THE AQUATIC INSECTS OF THE ST. JOHN RIVER DRAINAGE, AROOSTOOK COUNTY, MAINE

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Technical Bulletin 92

May 1979

ACKNOWLEDGMENTS

The authors wish to acknowledge with thanks the cooperation of the following:

John Bailey, Dennis Healy, Owen Fenderson, Eugene Miliczky, Tom Morrison, Kenneth Reinecke, Jane Rosinski, Gordon Russell, Joan Trial, and Barbara Welch in making the field collections.

Renee Duval for preliminary identifications and Leah Bauer for black fly identifications.

Jolene Walker for her patience in typing the manuscript.

The Department of Entomology, University of Maine at Orono for providing space and facilities.

Funding was provided by the Department of the Army, New England Division, Corps of Engineers under contract No. DACW 33-77-C-0105.

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INTRODUCTION

In September, 1977, an aquatic insect survey of the St. John River drainage was conducted. The objectives were to provide information on the existing fauna in the area of the proposed Dickey-Lincoln School Lakes hydro-electric project and to form the basis for predicting changes in the fauna should implementation of the proposed project take place. The results of that survey (Gibbs 1978) form the basis for this bulletin. The only additional information on the fauna of this river comes from a survey of organisms in the gut content of brook trout taken from the St. John River drainage between the Little Black River and Fort Kent during 1975-1976 (USACE 1977b).

Knowledge of the aquatic insect fauna of Maine is limited to certain taxonomic groups and specific watersheds. Lists of species present in Maine have been published for the Trichoptera (Blickle 1974, Blickle and Morse 1966), Odonata (Borror 1944, 1951, 1957, White 1969, 1974, White and Morse 1973), aquatic Coleoptera (Malcolm 1971) and the Tipulidae (Diptera) (Alexander 1962). Faunal surveys have been conducted on the Narraguagus River (Mingo 1978), the Allagash River (Trotsky 1972) and the Kennebec River (Trotsky and Gregory 1974). Aquatic insects were included in a survey of the insects of Mount Desert Island in Hancock County (Procter 1946). The fauna of the upper Penobscot River in relation to water quality was studied (Rabeni 1977) as were the black flies (Simuliidae) of the Piscataquis River (Bauer 1977).

STUDY AREA

The headwaters of the St. John River (Fig. 1) are found in Somerset County, Maine and in the Province of Quebec and the river flows northeasterly through Maine to the New Brunswick border. The survey area included a 104 km region of the St. John River drainage from the Ninemile Brook (Township 12 Range 15) to the Lincoln School area (St. Francis Township). The principal tributaries included in this survey were the Big Black and Little Black Rivers. Selected tributaries along each drainage were also included.

The river system is characterized by rapidly flowing water, coarse substrates and a wide, shallow stream bed. Above the Lincoln School

area, the watershed covers approximately 10,578 km^2. Of this area approximately 3,341 km^2 lie above Ninemile Brook.

Due to the lack of sizeable lakes in the headwaters and thus limited storage capacity, the watershed is subjected to a greatly fluctuating annual runoff regime (Fig. 2). Discharge ranges from a spring peak of approximately 1,840 — 1,980 m^3/sec to midsummer and midwinter lows of about 8.5 — 11.3 m^3/sec. The mean gradient for the primary stream segment is 1.1 m/km.

Significant lentic habitats exist only in the Big Black and Little Black River drainages. Physical and chemical characteristics of the St. John River drainage are reported in USACE (1977a, b).

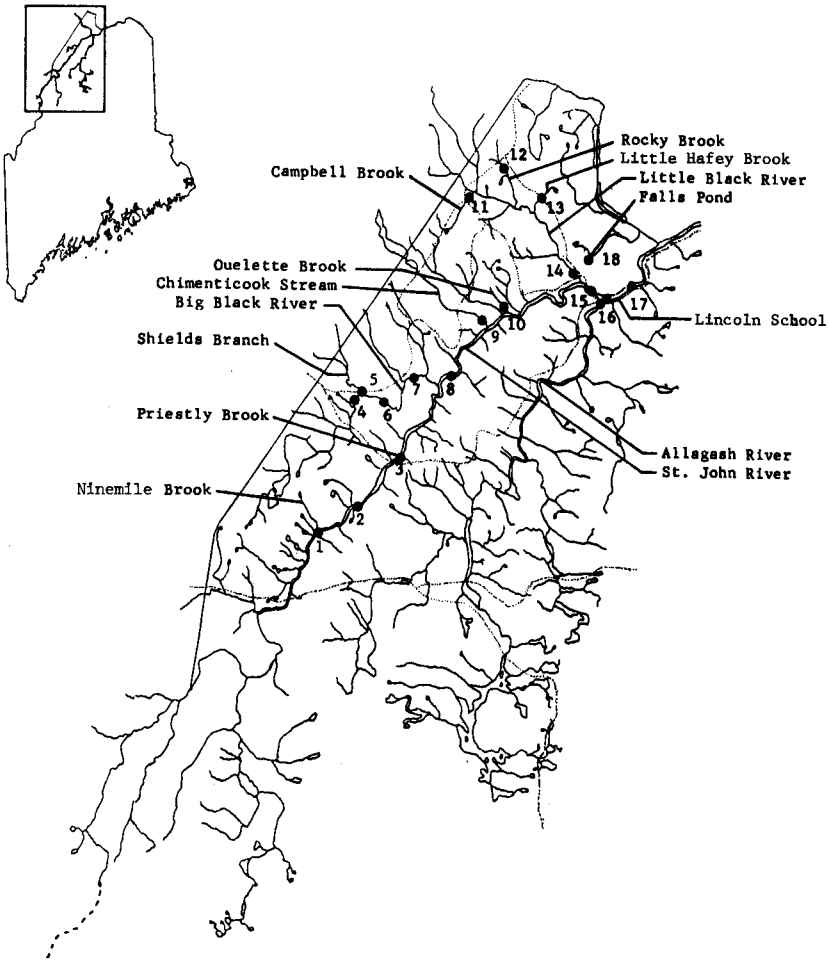

Figure 1. Study area and site locations.

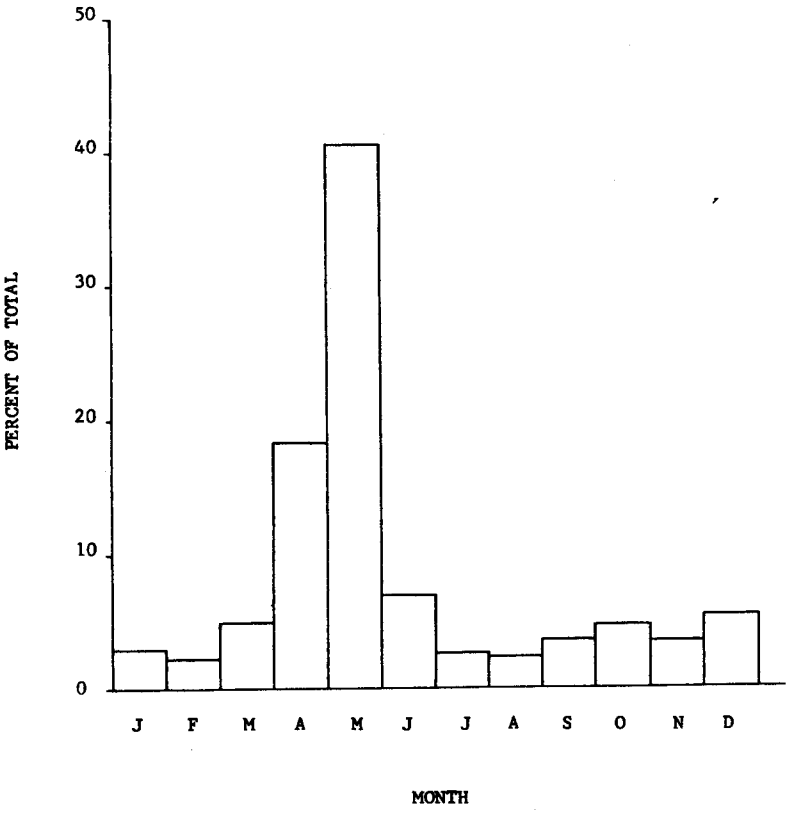

Figure 2. Mean monthly discharge as a percentage of total annual discharge, 1973-1975.

SAMPLING SITES

The location and characteristics of each sampling site are reported below and in Fig. 1. Observations were made between September 22 and September 25, 1977, following a period of significant rainfall when the flow varied from 62.83 m^3/sec on September 22 to 42.73 m^3/sec on September 25 at the USGS gauge at Dickey.

Site 1: St. John River, 46°42′05″ — 69°43′05″ — opposite Ninemile campsite and below Ninemile bridge.

Description: Surber and sweep samples were taken near the middle of the river in rubble substrate. Sweep samples were also taken in emergent vegetation at the margin of the river.

Site 2: St. John River, 46°47′07″ — 69°35′35″ — at Seven Islands.
Description: The river was wide and shallow in this area and broken up by a series of islands. Surber and sweep samples were taken in rubble substrate.
Site 3: Priestly Brook, 46°49′30″ — 69°32′29″ — 6 m above the confluence with the St. John River.
Description: Surber and sweep samples were taken in gravel and mud substrate. Sweep samples were also taken in the vegetation at the stream margin.
Site 4: Big Black River, 46°52′35″ — 69°39′43″ — above the confluence with Shields Branch at "Bastford Rapids" about 30 m below the St. Pamphile Road bridge.
Description: Surber and sweep samples were taken in a rubble substrate. Sweep samples were also taken in eddies and emergent vegetation at the stream margin.
Site 5: Big Black River (Shields Branch), 46°56′31″ — 69°39′05″.
Description: The river was slow and meandering in this area. Sweep and Surber samples were collected in rubble and sand substrate under the Seven Islands Co. bridge. Sweep samples were also collected from areas of mud substrate, vegetation (*Potamogeton* sp. and *Sparganium* sp.), and in a temporary "oxbow" pond.
Site 6: Big Black River, 46°54′58″ — 69°34′14″.
Description: The river was slow and meandering in this area. Sweep samples were taken in areas of vegetation (*Potamogeton* sp., *Sparganium* sp. and *Eleocharis* sp.) and mud.
Site 7: Big Black River, 46°57′03″ — 69°32′00″ — 0.8 km below the confluence with Five Mile Brook.
Description: Surber and sweep samples were taken in gravel substrate. Sweep samples were taken in eddies and in vegetation at the river margin.
Site 8: St. John River, 46°57′53″ — 69°25′14″ — 2.5 km below the confluence with Big Black River in an area of fast rapids adjacent to a sand beach on the south shore.
Description: Surber and sweep samples were taken from areas of sand and gravel between large emergent rocks.
Site 9: Chimenticook Stream, 47°02′48″ — 69°16′54″ — 10 m above the confluence with the St. John River.
Description: Surber and sweep samples were collected from gravel substrate. Sweep samples were also collected from vegetation at the stream margin.
Site 10: Ouelette Brook, 47°04′59″ — 69°16′54″ — 15 m above the confluence with the St. John River.
Description: Surber and sweep samples were collected from gravel

substrate. Sweep samples were also taken in vegetation at the stream margin.

Site 11: Little Black River (Campbell Branch), 47°12′46″ — 69°24′08″ — adjacent to the gravel pit.
Description: Surber and sweep samples were collected from riffle areas with rubble and sand substrate. Sweep samples were also taken in pools and among detritus and vegetation at the stream margin.

Site 12: Rocky Brook, 47°12′46″ — 69°24′08″.
Description: Surber and sweep samples were collected from rubble and sand substrates. Sweep samples were also collected from pools and vegetation at the stream margins.

Site 13: Little Hafey Brook, 47°14′26″ — 69°12′56″ — above the bridge and a beaver flowage.
Description: Surber and sweep samples were collected from gravel substrate in riffle areas. Sweep samples were also collected from pools with sand substrate and from vegetation.

Site 14: Little Black River, 47°07′26″ — 69°05′54″ — above bridge near the confluence with the St. John River.
Description: Surber samples were collected from riffle areas of cobble, rubble and some larger rocks. Sweep samples were collected from pools below the riffles and from vegetation at the stream margin.

Site 15: St. John River, 47°06′43″ — 69°05′15″ — opposite the landing downstream from the Route 161 bridge in Allagash.
Description: Surber samples were collected from a riffle area on the south side of the river. Sweep samples were collected from backwater areas near the shore and among vegetation at the river margin.

Site 16: St. John River, 47°05′08″ — 69°02′04″ — at the confluence of the Allagash and St. John Rivers.
Description: Surber and sweep samples were taken in riffle areas. Sweep samples were also taken in vegetation at the river margin.

Site 17: St. John River, 47°06′43″ — 69°05′15″ — behind Lincoln School.
Description: Surber samples were taken in a substrate of rubble with larger rocks and boulders. Sweep samples were taken in the channels between islands and in a shallow backwater area.

Site 18: Falls Pond (Big Falls Pond), 47°09′48″ — 69°04′08″ — Fall Brook Lake Road.
Description: This was a 106 ha pond with an average depth of about 1.5 m. Emergent vegetation surrounded the pond and occurred in patches at the center. Quantitative sweep samples were taken along the margin at a depth of about 1 m. Qualitative sweep samples were taken in emergent vegetation along the south shore.

METHODS

Because of the inaccessibility of the area resulting from the absence of roads, the actual survey was conducted by individuals in three canoe parties simultaneously collecting from different areas of the watershed. One party collected from the upper St. John River (Fig. 1, Sites 1 to 3, 8 to 10) the second party collected from the Big Black River (Sites 4 to 7), and the third party collected from the Little Black River and the remaining sites (Sites 11 to 18).

The lateness of the season and the limitations of time (September 22 to September 25, 1977) restricted the survey primarily to the collection of immature aquatic forms. The choice of sampling equipment and method of sample storage were limited by available space since each survey crew also carried maintenance equipment and food supplies.

Aquatic insects were collected from 18 sampling sites. At those sites having rapidly flowing water and rocky substrates (all sites except 6 and 18), quantitative sampling was conducted using Surber square-foot samplers (Fig. 3a) with six replicates per site. At Site 18, a pond with a silt substrate, quantitative sampling consisted of six one-yard sweeps with an aquatic "D" frame net (Fig. 3b). A general search of rocks, submerged logs and aquatic vegetation was also made at each site.

Quantitative samples were preserved in 5% formalin in Ziplock® plastic bags which were in turn stored in covered plastic buckets. Organisms from the qualitative samples were hand-sorted in the field and preserved in vials containing 70% ethanol. Organisms collected in the quantitative samples were separated by hand in the laboratory and preserved in 70% ethanol. All organisms were identified to species when possible. Where taxonomic keys were not available for species determination or where the specimens were too small, identifications were made at the lowest taxonomic level possible, usually genus.

Although the survey was aimed primarily at the aquatic insect fauna, a variety of non-insect macroinvertebrates was also collected. These organisms were treated as described above and, because of their importance as components of the aquatic ecosystem, they have been included in this report.

Voucher specimens have been deposited in the aquatic insect collection of the Department of Entomology, University of Maine at Orono.

RESULTS

Plecoptera (Stoneflies)

Plecoptera nymphs were collected with Surber samplers and sweep nets from all sites except Site 18.

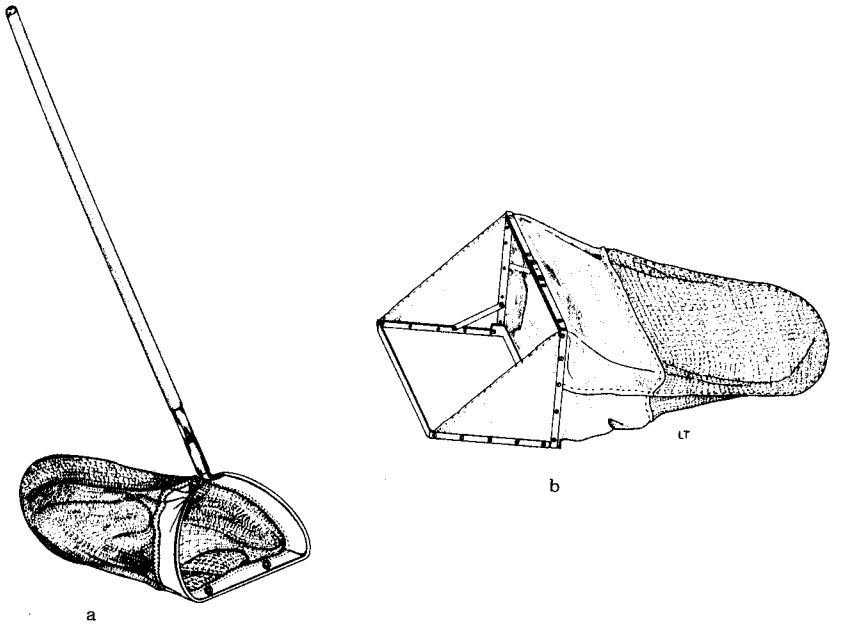

Figure 3. a) D-frame aquatic net. b) Surber sampler. (Reproduced with permission from Merritt, R.W. and K.W. Cummins 1978. *An Introduction to the Aquatic Insects of North America.* Kendall/Hunt Publishing Co. 441 p.)

The distribution and abundance of species in 13 genera are recorded in Table 1. The principal keys used for identification were Hitchcock (1974), Surdick and Kim (1976), and Hilsenhoff (1973). Additional references for specific groups were: Capniidae, Harper and Hynes (1971a); Leuctridae, Harper and Hynes (1971b); Taeniopterygidae, Harper and Hynes (1971c) and *Taeniopteryx* (Taeniopterygidae), Ricker and Ross (1968).

Ephemeroptera (Mayflies)

Ephemeroptera nymphs were collected from all sites using Surber samplers and kick nets. A majority of genera was collected from lotic habitats.

The distribution and abundance of species in 22 genera of Ephemeroptera are recorded in Table 2. The principal keys used for identification were Burks (1953), Edmunds, Jensen and Berner (1976) and Needham, Traver and Hsu (1935). Additional references for specific groups were: Baetidae, Ide (1937a,b), McDunnough (1932); *Ephemerella* (Ephemerellidae), Allen and Edmunds (1965);

TABLE 1. Numbers of Plecoptera collected at 18 sites in the St. John River area.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CAPNIIDAE																		
Paracapnia sp.				1														
CHLOROPERLIDAE					1		1					2	2	1				
Alloperla sp.									*		2		*					
LEUCTRIDAE																		
Leuctra ferruginea (Walker) ? adult							*											
Paraleuctra sara (Claassen)										12								
PERLIDAE																		
Acroneuria abnormis (Newman)		*					*									*		
A. carolinensis (Banks)		*												2				
A. spp.		*		5	1		1	2					*		2	*		
Neoperla clymene (Newman)							1							2				
Paragnetina immarginata (Say)									1									
Phasganophora capitata (Pictet)		1			2				1		1			2				
PERLODIDAE																		
Isogenus spp.	3	3		*	*	*	1	4	1	1	2		*	1	2	*	3	
Isoperla spp.		1							*	*	*	*						
PTERONARCIDAE																		
Allonarcys biloba Newman												1			*			
A. comstocki Smith		1					*				*					1		
A. proteus Newman												*						
A. spp.												1						
Pteronarcys dorsata (Say)									1					1				
TAENIOPTERYGIDAE																		
Taeniopteryx nivilis (Fitch) ?			*															
T. sp.			*															

*Species collected only with the "D" frame net.
? tentative identification.

Ephemeridae, McCafferty (1975); Heptageniidae, Flowers and Hilsenhoff (1975) and *Stenonema* (Heptageniidae), Lewis (1974).

Odonata (Dragonflies and Damselflies)

Odonata nymphs were collected with Surber samplers and kick nets from lotic and lentic habitats.

The distribution and abundance of species in 15 genera of Odonata are recorded in Table 3. The keys used for identification were Needham and Westfall (1955), Walker (1953) and Walker and Corbet (1975).

Hemiptera (Bugs)

Hemiptera were collected from 14 sites. Most of the genera were collected with kick nets and were taken from areas having reduced water velocity such as Falls Pond and the deadwater area of Site 6.

The distribution and abundance of 8 genera of Hemiptera are recorded in Table 4. The keys used for identification were Brooks and Kelton (1967) and Usinger (1956).

TABLE 2. Numbers of Ephemeroptera collected at 18 sites in the St. John River area.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
BAETIDAE																		
Baetis brunneicolor McDunnough ?			*									4	7			*	*	
B. frondalis (McDunnough) ?	*																*	
B. quebecensis McDunnough ?									*									
B. vagans McDunnough ?									*	*			*	*				
B. spp.					*			1	*	*	2	4	8			*	1	
Callibaetis sp.						1												26
Centroptilum spp.				*	*	*			*			*		*	*	*		
Cloeon sp.	*			1						1							*	
Pseudocloeon spp.	3	1		1	3		3	2		1		1		1	*	*	*	
BAETISCIDAE																		
Baetisca bajkovi (Neave)								*		*		1						
B. callosa Traver		*			*							*		*				
B. laurentina McDunnough					1	*												
B. spp.	*	*		1		*					1	*		*	*		2	
†*B.* n.sp.												*						
CAENIDAE																		
Caenis sp.					*		1											53
EPHEMERELLIDAE																		
Ephemerella aurivillii Bengtsson									*	*		*	*					
E. bicolor Clemens	*	*	*	*	*	*					*				*		*	
E. cornutella McDunnough											*							
E. funeralis McDunnough					*						*	*	*					
E. subvaria McDunnough	*	*							*			*		*		*	*	
E. spp.	10	9	13	3	6	*	15	3	8	13	4	35	25	72	3	3	*	
EPHEMERIDAE																		
Ephemera guttulata Pictet				*			1											
E. sp.				*										*				
Hexagenia sp.			1									*						
Lithobrancha recurvata (Morgan)											*	*	*					
HEPTAGENIIDAE																		
Epeorus pluralis (Banks)										2								
E. sp.	20	11	1	1				1	9	6	1		2		1	2	*	
Heptagenia hebe McDunnough		1															1	
H. marginalis Banks									*	*			*					
H. spp.	*	14		*			7	1	1	6			*					
Rhithrogena amica Traver									*	*	*		16					
R. uhari Traver										2								
R. spp.	11	27			14		1	35	42	1	36	12		6	12	11	4	
Stenacron interpunctatum (Say)			8	*	9		6	1	*			*						
S. sp.					*				*			*		*			1	
Stenonema fuscum Clemens	*	7		*	4		1	1	*		*		13	11	*	*	*	
S. vicarium Walker				1	1		*				*		13	3				
S. spp.	34	20	3	6	7		5	7	1		1	1		9	2	4	20	
LEPTOPHLEBIIDAE																		
Leptophlebia nebulosa (Walker)					*	*			*			*			*			
L. sp.				*	*	*											*	
Paraleptophlebia guttata McDunnough															*			
P. moerens McDunnough ?			*															
P. mollis Eaton	*	*		*	*			*	*	*		*	*		*	*	*	
P. spp.	16	22	2	8	17	*	4	9	1	33		11	11	11	1	2	4	
METRETOPODIDAE																		
Metretopus borealis Eaton	*		*		*	4		*							*		*	
†POTAMANTHIDAE																		
†*Potamanthus myops* Walsh							1											
SIPHLONURIDAE																		
Isonychia sadleri Traver										1								
Isonychia spp.	3	28		8	*		*	11	5					10	*	*	*	
TRICORYTHIDAE																		
Tricorythodes sp.	*						1											

*species collected only with "D" frame net.
? tentative identification
† new state of Maine distributional record

TABLE 3. Numbers of Odonata collected at 18 sites on the St. John River.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ANISOPTERA (Dragonflies)																		
AESHNIDAE																		
Aeshna umbrosa Walker												*					*	*
A. sp.						*						*					*	*
Boyeria vinosa Say				*			*		1	3				*				
CORDULEGASTRIDAE																		
Cordulegaster maculatus Selys											1	*	1					
CORDULIIDAE																		
Helocordulia uhleri Selys															*			
Neurocordulia obsoleta Say		1													*			
GOMPHIDAE	1		1	3			2		1				1					
Gomphus sp.		1			*			*							*			
Hagenius brevistylus Selys						*												
Hylogomphus abbreviatus Hagen																*		
H. viridifrons Hine ?		*																
Ophiogomphus anomalus Harvey		*						*							2			
O. aspersus Morse	1	2												*	*			
O. mainensis Packard	4	2		1			*		*					*		*		
O. spp.				4			2	*	1					1		*		
Stylogomphus albistylus Hagen				1							*							
S. parvulus Selys ?													*					
S. spp.													*					
MACROMIIDAE																		
Macromia illinoiensis Walsh								*										
M. taeniolata Rambur															*			
M. spp.								*							*			
ZYGOPTERA (Damselflies)																		
CALOPTERYGIDAE																		
Calopteryx aequabilis (Say)					*													
C. sp.					*													
COENAGRIONIDAE																		
Enallagma sp.	*					4												18
Nehalennia sp.																		19

*species collected only with "D" frame net.
? tentative identification.

TABLE 4. Numbers of Hemiptera collected a 18 sites in the St. John River area.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CORIXIDAE																		
Callicorixa sp.															*			
Sigara sp.	*				*	*											*	*
Trichocorixa sp.	*					*												1
Unidentified						*												
GERRIDAE																		
Gerris sp.			*	*						*	*	*	*					
NEPIDAE																		
Ranatra sp.																		*
NOTONECTIDAE																		
Buenoa sp.						▸												*
MESOVELIIDAE																		
Mesovelia sp.																		*
VELIIDAE																		
Rhagovelia sp.				*				*	*						*		*	

*species collected only with "D" frame net.

Megaloptera (Alderflies, Dobsonflies, Fishflies)

Megaloptera were collected with Surber samplers and kick nets from stream areas having moderately to rapidly flowing water. The distribution and abundance of species in 2 genera of Megaloptera are recorded in Table 5. The keys used for identification were Neunzig (1966), Ross (1937), and Tarter (1976).

TABLE 5. Numbers of Megaloptera collected at 18 sites on the St. John River.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CORYDALIDAE																		
Nigronia serricornis (Say)				*			*		*					3				
SIALIDAE																		
Sialis sp.				*	1					1		*	2			*		

*species collected only with "D" fame net.

Trichoptera (Caddisflies)

Larval Trichoptera were collected with Surber samplers and kick nets at all sampling sites.

The distribution and abundance of species in 35 genera of Trichoptera are recorded in Table 6.

The principal keys used for identification were Ross (1944) and Wiggins (1977). Additional references for specific groups were: Brachycentridae, Wiggins (1965); Hydropsychidae, Flint (1961); Leptoceridae including *Ceraclea*, Morse (1975) and Resh (1976), *Mystacides*, Yamamoto and Wiggins (1964) and *Nectopsyche*, Haddock (1977); Phryganaeidae, Wiggins (1960); Psychomyiidae, Flint (1964) and Rhyacophilidae, Flint (1961).

Aquatic Coleoptera (Beetles)

Aquatic Coleoptera were collected from 17 sites. Species belonging to the Elmidae and Psephenidae were collected with Surber samplers from areas of rapidly flowing water while the remaining species were collected with D frame nets from areas having reduced flow.

The distribution and abundance of species in 12 genera of Coleoptera are recorded in Table 7. The principal keys used for identification were Brown (1972), Leech and Chandler (1956) and Malcolm (1971). Additional references to specific groups were: Coleoptera in general, Young (1954), *Dubiraphia* (Elmidae), Hilsenhoff (1973) and *Psephenus* (Psephenidae), Brown and Murvosh (1974).

TABLE 6. Numbers of Trichoptera collected at 18 sites in the St. John River area.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
BRACHYCENTRIDAE																		
Brachycentrus sp.	*	3		1				*	27		*				2	*		
Micrasema sp.												6						
GLOSSOSOMATIDAE																		
Glossosoma sp.		9	1	2			2	2	9	278	37	45	11	99	7	5		
HELICOPSYCHIDAE																		
Helicopsyche borealis **(Hagen)**	*	*					2											
HYDROPSYCHIDAE																		
Cheumatopsyche sp.	1	6		37	1		7	1	30	11				197	1	1		
Hydropsyche sp.	18	14	*	48	3		1	7	34	28	28	104	11	154	1	12		
Macronema zebratum **(Hagen)**		4																
Parapsyche apicalis Banks									*									
HYDROPTILIDAE																		
Agraylea sp.						*												
Hydroptila sp.			3	4	11		13					1	2					
Ochrotrichia sp.				*														
Oxyethira sp.				2		*	1							1				15
LEPIDOSTOMATIDAE																		
Lepidostoma sp.	2	5	6					1	8	3	4	7	2		1	2	3	
LEPTOCERIDAE																		
Ceraclea sp.		1		1			1											
Mystacides sepulcharlis (Walker)					*			*										
M. sp.					*			*										15
†*Nectopsyche albida* (Walker)	*																	1
Setodes sp.				1														
Traienodes aba Milne																		*
LIMNEPHILIDAE						*						4	4					
Apatania sp.	*		*												2			
Grammotaulius sp.													3					
Hydatophylax sp.			*	*	*				*			*			*			
Limnephilus sp.				*	*													
Nemotaulius hostilis **(Hagen)**				*		1												1
Psychoglypha subborealis (Banks)						*						1	1					
Pycnopsyche sp.					*								3					
ODONTOCERIDAE																		
Psilotreta sp.							2							2	*			
PHILOPOTAMIDAE																		
Chimarra aterrima **Hagen**				15			*		1					18	2			
C. obscura (Walker)				17			1											
C. socia **Hagen**	1	2		53				1						56	1	2		
Dolophilodes distinctus (Walker)		1		3					6	1	2	19	1	22	1			
PHRYGANEIDAE																		
Banksiola sp.																		1
Phryganea sp.	*																	1
Ptilostomis sp.					*							*			*			
POLYCENTROPODIDAE																		
Neureclipsis sp.										1								
Polycentropus sp.				*		*	8					*	*					2
PSYCHOMYIIDAE																		
Psychomyia flavida **Hagen**					1													
P. nomada (Ross)							1											
RHYACOPHILIDAE																		
Rhyacophila acropedes Banks										1								
†*R. acutiloba* Morse and Ross				1							1	11						
R. fuscula (Walker)									*		2	4	*			1		
R. manistee Ross				*			1			1	2			2	2			
†*R. melita* Ross							*	1						1	*			
R. nigrita Banks												3						
R. spp.									1			1	1					

*species collected only with "D" frame net.
? tentative identification
† new state of Maine distributional record

TABLE 7. Numbers of Coleoptera collected at 18 sites in the St. John River area.

	SITE																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
DYTISCIDAE																		
Bidessus affinis (Say)															*			
Hydroporus (Oreodytes) sp.															*			
ELMIDAE																		
Dubiraphia minima Hilsenhoff ?															*			
D. sp. (larvae)			5	*	*		1											
Optioservus ovalis (LeConte)					4					6	4	11	4					
†*O. trivittatus* (Brown)		1		1	2				2					5	1			
O. spp. (larvae)	29	18		11	8		7	3	1	12	6	15	29	29	6	5	2	
Oulimnius tatuisculus (LeConte)												1	4					
Promoresia tardella (Fall)												18						
P. sp. (larvae)				2					*			38	2					
†*Stenelmis bicarinata* LeConte															1			
S. crenata (Say)				3	6		1											
S. spp. (larvae)	1	7		6	1	13			*				*	1	1	1		
GYRINIDAE																		
Gyrinus sp.			*		*										*			
HALIPLIDAE																		
Haliplus cribrarius LeConte						*												
HYDROPHILIDAE																		
Hydrobius fuscipes Linnaeus																*		
PSEPHENIDAE																		
Ectopria nervosa (Milsheimer)(larvae)				1	*													
Psephenus herricki (DeKay)(larvae)	1	7		7	2		12		3		1					*		

*species collected only with "D" frame net.
? tentative identification
† a new state of Maine distributional record.

Aquatic Diptera (Flies)

Aquatic Diptera were collected from all sites. The distribution and abundance of species in 43 genera are recorded in Table 8. The principal keys used for identification were Johannsen (1934, 1935, 1952), and Wirth and Stone (1956). Additional references for specific groups were: Ceratopogonidae, Thomsen (1937); Chironomidae, Beck (1976); Mason (1968), Stewart and Lock (1973); Simuliidae, Stone (1964) and Tabanidae, Pechuman (1972), and Teskey and Burger (1976).

Non-Insect Aquatic Macroinvertebrates

A variety of non-insect invertebrates were collected during sampling. Their distribution and abundance are recorded in Table 9. The principal keys used for identification were Pennack (1953) and Edmundson (1959). Additional references for specific groups were: Astacidae (Decapoda), Hobbs (1972); Hirundinea, Klemm (1972) and Pelecypoda, Burch (1972).

TABLE 8. Numbers of Diptera collected at 18 sites in the St. John River area.

	SITE																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CERATOPOGONIDAE																		
Palpomyia sp.		*	2	1	1	*	2	*		3		3			2			1
Stilobezzia sp.		1						1								2	1	
CHIRONOMIDAE																		
Conchapelopia sp.	1	*		2			7			2								
Ablabesmyia sp.																		*
Procladius sp.												*					*	3
Chironomus sp.																		*
Dicrotendipes sp.		1			1	*												*
Microtendipes sp.	3			1	1		77		1	8		4	71	2	1	6	4	
Einfeldia sp.																		*
Polypedilum sp.			*	1	*	*		*		1		1	12				1	*
Cryptochironomus sp.																	1	*
Endochironomus sp.				1														*
Phaenopsectra sp.				1														
Paralauternborniella sp.							2											
Robackia sp.								1										
Harnischia sp.																		*
Tanytarsus sp.				1	*			*		1				1				2
Unknown Tanytarsini							1		9			3		1				*
Micropsectra sp.	1			1	1		2		1			6	2	1	1			
Cricotopus sp.		1		2			1				1	7		9	1		*	
Rheocricotopus sp.	1																	
Orthocladius sp.								2	*									
Psectrocladius sp.						*												*
Parametriocnemus sp. ?										1								
Trichocladius sp.			*															
Trissocladius sp.														1				
Zalutschia sp.														*				
Corynoneura sp.				*	*													
Eukiefferiella sp.				*			*							1	*			
EMPIDIDAE																		
Hemerodromia sp.				1			2					1		3				
RHAGIONIDAE																		
Atherix lantha Webb	*	*	*	16	1		7	1	*	1	1	123	32	9		1		
SIMULIIDAE																		
Simulium parnassum Malloch (adult)			*														1	
S. penobscotensis Snoddy & Bauer (adult)			*	*					*									
S. tuberosum (Lundstroem)		3					1				1			4				
S. venustum (Say)				*										*			*	
TABANIDAE																		
Chrysops sp.			1		*													
Tabanus sp.	1	*					1											
TIPULIDAE																		
Antocha sp.				2	1		2			2				1				
Dicranota sp.			1								7	9						
Hexatoma sp.	5	5		1			*	1	*	3	8	2	1	3	4	1	3	
Limnophila sp.			*						*									
Tipula sp.				*								1	1					
Unidentified pupa											1							

*species collected only with "D" frame net.
? tentative identification

Lepidoptera (Butterflies and moths)

A single larval Lepidoptera was collected. Keys of Hilsenhoff (1975) and Lange (1956) were used for identification.

PYRALIDAE

Paraponyx Hubner

P. sp. — a single unidentified larva was collected at Falls Pond (Site 18).

TABLE 9. Numbers of non-insect macroinvertebrates collected at 18 sites in the St. John River area.

	SITE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
COELENTERATA																		
Hydrozoa																		
Hydroida																		
Hydridae																		
Hydra americana Hyman																		*
ANNELIDA																		
Oligochaeta																		
Haplotaxida																		
Naididae																		
Nais sp.	1	11		1			1	1		3					1			*
Pristina sp.	1																	
Stylaria proboscidea (O.F.M.)					*													
S. fossularis Leidy						*												5
Tubificidae																		
Peloscolex sp.-*Tubifex* sp.											1							*
Limnodrilus sp.												*						
Lumbriculida																		
Lumbriculidae																		
Lumbriculus sp.	3	5	5	1	1		2		2	14	7	2	1	4	6	2	4	*
Lumbricus sp.							1		*				1				*	
Hirudinea																		
Rhynchobdellida																		
Glossiphoniidae																		
Helobdella stagnalis Linnaeus																		*
Pharyngobdellida																		
Erpobdelladea																		
Dina sp.						*												
ARTHROPODA																		
Crustacea																		
Amphipoda																		
Talitridae																		
Hyalella azteca (Saussure)													1					47
Decapoda																		
Astacidae																		
Orconectes sp.				1									*					*
Arachnoidea																		
Hydrachnellae																		
Arrenuridae																		
Arrenurus sp.					*													*
Limnesiidae																		
Limnesia sp.					*	*												*
Unioniocolidae																		
Unionicola sp.																		*
MOLLUSCA																		
Gastropoda																		
Mesogastropoda																		
Ancylidae																		
Ferrissia sp.						*	1			1								*
Hydrobiidae																		
Amnicola sp.	*	1		1	*	*		*									*	*
Planorbidae																		
Gyraulus sp.												*						
Helisoma sp.	*					*											*	*
Planorbula sp.																		*
Physidae																		
Physa sp.	*											*	*	*				*
Valvatidae																		
Valvata tricarinata (Say)					*												*	*
Valvata sp.																		*
Pelecypoda																		
Sphaeriidae																		
Pisidium sp.	23	43	2	16	*		20							3				2
Sphaerium sp.		*			*	*												*
Unionidae																		
Lampsilis sp.						2												

*species collected only with "D" frame net.

DISCUSSION

This survey revealed the presence of a rich and varied, primarily rheophilic (flowing water) fauna. Undoubtedly there are many additional species present in the survey area which were not collected due to the restrictions of time and the intensity of the collecting. All possible habitats were not investigated. The fact that collections were made only during September meant that forms which were in the egg stage, buried deep within the substrate or in the terrestrial adult stage were not collected. It was also impossible to identify many of the immature forms since specific identification of aquatic insects is often based on the adult form.

Nevertheless, 184 insect species representing 146 genera, 60 families and 9 orders were collected. These include seven new distributional records for the state of Maine. In addition, a probable new species of *Baetisca* (Ephemeroptera: Baetiscidae) was also collected. Specimens of *Baetisca* were taken at Site 12 from beds of clean sand which had accumulated in eddies adjacent to obstructions left at an abandoned bridge site. The only specimens collected were immature and these were forwarded to the Laboratory of Aquatic Entomology at Florida A&M University for identification. It was the opinion of Dr. Manual Pescador, who is currently revising the family, that the nymphs probably represented an undescribed species. However, the exact identity of the nymphs cannot be confirmed until a series of reared adults has been examined.

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