THE AQUATIC INSECTS OF THE NARRAGUAGUS RIVER, HANCOCK AND WASHINGTON COUNTIES, MAINE

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The Aquatic Insects of the Narraguagus River, Washington and Hancock Counties, Maine.

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and
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The Narraguagus River is well known among fishermen and canoeists for its recreational aspects, but has received little scientific attention.

Bryant (1952) conducted a general survey of the watershed to obtain specific information on the accessibility of the river and its tributaries to salmon migration and to determine the distribution and abundance of spawning and rearing areas. River discharge, water temperature, obstructions to fish migration, and pollution sources were also recorded.

Hofmann (1966) assessed Atlantic salmon production in two nursery areas and evaluated the benthic macroinvertebrate community as a potential food source for salmon parr.

Mingo (1978) determined the identity and concentration of pesticide residues in the aquatic ecosystem and assessed the impact of those residues on the benthic community in riffle areas. Included in that study was a survey of the aquatic insect fauna of the east branch of the river and of selected tributaries. The results of that survey form the basis for this bulletin.

STUDY AREA

General Description

The Narraguagus River includes two principal branches which drain a combined area of approximately 373 square kilometers in Washington and Hancock Counties (Bryant, 1952). The main branch to the river, on which this survey was conducted, is the East Branch (Figure 1). It originates at Eagle Lake and flows southeasterly for a distance of approximately 69 kilometers where it reaches tide water at the U.S. Route 1 bridge in Cherryfield. The West Branch is the principal tributary of the system.

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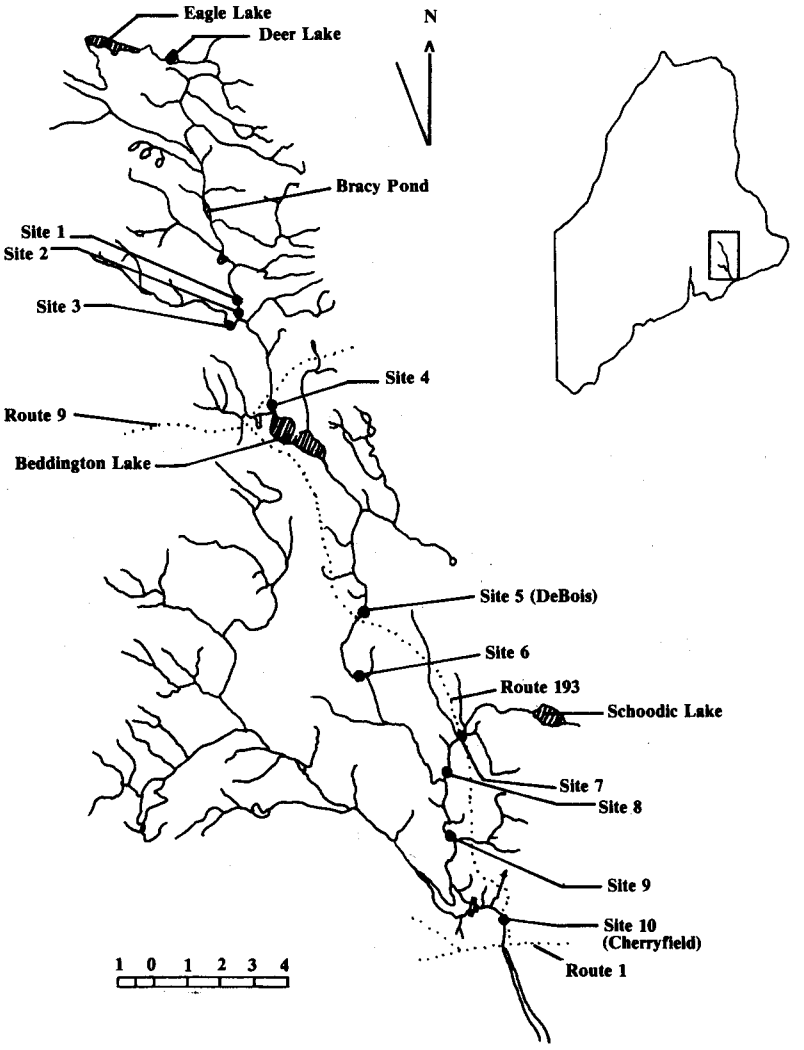

Figure 1. Area map of the Narraguagus River and tributaries, Hancock and Washington Counties, Maine.

It is approximately 40 kilometers long and drains a watershed of approximately 113 square kilometers. The two branches merge approximately 4 kilometers north of Cherryfield.

The southern reach of the river (from DeBlois to Cherryfield) passes through areas that are utilized for the commercial production of blueber-

ries and are locally known as "the barrens." The soil in this area was derived from sediment deposition during the Wisconsin glaciation and consists of a mixture of sand and gravel with occasional glacial erratics. Within the barrens, the river and its tributaries have cut channels from 12 to 18 meters deep in places.

North of DeBlois the topography becomes increasingly hilly and the river passes through areas of mixed conifers and hardwoods. The river in this area is characterized by riffles alternating with pools.

Site Descriptions

During the initial year of this study (1973), ten sample sites were established on the East Branch and two of its tributaries. Efforts were made to locate sites in areas having comparable flow regimens, substrates and water depths. Each site was located in a riffle area where water depths were between 30 and 45 centimeters and where the substrate consisted of sand, gravel, small stones, and rocks.

Site 1: Narraguagus River (East Branch) — 1.6 kilometers north of the confluence with Humpback Brook. The river was about 9 meters wide and had a substrate of small stones, coarse gravel, and sand.

Site 2: Narraguagus River (East Branch) — 30 meters north of the confluence with Humpback Brook. The river was about 9 meters wide and had a substrate of small stones, coarse gravel, and sand. Aquatic vegetation was present along narrow bands adjacent to both shores.

Site 3: Humpback Brook — 400 meters west of the confluence with the Narraguagus River. This tributary was approximately 2.4 meters wide and consisted of a straight walled channel with an unstable, sand substrate. Aquatic vegetation was present in narrow bands at the base of each bank where silt and organic material had accumulated. Water temperatures at this site were also consistently 5 to 10 degrees cooler than the main river.

Site 4: Narraguagus River (East Branch) — 1.6 kilometers south of the Route 9 bridge and about 1.6 kilometers north of Beddington Lake. This site was coincident with the southernmost site used by Hofmann (1966). The river was approximately 21 meters wide and consisted of a series of rapids having a substrate of boulders, large rocks, and medium sized stones. Most stones were from 15 to 30 centimeters in diameter. Intersticial areas and eddies behind obstructions were filled with small stones, coarse gravel, and sand.

Site 5: Narraguagus River (East Branch) — 45 meters north of the Route 193 bridge in DeBlois. The river was approximately 12 meters wide and consisted of a riffle area at the base of a large pool. The substrate was composed of small stones, coarse gravel, and sand.

Site 6: Narraguagus River (East Branch) — 6.4 kilometers south of DeBlois. This site was located near the center of the barrens. The river was approximately 9 meters wide and had a substrate of small stones, gravel, and sand.

Site 7: Schoodic Brook — 45 meters east of the Route 193 bridge. This site consisted of a sand bar immediately upstream of a small beaver dam. This area produced few macroinvertebrates and was abandoned after the first year of the study.

Site 8: Schoodic Brook — 800 meters east of the confluence of Schoodic Brook with the main river. At this site the tributary was a straight walled channel approximately 6 meters wide. The substrate consisted of coarse gravel, sand, and silt.

Site 9: Narraguagus River (East Branch) — at the confluence with Lawrence Brook. The river was approximately 21 meters wide and consisted of a riffle area at the base of a large pool. The west bank consisted of a large sand bar which extended to midstream. During periods of low water, this area became exposed, and the river was reduced in width to about 9 meters. The opposite bank was within the discharge of Lawrence Brook and had a substrate of large rocks, stones, gravel, and sand. Aquatic vegetation was present in a zone adjacent to the east bank.

Site 10: Narraguagus River — below the confluence of the East and West Branches approximately 800 meters north of the U.S. Route 1 bridge (tidewater) in Cherryfield. The river consisted of a series of rapids separated by large pools. The river was approximately 30 meters wide and had a substrate of large rocks and occasional boulders. Intersticial areas and eddies behind obstructions were filled with small stones, gravel, and sand. Aquatic vegetation was present in quiet areas adjacent to the west bank.

METHODS

Samples were taken at approximately monthly intervals from June through September of 1973 and 1974 with a modified Hess sampler which enclosed an area of 0.85 square meters. Three samples were taken at each site, preserved in the field in 70% ethanol and sorted by hand in the laboratory. Additional samples were taken at irregular intervals (approximately weekly) at each site from early March through mid-October of 1973 and 1974. These samples were taken with a "D" frame aquatic net, sorted in the field and preserved in 70% ethanol. Special collections were also taken from silty areas, aquatic vegetation, large rocks, and submerged, decaying wood.

The adult stages were collected whenever possible. Specimens were

collected in flight with an aerial net, by sweeping vegetation and by picking specimens directly from tree trunks, bridges and vegetation adjacent of the river.

Many adults were also obtained by rearing the immature stages in the laboratory. Mature nymphs were field collected, returned to the laboratory, and reared according to methods described by Burks (1953) and Wiggins (1977).

Emergence of adult insects was monitored at each site with a conical emergence trap modified from a design illustrated by Lattin (1956). Each trap enclosed an area of 0.40 square meters. Traps were maintained at all sites from June through September of 1973 and 1974 and were cleared of insects at weekly intervals.

All specimens (both adults and immatures) were identified to species whenever possible and verified by taxonomic specialists. State and national distributional records were determined through literature reviews and consultation with taxonomists. The occurrence of previously undescribed species was similarly determined.

Representative specimens of species reported in this inventory have been deposited in the aquatic insect collection of the Department of Entomology, University of Maine at Orono.

The inventory presented here is arranged phylogenetically by order and alphabetically within each order. A single asterisk indicates a new state distribution record and a double asterisk indicates a new national distribution record. A question mark indicates a tentative identification.

RESULTS

EPHEMEROPTERA

Ephemeroptera representing 10 families, 28 genera and 74 species were collected during this survey. Though most species were collected from areas of moderately or rapidly flowing water, 11 species occurred only in areas having reduced flow.

Principal taxonomic references: Burks (1953), Edmunds, et al. (1976) and Needham, et al. (1935).

Baetidae

Keys and Biology: Bergman and Hilsenhoff (1978)

Baetis Leach, 1815

This is one of the largest and taxonomically most difficult genera in the family. Adults are very similar and a number of synonymies are involved. In addition, nymphal identifications are often

based upon characteristics which can change with age, temperature, and locality. As a result, the following determinations should be considered as tentative. (The reader is advised that a key to the larvae of North American *Baetis* species has been published by Morihara and McCafferty (1979) since these determinations were made.)

Members of this genus were common throughout the study area and were typically collected from areas of rapidly flowing water.

**B. bicaudatus* Dodds — Adults: 21 June - 29 Sept.
Distribution: All sites

**B. brunneicolor* McDunnough — Nymphs: 1 Sept.
Distribution: Site 3

**B. frondalis* McDunnough — Nymphs: 4 July
Distribution: Site 6

B. hageni Eaton — Nymphs: 12 May
Distribution: Bracy Pond

**B. insignificans* McDunnough — Adults: 7 Sept.
Distribution: Sites 1, 2

B. intercalaris McDunnough — Nymphs: 14 Sept.
Distribution: Site 9

B. levitans McDunnough — Nymphs: 4 July
Distribution: Site 6

B. pluto McDunnough — Nymphs: 2 July
Distribution: Site 6

B. pygmaeus (Hagen) — Adults: 15 Sept.
Distribution: Sites 3, 4

B. quebecensis McDunnough — Adults: 28 June
Distribution: Site 4

B. spp. — Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10

Callibaetis Eaton, 1881

The only keys for this genus concern small geographic regions and are based on the rearing of local species. The genus is typically found in lentic habitats and may occur in large numbers where vegetation is abundant. Adults were collected from a partially impounded area of the river near Bracy Pond.

C. spp. Adults: 18 May

Centroptilum Eaton, 1869

Members of this genus were collected from areas having greatly reduced flow.

C. convexum Ide Nymphs: 4 July - 14 Sept.
Distribution: Sites 3, 8

C. rivulare Traver Adults: 16 Aug.
Distribution: Site 7

C. n. sp. Adults: 29 June - 24 Aug.
Distribution: Sites 7, 8, 10

C. spp. Nymphs: 4 July - 14 Sept.
Distribution: All sites

Cloeon Leach, 1815

Nymphs of this genus were typically found in slowly flowing backwaters along the river margins.

C. rubropictum McDunnough Adults: 12 July - 16 July
Distribution: Site 2

C. spp. Adults: 19 July - 15 Sept.
Distribution: Sites 1, 2, 8, 10

Heterocloeon McDunnough, 1925

H. curiosum (McDunnough) Nymphs: 4 July - 14 Sept.
Distribution: Site 6

Pseudocloeon Klapalek, 1905

P. carolina Banks Adults: 15 Aug.
Distribution: Site 4

****P. chlorops** (McDunnough) Adults: 25 June
Distribution: Site 4

***P. cingulatum** McDunnough Nymphs: 10 June - 14 Sept.
Distribution: Sites 1, 5

***P. punctiventris** McDunnough Adults: 15 Sept.
Distribution: Site 2

P. spp. Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 9

Baetiscidae

Keys and Biology: Berner (1955), Pescador and Peters (1974)

Representatives of this family were found in eddies, among accumulations of detritus, and buried in sandy areas along the stream margins.

Baetisca Walsh, 1862

B. bajkovi Neave? Nymphs: 9 June
Distribution: Site 8

B. obesa (Say) Nymphs: 9 June - 4 July
Distribution: Sites 4, 6, 8

Caenidae

Keys and Biology: McDunnough (1931)

Genera in this family are adapted for existence in slowly flowing, silty habitats. Specimens were collected only from areas of greatly reduced flow.

Brachycercus Curtis, 1834

B. laucustris (Needham) Adults: 16 Aug.
Distribution: Sites 7, 8 Nymphs: 16 Aug.

Caenis Stephens, 1835

C. spp. Nymphs: 16 Aug.
Distribution: Site 8

Ephemerellidae

Keys and Biology: Allen and Edmunds (1959; 1961 a, b; 1962 a, b; 1963 a, b; 1965)

This family is represented by a single genus which contains numerous widespread and abundant species. Nymphs inhabit a great variety of habitats and were collected from all sites.

Ephemerella Walsh, 1862

**E. aestiva* McDunnough — Adults: 4 July; Nymphs: 23 April
Distribution: Sites 1, 2, 3

E. attenuata McDunnough — Adults: 16 July
Distribution: Site 2

E. bicolor Clemens — Adults: 12 June
Distribution: Sites 1, 2, 5

E. cornutella McDunnough — Nymphs: 23 July
Distribution: Site 6

E. deficiens Morgan — Nymphs: 2 July
Distribution: Site 6

E. invaria (Walker) — Nymphs: 21 April
Distribution: Site 10

E. margarita Needham — Adults: 16 July
Distribution: Site 2

E. rotunda Morgan — Nymphs: 14 April
Distribution: Site 5

E. septentrionalis McDunnough — Nymphs: 10 June
Distribution: Site 1

E. serratoides McDunnough — Nymphs: 8 June
Distribution: Site 4

E. sorida McDunnough — Adults: 6 July
Distribution: Site 4

**E. subvaria* McDunnough — Nymphs: 14 April
Distribution: Sites 5, 6

E. temporalis McDunnough — Nymphs: 23 April - 19 July
Distribution: Sites 2, 8

E. tuberculata Morgan — Nymphs: 23 July
Distribution: Site 6

E. versimilis McDunnough — Nymphs: 8 June
Distribution: Site 4

E. walkeri Eaton — Nymphs: 4 July
Distribution: Site 6

E. spp. — Nymphs: 9 June - 14 Sept.
Distribution: All sites

Ephemeridae

Keys and Biology: McCafferty (1975)

Immature members of this family typically construct U-shaped burrows in areas of reduced water velocity where there are accumulations of sand, silt, and detritus.

Ephemera Linnaeus, 1758

Immatures of this genus were collected from a single site which was characterized by reduced flow and a sandy, silty substrate.

E. varia Eaton — Nymphs: 4 July
Distribution: Site 8

Hexagenia Walsh, 1863

Immatures of this genus typically occur in substrates of soft mud and clay which are firm enough to permit construction of burrows. Coarser substrates (sand, gravel, or peat) are avoided. Immature specimens were collected near shore where there were accumulations of detritus.

H. limbata Serville — Adults: 6 July - 27 July
Distribution: Sites 3, 8 — Nymphs: 19 July - 16 Aug.

Lithobrancha McCafferty, 1971

Nymphs occur in mixtures of sand and silt and are usually associated with colder, swifter streams. Specimens were collected near shore where detritus had accumulated.

L. recurvata (Morgan) — Nymphs: 19 April - 1 Sept.
Distribution: Site 3

Heptageniidae

Keys and Biology: Flowers and Hilsenhoff (1975), Lewis (1974), Richardson and Tarter (1976)

With the exception of one genus, the immature stages of this family are greatly flattened and occur in areas of rapidly flowing water.

Arthroplea Bengtsson, 1908

The immature stages of this genus show the least degree of flattening in the family. They are also exceptions to the general biology of the family as the nymphs inhabit ponds and other bodies of water with barely perceptible flow. The maxillary palpi are modified to form filtering organs which are swept through the water and over the substrate to gather particulate, organic matter. Nymphs were collected from a pond-like area in a beaver flowage.

A. bipunctata McDunnough — Nymphs: 23 April
Distribution: Site 7

Epeorus Eaton, 1881

E. pleuralis (Banks) — Nymphs: 14 April - 5 May
Distribution: Site 4

**E. rubidus* (Traver) — Nymphs: 27 May - 17 June
Distribution: Sites 5, 6

E. vitreus (Walker) — Adults: 15 Aug. - 8 Sept.
Distribution: Site 4 — Nymphs: 10 June - 15 Aug.

E. spp. — Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9

Heptagenia Walsh, 1863

H. hebe McDunnough — Adults: 4 July - 7 Sept.
Distribution: Sites 1, 2, 4, 5 — Nymphs: 27 May - 8 June

***H. horrida* McDunnough — Adults: 27 June - 31 July
Distribution: Sites 2, 10

H. minerva McDunnough — Adults: 2 July
Distribution: Site 4

H. spp. Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 8, 9, 10

Rhithrogena Eaton, 1881

Although the immature stages of this genus key readily, only adult males can be identified with certainty. As a result nymphal determinations must be considered as tentative.

R. amica Traver Nymphs: 10 June
Distribution: Site 4

**R. uhari* Traver Nymphs: 21 June
Distribution: Site 4

R. spp. Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 4, 5, 6, 9

Stenacron Jensen, 1974

S. interpunctatum (Say) Adults: 11 July - 23 July
Distribution: Sites 1, 8, 10

Stenonema Traver, 1933

S. annexum Traver Nymphs: 10 June - 27 July
Distribution: Sites 1, 10

S. fuscum Clemens Adults: 17 June
Distribution: Sites 2, 4 Nymphs: 14 April - 1 Sept.

S. f. rivulicolum McDunnough Nymphs: 14 April
Distribution: Site 4

S. smithae Traver Nymphs: 19 July
Distribution: Site 4

S. spp. Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 8, 9, 10

Leptophlebiidae

Keys and Biology: Berner (1975), Clifford, et al. (1979), Hayden and Clifford (1974).

Habrophlebia Eaton, 1881

The immature stages of this genus are normally found among

vegetation or leaf debris near the edges of streams where there are accumulations of silt.

H. vibrans Needham — Adults: 25 June - 6 July
Distribution: Sites 1, 2, 3, 4, 5, 8

Habrophlebiodes Ulmer, 1920
H. americana (Banks) — Adults: 25 June - 11 July
Distribution: Sites 1, 2, 5, 8 — Nymphs: 19 April

Leptophlebia Westwood, 1840
L. cupida (Say) — Adults: 23 May - 8 June
Distribution: Sites 3, 6, 8

**L. intermedia* Traver — Nymphs: 23 April
Distribution: Site 3

L. nebulosa (Walker) — Nymphs: 23 April
Distribution: Site 3

Paraleptophlebia Lestage, 1917
P. guttata McDunnough — Adults: 27 July - 15 Aug.
Distribution: Sites 1, 2, 4

P. mollis (Eaton) — Nymphs: 29 March - 10 June
Distribution: Sites 2, 4

P. spp. — Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 8, 9, 10

Metretopodidae
Keys and Biology: Berner (1978), Clifford (1976)

Metretopus Eaton, 1901
Nymphs occur in slowly flowing streams among vegetation.

M. borealis Eaton — Nymphs: 9 June
Distribution: Site 8

Siphloplecton Clemens, 1915
Nymphs were often collected from vegetation in areas of very shallow water near shore.

S. basale (Walker)
Distribution: Sites 2, 3

Adults: 10 April - 12 May
Nymphs: 29 March - 9 April

Siphlonuridae

Isonychia Eaton, 1871

The immature stages of this genus are very strong swimmers and are usually found in areas of rapidly flowing water. The front legs of the nymphs possess rows of long setae which overlap to form filters which strain particulate materials from the current. Nymphal characteristics may vary with age and only adult males can be identified with certainty. Thus nymphal identifications must be considered as tentative.

I. notata Traver
Distribution: Site 6

Nymphs: 23 July

I. sadleri Traver
Distribution: Site 1

Nymphs: 2 July

I. spp.
Distribution: Sites 1, 2, 4, 5, 6

Nymphs: 9 June - 14 Sept.

Siphlonurus Eaton, 1868

The immature stages of this genus were frequently found among vegetation in very shallow areas near shore.

S. alternatus (Say)
Distribution: Site 2

Nymphs: 16 July

**S. marginata* Traver
Distribution: Site 2

Nymphs: 11 July

**S. marshalli* Traver
Distribution: Sites 1, 2, 3

Adults: 5 June
Nymphs: 9 April - 10 June

S. mirus Eaton
Distribution: Site 3

Adults: 25 May (field collection)
5 June (reared)

S. spp.
Distribution: Sites 1, 2, 4

Adults: 10 June - 15 July

Tricorythidae

Tricorythodes Ulmer, 1920

Immature members of this genus are adapted for life in silty habitats and typically occur in streams having little or no flow. The genus was widely distributed but generally collected from quiet areas of the river.

T. atratus McDunnough — Nymphs: 14 Sept.
Distribution: Site 1

T. minutus Traver — Adults: 31 July - 8 Sept.
Distribution: Sites 1, 2, 4, 8

T. spp. — Nymphs: 8 Aug. - 14 Sept.
Distribution: Sites 1, 2, 4, 6, 8, 9, 10

ODONATA

Odonata representing 9 families, 22 genera and 36 species were collected during the course of this survey. Few species occurred among the lotic habitats where most sampling took place. As a result few naiads were collected. Most species were captured as adults and probably represent species more typical of lentic habitats.

Principal taxonomic references: Needham and Westfall (1955), Smith and Pritchard (1956), Walker (1912, 1953, 1958) and Walker and Corbet (1975).

ANISOPTERA — Dragonflies

Dragonflies were the most commonly collected representatives of the order. Though most species are large and conspicuous, all are expert fliers and are extremely difficult to capture. Adults were widely distributed in the survey area but were never abundant.

Aeshnidae

Among the Odonata, the Aeshnidae is presently the dominant family. All adults are above average in size with some species constituting the giants of the order.

Aeshna Fabricius, 1775

A. canadensis Walker — Adults: 19 July
Distribution: Site 1

A. interrupta interrupta Walker — Adults: 8 Sept. - 15 Sept.
Distribution: Sites 3, 5

A. umbrosa Walker — Adults: 7 Sept.
Distribution: Site 4

Basiaeshna Selys, 1883
B. janata Say — Adults: 5 June - 19 July
Distribution: Sites 1, 2, 10

Boyeria McLachlan, 1896
B. vinosa Say — Adults: 1 Sept. - 15 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 9

Cordulegastridae

Cordulegaster Leach, 1815
C. maculatus Selys — Naiads: 14 Sept. - 15 Sept.
Distribution: Site 3

Corduliidae

Dorocordulia Needham, 1901
D. libera Selys — Adults: 21 June
Distribution: Site 5

Helocordulia Needham, 1901
H. uhleri Selys — Naiads: 14 April
Distribution: Site 4

Somatochlora Selys, 1871
S. minor Calvert — Adults: 6 July
Distribution: Site 1

Gomphidae

Members of this family were most frequently collected from lotic habitats. The immature stages lie partially buried in the substrate where they wait to ambush prey.

Gomphus Leach, 1815
G. (Gomphus) abbreviatus Hagen? — Naiads: 14 April - 6 July
Distribution: Sites 4, 5

G. (Gomphus) exilis Selys — Adults: 6 July - 12 July
Distribution: Sites 1, 4, 5

G. (Gomphus) spicatus Hagen — Adults: 8 June
Distribution: Site 4

G. (Gomphurus) fraternus Say? — Naiads: 29 March
Distribution: Site 2

G. (Hylogomphus) brevis Hagen — Adults: 23 June - 19 July
Distribution: Sites 1, 10

Hagenius Selys, 1854

Members of this genus are greatly flattened and are often found among accumulations of leaf materials in quiet areas.

H. brevistylus Selys — Adults: 31 July
Distribution: Site 1

Ophiogomphus Selys, 1854

This genus was particularly common in areas of flowing water.

O. aspersus Morse — Adults: 19 July - 24 Aug.
Distribution: Site 1

O. mainensis Packard — Adults: 23 June
Distribution: Sites 2, 4, 5, 6 — Naiads: 29 March - 19 July

O. spp. — Naiads: 23 April - 12 May
Distributions: Sites 1, 2, 5, 6

Stylogomphus Needham, 1897

S. albistylus Hagen — Naiads: 19 April - 14 Sept.
Distribution: Sites 1, 2, 4, 5

Libellulidae

Libellula Linnaeus, 1758

L. exusta Say — Adults: 12 June - 28 June
Distribution: Site 4

L. quadrimaculata Linnaeus — Adults: 8 June - 2 July
Distribution: Sites 3, 4

Sympetrum Newman, 1833
S. internum Montgomery — Adults: 31 July - 7 Sept.
Distribution: Sites 2, 3, 4, 5, 8

Macromiidae

The immature stages of this family inhabit large streams and lakes but are absent from areas of rapidly flowing water.

Didymops Rambur, 1842
D. transversa Say — Adults: 8 June
Distribution: Site 4

Macromia Rambur, 1842
M. illinoiensis Walsh — Naiads: 9 April - 29 Sept.
Distribution: Sites 2, 5

ZYGOPTERA — Damselflies

Calopterygidae

Members of this family were conspicuous among vegetation in sunny areas along the river. Adults have broad wings which are conspicuously banded with black. The naiads are slender, long-legged and are usually found clinging to vegetation and debris.

Calopteryx Leach, 1815
C. aequabilis (Say) — Adults: 21 June - 9 Aug.
Distribution: Sites 1, 3

C. amata Hagen — Adults: 23 June - 28 June
Distribution: Sites 1, 2, 5, 6

C. maculata (Beauvois) — Adults: 6 June - 12 July
Distribution: Sites 1, 2, 4

Coenagrionidae

Adult members of this family are usually small, brightly colored and have clear wings. Naiads are usually green or brown and occur among vegetation in quiet areas.

Argia Rambur, 1842
A. moesta (Hagen) — Adults: 4 July - 16 Aug.
Distribution: Sites 1, 2, 4, 6

A. violacea (Hagen) — Adults: 11 July - 9 Aug.
Distribution: Sites 1, 2, 3

Chromagrion Needham, 1903
C. conditum (Hagen) — Adults: 21 June - 6 July
Distribution: Sites 1, 3

Coenagrion Kirby, 1890
C. resolutum (Hagen) — Adults: 25 June
Distribution: Site 3

Enallagma Charpentier, 1840
E. ebrium Hagen — Adults: 23 June
Distribution: Site 5

E. exsulans (Hagen) — Adults: 4 July - 11 July
Distribution: Sites 1, 2, 4

E. hageni (Walsh) — Adults: 23 June - 6 July
Distribution: Site 5

Ischnura Charpentier, 1840
I. verticalis Say — Adults: 28 June - 16 July
Distribution: Sites 1, 3, 4

Lestidae
Lestes Leach, 1815
L. congener Hagen — Adults: 7 Sept.
Distribution: Site 2

L. rectangularis Say — Adults: 16 Aug.
Distribution: Site 4

PLECOPTERA

Plecoptera representing 8 families, 19 genera and 46 species were collected in the course of this survey. All species collected were common in areas of rapidly flowing water. Few occurred in areas having reduced flow.

Principal taxonomic references: Hilsenhoff (1975), Hitchcock (1974) and Surdick and Kim (1976).

Capniidae

Keys and Biology: Harper and Hynes (1971a)

Members of this family are collectively referred to as winter stoneflies. Adults were typically collected from the surface of snow banks adjacent to the river from mid-winter until early spring.

Allocapnia Claassen, 1924

A. maria Hanson — Adults: 29 March - 9 April
Distribution: Sites 2, 3

This species is a close relative of *A. pechumani* Ross and Ricker and *A. minima* (Newport) and hybridizes with both. *A. pechumani* occurs in New York, southern Quebec and New Brunswick but has yet to be reported from Maine. The range of *A. maria* includes most of Maine and lies almost entirely within that of *A. minima*. Throughout the area of overlap, occasional hybrid swarms appear.

Hybridization was first demonstrated between *A. maria* and *A. minima* by Hanson (1960). He observed only ten specimens which were sufficiently intermediate between the two parental types to be considered as true hybrids. However, he also found evidence of introgression of genetic characters when large collections of the two species were compared. Of several thousand males of *A. maria* and *A. minima* examined by Ross and Ricker (1971) only a dozen specimens were indubitable hybrids though a large number showed intermediate characteristics between the two species.

During the course of this survey, adult males representing intermediates between *A. maria* and *A. minima* (P.P. Harper, personal communication) were also observed. These were collected on April 9th and 10th at Sites 2, 4 and 6 and consisted of only five specimens.

A. minima (Newport) — Adults: 1 March — 23 April
Distribution: Sites 2, 3, 4, 6, 9

A. pygmaea (Burmeister) — Adults: 1 March - 5 May
Distribution: Sites 2, 3, 4

Paracapnia Hanson, 1946

P. angulata Hanson — Adults: 27 May
Distribution: Site 9

P. opis (Newman) Adults: 9 April - 27 May
Distribution: Sites 2, 4, 5 Nymphs: 1 March

P. spp. Nymphs: 9 April
Distribution: Sites 2, 4

Chloroperlidae

Adult members of this family are normally small insects that are yellow or green in color. The immature stages are very similar and cannot be identifies to species.

Alloperla Banks, 1906

A. atlantica (Say) Adults: 10 June - 12 July
Distribution: Sites 2, 4, 5, 6, 9

A. caudata Frison Adults: 10 June - 2 July
Distribution: Site 4

A. chloris Frison Adults: 21 June - 12 July
Distribution: Sites 4, 9, 10

****A. idei* (Ricker) Adults: 21 June - 13 July
Distribution: Sites 9, 10

***A. leonarda* Ricker Adults: 17 June
Distribution: Site 6

****A. onkos* Adults: 10 June
Distribution: Site 4

A. spp. Nymphs: 8 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 8, 9, 10

Hastaperla Ricker, 1935

H. brevis (Banks) Adults: 10 June - 11 July
Distribution: Sites 4, 5, 6, 7, 8, 9, 10

***H. orpha* (Frison) Adults: 27 May - 17 June
Distribution: Sites 2, 6

H. spp. Nymphs: 4 July 8 Aug.
Distribution: Sites 1, 2, 4, 5, 6, 7, 8, 9, 10

Leuctridae

Keys and Biology: Harper and Hynes (1971b)

The immature stages of this family are detritivores and inhabit gravel where there are accumulations of debris.

Leuctra Stephen, 1835

L. duplicata Claassen — Adults: 17 June
Distribution: Site 6

L. sibleyi Claassen — Nymphs: 19 April
Distribution: Site 4

L. tenella Provancher — Nymphs: 9 June
Distribution: Site 2

L. tenuis (Pictet) — Adults: 25 June - 24 Aug.
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 8, 10

L. spp. — Nymphs: 6 June - 1 Aug.
Distribution: All sites

Paraleuctra Hanson, 1941

P. sara (Claassen) — Adults: 5 May
Distribution: Site 4

Nemouridae

Keys and Biology: Harper and Hynes (1971c)

Nemoura Latrielle, 1796

N. albidipennis Walker — Nymphs: 23 April
Distribution: Site 5

N. completa Walker — Adults: 5 May
Distribution: Site 4

****N. macdunnoughi* Ricker — Adults: 5 May
Distribution: Sites 3,4 — Nymphs: 19 April

N. perfecta Walker — Adults: 5 May
Distribution: Sites 3, 4 — Nymphs: 19 April

N. truncata Claassen — Nymphs: 19 April
Distribution: Site 3

Perlidae

Keys and Biology: Frison (1935), Stark and Gaufin (1976a, b).

The Perlidae are large insects which occupy a wide variety of aquatic habitats. They are most common in areas of rapidly flowing water which have rubble substrates. Most specimens were collected from riffle areas or from vegetation adjacent to such areas.

Acroneuria Pictet, 1841

The immature stages exhibit life cycles requiring at least two years to complete. As a result the immature stages usually may be collected throughout the year.

A. abnormis (Newman) — Adults: 17 June - 29 June
Distribution: Sites 4, 10

A. lycorias (Newman) — Nymphs: 19 April
Distribution: Site 4

A. spp. — Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 4, 5, 6, 9, 10

Neoperla Needham, 1905

N. clymene (Newman) — Adults: 6 July 23 July
Distribution: Sites 1, 2, 4, 5, 6, 9, 10 — Nymphs: 6 July

Paragnetina Klapalek, 1907

The immature stages of this genus occur in large permanent streams and have a two to three year life cycle.

P. immarginata (Say) — Adults: 17 June
Distribution: Sites 2, 4, 5, 6 — Nymphs: 19 April - 10 June

Perlesta Banks, 1906

Members of this genus are among the smallest of the family. They require one year to complete development.

P. placida (Hagen) — Adults: 16 July 16 Aug.
Distribution: Sites 1, 2, 4, 10 — Nymphs: 19 April

Perlinella Banks, 1900

P. drymo (Newman) — Adults: 10 June - 17 June
Distribution: Sites 4, 6, 9 — Nymphs: 14 April - 28 Sept.

Phasganophora Klapalek, 1921

P. capitata (Pictet) — Adults: 25 June - 20 July
Distribution: Sites 1, 2, 4, 5, 6, 9, 10 — Nymphs: 19 April

Perlodidae

Keys and Biology: Harden and Mickel (1952), Hilsenhoff and Billmyer (1973), Tarter (1976)

The Perlodidae is one of the most abundant and widespread families in the order. Nymphs may be found in a wide variety of habitats.

Isogenus Newman, 1833

The immature stages are carnivorous and require one year to complete development.

I. hansoni Ricker — Nymphs: 9 April - 19 April
Distribution: Site 4

I. hastatus Banks — Nymphs: 11 July
Distribution: Site 4

Isoperla Banks, 1906

Although most members of this genus are carnivorous, the observed food habits are diverse (Hilsenhoff 1975).

I. dicala Frison — Adults: 10 June - 28 June
Distribution: Sites 4, 5 — Nymphs: 2 July

****I. *francesca*** Harper — Nymphs: 19 April
Distribution: Sites 4, 5

I. frisoni Illies — Adults: 10 June - 12 July
Distribution: Sites 1, 2, 4, 9, 10 — Nymphs: 10 June

I. lata Frison — Adults: 10 June
Distribution: Sites 4, 6 — Nymphs: 1 March - 10 April

I. richardsoni Frison (species complex) — Nymphs: 27 May
Distribution: Site 5

I. signata (Banks) — Adults: 17 June - 11 July
Distribution: Sites 1, 3, 4, 6 — Nymphs: 19 April - 23 April

I. transmarina (Newman) — Adults: 27 May
Distribution: Sites 2, 4, 5, 9 — Nymphs: 19 April - 23 April

I. n. sp. (A) — Adults: 10 June - 17 June
Distribution: Sites 4, 6

I. n. sp. (B) — Adults: 10 June
Distribution: Site 4

I. spp. — Nymphs: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10

Pteronarcidae

Keys and Biology: Tarter (1976)

Members of this family are among the largest representatives of the order. The immature stages require several years to complete development and are easily recognized by their size and the presence of gill tufts on the abdominal segments. Specimens were collected in association with submerged, decaying wood.

Pteronarcys Newman, 1838
P. dorsata Say — Nymphs: 11 July - 8 Aug.
Distribution: Sites 2, 6

Taeniopterygidae

Keys and Biology: Harper and Hynes (1971d), Ricker and Ross (1968, 1975).

Members of this family inhabit large streams and rivers. They are medium-sized insects which emerge during late winter and early spring.

Blotoperla Ricker and Ross, 1975
**B. rossi* Frison — Adults: 5 May
Distribution: Site 4

Brachyptera Newport, 1851
B. glacialis (Newport) — Nymphs: 9 April - 5 May
Distribution: Sites 2, 4

Taeniopteryx Pictet, 1841
T. burksi Ricker and Ross — Nymphs: 1 March - 19 April
Distribution: Site 3

T. parvula Banks — Adults: 9 April - 21 April
Distribution: Sites 2, 4

HEMIPTERA

Hemiptera representing 7 families, 8 genera, and 8 species were collected during the course of this survey. Since the primary sampling emphasis of this survey was placed on lotic habitats rather than lentic, the Hemiptera are under represented. Undoubtedly further collections will reveal the presence of a rich and diverse hemipteran fauna.

Principal taxonomic references: Brooks and Kelton (1967), Hungerford (1948) and Usinger (1956).

Belostomatidae

Members of this family were collected among vegetation and debris in a small impoundment near Bracy Pond.

Belostoma Latreille, 1807
B. flumineum Say — Adults: 12 May

Corixidae

Members of this family occur in nearly all ponds, lakes, and streams. Specimens were typically observed among aquatic vegetation and debris in quiet areas along the river margins, but were generally not collected.

Sigara Fabricius, 1775
S. spp. — Adults: 19 July
Distribution: Sites 2, 8

Gerridae

Representatives of this family inhabited quiet areas of the water surface and occurred abundantly in such areas.

Gerris Fabricius, 1794
G. spp. — Adults: 19 July
Distribution: Site 2

Nepidae

Keys and Biology: Gonsoulin (1975).

This family inhabits shallow, shady pools which usually contain accumulations of debris and decaying vegetation. Specimens were found clinging to aquatic vegetation in a quiet area near shore at Site 4.

Ranatra Fabricius, 1790

R. fusca Palisot de Beauvois Adults: 29 Sept.

Notonectidae

Specimens of this family were collected in aquatic vegetation and debris in shallow areas near the river margin.

Notonecta Linnaeus, 1758

N. spp. Adults: 19 July

Distribution: Sites 2, 8

Saldidae

Members of this family inhabit beaches and shorelines of lakes, ponds, and streams. Specimens were collected from large rocks and other midstream obstructions in areas of rapidly flowing water at Site 9. Two genera were tentatively identified.

Isoncytus Reuter, 1912

I. spp. Adults: 27 July

Pentacora Reuter, 1912

P. spp. Adults: 11 July

Veliidae

Members of this family are small, surface dwelling species which occur in areas of rapidly flowing water.

Rhagovelia Mayr, 1865

This genus was typically collected from the swifter riffle areas of the river at Site 1.

R. obesa Uhler Adults: 19 Aug.

COLEOPTERA

Aquatic Coleoptera representing 9 families, 21 genera and 26 species were collected during this survey. Species belonging to the Dryopidae,

Elmidae, and Psephenidae were collected from areas of rapidly flowing water. The remaining species were collected from areas with reduced flow.

Principal taxonomic references: Brown (1972), Hilsenhoff (1975), Leech and Chandler (1956) and Malcolm (1971).

Chrysomelidae

Keys and Biology: Bayer and Brockmann (1975)

Donacia Fabricius, 1775

A single large larva was collected 9 June from Site 3.

Galerucella Crotch, 1873

Larvae and pupae were collected from waterlilies (*Nuphar* sp.) at Site 10 and reared.

G. nymphaeae (Linnaeus) — Adults: 19 Aug. - 21 Aug.
Larvae: 16 Aug.

Dryopidae

Keys and Biology: Brown (1975)

Helichus Erichson, 1847

Adults were collected from under a large slab of bark near shore at Site 6.

H. fastigiatus (Say) — Adults: 8 Aug.

Dytiscidae

Hydroporus Clairville, 1806

This genus contains numerous species and was last revised by Fall in 1923. Since then, additional species have been described and the genus is again in need of revision (Malcolm, 1971). As a result specific identifications were not attempted.

H. spp. — Adults: 11 July - 14 Sept.
Distribution: Site 7

Elmidae

Keys and Biology: Brown (1975), Brown and White (1978), Hilsenhoff (1973), Mingo (1979), White (1978).

Members of this family were the most frequently encountered representatives of the order. Most species have life cycles which require several years to complete (Brown 1973). As a result the adult and immature stages may be collected throughout the year.

Ancyronyx Erichson, 1847

This genus contains a single species and was collected only in association with submerged, decaying wood.

A. variegata (Germar) Adults: 21 June - 15 Sept.
Distribution: Sites 5, 9, 10

Dubiraphia Sanderson, 1954

Adult members of this genus were found in association with aquatic vegetation and submerged, decaying wood. Larvae were collected from substrates of sand and gravel. Larvae cannot be identified to species.

D. minima Hilsenhoff Adults: 16 July - 4 Aug.
Distribution: Sites 7, 8, 10

D. quadrinotata (Say) Adults: 11 July - 16 Aug.
Distribution: Sites 3, 8, 10

D. vittata (Melsheimer) Adults: 18 May - 15 Sept.
Distribution: Sites 2, 3, 7, 8, 10

D. n. sp. Adults: 11 July
Distribution: Site 3

D. spp. Larvae: 19 July - 28 Sept.
Distribution: Sites 3, 5, 8, 9

Macronychus Muller, 1806

This genus contains a single species. Specimens were collected only in association with submerged, decaying wood.

M. glabratus Say Adults: 16 June - 27 Sept.
Distribution: Sites 1, 2, 4, 5, 6, 9, 10 Larvae: 15 Sept.

Optioservus Sanderson, 1954

This genus was commonly collected from a variety of substrates but was never abundant.

O. ovalis (LeConte) Adults: 9 April - 8 Sept.
Distribution: Sites 3, 4, 5, 6 Larvae: 9 June - 27 Sept.

Oulimnius Des Gozis, 1886

This genus is represented in Maine by a single species which occurs abundantly in smaller, upland streams typical of mountainous areas (Mingo 1979). Adults were collected from the two northern most sites (Sites 1, 2) and were represented by single specimens.

O. latiusculus (LeConte) Adults: 15 Sept.

Promoresia Sanderson, 1954

Members of this genus were commonly collected from a variety of substrates.

P. elegans (LeConte) Adults: 8 Aug.
Distribution: Sites 5, 6, 9

P. tardella (Fall) Adults: 19 April - 28 June
Distribution: Sites 2, 3, 9

P. spp. Larvae: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10

Stenelmis Dufour, 1835

This was the most frequently collected coleopteran genus. Adults and larvae were common in riffle areas, on aquatic vegetation and on submerged, decaying wood. Larvae cannot be identified to species.

S. crenata (Say) Adults: 9 April - 15 Sept.
Distribution: Sites 1, 2, 4, 5, 6, 9

S. mera Sanderson Adults: 10 June - 15 Sept.
Distribution: Sites 3, 4, 5, 6, 10

S. spp. Larvae: 29 June - 27 Sept.
Distribution: All sites

Gyrinidae

Adult members of this family formed large schools which were frequently observed in sheltered areas of the river.

Dineutus MacLeay, 1825

D. discolor Aube — Adults: 29 Aug. - 14 Sept.
Distribution: Sites 1, 2, 4, 5, 9, 10

Gyrinus Geoffroy, 1762

This genus contains many species which are poorly defined (Malcolm 1971). As a result species determinations were not attempted.

G. spp. — Adults: 19 April - 1 Sept.
Distribution: Sites 1, 3, 4, 7, 8

Haliplidae

Keys and Biology: Hilsenhoff and Brigham (1978)

Haliplus Latreille, 1802

Adults were commonly observed among vegetation and detritus along the margins of the river but were generally not collected.

H. connexus Metheson — Adults: 11 July
Distribution: Site 3

Hydrophilidae

Crenitis Bedel, 1881

C. digestus (LeConte) — Adults: 10 June - 7 Sept.
Distribution: Sites 1, 4

Helophorous Fabricius, 1775

H. spp. — Adults: 16 July
Distribution: Site 6

Laccobius Erichson, 1837

L. agilis Randall? — Adults: 16 July
Distribution: Site 6

Sperchopsis LeConte, 1862

Adults of this genus were collected at Sites 5 and 7 from the flotation blocks on the emergence traps when they were inverted to remove spiders and accumulated debris.

**S. tesselatus* (Ziegler) — Adults: 21 June - 28 Sept.

Psephenidae

Keys and Biology: Brown and Murvosh (1974), Murvosh (1971).

Ectopria LeConte, 1853

This genus was widely distributed but infrequently collected. Only larvae were collected.

E. nervosa (Melsheimer) Larvae: 14 April - 14 Sept.
Distribution: Sites 1, 4, 5, 6, 9, 10

Psephenus Haldeman, 1853

Adults of this genus congregated in large numbers on obstructions which protruded from areas of rapidly flowing water.

P. herricki (DeKay) Adults: 6 July - 4 Aug.
Distribution: Sites 1, 2, 4, 5, 6, 9, 10

Ptilodactylidae

Keys and Biology: LeSage and Harper (1976)

Anchytarsus Guerin-Meneville, 1843

This genus contains a single species. The larvae are xylophagous and are found only in areas containing submerged, decaying wood. This genus was represented by the collection of a single larva from the outfall of Deer Lake.

A. bicolor (Melsheimer) Larva: 29 March

MEGALOPTERA

Megaloptera representing 2 families and 2 genera each containing a single species were collected during the course of this survey.

Principal taxonomic references: Tarter (1976), Tarter, et al. (1976), and Chandler (1956a).

Corydalidae

Keys and Biology: Neunzig (1966)

Larval Corydalidae occur in a variety of habitats but prefer coarse, rubble substrates where they can move freely within the stream bed. Larvae were collected exclusively from areas of rapidly flowing water.

Nigronia Banks, 1908

N. serricornis (Say) — Adults: 6 July - 16 July
Distribution: Sites 1, 2, 3, 4, 5, 6, 9 — Larvae: 15 June - 28 Sept.

Sialidae

Keys and Biology: Ross (1937)

Sialis Latreille, 1802

Larvae of this genus were often found in large numbers in backwater areas where there had been an accumulation of organic debris. However, larvae were not restricted to such habitats and were collected from riffle areas as well.

S. vagans Ross — Adults: 16 June - 21 June
Distribution: Sites 3, 7

S. spp. — Larvae: 14 April - 14 Sept.
Distribution: Sites 1, 3, 5, 7, 8, 10

NEUROPTERA

The Neuroptera were represented by a single family and 2 genera each containing a single species. Immatures are predaceous upon freshwater sponges and are found only in association with these hosts.

Principal taxonomic references: Brown (1952) and Chandler (1956b).

Sisyridae

Climacia McLachlan, 1869

C. areolaris (Hagen)? — Larvae: 1 March
Distribution: Site 2

Sisyra Burmeister, 1839

S. vicaria (Walker) — Adults: 25 June
Distribution: Site 7

DIPTERA

Aquatic Diptera representing 11 families, 45 genera and 64 species were collected during this survey.

Principal taxonomic references: Alexander (1942, 1962), Johannsen (1934, 1935) and Wirth and Stone (1956).

Athericidae

Keys and Biology: Webb (1977)

Atherix Meigan, 1803

This genus is represented in the eastern United States by a single species. Larvae were widely distributed and commonly collected.

A. lantha Webb — Larvae: 1 March - 14 Sept.
Distribution: Sites 1, 3, 4, 5, 6, 9, 10

Blephariceridae

Blepharicera Macquart, 1843

Larvae and pupae of this genus occurred in areas of rapidly flowing water.

B. tenuipes (Walker)? — Pupae: 10 June - 16 July
Distribution: Sites 2, 4, 6, 9, 10 — Larvae: 4 April - 16 July

Ceratopogonidae

Keys and Biology: Thomsen (1937), Wirth (1952, 1953), Wirth and Grogan (1977)

Heteromyia Say, 1825

**H. fasciata* Say — Adults: 16 July
Distribution: Site 2

Palpomyia Meigen, 1818

P. spp. — Larvae: 14 April - 28 Sept.
Distribution: Sites 1, 2, 3, 4, 6, 8, 9, 10

Stilobezzia Kieffer, 1911

S. spp. — Larvae: 9 June
Distribution: Site 9

Chironomidae

Members of this family were the most frequently encountered representatives of the order. Larvae and adults occurred throughout the study area, during all sampling periods and in all habitats. Adults, collected from emergency traps, were frequently found to harbor parasitic mites.

Representatives of these associations were forwarded to the Biosystematics Research Institute, (Ottawa, Ontario, Canada) for identification and are listed below. Parasites associated with these hosts are reported by Mingo (1978). Additional information concerning parasitic mites and their hosts may be found in a review by Smith and Oliver (1976).

Ablabesmyia Johannsen, 1905
A. spp. Adults: 16 July
Distribution: Site 2

Chironomus Meigen, 1800
C. spp. (complex) Adults: 28 June - 7 Sept.
Distribution: Sites 1, 4

Cladotanytarsus Kieffer, 1922
C. spp. Adults: 27 July - 24 Aug.
Distribution: Site 7

Cricotopus Van der Wulp, 1874
C. spp. Adults: 19 July - 29 Aug.
Distribution: Sites 1, 2, 3, 4, 7

Eukiefferiella Thienemann, 1926
E. spp. Adults: 28 June - 1 Sept.
Distribution: Sites 2, 5, 7

Microcriocotopus Thienemann and Harrish, 1932
M. spp. Adults: 28 June - 1 Sept.
Distribution: Sites 1, 2, 7

Microtendipes Kieffer, 1915
M. spp. Adults: 28 June - 23 July
Distribution: Sites 3, 4, 8

Orthocladius Van der Wulp, 1874
O. spp. Adults: 19 July - 7 Sept.
Distribution: Sites 2, 3, 7

Paramerina Sittkau, 1962
P. spp. Adults: 9 Aug.
Distribution: Site 8

Pentaneura Philippi, 1865
P. spp. Adults: 28 June
Distribution: Site 6

Phaenopsectra (s. s.) Kieffer, 1921
P. spp. Adults: 2 July - 16 Aug.
Distribution: Sites 8, 10

Phaenopsectra (Tribelos) Kieffer, 1921
P. spp. Adults: 28 June - 27 July
Distribution: Sites 4, 8, 10

Polypedilum Kieffer, 1913
P. spp. Adults: 28 June - 29 Aug.
Distribution: Sites 2, 4, 7, 8

Strictochironomus Kieffer, 1919
S. spp. Adults: 2 July
Distribution: Site 7

Stempellina Bause, 1913
S. spp. Adults: 19 July
Distribution: Sites 4, 8

Tanytarsus Van der Wulp, 1874
T. spp. Adults: 28 June - 21 Sept.
Distribution: Sites 1, 2, 3, 4, 6, 7, 8, 10

Thienemannamyia Fittakau, 1957
T. spp. Adults: 6 July
Distribution: Site 2

Two additional chironomid genera contain species which form phoretic associations with a variety of aquatic hosts. The biology and taxonomy of these associations are discussed by Hilsenhoff (1968) and Steffan (1967a, b).

Plecopteracoluthus Steffan, 1965
Larvae belonging to this genus were found to form phoretic associations with a variety of hosts which included: *Nigronia serricornis* (Say) (Megaloptera: Corydalidae); *Acroneuria abnormis* (Newman), *A. lycorias* (Newman), and *Phasganophora capitata* (Pictet) (Plecoptera: Perlidae); *Calopteryx aequabilis*

(Say) (Odonata: Calopterygidae) and *Argia moesta* (Hagen) (Odonata: Coenagrionidae).

**P. downesi* Steffan — Larvae: 9 April - 14 Sept.
Distribution: Sites 2, 3, 4, 5, 6, 9

Symbiocladius Kieffer, 1925

Larvae of this genus are parasitic on mayfly nymphs belonging to the family Heptageniidae. The principal host species was *Epeorus vitreus* (Walker). Occasional specimens of *Heptagenia hebe* McDunnough were also found to harbor parasites. However, the low incidence of parasitism suggests that this species is an incidental host only.

**S. equitans* Claassen — Adults: 15 Aug. - 24 Aug. (reared)
Distribution: Sites 1, 4 — Pupae: 9 April - 21 Sept.
Larvae: 9 April - 15 Sept.

Culicidae

Adult mosquitoes were a common and persistent nuisance throughout the study area but were generally not collected. As a result this family is poorly represented in the survey. A check list of mosquito species occurring in Maine may be found in McDaniel (1975).

Culex Linnaeus, 1758

C. spp. — Adults: 19 July - 5 Aug.
Distribution: Sites 3, 7

Dolichopodidae

Hydrophorus Fallen, 1823

Larvae of this genus were collected under stones, slightly above the water line.

H. spp. — Larvae: 14 April - 9 June
Distribution: Sites 4, 5, 8

Empididae

Keys and Biology: Melander (1947)

Clinocera Meigen, 1803

C. spp. — Larvae: 9 June
Distribution: Sites 1, 2, 3, 4, 9, 10

Hemerodromia Meigen, 1822

H. spp. — Larvae: 1 March - 4 July
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10 — Pupae: 10 June - 2 July

Nymphomyiidae

Keys and Biology: Cutten and Kevan (1970), Kevan and Cutten-Ali-Khan (1975).

Palaeodipteron Ide, 1965

The collection of a pair of adults of this genus represented the first reported occurrence of the family from the United States (Mingo and Gibbs 1976).

P. walkeri Ide — Adults: 8 Aug.
Distribution: Site 2

Simuliidae

Keys and Biology: Davies, et al. (1961), Stone (1964), Stone and Snoddy (1969), Wood, et al. (1963).

Adult specimens were captured during attacks upon the authors. Larvae were common only in areas of rapidly flowing water.

Cnephia Enderlein, 1921

C. mutata (Malloch) — Larvae: 29 April
Distribution: Site 3

Prosimulium Roubaud, 1906

P. fontanum Syme and Davies — Larvae: 29 April - 5 May
Distribution: Site 3

P. mixtum Syme and Davies — Larvae: 29 April
Distribution: Sites 3, 4

P. multidentatum (Twinn) — Adults: 12 May - 9 June
Distribution: Sites 1, 2, 3

Simulium Latreille, 1802

S. jenningsi Malloch — Adults: 28 June - 29 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 9, 10

S. venustum Say — Adults: 8 June - 28 June
Distribution: Sites 1, 2, 3, 4, 6, 7, 8

Larvae of five additional species were collected during late summer and early fall. However, the collection dates for these species have been lost. These additional species included: *S. fibrinflatum* Twinn (Site 2), *S. nyssa* Stone and Snoddy (Sites 4, 5), *S. tuberosum* (Lundstroem) (Site 4), *S. verecundum* Stone and Jamnback (Site 2), and *S. vittatum* Zetterstedt (Sites 2, 4). Unidentified larvae of *Simulium* species were also collected from Sites 1, 2, 4, 5, 6, 9, 10

Tabanidae

Keys and Biology: Burton (1975), Pechuman (1972), Teskey (1969), Teskey and Burger (1976).

Chrysops Meigen, 1800

All adult representatives of this genus were females which were taken during attacks upon the authors.

C. ater Macquart — Adults: 16 June - 28 June
Distribution: Sites 2, 3, 5, 6

C. carbonarius Walker — Adults: 16 June - 28 June
Distribution: Sites 1, 2, 3, 5, 6

C. cincticornis Walker — Adults: 12 July
Distribution: Site 1

C. cuclux Whitney — Adults: 16 June - 12 July
Distribution: Sites 1, 2, 3, 5, 6

C. excitans Walker — Adults: 28 June - 12 July
Distribution: Sites 1, 3

C. frigidus Osten Sacken — Adults: 28 June
Distribution: Site 2

C. macquarti Philip — Adults: 20 Aug.
Distribution: Site 3

C. mitis Osten Sacken — Adults: 21 June - 28 June
Distribution: Sites 3, 4, 5

C. shermani Hine — Adults: 28 June
Distribution: Site 3

C. spp. Larvae: 9 June - 14 Sept.
Distribution: Sites 3, 5, 8

Hybomitra Enderlein, 1922

Adults were strongly attracted by the shape and color of the tires of the vehicle used during the survey and were collected from inside the windows after becoming trapped in the vehicle.

H. epistates (Osten Sacken) Adults: 21 June
Distribution: Site 5

H. lasiophthalmus (Macquart) Adults: 21 June
Distribution: Site 1

H. lurida (Fallen) Adults: 21 June
Distribution: Site 5

H. nuda (McDunnough) Adults: 16 June
Distribution: Site 6

Tabanus Linnaeus, 1758

T. fairchildi Stone Larvae: 10 June - 11 July
Distribution: Sites 4, 5, 6

Tipulidae

A revised key to this family (Byers 1978) has been published since the following identifications were made. As a result the genera listed below must be considered as tentative identifications.

Antocha Osten Sacken, 1859

A. spp. Larvae: 19 April - 24 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10

Dicranota Zetterstedt, 1838

D. spp. Larvae: 14 April - 14 Sept.
Distribution: Sites 5, 6

Dicranophragma Osten Sacken, 1859

D. spp. Larvae: 5 May
Distribution: Site 4

Eriocera Macquart, 1838

E. spp. Larvae: 5 May - 14 Sept.
Distribution: Sites 2, 4, 5, 8

Helobia Lepeletier and Serville, 1828
H. spp. Larvae: 9 June
Distribution: Site 8

Hexatoma Latreille, 1809
H. spp. Larvae: 19 July - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 9

Limnophila Macquart, 1834
L. spp. Larvae: 9 June - 27 Sept.
Distribution: Sites 4, 5, 6, 7b, 9, 10

Pseudolimnophila Alexander, 1919
P. spp. Larvae: 14 April - 14 Sept.
Distribution: Sites 4, 6

Tipula Linnaeus, 1758
T. spp. Larvae: 14 April - 27 May
Distribution: Sites 4, 5

Ulomorpha Osten Sacken, 1869
U. spp. Larvae: 4 July
Distribution: Site 6

TRICHOPTERA

Trichoptera representing 17 families, 46 genera and 73 species were collected during the course of this survey. Representatives of the order were widely distributed throughout the study area and were collected at all sites. The majority of taxa occupied areas of flowing water though others were common only in areas of slowly flowing water.

Principal taxonomic references: Anderson (1976), Hilsenhoff (1975), Ross (1944) and Wiggins (1977).

Brachycentridae

Keys and Biology: Gallepp (1974, 1977), Wiggins (1965)

Brachycentrus Curtis, 1834

The immature stages of this genus typically construct tapering four-sided cases. Larvae were particularly common and conspicuous on stones in rapidly flowing water.

B. lateralis (Say)? Adults: 27 May
Distribution: Site 2

B. numerosus (Say) Adults: 12 May — 8 June
Distribution: Site 2

B. n. sp. Adults: 27 May
Distribution: Sites 2, 4

B. spp. Larvae: 1 March - 14 Sept.
Distribution: Sites 2, 4, 9, 10

Micrasema McLachlan, 1876

Larvae occur in areas of rapidly flowing water in small, cold streams where they are usually found attached to stones and vegetation.

M. wataga Ross Adults: 25 June - 19 July
Distribution: Sites 1, 2, 3, 4, 8

M. spp. Larvae: 1 March - 14 Sept.
Distribution: Sites 2, 3, 6, 9

Glossosomatidae

The larval stages of this family usually construct "turtle shell" cases which incorporate ballast stones for increased weight. The larvae are specialized for feeding upon diatoms, green algae, and fine organic material which occurs on the exposed, uppermost portions of rocks within riffle areas.

Agapetus Curtis, 1834

A. pinatus Ross Adults: 6 July
Distribution: Site 2

**A. rossi* Denning Adults: 25 June - 12 July
Distribution: Sites 1, 2, 4, 6

A. spp. Larvae: 9 June
Distribution: Sites 1, 2, 4, 6, 10

Glossosoma Curtis, 1834

G. lividum (Hagen) Adults: 10 June - 6 July
Distribution: Sites 1, 2, 3, 4, 10 Larvae: 23 June - 14 Sept.

**G. nigrior* Banks — Adults: 5 May - 27 July
Distribution: Site 4

G. spp. — Larvae: 9 June - 14 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 9, 10

Protoptila Banks, 1904
P. maculata (Hagen) — Adults: 28 June - 4 July
Distribution: Sites 5, 6

P. spp. — Larvae: 4 July - 14 Sept.
Distribution: Sites 5, 6

Goeridae

Members of this family feed on periphyton growing on large rocks in rapidly running water. The larval cases also incorporate ballast stones for increased weight.

Goera Curtis, 1834
G. calcarata Banks — Adults: 17 June - 12 July
Distribution: Sites 1, 5, 6 — Larvae: 14 Sept.

G. fuscula Banks — Larvae: 18 May
Distribution: Site 3

G. spp. — Larvae: 4 July - 14 Sept.
Distribution: Sites 1, 2, 3, 5, 6, 9

Helicopsychidae

Helicopsyche Hagen, 1866

Larvae construct a tightly coiled, snail-like case from grains of sand and typically occupy intersticial spaces in areas of rapidly moving water.

H. borealis (Hagen) — Adults: 29 June - 31 July
Distribution: Sites 1, 2, 3, 4, 6, 8, 9, 10 — Larvae: 29 June

Hydropsychidae

Keys and Biology: Flint (1961), Malas and Wallace (1977), Schuster and Etnier (1978), Wallace (1975a, b), Wallace and Malas (1976a, b), Williams and Hynes (1973)

This is the second largest family in the order. All larvae are filter feeders and may be found in any type of running water. The larvae construct nets with specific mesh sizes which vary with species and instar.

Cheumatopsyche Wallengren, 1891

**C. gracilis* (Banks) — Adults: 28 June - 12 July
Distribution: Sites 2, 5

C. minuscula (Banks) — Adults: 25 June - 23 July
Distribution: Sites 1, 3, 4, 7, 8, 10

C. spp. — Adults: 28 June - 13 July
Distribution: All sites — Larvae: 29 March - 27 Sept.

Diplectrona Westwood, 1840

D. modesta Banks — Adults: 17 June
Distribution: Site 6

Hydropsyche Pictet, 1834

H. betteni Ross — Adults: 28 June - 1 Sept.
Distribution: Sites 1, 2, 4, 7, 8

H. morosa Hagen — Adults: 10 June - 21 June
Distribution: Sites 4, 5

H. sparna Ross — Adults: 21 June - 23 July
Distribution: Sites 4, 5, 10

H. walkeri Betten and Mosely — Adults: 28 June - 12 July
Distribution: Site 4

H. spp. — Larvae: 29 March - 27 Sept.
Distribution: All sites

Macronema Burmeister, 1839

The larval stages of this genus construct extremely fine capture nets which are capable of retaining microseston. As a result, larvae are able to occupy large rivers or areas below impoundments which lack large suspended particulate materials. Details of the capture nets are described by Wallace (1975a) and Wallace and Sherberger (1974, 1975).

M. zebratum (Walker) Adults: 29 June - 13 July
Distribution: Dear Lake Outfall and Sites 9, 10 Larvae: 29 March - 8 Aug.

Hydroptilidae

Members of this family are among the smallest representatives of the order and are collectively referred to as the micro-caddisflies. The larvae inhabit all types of permanent waters including cold springs, rivers and lakes. The larvae are frequently overlooked due to their small size, usually 2-3 mm.

Agraylea Curtis, 1834
A. sp. Larvae: 1 March - 8 Aug.
Distribution: Sites 1, 2, 3, 6, 9, 10

Hydroptila Dalman, 1819
H. fiskei Blickle Adults: 16 July
Distribution: Site 4

H. xoncla Ross Adults: 28 June
Distribution: Site 1

H. spp. Larvae: 8 Aug.
Distribution: Sites 1, 4

Ithytrichia Eaton, 1873
I. clavata Morton? Adults: 17 Aug.
Distribution: Sites 1, 2, 4, 5, 6, 10

Mayatrichia Mosely, 1937
M. spp. Larvae: 31 Aug.
Distribution: Site 5

Oxyethira Eaton, 1873
O. sp. Adults: 16 July
Distribution: Sites 2, 4 Larvae: 6 July

Lepidostomatidae

Larvae inhabit smaller, cooler streams but may occur in large rivers. The larvae are detritivores and are associated with accumulations of plant debris.

Lepidostoma Rambur, 1842
L. americanum (Banks) Adults: 27 July
Distribution: Site 1

L. costalis (Banks) — Adults: 31 July
Distribution: Site 3

L. swannanoa Ross — Adults: 17 June
Distribution: Site 6

L. togatum (Hagen) — Adults: 16 June - 24 Aug.
Distribution: Sites 1, 2, 4, 5, 7, 10

L. spp. — Larvae: 10 June - 27 Sept.
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 9, 10

Leptoceridae

Keys and Biology: Haddock (1977), Lehmkuhl (1970), Merrill and Wiggins (1971), Morse (1975), Resh (1976), Resh, et al. (1976), Yamamoto and Wiggins (1964).

The larval stages of this family occupy a variety of habitats but are predominantly found in large streams and ponded environments.

Ceraclea Stephens, 1829

Larvae in this genus occur in both lentic and lotic habitats. Many are detritivores though several are exclusively predaceous upon freshwater sponges.

**C. wetzeli* Ross — Adults: 2 July - 6 July
Distribution: Sites 4, 8

C. spp. — Adults: 2 July - 11 July
Distribution: Sites 1, 4, 5 — Larvae: 1 March - 2 July

Mystacides Berthold, 1827

The larval stages of this genus inhabit shallow, quiet areas along lake shores, ponds and streams.

M. sepulcharlis (Walker) — Adults: 25 June - 16 Aug.
Distribution: Sites 2, 3, 4, 5, 6, 7, 8, 10 — Larvae: 16 July

Nectopsyche Muller, 1879

N. spp. — Larvae: 21 Aug.
Distribution: Site 10

Oecetis McLachlan, 1877

O. avara (Banks) — Adults: 28 June - 31 July
Distribution: Sites 1, 2, 4, 5, 9, 10 — Larvae: 9 June

O. inconspicua (Walker) — Adults: 21 June - 16 Aug.
Distribution: Sites 1, 2, 3, 5, 7, 8, 9, 10 — Larvae: 6 July - 16 July

O. persimilis (Banks) — Adults: 4 July - 12 July
Distribution: Sites 5, 10

O. spp. — Larvae: 9 June - 4 July
Distribution: All sites

Setodes Rambur, 1842

S. incerta (Walker) — Adults: 27 July
Distribution: Sites 2, 9

S. spp. — Larvae: 4 July
Distribution: Sites 1, 2, 5, 6, 9

Triaenodes McLachlan, 1865

The larval stages of this genus possess long fringes of swimming hairs on the hind legs and are thus able to move freely within the water column. Larvae commonly occur among beds of submerged aquatic vegetation.

T. ignita (Walker) — Adults: 2 July - 6 July
Distribution: Site 8

T. marginata Sibley — Adults: 11 July - 27 July
Distribution: Sites 1, 8

T. tarda Milne? — Larvae: 2 July
Distribution: Site 1

Limnephilidae

This family is the largest representative of the order in North America. Larvae feed primarily upon plant materials and occur in a wide variety of aquatic habitats. Most larvae taken were from areas of reduced flow where there were accumulations of plant materials.

Anabolia Stephens, 1837

A. bimaculata (Walker) — Adults: 28 June - 16 July
Distribution: Sites 6, 8, 10

A. spp. — Larvae: 12 May
Distribution: Bracy Pond

Apatania Kolenti, 1848

A. spp. — Adults: 5 May
Distribution: Site 4

Frenesia Betten and Mosley, 1940

F. difficilis (Walker) — Larvae: 4 July
Distribution: Sites 2, 3

Ironoquia Banks, 1900

I. spp. — Larvae: 5 May
Distribution: Site 4

Limnephilus Leach, 1815

This genus contains approximately 95 species in North America. However, only five species of larvae have been associated with their adult stages. Larvae were collected from areas of reduced flow.

L. spp. — Larvae: 12 May - 14 Sept.
Distribution: Sites 1, 2

Neophylax McLachlan, 1871

The larvae of this genus occur in rapidly flowing water. They feed upon diatoms and fine organic materials on the upper surface of rocks. Larvae also incorporate ballast stones during case construction to increase weight and stability in the current.

N. consimilis Betten? — Larvae: 19 April
Distribution: Site 3

**N. fuscus* Banks — Adults: 29 Sept. - 7 Oct.
Distribution: Sites 1, 2

N. oligius Ross — Adults: 7 Sept. - 7 Oct.
Distribution: Sites 1, 2

N. spp. — Adults: 9 June
Distribution: Sites 1, 2, 3

Platycentropus Ulmer, 1905
P. radiatus (Say)? Larvae: 1 March - 5 May
Distribution: Sites 3, 4

Psychoglypha Ross, 1944
**P. subborealis* (Banks) Larvae: 4 July
Distribution: Sites 3, 8

Pycnopsyche Banks, 1905
P. guttifer (Walker) Adults: 24 Aug. - 21 Sept.
Distribution: Sites 4, 8, 10 Larvae: 5 May - 31 May

P. lepida (Hagen) Adults: 24 Aug.
Distribution: Site 2

P. spp. Larvae: 9 June - 14 Sept.
Distribution: Sites 2, 3, 4, 7, 8, 10

Molannidae

Larvae in this family construct flattened cases and typically occur on sandy substrates in areas of reduced flow.

Molanna Curtis, 1834
M. musetta Betten Adults: 18 July - 23 July
Distribution: Site 8

M. spp. Adults: 11 July
Distribution: Site 1

Odontoceridae

Psilotreta Banks, 1899

Larvae occur in riffle areas and feed primarily on plant materials, algae, and fine organic particles.

P. indecisa (Walker) Adults: 21 June
Distribution: Sites 1, 2, 4 Larvae: 19 April - 23 July

Philopotamidae

Larvae belonging to this family construct elongated, sack-like nets which depend upon the current for inflation and efficient filtering. Larval retreats and capture nets are described by Malas and Wallace (1977) and Wallace and Malas (1976a).

Chimarra Stephens, 1829

C. aterrima Hagen — Adults: 10 June - 16 Aug.
Distribution: Sites 2, 4, 5, 6, 8, 9, 10 — Larvae: 29 March - 27 May

C. obscura (Walker) — Adults: 4 July
Distribution: Sites 4, 9, 10 — Larvae: 29 March - 27 Aug.

C. socia Hagen — Adults: 17 July - 23 July
Distribution: Sites 1, 2, 3, 4, 5, 6, 7, 8, 10 — Larvae: 18 May - 6 July

C. spp. — Adults: 6 July - 15 Sept.
Distribution: All sites

Dolophilodes McLachlan, 1868

This genus is represented in the eastern United States by a single species. Adult females emerging during the colder periods of early spring lack wings while those occurring during warmer periods have fully developed wings. Gradations between the two extremes do not occur. This phenomenon appears to be the result of temperature acting upon the final larval instar (Ross 1944). Males do not display such wing dimorphism. Wingless females were not collected after 5 May.

D. distinctus (Walker) — Adults: 1 March - 27 July
Distribution: Sites 3, 4, 5, 6, 7, 8 — Larvae: 6 July

Phryganeidae

Keys and Biology: Wiggins (1960)

Larvae occur in a wide variety of lentic and lotic habitats. Larvae are omnivorous and are most typically collected from areas having reduced flow.

Oligostomis Kolenati, 1848

O. spp. — Larvae: 16 Oct.
Distribution: Site 3

Phryganea Linnaeus, 1758

P. cinerea Walker — Adults: 12 July
Distribution: Site 2

Ptilostomis Kolenati, 1859

P. spp. Larvae: 1 March - 5 May
Distribution: Sites 3, 4

Polycentropodidae

Keys and Biology: Flint (1964)

The larval retreats produced among this family exhibit considerable diversity of structure. All retreats are fixed in position and in most cases are essentially short tubes which are equally open at either end. However, some are trumpet-shaped and depend upon a gentle current for inflation and efficient filtration. Others have long chambered tubes constructed deep within the substrate.

Neureclipsis McLachlan, 1864

Larvae in this genus construct large, trumpet-shaped nets which depend upon the current for inflation. As a result larvae are restricted to areas with slower currents.

N. crepuscularis (Walker) Adults: 21 June - 16 July
Distribution: Sites 1, 2, 4, 5, 9 Larvae: 27 Aug.

Nyctiophylax Brauer, 1865

**N. banksi* Morse Adults: 16 July - 27 July
Distribution: Sites 1, 2

N. celta Denning Adults: 28 June - 29 June
Distribution: Sites 4, 10 Larvae: 8 Sept. - 14 Sept.

Phylocentropus Banks, 1907

P. carolinus Carpenter Adults: 25 June - 11 July
Distribution: Sites 1, 4, 7, 8, 10

P. placidus (Banks) Adults: 21 June - 11 July
Distribution: Sites 1, 5, 8, 10

P. spp. Larvae: 4 July - 16 July
Distribution: Sites 1, 3, 4, 5, 7, 8, 9, 10

Polycentropus Curtis, 1835

P. cinereus Hagen Adults: 25 June - 31 July
Distribution: Sites 4, 7, 8, 10

P. spp. Larvae: 18 May - 28 June
Distribution: Sites 1, 3, 4, 5, 7, 8, 9, 10

Psychomyiidae

Most members of this family inhabit cool, running water. The larvae occupy slender, winding tubes which are often ten or more times their length. The diet consists mainly of algae and detritus.

Lype McLachlan, 1879
L. diversa (Banks) — Adults: 2 July - 27 July
Distribution: Sites 3, 5, 7

Rhyacophilidae

Keys and Biology: Flint (1962), Schmid (1970)

Members of this family are among the most primitive representatives of the order. Larvae are free living and construct neither a case nor a retreat. They are largely carnivorous and are typically found in cool, mountain streams.

Rhyacophila Pictet, 1834
R. carolina Banks — Adults: 28 June
Distribution: Site 7

R. fuscula (Walker) — Adults: 5 Aug. - 21 Aug.
Distribution: Sites 4, 10 — Larvae: 14 Sept. - 28 Sept.

R. manistee Ross? — Larvae: 29 March - 9 April
Distribution: Site 2

R. vuphiphes Milne — Adults: 1 Aug. - 9 Aug.
Distribution: Sites 4, 9 — Larvae: 4 July

R. spp. — Larvae: 9 June - 14 Sept.
Distribution: Sites 2, 4, 5, 6, 7, 9, 10

Sericostomatidae

Keys and Biology: Ross and Scott (1974), Ross and Wallace (1974)

Agarodes Banks, 1899
A. distinctum (Ulmer) — Adults: 4 July - 12 July
Distribution: Sites 1, 2, 3, 5

A. spp. — Larvae: 1 March - 9 June
Distribution: Site 2

LEPIDOPTERA

The aquatic Lepidoptera collected during this survey were represented by a single family and two genera each of which contained a single species.

Principal taxonomic references: Hilsenhoff (1975) and Lange (1956b)

Pyralidae

Keys and Biology: Heppner (1976), Lange (1956a), Lavery and Costa (1976)

Members of this family were collected from aquatic vegetation in slowly to moderately flowing water. Larvae occurred in retreats constructed from excised leaf materials and silk secretions.

Parargyractis Lange, 1956
P. fulicalis (Clemens) — Adults: 6 July - 16 July
Distribution: Sites 4, 10 — Larvae: 27 Aug.

Paraponyx Hubner, 1826
P. obscuralis (Grote) — Larvae: 28 June - 4 July
Distribution: Sites 2, 3, 4

DISCUSSION

The aquatic insect survey presented here was limited by sampling intensity, habitat diversity and seasonal accessibility. Primary sampling emphasis was placed upon the flowing water habitats of the main river and selected tributaries. As a result those species typically found in pond habitats or in areas having greatly reduced flow are poorly represented in this inventory. Further collections from such habitats will undoubtedly correct this deficiency.

The inventory was further restricted by taxonomic problems. Many aquatic species cannot be identified as immatures, subimagos, or as females. However, within these limitations, the inventory revealed the presence of a rich and diverse aquatic insect fauna. The inventory contains 333 species, representing 193 genera, 75 families and 10 orders of insects. The inventory includes 6 new national distributional records and 27 new state distributional records. In addition 5 previously undescribed species were collected.

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