FW 488. Problem Solving in Fisheries and Wildlife Science (3 credits, Winter term)

Pre-requisites: FW 320, 321

Recommended pre-requisites: One or more 400-level FW courses, such as FW 481 Wildlife Ecology, FW 454 Fishery Biology, or FW 426 Coastal Ecology and Resource Management

Description: This is the first of a two-course capstone sequence designed to introduce students to the synthesis of scientific information on species, habitats and ecosystems and the use of such data in shaping fisheries and wildlife conservation, management and policy. The course will center on three activities: 1) a review of three or four case histories on current, "real world" conservation and management problems presented by faculty or agency biologists who have worked on each problem; 2) discussion about the process used to logically address complex problems in fish and wildlife conservation, leading to development of 3) independent work by students in small groups on a select topic of their choice. The intent of the case history studies is to provide an in-depth treatment of a "real life" complex issue in natural resource management. Each case study will be presented using a common framework that will provide students with a logical process for addressing complex problems in general, and their group problem specifically. The group project provides an opportunity for students to apply what they have learned in this and previous courses to address a conservation or management issue of interest. Each student group will work on a project that includes data analysis and/or synthesis, literature review, and evaluation of the social and economic systems that are involved in the controversy or management problem. Project write-up and presentation will be completed in the subsequent companion course, FW 489 Effective Communications in Fisheries and Wildlife Science, offered in Spring term. Students are required to take the two courses sequentially.

This will be a required course in the FW curriculum, offered each Winter term as part of a 2 course sequence that must be taken together (FW 488 (Winter) and FW 489 (Spring)). The course sequence will be restricted to majors with senior status. A distance version of the course will be developed in 2009.

This course and FW 489 Effective Communications in Fisheries and Wildlife Science will replace the three course Group Problem Solving sequence, FW441, 442 and 443.

Justification: Most issues we face in natural resource management are at least mildly controversial, require insights from multiple perspectives and disciplines, and are resolved using incomplete and often conflicting scientific information. Making such decisions requires the application of critical thinking to ensure that appropriate science is available to decision-makers. This kind of problem solving requires individuals who can work together, identify biological and ecological principles that apply to the problem, evaluate and synthesize available data from a variety of sources, and present information in an unbiased and comprehensible fashion to different audiences. At the same time, scientists should be aware of the social context in which their recommendations may be used. Our two term capstone sequence is designed to provide students with examples of how natural science can

inform decision-making, preparing them for challenges they will likely face as natural resource agency personnel, scientists, educators, law enforcement agents, and educated citizens. Group projects will provide hands-on experience working with others on a research project that may include original data collection or synthesis of existing data and literature.

Course Format: The course will meet twice per week (80 minutes each). The course will consist of 2 weeks of general preparatory material to get the Group Projects started, followed by 3 or 4, two week Case Studies. The final week or weeks of the course will be devoted to project work and report preparation.

Course Content:

Case Studies: Each Case Study will be developed by a faculty member with first-hand experience in the topic who will work with the primary course instructor to assure consistency in approach and general content. The Case Studies will be presented over a 2 week period and will follow an outline that will be used by the students for their own project reports:

1. Problem Identification: species, habitats, and people
2. Management goals and Objectives
3. Biological and Ecological Principles: what scientific knowledge is relevant to the problem?
4. Conceptual Models: identify drivers, linkages, human-ecological connections
5. Information Resources: peer-reviewed literature, grey literature, popular articles and websites, local people, data bases
6. Data summary: what we know and don't know, what is relevant, levels of uncertainty
7. Synthesis
8. Resolution or Recommendations
9. Review what actually happened and/or future needs

Case study topics may not be the same every year. The primary course instructor will strive to include a variety in these studies, in terms of the types of issue addressed (e.g., endangered species recovery or rehabilitation, habitat restoration, predator or invasive species control) and taxa or levels of biological organization. Potential Case Studies for Winter 2010 are:

Fisheries Management: Salmon management in the face of environmental uncertainty
Endangered species recovery: Sea turtle bycatch limits (Selina Heppell),
Endangered species recovery: Nassau grouper conservation in the Caribbean (Scott Heppell),
Habitat restoration and rehabilitation: Stream ecosystems (Stan Gregory),
Invasive species: Bullfrog introductions and control (Tiffany Garcia),
Ecosystem management: Predator control and grassland bird conservation and management (Bruce Dugger).

Group Projects: This course will be the first of a two-course sequence that will require the students to work in a small group on a topic related to fisheries and wildlife science, conservation, management, or education. The purpose of the Group Project is to provide students with the experience of problem solving in a group through original research (**Field Project** option) or review of data and literature on a controversial management issue (**Data and Literature Review Project** option):

Field Project Option: Projects that include original data collection (e.g., field or laboratory projects) are encouraged and should be started prior to this course, e.g., Fall term. FW 321 Vertebrate Communities and Ecosystems (required, offered Spring Term and on-line) is a pre-requisite for this course and includes an introduction to Group Problem Solving. This course is an opportunity for students to identify potential group members and projects that may include field data collection, as well as faculty or graduate student advisors for their project. Students in field courses taken prior to FW 488, such as FW 426 Coastal Ecology and Resource Management, can expand their field studies into a project for FW 488/489. Group members should be retained throughout the duration of the project, which will require scheduling coordination by the students. The final project for this option will be similar to a scientific research paper.

Data/Literature Review Project Option: Most projects will take the form of a synthesis and review of a particular issue in fisheries, wildlife, or conservation biology. A list of potential synthesis project topics, solicited from core and courtesy faculty, will be provided during Spring term of the prior academic year (presented in FW 321 Vertebrate Communities and Ecosystems) and posted on the FW Departmental website. Groups may also develop their own topic with approval of the course instructor. The final project for this option will be similar to a review and synthesis paper.

Students who have not already identified a group to work with when they start FW 488 will be placed in groups of 4-6 people by the course instructor, based on an interests and skills questionnaire. All Group Projects will include a member of the core and courtesy faculty as a resource for students. However, the resource faculty will not have a major supervisory role (with the exception of Group Projects that include original research). Students can modify their problem topic at the beginning of the term with approval from the Course Instructor and resource faculty. Resource faculty should provide a project title, a list of initial resources to get the group started, and original data if appropriate. Topics should be relatively specific and may include things like:

- Hatchery introductions as a conservation measure for particular salmon, sturgeon or rockfish populations
- Use of contraceptives in wildlife population control
- No-take marine reserve design in state waters
- Sea lion and bird removals to protect endangered salmon
- Effectiveness of selected habitat rehabilitation projects
- Species or assemblage survey design, monitoring and assessment

Learner Outcomes:

Critical Thinking Skills

- Describe how scientific information contributes to natural resource problem solving in case studies (knowledge, comprehension);
- Recognize biases and assumptions in scientific research and reporting of scientific research in popular media (knowledge, analysis);
- Distinguish variance and uncertainty in data and understand their impacts on the rigor and interpretation of scientific information (analysis);
- Demonstrate the use of logic and reasoning, analysis and synthesis to arrive at defensible conclusions (application);
- Compile and review scientific resources from the peer-reviewed literature and reports to formulate scientific arguments (synthesis, comprehension)

Leadership and Team Building Skills

- Communicate and work with a team of people on a common problem (application);
- Construct a research plan and timeline (application);
- Evaluate written products by team members and provide useful feedback for improvement (evaluation)

Evaluation and Grading

All students will receive a grade for the course based on individual work AND Group Project products:

Assignment:	Due date:	Group (G) or Individual (I) product	**Points:**
Problem Identification Statement	Week 2-3	Individual – all group members must submit their own statements	**10**
List of relevant information resources	Week 5	Group product	**10**
Review of applicable biological or ecological principles and critical data	Week 7	Individual – 5-7 page essay, plus references.	**20**
Detailed outline of the Project Report	Finals week	Group product. Includes a list of section responsibilities for each group member	**20**

Additional points towards your final grade:

Case Study quizzes = 20 points

Each case study will end with a 30 minute quiz that will include short answer questions, at least one data interpretation question, and a longer synthesis question.

Participation = 20 points

10 points = grade from instructor for class participation, based on in-class discussion and Blackboard Discussion Board postings

10 points = peer evaluation grade (average) from Group Members, submitted anonymously

Your grade for the course will be determined from a standard percentage scale of your cumulative points earned from the quizzes, assignments and participation:

A = 93-100, A- = 90-92.9, B+ = 87-89.9, B = 83-86.9, B- = 80-82.9, C+ = 77-79.9, C = 73-76.9, C- = 70-72.9, D+ = 67-69.9, D = 63-66.9, D- = 60-62.9, F < 60.

Resources:

There is no text required for this course. Materials for each Case Study will be posted on Blackboard and include scientific papers, reports, and data sets.

Students with Disabilities

Disability accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Expectations for Student Conduct

At Oregon State University academic dishonesty is defined by the Oregon Administrative Rules 576-015-0020.1.a-c as: *An intentional act of deception in which a student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.* Academic dishonesty includes:

- **CHEATING** - use or attempted use of unauthorized materials, information or study aids or an act of deceit by which a student attempts to misrepresent mastery of academic effort or information. This includes unauthorized copying or collaboration on a test or assignment or using prohibited materials and texts.
- **FABRICATION** - falsification or invention of any information (including falsifying research, inventing or exaggerating data and listing incorrect or fictious references.
- **ASSISTING** - helping another commit an act of academic dishonesty. This includes paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, or taking a test/doing an assignment for someone else (or allowing someone to do these things for you). It is a violation of Oregon state law to create and offer to sell part or all of an education assignment to another person (ORS 165.114).
- **TAMPERING** - altering or interfering with evaluation instruments and documents.
- **PLAGIARISM** - representing the word or ideas of another person as one's own OR presenting someone else's words, ideas, artistry or data as one's own. This includes copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project, then submitting it as one's own. It also includes pasting text from other document into your own work without quotation marks, even if you include a citation.

Academic dishonesty cases are handled initially by the academic units (collection of evidence and documentation of incident, meeting with student regarding the situation, determination of responsiblity and academic penalty) but will also be referred to the Student Conduct Coordinator for action under the rules.

http://oregonstate.edu/admin/stucon/achon.htm

Course Schedule

Week #	Lectures	Lab	Assignment due
1	• Introduction: How is science used to solve problems in natural resource management? • "Evidence-based" conservation; integrating across levels of biological organization	Form Groups	none
2	• Sources of information: from peer-reviewed science to local ecological knowledge • Research Techniques: getting the information you need	Library exercise Project Statement peer review	Project Problem Statement draft (Individual)
3	• Case Study #1: Problem statement and background • Case Study #1: data	Data review Case Study #1	Final Project Problem Statement (Group)
4	• Case Study #1: synthesis and resolution • Case Study #1 quiz and discussion	Project information gathering	
5	• Case Study #2: Problem statement and background • Case Study #2: data	Data review Case Study #2	Project Bibliography (Group)
6	• Case Study #2: synthesis and resolution • Case Study #2 quiz and discussion	Project data review and synthesis, uncertainty lab	
7	• Case Study #3: Problem statement and background • Case Study #3: data	Data review Case Study #3	Review of applicable principles and critical data for Project (Individual)
8	• Case Study #3: synthesis and resolution • Case Study #3 quiz and discussion	Project report outlines	
9	• Case Study #4: Problem statement and background • Case Study #4: data	Data review Case Study #4	
10	• Case Study #4: synthesis and resolution • Case Study #4 quiz and discussion	Project report	
Finals Week			Project Report Outline (Group)