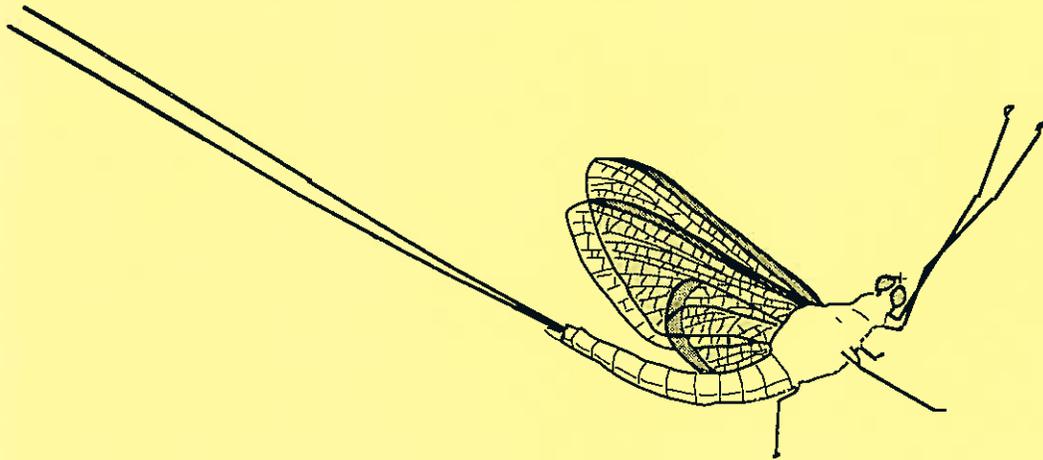


# Mayfly Watch 1997

Results and Recommendations

Year One  
of a Citizen Volunteer Project  
Along the Ohio Shore of Lake Erie



Submitted to the Ohio Lake Erie Office  
in Partial Fulfillment of  
Lake Erie Protection Fund Project LEPF-97-30

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## Executive Summary

"Mayfly Watch" was started in the spring of 1997 as a cooperative effort between the Water Quality Laboratory of Heidelberg College and over two dozen volunteers who live, work, or engage in recreation along the shoreline of the central basin of Lake Erie in Ohio. It is part of a larger project on the recolonization of Lake Erie by native burrowing mayflies known locally as fishflies, shadflies, and Canadian soldiers, and scientifically as *Hexagenia*.

Burrowing mayflies were abundant in shallow regions of Lake Erie before they were killed by increasing levels of pollution. The huge swarms of mayflies that were characteristic of the Lake Erie shoreline in early summer until the mid-1950s disappeared for almost forty years. Probably because of largescale reductions in the pollution of the lake, the burrowing nymphs of *Hexagenia* began to recolonize the western basin in the early 1990s, and large swarms of the mayflies reappeared along the shoreline by 1995.

Although the burrowing nymphs represent a renewed food resource year-around for the Lake Erie fishery, swarming adults in summer present an unsightly nuisance and threaten industrial operations as well as public safety. It has been predicted that as *Hexagenia* continues to repopulate the western basin, these mayflies will expand their range into the shallow nearshore waters of the central basin. As a means to determine the presence, general location, and relative size of mayfly populations offshore, Mayfly Watch was established on shore as a more effective way to gather that information than the traditional biological sampling of lake sediments.

The specific objectives in 1997 were to establish a volunteer network that would gather information at regularly spaced intervals along the shoreline regarding (1) the number of nights between 15 June and 31 July that winged *Hexagenia* were present on shore, (2) the seasonal timing and duration of their presence on shore, and (3) the extent to which their presence was synchronized on specific dates from place to place along the central basin shoreline and with varying weather conditions.

Twenty-two locations were established along the lakeshore from Erie County to the Pennsylvania state line (Ashtabula County). *Hexagenia* were found at all locations except two. In addition, a related mayfly called

*Ephemera simulans* was found near the eastern and western ends of the study area.

*Hexagenia* appeared at a few locations in late June, but in general it first appeared toward the western end of the study area on 2 July 1997 and began to appear successively later further eastward through 6 July. Similarly, the last observations were made later to the west and generally earlier toward the east. Observers found the mayflies at most locations fewer than eight of the 47 days. There was not a recognizable relationship between preexisting weather conditions and the days when mayflies were seen. Because 1997 was the first year of Mayfly Watch, it was not clear from the widespread but infrequent appearance of *Hexagenia* whether the mayflies had been present along the shoreline in earlier years or whether 1997 was the first year in recent decades that they exhibited such a wide distribution. The next two years of Mayfly Watch will help to answer that question.

The results of the first year lead to the following recommendations:

- Mayfly Watch should be continued in 1998 and 1999 as planned, using as many of the original volunteers as possible, and filling in existing gaps in coverage along the shoreline.
- Weather data should be gathered along with mayfly observations in ensuing years, as relationships between weather conditions and mayfly swarms may become evident if the abundance of the mayflies increases.
- Future years of Mayfly Watch should include more extensive collections of specimens by the volunteers in order to provide a better estimate of the geographic distribution of the individual species.

winged *Hexagenia* (species *limbata* and *rigida*) along the lakeshore beginning in 1992 following their absence of nearly forty years, provided the first evidence that the burrowing mayflies were finding the lake bottom suitable once again<sup>4</sup>.

From a few isolated areas of the western basin where they could still be found in the 1980s and early 1990s, the nymphs have increased their geographic coverage of the basin and also their abundance every year since about 1992. (Details of the range expansion through 1995 were presented in a report by Krieger and coworkers<sup>4</sup>.) By the summer of 1997, burrowing nymphs were found from the mouths of the Maumee and Ottawa rivers in Toledo to the mouth of the Detroit River, and as far east as the South and Middle Passages in the island area. Their abundance in May 1997 ranged from fewer than 30 nymphs per square meter of sediment at a few sampling locations to more than 1,500 per square meter a few miles beyond the Detroit River and Maumee Bay<sup>5,6</sup>. Table 1 demonstrates the very rapid increase in the numbers of *Hexagenia* nymphs in the sediments of the western basin.

Table 1. Mean number of *Hexagenia* nymphs per square meter of lake bottom found in May 1995 through 1997 at three locations, and averaged for 23 locations, in the western basin of Lake Erie.

	north of Little Cedar Point (7M)	south of Middle Sister Island (7L)	east of Middle Bass Island (5B)	western basin average
1995	115	5	43	34
1996	755	67	34	104
1997	2064	619	499	451

The rapid increase in the number of nymphs in the lake sediments has consequently resulted in a dramatic increase in the sizes and occurrences of swarms of winged (subadult and adult) *Hexagenia* during the summer months along the shore of the western basin of Lake Erie. The swarms have presented not only a nuisance and an eyesore under porch and storefront lights<sup>7</sup>, but also a threat to industry<sup>8</sup> and public safety<sup>9</sup>.

We predicted that as the mayflies continue to repopulate the western basin they will expand their range into the shallow waters of the central basin as well. Because the initial density of nymphs in central basin

sediments will be very low, the chances of detecting them through standard sediment sampling will also be low. Therefore, the volunteer program called Mayfly Watch was set up along the central basin shoreline of Ohio in hopes of finding the winged stages, since they emerge from vast areas of the lake and concentrate under lights on shore.

The specific objectives of Mayfly Watch were to gather information at regularly spaced intervals along the shoreline regarding (1) the number of nights between 15 June and 31 July that winged *Hexagenia* were present on shore, and (2) the seasonal timing and duration of their presence on shore, and (3) the extent to which their presence was synchronized on specific dates from place to place along the central basin shoreline and with different weather conditions.

## Acknowledgments

Many volunteers made this project possible. A primary contact was assisted by additional volunteers at some of the twenty-two locations. As far as is known, all are listed in Table 2 or Table 3. However, numerous other individuals were doubtless involved, including employees at some of the lake-side industries, family members, and lakeshore residents, especially several enlisted by Ms. Nancy Csider near Mentor Marsh and Headlands Beach State Park. The enthusiasm, vigilance, and persistence of all of these people are deeply appreciated.

Special thanks are expressed to Mr. Frank Lichtkoppler and Mr. Dave Kelch of the Ohio Sea Grant Extension Service and to Mr. Al Percival of the Davis-Besse nuclear power plant for suggesting names of potential volunteers. Mr. Keith Linn of the Northeast Ohio Regional Sewer District (NEORS) involved several field technicians (Table 3) in Mayfly Watch. Ms. Nancy Miller at the Water Quality Laboratory of Heidelberg College was indispensable in coordinating with the volunteers. Two Heidelberg student technicians, namely Mr. Kevin Boggs and Ms. Laura Shields, retrieved mayfly specimens and data sheets from many of the volunteers, and another student, Mr. Mark Blanchard, identified the species and sex of the specimens.

This study is part of a project funded by the Lake Erie Protection Fund through Grant LEPF-97-30 to Heidelberg College.

Table 2. Volunteers who participated in the 1997 Mayfly Watch, listed from west to east.

Primary Contact	Additional Volunteers	Organization	Location
Dr. David M. Klarer	Mark Link Marje Bernhardt	Old Woman Creek State Nature Preserve	2 miles east of Huron, Erie County
Donald Parsons	Christie Parsons	Don Parsons, Inc.	Vermilion, Lorain County
Jim Cooper	Helen Cooper	J & H Charters	Beaver Park Marina, Lorain County
David O. Kelch		Ohio Sea Grant Program	Beaver Park Marina, Lorain County
Irene Baumler	Bill Baumler	charter captain	Lorain, Lorain County
Ed Abel		CEI	Lorain, Lorain County
Karl Ceceris			Avon Lake, Lorain County
Keith Linn	See Table 3. Kim Shaw	Northeast Ohio Regional Sewer District	Downtown Cleveland to west of Euclid, Cuyahoga County
Thomas J. Denbow		Chagrin River Watershed Partners	Euclid, Cuyahoga County
Jonathan Cherry	B. Cherry		Euclid, Cuyahoga County
Rickie Crone	Erich Obersteiner		Willowick, Lake County
Frank Lichtkoppler		Ohio Sea Grant Program	Mentor-on-the-Lake, Mentor Park, Lake County
Nancy Csider	"Headlands Network" of volunteers	Mentor Marsh Nature Center, CMNH	w. of Headlands Beach State Park, Lake County
Bob Horvath		Lake Metro Parks	4 miles east of Fairport Harbor, Lake County
John Pogacnik		Lake Metro Parks	North Perry, Lake County
Louise Watson			Madison on the Lake, Lake County
John Mahan		Ashtabula River Partnership	Ashtabula, Ashtabula County
Dianna Long		CEI	Ashtabula, Ashtabula Cty.
Leonard Eames			North Kingsville, Ashtabula County
Jim Supplec	Karen Supplec Jeff Supplec		Conneaut, Ashtabula County
Dave Dickson	Kris Dickson	Conneaut Township Park	west of Conneaut Harbor, Ashtabula County

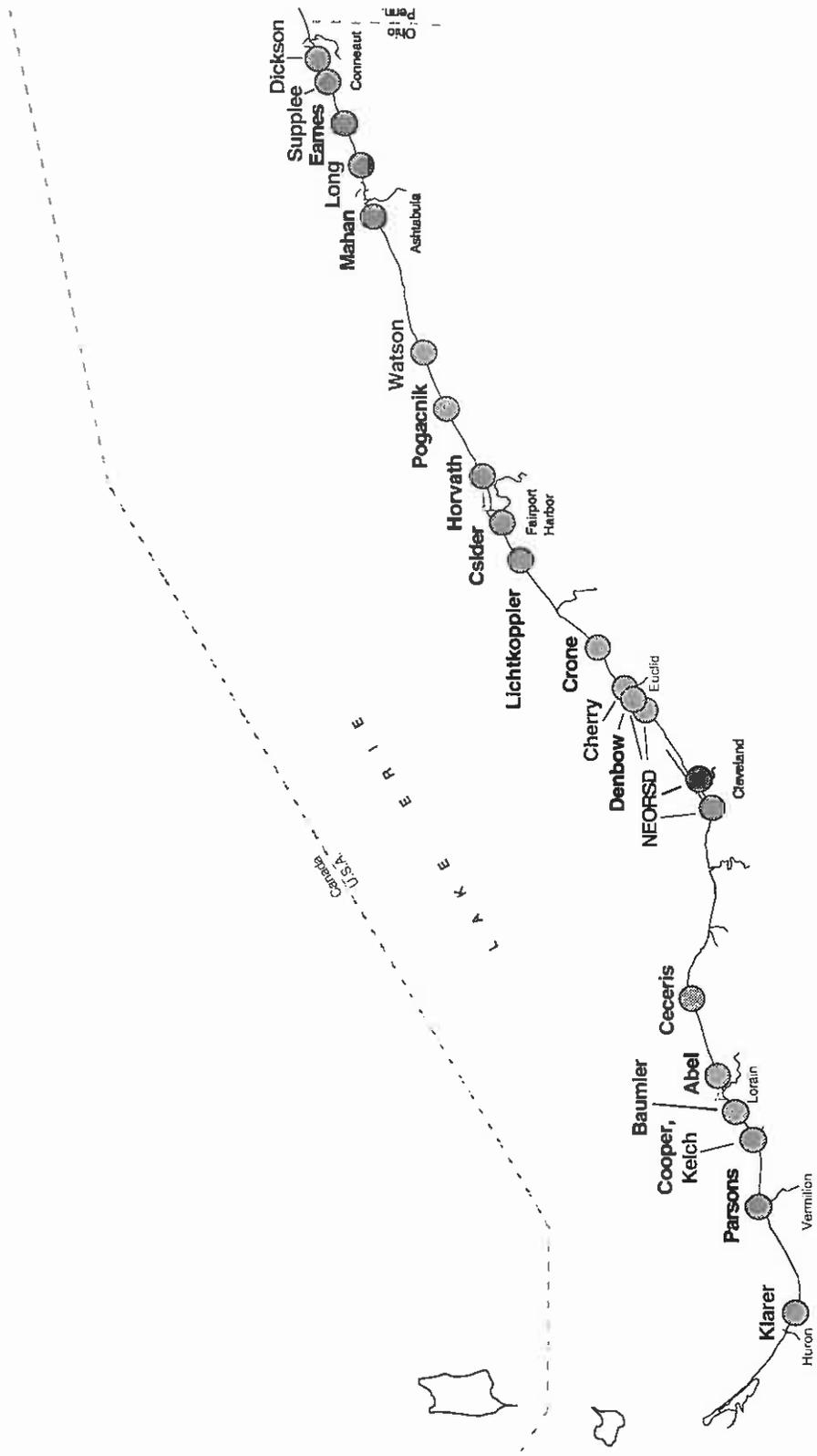
## Methodology

Twenty-two observation sites were located at the residence, dockage, or work site of the individual volunteers, from just east of Huron in Erie County to just west of the Pennsylvania line in Ashtabula County (Figure 1). Employees of the NEORSD looked for *Hexagenia* at several locations both along the lakeshore and in downtown Cleveland (Table 3). Lakeshore locations were at private residences; state, county, township, and city parks; state nature preserves; electric generating plants; marinas; and wastewater treatment plants. Two citizen river coalitions and the Ohio Sea Grant Program were represented (Table 2).

Each volunteer received (1) a fact sheet<sup>1</sup> describing the life cycle and recent history of *Hexagenia* in Lake Erie; (2) a set of instructions (Appendix A); (3) a data sheet (Appendix B) on which to record daily observations; (4) three vials, one containing two winged *Hexagenia*, one a shed subadult (subimago) skin, and the third a shed nymphal skin; and (5) two containers, one containing ethyl (grain) alcohol, into which a few specimens of mayflies or skins would be placed in the event that they appeared during the observation period. Volunteers were to compare the appearance, color patterns, and size of specimens that they observed against the specimens given them in the vials to ensure that they were indeed observing *Hexagenia* and not other kinds of mayflies.

The daily observations included the following: (1) At any time, but preferably in the first hours after sunset (because birds begin eating mayflies at dawn), the volunteer looked for winged *Hexagenia* on surfaces near or under lights. The volunteer was asked to collect two or three individuals for later confirmation. (2) During daylight, the volunteer observed the same surfaces as above for the presence of shed subadult skins, and collected a few for confirmation. (3) Under calm weather conditions, if the sampling area was at the water's edge, the volunteer looked for shed nymphal skins floating on the water surface, and saved a few for confirmation.

Beginning on 15 June 1997 and ending on 31 July 1997, observations were recorded daily on the data sheet. Additional comments often included general weather conditions and a subjective estimate of the number of mayflies present. Volunteers were encouraged to enlist the help of someone else if they were unable to make observations for several days.



Mayfly Watch 1997

Figure 1. Locations of observations by Mayfly Watch volunteers in 1997.

## Results

**Where *Hexagenia* Were Found.** Winged *Hexagenia* were found by every observer except two, near Ashtabula (Figure 2). On the basis of the few specimens collected, *Hexagenia rigida* appeared to be the more widely distributed of the two species, occurring from the westernmost to the easternmost locations, and at all locations in between where collections were made, except one (Table 4). The other species, *H. limbata*, was collected over a much narrower range of shoreline, from west of Lorain to Fairport Harbor, and was absent from all collections further eastward (Table 4).

Table 3. Locations where winged *Hexagenia* were observed in Cleveland and western Euclid, Ohio, by personnel of the Northeast Ohio Regional Sewer District.

Location	Dates <i>Hexagenia</i> Was Found	Observer
Cleveland Westerly Wastewater Treatment Plant (near Edgewater State Park)	14 July 1997 15 July 1997 18 July 1997	Robert Kunkle Andrew Cook Larry Cinadr
Cleveland City Hall 601 Lakeside Ave. NE	15 July 1997	Zsolt Szerencsy
Wildwood State Park at Mouth of Euclid Creek	15 July 1997	James Justice
Cuyahoga River near 1148 Main Ave.	15 July 1997	Frank Greenland
14713 Lakeshore Blvd.	16 July 1997	Andrew Cook
3826 Euclid Ave.	18 July 1997	Lester Stumpe
West Third and Superior	18 July 1997	Bill Mack
Lake Erie at East 185th	3 August 1997	Bill Mack

Unexpectedly, a third species of mayfly, only slightly smaller than *Hexagenia*, was present in some of the collections. Like *Hexagenia*, *Ephemera simulans* is a burrowing mayfly assigned to the Family Ephemeridae within the insect Order Ephemeroptera. *Ephemera* can be readily distinguished from *Hexagenia* by having three filaments trailing from the tip of the abdomen rather than only two, and by having several distinct blotches or spots on the wings which are absent from *Hexagenia*. *Ephemera* was present in collections from three adjacent locations between Huron and Lorain, and from a fourth location west of Conneaut (Figure 2).

Table 5. Continued.

Date	Mentor				Madison on the Lake and North Perry							
	sun/wind	waves, feet	rain, inches	maximum Temp., °F	minimum Temp., °F	water Temp., °F	wind mph	waves inches	rain, inches	maximum Temp., °F	minimum Temp., °F	barometric pressure, in.
July 11	sunny, calm	none		77	58	72	NE 5-10			71	54	30.25
12	sunny, calm	none		82	57	72	SW 5-10			72	58	30.20
13	sunny, calm	none		86	57	72	NW 5			76	68	30.10
14	sunny	1	0.30	90	67	73	SW 5			96	68	29.95
15	sunny	1		83	72	73	SW 5			78	70	29.95
16	sunny, calm	1		89	69	74	S 5-10			82	65	30.05
17	sunny, windy	2-4		86	69	74	SW 5			82	65	29.95
18	sunny, windy	1-3		89	70	76	W 5			79	68	29.95
19	sunny, windy	2-4		75	66	77	NW 10-15			69	58	30.00
20	partly cloudy	1-2		78	65	77	NW 5-10			72	53	30.15
21	partly cloudy	1-2	0.37	84	68	77	SW 5	0.24		76	65	30.05
22	cloudy	1-2	0.08	78	67	77	SW 5			72	66	30.10
23	partly cloudy	1-2		83	69	77	NE 5			73	62	30.10
24	cloudy, calm	>1		79	69	77	NE 5			71	63	30.05
25	cloudy, calm	>1		81	60	77	SW 5			72	61	30.10
26	cloudy, t-storm	1	0.41	86	69	77	SE 5-10	0.05		76	61	29.95
27	cloudy, windy	1-3	0.01	89	74	77	NW 10-15			76	69	29.90
28	cloudy, windy	1-3		82	72	77	S 5-10			75	72	29.90
29	sunny, windy	3-5		75	66	77	NE 15-20			70	65	30.10
30	sunny	1-2		75	56	77	NE 10-20			71	53	30.30
31	sunny, calm	1		80	62	76	NE 5			76	54	30.35

\* As reported in the Lake County News-Herald

Table 6. Continued.

Date	Wind			PAR, ave. $\mu\text{mol/s}$ per sq. m	PAR flux total $\mu\text{mol}$ per sq. m	Rain total mm	Temp. ave. $^{\circ}\text{C}$	Barometric Pressure			Rel. Hum. ave. %
	Speed ave. m/s	Speed max. m/s	Direction ave. $^{\circ}$					ave. mm	max. mm	min. mm	
July 21	3.8	32	149	247	21301	0	22	746	746	745	86
22	9.4	29	75	170	14695	0	22	746	747	746	93
23	6.6	24	78	213	18403	0	22	745	746	745	93
24	6.4	17	55	432	37328	0	22	746	747	744	89
25	4.1	14	122	545	47065	0	22	746	748	744	83
26	4.7	51	189	300	25889	0	25	742	744	740	85
27	5.2	17	181	536	46355	0	26	742	744	741	83
28	7.1	28	167	482	41659	0	24	743	746	741	83
29	14.3	33	46	618	53402	0	21	749	751	746	60
30	6.9	22	97	611	52802	0	20	752	753	751	69
31	4.9	20	121	608	52508	0	20	753	754	751	80

† Midnight to midnight

\* Photosynthetically Active Radiation (PAR): that solar radiation used by plants for photosynthesis

emergence, and no changes seemed to correspond well with the beginning of emergence. Water temperature increased gradually, reaching a seasonal maximum on 7 July which was maintained until the last day of the study (Table 5).

No mayflies were recorded on 12 and 13 July except at the western and eastern ends of the study area. Weather patterns that might have accounted for their absence were not observed (Tables 5 and 6).

## Discussion

Upon finding *Hexagenia*, several observers commented that they had not seen the "Canadian soldiers" for many years. Yet the mayflies were found by almost every observer at least one day during the summer of 1997. In the process of recruiting volunteers in the spring, I was told that *Hexagenia* occurs every summer in noticeable numbers on buildings in downtown Cleveland<sup>10</sup>. The seemingly conflicting reports suggest two possibilities: (1) The mayflies may have been present along at least some parts of the central basin shoreline prior to 1997 but simply went unnoticed because of their small numbers, or (2) they were present in Cleveland and perhaps a few other locations along the shoreline before 1997 but suddenly expanded their range in 1997 to include most of the shoreline.

We predicted that, because *Hexagenia* has expanded its range rapidly in the western basin, it is likely to expand eastward along the central basin nearshore zone. It could be that the expected expansion has already taken place and that 1997 marked the first year of the renewed appearance of winged *Hexagenia* along most of the shoreline. Unfortunately, information for past years is lacking, so neither of the above possibilities can be confirmed. More important, however, is that the data collected in 1997 will serve as a baseline for measuring changes in future years.

Measurement of changes in the *Hexagenia* population of the central basin in future years can be based on two aspects of the "presence/absence" data that are collected by the Mayfly Watch volunteers. First, changes in the number of days that winged *Hexagenia* are found at each location will indicate an increase or decrease in the mayfly population in the immediate vicinity. Volunteers looked for mayflies for 47 days (15 June through 31 July) in 1997, yet only two observers found *Hexagenia* on more than eleven (23%) of those days

(Figure 2). Thus, if some volunteers record the mayflies during a greater proportion of the observation period in future years, an increase in the local *Hexagenia* populations offshore can be assumed.

Second, changes in the proportion of volunteers who record *Hexagenia* on the same days in future years will reflect changes in the abundance of the mayflies along all or parts of the shoreline. In 1997, *Hexagenia* was found at nine (41%) or fewer of the 22 locations on any given day, and on most days it was found at no more than three locations (Table 4). Thus, an increase in the number of locations per day will indicate an increase in the *Hexagenia* population. The increase in locations may be limited to only part(s) of the shoreline, which would indicate greater success of the mayfly population in some areas of the lake than others.

It is of interest to know the ranges and relative abundances of the two species of *Hexagenia* as well as of *Ephemera simulans*. The number of specimens (from one to about ten) collected by each observer in 1997 was insufficient to provide detailed information of that type. Therefore, it would be useful for the volunteers to collect more mayflies (several dozen when available) in future years.

Those observations made at marinas and the mouths of tributaries present a confounding factor in relating the data gathered in this study to the recolonization of Lake Erie by *Hexagenia* (and perhaps *Ephemera*). Those locations present somewhat different environmental conditions for the bottom-dwelling animals than the conditions present in the lake beyond shore. Those places might be more suitable for *Hexagenia* than the adjacent lake. Thus, the large mayflies found at those locations may have grown in the tributaries rather than in the lake. Indeed, it is known that a number of shoreline habitats, such as some of the coastal marshes, have harbored apparently-healthy *Hexagenia* for years.

How probable is it that most or all of the *Hexagenia* that were found in 1997 came from marshes and the many tributaries that empty into the lake along the shoreline? That question cannot be answered readily. To help answer that question, we collected sediment samples from a large number of sites within a few miles of shore in June 1997, with the assistance of U.S. Geological Survey personnel from Sandusky, Ohio. The samples were inspected for the presence of *Hexagenia* nymphs, and nymphs were indeed found at two sites -- north of Lorain Harbor and immediately west of Fairport Harbor -- but because the population density in the sediments throughout the nearshore areas was probably very low,

there was only a small chance of successfully sampling them anywhere they were present. The sediment data do tell us that some areas of the central basin are presently supporting populations of *Hexagenia*.

## Recommendations

1. The first year of Mayfly Watch provided important baseline information on the distribution and relative abundance of winged *Hexagenia* along the central basin of Lake Erie in Ohio. Mayfly Watch should be continued in 1998 and 1999 as planned, using as many of the original volunteers as possible, and filling in a few existing gaps in coverage along the shoreline.

2. The detailed weather information collected at a few points along the lakeshore did not show any obvious relationships with the timing of the mayfly emergence along the lakeshore. Nevertheless, weather data should be gathered concurrently with the mayfly observations in future years, as some relationships may become evident if the abundance of the mayflies increases.

3. Too few specimens of winged mayflies were collected at each location in 1997 to ascertain whether both species of *Hexagenia* as well as *Ephemera* were present. Future years of Mayfly Watch should include more extensive collections, perhaps with several specimens saved each day when winged mayflies are observed.

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# **A P P E N D I C E S**

**APPENDIX A      Instructions to Volunteers**

**APPENDIX B      Volunteer Data Sheet  
(First Page of Two)**

## APPENDIX A INSTRUCTIONS TO VOLUNTEERS

Date: May 1997  
To: "MAYFLY WATCH" VOLUNTEERS  
From: Ken Krieger  
Subject: PROCEDURES FOR MONITORING MAYFLIES

Dear Volunteer:

Your willingness to help this summer in spotting the presence of the large burrowing mayflies, called *Hexagenia*, along the shoreline of Lake Erie is very much appreciated. Many Ohioans know this insect as the Junebug, fishfly, shadfly, or Canadian soldier. As a result of improved water quality, this native insect has already recolonized the western basin of the lake in large numbers. In the summer of 1996, winged adult *Hexagenia* were noticed in the westernmost end of the central basin, and it is believed that these large mayflies will soon be found in more-eastern areas of the central basin. (The central basin is the region approximately from Sandusky, Ohio, to Erie, PA.)

The return of this mayfly to the bottom sediments of the central basin will be a very positive sign that important progress has been made toward improving the environmental quality of the basin. The enclosed fact sheet from the Ohio Sea Grant Program ("Mayflies and Lake Erie, a Sign of the Times") provides information about the life history and role of *Hexagenia* in Lake Erie, and its importance to people living on or near the lake.

In order to document the presence or absence of adult *Hexagenia* along the shoreline this summer, we are enlisting the help of volunteers like you who can keep a watchful eye during the period of peak emergence of the adults from the lake. During the second week of June, I will make a personal visit and provide you with the following materials to make your task easier:

(1) **Three vials containing preserved specimens** of (a) shed skins of *Hexagenia* nymphs that float on the water surface, (b) skins of flying *Hexagenia* (subadults) that are shed while the mayfly is on land, and (c) adult *Hexagenia*. You will need to look each day for the presence of one or more of these three "signs" that these mayflies are present. Because there are many kinds of mayflies, most of them considerably smaller than *Hexagenia*, you may want to compare the general

appearance, color patterns, and size of shed skins or adults that you see against the specimens provided to you. If during the collection period, you have doubts about whether the skins or adults you see belong to *Hexagenia*, go ahead and collect them; if they are not *Hexagenia*, they will still be useful to the study. The enclosed fact sheet has pictures and drawings that should help you identify the various life stages of this mayfly.

(2) A "**Volunteer Data Sheet**" (2 pages) on which to record daily the presence of *Hexagenia* in the area you have chosen to look for them. Each day of the observation period is listed on the Volunteer Data Sheet, and there are boxes to record the presence of one or more of the forms (skins or adults), the weather that day, brief comments, and your initials.

I will discuss the daily procedures with you in detail when I deliver the vials and data sheets to you. Basically, they are as follows:

(1) If it is convenient, look nightly any time after sunset, preferably two to three hours after, for winged *Hexagenia* that may have landed on sidewalks, walls, or other structures in the immediate vicinity of outdoor lights at or near the water's edge. Several (two or three) animals that look like the specimens provided in the vials should be collected by grasping the erect wings of the animal, lifting it off the surface, and placing it in one of the plastic jars. There is no need to try to collect a large number of animals, should there be many of them. If it is not convenient for you to look for winged *Hexagenia* at night, you may look for them the next morning, although birds may have eaten most of them.

(2) During daylight hours, observe walls, window screens, and other objects for the presence of shed skins of the first winged stage (subadult) that was left after the adult flew away. If these look like, and are about the same size as, the skins provided to you as examples, place a few of these (two or three) in the same jar as the winged animals. Winged *Hexagenia* may also be present.

(3) If your sampling area includes water at the edge of Lake Erie, such as at a pier or beach, observe the water surface either at night or during the day for the presence of shed nymphal skins floating on the surface. The nymph swims from the muddy lake bottom up to the surface, then the subadult emerges from a split in the top of the nymphal skin. Collect two or three of the nymphal skins and place them in the smaller container supplied to you. For your safety, look for floating nymphal skins only when the lake is calm. Note: The containers are supplied to you with ethanol (grain alcohol); should it be spilled, you can replace it with methanol (wood alcohol) or isopropyl alcohol (rubbing alcohol), available at any drugstore.

(4) Daily, record your observations on the "Volunteer Data Sheet", placing a check mark in the appropriate boxes for the forms of *Hexagenia* that were found. Even if the skins or animals that you saw were beyond your reach, place a check mark on the sheet and write a comment about that on the sheet. If you prefer, rather than using a check mark, you may record an estimate of the numbers of each form you saw; but a check mark is adequate.

(5) Only if you think that *Hexagenia* have begun to appear, you should begin to record brief weather observations on the data sheet each day. General descriptions will do, such as "windy off lake" or "calm", "rained all day" or "shower around 6 p.m." Also, if available, indicate the approximate high and low temperatures on each date; they don't have to be exact or official readings. This general information will help us determine the kinds of weather conditions that may typically exist before the mayflies emerge from Lake Erie.

(6) Finally, the first time you think that you have seen signs of the large burrowing mayflies, please notify me the next work day by telephone (419 448-2226), fax (419 448-2124), or e-mail (kkrieger@mail.heidelberg.edu). I will make arrangements to come by and confirm your sightings.

If you will be away or cannot look for mayflies for two or three days, feel free to enlist the help of someone else during that time, or simply begin your observations again as soon as you can. It is preferred, but not essential, that observations be made every day from June 15th through July 31st. If *Hexagenia* are present in your area, they will probably appear on more than one or two days.

If you are in a boat and see nymphal skins floating on the water, or if winged *Hexagenia* land on your boat, please write down your observations as soon as you can, including the date, general location, and weather conditions. If possible, bring back some specimens.

THANK YOU FOR YOUR HELP! At the end of the summer, you will receive a summary report about the over-all results of the MAYFLY WATCH.

**THIS PROJECT IS SPONSORED BY THE LAKE ERIE PROTECTION FUND OF THE OHIO LAKE ERIE OFFICE.**

**APPENDIX B  
FIRST PAGE OF VOLUNTEER DATA SHEET**

**M A Y F L Y    W A T C H    1997**

**VOLUNTEER DATA SHEET**

Project Director: Dr. Ken Krieger, Heidelberg College, Tiffin, OH 44883  
 phone: 419 448-2226    fax: 419 448-2124    e-mail: kkrieger@mail.heidelberg.edu

Cooperating Organization _____		City/County _____		Names of Volunteers _____		Recorder's Initials _____	
Day	Date	Floating Nymphal Skin Found (✓)	Subinaginal Skin Found (✓)	Winged Hexagenia Found (✓)	TODAY'S WEATHER (or other comments) Wind      Rain	°F	Hi Lo
Sun	15-Jun						
Mon	16-Jun						
Tue	17-Jun						
Wed	18-Jun						
Thu	19-Jun						
Fri	20-Jun						
Sat	21-Jun						
Sun	22-Jun						
Mon	23-Jun						
Tue	24-Jun						
Wed	25-Jun						
Thu	26-Jun						
Fri	27-Jun						
Sat	28-Jun						
Sun	29-Jun						
Mon	30-Jun						
Tue	1-Jul						
Wed	2-Jul						
Thu	3-Jul						
Fri	4-Jul						
Sat	5-Jul						

Please continue on next sheet.

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