the spring and probably can be found in late May. The individuals located away from water were feeding in areas

where prey was abundant, such as the Spruce Bog. On 8 July 2000, several adults were seen flying and ovipositing along the shaded, woody margins of the Pine River below the Pine Lake dam. On at least two occasions, they were preyed upon by *Hagenius brevistylus*.

Collections: Canyon Lake, south end - 05/15/1998 [L]; Conway Bay - opening near shore 06/27/1996 [1f]; Florence Pond - 05/11/1998 [L]; near Florence Pond - 06/17/1997 [1f]; Ives Lake at Elm Creek - 06/17/1997 [2m]; Ives Lake - 06/26/1996 [14 m], 06/29/1996 [1m], 06/20/1997 [2m], 06/23/1997 [L], 07/02/1996 [3m], 06/16/1997 [1f], 06/16-20/1997 [exuviae], 07/09/2002 [2m both near dusk, flying low over the water]; Lily Pond - 06/29/1996 [1m]; Loop Road, near Ives Lake - 06/27/1996 [1f], in beaver pond - 06/17/1997 [1m]; Mountain Lake, by "Illiad" - 06/28/1997 [L], 05/13/1998 [L]; Second Pine Lake - 06/19/1997 (E), 07/10/2002 (E); Pine River: at shore of Lake Superior - 06/25/1997 [L], 06/29/1997 [1f], above bridge - 07/08/2000 [1m, 1f], at bridge - 06/25/1997 [L], at dock near HMC Store - 07/09/2002 (3E); Salmon Trout Bay - 06/26/1997 [1m]; River Styx, near base of wood footbridge - 06/25/1997 [1m], 05/14/98 [L], at Ives Lake outlet - 05/14/1998 [L]; Salmon-Trout River - 06/25/1996 [1m]; Spruce Bog - 07/01/1996 [1m]; Pine River - 07/14/1998 [E]; Mountain Stream - 08/13/1996 [f].

Boyeria vinosa (Say) - Fawn Darner. A very common species in all of the permanent streams, usually found along the margins of streams with sufficient woody debris or undercut banks. Larvae also have been taken among rocks and woody debris in wave-swept portions of some the area's lakes. Adults are rarely found away from water, and are best spotted when standing in the stream close to the banks. Adults fly in a frustratingly slow yet random pattern as they inspect potential oviposition sites or potential mates; they are particularly difficult to spot where banks are undercut. Based on differing size classes of larvae, we believe this species has a two-year life cycle in this part of its range.

Collections: Mountain Lake, by "Illiad" - 06/28/1997 [L], 05/13/1998 [L]; Mountain Stream - 07/08/1992 (SPY) [L], 08/13/1996 [sight record], at bridge - 07/09/1985 (WPM) [L], 06/02/1986 (WPM) [L], 20m below falls - 06/30/1996 [L], 06/22/1997 [L], 05/13/1998 [L], 200m upstream from falls - 07/03/1996 [L], above falls - 07/16/1998 [1m]; Pine River, 10/10/1941 R. Manville [L], at bridge - 08/25/1985 (WPM) [L], 06/02/1986 (WPM) [L], 06/18/1997 [L], 06/24/1997 [L], 05/11/1998 [L], below Pine Lake -

06/28/1997 [L], 07/08/2000 [2 L]; 07/10/2002 [8 E], 07/14/1998 [exuviae, on woody substrates; numerous adults seen flying along river margin, females ovipositing on submerged wood, larvae abundant in riffles]; River Styx, at falls - 06/26/1997 [L], downstream of falls by wooden footbridge - 06/25/1997 [L], 05/14/1998 [L]; Rush Creek, effluent by Rush Lake - 08/25/1985 (WPM) [L]; Rush Creek at Bridge - 07/09/1985 (WPM) [L], 08/19/1985 (WPM) [L]; Salmon-Trout River, at "Raven's Roost" - 05/16/1998 [L], at gate house - 05/16/1998 [L], ca. 500m upstream from bridge 08/22/2001 [1m].

Gomphaeschna furcillata (Say) - Harlequin Darner. This unusual aeshnid has the habit of perching on posts and other vertical surfaces. Its coloration is similar to a drab-looking gomphid. Females apparently oviposit in decayed wood near the waterline in swamps (Dunkle 2000). There appears to be abundant habitat in the flooded beaver meadows adjacent to the south side of Ives Lake, and males have been seen flying out over the road from that area, with one male captured in 2000. The specimens from the HMC taken in 1996 were the first records of this species in the UP, and for Michigan in the 20th Century (O'Brien 1997). Since then, other Michigan Odonata Survey collectors have found *G. furcillata* in a number of Counties as far south as Mecosta County (Tennessen 1997, Tennessen and Hudson 1997, Ross 1998).

Collections: Conway Bay, opening near shore - 06/27/1996 [1m, 1f]; Ives Lake - 06/17/1997 [1f, perched on post]; 07/08/2000, along Ives Lake Road [1m]; South of Burnt Mountain - 06/26/1996 [1m]; Salmon Trout Bay - 07/02/1996 [1m].

ANISOPTERA- GOMPHIDAE

Several gomphid species are widely distributed in the HMC area, especially *Dromogomphus spinosus*, *Gomphus spicatus*, *Gomphus adelphus* and *Hagenius brevistylus*, with several other species apparently restricted to either lentic or lotic habitats.

Arigomphus cornutus (Tough) - Horned Clubtail. Although usually associated with marshy ponds and slough areas off streams, we have found this species among vegetated areas of beaver ponds with algal mats. These mats provide areas where larvae climb up and transform to adults.

Collections: Beaverpond south of Burnt Mountain - 06/26/1996 [3m], 07/07/2000 - observed resting on bracken fern [1m].

Dromogomphus spinosus Selys - Black-shouldered Spinyleg. Commonly found in the larger lakes and streams in the area. Males often perch on the shoreline, rocks and even the bow of a rowboat or canoe. From these perches, they can fly out after rivals, females and prey. They have also been seen perched along sandy roads where they can fly out after prey. Specimens taken in areas away from the water such as the Spruce Bog and the Skeet Field, were sexually immature and were feeding on the abundant dipteran fauna found there.

Collections: Howe Lake - 07/17/1998 [1m]; Ives Lake - 07/30/1984 [1m], 07/02/1996 [1f, exuviae among reeds near and next to Stone House], 07/09/2002 [2E], 08/13/1996 [1m], 08/14/1996 [1m], 06/23/1997 [L], 05/10/1998 [L], 07/13/1998 [1m]; Mountain Stream - 06/30/1996 [1m, 1f]; Pine Lake - 07/14/1998 [1f], 07/09/2002 [3E], 07/05/1927 (C.L. Hubbs) [1m], 07/09/1927 (Hubbs) [1m], 07/10/1927 (C.L. Hubbs) [1f]; Mountain Lake - 07/06/1922 (C.L. Hubbs) [1m, 1f], by "Illiad" - 05/13/1998 [L]; Pine River, by bridge - 06/24/1997, 07/09/2002 [2E]; Rush Creek - 07/16/1998 [1f]; Spruce Bog, NE of Cranberry Bog - 07/01/1996 [2m, 1f]; Breakfast Roll, 08/12/1996 [1m]; edge of Skeet Field 07/12/2002 [1f, perched and feeding]; HMC, unspecified location - 08/02/1984 (DCLG) [1m], 06/22/1986 [1m, 1f]

Gomphus (Hylogomphus) adelphus Selys - Moustached Clubtail. This species is usually found near rapid streams, although larvae have been collected in the wind-swept portions of the area's oligotrophic lakes. Females have been collected from trees near the water.

Collections: Conway Bay - 07/16/1998 [1f]; Elm Creek, at Ives Lake - 06/17/1997 [1f]; First Pine Lake - 07/16/1998 [1f]; Mountain Lake, by "Illiad" - 05/13/1998 [L]; Mountain Stream - 06/13/1992 (WPM) [1L], below falls - 06/30/1996 [L], 06/22/1997 [L], 05/13/1998 [L]; Pine River, near bridge - 06/18/1997 [L], 06/24/1997 [L], 05/11/1998 [L], below Pine Lake - 06/28/1997 [L]; River Styx, by Ives Lake - 05/14/1998 [L], by falls - 06/26/1997 [L], 07/11/2002 [1m], by wooden footbridge - 06/25/1997 [L]; Rush Creek, at bridge - 07/09/1985 (WPM) [L], just below Rush Lake boathouse - 08/25/1985 (WPM) [L]; HMC, unspecified location - 07/13/1950 (JSR) [1f].

Gomphus exilis Selys - Lancet Clubtail. It is usually seen flying in lakes and ponds, and frequently perches on lily pads.

Collections: Ives Lake - 06/19/1997 [exuviae], 07/13/1998 [2 m]; Mountain Stream - 06/30/1996

[1m]; Second Pine Lake - 06/19/1997 [exuviae]; Spruce Bog, NE of Cranberry Bog - 07/01/1996 [1f].

Gomphus quadricolor Walsh - Rapids Clubtail [County Record]. This clubtail is about the size of *G. spicatus*, but a bit more colorful. It is associated with riffles and swifter portions of rocky streams. The individual was collected as it perched on the shore of Pine Lake, about 100m from the Pine River. Several others were seen, but were too wary to be caught.

Collections: shore of Pine Lake, 07/09/2002 [1m].

Gomphus spicatus Hagen - Dusky Clubtail. The most commonly encountered clubtail in the Huron Mountains. Males and females are often seen basking in the sun on the road and upon rock surfaces, flowers and logs. This late spring-early summer species is the earliest gomphid to emerge in the HMC area. Larvae live in marshy areas to wave-swept margins of lakes and ponds. One *G. spicatus* female was entangled in a spider web near the shore of Howe Lake. The species is ubiquitous in the Upper Peninsula, and is so frequently encountered at the HMC that we did not collect them as often as we saw them.

Collections: Breakfast Roll - 07/01/1996 [3m, 3f]; Canyon Lake - 06/28/1996 [1m]; Conway Bay - 06/30/1996 [1m], in forest opening near shore - 06/27/1996 [1m]; Elm Creek, in beaver pond off Loop Road - 06/28/1996 [1m]; Florence Pond - 07/16/1998 [1f]; Howe Lake - 07/17/1998 [1m, 2f]; Ives Lake area - 06/22/1986 [1m]; Ives Lake - 06/23/1996 [1m], 07/02/1996 [1m, m&f in copula], 07/06/2000 [1m], 07/07/2000 - very common on Ives Lake Road, 07/09/2002 [1m], 07/13/1998 [1f]; Mountain Stream trail - 06/30/1996 [2m]; Salmon Trout Bay - 07/02/1996 [1m]; Salmon-Trout River - 06/25/1996 [1m]; South of Burnt Mountain - 06/26/1996 [2m]; HMC, unspecified location - 07/12/1920 (Andrews) [1f].

Hagenius brevistylus Selys - Dragonhunter. This is the largest of our clubtails. In midsummer, the adults are commonly encountered and easily approached as they perch upon branches overhanging streams and lake margins. Larvae are quite commonly found among woody and detritus accumulations in streams and along wave-swept margins of the rocky-bottomed lakes. When disturbed, they drift in the water not unlike a fallen leaf. We have seen dragonhunters prey upon *Calopteryx aequabilis* and *C. maculata*, as well as *Basiaeschna janata* and an undetermined gomphid along the Pine River.

Collections: First Pine Lake - 07/16/1998 [1m]; Howe Lake - 07/17/1998 [1m, 4L]; Ives Lake - 07/03/1927 (C.L. Hubbs) [L], by Stone House - 06/28/1996 [L], 07/02/1996 [E], 07/06/2000 [1f] ovipositing in weedbeds near mouth of Elm Creek, 07/13/1998 [1f, flying at 2100 hrs]; Ives Lake Road - date [1f, resting on branch]; Lily Pond - 08/12/1996 [1m]; Pine Lake - 07/14/1998 [1m], 07/09/2002 [1f]; Mountain Lake - 08/23/2001 [1m observed]; Mountain Stream - 07/21/1927 (C. L. Hubbs) [L], ca. 20 m below falls - 06/30/1996 [L], date [1f]; Pine River - 06/18/1997 [L], 07/14/1998 [1m, 1f, ex], 07/10/2002 [1m, feeding on *Calopteryx maculata*, plus 5 exuviae seen]; Rush Creek - date [1m]; River Styx on footbridge - 07/11/2002 [1m]; HMC, unspecified location - 08/22/1993 [1m].

Ophiogomphus carolus Tough - Riffle Snaketail. Larvae collected by McCafferty and Provonsa are the only records thus far for this area, though they fall at the southern periphery of the Huron Mountain Club property. We anticipate that others will be found within the HMC property along the upper reaches of the Salmon-Trout River.

Collections: Huron River, at Big Eric's Forest - 06/02/1986 (WPM & AVP) [L].

Ophiogomphus colubrinus Selys - Boreal Snaketail. This species is representative of highly oxygenated northern waters, it appears to have only localized distribution in the HMC area - where those exact conditions exist.

Collections: Mountain Stream, ca. 20 m below falls - 06/30/1996 [L]; Pine River, above bridge - 07/08/2000 [L], 07/10/2002 [E].

Stylogomphus albistylus (Hagen) - Least Clubtail. Specimens from the Huron Mountains are the first to be recorded from the UP (Kielbaso et al. 1996). Subsequent surveys in Michigan now show this species to be widespread in the Upper Peninsula, and more localized in the Lower Peninsula (Bright 1998). The larvae climb up the rocks at the edge of the stream, where the adults emerge within a few inches to less than 1 m away from the water's edge (Bright 1997). They fly off to the wooded areas near the stream until they are sexually mature. We have observed what we think are *S. albistylus* feeding on chironomid adults in the air above Mountain Stream falls. Females fly only an inch or so above the water when ovipositing, making them very difficult to capture. Larval collections are the most reliable method to sample for this species. On 07/10/2002, the senior author estimated many hundreds of exuviae along the upper section of the

Pine River. In some cases, exuviae were on top of other exuviae. Where all these adults go is a great mystery!

Collections: Mountain Stream - 06/20/1998 [68 exuviae and 1 teneral collected]; 6/30/1996 [4m, 2f, teneral, ex], 06/22/1997 [L], 05/13/1998 [L], 07/16/1998 [1f, ovipositing], 200 m upstream of falls - 07/03/1996 [L]; Pine River, below Pine Lake - 06/28/1997 [L, ex - adult emerging], at bridge - 06/24/1997 [L], in river above bridge - 07/08/2000 [L], 07/10/2002 [many EX]; River Styx, just above falls - 05/14/1998 [L], by falls - 06/26/1997 [L], by wooden footbridge downstream of falls - 06/25/1997 [L], 05/14/1998 [L].

ANISOPTERA- CORDULEGASTRIDAE

Spiketails in the HMC area principally lotic (see exception below), with adults frequently seen patrolling sections of streams and rivers. We have verified records for the HMC only for *Cordulegaster maculata*; a record for *C. erronea* Hagen from Andrews (1929) is based on his speculation, not an actual specimen.

Cordulegaster maculata Selys - Twin-spotted Spiketail. This species is abundant along the larger streams and the rivers in the Huron Mountain region. However, several larval specimens were also collected among rocks in wave-swept portions of Ives and Mountain Lake, and another from a small spring-fed brook north of Florence Pond. Larvae live in areas with moderate to swift flow, and especially areas with sandy to gravelly substrates. There, they live partially submerged in the bottom waiting for a meal to pass close by. Males patrol up and down the length of a segment of a stream, and their brilliant green eyes and yellow-spotted bodies are enticingly beautiful insects that speed past the wading fisherman (or collector) like a cruise missile. In smaller streams such as Cedar Creek, *C. maculata* appears to be the dominant invertebrate predator.

Collections: Breakfast Roll Mountain - 07/01/1996 [1m, feeding]; Canyon Lake, outlet of small stream - 06/28/1996 [2m], top of cliffs - 06/20/1997 [1f, feeding on insects]; Conway Bay - 06/30/1996 [1f, found in a "sink" along the Lake Superior shore where numerous dragonflies were resting or feeding in opening surrounded by small conifers]; Cranberry Bog - 07/01/1996 [1m, apparently feeding]; Cliff River at 40 ft. Falls - 07/09/1985 (WPM) [L]; Cedar Creek - between Turkeyneck Falls and Mountain Lake, 07/07/2000 [2m, 5 L]; Elm Creek - 07/14/1998 [1m, 1f]; Ives Lake - 05/10/1998 [L]; Loop Road, not far from Elm

Creek - 06/20/1997 [1m]; Mountain Lake, by "Illiad" - 05/13/1998 [L]; Mountain Stream - 07/12/1927 (C. L. Hubbs) [L], 06/30/1996 [3m], 20 m below falls 06/30/1996 [L], 05/13/1998 [L], 200 m above falls - 07/03/1996 [L]; Pine River, at bridge - 06/18/1997 [L], 06/24/1997 [L], 05/11/1998 [L]; River Styx, near base of falls - 06/26/1997 [2m], 06/26/1997 [L], downstream of falls by wooden bridge - 06/25/1997 [L], 05/14/1998 [L]; Salmon-Trout Bay - 07/02/1996 [m&f in copula]; Salmon-Trout River - 06/25/1996 [3m, female ovipositing], 06/21/1997 [L, ex], 06/21/1997 [1m], at gate house - 06/30/1996 [1m, m&f in copula], 05/12/1998 [L], below "middle falls" - 05/15/1998 [L]; South of Burnt Mountain - 06/26/1996 [1m]; Unnamed stream off Loop Road - 06/16/1997 [E], 06/17/1997 [1m]; "Huron Mountains," unspecified location - 07/13/1950 (J.S. Rogers) [1m].

ANISOPTERA- MACROMIIDAE

Two species of macromiids are represented in the HMC, both of which are commonly encountered in the region's larger lake and stream habitats.

Didymops transversa (Say) - Stream Cruiser. This fast-flying species is seen typically flying low over the water. Larvae are sprawlers, typically found in the region's sandy-bottomed lakes in wave-swept areas. At Ives Lake, we have found exuviae on the side of Stone House, 3-4 m above the water surface. Boat houses are typical emergence sites. Adults appear to often feed away from their larval habitat, such in the wooded areas near Ives Lake and the fen below the skeet field.

Collections: Conway Bay, forest opening near shore - 6/30/1996 [1m]; Ives Lake - 06/23/1996 [1m, 2f], 06/26/1996 [3m, 1f, ex from Stone House wooden deck], 07/02/1996 [2m, 1f, ex], 06/19/1997 [E], 06/23/1997 [L], 05/16/1998 [L], 07/15/1998 [1m]; Loop Road, gravel pit - 6/28/1996 [1f]; Florence Pond - 06/23/1997 [sex not recorded]; Mountain Lake, by "Illiad" - 06/28/1997 [L], 05/13/1998 [L]; South of Burnt Mountain - 6/26/1996 [1m]; near Mountain Stream - 6/30/1996 [1m]; River Styx, at Ives Lake - 05/14/1998 [L]; Second Pine Lake - 07/05/1927 (C.L. Hubbs) [L]; Fen below Skeet Field - 07/09/2002 [1m, feeding].

Macromia illinoensis Walsh - Illinois River Cruiser. Usually associated with river habitats, we also find this species in rocky, wave-swept lakes, such as Ives Lake, where it is quite common. It is also found along the Pine River, but not the lower stretches of the Salmon-Trout River. We have seen

adults feeding along the open shoreline of Ives Lake, and in one instance, a female was feeding on tabanids that were flying around MFO's head.

Collections: Florence Pond - 05/11/1998 [L]; Ives Lake - 07/03/1927 (C.L. Hubbs) [L], 07/09/1985 - (WPM) [L], 06/28/1996 [1m], 06/29/1996 [1m], 06/30/1996 [1m], 07/02/1996 [1m - teneral, ex, emerged from exuviae early in the morning by side of Stone House], 07/13/1998 [2m]; Mountain Lake, by "Illiad" - 06/28/1997 [L], 05/13/1998 [L], 08/23/2001 [5 old exuviae]; Pine River, at bridge - 08/25/1985 (WPM) [L], 06/02/1986 (WPM) [L]; River Styx, at Ives Lake - 05/14/1998 [L].

ANISOPTERA- CORDULIIDAE

Species of Corduliidae are primarily found in the area's slow-moving streams, backwaters, and boggy lakes. In early to mid-summer, the road to Ives Lake is an excellent place to see hundreds of *Epitheca*, where they feed along the treeline near the shore. Many of the emeralds patrol above the sandy roads for feeding, which accounts for many of the *Somatochlora williamsoni* that have been taken.

Cordulia shurtleffi Scudder - American Emerald. This is a very common inhabitant of sloughs, ponds, impoundments and bog-margined lakes, and is one of area's earliest dragonflies to emerge in spring (mid-May through early June).

Collections: 500m north of Canyon Lake - 05/15/1998 [1m]; Johnson's Marsh - 05/17/1998 [1m]; Elm Creek, outflow into Ives Lake - 06/17/1997 [2m]; Canyon Lake - 06/28/1996 [1m], 06/20/1997 [4m], 06/26/1997 [L], 05/15/1998 [L]; Cranberry Bog - 05/13/1998 [L]; Ives Lake - 06/26/1996 [E]; South of Burnt Mountain - 06/26/1996 [2m, 1f]; Elm Creek, Beaver Pond off Loop Road - 06/26/1996 [6 m], 06/28/1996 [1m], 07/12/2002 [1m], 07/13/1998 [1f]; Florence Pond - 06/27/1996 [2m], 06/24/1997 [L]; Lily Pond - 06/22/1997 [L]; near Mountain Stream - 06/30/1996 [2 m]; Salmon-Trout Bay - 07/02/1996 [2m]; Mountain Lake - 07/06/1927 (C. L. Hubbs) [2f], 07/08/1927 (C.L. Hubbs) [1f].

Dorocordulia libera (Selys) - Racket-tailed Emerald. Common inhabitant of bog lakes, beaver ponds and sedge-margined ponds. Males are often seen hovering about 1.25 m high over a small area, then darting off to a nearby spot and repeating the process.

Collections: Beaver pond, south of Burnt Mountain - 6/26/1996 [5 m]; Breakfast Roll Mountain, on exposed summit area - 07/01/1996 [1f]; Lily Pond -

07/12/2002 [2]; Canyon Lake - 06/28/1996 [3m], 06/25/1997 [L], 05/15/1998 [L]; Conway Bay, forest opening near shore - 06/28/1996 [1m, 1f], 06/30/1996 [5 f]; Cranberry Bog - 06/27/1996 [1m, 1f], 07/10/2002 [1m]; Florence Pond - 06/24/1997 [L]; Ives Lake - 06/22/1986 [1m], 07/13/1998 [3m], 07/15/1998 [1m], near Ives Lake - 07/17/1998 [1m]; 07/09/2000 [1m]; Mountain Stream - 06/30/1996 [1f]; River Styx, at Ives Lake - 05/14/1998 [L]; Salmon-Trout River - embayment 06/28/1996 [1f ovipositing]; Salmon-Trout Bay - 07/02/1996 [2m, 2f], 06/26/1997 [1m]; 07/15/1998, Ives lake [1m].

Epitheca canis (MacLachlan) - Beaverpond Baskettail. A common inhabitant of the region, and is one of the earliest dragonflies on the wing. The larvae inhabit bog lakes, impounded streams, and similar habitats, such as the south end of Canyon Lake..

Collections: Canyon Lake, south end in boggy area - 05/15/1998 [L]; Conway Bay, forest opening near shore - 6/27/1996 [1f]; Elm Creek beaver pond, off Loop Road - 06/17/1997 [1m]; Ives Lake - 6/29/1996 [2m, 1f], 06/16/1997 [2m]; Mountain Stream - 6/30/1996 [1m]; Salmon-Trout River - 6/25/1996 [2 m], by gate house - 05/12/1998 [1m], slough off main stem near mouth - 07/02/1996 [L]; Salmon-Trout Bay - 06/26/1997 [1m]; in black alder swamp - 05/12/1998 [L].

Epitheca cynosura (Say) - Common Baskettail. Found in a variety of the region's lakes, although Kormondy (1959) described the habitat as being essentially marl lakes, which do not occur in the Huron Mountains. Bog-margined lakes and lakes with high productivity are typical habitats. Most of the specimens designated as coming from Ives Lake were caught during feeding flights along the roadside areas near the beaver impoundment.

Collections: Breakfast Roll Mountain, exposed summit - 07/01/1996 [2m]; Canyon Lake - 06/28/1996 [2m, 1f]; Conway Bay, woods clearing near shore - 06/28/1996 [1m]; Elm Creek beaver pond - 06/26/1996 [1f]; Florence Pond - 05/11/1998 [L]; Ives Lake - 6/23/1996 [1m, 1f], 06/26/1996 [2m, 1f, 1 pr. in copula], 07/13/1998 [1f], 07/14/1998 [1f], 07/09/2002 [1m, 2f]; Spruce Bog, NE of Cranberry Bog - 07/01/1996 [1m].

Epitheca spinigera (Selys) - Spiny Baskettail. Usually associated with lakes containing a boggy margin, or having deep detritus substrates, but we have also found larvae in rocky wind-swept portions of lakes. This does appear to be the predominant *Epitheca* in the area. One can watch

these dragonflies fly and feed on the lee side of large trees within a small area along the lakeshore as the wind blows small insects from the trees. These baskettails can be flying into dusk, as we collected several of both sexes from between 2045 and 2200 hrs.

Collections: Breakfast Roll, exposed summit - 07/01/1996 [1m]; Conway Bay, forest opening near shore - 6/27/1996 [1m, 3f]; Ives Lake - 6/29/1996 [2m, 2f, 1f with very infusate wings, especially after the nodus], 06/19/1997 [1m], along Ives Lake Road - 07/08/2000 [2m, 1f], 07/09/2000 [2m], 07/09/2002 [4m, 2f], 07/17/1998 [1f]; Mountain Lake, by "Illiad" - 05/13/1998 [L]; Mountain Stream, along trail - 06/30/1996 [2m]; Second Pine Lake - 06/19/1997 [7ex]; Canyon Lake - 06/20/1997 [1f]; Salmon-Trout River - 06/25/1996 [1m]; Salmon-Trout Bay - 07/02/1996 [1m], 06/26/1997 [1m].

Neurocordulia yamaskanensis (Provancher) - Stygian Shadowdragon. A truly shadowy species, as it flies around dusk and into twilight. We have not been able to capture adults, but an exuviae and a larval confirm its existence here. Larvae are found in streams as well as rocky-margined lakes with sufficient wave action. Adults are known to fly low over the water surface, and likely feed on mayflies and midges that fly up from the water early in the evening.

Collections: Pine River, 0.25 mile below Pine Lake - 06/12/1992 (Yanoviak) [L]; Ives Lake - 06/19/1997 [E], 08/23/2001 [2 exuviae on side of Stone House, no doubt from earlier in the summer].

Somatochlora cingulata (Selys) - Lake Emerald. This species has only rarely been collected in the Huron Mountains, and we were able to find specimens from only one site. The larval specimens from Florence Pond came from the boggy section, slightly underneath the banks of the sphagnum mat (EB, pers. obs.) According to Dunkle (2000) males fly high above open water, and larvae live in lakes - "boggy or not."

Collections: Cranberry Bog - 06/27/1996 [L]; Florence Pond - 06/24/1997 [L], 05/11/1998 [L]; Trout Lake - 07/8/1927 (C.L. Hubbs) [1f, teneral]; Huron Mountain, top of summit - 07/12/1927 (C.L. Hubbs) [1f].

Somatochlora elongata Scudder - Ski-tailed Emerald. Several males were observed patrolling the sedgy/mucky margins of the beaver impoundment on the SW side of Ives lake in August 2001. One female was seen looking for presumed oviposition sites. Near Mountain Stream,

one specimen collected was seen hawking midges, flying at a height of 2-10 m high.

Collections: Mountain Lake, 50 m from shore in woods clearing - 06/28/1997 [1f]; Elm Creek beaver pond, off Loop Road - 07/13/1998 [1f]; Elm Creek - 07/14/1999 [3 m, patrolling]; Beaver impoundment on SW end of Ives Lake - 08/22/2001 [1m], 08/23/2001 [1m, 1f obs]; Slough near Lily Pond - 07/15/1998 [1m, patrolling]; Near Mountain Stream - 07/16/1998 - [1f].

Somatochlora forcipata Scudder - Forcinate Emerald. This species inhabits small, boggy spring-fed streams and alder swamps (Dunkle 2000), which agrees with the two locations where we have found this species.

Collections: Canyon Lake, by boggy area of south end - 06/25/1997 [L]; Conway Bay, in forest opening near shoreline - 06/30/1996 [1m, 1f].

Somatochlora franklini (Selys) - Delicate Emerald. Specimens collected at Conway Bay were perched on balsam fir branches at the edge of the forest opening. Dunkle (2000) describes the larval habitat as shallow, mossy spring-fed fens and trickles, often covered with a mat of moss or Equisetum. There are numerous habitats like that in the area.

Collections: Conway Bay, in forest opening near shoreline - 06/30/1996 [2f, 2m]; Salmon-Trout Bay - 07/02/1996 [1m]; near Lake Superior, trail through jack pine woods - 7/10/1921 (THH) [1f].

Somatochlora kennedyi Walker - Kennedy's Emerald. Specimens caught at Conway Bay were caught perched on twigs at the edge of a forest opening, and the female near Ives Lake was caught flying, perhaps feeding along the edge of a swampy area. The flooded beaver meadow adjacent to the SW side of Ives Lake Road may be a possible larval habitat.

Collections: Conway Bay, in forest opening near shoreline - 06/30/1996 [4m, 2f]; Ives Lake - 07/1/1996 [1f].

Somatochlora minor Calvert - Ocellated Emerald. Although a species of clear, sunny forest streams devoid of emergent vegetation (Dunkle 2000), we found larvae in the boggy sections of Florence Pond and a backwater section of River Styx before it enters Pine Lake.

Collections: Florence Pond - 05/11/1998 [L]; River Styx, at Ives Lake - 05/14/1998 [L], downstream of falls by wooden footbridge in backwater area - 06/25/1997 [L]; Salmon-Trout Bay - 06/26/1997 [1m].

Somatochlora walshii (Scudder) - Brush-tipped Emerald. This species is among the easiest emeralds to identify on the wing, as its compact size and brushy terminal appendages are unlike other species that are found in the area. The male collected along Ives Lake Road was feeding ca. 1.5 m high along the forest edge. Based upon the few records we have, it is not a common species within the HMC.

Collections: HMC, unspecified location - July 1920 [A.W. Andrews] [1f], 08/02/1984 (DCLG) [1f]; Ives Lake Road between Stone House and beaver impoundment outlet, 07/09/2000 [1m].

Somatochlora williamsoni Walker - Williamson's Emerald. This slender, mid- to late-summer emerald, is relatively common in vegetated pools of slow-moving streams and the beaver impoundment on the SW side of Ives lake Road. We also collected one female while she was ovipositing in boggy spots at the margin of Florence Pond. Both sexes frequently hawk insects near the edges of roads and in clearings. At Elm Creek, males establish territories along the appropriate habitats such as small sloughs or pools bordered by tall vegetation, and patrol them regularly.

Collections: Cranberry Bog - 07/10/2002 [1m, patrolling over shrubby "islands"]; Florence Pond - 08/21/2001 [1f]; Lily Pond - 07/12/2002 [1m near slough at edge of pond]; Ives Lake - 05/16/1998 [L]; near Ives Lake, along edge of road - 07/09/2000 [2m, 1f], 07/13/1998 [2m], 07/09/2002 [1f, 2130 hr]; Loop Road, in opening - 07/13/1998 [1m]; Ives Lake Road, near outlet of Beaver impoundment - 07/17/1998 [1m, 1f, in copula], 08/22/2001 [3m]; River Styx, at Ives Lake - 05/14/1998 [L]; Salmon-Trout River slough area - 05/16/1998 [L].

ANISOPTERA- LIBELLULIDAE

Although more speciose farther south, the most common species of Libellulidae in the Huron Mountains are the five species of *Leucorrhinia* as well as *Libellula quadrimaculata* and *Ladona julia*. Most members of this family are typically seen perched on twigs, sedge stems or other vegetation adjacent to the aquatic habitat. All are species of still or slow-moving waters; marshy areas and organic debris-filled zones of ponds and lakes as well as slow-moving streams. Sympetrum are also quite common later in the summer, and we have avoided including any teneral specimens that could not be positively identified to species.

Celithemis elisa (Hagen) - Calico Pennant. This species is not common in the region, but it is found in lakes with protected bays and bulrushes where males may be found perching upon stems.

Collections: Beaver Pond, above Elm Creek off Loop Road - 06/28/1996 [1f]; Florence Pond - 06/23/1997, [1m]; Howe Lake - 07/17/1998 [1m]; Trout Lake, 07/09/2000 [6E].

Leucorrhinia frigida (Hagen) - Frosted Whiteface. This species frequents boggy and sometimes marshy margins of lakes and ponds. It was the dominant species seen at Cranberry Bog in 2002.

Collections: Canyon Lake, by boggy area at south end - 05/16/1998 [L]; Cranberry Bog - 6/27/1996 [3m], 05/13/1998 [L], 07/10/2002 [3m]; Ives Lake 07/13/1998 [1m]; Lily pond - 6/29/1996 [1f, teneral], 06/22/1997 [L], 07/15/1998 [1m]; Salmon-Trout River, by gate house - 6/30/1996 [1m].

Leucorrhinia glacialis Hagen - Crimson-ringed Whiteface. An inhabitant of marshy to boggy regions of the area's ponds and lakes.

Collections: Cranberry Bog - 6/27/1996 [3m, 3f], 05/13/1998 [L]; Canyon Lake, south end - 6/28/1996 [1m]; Trout Lake - 07/09/2000 [1m, 1f, many seen].

Leucorrhinia hudsonica (Selys) - Hudsonian Whiteface. We find this species more typically in boggy ponds, sandy-bottomed lakes and even in sloughs off streams.

Collections: Cranberry Bog - 06/27/1996 [2m]; Elm Creek beaver pond, off Loop Road - 06/17/1997 [1f]; 06/28/1996 [1m]; South side of Burnt Mountain - 06/26/1996 [1m]; Salmon-Trout Bay 07/02/1996 [1m]; Spruce Bog (nr. Cranberry Bog) - 07/01/1996 [1f]; nr. Mountain Stream Trail - 06/30/1996 [1f]; Johnson's Marsh (<1 km from Gate) - 05/17/1998 [2m, 1f], 06/29/1997 [1f].

Leucorrhinia intacta (Hagen) - Dot-tailed Whiteface. This species is usually found in marshy borders of lakes, ponds, and backwaters.

Collections: Beaver Pond off Loop Road - 06/17/1997 [1m]; Cranberry Bog - 05/13/1998 [L], 06/27/1996 [1m]; Ives Lake - 6/29/1996 [1m]; Johnson's Marsh - 05/17/1998 [L]; Pine Lake - 07/09/2002 [1f].

Leucorrhinia proxima Calvert - Red-waisted Whiteface. This whiteface is typical of marshy or boggy zones of lakes and ponds.

Collections: Cranberry Bog - 6/27/1996 [7m], 05/13/1998 [L], 07/10/2002 [1m]; Ives Lake Road - 07/13/1998 [1m], 07/15/1998 [1m, 1f], 07/17/1998

[1m]; Howe Lake 07/17/1998 [1f]; Beaver pond off Loop Road - 06/20/1997 [1m], 07/13/1998 [1m].

Ladona julia Uhler - Chalk-fronted Corporal. This species is extremely abundant in late spring and early summer. Larvae inhabit beaver ponds, lakes and ponds with organic debris. In 1996, we saw thousands as they basked on tree trunks and logs along Lily Pond. On June 25, 1996, Mike and Susan Kielb counted 4 tandems, 155 individuals on moss-covered live trees, 360 on moss-covered deadfalls, 406 sunning on the road, 330+ in flight, and 55+ adults perched on bracken ferns. All these were in an area of less than 2 hectares.

Collections: Elm Creek beaver pond, off Loop Road - 6/26/1996 [3m, 1f], 6/28/1996 [1m]; Florence Pond - 06/23/1997 [many seen], 06/24/1997 [L], 07/07/2000 [2m, many seen]; Ives Lake - 6/23/1996 [2m, 1f]; Lily Pond - 6/25/1996 [2m], 06/22/1997 [L], 05/17/1998 [L], 08/12/1996 [1f]; South of Burnt Mountain - 6/26/1996 [1m, 1f]; Spruce Bog, NE of Cranberry Bog - 7/1/1996 [1f]; Trout Lake - 07/09/2000 [1m, many seen] Trout-Lake Trail at Loop Road - 6/23/1996 [2f]; HMC, unspecified location - 06/22/1986 [2f].

Plathemis lydia (Drury) - Common Whitetail. This species is not as abundant as *L. julia* in the North, a reversal of the situation on the southern part of the state. Most of our records are from impounded areas resulting from beaver activity. Ponds and slow-moving backwaters with muddy bottoms are typical habitats. This species, like *L. julia*, also is often seen sunning on rocks and logs or even along gravel areas of two-tracks.

Collections: Ives Lake Road near beaver impoundment - 07/12/2002 [1m, several seen]; South of Burnt Mountain - 6/26/1996 [3m, 1f]; Elm Creek beaver pond, off Loop Road - 06/26/1996 [1m, 1f] 07/17/1997 [1f]; Lily Pond - 06/29/1996 [1f]; Salmon-Trout River - 07/13/1991 [1f], 08/22/2001 [1f]; Huron Mountains, unspecified location - 07/18/1950 (J.S. Rogers) [1m].

Libellula pulchella Drury - Twelve-spotted Skimmer. This widespread species was not commonly seen in most of the areas we frequented. In June and July we often saw individuals flying about the reed-filled margins of Ives Lake, but they did not appear to be permanent residents. However, individuals at the beaver ponds were perched and defending territories.

Collections: Conway Bay - 6/30/1996 [1m]; Elm Creek beaver pond, off Loop Road - 6/28/1996 [1m]; Ives Lake - 06/28/1996 [1m], 06/29/1996

[1m], 08/12/1996 [1m]; Florence Pond - 06/23/1997 [11 seen].

Libellula quadrimaculata Linnaeus - Four-spotted Skimmer. This Holarctic species is fairly abundant at lakes or slow-moving sections of rivers where organic debris or boggy margins are prevalent, and all the HMC lakes and ponds support populations of this common species.

Collections: Cranberry Bog - 6/27/1996 [3m], 05/13/1998 [L], 07/10/02 [1m]; Canyon Lake, south end by boggy area - 05/15/1998 [L]; Conway Bay, forest opening near shore - 6/30/1996 [1m]; Ives Lake - 06/22/1986 [1m], 6/23/1996 [2m]; Johnson's Marsh - 06/29/1997 [L], 05/17/1998 [L]; Lily Pond - 6/25/1996 [1m, 13 more counted, 1 caught in spider web]; Florence Pond - 06/23/1997 [20+ observed]; Salmon-Trout River, north of road - 6/25/1996 [1m]; Elm Creek beaver pond, off Loop Road - 6/26/1996 [1m], 6/28/1996 [2m]; Salmon Trout Bay - 7/2/1996 [1m, 1f].

Sympetrum costiferum (Hagen) - Saffron-winged Meadowhawk. This species is typically found in marshy borders of sandy-bottomed ponds and lakes, and is quite common along the Great Lakes shores. They typically perch on the sand during cooler days, but usually forage from branches and stems. They are warier than most other *Sympetrum* and usually fly off when approached.

Collections: Ives Lake - 06/29/1996 [1m], 08/11/1996 [1m], 08/15/1996 [2m, 2f]; near Mountain Stream - 06/30/1996 [1m]; HMC, unspecified location - 08/09/1985 [1m].

Sympetrum danae (Sulzer) - Black Meadowhawk. This Holarctic species inhabits marshes, bogs and fens in the UP and the tip of the Lower Peninsula. Surprisingly, we have only one record for the Huron Mountains.

Collections: Ives Lake area 07/02/1996 [1f].

Sympetrum internum Montgomery - Cherry-faced Meadowhawk. Although we few records, we find that most *Sympetrum* species are under-collected.

Collections: Ives Lake area - 06/30/1996 [1m], 08/15/1996 [1m]; Lily Pond, 07/15/1998 [1m], Cranberry Bog, 07/10/2002 [1m].

Sympetrum obtrusum (Hagen) - White-faced Meadowhawk. This species is found in a variety of habitats, and tolerates acid conditions. Typically the most common *Sympetrum* in most areas of the UP, and abundant at the HMC.

Collections: HMC, location unspecified - 07/11/1921 [1m, 1f] THH; 08/04/1985 [4m]; Ives

Lake area, 06/29/1996 [1f], 07/15/1998 [1f], 08/11/1996 [[4m], 08/12/1996 [3m, 2f], 08/14/1996 [2m], 08/15/1996 [4m, 1f], 08/20/2001 [1m], 08/22/2001 [1m], 08/23/2001 [1m]; wet meadow near Rush Creek, 07/16/1998 [1m]; Lily Pond - 08/12/1996 [1m, 2f]; Florence Pond margins 07/16/1998 [2m], 08/21/2001 [3m]; Howe Lake 07/17/1998 [1m], open area at Breakfast Roll, 08/12/1996 [2m, 2f]; Salmon-Trout River margin 08/22/2001 [1f].

Sympetrum rubicundulum (Say) - Ruby Meadowhawk. This is a common species during the summer months, and is found in a variety of habitats. This common pond species is primarily a species of temporary ponds, but we have adult and larval records from marshy zones of lakes and stream sloughs.

Collections: Conway Lake area, 07/10/1920 [1f] (AWA); HMC, area unspecified, 08/18/1993 [1m, 1f], 08/20/1993 [3m, 2f], 08/22/1993 [2m, 1f]; wet meadow adj. Elm Creek, 07/14/1998 [2m]; Pine River 07/14/1998 (along bank, in copula) [1m, 1f]; Cranberry Bog area, 07/10/2002 [2m], 07/15/1998 [3m]; Ives Lake, 07/15/1998 [2m]; Lily Pond, 07/15/1998 [m]; Howe Lake, 07/17/1998 [1m]; fen below Skeet Field - 07/09/2002 [1f], 07/12/2002 [1m].

Sympetrum vicinum (Hagen) - Yellow-legged Meadowhawk. This late-summer species is often the last dragonfly seen in the fall. Specimens caught in late August 2001 were still exhibiting pale coloration, indicating that they were not yet sexually mature. Since this dragonfly tolerates cool weather, it is often seen perched on the ground, dark logs or stones to raise its body temperature on cool sunny days. Pairs are often seen flying in tandem near the water. We suspect that like elsewhere in the state, it will be found until hard frosts kill them off. Other researchers staying at the Stone House have indicated that "small red dragonflies" were seen into October, and they are most likely this species.

Collections: Howe Lake - 07/17/1998 [1m], Lily Pond - 08/22/2001 [1f]; Loop Road W of Florence Pond - 08/21/2001 [3m]; Ives Lake area - 08/15/1996 [abundant]; Pine River at Compound - 08/23/2001 [1m].

DISCUSSION

Seventy-nine species of Odonata have now been recorded for the Huron Mountain region, out of a total of 162 species statewide, and 126 species known from the Upper Peninsula (O'Brien, 2000,

2002). This compares favorably with the recent study of Mecosta Co., Michigan, where Ross (2002) has recorded 92 species. Another study in Gogebic Co. found 67 species during a two-year period, out of a possible 81 species for the Western Upper Peninsula (Dunlap and Hellenthal, 1999). In comparison, the well-collected Washtenaw Co. has 105 species recorded in the southern Lower Peninsula (O'Brien, 1998). In Ontario, 168 taxa are recorded, with 109 species recorded from northern Ontario districts (Catling & Brownell, 2000). It is certainly possible that more species could be added to the Huron Mountains list, especially species of Gomphidae and Corduliidae.

Clearly we are only just beginning to adequately survey the Odonata of the Upper Peninsula of Michigan, and documenting yearly changes in population numbers and species assemblage is beyond the objectives of the current study. Any "resident" in-depth study is likely to add more species to our current list. Such work will need to be done by people working in the UP on a full-season basis.

As stated in the introduction, the faunal composition of the Huron Mountains can in no way be construed to represent a "typical" UP species list, and it is not fully representative of all of Marquette County. The Huron Mountains lacks large areas of fen and bog habitats, and has only a small area of what can be considered boreal forest habitat. The only fen habitat is a small seep area below the "skeet field", where groundwater flow from a hillside has created small mossy hummocks, and clumps of sedges. A variety of orchid species occur there, and it is the only place where we have collected *Amphiagrion saucium*. The Florence Pond site represents the only true bog area and deserves further investigation throughout the flight season. Although there are a number of small unnamed streams in the area, most of them not appear to support significant populations of Odonata, as they may have poor primary productivity, and are scoured thoroughly by spring snowmelt floodwaters. Such seems to be the case for the upper reaches of Fisher Creek. The other major streams (Mountain Stream, River Styx, and upper section of the Pine River)- are fairly short as they feed from one lake to another. Elm Creek is one of the longer streams, draining a significant area to the SW of Ives Lake. The Salmon-Trout River is the longest stream in the area, and feeds into an impenetrable wooded swamp before it reaches Lake Superior. The shorter streams are easily accessed, and we feel that we have

adequately sampled them. However, much of the Salmon-Trout and even the upper reaches of Elm Creek are largely unsampled, and may yet have some species for which we have few or no records of.

Most of the land holdings of the HMC appear to be well protected for the foreseeable future. The only current danger to the natural integrity of the area lies with an influx of water craft and accidental organismal introductions by new landowners with inholdings along certain lakes (e.g., Ives Lake). Another potential danger lies with other land owners who may wish to log their property.

Some species never appeared to be "common" during our work at the HMC, either due to limitations of sampling effort and time. For example, we never captured adults of the crepuscular *Neurocordulia yamaskanensis*, but in trying to find them in the evening, we found several others species of Odonata that practically flew in the dark! We still lack information regarding the local larval habitat of *Gomphaeschna furcillata*. Sampling for this species requires more work in alder swamps and flooded beaver meadows. Finally, we were not able to thoroughly collect during late summer months, so some late-summer species (e.g., *Sympetrum vicinum*) are clearly under-represented. However, we are confident that our survey has reasonably documented the Odonata species diversity of the area.

ACKNOWLEDGMENTS

This study would not have been possible without the financial and logistical support of the Huron Mountain Wildlife Foundation and the University of Michigan Museum of Zoology. We thank Dr. David C.L. Gosling, Director of Research for the HMWF for his assistance and advice, and the Carroll-Paul Forest Properties and the staff of the Huron Mountain Club for access to the various areas of the Huron Mountains. Arwin Provansha (Purdue University) kindly loaned specimens collected at the HMC by W. P. McCafferty and his students. Additional thanks go to Nick Donnelly for identifying some of the *Sympetrum* and *Lestes*, and Tim Vogt for verifying some *Somatochlora* determinations. We finally wish to thank our families for their assistance and understanding during our stays at Ives Lake Research Station. Adrienne and Marjorie O'Brien have certainly been partners in the field and deserve much credit for their assistance.

This study augments the work of the Michigan Odonata Survey (MOS). The MOS databases all of the specimens listed herein, and one may view the publicly accessible part of the database via the Internet at: <http://insects.ummz.lsa.umich.edu/michodo/ododata.html>.

LITERATURE CITED

- Bright, E. 1997. New regional records for Michigan. *Williamsonia* 1(4):3.
- Bright, E. 1998. Distribution of *Stylogomphus albistylus* in Michigan. *Williamsonia* 2(4):2-3.
- Byers, F.C. 1927. An annotated list of the Odonata of Michigan. *Occ. Papers Mus. Zool. Univ. Michigan*. 183:1-15.
- Catling, P.M. and V.R. Brownell. 2000. Damselflies and Dragonflies (Odonata) of Ontario: Resource Guide and Annotated List. ProResources, Metcalfe, Ontario. 198 pp.
- Christy, B.H. [editor] 1929. The Book of Huron Mountain. Privately Printed (HMC), 216 pp. (reprinted 1996).
- Combs, A.F. 1917. Notes on a collection of Odonata from Schoolcraft County, Michigan. *Occ. Papers Mus. Zool. Univ. Michigan* 41:1-8.
- Dunkle, S.W. 2000. Dragonflies Through Binoculars. A Field Guide to Dragonflies of North America. Oxford Univ. Press, New Jersey. 266 pp.
- Dunlap, M.S. and R.A. Hellenthal. 1999. A survey of the Odonata of the Western Upper Peninsula of Michigan. Abstract from NABS Annual Meeting, Duluth, MN, 1999.
- Hebard, H. 1910. A few records from northern Michigan in the order Odonata. *Entomol. News* 21:134-135.
- Kielb, M.A. 1996. Preliminary checklist of the dragonflies (Odonata) of the Great Lakes Region. *Michigan Birds and Natural History*. 3(2):77-82.
- Kielb, M. A., E. Bright, and M. F. O'Brien. 1996. Range extension of *Stylogomphus albistylus* (Odonata: Gomphidae) for the Upper Peninsula of Michigan. *Great Lakes Entomol.* 29(2):87-88.
- Kormondy, E.J. 1958. A catalogue of the Odonata of Michigan. *Misc. Papers Mus. Zool. Univ. Michigan*. 104:1-43.
- O'Brien, M.F. 1997. Surveying for Odonata in the Huron Mountains in 1996. *Williamsonia* 1(1):2.
- O'Brien, M.F. 1998. New Odonata records for Washtenaw County, Michigan. *Williamsonia* 2(4):3-6.
- O'Brien, M.F. 2000. Summary of Odonata county records for Michigan. *Williamsonia* 4(1):5-13.

- O'Brien, M.F. 2002. 2002 Checklist of Odonata species found in Michigan. *Williamsonia* 6(3&4):12-13.
- Paulson, D.R. and S.W. Dunkle. 1999. A checklist of North American Odonata. Slater Mus. Nat. Hist. Occ. Pap. No. 56. 86 pp.
- Ross, S. 2002. The dragonflies and damselflies of Mecosta Co., MI: Complete list with recent additions. *Michigan Birds and Natural History* 9(1):1-6.
- Simpson, T.B., P.E. Stuart and B.V. Barnes. 1990. Landscape ecosystems and cover types of the Reserve Area and adjacent lands of the Huron Mountain Club. Occ. Pap. Huron Mountain Wildlife Foundation. No. 4. 128 pp, 4 maps.
- Smith, L. L. 1941. A limnological investigation of a permanently stratified lake in the Huron Mountain Region of Northern Michigan. *Papers of the Michigan Academy of Sciences, Arts and Letters*. 26:281-296.
- Tennessen K. 1997. Another UP record for *Gomphaeschna furcillata*. *Williamsonia* 1(1):4.
- Tennessen, K. and P. Hudson. 1997. More records of *Gomphaeschna furcillata* in the U.P. *Williamsonia* 1(3):2.
- Walker, E. M. 1953. The Odonata of Canada and Alaska. Vol. 1, Part I: general; Part II: Zygoptera - damselflies. Univ. Toronto Press, Toronto. p. 1-292.
- Walker, E.M. 1958. The Odonata of Canada and Alaska. Vol. 2: Anisoptera. Univ. Toronto Press, Toronto. p. 1-318.
- Walker, E. M. and P.S. Corbet 1975. The Odonata of Canada and Alaska. Vol. 3: Part 2, the Anisoptera-three families Univ. Toronto Press, Toronto. p. 1-308.
- Wells, J.R. and P. W. Thompson. 1976. Vegetation and flora of the Huron Mountains. Occ. Pap. Huron Mountain Wildlife Foundation. No. 3. 59 pp.

BULLETIN OF AMERICAN ODONATOLOGY

VOLUME 5

- THE DRAGONFLIES AND DAMSELFLIES (ODONATA) OF LOUISIANA, Bill Mauffray 5(1): 1-26
- ODONATA OF THE CAYMAN ISLANDS: A REVIEW, R. R. Askew, Richard Prosser, and Philip S. Corbet 5(2): 27-32
- TAXONOMIC AND POPULATION STUDIES OF BRITISH COLUMBIA *AESHNA* SPECIES, G. Peters 5(2): 33-42
- ADAPTING THE TOWNES MALAISE TRAP FOR COLLECTING LIVE ODONATA, Robert C. Glotzhofer & Dan Riggs, 5(3): 43-48
- ARCHILESTES GRANDIS* (GREAT SPREADWING) IN CENTRAL NEW JERSEY, WITH NOTES ON WATER QUALITY, David P. Moskowitz and David M. Bell, 5(3): 49-54
- VARIATION IN HEAD SPINES IN FEMALE *OPHIOGOMPHUS*, WITH A POSSIBLE EXAMPLE OF REPRODUCTIVE CHARACTER DISPLACEMENT (ANISOPTERA: GOMPHIDAE), Dennis R. Paulson, 5(3): 55-58
- THE ODONATA FAUNA OF CONNECTICUT, David L. Wagner and Michael C. Thomas, 5(4): 59-85

VOLUME 6

- THE DISTRIBUTION OF THE ODONATA OF HAWAII, Jerrell J. Daigle, 6(1): 1-5
- ADDITIONS TO THE DESCRIPTION OF *GOMPHOMACROMIA NODISTICTA* RIS, 1928 (ANISOPTERA: CORDULIIDAE), N. von Ellenrieder, 6(1): 7-11
- THE ODONATA OF IOWA, Robert W. Cruden and O. J. Gode, Jr., 6(2)p. 13-48
- ODONATA IN THE GREAT PLAINS STATES: PATTERNS OF DISTRIBUTION AND DIVERSITY, Roy J. Beckemeyer, 6(3) p. 49-99
- COMMENTS ON THE *ERYTHRODIPLAX CONNATA* (BURMEISTER, 1839) GROUP, WITH THE ELEVATION OF *E. FUSCA* (RAMBUR, 1842), *E. MINUSCULA* (RAMBUR, 1842), AND *E. BASIFUSCA* (CALVERT, 1895) TO FULL SPECIES (ANISOPTERA: LIBELLULIDAE), Dennis Paulson, 6(4) p. 101-110

VOLUME 7

- THE ODONATA OF THE HURON MOUNTAINS, MARQUETTE CO., MICHIGAN, Mark F. O'Brien, Ethan Bright and Michael A. Kielb, 7(1): 1-22

BULLETIN OF AMERICAN ODONATOLOGY

VOLUME 1

THE ODONATA OF NEW YORK, Thomas W. Donnelly 1(1): 1-27

DISTRIBUTION OF DRAGONFLIES AND DAMSELFLIES (ODONATA) IN FLORIDA, Sidney W. Dunkle 1(2): 29-50

MORPHOLOGICAL AND ECOLOGICAL DIFFERENCES AMONG SPECIES OF *LADONA* (ANISOPTERA: LIBELLULIDAE), Michael L. May 1(3): 51-56

COMPORTAMIENTO REPRODUCTIVO Y POLICROMATISMO EN *ISCHNURA DENTICOLLIS* Burmeister (Zygoptera: Coenagrionidae), [Reproductive behavior and polychromatism in *Ischnura denticollis*], with English summary Alejandro Córdoba Aguilar. 1(3): 57-64

A CHECKLIST OF THE ODONATA OF THE DOMINICAN REPUBLIC BY PROVINCE, Jerrell James Daigle 1(4):65-69

ODONATA DE LA SIERRA DE HUAUCHINANGO, PUEBLA, MEXICO [Odonata of the Sierra de Huachinango, Puebla, Mexico], José A. Gómez Anaya y Rodolfo Novelo Gutiérrez 1(4):71-73

VOLUME 2

LA NAYADE DE *ARCHILESTES LATIALATUS* DONNELLY, 1981 (ZYGOTERA: LESTIDAE) [The naiad of *Archilestes latialatus* Donnelly, 1981], R. Novelo-Gutiérrez 2(1): 1-7

DESCRIPCIÓN E HISTORIA NATURAL DE LAS LARVAS DE ODONATOS DE COSTA RICA. I II: *GYNACANTHA TIBIATA* (KARSCH 1891) (ANISOPTERA, AESHNIDAE) [Description and Natural History of the Odonata Larvae of Costa Rica. III: *Gynacantha tibiata* (Karsch 1891)(Anisoptera: Aeshnidae)], Alonso Ramírez 2(1): 9-14

DESCRIPTION OF THE NYMPH OF *EPITHECA (TETRAGONEURIA) SPINOSA* (HAGEN) (ODONATA:CORDULIIDAE), K. J. Tennessen 2(2): 15-19

THE LARVA AND ADULT MALE OF *SOMATOCHLORA GEORGIANA* WALKER (ODONATA: CORDULIIDAE), Jerrell J. Daigle 2(2): 21-26

MACROMIA ILLINOIENSIS AND *GEORGINA*: A STUDY OF THEIR VARIATION AND APPARENT SUBSPECIFIC RELATIONSHIP (ODONATA: CORDULIIDAE), Thomas W. Donnelly and Kenneth J. Tennessen 2(3): 27-61

THE SUBGENUS *TETRAGONEURIA* (ANISOPTERA: CORDULIIDAE: *EPITHECA*) IN NEW JERSEY, Michael L. May 2(4): 63-74

VOLUME 3

THE ODONATA OF OHIO - A PRELIMINARY REPORT, Robert C. Glotzhofer 3(1): 1 - 30

FOUR DECADES OF STABILITY AND CHANGE IN THE ODONATA POPULATIONS AT TEN ACRE POND IN CENTRAL PENNSYLVANIA, Clark N. Shiffer and Harold B. White 3(2): 31 - 41

DESCRIPCION E HISTORIA NATURAL DE LAS LARVAS DE ODONATOS DE COSTA RICA. IV: *MECISTOGASTER ORNATA* (RAMBUR, 1842) (ZYGOTERA, PSEUDOSTIGMATIDAE).[Description and Natural History of Odonata larva of Costa Rica. IV. *Mecistogaster ornata* (Rambur, 1842) (Zygoptera, Pseudostigmatidae)], Alonso Ramírez 3(2): 43-47

THE DISTRIBUTION OF ODONATA IN ALABAMA, Kenneth J. Tennessen, James D. Harper, R. Stephen Krotzer, 3(3): 49-74

DISTRIBUTION RECORDS OF THE ODONATA OF MONTANA, Kelly B. Miller and Daniel L. Gustafson, 3(4): 75 - 88
continued on inside cover

VOLUME 4

AN ANNOTATED LIST OF THE ODONATA OF NEW JERSEY
With an Appendix on Nomenclature in the Genus *Gomphus*, Michael L. May & Frank L. Carle 4(1): 1 - 35

THE ODONATA OF PATUXENT WILDLIFE RESEARCH CENTER AND VICINITY, Richard L. Orr 4(2): 37 - 67

THE STATUS OF *LESTES APOLLINARIS* NAVÁS AND *L. HENSHAWI* CALVERT, Thomas W. Donnelly 4(3): 69-74

THE DRAGONFLIES OF WASHINGTON, Dennis R. Paulson 4(4): 75-90