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Introduction to Geographic Information Systems for undergraduates in natural resources ecology & management

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Abstract

Ecological Methods (AEcl/Biol 371) is an upper-level course in the Department of Natural Resource Ecology & Management at Iowa State University. Not simply a techniques course, it integrates topics from lectures and labs such as population and landscape ecology so that students learn the skills needed to identify and solve applied ecological and wildlife management problems. Geographic Information Systems (GIS) have become an integral component of ecological research and natural resource management. Over the course of three, three-hour lab periods students in 371 use ESRI ArcGIS to create, manipulate, and display geographic data from the Iowa 4-H Center in Boone County.

Disciplines

Geographic Information Sciences | Higher Education and Teaching | Natural Resources Management and Policy | Science and Mathematics Education

Introduction to Geographic Information Systems for Undergraduates in Natural Resources Ecology & Management

Paul D. B. Skrade

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Objectives

Ecological Methods (AEcl/Biol 371) is an upper-level course in the Department of Natural Resource Ecology & Management at Iowa State University. Not simply a techniques course, it integrates topics from lectures and labs such as population and landscape ecology so that students learn the skills needed to identify and solve applied ecological and wildlife management problems. Geographic Information Systems (GIS) have become an integral component of ecological research and natural resource management. Over the course of three, three-hour lab periods students in 371 use ESRI ArcGIS to create, manipulate, and display geographic data from the Iowa 4-H Center in Boone County.

Lab One

The unit begins with an introduction to terms and concepts related to GIS. Examples of these are definitions of **Geographic Features** (real-world objects that can be 0-, 1-, or 2-dimensional like points, roads, and crop fields respectively) and **Feature Classes** (also called "**layers**" that are collections of features) and explaining the difference between **Vector** (points, lines, and polygons) and **Raster** (images like aerial photographs and topographic maps) data. Students learn skills such as creating shape files, calculating distances and areas, and digitizing land cover.
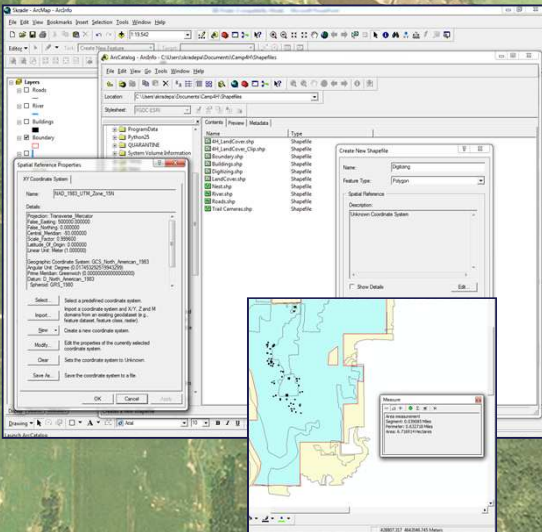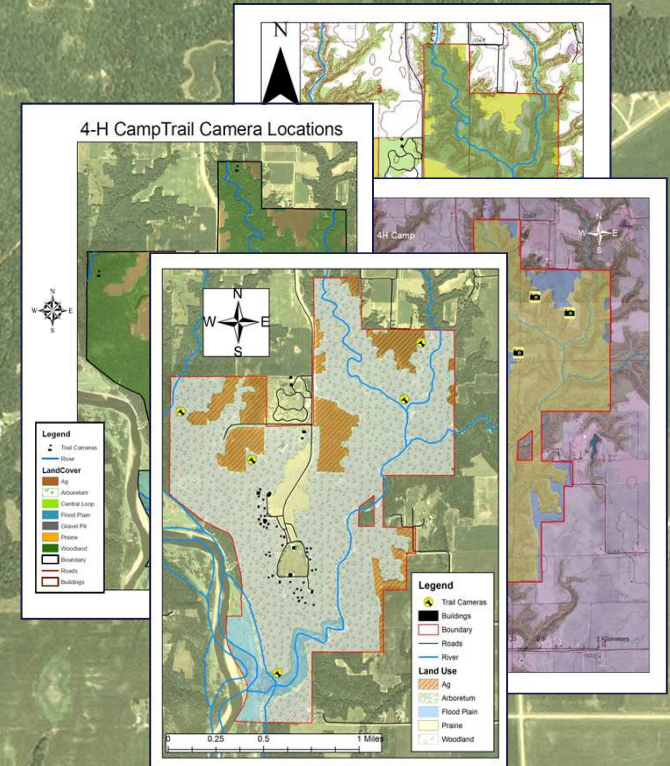
Lab Two

Much of ArcMap's utility is in the ability to manipulate feature classes based on their attributes and their overlap with other layers. In the second unit students are introduced to Geoprocessing and use several common tools to answer ecological and resource management questions. They start by calculating the area of prairie at the 4-H Camp and use that information to assist with camp management objectives.
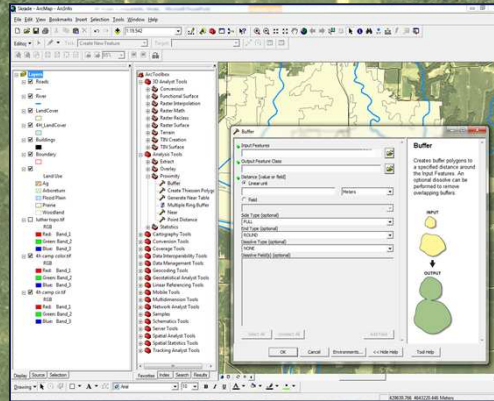
Students enjoying working with GIS

"The GIS skills I learned in 371 have really helped me in graduate school. I used GIS to make maps for my field technicians and figures for talks and with some extra help I was able to do my site selection and analyze spatial data."

Tyler Harms

Lab Three

For the final unit project the students must create a habitat map of the area with the locations of potential sites for trail cameras. The students determine placement of cameras based on available habitat types and a literature review of White-tailed Deer habitat use, with the proposed goal of estimating deer abundance and sex ratio.

4-H CampTrail Camera Locations

Applications

Undergraduate students directly apply the skills gained from this portion of the course in subsequent classes, such as the capstone course that is taken the following semester. Alumni have commented that these skills have made them competitive for jobs and internships related to natural resources while others utilized GIS in graduate school.

Acknowledgements

Natural **R**esource **E**cology and **M**anagement

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