ESRM 250 / CFR 520

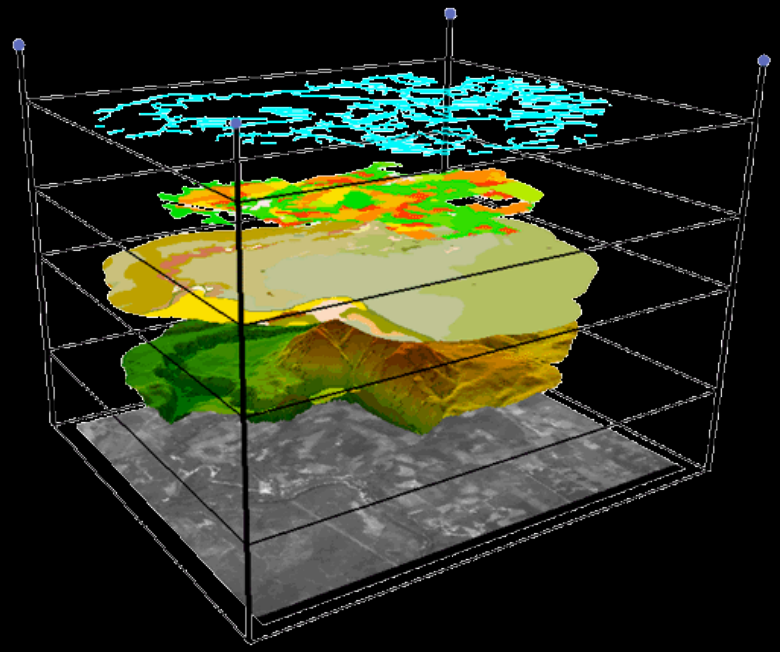
Introduction to Geographic Information Systems

Josh Lawler
Mu-Ning Wang

Tue/Thurs
Classes: 2:30 - 3:20 MGH 241
Lab: 3:30 – 5:50 MGH 030

What is a Geographic Information System?

A GIS is computer program or set of programs that provide tools for:



- managing, storing, and editing spatial data

- conducting spatial inquiries and analyses

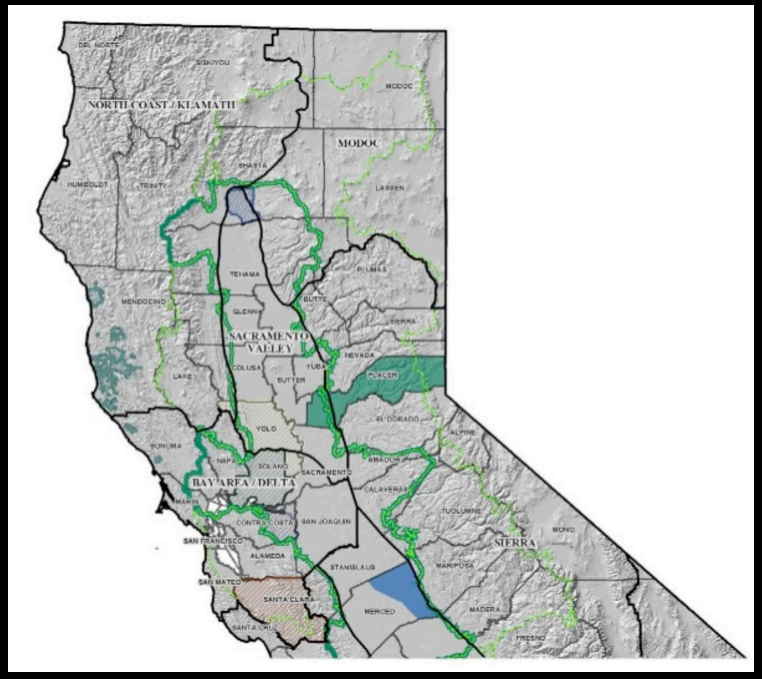
- displaying spatial data (making maps)

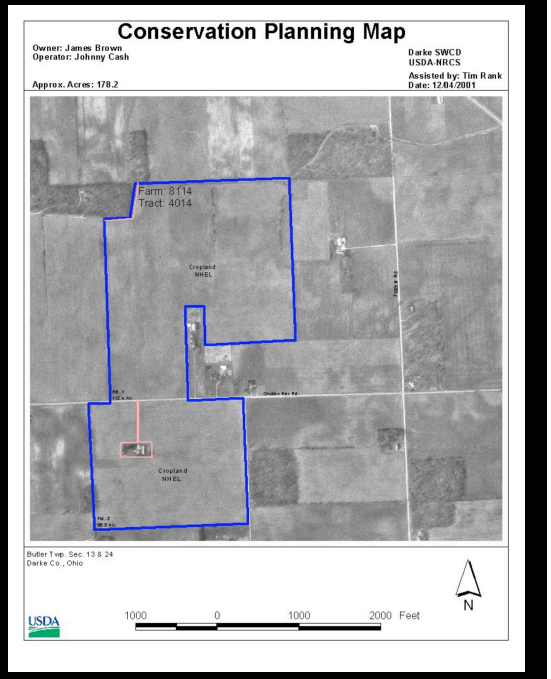

Pacific Ocean

What can a GIS do?

applications

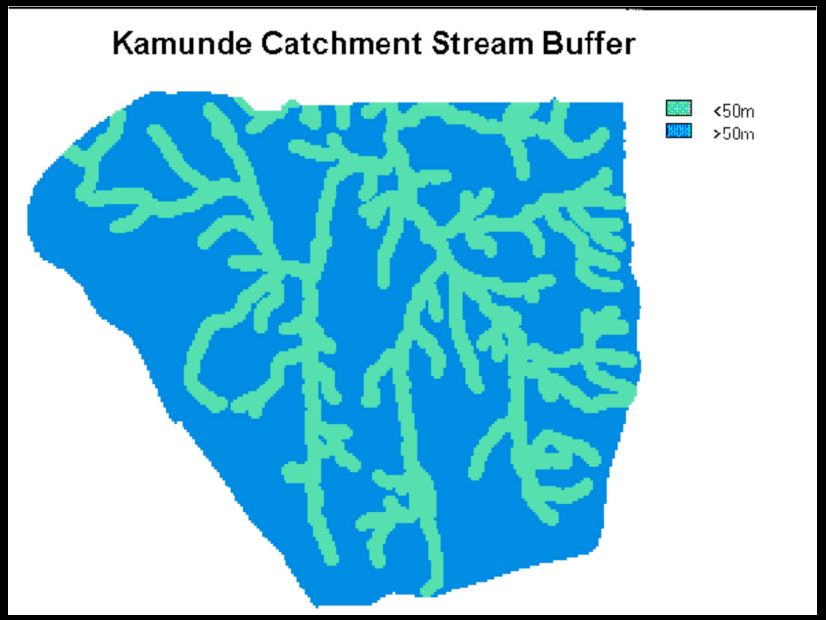
Conservation planning: where are the best place to protect?

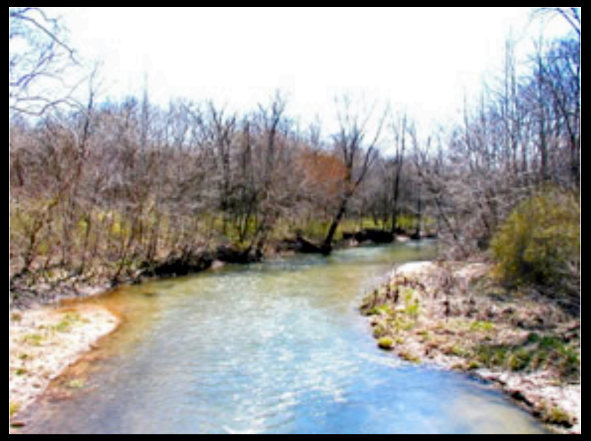




applications

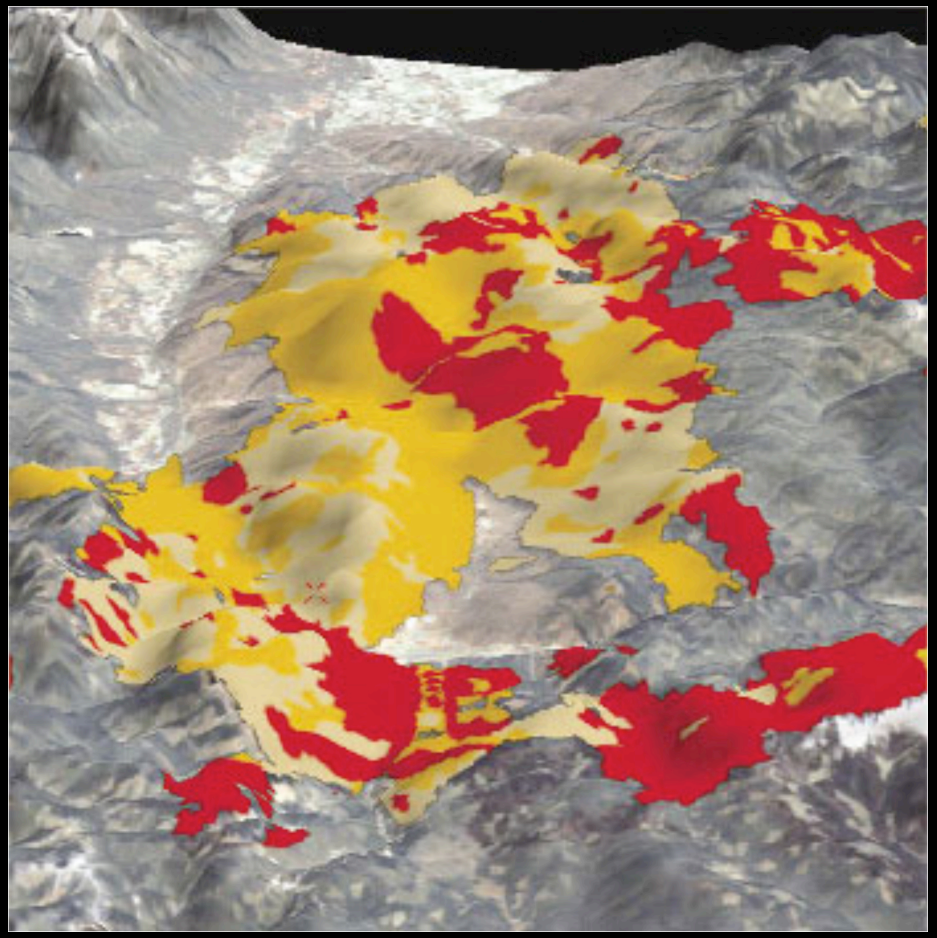
Evaluation of riparian buffer zones to target watershed restoration efforts

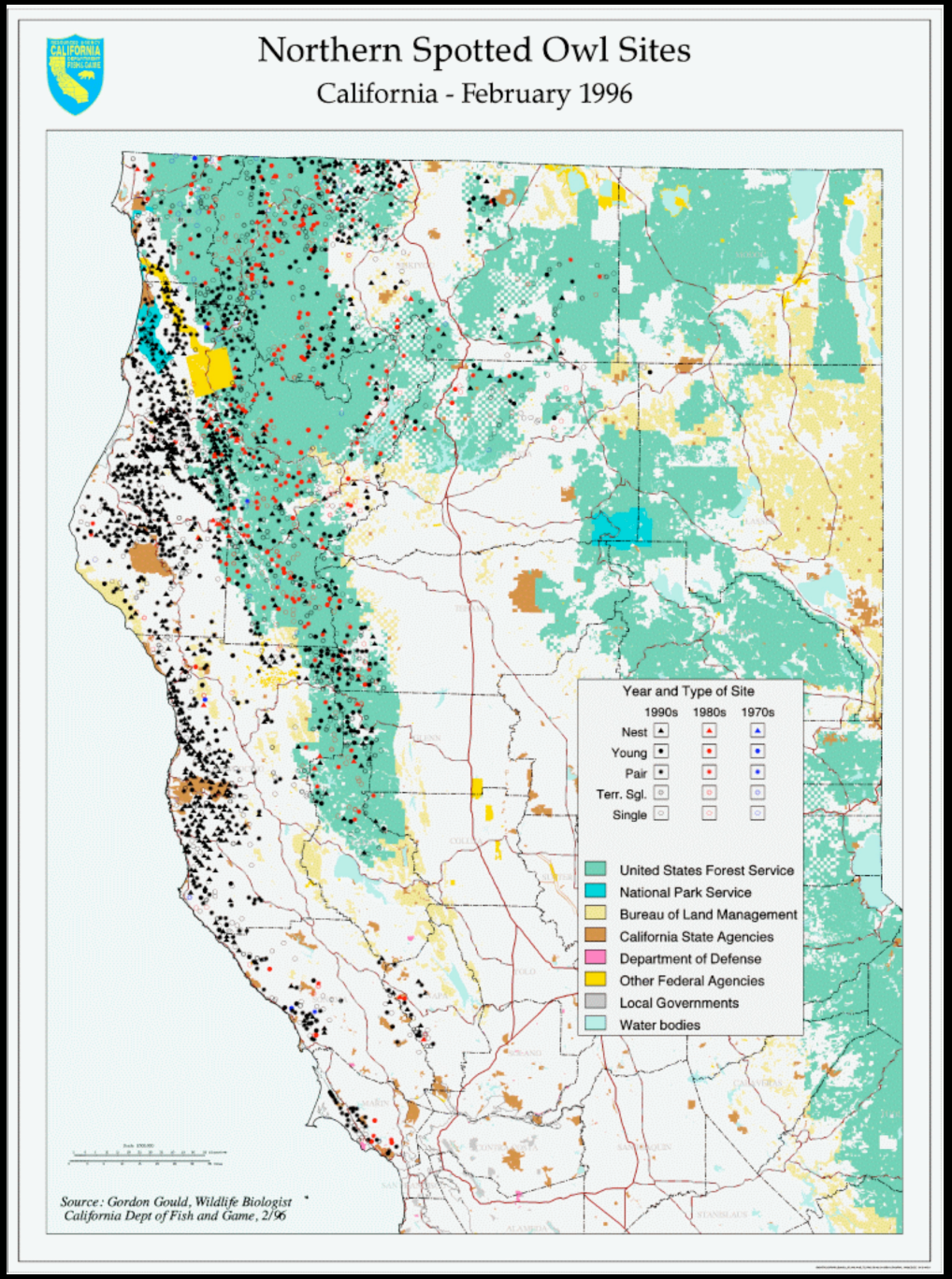




applications

Fire management: identifying sites for controlled burns and thinning



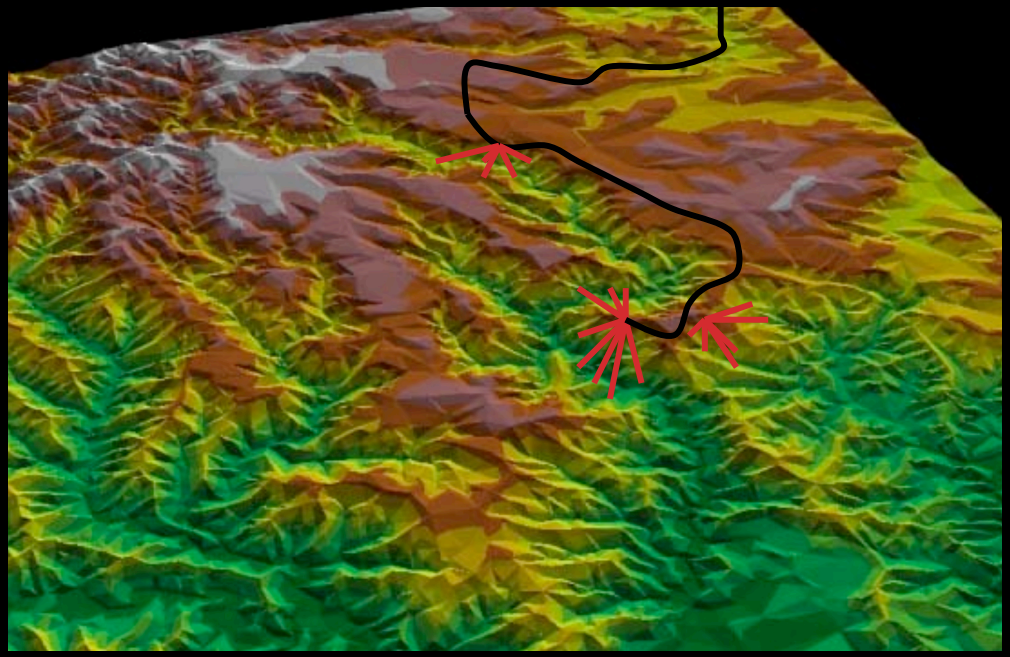


applications

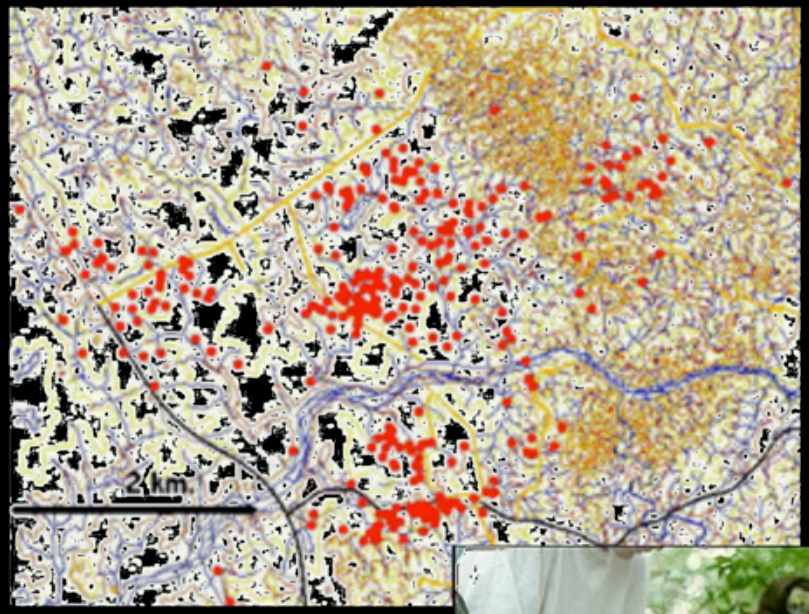
- Map species distributions
- Locate critical habitat
- Identify sites for translocations
- Model population dynamics

applications

Where are the most cost effective locations for sky lines for extracting timber on steep slopes?



applications

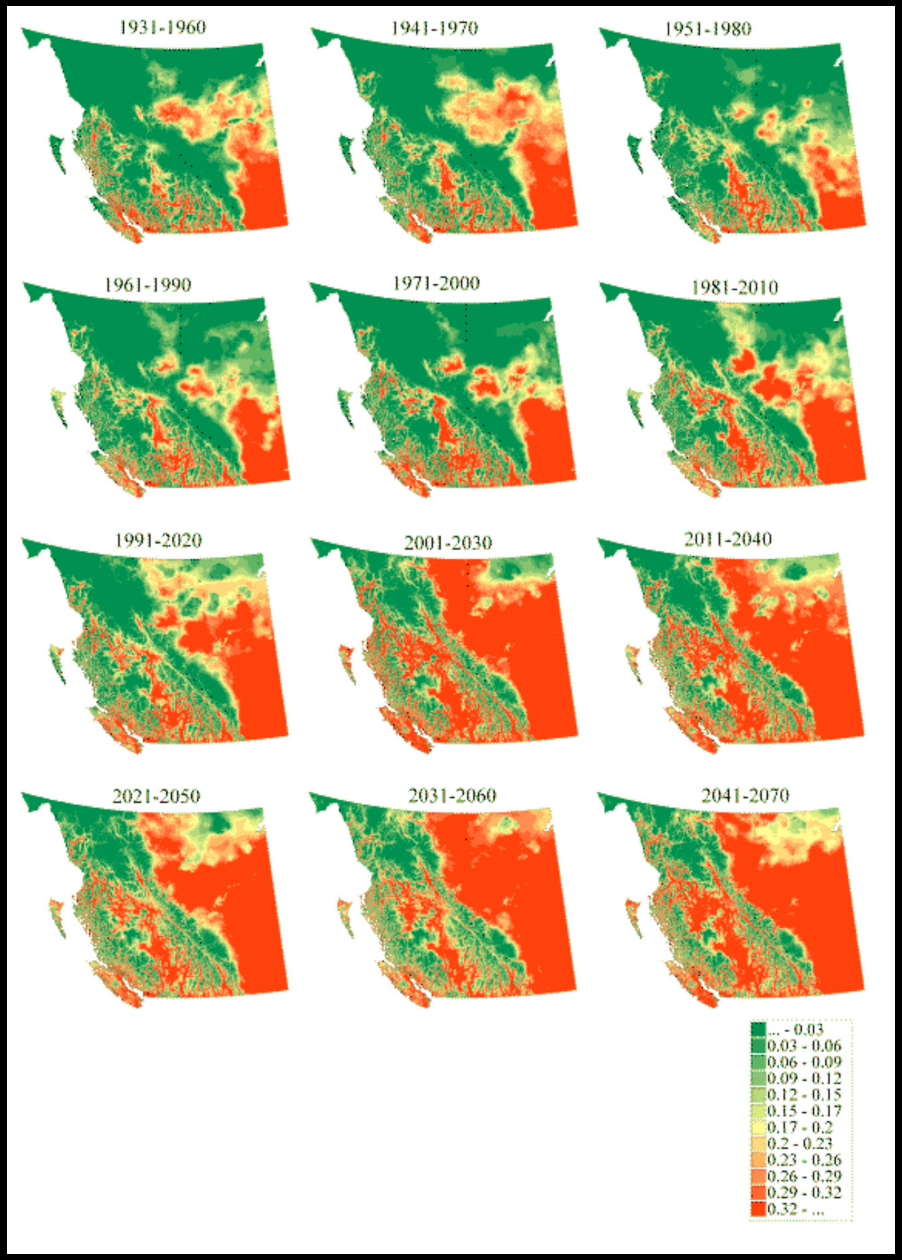


Wildlife biologists put a radio collar on a re
before it is released.

Wildlife biologist Chris Lucash
with radio-tracking equipment.

- Tracking wildlife locations
- Measuring home ranges
- Delineating territories
- Population census

applications

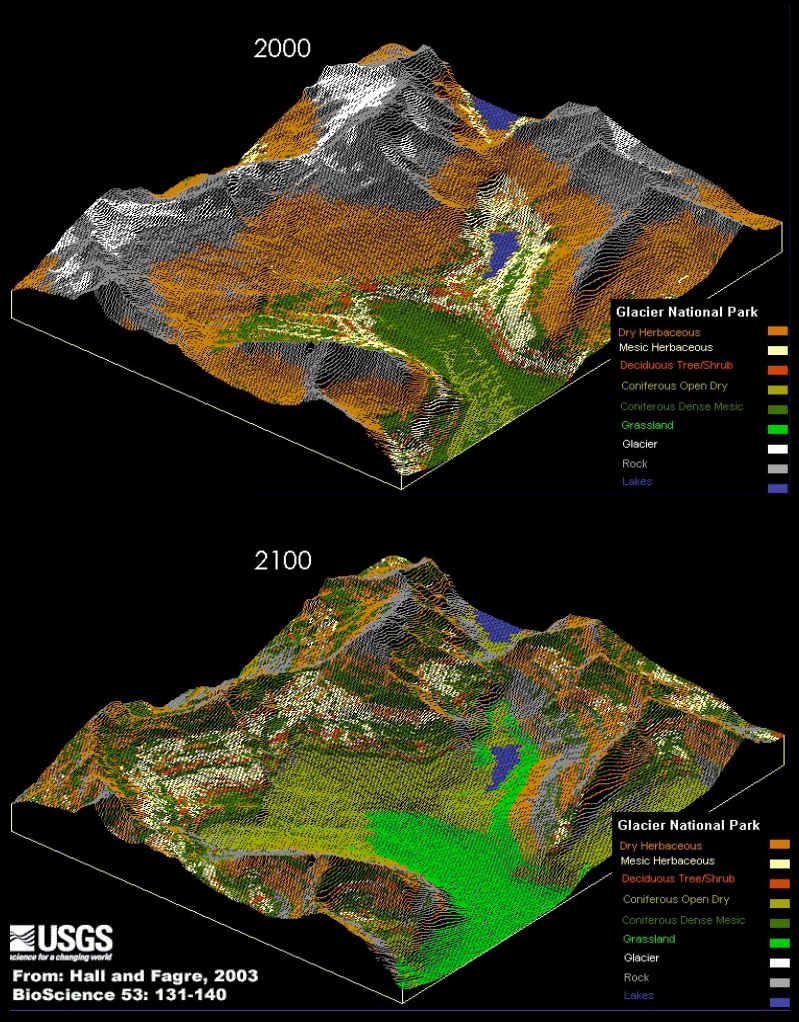


Likelihood of Mountain Pine Beetle outbreaks developing in British Columbia and Alberta under a plausible climate change scenario using the MPB infestation risk model (Safranyik 1975).

Tracking and predicting insect infestations and outbreaks

applications

Predicting climate-induced vegetation changes



applications

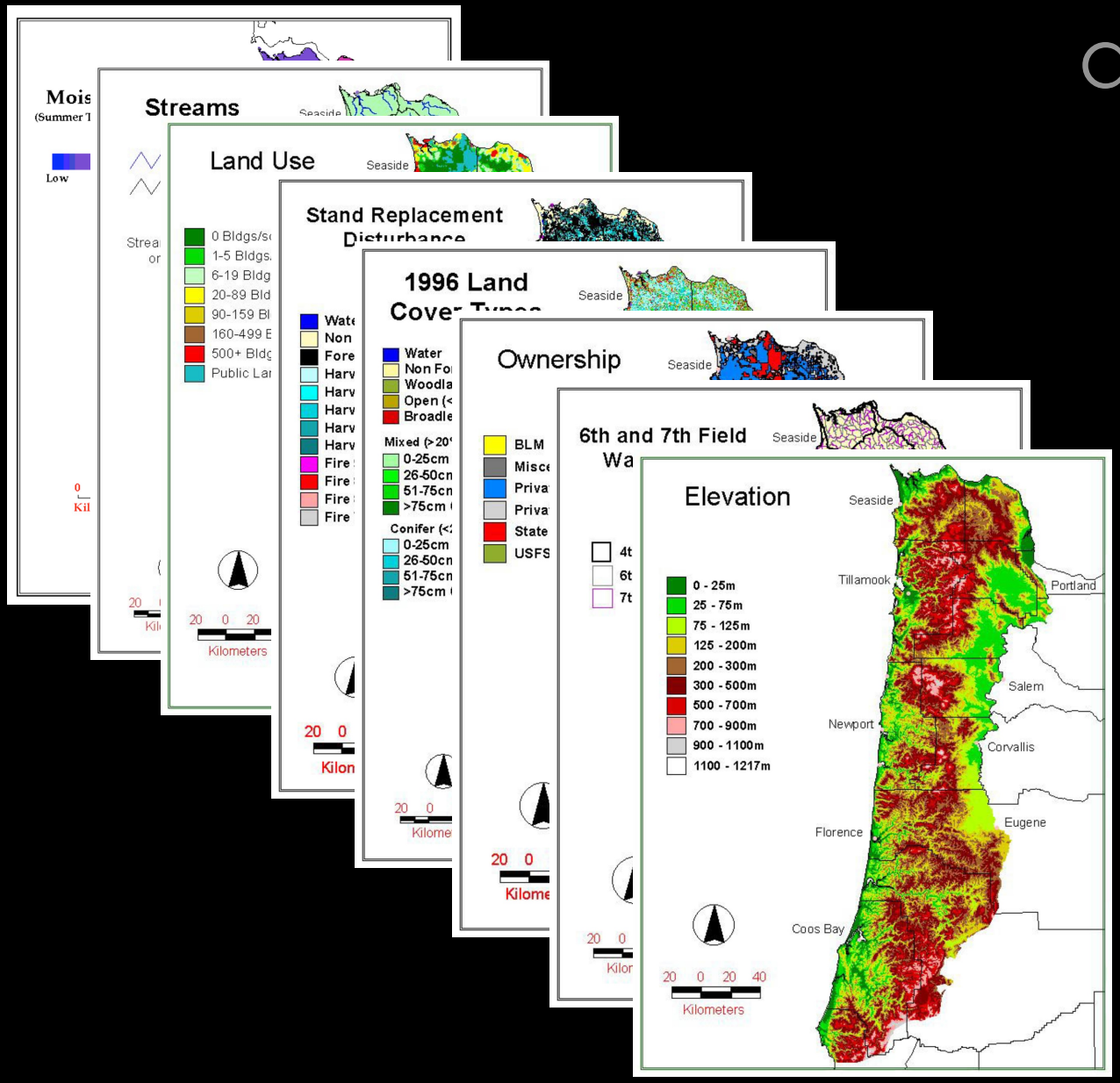
Predicting climate-induced shifts in species distributions

applications

http://www.fsl.orst.edu/clams/download/animations/5Rivers840_20qt3.mov

How do different forest management practices affect forest structure, economic returns, and wildlife habitat over time?

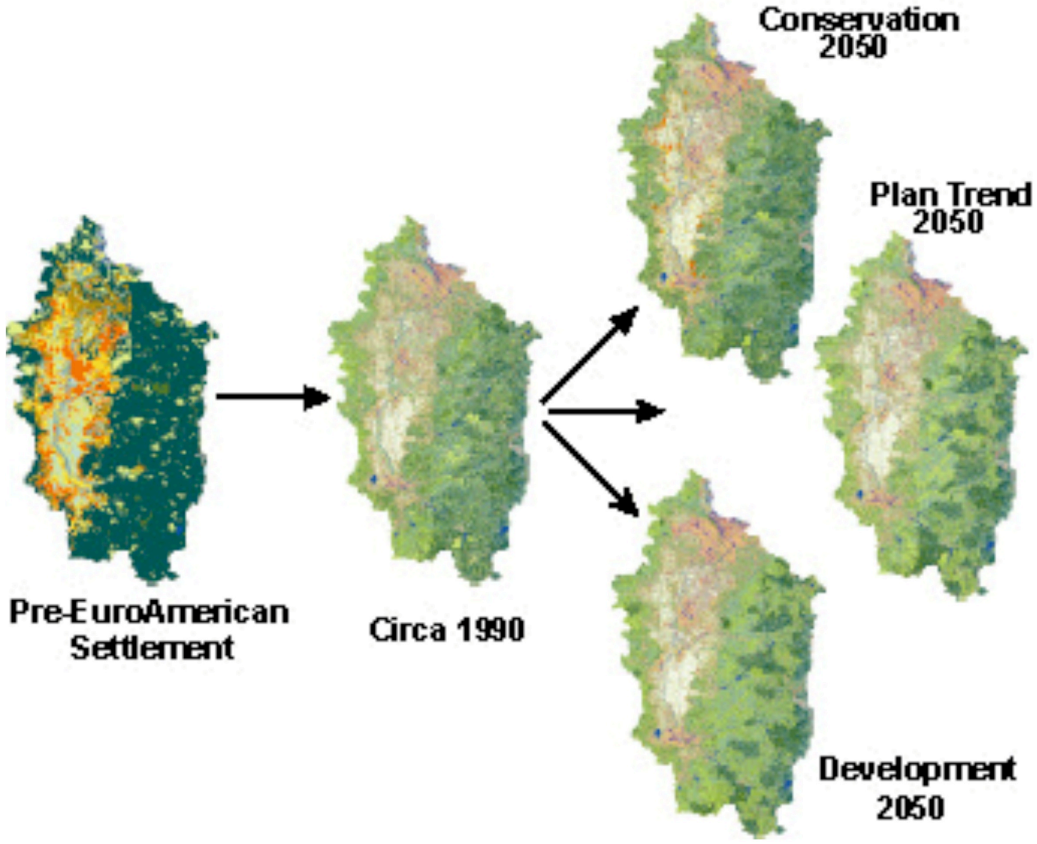
applications



Integrate multiple data types and sources

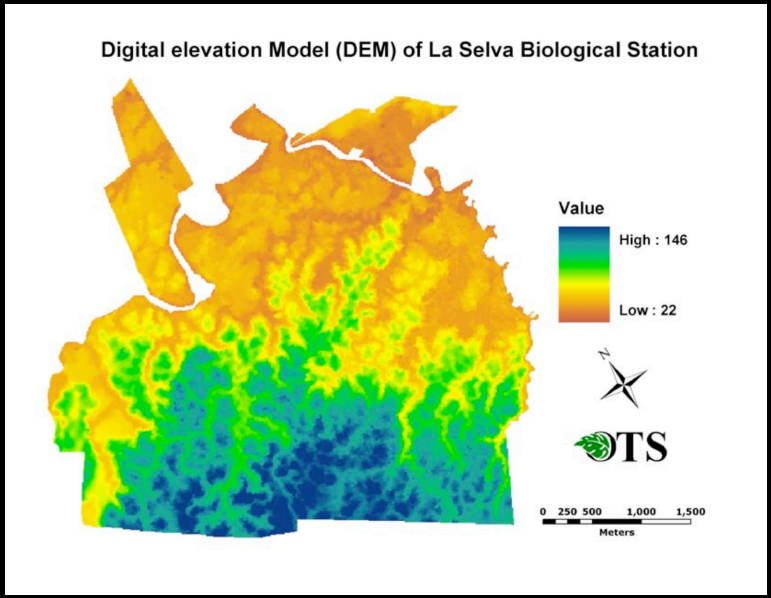
applications

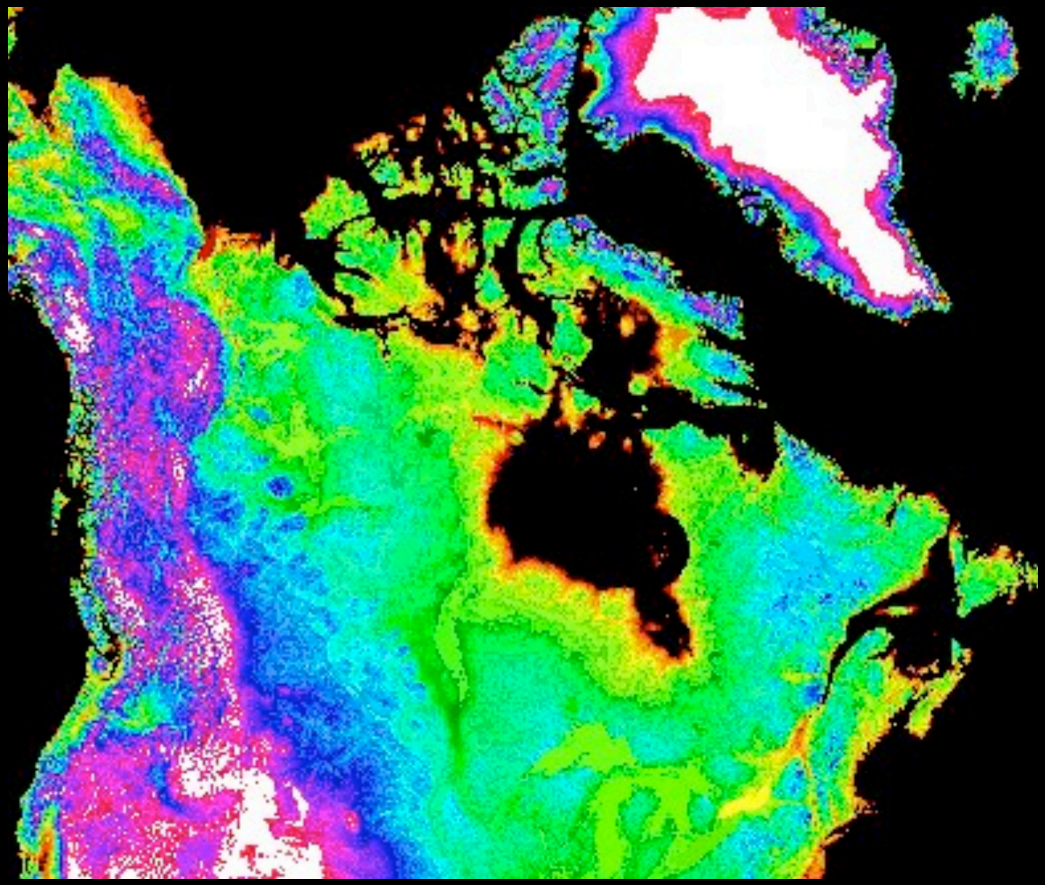
How will different alternative development scenarios affect agriculture, timber production, and wildlife in the Willamette Valley?



applications

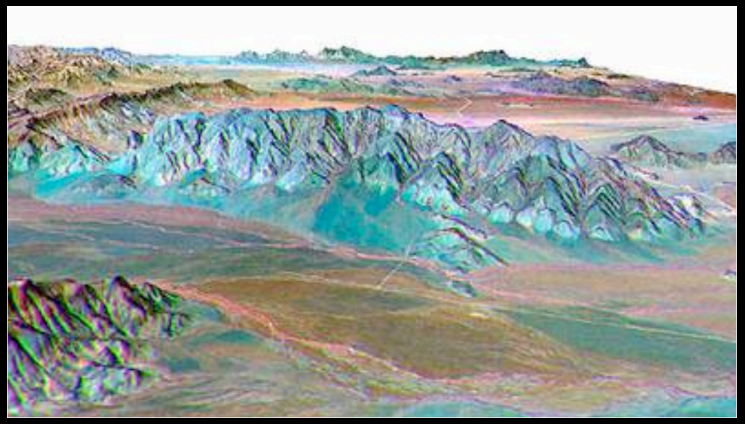
Analyses can be done
at very different scales.

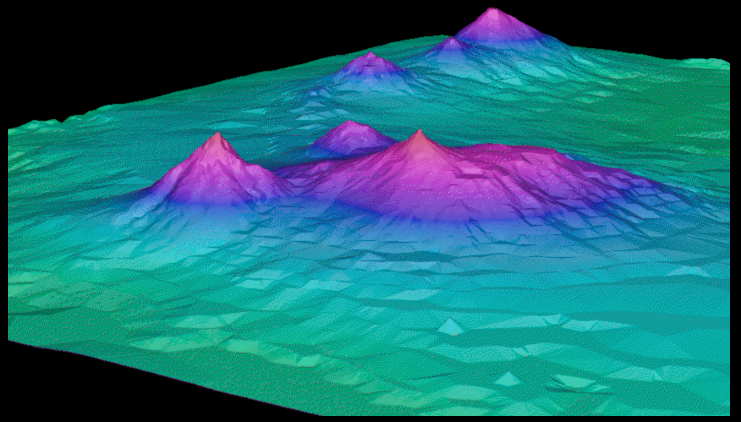




applications

Two-dimensional and three-dimensional representation



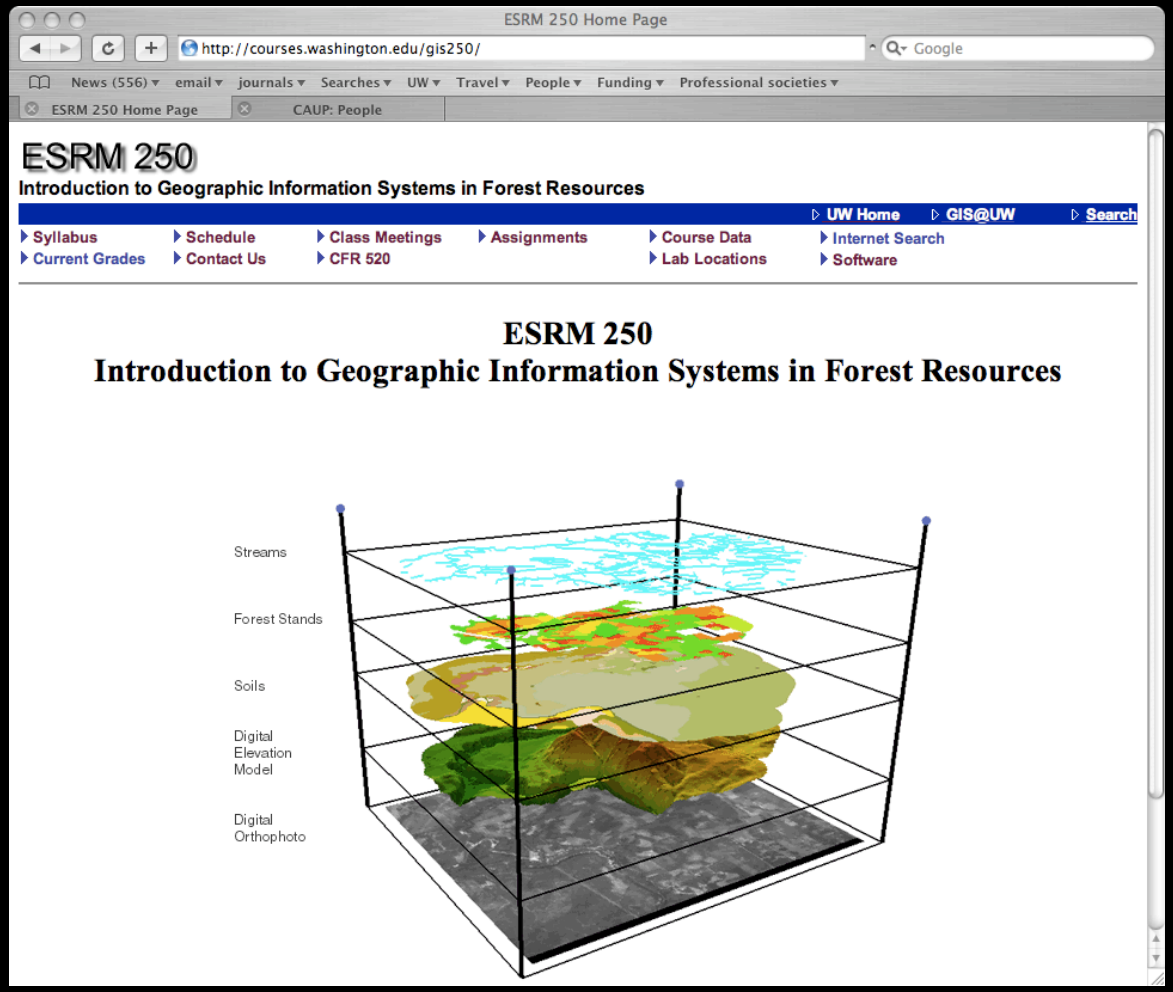


Course objectives

- Introduction to the technical use of GIS
- Use of current software & hardware
- Use of real-world data sets
- Understanding of GIS data sets
- Understanding of GIS analysis
- Ability to use GIS for solving problems
- Limited treatment of cartographic skills (see Geog 360)
- Limited treatment of analytical theory (see Geog 460)

Course website

http://courses.washington.edu/gis250/



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Contacts

Josh Lawler – jlawler@uw.edu
Mu-Ning Wang– muning0209@gmail.com

Josh- Office Hours: by appointment (send e-mail) or call 685-4367
Mu-Ning - Office Hours: Tues/Th, 1:00-2:20 Bloedel 389 or by appointment

- for "how to" questions, assignments, labs – Mu-Ning
- for general questions, use, application of GIS – Josh

Required skills – before you start (by the end of week 1)

- Basic familiarity with a word processor and spreadsheet
- Comfortable with
  - *hierarchical file structures*
  - *Windows Explorer*
- Cut-and-paste images from applications to the word processor
- Basic working knowledge of algebra, trigonometry, and coordinate geometry
- Basic familiarity with maps and map reading

Required skills – before you start (by the end of week 1)

- Account on one of the UW mail computers
- Save a document in Adobe PDF format
- Create Zip files with zip, WinZip, or PKZip
- Unzip files with zip, WinZip, or PKZip
- Use a Web browser, including file downloading
- Basic computing skills courses are available at UW C&C

Course structure

- Some paired lecture and lab sessions
- Guest lectures
- Lab sessions are guided by detailed web pages
- Labs exercises can be done on any computer with ArcGIS 9.3, CD, USB, and web access
- Periodic assignments (1 per week)

Assignments

- 8 assignments through the quarter plus one "Bonus" assignment (to improve grade, or skill, if so desired)
- For grad students (CFR 520), create Poster in ArcMap Layout, based on your research work (for graduate credit only)
- You will save your answers as PDF's (.pdf files), compress (zip) them, and upload them to Catalyst Drop-box
- Double-space all materials
- Assignments are due by 7:00 pm of the date listed on the website schedule. Late assignments will not be accepted
- Answer keys are posted after submission deadline
- Grades are posted after each assignment is scored

Grading and evaluation

- Final grade is based on assignments, exams, and class participation
- Each assignment = 100 points (total 800 points)
- Mid term (late quarter) = 200 points
- 5 bonus points for attendance at each guest lecture
- No extra credit available (other than the bonus points)
- Grades are assigned in accordance with UW Grading Policy

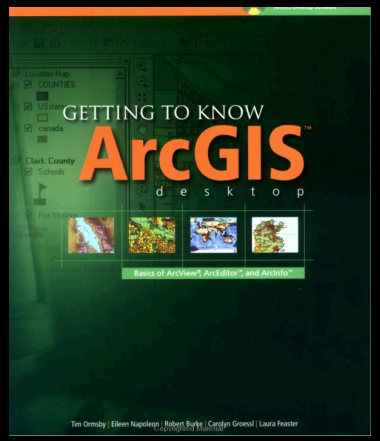
Media

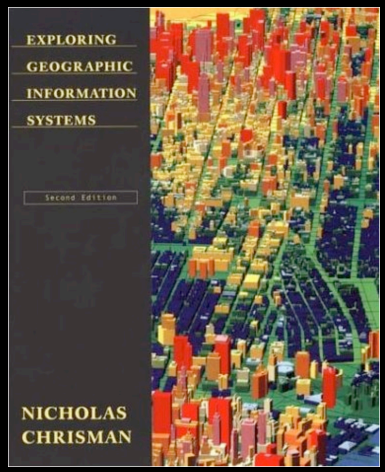
Required:

- Access to computers running ArcGIS 10
  (*not* ArcView 3.x or ArcView 9 or ArcGIS9.3)
- Internet access
- 1 recordable CD, with course data copied onto it
- USB drive (pen drive or removable hard drive)

Media

Recommended Reading





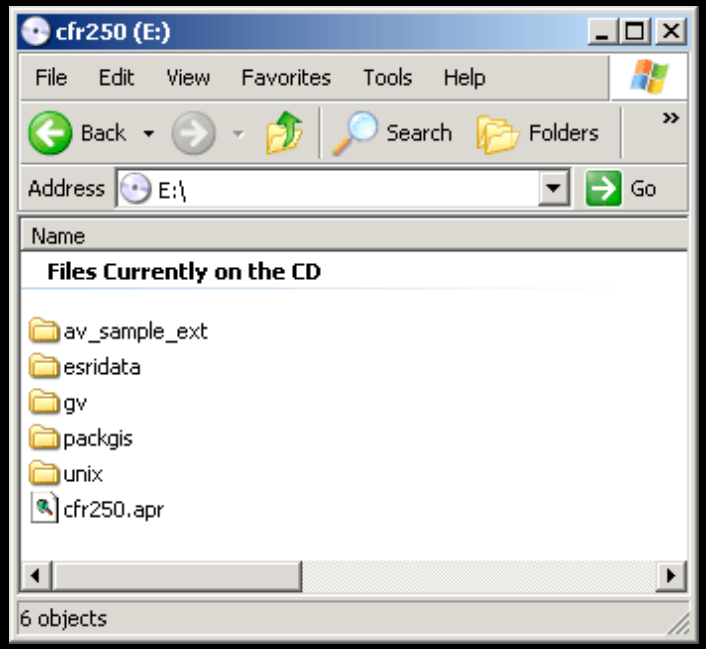
- Chrisman, Nicholas. 1997. Exploring Geographic Information Systems. New York: John Wiley & Sons. 320 p.
- Ormsby T, E Napoleon, R Burke, L Feaster, and C Groessl, 2004. Getting to Know ArcGIS Desktop, Second Edition. ESRI Press. To get the best price, order directly from Amazon.com or ESRI. ISBN: 1879102463

Software (3 options)

- This course will use ArcGIS Version 9.3. The software is installed at various locations around the UW campus, but if you want to run the software on your own, there are 3 options:
- 1: Use ArcGIS on computers at the UW
- 2: Get "Getting to Know ArcGIS Desktop"
- 3: Load ArgGIS Student Edition on your own computer

Course Sample Data

- Course CD contains
  - Pack Forest data
  - ESRI Data
  - Sample ArcView 3.x extensions
  - Ghostscript/Ghostview
  - UNIX-like utilities



Home work:

Schedule of Classes:

For the online course, work at your own pace. You should perform two lessons per week. But bear in mind that the assignments are based on the preceding lab exercises; if you do not perform the lab exercises you will find it is impossible to finish the assignments.

week	suggested date	Assignment Due Date	Lecture Subject	Lecture Notes ("WWW"), and PowerPoint Slide Shows ("PPT"), Help Files ("Help")	Lab Exercises
1	31.Mar	Assn 1: Create a PDF file Due: April 8	**Introduction to GIS Course syllabus**	WWW: Introduction WWW: Definitions **PPT: course_intr.ppt** Help: Help topics	Create the course CD How to use Go-Post and CollectIt Using On-line Help Convert Word document to PDF
	2. April		**Introduction to ArcGIS**	WWW: What is ArcGIS 9 WWW: Exploring the ArcGIS Interface WWW: ArcGIS GUI WWW: ArcGIS Modules **PPT: intro_arcgis.ppt** Help: Help topics	An ArcGIS Sampler
2	7. April	Assn 2: Introduction to GIS Due: April 15	**Data Types Displaying Data**	WWW: Getting Data Into ArcGIS Maps WWW: Displaying Layers WWW: Changing Layer Display Properties **PPT: arcmap_basics.ppt** Help: Help topics	ArcMap Basics
	9. April		**Displaying Data, Scale, Color**	Data input: Attributes; WWW: Spatial Data Model WWW: Relational Data Model WWW: Scale Issues WWW: Sample Data PPT: intro_gis.ppt	Catching up with exercises and reviews of materials you missed!

Photos

Photos will be submitted with your first assignment

Photos will be password protected

Photo will not be posted by request

Will allow us to get to know each other by face and name

Links to e-mail addresses and home pages--also password protected

Course Sample Data

- Pack Forest GIS database
  - Complete set of spatial data for the UW's Experimental Forest
  - Original data sources
    - Legacy maps
    - USGS digital line graphs
    - DNR data
    - GPS surveys
    - Digital orthophoto interpretation

Course Sample Data

ESRI Sample Data

- Worldwide data sets
  - cities
  - countries
  - major lakes
  - major rivers
- United States data
  - states
  - counties
  - cities
  - rivers
  - roads
- Canada
- Mexico

Software (cont)

- Option 2: ArcGIS 9.3 Workbook
  - 180-day Trial version
  - Students purchase Getting to Know ArcGIS Desktop, a workbook (I believe still includes a 180-day trial version of ArcGIS 9.3) on CD and a data CD for exercises
  - ~ $40
  - Available online through ESRI, Amazon.com, or another book store.
  - WARNING: Not tested by instructors