ECOLOGICAL MONITORING (NR457/657 - 3 credits)

Times: Tuesday 10:00-1050 and Friday 10:00-1:00 TNR 255

Instructor: Dr. Demchik (CNR 246; mdemchik@uwsp.edu): M 2:00-3:00, T 2:00-4:00; open door policy

Course description: Theory and practice of ecological monitoring emphasizing ecosystem structure, functions, and populations

Rationale: Ecosystem restoration and adaptive management require monitoring to assess the condition and/or trends in ecological structure, processes and/or populations. Much of this monitoring has been legally mandatory in recent years. This course provides an interdisciplinary introduction to monitoring theory and techniques that are applicable to conservation biology and ecosystem management.

Learning Outcomes: The student will:
1. Write monitoring goals
2. Select indicator species
3. Develop monitoring plans
4. Collect monitoring data
5. Analyze monitoring data (both existing and collected)
6. Report results
7. Critique other monitoring plans

Course Design: While I have altered this course quite a bit every semester, I completely redesigned it last year and I am partially redesigning it this year. To avoid belaboring this discussion, I got my second lecture and my lab offered back to back. This means that when I want to, I have a three-hour lab slot. For most of those weeks, we will be in the field.

Our Laboratory: I am in the middle of a number of restoration projects on both public and private lands. You are going to develop the monitoring plan for the Glacial Hollow YMCA Camp Forest Restoration that is active right now. Most of you were in the For 432 class, so, in some cases, you assisted in marking the restoration activity. Just a note, I have generally LOVED teaching this course in the past; however, this semester looks like it is just going to be a blast. Realize, this is redeveloped so, if stuff doesn't work out quite right, smile and accept it. I am trying to make this one of the most useful classes you get here, and sometimes, that means that things don't quite work perfect.

Full Blown Monitoring Plan: The main deliverable for this class is a full-blown monitoring plan. This is not one of those "pretend" plans, this is the plan that will be used, and the data will be used. The results will be presented on one of the last days of class to representatives of the YMCA Board of Directors and the CEO (and some others as well). I recommend keeping this as a portfolio item, because, you ARE on the team for this plan. You will track all of your time assigned to any feature of this project (time budgeting and managing billable versus non-billable hours is one of the most important skills a person can learn in restoration work). Most of these monitoring plans are done in teams, because very few people (read that NO ONE) has all of the skills needed to do a good job on these for everything that needs to be assessed. We will divide up into teams during the first lab period. These are CONTENT SPECIALIST teams, so, you are going with your skillset, in part. You are allowed to have assistance from people outside of the class; however, this needs to be documented in the plan. Remember, NOTHING in this is done seat-of-the-pants, everything is DOCUMENTED in the plan.

Teams will include:
- Project coordination team- 3 people
  - The goal of this group is to set initial timelines for each group and to assure they have met their timelines. This group will develop a spreadsheet of specific deliverables that will be included in the plan and will coordinate the development of the plan. This is an incredibly important job and the people who choose this team need to be some of the most self-motivated and aggressive people in the class. This team will draw all final sections together into a plan. Suggestion: come up with a template for what people should turn in to you. It should include everything from fonts to margins to headings. This makes life a lot easier (i.e. I have done this repeatedly, and hate dealing with problems created by poor formatting or people that "cannot" live within the rules of the format. They make life hard. Your group will meet with me every 3 weeks to do a progress report on the other groups' work and yes, each of these meetings will be documented in the plan, as well.
- Wildlife team- 3 people
  - The goal of this team is to develop monitoring protocols that can be carried out by future classes/groups/volunteers. These protocols should be as standard as is possible. Remember that the internet and the library website exist. Use them. You are required to set up protocol sheets that can be followed by VOLUNTEERS (i.e. non-experts) and in some cases, grade school to high school students. Any initial data can be collected by you but some is not possible. That is fine. You need to develop protocols for a 4 animals/elements; however, you can do more. You have to do the following animals:
    - Fishers/weasels (we will have 2 or more game cameras available)
    - Grouse
    - Woodcock
    - Den tree use
- Lake/Lakeshore team- 3 people
  - The goal of this team is to monitor the condition of the lakeshore and lake in general. Feel free to use existing resources. Basic water chemistry is one option as is shoreline vegetation etc. Remember, as with the wildlife team, you will need to develop protocols for monitoring this that can be followed by VOLUNTEERS.
- Plant communities team- 3 people
  - You are responsible for developing a protocol that will inventory the following items:
    - Forest condition (result in an overall map)
    - Invasives (adequate to target needed treatment)
    - Spring ephemerals
  - Remember, you will need to develop protocols for monitoring this that can be followed by VOLUNTEERS. Don't consider everything, focus on plants that are structural and food sources.
- Wetland team- 3 people
  - These wetlands were not treated during the restoration. You need to establish a baseline that may result in future work. That should include plants and herps. Include vernal pools/ephemeral wetlands as well. You will need to work strongly with the plant communities team. Remember, you will need to develop protocols for monitoring this that can be followed by VOLUNTEERS.
- Geospatial team- 2 people
  - The goal of your team is to create a geodatabase that collects all of the information from the previous teams. Everything for this needs to be stored in a format that will be usable for 25 years. This needs to be stored CLEANLY AND EFFICIENTLY. No creation of morphed, scary things. This is a database that can be used by others in the future. You will need to make things like:
    - Cover maps
    - Maps of monitoring plots
    - PDF's or Collector App projects for each group

Group Field Lab: Each of your groups will develop and deliver one of the field labs for this class. The students in the class will collect your data using your protocol sheets. You will process their data.

Grades: Grades will be based on 2 exams (mid-term and final) at 20% each, the field lab that you build (20%) and my overall grade for the monitoring plan (40%). Yes, that is right, 40% of your grade in this class is based on the composite of everyone's work. When the rest of them screw up, it is a problem. That previous sentence just described the rest of your life in natural resource management. You need to figure out how to make this happen in spite of personalities.

One last thing, my exams for this class generally scare the heck out of people. They are going to be two-three hours long. I will give you the mid-term on a Friday and you are given access to any resource you want...the internet, your notes, discussion with other people in class...pretty much anything short of calling professionals to ask questions. Same deal with the final, except it is 2 hours long (university rules). You will; however, do your own work in the writing (no plagiarism) and will submit it to the dropbox.

Readings: There will be a number of scientific papers distributed to you to read; however, there is no book for this class. The expectation is that you will read the material prior to coming to the scheduled discussions to avoid looking silly.

Format for the Monitoring Plan (Note: this is modeling NPS and others)

Executive Summary (responsible party is the Project Coordination Team)
This is a single page that summarizes the whole things. This is kind of like an abstract.

Project Background (responsible party is the Project Coordination Team)
This will be about three paragraphs defining things like funding sources, involved partners.

Monitoring Plan Development Team (responsible party is the Project Coordination Team)
This will be all of you. This will be written like this:
Wildlife Team
Bob Bobson- Ecosystem Restoration and Management student at University of Wisconsin-Stevens Point.
Responsible for developing the woodcock and wood duck monitoring protocols.

Project Goals (responsible party is the Project Coordination Team)
This will be directly from the funding document. I will provide this.

Monitoring objectives (responsible party is the Project Coordination Team)
There will be one or more of these, written appropriately, for each group. Reference section for each

Documented Time (responsible party is the Project Coordination Team)
Presented in a table organized by team and person in team
This needs to be legally defendable, in the past people many people have been fired or jailed for billing in excess of hours expended…track these well).

Sections
- Project coordination (responsible party is the Project Coordination Team)
    - Timelines
    - Team meetings (dates, times, minutes in the appendix)
    - Field data collection dates (raw data in the appendix)
    - Protocol development (first draft in the appendix)
    - Protocol review teams (all names…both internal to the class and any externals that you want)
    - Public review (in case, full class review…all comments, in the appendix with response)
    - Response to feedback
- Wildlife (responsible party is the Wildlife Team)
    - Introduction (this will be a two or more pages that include peer-review articles on each focal organism. The articles should focus on habitat requirements and monitoring techniques.
    - Timeline for monitoring
    - Monitoring protocols (complete with photo guides, etc.)
    - Table of first year's data (if collected)
    - Reference to appendix for RAW data
- Lake/Lakeshore area (responsible party is the Lake/Lakeshore Team)
    - Introduction (this will be a two or more pages that include peer-review articles lake/lakeshore management that is APPROPRIATE to this project. Also, be sure to include specifics on how to monitor this stuff)
    - Timeline for monitoring
    - Monitoring protocols (complete with photo guides and in your case, specific points that were monitored)
    - Table of first year's data (if collected)
    - Reference to appendix for RAW data
- Plant communities (responsible party is the Plant Communities Team)
    - Introduction (this will be a two or more pages that include peer-review articles on monitoring of barrens and savanna habitats).
    - Timeline for monitoring
    - Monitoring protocols (complete with photo guides, etc.)
    - Table of first year's data (if collected)
    - Reference to appendix for RAW data

- Wetlands (responsible party is the Wetlands Team)
  - Introduction (this will be a two or more pages that include peer-review articles on each of your main focus on wetlands of this region).
  - Timeline for monitoring
  - Monitoring protocols (complete with photo guides, etc.)
  - Table of first year's data (if collected)
  - Reference to appendix for RAW data
- Geospatial (responsible party is the Geospatial Team)
  - Introduction (this will focus on how other similar projects have chosen to store data, why you chose what you did and how to access the data)
  - Discussion of the metadata for each feature
  - Collection of appropriate figures (many may actually be in the other chapters; however, you will describe how they were made…what data was used, where it was collected, where it is available, etc. and reference each figure)
  - Geodatabase may be included in some format in this document or referenced to an online location. Issues will arise about what data can legally be stored there (i.e. invasive plants is fine) and what is privileged information (i.e. endangered species data is not publicly available)

Appendix (responsible party is the Project Coordination Team)

Schedule

Week	Tuesday	Friday
1/21 to 1/24	Planning and designing monitoring	Planning and designing monitoring (assign teams) Class is done at 12:00 (I am running a chainsaw indoor training at 12:00)
1/28 to 1/31	Class Canceled (I am at a Log Quality Training)	Indicator Species Discuss Moses Creek Restoration (Mandatory Monitoring)
2/4 to 2/7	Focus on a technique: Birds, Mammals, Reptiles and Insects	First Site Visit (general walk through)
2/11 to 2/14	Focus on a technique: Birds, Mammals, Reptiles and Insects	Focus on a technique: Plants and Plant Growth
2/18 to 2/21	First draft of protocol sheets will be given out to the class Case Study: Cockscomb Basin	This will function as public review (this is coordinated by the Project Coordination Team and they will document all comments)
2/25 to 2/28	Class Canceled (I am presenting at Ruffed Grouse Symposium)	Case study: Sian Kaan Data Archiving and Sampling Statistics Internet Resources
3/3 to 3/6	Lake/Lakeshore Team presents on their plan for monitoring the site	First Exam
3/10 to 3/13	Class Canceled (I am running an all day trip for For 436)	We will complete all monitoring of the Lake/Lakeshore area (this is coordinated by the Lake/Lakeshore Team). Note: we are doing this before spring break because this may require going out on the ice to take samples...better to do when the ice is good
3/16 to 3/20	Spring Break	Spring Break
3/24 to 3/27	Wetlands Team Presents on their plan for monitoring the site	We will all monitoring for the Wetland Area (this is coordinated by the Wetland Team)...this time was chosen to allow access over frozen wetland
3/31 to 4/3	This is the final day for the whole document to be turned in. It is going to go to print. Buffer	Research Symposium
4/7 to 4/10	Wildlife Team presents on their plan for monitoring the site	We will complete some monitoring of wildlife (this is coordinated by the Wildlife Team)...Note: Team should have already placed trail cameras
4/14 to 4/17	Plant Team Presents on their plan for monitoring the site	We will complete some monitoring for plants (this is coordinated by the Plants Team)
4/21-4/24	Geospatial Team presents on protocols for data storage, database formats, other stuff	Meet in a computer room and go through all available features in the dataset (this only runs from 10:00-12:00)
4/28 to 5/1	Planning for the public presentation of this plan (Project Coordination team runs this)	First run at the presentation of this plan (this is the pretend one)...critique and work on fixing error
5/5 to 5/8	The real deal, this is the presentation of all of your work	Buffer (could be soils and DNA) Reflection session and steps forward