

**FIELD BIOLOGY**  
**SYLLABUS FOR BIOL 117**  
FALL SEMESTER 2008

Dr. David Foster  
Jordan Hall 362

Office hours: M/F 8:00 - 10:30 am  
                  Th 8-9:00 am

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Dr. Erik Lindquist  
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                  T/TH 1:15-3:00 pm

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**Course Web Site:** <http://home.messiah.edu/~quist/fieldbio.htm>

**Lecture:** Tuesday/Thursday 11:55 - 1:10 am, Jordan 170

### **GENERAL STATEMENT ABOUT THE COURSE**

Our time together is meant to be a celebration of the Creator and the works of His hands. We will spend our time together this spring studying examples of the major biological communities within the greater Harrisburg area. Our primary focus will be the species that are present, the roles that each plays within their respective community, and the controlling factors that regulate the system – climatic, geological, and hydrological. A significant focus of the course will be the adaptations of the organisms to the winter environment and the transition to spring. It is my hope that as you gain awareness and knowledge of the creatures around you, that the concept of neighbor will be extended to include not only humans, but also the Lord's plants and animals. This is the first step necessary to become effective stewards of the Lord's garden.

### **COURSE OBJECTIVES, TEACHING STYLE, AND ORGANIZATION**

Course Objectives: To introduce you to the "university of the creation," making it available for a lifelong education. I Kings 4: 29-34.

***At the successful completion of the course, students will demonstrate within the context of the greater Harrisburg region,***

#### **1. an introductory knowledge of:**

- a. basic principles of interpretive natural history.
- b. basic principles of ecology.
- c. biological taxonomy and the major groups/species of animals and plants.
- d. the important forest ecosystems.
- e. wetland ecosystems.
- f. Biblical principles of the Judeo-Christian Stewardship Environmental Ethic.

#### **2. an ability to:**

- a. identify and explain the major landforms
- b. identify the common species of plants.
- c. identify the major forest types.
- d. identify common amphibian, reptile, bird, and mammal species by sight and/or sound (where appropriate).
- e. explain how Biblical principles of Creation stewardship apply to practical situations and identify the key scriptural verses that relate to this.
- f. keep a professional field notebook.

**To accomplish these objectives we will do the following:**

1. spend as much time as possible outside to share experiences and study natural ecosystems and landscapes.
2. develop a fundamental scientific knowledge of ecosystem principles.
3. develop a precise scientific vocabulary for use in description and analysis.
4. identify the major animal and plant species present in the area of the region on and surrounding Messiah's campus and delineate the ecological communities of which they are a part.
5. take field trips to examine important ecological within south-central Pennsylvania.
6. develop the discipline of thinking about things in context.
7. engage in critical and reflective thinking about ecosystems, their organizational fabric, and our place within them.
8. explain how Biblical principles of creation stewardship should be commonly practiced in the lives of each Christian.
9. individually keep a field notebook to record your thoughts and observations while working in the field.
10. engage yourself in the individual study of a small section of the Messiah College campus. The details of the study are presented below.

**Teaching Style:** Our ultimate goal is to help you fall in love with the natural world. As you learn to walk hand in hand together, you will find that it constantly draws you to the Creator in praise. Some of our time will be spent in a formal lecture. At other times, we will be more informal as you ask and answer questions from your study, readings, and experiences.

**Organization:** Our "inside time" will be used for devotions, discussion of the reading material, and the introduction of the major groups of organisms present in our area and to provide useful information on their study. An important part of this time will be class discussion of your own observations and conclusions. We will be spending as much time "in the field" as possible both as a class and individually. This will provide a wealth of material to examine, analyze and discuss while we are together.

**TEXTS**

- Sibley, D.A. 2003. The Sibley Field Guide to Birds of Eastern North America. Alfred A. Knopf, Inc.
- Leopold, A. 1949. A Sand County Almanac. Random House Publishers.
- Watts, M.T. 1991. Tree Finder. Nature Study Guild.
- Hallowell, A.C. and B.G. Hallowell. 1981. Fern Finder. Nature Study Guild.
- Other readings and web sites as assigned by the professors.

**REQUIRED EQUIPMENT:** binoculars, field notebook/reflective journal, textbooks, field clothes. These should be brought to each class session. Your binoculars, notebook, and field guides should be readily available whenever we go into the field.

**GRADING**

1. Species identification quizzes: 5%
2. Field Practical: 15%
3. Three written exams over readings/lectures/discussions: 30%
4. Backyard Habitat Study – poster presentation: 20%
5. Field and lab notebook: 20%
6. Attendance and participation: 10%

## GRADING RUBRIC

Quality/ Characteristic	A – Honor – Outstanding	B – Excellent Above Average	C – Good – Average	D – Poor – Below Average	F – No credit Unsatisfactory
1. Interest and ability to communicate.	Almost always shows creativity, sound judgement, intellectual curiosity and communicates correctly and clearly	Frequently shows creativity, sound judgment, intellectual curiosity and communicates correctly and clearly	Shows sustained interest and is able to communicate well and understandably.	Exhibits interest. Marginal performance in communicating	Shows sub-minimal interest. Does not communicate clearly enough to get ideas across.
2. Performance skills of discipline.	Almost always analyzes critically, synthesizes creatively, uses facts in original thinking, and generalizes logically.	Frequently analyzes critically, synthesizes creatively, uses facts in original thinking, and generalizes logically.	Usually produces viable generalizations and satisfactorily organizes data.	Commits errors in fact and judgment when discussing material and has difficulty going beyond gathering and examining facts and data.	Does not comprehend the concepts and ideas which are a part of the course. Does not gather and examine facts and data satisfactorily.
3. Techniques of scholarship.	Shows sound techniques in all projects and uses knowledge effectively.	Shows sound techniques in most projects and uses knowledge effectively.	Good understanding of techniques in most projects.	Demonstrates minimal competence in the techniques of scholarship.	Does not use sound techniques of scholarship.
4. Meeting requirements of the course—in preparation, outside reading and class participation, etc.	Meets or exceeds stated course requirements with distinction in all aspects.	Meets or exceeds stated course requirements with excellence in most aspects.	Meets stated course requirements with adequate performance in all aspects.	Meets stated course requirements with adequate performance in some aspects.	Does not meet the standards and requirements.

**Extra Credit: up to 4 points. Digital wildlife photographs** of (unrestrained) deer, mink, raccoon, turkey, bald eagle, osprey, trout and fox are provided two points of extra credit each. Each photograph must be recognizable. Motion-triggered and underwater cameras are available for checkout by students. The precise time, date, and location of the picture must accompany the photo (time & date should match the “picture taken on” date). The photographs must be taken on Messiah College campus by the one seeking the extra credit. Lastly, a 250 word write up on the species should be submitted with the photo.

**GRADING SCALE:** The following scale, will be used to ascertain your grade for the course:

<b>93-100</b>	<b>A</b>
<b>90-92.9</b>	<b>A-</b>
<b>87-89.9</b>	<b>B+</b>
<b>83-86.9</b>	<b>B</b>
<b>80-82.9</b>	<b>B-</b>
<b>77-79.9</b>	<b>C+</b>
<b>73-76.9</b>	<b>C</b>
<b>70-72.9</b>	<b>C-</b>
<b>67-69.9</b>	<b>D+</b>
<b>60-66</b>	<b>D</b>
<b>Below 60</b>	<b>F</b>

**THE FIELD NOTEBOOK:** All students will keep a field notebook to record your field observations made during the course. You should make every effort to organize and write clearly as you take your field notes. At the end of a period of observations, you may wish to edit and summarize your notes, but be sure to include the original notes also. The notebook should include all field trip notes, species lists and observations from your personal field time. Each page should be dated and the beginning and ending time of your observations noted. Notebooks will be turned in when you present your Backyard Wildlife study. Although the format of each notebook will vary, the following is considered to be basic information which should be included for all entries: date, time, weather conditions, location (be specific—you or someone else may wish to return to the site of observation. Refer to maps or a GPS unit when appropriate and give latitude and longitude (or UTM coordinates), road numbers, mileage, etc.). Always give a description of the general habitat where the observations occur. When describing a species, include information on physical appearance, behavior, etc. Sketches are often very useful. When questions and/or answers come to your mind, include them. Write with clarity. Remember that others will read your notebook so use it only for observations that your professors will read (no folded pages will be kept private). Summaries are often helpful following a series of prolonged observations. Cumulative species lists (including date and location) should be included for each group studied. The latter should be prepared at the end of the course and should be in the back of the notebook when it is submitted.

**BACKYARD WILDLIFE HABITAT - A PROJECT OF STEWARDSHIP IN ACTION:** An important component of this course will be the preparation of a certification proposal for a "Backyard Wildlife Habitat". In 1973, the National Wildlife Federation began certifying privately owned property (your own back yard, church property, school property, etc.) as Backyard Wildlife habitats. This opportunity is growing in popularity and many individuals are discovering the joy of converting their sterile acre(s) of lawn into habitat that celebrates creation. For many Christians, this has become an important avenue of service and praise to their Lord. We have all been given the special privilege of "keeping the garden". This assignment will provide you with new insight regarding this area of your stewardship.

Your task in this assignment is to use a one acre parcel of the Messiah College property of as your working model (areas will be provided by Lindquist and/or Foster). If you live close to the campus and wish to use your own home as the site of your study, you should clear this with us prior to beginning the work. During the course of the semester you should obtain photographs of the parcel in its present condition, and then propose a wildlife habitat plan for the property. Special attention should be paid to the four key components of wildlife habitat: food, water, cover, and places to raise young. Measurements of the property and the development of detailed maps/plans/schematics will be an essential part of your report. An

inventory of the species currently present will be important. Your project should be prepared as a formal application for a certified Backyard Wildlife Habitat. Information for this process can be obtained on the National Wildlife Federation's home page at <http://www.nwf.org/backyard/> where you will find detailed instructions and information. You may download material from the National Wildlife Federation's home page including the formal application sheet. Should you wish in the future to actually complete such a project and submit your proposal for certification, there is currently a \$15 application fee. Your habitat proposal should include a butterfly garden; plants to attract hummingbirds; cover for small mammals; a water garden for aquatic plants as well as a source of water for birds, amphibians, fish, and mammals, and nesting sites for birds and other animals. Other ideas may also be incorporated. There are now more than 70,000 backyards that have been certified across the United States.

Three copies of *Landscaping for Wildlife* will be on reserve in the library, and is an excellent introduction to your assignment. It provides a wealth of information as well as examples that have been successfully used to create garden habitats. You may also wish to visit some of the local garden centers and consult the publications that they offer. Both Stauffers of Kissel Hill Garden Centers (formerly known as Country Market) and Ashcombe Farms have a wide assortment of information available that directly pertains to your project. Other material is also on reserve in the library.

An important part of your work will be the creation of a proposed budget for the project. What will it cost in terms of supplies? To answer this question will require that you visit one or more of the local garden centers to obtain prices on the plants, pumps, pond liners, bird house, bird feeders etc. which you propose to use in your project. Identify the source of the prices that you quote, and name of the store and its location/phone number. If any of your quotes come from a catalog, identify the catalog and be prepared to show it to us if we ask to see it.

Your Backyard Wildlife Habitat certification project will be presented **orally as a PowerPoint presentation** to the class **and as a written report (proposal)**. The written paper should include (1) the completed application form that you may download from the National Wildlife Federation's web page mentioned above. This will be followed (2) by an introductory written section that describes the habitat at the project's inception (including maps and a list of the species that are present) and explains the nature of your project and your goals. I will be looking for depth and breadth here. All four aspects of habitat needs should be included (food, water, cover, and living space – see *Landscaping for Wildlife* and the Backyard Wildlife Habitat materials). When you identify the plants that you plan to use in your restoration efforts, be sure to indicate why you chose each species. Don't forget the needs of species during the winter as well as the summer. The next section (3) should include photographs, diagrams, maps, etc. to provide a detailed visual description of the project. The last section of the paper (4) should be your itemized budget for the project with any accompanying explanation that is necessary. Identify the source of your prices.

Are you looking for an exciting part-time or full-time job? Consider the possibilities of offering your services as a consultant to those who would like their backyards certified for them. Have fun – and welcome to the stewardship of Creation.

### **IN-CLASS COMPUTER POLICY**

Except in cases verified by a medical note, students may not use computers in class.

### **AMERICANS WITH DISABILITIES ACT**

Any student whose disability falls within ADA guidelines should inform the instructor at the **beginning** of the semester of any special accommodations or equipment needs necessary to complete the requirements for this course. Students must register documentation with the Office of Disability Services (Hoffman 101). If you have questions, call extension 5382.

## **SELECT BIBLICAL REFERENCES FOR A THEOLOGY OF NATURE**

### **Original Created Order**

Genesis 1:28

Genesis 2:15 (Tilling = serving: see Joshua 24:15; keeping—compare with Numbers 6:24)

Genesis 2:19-20 (What is the significance of naming?)

### **The breaking of relationships**

Genesis 3:17-18 (results of our disobedience)

Genesis 9 (God's covenant Noah and every living creature)

Leviticus 25 and 26 (Land use instructions and consequences when the land is not given its Sabbath rest). See also 2 Chronicles 36:20-21

Isaiah 6:8: Woe to those who fill the land and despoil it

Isaiah 24:4-6 (the covenant is probably that referred to in Genesis 9)

Hosea 4:3 (results of our disobedience)

Jeremiah 12:4 (results of our disobedience)

Ezekiel 34:18 (admonishment not to pollute and destroy the sustainability of creation)

### **Redemption and restoration**

II Chronicles 11-14- if my people will turn from their wicked ways I will heal their land

John 3:16 (world = Cosmos?) see footnote to this verse in the NIV Study Bible

Romans 8:19-22 (who are the "sons of God" and the "children of God")

Colossians 1:16-20 (see footnote in NIV Study Bible)

II Corinthians 5:18 (those who are reconciled have the ministry of reconciliation)

### **Other important passages**

I Kings 4:29-34

Job 3 6:27 through chapter 41

Psalms 8

Psalms 19

Psalms 24:1-2

Psalms 33:6-9

Psalms 50: 10-12

Psalms 65

Psalms 96:11-12

Psalms 115:15-16

Psalms 104

Isaiah 55:10-13

Hosea 2:18-20

Revelation 4:11

Revelation 11:18

Revelation 21-23

## CLASS SCHEDULE

After devotions, each class will begin with an opportunity for reporting personal observations. We will then move on to the content material for the day.

<b>Lecture Date</b>	<b>Topic and Professor L(indquist) or F(oster)</b>
T Sept. 2 R Sept. 4	<b>Syllabus and Introduction to Natural History (L &amp; F)</b> <b>Geology and Climate of Central PA (F)</b>
T Sept. 9 R Sept. 11	<b>Life on Land (L)</b> <b>Life on Land (continued) (L)</b>
T Sept. 16 R Sept. 18	<b>Life in Water (L)</b> <b>Pennsylvania Vertebrates (L)</b>
T Sept. 23 R Sept. 25	<b>Aquatic Invertebrates (F)</b> <b>Nutrient Cycling &amp; Retention: The Nitrogen and P cycles (F)</b>
T Sept. 30 <b>R Oct. 02</b>	<b>Nutrient Cycling &amp; Retention: The Carbon Cycle (F)</b> <b>EXAM #1</b>
T Oct. 7 R Oct. 9	<b>Life in the Soil (F)</b> <b><i>Fall Break</i></b>
T Oct. 14 R Oct. 16	<b>Organismal Interactions: Communities and Competition (L)</b> <b>Organismal Interactions: Parasites, Pathogens and Mimics (L)</b>
T Oct. 21 R Oct. 23	<b>Organismal Interactions: Mutualism (L)</b> <b>Vines: Structural Parasites in a Nice Neighborhood (F)</b>
T Oct. 28 <b>R Oct. 30</b>	<b>Edible and Medicinal Plants (F)</b> <b>EXAM #2</b>
T Nov. 4 R Nov. 6	<b>Life History Traits: Plants (F)</b> <b>Life History Traits: Animals (L)</b>
T Nov. 11 R Nov. 13	<b>Food Webs- Violence at the Goldenrod Motel</b> <b>Forests and Succession</b>
T Nov. 18 R Nov. 20	<b><u>Ancient Forests: Rage over Trees</u> (F)(video)</b> <b>Biological Diversity (L)</b>
<b>T Nov. 25</b> R Nov. 27	<b>EXAM #3</b> <b>Thanksgiving Recess</b>
T Dec. 2 R Dec. 4	<b>Vernal Ponds: Looking Towards Spring (L)</b> <b>Carnivorous Plants and Other Crazy Things (F)</b>
T Dec. 9 R Dec. 11	<b><u>Life in Cold Blood</u> (L)(video)</b> <b>Global Ecology: The Current Situation (L &amp; F)</b>
<b>W Dec. 17</b>	<b>FINAL EXAM: 1:30-3:30pm.</b>

## LAB SCHEDULE




Sept	03	Campus Forest & Watershed (F) Introduction to the Thayer Bird CD; visit feeder station Expectations for the Backyard Wildlife Habitat Project
	10	Navigation Lab (F)
	17	Radiotelemetry Lab (L & F) Vernal Pond visit
	24	Quiz on Vertebrate Calls and Sight Identification (L) Water and Macroinvertebrates
Oct.	01	Macroinvertebrate Diversity (L)
	08	Trees and Shrubs (F)
	15	Printing Lab (Climenhaga) (F)
	22	Migratory Waterfowl at West Fairview and Wildwood Lake (L)
	29	Pine Grove Furnace State Park (L)
Nov.	05	Wagoner's Gap Hawk Watch (L)
	12	Backyard Wildlife Habitat Project Time & Consultation (F)
	19	Field Practical (L & F)
	26	Thanksgiving
Dec.	03	Class Presentations (L & F)
	10	Class Presentations (L & F)

## LIBRARY RESOURCES ON RESERVE

- The Calls of Frogs and Toads. Lang Elliott.
- Thayer Birding Software's Guide to Birds of North America. Cornell Lab of Ornithology.
- Trees of Pennsylvania: A Complete Reference Guide. Ann F. Rhoads & Timothy A. Block.
- National Geographic Field Guide to the Birds of North America. Jon L. Dunn & Jonathan Alderfer.
- National Audubon Society Field Guide to North American Insects and Spiders.
- Kaufman Field Guide to Insects of North America. Kenn Kaufman & Eric R. Eaton
- A Field Guide to Reptiles and Amphibians: Eastern and Central North America. Roger Conant & Joseph T. Collins.
- Landscaping for Wildlife. Carrol L. Henderson
- Winter Weed Finder: A Guide to Dry Plants in Winter. Don Miller.

## List of Vertebrates for Call and Sight Identification

### Fish

-  Rainbow Trout
-  Brown Trout
-  Brook Trout

### Amphibians

-   American Toad
-   Fowler's Toad
-   Bullfrog
-   Green Frog
-   Pickerel Frog
-   Spring Peeper
-  Spotted Salamander
-  Marbled Salamander
-  Eastern Red-spotted Newt
-  Red-backed Salamander
-  Northern Slimy Salamander
-  Red Salamander
-  Northern Two-lined Salamander



### Reptiles

-  Eastern Box Turtle
-  Painted Turtle
-  Common Snapping Turtle
-  Five-lined Skink
-  Eastern Fence Lizard
-  Eastern Garter Snake
-  Black Rat Snake
-  Northern Water Snake
-  Northern Ringneck Snake
-  Northern Copperhead
-  Timber Rattlesnake

### Birds

-   Canada Goose
-   Mallard
-   Red-tailed Hawk
-   Killdeer
-   Mourning Dove
-   Great Horned Owl
-   Barred Owl

-   Eastern Screech Owl
-   Belted Kingfisher
-   Northern Flicker
-   Pileated Woodpecker
-   Red-bellied Woodpecker
-   Downy Woodpecker
-   Eastern Phoebe
-   Blue Jay
-   American Crow
-   Fish Crow
-   Common Raven
-   American Robin
-   Gray Catbird
-   Northern Mockingbird
-   White-breasted Nuthatch
-   Carolina Wren
-   Carolina Chickadee
-   Tufted Titmouse
-   Red-eyed vireo
-   Eastern Towhee
-   Field Sparrow
-   Chipping Sparrow
-   White-throated Sparrow
-   Song Sparrow
-   Dark-eyed Junco
-   Northern Cardinal
-   House Finch
-   American Goldfinch
-   Wild Turkey
-   Bobwhite Quail
-  Great Blue Heron
-  Turkey Vulture
-  Bald Eagle
-  American Kestrel

-  Sight Recognition Required
-  Call Recognition Required