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Status Report to the Michigan Chapter, TNC
Great Lakes Science Center - Great Lakes Marsh Study

November 30, 1996

by

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1. Study results to date

Offshore Macroenthos - bioindicators of water quality

Samples were successfully taken in the spring and fall at 4 sites in the Les Cheneaux Island area as described in the study plan. Additional samples were collected in Duck Bay, West Entrance area, and Search Bay to more fully describe the offshore benthic fauna. Sample processing is going slowly since in addition to mayflies and oligochaete worms, the samples contained a very diverse invertebrate fauna in excess of 30 taxa. Picking and processing all the material in the sample takes more time but the additional information seems well worth the effort, and would complete the description of the invertebrate fauna in the island area. Density estimates of Hexagenia limbata and Ephemera simulans from McKay Bay have both averaged around 400 m⁻². These densities are similar to that found in other bodies of water with large populations of burrowing mayflies (western Lake Erie, Lake St. Clair, St. Marys River). Mayflies appear to be absent from samples taken in the harbor at Cedarville, based on field observations, however they were present further out in the Sheppard Bay area. Casual observations suggest that any impact in the Cedarville Harbor is probably very localized.

Nearshore Meio Benthos

All samples were collected according to procedures described in the study plan. Sampling sites were chosen based on a combination of sediments and vegetation characteristics. In the intense study at Prentiss Bay, six habitats were sampled in May, July, and September. South of M134, a sand silt (bulrush) habitat was sampled, a silt habitat (devoid of vegetation), and a fine sediment-root mass habitat (cat-tail). North of the highway sediments were all fine and associated with root masses of the dominant vegetation. We sampled in Carex, Calamagrostis, and in Calamagrostis with shrub development. The amount of standing water became progressively less as one moved from Carex to the shrub habitat. In the broad study we selected a silt and Calamagrostis habitat at each of the other five sites since they were the only communities common to all sites.

Sample processing has gone slow but the technique we developed appears to work rather well. As far as we know, no one has looked at meio fauna communities in wetlands. Our finding of two species of cyclopoid copepods (Diacyclops languidoides and D. nearcticus) rarely collected in North America in the Calamagrostis habitat would support this conclusion. Previous collections of these species were mainly from groundwater habitats associated with streams and rivers. Apparently the groundwater and root masses associated with wet meadows and shrub swamps in Prentiss Bay mimic that found in the interstitial habitat of streams and rivers. We hope to find several keystone species in each habitat which we can use to describe each invertebrate

community. Nematodes, water mites, rotifers, ostracods, copepod nauplii, and harpacticoids were common taxa. Total length of these taxa ranged from 60um to 2.8 mm and densities from 1 to $4 \times 10^6 \text{ m}^{-2}$.

Processing Fish Stomachs

No work has been done on this project. We have been told by the MSU and UM scientist that fish have been collected for this study but we have not yet made an attempt to secure the material. We did receive some fish from the Inter-Tribal Fisheries and Assessment Program seining study in St. Martins Bay. We also have access to all the fish collected from cormorant stomachs by Susan Maruca in the island area. We will try to get at this material after the first of the year.

Species List

The invertebrate taxa list for the Northern Lake Huron Shoreline now contains about 165 taxa (Table 1). This list should double or triple if species level identification are made for each group (e.g. Rotifera, Tipulidae).

Chironomids associated with spring warbler migration

At least twelve species of adult chironomids were found to emerge along the northern Lake Huron shoreline from ice out till early June (Table 2). Species identifications are still provisional and somewhat difficult. Continued work in this area should produce the necessary familiarity to make this process easier. To quantify the density of adults available to migrating warblers we tried spraying cedar and white spruce fronds with a sticky substance, counting the adults attached after a set time, and then measuring the surface area of the plants with a computer scanner. Estimates as high as 1.7 chironomid adults per square inch were found on shoreline vegetation. The habitat of the larval stages of these spring emerging species in Lake Huron was estimated based on known life history information. Most of the species probably live in nearshore areas (9 out of 12) with about half on rocky sediments and half on sand-silt sediments.

Somatochlora hineana

In August, we attempted to locate populations of the endangered Hine's emerald dragonfly (Somatochlora hineana) along the shoreline of Lake Huron and Michigan. No specimens of Somatochora were collected, however a very extensive list of dragonfly species associated with the Great Lakes shoreline was developed (Table 3). We will continue to survey calcareous wetlands in the upper and lower peninsula of Michigan.

2. Surprising findings

The wet interphase between upland forest and standing water appears to be a rather unique habitat in the Les Cheneaux Island area, where the relatively cold groundwater seepage meets the relatively stable temperature regime of the Great Lakes. This interphase in the Les Cheneaux Island area is especially dynamic, protected or created by dunes, islands, or roads. In addition, the influence of seiches, unique to large bodies of water, adds another variable to the hydrology equation. The community of invertebrates sampled so far in this habitat appear to be as novel as many of the plants associated with the Great Lakes shoreline.

Sampling in the deeper waters of the Les Cheneaux Island area has presented a very diverse fauna found nowhere in the Great Lakes but with members who are common in certain areas of the Great Lakes. Because of the pristine nature of the Les Cheneaux Island area this faunal composition may represent what originally inhabited the protected, shallow, nearshore areas of the Great Lakes prior to human kinds degradation of these areas. This community could be a remediation goal of government agencies involved in cleanup activities.

3. Enrichment

Maybe to early to measure but the possibility of learning and conceiving of ideas from such a broad group of scientist is compelling. So far I am impressed that know one individual has dominated the thrust of research being done. It will be interesting to see how the results can be melded together into a big picture.

4. Relationships

I probably never would have exited on to M134 if it had not been for the TNC. The Les Cheneaux Area is beautiful and has presented me with several areas of exciting work that I never would have got involved in. I have added many unique taxa found in the area to my checklist of invertebrates found in the Great Lakes. In addition, the funding has come in at a time when our own resources were at a very low level.

Table 1

Invertebrate Taxa List
 Northern Lake Huron Shoreline
 Nov. 21, 1996 version

	A	B	C	D	E	F	G	H	I	J	K	L
1	Taxa	St. Martin	Search	Mismer	Hessel	MackInac	Cedarville	Duck	McKay	Prentiss	Dudley	Stevenson
2												
3	Porifera											
4	Coelenterata											
5	Turbellaria											
6	Rotifera											
7	Nematoda											
8	Tardigrada											
9	Bryozoa											
10	Plumatella nitens											
11	Annelida											
12	Oligochaeta											
13	Aeolosomatidae									x		
14	Enchytraeidae		x							x		
15	Naididae											
16	Amphichaeta leydigi									x		
17	Chaetogaster diaphanus									x		
18	Chaetogaster diastrophus		x							x		
19	Nias communis		x							x		
20	Nias simplex		x									
21	Nias variabilis		x							x		
22	Pristina acquiescens		x							x		
23	Slavina appendiculata		x							x		
24	Stytaria lacustris		x							x		
25	Veldovskiyella comata		x							x		
26	Lumbriculidae											
27	Eclipidrilus lacustris		x									
28	Stylodrilus heringianus		x							x		
29	Tubificidae											
30	Limnodrilus udekemianus									x		
31	Hirudinea											
32	Crustacea											
33	Copepoda											
34	Harpacticoid											
35	Attheyella americana									x		
36	Bryocamptus hutchinsoni									x		
37	Bryocamptus zschokkei									x		
38	Elaphoidella subgracilis									x		
39	Moraria laurentica		x									
40	Moraria sp.									x		
41	Parastenocaris delamarei											
42	Parastenocaris lacustris											
43	Cyclopoida											
44	Acanthocyclops brevispinosus									x		
45	Acanthocyclops venustoides											
46	Acanthocyclops robustus									x		
47	Diacyclops albus											
48	Diacyclops languidoides											
49	Diacyclops nearcticus											
50	Ectocyclops phaleratus									x		
51	Eucyclops agilis									x		
52	Macrocylops albidus									x		
53	Microcyclops rubellus									x		
54	Microcyclops varicans									x		
55	Paracyclops poppei									x		
56	Tröppocyclops prasinus mexicanus									x		
57	Calanoida											
58	Eurytemora affinis									x		
59	Leptodiaptomus sicilis									x		
60	Cladocera											
61	Alona									x		
62	Chydorus									x		
63	Diaphanosoma brachyurum									x		
64	Ilyocryptus									x		
65	Latona setifera									x		
66	Scapholeberis kingi?									x		
67	Sida crystallina									x		
68	Simocephalus									x		
69	Ostracoda											
70	Isopoda											
71	Asellus									x		
72	Amphipoda											
73	Hyaella azteca									x		
74	Gammarus									x		
75	Decapoda											
76	Hydracarina											
77	Insecta											

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1	Taxa	St. Martin	Search	Misner	Hessel	Mackinac	Cedarville	Duck	McKay	Prentiss	Dudley	Stevenson
78	Collembola											
79	Entomobrya nivalis											
80	Isotomurus ?tricolor											
81	Lepidocyrtus paradoxus											
82	Proisotoma woodi											
83	Ephemeroptera											
84	Caenis amica									N	A	
85	Caenis hilaris										A	
86	Caenis latipennis										A	
87	Caenis macaferti?											
88	Caenis youngi											
89	Ephemera simulans											
90	Eurylophella ?lutulenta											
91	Hexagenia limbata											
92	Leptophlebia sp.											
93	Nixe? sp.											
94	Stenacron interpunctatum										A	
95	Stenonema femoratum										A	
96	Odonata											
97	Zygoptera											
98	Coenagrionidae											
99	Enallagma hageni	A	A									
100	Nehalennia irene									A		
101	Ischnura verticalis	A	A							A		
102	Lestidae											
103	Lestes disjunctus disjunctus			A						A		
104	Lestes sp.			N								
105	Anisoptera											
106	Aeshnidae											
107	Aeshna canadensis	A	A							A		
108	Aeshna constricta	A										
109	Aeshna eremita	A, N?										
110	Aeshna umbrosa		A						A			
111	Aeshna sp.									N		
112	Basiaeschna janata		A							N		
113	Libellulidae											
114	Dorocordulia libera	A								N		
115	Ladona julia		A									
116	Leucorrhinia intacta		A							N		
117	Leucorrhinia proxima		A									
118	Leucorrhinia sp.									N		
119	Libellula pulchella	A										
120	Libellula quadrimaculata	N	A									
121	Somatochlora walshii	A								A		
122	Somatochlora williamsoni	A	A						A	A		
123	Somatochlora sp.									N		
124	Sympetrum danae									A		
125	Sympetrum obtusum	A							A	A		
126	Sympetrum semichinctom									N		
127	Sympetrum vicinum	A								N		
128	Plecoptera											
129	Paracapnia angulata											
130	Hemiptera											
131	Megaloptera											
132	Sialis itasca		A									
133	Trichoptera											
134	Hydroptilidae											
135	Agraylea multipunctata										A	
136	Oxyethira									L	A	
137	Polycentropus cinereus										A	
138	Polycentropus sp.									L		
139	Lepidostomatidae											
140	Lepidostoma sp.											
141	Phryganeidae											
142	Agrypnia straminea										A	
143	Limnephilidae											
144	Limnephilus parvulus									A		
145	Limnephilus sackeni										A	
146	Pycnopsyche guttifer										A	
147	Molannidae											
148	Molanna ulmerina										A	
149	Lepidoptera											
150	Paragyraactis confusalis									L		
151	Coleoptera											
152	Gyrinidae											
153	Gyrinus analis		A									

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1	Taxa	St. Martin	Search	Mismer	Hessel	Mackinac	Cedarville	Duck	McKay	Prentiss	Dudley	Stevenson
154	<i>Gyrinus aquinis</i>										A	
155	<i>Gyrinus pectoralis</i>		A									
156	Dytiscidae											
157	<i>Hydroporus</i> sp.	A										
158	<i>Hygrotus sayi</i>										A	
159	<i>Hygrotus sellatus</i>		A									
160	<i>Ilybius biguttulus</i>										A	
161	<i>Rhantus</i> sp.									L		
162	Hydrophilidae											
163	<i>Enochrus ochraceus</i>		A							A		
164	<i>Laccobius agilis</i>									A		
165	<i>Laccobius truncatipenis</i>		A									
166	<i>Paracymus subcupreus</i>	A										
167	<i>Tropisternus blatchleyi</i>		A									
168	<i>Tropisternus</i> sp.		L									
169	Diptera											
170	Chironomidae											
171	Diamesinae											
172	<i>Diamesa</i>										L	
173	<i>Pagastia orthogonia</i>									A		P
174	Prodiamesinae											
175	<i>Monodiamesa tuberculata</i>									A		A,P
176	Tanypodinae											
177	<i>Larsia</i> sp.											
178	<i>Natarsia</i> sp.											
179	Orthoclaadiinae											
180	<i>Acricotopus lucens</i>	A										
181	<i>Hydrobaenus johannseni</i>									A		A,P
182	<i>Chaetocladus</i>									P		
183	<i>Chaetocladus stamfordi</i>									A		
184	<i>Corynoneura</i>											
185	<i>Cricotopus annulator</i>									A		
186	<i>Cricotopus coronatus</i>										A	A,P
187	<i>Eukiefferiella claripennis</i>											A,P
188	<i>Heterotrissocladius changi</i>									A		P
189	<i>Heterotrissocladius oliveri</i>									A	A	
190	<i>Limnophyes brachytomus</i>										A	
191	<i>Orthocladus dentifer</i>											A
192	<i>Orthocladus nigrifus</i>											P
193	<i>Orthocladus oliveri</i>									A,P		P
194	<i>Orthocladus robacki?</i>				A							
195	<i>Parakiefferiella bathophila</i>				A					A,P		A
196	<i>Parakiefferiella fennica</i>											A,P
197	<i>Psectrocladius</i> sp.											
198	<i>Pseudosmittia ruttneri</i>											
199	Chironominae									A	A	
200	<i>Cladotanytarsus</i> sp.									L		
201	<i>Lipiniella prob. arenicola</i>											
202	<i>Micropsectra nigripila</i>										A	
203	<i>Microtendipes chloris</i>									A		
204	<i>Paracladopelma galaptera</i>									A		
205	<i>Paratanytarsus tenuis</i>										A	
206	<i>Polypeditum</i> sp.											
207	<i>Stictochironomus</i> nr. <i>unguiculatus</i>									L		
208	<i>Tanytarsus</i> sp.										A	
209	Ceratopogonidae									L		
210	<i>Atrichopogon</i>											
211	<i>Bezzia/Palpomyia</i>											
212	Culicoides											
213	<i>Dasyhelea</i>											
214	Dixidae											
215	Tipulidae											
216	Empididae											
217	<i>Hemerodromia</i>											
218	Gastropoda											
219	Pelecypoda											

ADULT CHIRONOMID EMERGENCE PHENOLOGY OF COMMON SPRING SPECIES FOUND ALONG THE SHORELINE IN THE LES CHENEUX ISLAND AREA OF NORTHERN LAKE HURON. ALSO INCLUDED ARE ADULT SIZE RANGES OF MALES AND ESTIMATED HABITAT OF THE LARVAL STAGE.

	Total Body Length of Male Including Antenna (mm)	Habitat
<u>Late April-Early May Emergence Period</u>		
<i>Hydrobaenus johannseni</i> (Sublette)	6.1	nearshore - rubble
<i>Heterotrissocladius oliveri</i> Saether	4.9-5.7	offshore - sand/silt
<u>May Emergence Period</u>		
<i>Orthocladius nigritus</i> Malloch	5.4	nearshore - rubble
<i>Heterotrissocladius changi</i> Saether	4.6-5.2	offshore - sand/silt
<i>Pseudosmittia rutteri</i> Strenzke et Thien.	2.7-4.0	nearshore - ?
<i>Parakeifferiella bathophila</i> (Kieffer)	2.7-3.4	nearshore - rubble
<u>Middle May-Early June Emergence Period</u>		
<i>Stictochironomus</i> n. sp.	6.5-8.1	nearshore - sand/silt
<i>Monodiamesa tuberculata</i> Saether	6.0-8.3	offshore - sand/silt
<i>Micropsectra</i> nr. <i>notescens</i> (Walker)	4.8-5.1	nearshore - ?
<i>Tanytarsus norvegicus</i> gr. Kieffer	4.7-5.0	nearshore - ?
<i>Paratanytarsus tenuis</i> Meigen	4.5-5.0	nearshore - ?
<i>Stempellina bausei</i> Kieffer	3.9-4.0	nearshore - ?

Great Lakes Odonata Survey, Aug. 1996

17 Aug. 1996 (Pat Hudson, Ken Tennessen, Tex Wells)

1) MI, Arenac Co., Lake Huron, Wigwam Bay Wildlife Area

Enallagma carunculatum 3m 2f (common)*Enallagma signatum* 1m (only one seen)*Ischnura verticalis* 3m 1f (common)*Leucorrhinia frigida* (only one seen)*Sympetrum vicinum* 1m (teneral, numerous)*Anax junius* (1 nymph close to emergence)Saw *Aeshna* sp. (probably *canadensis* and/or *eremita*).2) MI, Alpena Co., L. Huron, Squaw Bay, east shore near Hwy. 23
and north shore off Partridge Pt. Rd.*Aeshna canadensis* 2m (numerous)*Aeshna constricta* 1m*Libellula pulchella* 3m*Libellula quadrimaculata* 1m*Sympetrum costiferum* 11m 3f (common)*Sympetrum obtrusum* 4m (common)*Sympetrum vicinum* 2m*Lestes disjunctus disjunctus* 5m 2f (common)*Enallagma ebrium* 1m (only one seen)*Enallagma hageni* 1m*Ischnura verticalis* 1m 1f*Nehalennia irene* 1m 1fSaw *Libellula lydia*.

3) MI, Alpena Co., L. Huron, Whitefish Bay, just east of Alpena

Aeshna canadensis 1m (numerous)*Aeshna eremita* 1m*Aeshna umbrosa* 1m*Leucorrhinia proxima* 1m*Sympetrum costiferum* 1m 1f*Lestes disjunctus disjunctus* 2m 1f*Lestes vigilax* 1m*Enallagma hageni* 2mSaw *Ischnura verticalis*.Nymphs of: *Aeshna* sp., *Ladona julia*, *Sympetrum vicinum*.

18 Aug. 1996 (Pat Hudson, Ken Tennessen, Tex Wells)

- 1) MI, Mackinac Co., marsh along Hwy. M134, Prentiss Bay, Lake Huron

Somatochlora williamsoni 3m (a few others seen) ✓

Sympetrum danae 1m (several teneral) ✓

H *Lestes disjunctus disjunctus* 1m (common) ✓

Nehalennia irene 1f (numerous)

Nymphs of: *Aeshna* sp., *Sympetrum vicinum*, *Leucorrhinia* spp.,
Somatochlora sp.

- 2) MI, Mackinac Co., McKay Creek, Hwy. M-134

Aeshna umbrosa 1m

X *Somatochlora williamsoni* 2m 1f

Sympetrum obtrusum 1m 1f (common)

- 3) MI, Mackinac Co., pond, jct. Hwy. 123 & I-75

Aeshna canadensis 1m (numerous)

Sympetrum costiferum 3m (common)

Sympetrum danae 4m 1f

Sympetrum obtrusum 1 pr.

Nymphs of: *Aeshna* sp. (*canadensis*?), *Libellula quadrimaculata*,
Leucorrhinia sp.

- 4) MI, Mackinac Co., Summberby Swamp, Hwy. 123

Cordulegaster diastatops 1f (only one seen)

Sympetrum danae 3m

Lestes congener 1m

Lestes dryas 2m 1f

Lestes unguiculatus 1m 1f

Nymph of: *Boyeria vinosa*, *Cordulegaster bilineata*, *C. maculata*.

- 5) MI, Mackinac Co., Lake Huron, St. Martin Bay, about 1 mi. S of Hwy. M-134

Aeshna canadensis 1 pr. (common) ✓

Aeshna constricta 1m ✓

Aeshna eremita 2m (common)

Somatochlora walshii 2m (over gravel road)

Somatochlora williamsoni 3m (common)

Enallagma hageni 2m 2f (common)

Saw *Ischnura verticalis*.

Nymphs of: *Aeshna* sp. (*eremita*?), *Libellula quadrimaculata*.

- 6) MI, Mackinac Co., Search Bay, 1 mi. S of Hwy. M-134, Lake Huron

Aeshna canadensis 1m

Aeshna umbrosa 1m

Somatochlora williamsoni 1m

Saw *Leucorrhinia proxima*, *Libellula quadrimaculata*, *Lestes disjunctus disjunctus*, *Enallagma hageni*, *Ischnura verticalis*.

19 Aug. 1996 (Pat Hudson, Ken Tennessen, Tex Wells)

- 1) MI, Mackinac Co., Lake Michigan, W of St. Ignace, Boulevard Dr.

Sympetrum costiferum 2m 1f

Lestes disjunctus disjunctus 3m 2f

Saw *Sympetrum obtrusum*.

- 2) MI, Mackinac Co., Pte. aux Chenes River, Hwy. 2

Somatochlora williamsoni 4m 1f (numerous)

Sympetrum costiferum 1m

Leucorrhinia frigida 1m

Saw *Aeshna canadensis*, *Sympetrum obtrusum*, *Sympetrum vicinum*.

- 3) MI, Mackinac Co., Brevort River, Hwy. H-57 [not Great Lakes water, but dragonflies from here probably feed on insects from L. Michigan]

Aeshna constricta 1f

Boyeria vinosa 1m

Sympetrum internum 3f

Saw *Calopteryx maculata*.

- 4) MI, Mackinac Co., St. Martin Island (north bay), Lake Huron

Aeshna canadensis 1m (numerous)

Sympetrum costiferum 2m 1f 4 prs. (common)

Sympetrum danae 4m (numerous)

Sympetrum obtrusum 1m (numerous)

Lestes disjunctus disjunctus (numerous)

Enallagma hageni 2 prs. (numerous)

Saw *Libellula quadrimaculata*.

Nymphs of: *Aeshna* sp., *Leucorrhinia proxima* (?).

5) MI, Mackinac Co., Big St. Martin Island (east bay), L. Huron

Somatochlora walshii 1f (only one seen)

Sympetrum costiferum 1f (numerous)

Sympetrum danae 1m

Saw *Aeshna* sp., *Somatochlora williamsoni*, *Libellula quadrimaculata*, *Sympetrum obtrusum*, *Lestes disjunctus disjunctus*.

Nymphs of: *Aeshna* sp. (probably *canadensis*), *Anax junius* (?), *Leucorrhinia proxima* (?), *Sympetrum vicinum*.

20 Aug. 1996 (Pat Hudson, Ken Tennessen)

1) MI, Mackinac Co., South Service Rd., S of Hwy. M-134

Aeshna canadensis 1f

Aeshna constricta 1f

Aeshna eremita 1m

Somatochlora walshii 1f

Saw *Libellula pulchella*, *Sympetrum obtrusum*, *Sympetrum vicinum*.

2) MI, Mackinac Co., Brevort River, Hwy. H-57

Ophiogomphus colubrinus 1m

Stylurus scudderi 2m

Saw *Aeshna* sp., *Boyeria vinosa*, *Sympetrum obtrusum*, *Calopteryx aequabilis*, *Calopteryx maculata*.

Nymphs of: *Aeshna* sp., *Boyeria vinosa*, *Cordulegaster maculata*, *Ophiogomphus colubrinus*, *Gomphus* (*Gomphus*) sp. (probably *lividus* or *descriptus*), *Calopteryx aequabilis*, *Calopteryx maculata*.

