

ECOL 8000

## Ecological Thought: Past to Present

Credits: 3 hours (4 with attendance at Ecology Seminar)

Schedule: Tu/Th 11:00A-12:15P

Instructors: Prof. B. C. Patten, Dr. S. J. Whipple, Mr. S. R. Borrett

# Syllabus

### Objectives:

1. Impart knowledge of historical and contemporary ecological literature
2. Review major lines of ecological development, from past to present
3. Provide an orientation to regional and Georgia environments
4. Introduce the Institute of Ecology faculty
5. Provide contact with selected ecological research sites
6. Gain exposure to research concepts and methods in ecological sub-disciplines
7. Acquire experience in team-generated written and oral scientific communication.

### Textbook and Readings Packet:

Real, L., and J. H. Brown, editors. 1991. *Foundations of Ecology: Classic Papers with Commentaries*. University of Chicago Press, Chicago. 905 pp.

**Readings packet containing the following available for purchase at BelJeans copy center:**

Photocopy of: Kormondy, E. J. 1965. *Readings in Ecology*. Prentice Hall, Englewood Cliffs, New Jersey. 219 pp.

Photocopies of journal articles and book sections for Weeks 1 through Week 3 will be available for purchase at Bel Jeans copy center.

Articles for Weeks 4 through 14 will be available as PDF files on the UGA Library reserve system.

An archival copy of all journal articles and books sections will be available from the instructors if needed.

### Other Sources :

Allee, W. C., Emerson, A. E., Park, O., Park, T. and Schmidt, K. P. 1949. *Principles of Animal Ecology*. Saunders, Philadelphia & London. 837 pp.

Connell, J. H., Mertz, D. B., and Murdoch, W. W. 1970. *Readings in Ecology and Ecological Genetics*. Harper & Row, New York, Evanston, and London. 397 pp.

Dodson, S. I., Allen, T. F. H., Carpenter, S. R., Kandis, E., Ives, A. R., Jeanne, R. L., Kitchell, J. F., Langston, N. E., and Turner, M. G. 1999. *Readings in Ecology*. Oxford University Press, New York and Oxford. 461 pp.

■ Hazen, W. E. 1964. *Readings in Population and Community Ecology*. Saunders, Philadelphia & London. 388 pp.

(The letters ■, ■, ■ and ■ identify these sources in the listings below)

## Course Elements

### 1. Readings and discussions

Readings will be organized into topics reflecting major lines of thought developed at different levels of organization during the history of ecology. Nominally, each week, one paper-group from Kormondy (1965, cited above), one classic paper, and one more modern paper will be reviewed with reference to these topics. Often multiple papers are listed for each category. In this case the students and faculty mentor will decide which paper will be read by the entire class. For weeks 13 and 14 there is no Kormondy section; in this case, a total of three articles from the classic paper and modern paper sections will be chosen by the students and faculty mentor.

- a. Three students weekly, in collaboration with a mentoring faculty member or instructor, will make selections from three categories:
  - 1) Digests of historical paper-groups in Kormondy (1965) ■;
  - 2) Classic papers, taken mainly from Real & Brown (1991) ■, supplemented by faculty selections;
  - 3) More modern papers, selected from lists generated by the faculty and instructors.
- b. Each 3-student group, assisted by its mentor, will lead the class in discussions.
- c. The students will also prepare summary handouts to accompany the discussions.
- d. A round will be concluded when each student in the class has led one discussion. Multiple rounds and a possible partial final round will be determined by class size.
- e. Each weekly group of three students will, guided by its mentor, prepare a term paper reviewing the classic to modern literature in its topic area. These term papers will be written in the style of a review journal, such as *Annual Reviews of Ecology and Systematics*. They will be due and orally presented during the final three weeks of the course. One topic only from any round will translate into term

papers. Topic selections will be made by the students early in the course to allow equal time (most of the semester) for term paper preparation.

## 2. Field trips

Two kinds of field trips will introduce Southeastern natural history and connect the readings to field ecology. If possible, a third category could serve on a time- and budget-permitting basis to introduce the research programs and scientists at one or more laboratories remote from UGA.

- 1) **Two weekend camping/hiking excursions**, departing Friday afternoon or early evening, returning Sunday evening.
  - Great Smoky Mountains National Park, with a Sunday afternoon stop at Coweeta Hydrologic Laboratory for an orientation to experimental watershed research.
  - Okefenokee Swamp National Wildlife Refuge, and Cumberland Island National Seashore.
- 2) **Several area trips** of a few hours' duration at times to be arranged. Possibilities include Horseshoe Bend, granite outcrops, urban watersheds, Lake Oglethorpe, etc.
- 3) **Possible overnight trips** to other institutions such as SREL, Skidaway, Sapelo, Ichauway, etc.

## 3. Faculty symposium: Friday and/or Saturday, September 26-27

This symposium is designed to be an integral part of the course. Its purposes will be to introduce all students, graduate and undergraduate, to the faculty, as well as provide an opportunity for faculty members to present and discuss their research. The scope and format will be similar to that of the January Student Symposium. All faculty members will be encouraged to participate by presenting results of their research concluded or in progress.

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# TOPIC 1. ORIGINS OF ECOLOGY

## Week 1: Aug 19 & Aug 21

### Book Section

#### **Background of Ecology — 1** (31 pp.)

13–43: Pre-20th Century

### Paper-Group 1

#### **Defining Ecology** (25 pp.)

xiii–xiv: Early definitions

Reiter (1865)

St. Hilaire (1859)

Haeckel (1866)

Mivart (ca. 1850's)

1–10: Early Natural History

Theophrastus (300 B. C.)

de Reaumur (ca. 1742)

Linnaeus (1750)

1-13: Definition as a Science  
Kingsland, S. E. (1991)

**Week 2: Aug 26 & Aug 28**

**Book Section** Background of Ecology — 2 (27 pp.)  
43-69 Early 20th Century

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**TOPIC 2. THE ENVIRONMENT**

**Paper-Group 2** Autecology 1 -  
Environmental Factors Affecting Organisms (29 pp.)  
11-39

Justus Liebig (1840)	Rudolf Geiger (1941)
F. F. Blackman (1905)	George L. Clarke (1939)
Victor E. Shelford (1911)	H. J. Oosting & W. D. Billings (1942)
Lawrence J. Henderson (1913)	W. W. Garner & H. A. Allard (1923)

**Week 3: Sep 2 & Sep 4**

**Paper-Group 3** Autecology 2  
Organism Responses to Environment (21 pp.)  
40-60

T. H. Bullock (1955)	D. H. Spalding (1832)
H. S. Jennings (1904)	K. Lorenz & N. Tinbergen (1938)
J. Loeb (1918)	A. D. Hasler & W. J. Wisby (1951)

**Classic Paper 3a** Grinnell, J. (1917) (7 pp.)  
The niche-relationships of the California Thrasher. *The Auk* 34:  
427-433.  
118-124

**Classic Paper 3b** Hutchinson, G. E. (1957) (13 pp.)  
Concluding remarks. *Cold Spring Harbor Sympos. Quant. Biol.* 22:  
415-427.  
225-237

**Modern Paper 3** Patten, B. C. and Auble, G. T. (1981) (30 pp.)  
System theory of the ecological niche. *Amer. Nat.* 117: 893-922.  
(select one)

**James, F.C., Johnston, R.F., Warner, N.O., Niemi, G.J., Broecklin, W.J. (1984) (31 pp.)**  
The Grinnellian niche of the wood thrush. *American Naturalist* 124:17-47.

**Austin, M.P. (1985) (23 pp.)**  
Continuum concept, ordination methods and niche theory. *Annual Review of Ecology and Systematics* 16:39-61.

**Leibold, Mathew A. (1995) (12 pp.)**  
The niche concept revisited: mechanistic models and community context. *Ecology* 76(5):1371-1382.

**Pulliam, H. Ronald (2000) (13 pp.)**  
On the relationship between niche and distribution. *Ecology Letters* 3:349-361.

**Fitt, W.K., Cook, C.B. (2001) (11 pp.)**  
The effects of feeding or addition of dissolved inorganic nutrients in maintaining the symbiosis between dinoflagellates and a tropical marine cnidarian. *Marine Biology* 139(3):507-517

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### TOPIC 3. THE POPULATION

#### Week 4: Sep 9 & Sep 11

#### Paper-Group 4

#### Population Growth (15 pp.)

62-76

T. R. Malthus (1798)

R. N. Chapman (1928)

P. F. Verhulst (1838)

C. S. Elton (1924)

R. Pearl and L. J. Reed (1920)

#### Classic Paper 4a

#### **Volterra, V. (1926) (3 pp.)**

Fluctuations in the abundance of a species considered mathematically. *Nature* 118: 558-560.

283-285

#### Classic Paper 4b

#### **Pearl, R. (1927) (17 pp.)**

The growth of populations. *Quart. Rev. Biol.* 2: 532-548.

**Classic Papers 4c**  
(select one)

**Birch, L. C. (1948) (12 pp.)**

The intrinsic rate of natural increase of an insect population. *J. Animal Ecol.* 17: 15–26.

**Smith, F. E. (1952) (10 pp.)**

Experimental methods in population dynamics: a critique. *Ecology* 33: 441–450.  
96–105

**Modern Papers 4**

**Hall, C. A. S. (1988) (27 pp.)**

An assessment of several of the most important theoretical models in ecology and of the data used in their support. *Ecol. Mod.* 43: 5–31.

(select one)

**Rohani, P., May, R.M. and Hassell, M.P. (1996) (13 pp.)**

Metapopulations and equilibrium stability- the effects of spatial structure. *Journal of Theoretical Biology* 181:97-109.

**Ellner, S.P., Bailey, B.A., Bobashev, G.V., Gallant, A.R., Grenfell, A.R., Nychka, D.W. (1998) (16 pp.)**

Noise and nonlinearity in measles epidemics: combining mechanistic and statistical approaches to population modeling. *American Naturalist* 151:425-440.

**Turchin, P. and Ellner, S.P. (2000) (18 pp.)**

Living on the edge of chaos: population dynamics of Fennoscandian voles. *Ecology* 81:3099-3116.

**Keeling, M.J. and Rohani, P. (2002) (10 pp.)**

Estimating spatial coupling in epidemiological systems: a mechanistic approach. *Ecology Letters* 5(1):20-29

**Week 5: Sep 16 & Sep 18**

**Paper-Group 5**

**Population Interactions (25 pp.)**

77–101

P. R. Burkholder (1952)

H. E. Howard (1920)

G. F. Gause (1934)

W. M. Wheeler (1918)

J. H. Connell (1961)

W. C. Allee (1926)

**Classic Papers 5**

**Huffaker, C.B. (1958) (41 pp.)**

Experimental studies on predation: dispersion factors and predator-prey oscillations. *Hilgardia* 27:343-383.  
164-204.

(select one)

**Connell, J. H. (1961) (14 pp.)**

The influence of interspecific competition and other factors on the distribution of the barnacle *Chthamalus stellatus*. Ecology 42:710-723. 836-849.

**Rosenzweig, M.L. and MacArthur, R.H. (1963) (15 pp.)**

Graphical representation and stability conditions of predator-prey interactions. American Naturalist 97:209-223.

**Modern Papers 5**

**Schoener, T.W. (1983) (46 pp.)**

Field experiments on interspecific competition American Naturalist 122: 240-285.

(select one)

**Zangerl, A.R., and M.R. Berenbaum (1993) (8 pp.)**

Plant chemistry and insect adaptation to plant chemistry as determinants of host plant utilization patterns. Ecology 74:47-54.

**Madrich, M.D. and Hunter, M.D. (2002) (7 pp.)**

Phenotypic diversity influences ecosystem functioning in an oak sandhills community. Ecology 83(8):2084-2090

### **Week 6: Sep 23 & Sep 25**

**Paper-Group 6**

**Population Regulation (16 pp.)**

102-117

D. Lack (1948)

N. G. Hairston, F. E. Smith

L. C. Birch (1957)

& L. B. Slobodkin (1960)

A. J. Nicholson (1957)

**Classic Paper 6a**

**Hairston, N. G., Smith, F. E., and Slobodkin, L. B. (1960) (5 pp.)**

Community structure, population control, and competition. Amer. Nat. 94: 421-425.

357-36.

**Classic Paper 6b**

(select one)

**MacArthur, R. H. (1958) (21 pp.)**

Population ecology of some warblers of northeastern coniferous forests. Ecology 39: 599-619.

686-706.

Classic Paper 6c

**Hutchinson, G. E. (1959)** (15 pp.)

Homage to Santa Rosalia; or, why are there so many kinds of animals?  
Amer. Nat. 93: 145–159.  
342–356

**Fretwell, S. D. and Lucas, H. L. (1970)** (21 pp.)

On territorial behavior and other factors influencing habitat distribution in birds. *Acta Biotheoretica* 19: 16–36.

Modern Papers 6  
(select one)

**Pulliam, H. R. (1988)** (10 pp.)

Sources, sinks, and population regulation. *Amer. Nat.* 132: 652–661.

**Hunter, M. D. & P. W. Price (1992)** (9 pp.)

Playing chutes and ladders: heterogeneity and the relative roles of bottom-up and top-down forces in natural communities. *Ecology* 73: 724–732

**Turchin, P. (1995)** (22 pp.)

Population regulation: old results and a new synthesis. In Cappuccino, N., and Price, P. W. (eds.), *Population Dynamics: New Approaches and Synthesis*, pp. 19–40. Academic Press, San Diego.

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## TOPIC 4. THE BIOCOENOSIS

### Week 7: Sep 30 & Oct 2

Paper-Group 7

**Community Composition & Ordering** (22 pp.)

118–139

E. Forbes (1844)

H. C. Cowles (1899)

K. Möbius (1877)

C. McMillan (1959)

E. Warming (1909)

E. S. Deevey (1939)

Classic Paper 7

**Cowles, H. C. (1899)** (31 pp.)

The ecological relations of the vegetation of the sand dunes of Lake Michigan. *Bot. Gaz.* 27: 95–117, 167–202, 281–308, 361–391.  
28–58

(select one)

**Watt, A.S. (1947)** (22 pp.)

Pattern and process in the plant community. *Journal of Ecology* 35:1-22  
664-685

**Whittaker, R. H. (1956) (80 pp.)**

Vegetation of the Great Smoky Mountains. Ecol. Monogr. 26: 1-80.

**Bray, J.R. and Curtis, J.T. (1957) (25 pp.)**

An ordination of the upland forest communities of southern Wisconsin. Ecol. Monogr. 27: 325-349.  
571-595

**Whittaker, R.H. (1967)** Gradient analysis of vegetation.

Biol. Rev. 42: 207-264. (58 pp.)

**Modern Papers 7**

**Shugart, H.H. and Urban, D.L. (1989) (26 pp.)**

Factors affecting the relative abundance of forest tree species. In: Toward a More Exact Ecology. Grubb, P.J. and Whittaker, J.B. (eds.), pp. 249-274. Blackwell. Oxford.

**Covich, A.P., Palmer, M.A., Crowl, T.A. (1999) (10 pp.)**

The role of benthic invertebrate species in freshwater ecosystems. Bioscience 49(2):119-128

**Wither, M. A. and Meentemeyer, V. (1999) (48 pp.)**

Concepts of scale in landscape ecology. In: Landscape Ecological Analysis: Issues and Applications. Klopatek, Jeffrey M. and Gardner, Robert H. (eds.), pp. 205-252. Springer. New York.

**Week 8: Oct 7 & Oct 9**

**Paper-Group 8**

**Community Nature & Change (26 pp.)**

140-165

F. E. Clements (1916)

L. G. Ramensky (1926)

V. N. Sukatchew (1928)

H. A. Gleason (1926)

J. Braun-Blanquet

S. A. Cain (1947)

& E. Furrer (1913)

R. H. Whittaker (1953)

**Classic Paper 8a**

**Gleason, H. A. (1926) (20 pp.)**

The individualistic concept of the plant association  
98-117

**Classic Paper 8b**

**Clements, F. E. (1936) (39 pp.)**

Nature and structure of the climax. *J. Ecology* 24: 252–284.  
59–97.

**Modern Papers 8**

(select one)

**May, R. M. (1972) (2 pp.)**

Will a large complex system be stable? *Nature* 238: 413–414.

**Drury, W. H. and Nisbet, I. C. T. (1973) (38 pp.)**

Succession. *J. Arnold Arboretum* 54: 331–368.

**Connell, J. H., and Slatyer, R. O. (1977) (26 pp.)**

Mechanisms of succession in natural communities and their role in community stability and organization. *Amer. Nat.* 111: 1119–1144.

**McNaughton, S. J. (1977) (11 pp.)**

Diversity and stability of ecological communities: a comment on the role of empiricism in ecology. *Amer. Nat.* 111: 515–525.

**Paine, R. T. (1980) (19 pp.)**

Food webs: linkage, interaction strength and community infrastructure. *J. Anim. Ecol.* 49: 667–685.

**Delcourt, H. R., Delcourt, P. A. and Webb III, T. (1983) (23 pp.)**

Dynamic plant ecology: the spectrum of vegetational change in space and time. *Quaternary Science Reviews* 1: 153–175.

**Fastie, Christopher L. (1995) (18 pp.)**

Causes and ecosystem consequences of multiple pathways of primary succession at Glacier Bay, Alaska. *Ecology* 76(6):1899–1916.

**Chave, Jerome, Muller-Landau, Helene C., Levin, Simon A. (2002) (23 pp.)**

Comparing classical community models: theoretical consequences for patterns of diversity. *American Naturalist* 159(1):1-23

## TOPIC 5. THE ECOSYSTEM

### Week 9: Oct 14 & Oct 16

#### Paper-Group 9

#### Ecosystem Perceptions and Concepts (5 pp.)

166-170

F. C. Evans (1956)

S. A. Forbes (1887)

#### Classic Paper 9a

#### **Forbes, S. A. (14 pp.)**

The lake as a microcosm. Bull. Illinois Nat. Hist. Survey 15 (1925):  
537-550.

14-27

#### Classic Paper 9b

#### **Tansley, A. G. (1935) (24 pp.)**

The use and abuse of vegetational concepts and terms. Ecology 16:  
284-307.

318-341.

#### Modern Paper 9

#### **Hedin, Lars O., Armesto, Juan J., and Johnson, Arthus H. (1995) (17 pp.)**

Patterns of nutrient loss from unpolluted, old-growth temperate forests:  
evaluation of biogeochemical theory. Ecology 76(2):493-509.

#### **Meyer, J.L., Wallace, J.B., Eggert, S.L. (1998) (10 pp.)**

Leaf litter as a source of dissolved organic carbon in streams.  
Ecosystems 1(3):240-249.

#### **Lawton, J. H. (1999) (16 pp.)**

Are there general laws in ecology? Oikos 84: 177-192.

#### **Paul, M.J., Meyer, J.L. (2001) (33 pp.)**

Streams in the urban landscape. Annual Review of Ecology and  
Systematics 32: 333-365.

### Week 10: Oct 21 & Oct 23

#### Paper-Group 10

#### Ecosystem Energetics (20 pp.)

171-190

E. N. Transeau (1926)

George L. Clarke (1946)

C. Juday (1940)

Howard T. Odum (1957)

R. L. Lindeman (1942)

- Classic Paper 10a** **Lindeman, R. L. (1942)** (20 pp.)  
 The trophic-dynamic aspect of ecology. *Ecology* 23: 399–418.  
 157–176
- Classic Papers 10b** **Odum, H. T., and Pinkerton, R. C. (1955)** (13 pp.)  
 (select one) Time's speed regulator: the optimum efficiency for maximum  
 power output in physical and biological systems. *Amer. Scient.*  
 43: 331–343.
- Odum, H.T. (1957)** (58 pp.)  
 Trophic structure and productivity of Silver Springs, Florida. *Ecol.*  
*Monogr.* 27: 55–112.
- Teal, J. M. (1962)** (11 pp.)  
 Energy flow in the salt marsh ecosystem of Georgia. *Ecology* 43:  
 614–624.  
 639–649.
- Modern Papers 10** **Wiegert, R. G. & Owen, D. F. (1971)** (13 pp.)  
 (select one) Trophic structure, available resources and population density in  
 terrestrial versus aquatic ecosystems. *J. theor. Biol.* 30: 69–81.
- Patten, B. C. (1985)** (20 pp.)  
 Energy cycling, length of food chains, and direct vs. indirect effects in  
 ecosystems. *Can. Bull. Fish. Aqu. Sci.* 213: 119–138.
- Coleman, D.C. (1996)** (12 pp.)  
 Energetics of detritivory and microbivory in soil in theory and  
 practice. In: *Food Webs: Integration of Patterns and Dynamics*.  
 Polis, G.A., Winemiller, K.O. (eds.). pp.39-50. Chapman and  
 Hall. New York.
- Kreeger, D. A. and R. I. E. Newell (2000)** (13 pp.)  
 Trophic complexity between producers and invertebrate consumers  
 in salt marshes. In: *Concepts and Controversies in Tidal Marsh  
 Ecology*. M. P. Weinstein and D. A. Kreeger (eds.). pp. 187-  
 220. Kluwer Academic Publishers, Dordrecht.
- Post, David M. (2002)** (9 pp.)  
 The long and short of food-chain length. *Trends in Ecology and Evolution*  
 17(6):269-277.

## Week 11: Oct 28 & Oct 30 (Fall break)

### Paper-Group 11

#### Ecosystem Biogeochemistry (9 pp.)

191-199

H. W. Harvey (1926)

A. C. Redfield (1958)

O. Arrhenius (1922)

### Classic Paper 11

#### **Sverdrup, H.U. (1953)** (9 pp.)

On conditions for the vernal blooming of phytoplankton. *Journal du Conseil* 18: 287-295.

#### **Likens, G. E., Borman, F. H., Johnson, N. M., Fisher, D.W., and Pierce, R. S. (1970)**. (25 pp.)

Effects of forest cutting and herbicide treatment on nutrient budgets in the Hubbard Brook watershed-ecosystem. *Ecol. Monogr.* 20: 23-47. 880-904.

### Modern Paper 11

#### **Reiners, William A. (1986)** (15 pp.)

Complementary models for ecosystems. *American Naturalist* 127(1):59-73.

#### **Elser, J.J., Sterner, R.W., Gorokhova, E., Fagan, W.F., Markow, T.A., Cotner, J.B., Harrison, J.F., Hobbie, S.E., Odell, G.M. and Weider, L.J., (2000)** (11 pp.)

Biological stoichiometry from genes to ecosystems. *Ecology Letters*, 3: 540-550.

#### **Fu, Shenglei, Cabrera, M.L., Coleman, D.C., Kisselle, K.W., Garrett, C.J., Hendrix, P.F., Crossley, D.A. Jr. (2000)** (20 pp.)

Soil carbon dynamics of conventional tillage and no-till agroecosystems at Georgia Piedmont - HSB-C models. *Ecological Modelling* 131(2-3):229-248

## Week 12: Nov 4 & Nov 6

### Paper-Group 12

#### Ecosystem Organization and Regulation (19 pp.)

200-219

A. Leopold (1941)

E. P. Odum (1962)

G. E. Hutchinson (1959)

R. Margalef (1963)

R. H. MacArthur

& J. W. MacArthur (1961)

**Classic Paper 12** **Odum, E. P. (1969) (9 pp.)**  
The strategy of ecosystem development. *Science* 164: 262–270.  
596–604

**Modern Papers 12** **Vitousek, P.M. and Reiners, W.A. (1975) (6 pp.)**  
Ecosystem succession and nutrient retention: a hypothesis.  
*Bioscience* 25:376-381.

(select one) **Ulanowicz, R.E. 1989 (9 pp.)**  
A phenomenology of evolving networks. *Syst. Res* 6: 209–217.

**Bartlett, R., Pickering, J., Gauld, I., Windsor, D. (1999) (4 pp.)**  
Estimating global biodiversity: tropical beetles and wasps send different signals. *Ecological Entomology* 24(1):118-121

**Porter, J.W., Lewis, S.K., Porter, K.G. (1999) (9 pp.)**  
The effect of multiple stressors on the Florida Keys coral reef ecosystem: A landscape hypothesis and a physiological test.  
*Limnology and Oceanography* 44(3) Part 2:941-949

**Jørgensen, S. E., Patten, B. C., and Straskraba, M. (2000) (36 pp.)**  
Ecosystems emerging: growth. *Ecol. Mod.* 126: 249–284.

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### **Week 13: Nov 11 & Nov 13**

#### **Behavioral & Evolutionary Ecology**

**Classic Papers 13** **Charnov, E.L. (1976) (9 pp.)**  
Optimal foraging theory, the marginal value theorem. *Theoretical Population Biology* 9: 129–136.

(select one) **Lack, D. (1947) (51 pp.)**  
The significance of clutch-size, Parts 1 and 2. *Ibis* 89:302-352.

**Ehrlich, P.R. and Raven, P.H. (1964) (23 pp.)**  
Butterflies and plants: A study in coevolution. *Evolution* 18:586-608.  
362–384

**Gould, S.J. and Lewontin, R.C. (1979) (18 pp.)**

The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. Proceedings of the Royal Society of London B 205:581-598

**Modern Papers 13 Berenbaum, M.R., A.R. Zangerl, and J.K. Nitao. (1986) (14 pp.)**

(select one) Constraints on chemical coevolution: Wild parsnip and the parsnip web worm. Evolution 40:1215-1228.

**Vermeij, G.J. (1994) (18 pp.)**

The evolutionary interaction among species: Selection, escalation, and coevolution. Annual Review of Ecology and Systematics 25:219-236

**Ritchie, M.E. (1998) (22 pp.)**

Scale-dependent foraging and patch choice in fractal environments. Evolutionary Ecology 12(3):309-330.

**Thompson, J.N. (1999) (14 pp.)**

Specific hypotheses on the geographic mosaic of coevolution. American Naturalist 153:S1-S14

**Irwin, R.E., Brody, A.K., Waser, N.M. (2001) (8 pp.)**

The impact of floral larceny on individuals, populations, and communities Oecologia 129(2):161-168

**Moore, A.J., Gowaty, P.A., Wallin, W.G., Moore, P.J. (2001) (7 pp.)**

Sexual conflict and the evolution of female mate choice and male social dominance. Proceedings of the Royal Society of London, Series B: Biological. 268(1466):517-523

**Week 14: Nov 18 & Nov 20**

### Ecological Modeling

**Classic Papers 14 Riley, G.A. (1946) (20 pp.)**

Factors controlling phytoplankton populations on Georges Bank. Journal of Marine Research 6,:54-73

(select one)

**Riley, G.A. (1947) (10 pp.)**

A theoretical analysis of the zooplankton population of Georges Bank. *Journal of Marine Research* 6: 104-113

**Botkin, D.B., Janak, J.F., and Wallis, J.R. (1972) (24 pp.)**

Some ecological consequences of a computer model of forest growth. *Journal of Ecology* 60:849-872.

**DiToro, D.M., D.J. O'Connor, and R.V. Thomann (1975) (52 pp.)**

Phytoplankton-Zooplankton-Nutrient interaction model for western Lake Erie. Pages 423-474 In: Systems Analysis and Simulation Vol. III. Patten, B.C. (ed.) Academic Press, New York.

**May, R.M. (1975) (14 pp.)**

Biological populations obeying difference equations: stable points, stable cycles and chaos. *Journal of Theoretical Biology* 51:511-524.

**Wiegert, R.G. (1975) (25 pp.)**

Simulation modelling of the algal-fly components of a thermal ecosystems: effects of spatial heterogeneity, time delays, and model condensation. Pages 157-181 In: Systems Analysis and Simulation Vol III. Patten, B.C. (ed.) . Academic Press, New York.

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**Week 15: Nov 25 & Nov 27 (Thanksgiving)**

**Student oral presentations**

**Week 16: Dec 2 & Dec 4**

**Student oral presentations**