

## **BIOL 7360Q – SPATIAL ECOLOGY OF ANIMALS**

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Office Hours: T, R 9-11:00 am, or by appointment

Lecture: Supple 257, W 5:00-7:45pm

**Course Overview:** The critical role of space in animal ecology has been long recognized but has only recently emerged as a new subdiscipline of ecology. Spatial ecology of animals blends the disciplines of population ecology, behavioral ecology and landscape ecology. Recent developments in radio and satellite telemetry, remote sensing and geographic information systems (GIS) have resulted in new insights into the spatial ecology of animals. Furthermore, these insights have important applications to the fields of wildlife management and conservation biology. This course is intended to critically examine the concepts and techniques encompassing spatial ecology of animals. Students will gain “real-world” experience applying these concepts and techniques (e.g. GIS) during this course.

### **Course Goals and Objectives:**

- 1) An understanding of the basic concepts and applications of spatial ecology as it relates to animals.
- 2) Knowledge of the quantitative methods used to sample populations, measure resource selection, and gain insights into animal spatial ecology.
- 3) Practical knowledge and understanding of geographic information system (GIS) – based applications in animal ecology.

### **Textbooks:**

1. Gorr, W. L., and K. S. Kurland. 2005. GIS Tutorial, Workbook for ArcView 9. ESRI Press (required).
2. Price, Maribeth. 2002. Mastering ArcGIS, 2/e. McGraw-Hill Science/Engineering/Math (optional).

### **Course Grading:**

|                     |      |
|---------------------|------|
| Project             | 90 % |
| Readings discussion | 10%  |

See project handout for guidelines on grading.

Reading(s) discussion grades will be based on your participation in class. Grading is as follows (A: 100% participation during discussion, B: 75% participation during discussion, C: 50% participation during discussion, F: < 50% participation during discussion).

**Course outline:**

| <b>Date</b>  | <b>Topic</b>                       | <b>Readings</b>                                 | <b>Tutorial</b> |
|--------------|------------------------------------|---|-----------------|
| 22 Aug       | Introduction                       |   | 1               |
| 29 Aug       | Scale, landscape patterns          | Levins 1992                                     | 2-3             |
| 05 Sep       | Home range, territories, dispersal | Dunning et al. 1992;                            | 4               |
| 12 Sep       | RT/ST/GPS                          | Amstrup et al. 2004                             | 5               |
| 19 Sep       | Home range estimators              | Anderson et al. 2005                            | 6               |
| 26 Sep       | Metapopulations,                   | Hanski et al 1995;                              | 7               |
| 03 Oct       | Source/sink                        | Pulliam 1988; Doak 1995                         | 8               |
| 10 Oct       | Fragmentation                      | Lord and Norton 1990;<br>Kotliar and Wiens 1990 | 9               |
| 17 Oct       | Resource selection                 | Guthery et al. 2001;<br>Aspbury and Gibson 2004 |                 |
| 24 Oct       | Modeling and GIS                   | Mitchell et al. 2001                            |                 |
| 31 Oct       | No class                           |   |                 |
| 07 Nov       | GIS and aquatic research           | Toepfer et al. 2000                             |                 |
| 14 Nov       |                                    |   |                 |
| 21 Nov       | No class – Turkey Day              |   |                 |
| 28 Nov       | Project assistance                 |   |                 |
| <b>5 Dec</b> | <b>Project Presentations</b>       |   |                 |

**Course Readings:**

- Amstrup, S.C., T.L. McDonald, and G.M. Durner. 2004. Using satellite radiotelemetry data to delineate and manage wildlife populations. *Wildlife Society Bulletin* 32(3): 661-679.
- Anderson, D.P., and J.D. Forester, M.G. Turner, J.L. Frair, E.H. Merrill, D. Fortin, J.S. Mao, and M.S. Boyce. 2005. Factors influencing female home range sizes in elk (*Cervus elaphus*) in North American landscapes. *Landscape Ecology* 20: 257-271.
- Aspbury, A., and R.M. Gibson. 2004. Long-range visibility of greater sage grouse leks: a GIS-based analysis. *Animal Behaviour* 67: 1127-1132.
- Doak, D.F. 1995. Source-sink models and the problem of habitat degradation: general models and applications to the Yellowstone Grizzly. *Conservation Biology* 9: 1370-1379.
- Dunning, J.B., B.J. Danielson, and H.R. Pulliam. 1992. Ecological processes that affect populations in complex landscapes. *Oikos* 65: 169-175.
- Guthery, F.S., M.C. Green, R.E. Masters, S.J. DeMaso, H.M. Wilson, and F.B. Steubing. 2001. Land cover and bobwhite abundance on Oklahoma farms and ranches. *Journal of Wildlife Management* 65: 838-849.

- Hanski, I., T. Pakkala, M. Kuussaari, and G. Lei. 1995. Metapopulation persistence of an endangered butterfly in a fragmented landscape. *Oikos* 72: 21-28.
- Kotliar, N.B., and J.A. Wiens. 1990. Multiple scales of patchiness and patch structure: a hierarchical framework for the study of heterogeneity. *Oikos* 59: 253-260.
- Levin, S.A. 1992. The problem of pattern and scale in ecology: the Robert H. MacArthur Award lecture. *Ecology* 73: 1943-1967.
- Lord, J.M., and D.A. Norton. 1990. Scale and the spatial concept of fragmentation. *Conservation Biology* 4: 197-202.
- Mitchell, M.S., R.A. Lancia, and J.A. Gerwin. 2001. Using landscape-level data to predict the distribution of birds on a managed forest: effects of scale. *Ecological Applications* 11: 1692-1708.
- Pulliam, H.R. 1988. Sources, sinks, and population regulation. *American Naturalist* 132: 652-661.
- Toepfer, C.S., W.L. Fisher, and W.D. Warde. 2000. A multistage approach to estimate fish abundance in streams using geographic information systems. *North American Journal of Fisheries Management* 20: 634-645.