Environmental Impact Analysis/Field Techniques at

Brockport:

State University of New York
College at Brockport

A Summer Course	Session III: 6 Jul to 6 Aug 1992 Monday through Thursday 9 am to 5 pm 6 semester credit hours
Lake Ontario: Environmental Impact Analysis/ Field Techniques	A traditional field techniques course is integrated into a meaningful whole using an environmental impact analysis framework. Students are presented with a realistic development proposal for a site on Lake Ontario. Morning lectures emphasize environmental analysis principles, laboratory and field techniques, and Lake Ontario resources and environmental issues. Afternoon laboratory and field activities stress sampling methods and identification skills for aquatic and terrestrial plants and animals. Students will have hands-on experience with sampling gear and Brockport's Great Lakes vessel, the RV Madtom. Experienced professionals will speak on legal, engineering, consulting and other aspects of environmental impact analysis. Based on environmental analysis methodology learned in class and data collected at the project site and from reference materials, student teams will prepare and write environmental impact statements for the proposed project.
Register for	BIO 488/588 Environmental Analysis Enrollment: 10 minimum, 16 maximum
Prerequisites	General ecology course or general science background or permission of the instructor
For More Information	Dr. James M. Haynes Department of Biological Sciences 716-395-5783 or 2193

THE BASIC SEQR PROCESS

Implemented November 1, 1978
Revisions Effective June 1, 1987

New York State
Department of Environmental Conservation

Laboratory Manual of

Aquatic Biology

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wcb
Wm. C. Brown Company Publishers
Dubuque, Iowa

EXERCISE 10

Introduction to the Phyla of Freshwater Organisms

Summary

In this and the subsequent exercises of Section II you will have the opportunity to become acquainted with the various taxa of aquatic organisms. A series of preserved and/or fresh specimens will be used with a dichotomous key to determine the phylum to which the organism belongs. Record your determinations (Phylum name) on the Worksheet and have these checked by your instructor. Use the Worksheet to also note the characteristics of the organisms you identify.

Introduction

The classification of organisms provides a sort of filing system under which organisms can be cataloged in an orderly fashion, and it provides a means of expressing the degree of phylogenetic relationship between organisms. The typical hierarchical arrangement of taxa in classification is shown for the large burrowing mayfly *Hexagenia limbata* (Table 10-1).

By convention the name of a genus (plural: genera) and species (plural: species) is printed in italic type and follows Latin grammatical rules for agreement in gender, number, and case. In the multicellular animals (Kingdom Metazoa) the names of families are always capitalized and end in "-idae." In the multicellular plants (Kingdom Metaphyta) family names usually end in "-aceae."

TABLE 10-1
Classification scheme for the mayfly, Hexagenia limbata.

Taxon	Mayfly example	Characteristics of taxon
Kingdom	Metazoa	All multicellular animal life
Phylum	Arthropoda	All animals with external skeletons, bilateral symmetry, and jointed legs
Class	Insecta	All arthropods with head, thorax, and abdomen, one pair of antennae, one or two pairs of wings, and three pairs of legs
Order	Ephemeroptera	Insects with aquatic nymph and aerial subimago stage, vertically held membranous wings, 2 or 3 long posterior cerci
Family	Ephemeridae	All true burrowing mayflies
Genus	Hexagenia	A group composed of a few closely related kinds of burrowing mayflies
Species	limbata	A particular kind of burrowing mayfly

The 24 phyla of freshwater organisms are shown in Table 10-2. The subjective nature of classification hierarchy is illustrated by the fact that a number of biologists would consider the several phyla of non-segmented worms to be part of just one phylum known as Aschelminthes. Also shown in Table 2 are the numbers of the exercises which consider the phyla in greater detail. Groups of aquatic organisms not covered include the viruses, bacteria, fungi, mites, spiders, reptiles, amphibians, and water birds.

As you observe the organisms to be identified, you might also look for adaptations to the aquatic environment. For example, in aquatic organisms, often the location of respiratory surfaces, permeability of the integument, body shape and musculature demonstrate adaptations to the aquatic medium.

The key to phyla of aquatic organisms was modified from Eddy and Hodson (1961). You may wish to refer to the separate exercises cited in Table 10-2 for figures of organisms from the different phyla. The glossary of terms (Appendix A) may be helpful as you work your way through the key.

TABLE 10-2

A listing of freshwater phyla, their common names, and related laboratory exercises.

Phyle names	Common names	Exercise numbers
(Kingdom Protista)		
Cyanophyta	Blue-green algae	22
Chlorophyta	Green algae	22
Chrysophyta	Yellow-green algae, Diatoms	22
Rhodophyta	Red algae	22
Misc. Flagellate phyla	Euglenoids, Dinoflagellates, Chrysomonads, Cryptomonads, Zooflagellates	22
Sarcodina	Amoeboids	20
Ciliophora	Ciliates	20
Eumycophyta	Fungi	(not covered)
(Kingdom Metaphyta)		
Bryophyta	Liverworts, Mosses	23
Pteridophyta	Horsetails, Ferns, Quillworts	23
Spermatophyta	Seed plants	23
(Kingdom Metazoa)		
Porifera	Sponges	20
Coelenterata	Hydras, Jellyfish	20
Bryozoa	Moss animalcules	20
Platyhelminthes	Flatworms	11
Nematoda	Roundworms	11
Nematomorpha	Horsehair worms	11
Gastratricha	Gastrotrichs	11
Rotatoria	Rotifers	11
Annelida	Segmented worms	11
Tardigrada	Water Bears	20
Arthropoda	Crustaceans, Insects	12-17
Mollusca	Snails, Clams	18, 19
Chordata	Fish	21

Key to the Phyla of Freshwater Organisms

1a. Organism consisting of one cell or part of a group of cells, never forming more than one layer; often microscopic ..... (Kingdom Protista) 3

1b. Organism consisting of many cells forming at least several layers and usually organs 2

2a. Organism contains chlorophyll within their cells, usually a portion of the organism is green in color ..... (Kingdom Metaphyta) 11

2b. Organism lacks chlorophyll ..... (Kingdom Metazoa) 13

3a. Organisms with chlorophyll ..... (Algae) 4

3b. Organisms without chlorophyll, often translucent ..... (Protozoans) 8

4a. Chlorophyll not contained in special bodies; cells without a membrane surrounding nucleus; food reserves as glycogen so the iodine test for starch is negative; often appear bluish-green ..... Cyanophyta

4b. Chlorophyll contained within special bodies; cells with a nucleus (usually not visible without special staining) 5

5a. With at least on apparent whiplike flagella for locomotion ..... Flagellate phyla

5b. Without apparent flagella for locomotion in mature forms 6

6a. Chlorophyll bodies usually with conspicuous pyrenoid (starch-storing granule); iodine test for starch positive; usually grass green color ..... Chlorophyta

6b. Color usually not green; no pyrenoid bodies present and iodine test for starch is negative 7

7a. Organism usually yellow-green to yellow- or golden-brown; many forms (especially Diatoms) with the cell wall impregnated with silicon, wall often in two adjoining or overlapping sections ..... Chrysophyta

7b. Organism usually violet or gray-green; usually having branched filaments either macroscopic or microscopic in size; much more common group in marine than freshwater environments ..... Rhodophyta

8a. With at least one apparent whiplike flagella for locomotion ..... Flagellate phyla

8b. Without apparent flagella for locomotion 9

9a. Usually not motile and filamentous ..... Eumycophyta

9b. Usually motile and not filamentous 10

10a. Locomotion by minute hairs or cilia ..... Ciliophora

10b. Locomotion by pseudopodia; some living within shells or tests ..... Sarcodina

11a. Multicellular plants which are low-growing, lacking vascular and supportive tissue, lack true roots; most prominent form is the gametophyte generation ..... Bryophyta

11b. Multicellular plants which often grow upright, have vascular tissue and supportive tissues (the portion below waters surface may have reduced supportive tissues), true roots are present; most prominent form is the sporophyte generation 12

12a. In sexual reproduction there is no formation of a protective seed surrounding the embryo ..... Pteridophyta

12b. Sexual reproduction involves the formation of a seed which protects the embryo plant .. Spermatophyta

13a. General body plan is bilateral symmetry (equal right and left halves) 15

13b. General body plan is radial symmetry or lacking any definite symmetry 14

14a. Asymmetrical aquatic forms, appearing as gray, brownish, or green masses attached to sticks and stones ..... Porifera

14b. Radially symmetrical body form; body disc or tube-like with radiating tentacles ..... Coelenterata

15a. Animals with backbones (vertebrae) or with notochord; nostrils or pharyngeal gill clefts present or both ..... Chordata

15b. Animals without backbones or notochord; not possessing nostrils nor pharyngeal gill clefts 16

16a. Animals without any terminal bristles or rings of cilia on anterior end of body 18

16b. Minute animals with several terminal tufts of large bristles or with one or two rings of cilia at the anterior end of body 17

17a. Animals with one or two rings of cilia at anterior end of body; body may be smooth, jointed or enclosed in case or shell-like lorica; posterior end of body may be with or without one or two jointed toes; internal jaw-like structure present anteriorly ..... Rotatoria

17b. Animals with prominent tuft of bristle-like structures at anterior end of body; body more or less covered with spine-like structures; posterior end forked with two non-jointed processes; no jaw-like structures present anteriorly ..... Gastrotricha

18a. Body more or less divided into segments (metameric) 23
18b. Body not divided into any apparent segments 19
19a. Anus present and usually terminal; mouth at terminal end 20
19b. Anus absent; mouth usually not at terminal end but more or less posterior to anterior end ..... Platyhelminthes
20a. Small colonial, sessile, aquatic form with mouth and anus at same end and enclosed by a horseshoe-shaped structure bearing tentacles ..... Bryozoa
20b. Not colonial; mouth and anus at opposite ends; no tentacles around mouth 21
21a. Body long and slender, worm-like; not bearing nor enclosed in a calcareous shell 22
21b. Body not long and slender, enclosed or bearing a calcareous shell; a protrusible flat or hatchet-shape structure used for locomotion ..... Mollusca
22a. Predominantly small slender worms seen only with a microscope, more or less transparent; easily recognized by their almost continual whiplike motion ..... Nematoda
22b. Long, wiry worms, usually brown or black in color; their writhing and undulating motion often results in them becoming entangled with one another ..... Nematomorpha
23a. Body with appendages, some of which serve as legs 24
23b. Body bearing no appendages serving as legs; may be without appendages or with pairs of bristles ..... Annelida
24a. Body without distinct mouth parts; body shows little segmentation, appendages short and without joints; minute forms found on bottom of ponds (some also found in wet moss) ..... Tardigrada
24b. Body with various jointed mouth parts; body usually well segmented (obscured in few groups by fusion of carapace); paired appendages on body are distinctly jointed ..... Arthropoda

BIO 488/588 Environmental Analysis Quiz 1 Summer 1998

Directions: Read each question carefully before answering as completely and concisely as possible in the spaces provided. You have 40 mm to complete this 20 point quiz.

1.Define and briefly describe the significance 0-f each of the following terms relative to environmental analysis (3 pts).

a. Record of Decision —

b. mitigation —

c. impact —

2. What is the fundamental purpose of NEPA and the various SEPA's patterned after the federal law (a)? What are the key benefits and deficiencies of these laws (b)? (3 pts)

a.

b.

3. List and briefly describe what should be considered in any two of the eight areas mandated by CEO for inclusion in an EIS. *(3* pts)

a.

b.

4. According to Bregman and Mackenthun, what are two of the 11 steps or tasks required to prepare an EIS? Briefly explain the importance of each? (3 pts)

a.

b

5. Identify using common names each of the organisms pointed out by the instructor. (1/2 pt each)

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

k.

l.

m.

n.

o.

p.

BIO 488/588 Environmental Analysis Quiz 1 Summer 1998

Lab and field practical based on bird and terrestrial/aquatic vegetation field unit taught by another faculty member in week 2 of the course.

BlO 488/588 Environmental Analysis Quiz 3 Summer 1998

Directions: Read each question carefully before answering as completely and concisely as possible in the spaces provided. You have 40 min to complete this 20 point quiz.

1. a. Why is it important to consider cumulative impacts in an EIS?

b. Why is it important to project impacts over time and space in an EIS?

2. What are two of the 10 or so steps one should take when attempting to assess a potential environmental impact? Using a hypothetical example, explain the factors you would consider for each step. (3 pts)

a.

b.

3. Name and briefly describe two of the methods we used to sample aquatic invertebrates. What kind of habitat is each method used in; why is it pretty much limited to this habitat; and why won't the other method work well in this habitat? (3 pts)

a.

b.

4. According to Bregman and Mackenthun, what are two pieces of federal legislation (laws) that are relevant to preparing many EIS's? Briefly explain the importance of each relative to a typical EIS? (3 pts)

a.

b.

5. Identify using common names each of the organisms pointed out by the instructor. (1/2 pt each)

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

k.

1.

m.

n.

o.

p.

BI0 488/588 Environmental Analysis Quiz 4 Summer 1998

Directions: Read each question carefully before answering as completely and concisely as possible in the spaces provided. You have 40 mm to complete this 20 point quiz.

1. For each of the following steps needed for proper citizen review of the EIS process, list two actions or considerations needed to ensure effective citizen involvement and proper EIS preparation (6 pts).

a. How do you find out about intended projects?

b. Does the project fall under NEPA or a SEPA?

c. How do you influence what an EIS will address?

d. How do you object to a Negative Declaration?

e. What is the proper way to review a DEIS?

f. How.do you object to a FElS?

2. Based on Bregman and Hackenthun, list two socioeconomic issues that typically are addressed in an EIS and describe why they are important (3 pts).

a.

b.

3. List and briefly describe two major ecological or environmental issues that have influenced or are currently influencing Great Lakes fishes or fisheries *(3* pts)

a.

b.

4. List and briefly discuss two pieces of scientific evidence that suggest consuming some Great Lakes fishes poses a risk to human or ecosystem health (3 pts).

a.

b.

5. Identify using common names each of the organisms pointed out by the instructor. (1/2 pt each)

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

SURVEY FOR A HYPOTHETICAL 100 BOAT SLIP MARINA
ON SANDY CREEK

BOATERS

1) What is your permanent zip code?

2) What is your occupation?

3) Approximately how many years have you been using the public boat launch?

4) How often do you use the public boat launch?

a) Weekends
- 4 times a month?
- 2 times a month?
- 1 time a month?

b) Daily?
- 5 - 10 days/month?
- 11 - 16 days/month?
- 16+ days/month?

5) What percent of the time that you use the public boat launch do you have to wait to put your boat in or take your boat out of the water?

6) In your opinion, do we need more marinas?

Comments:

7) Could you recommend a better location for a 100 slip marina

other than Sandy Creek?

8) Should the public boat launch capacity be increased?
Why?

9) What is your overall opinion about each of the following? Please state a reason for your opinion if applicable. (+ means that you or the community could benefit from the project.)
(— means that you or the community could be adversely affected by the project.)
(? means that you will not be effected or you are not sure you will be effected.)
On Lower Sandy Creek:

	+	-	?

a) More marinas
Comments:

b) More boat launches
Comments:

c) A restaurant
Comments:

d) A boat repair station_____
Comments:

e) Fuel station
Comments:

f) Pump out station
Comments:

g) Noise levels
Comments:

h) Car traffic
Comments:

i) Boat traffic/safety
Comments:

j) Food store
Comments:

k) Development of wetlands_____ _____
Comments:

l) Fishing in Sandy Creek_and Lake Ontario
Comments:

10) If a new marina is built, would you berth your boat there? Why or why not?

11) How much would you be willing to pay for these services?

12) What are your reasons for not docking your boat at one of the marinas already in Sandy Creek?