

**LEARNING OUTCOMES ASSESSMENT PLAN**  
**DEPARTMENT OF FISHERIES AND WILDLIFE**

**DRAFT**  
**December 18, 2003**

**INTRODUCTION**

The Department of Fisheries and Wildlife initiated a strategic planning process in 1997 and monitors alignment with the plan's strategic goals annually at a faculty retreat. The overall purpose of the strategic planning effort is continual improvement of department programs. In addition to the department's strategic planning process, the College of Agricultural Sciences regularly develops performance metrics on its units in association with the college's *Strategic Intent* document. The department has a strong commitment to offering a quality educational experience for all students enrolled in our classes and programs. The department's on-going efforts to improve our teaching program include professional development activities associated with teaching and advising, peer evaluation of teaching faculty, and recognition of outstanding teachers through college, university and national-level awards. Thus, learner outcome assessment is consistent with our continual improvement process.

**DEPARTMENTAL MISSION**

Faculty and students in the Department of Fisheries and Wildlife acquire, integrate, and disseminate knowledge about fish and wildlife at all levels of biological organization. We focus on resource systems influenced by human activities. Our goal is to provide people with the knowledge needed to make wise decisions on issues of conservation, sustainable use, and ecosystem restoration. We accomplish this through a combination of undergraduate and graduate education, scholarly research, extension education, and public outreach.

**LEARNER OUTCOME ASSESSMENT**

Our learner outcome assessment contains two levels of evaluation: (1) an assessment of graduates' success in finding employment and their preparation for continuing education; and (2) an assessment of learner competencies in 6 skill areas (Conservation and Management, Mathematical skills, Observation and Perception, Communication, Leadership and Team Building, and Critical Thinking).

## **Employment and Continuing Education of Graduates**

Overall teaching program success will be evaluated based on success of graduates in finding employment, preparation for graduate or professional degree education, and overall satisfaction with their program of study.

### ***Goals and Measures of Success***

1. Students graduating from the Department of Fisheries and Wildlife will obtain employment in their field.

**Measure:** Periodically (every 3 years) survey graduates to determine employment trends.

**Criteria for Success:** Within 3 years of graduation, 50% of BS, 75% of MS and 90% of PhD graduates will be permanently employed in natural resources related fields.

2. Students graduating from the Department of Fisheries and Wildlife will be prepared for graduate education.

**Measure:** Periodically (every 3 years) survey graduates to determine proportion of graduates continuing their education and their scores on the Graduate Record Exam.

**Criteria for Success:** Within 3 years of graduation, 30% of BS, 30% of MS graduates will be enrolled in or have completed a MS or PhD degree program, respectively.

More than 50% of graduates from our department who take the GRE will score 600 or more on the verbal and quantitative components of the exam.

3. Students graduating from the Department of Fisheries and Wildlife will have a high level of satisfaction with their training and program of study.

**Measure:** Conduct exit interviews of graduating students to determine level of satisfaction with their program of study.

**Criteria for Success:** Greater than 50% of graduates will be “very satisfied” with the education they receive from our department.

## **Learner Competencies in Skill Areas**

Our learner outcome assessment will focus on undergraduate performance in 6 skill areas (Conservation and Management, Mathematical skills, Observation and Perception, Communication, Leadership and Team Building, and Critical Thinking). Learner competencies in skill areas will be assessed annually using two approaches: (1) embedded assessments in Fisheries and Wildlife core curriculum and senior systems/applications courses, and (2) assessment of capstone Group Problem Solving teams. Skills areas are presented and reinforced throughout our curriculum (Appendix 1).

### ***Goals and Measures of Success***

1. **Conservation and Management competencies**—students should be able to: 1) understand physical and ecological elements and processes sustaining ecosystems, and recognize the implications of altering those components; 2) apply conservation principles in developing conservation approaches for ecosystems or organisms within ecosystems; and 3) incorporate social information in developing conservation plans.

**Measure:** Conduct annual assessments of Group Problem Solving teams and assessments embedded in FW core curriculum and senior systems/applications courses to determine conservation and management skill competencies. Competencies may be demonstrated for specific ecosystems and/or organisms.

**Criteria for Success:** At least 75% of students will meet conservation and management skill competencies.

2. **Mathematical skills**—Students graduating from the Department of Fisheries and Wildlife will meet mathematical skills competencies. Specifically, students should be able to: 1) translate problems into mathematical/numeric/statistical representations; 2) understand the process of mathematical model building and interpretation; 3) produce tabular and graphic summaries of quantitative data; 4) conduct simple tests of statistical hypotheses; and 5) design appropriate, sound sampling schemes and experiments.

**Measure:** Conduct annual assessments embedded in FW core curriculum and senior systems/applications courses to determine mathematical skill competencies.

**Criteria for Success:** At least 75% of students will meet mathematical skill competencies.

3. **Observation and perception skills**—Students graduating from the Department of Fisheries and Wildlife will meet observation and perception skills competencies. Specifically, students should be able to observe and accurately record natural events.

**Measure:** Conduct annual assessments of Group Problem Solving teams and assessments embedded in FW core curriculum and senior systems/applications courses to determine observation and perception skills competencies.

**Criteria for Success:** At least 75% of students will meet observation and perception skills competencies.

4. **Communication skills**—Students graduating from the Department of Fisheries and Wildlife will meet communication skills competencies. Specifically, students should be able to: 1) effectively use diverse forms of communication (oral, written, visual, symbolic); 2) engage in constructive dialog with diverse publics (both explain complex technical phenomena and understand comments of nontechnical persons; and 3) effectively communicate ideas and technical information in formal and professional formats.

**Measure:** Conduct annual assessments of Group Problem Solving teams and assessments embedded in FW core curriculum and senior systems/applications courses to determine communication skills competencies.

**Criteria for Success:** At least 75% of students will meet communication skills competencies.

5. **Leadership and team building skills**—Students graduating from the Department of Fisheries and Wildlife will meet leadership and team building skills competencies. Specifically, students should be able to: 1) constructively provide criticism to peers and to accept criticism from peers; 2) lead a peer-group to develop collective solutions that exceed the individual contributions; 3) work with people of disparate social, political and educational backgrounds to build consensus and resolve conflicts while maintaining personal integrity.

**Measure:** Conduct annual assessments of Group Problem Solving teams to determine leadership and team building skills competencies.

**Criteria for Success:** At least 75% of students will meet leadership and team building skills competencies.

6. **Critical thinking skills**—Students graduating from the Department of Fisheries and Wildlife will meet critical thinking skills competencies. Specifically, students should be able to: 1) recognize biases and assumptions their own work and the work of others; and 2) use logic and reasoning, analysis and synthesis to arrive at defensible conclusions.

**Measure:** Conduct annual assessments of Group Problem Solving teams and assessments embedded in FW core curriculum and senior systems/applications courses to determine critical thinking skills competencies.

**Criteria for Success:** At least 75% of students will meet critical thinking skills competencies.

### *Skill Competency Evaluation and Criteria*

Courses in which assessments will be conducted will use an excel spreadsheet with standardized criteria for evaluating skill competencies. This section describes our approach to ranking skill competencies and lists individual criteria for which each student in the class will be assessed a competency score from 1 to 4, where a score of 3 represents our minimum acceptable skill level (i.e., student is minimally competent in this area). A course evaluating a skill area will not necessarily score all criteria (e.g., some courses evaluating mathematical skills might only score statistical concepts and applications—see Appendix A).

### **Conservation and Management Skills**

Understand physical and ecological elements and processes sustaining ecosystems, and recognize the implications of altering those components.

1. Student identifies physical and ecological elements of an ecosystem, but does not identify potential interactions. Student cannot distinguish between fundamental physical or biological components and ecosystem processes.
2. Student can distinguish physical and ecological elements of an ecosystem, and can describe physical and biological processes functioning in that ecosystem moderately well. Applications of ecological principles to general situations incomplete. Student does not connect alterations in fundamental components to potential changes in the ecosystem
3. Student readily identifies breadth of physical and ecological elements sustaining an ecosystem. Basic system processes identified. Implications of altering the system understood in a general, but not specific, way.
4. Student readily identifies the breadth of physical and ecological elements sustaining a particular ecosystem. Role of processes in maintaining the ecosystem clearly articulated. Understanding the system units and integration of the whole demonstrated easily when student independently discusses implications of altering system components.

Apply conservation principles in developing conservation approaches for ecosystems or organisms within ecosystems

1. Student can identify conservation principles (e.g. biodiversity, role of invasive species), but cannot apply general principles to particular situations.
2. Student able to apply a particular conservation principle to a specific case, but cannot apply principles more broadly to other systems or organisms.

3. Student understands utility of a conservation principle to a variety of circumstances, from ecosystems to particular organisms, but has only a moderate understanding of a broad range of conservation principles.
4. Student is conversant in a broad range of conservation principles and their application for ecosystems and organisms within the ecosystems.

Incorporate social information in developing conservation plans.

1. Student recognizes social components in conservation but does not consider social elements in applications with a conservation objective.
2. Student incorporates only singular elements of social information in a conservation context.
3. Student incorporates multiple social elements in a conservation context moderately well.
4. Student weaves multiple social elements in planning for conservation objectives. He or she is highly skilled at applying appropriate components in a variety of contexts.

**Mathematical skills**

Translate Problems into Mathematical/numeric/statistical Representations

1. Student does not understand problems as mathematical constructs, and is unable to express problem components orally or in writing.
2. Student recognizes mathematical problems and can identify the components of the problem, but is unable to correctly solve problems, and inadequately expresses the components of a problem orally or in writing.
3. Student recognizes and solves mathematical problems and can develop mathematical expressions from written or oral narrative.
4. Student recognizes and solves mathematical problems readily. He or she easily applies mathematics to problems described written or orally.

Model Building and Interpretation

1. Student does not understand how conceptual and mathematical models can be used to describe natural phenomena.
  2. Student has a general grasp of how models are used and the differences between statistical, predictive and heuristic models.
  3. Student can build conceptual models of natural populations or systems that include such processes as birth and death rates, carrying capacity, dispersal, and environmental stochasticity.
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3. Student can interpret a system of equations and identify assumptions behind simple mathematical models.
  4. Student can parameterize a process model with empirical data, with a firm understanding of how data uncertainty and model assumptions may affect its applicability to real world situations.

### Tabular and Graphic Summaries

1. Student is not able to summarize data in a graph or table.
2. Student is able to summarize data but summaries are inappropriate for type of data, and column headings, axes labels, or captions are inappropriate or incomplete.
3. Student appropriately summarizes data in a table or graph; column headings, axes labels, or captions are appropriate, but incomplete. Student can interpret information from a table or graph in other work, including scientific literature.
4. Student appropriately summarizes data in a table or graph; column headings, axes labels, or captions are appropriate, and contain no or only minor errors.

### Statistical Concepts and Application

1. Student has no or only rudimentary knowledge of statistics; student interprets graphical summaries or statistical results with difficulty or often incorrectly.
2. Student has general knowledge of statistics (central tendencies....) and is able to interpret results correctly; has trouble determining the appropriate methods to apply to data.
3. Student has general knowledge of statistics (central tendencies, variation, correlation, hypothesis testing, etc.); interprets graphical summaries or statistical results correctly; can apply appropriate statistical tests to data.
4. Student has excellent knowledge of statistics (central tendencies, variation, correlation, ANOVA, regression, hypothesis testing, etc.); interprets graphical summaries or statistical results with ease; can select and apply appropriate statistical tests to data.

### **Observation and Perception Skills**

#### Observe and Accurately Record Natural Events–Senior Students

1. Student makes simple observations and records information accurately, but does not integrate complex phenomena.
2. Student is able to integrate observations with at least one basic principle or concept. Recognizes the ecological context to simple observations.
3. Student understands connectivity between observations and complex principles moderately well, and can discuss the ecological context for particular phenomena.
4. Student integrates observations with principles as a regular approach to analysis. Independently places observations into ecological context. Articulates integration easily in oral and written communication.

#### Observe and Accurately Record Natural Events–Sophomore students

1. Student makes partially correct observations, but records incomplete.
2. Student can make and accurately record simple observations.
3. Student connects observations with basic principles in oral or written communication.

4. Student uses observations of natural phenomena as basis for understanding or questioning larger principles or ecological concepts.

## **Communication Skills**

### Written Communications

1. Student's written communication skills are inadequate; writing contains multiple errors in format, style, grammar and spelling. Sentence construction, thesis, and content are poorly developed. No evidence that student is familiar with the peer-reviewed literature related to the subject.
2. Student's written communication skills are poorly developed. Correctly uses complete sentences, cites some primary literature, can generally support an argument or thesis but lacks good organization.
3. Student is able to communicate ideas and technical information in formal and professional formats. Writing contains minor errors in format, style, grammar and spelling. Sentence construction, use of topic sentences, thesis development and content are good. Recognizes plagiarism. Appropriate peer-reviewed literature is used.
4. Student very effectively communicates ideas and technical information in formal and professional formats. Sentence construction, thesis development and content are very good. Peer-reviewed literature is extensively used and synthesized. Writing potentially suitable for submission in a scientific journal.

### Oral Presentations

1. Student's oral presentation skills are inadequate; presentation indicates minimum preparation and practice. Presentation purpose or goals not presented; speaking skills (voice projection, eye contact, mannerisms, etc.) very poor; no or very ineffective visual aids; cannot respond to questions.
2. Student's oral presentation skills are poorly developed; presentation indicates some evidence of preparation and practice. Presentation purpose or goals not clear; speaking skills (voice projection, eye contact, mannerisms, etc.) need further refinement; visual aids are used but are not effective; responds to questions ineffectively.
3. Student is able to give a professional presentation adequately. Presentation indicates clear evidence of preparation and practice. Presentation purpose or goals are apparent; speaking skills (voice projection, eye contact, mannerisms, etc.) well developed; visual aids are effective; responds to questions capably.
4. Student gives an excellent professional presentation. Presentation is polished with excellent goals statement, speaking skills (voice projection, eye contact, mannerisms, etc.) and visual aids; responds to questions with in-depth answers.

## **Leadership and Team Building Skills**

### Collegiality and Team Building

1. Behavior causes dysfunctional groups – e.g. demonstrates hostile or derogatory behavior; distracts the group from the project; takes control of the group without consent of the group; does not participate; or over reacts to another’s challenge to an idea.
2. Show some good behaviors/skills (4 below) but tends to impede group.
3. Mostly shows good behaviors/skills (4 below), and is productive, functioning group member.
4. Behavior enhances group function – works to keep members on task; proposes activities/tasks to get action out of the group; shows persistence in getting tasks finished; helps move the group towards the goal; asks questions; positively challenges others by forcing them to justify or clarify ideas; accepts criticism from peers and critically self-evaluates group progress; encourages participation by, and ideas from, all members; alleviates disagreements and promotes compromise within the group.

### Interpersonal Communication

1. Interpersonal relationships characterized by a lack of respect towards others and/or not listening to or responding to the needs of others.
2. Student is inconsistent in relationships with others. On occasion will treat others with respect, and will listen to needs of others. At other times inconsiderate of other team members.
3. Student treats others with respect, usually listens, considers and responds appropriately to the needs, feelings and capabilities of others in a variety of situations.
4. Student consistently communicates well with others, and treats others with respect. Acts responsibly and dependably in performing tasks. Show initiative and contributes to the group.

### **Critical Thinking Skills**

#### Recognition of biases and assumptions

1. Student cannot identify biases, nor differentiate between reasoning from rationalization, nor distinguish anecdote from rigorously derived information.
2. Student can identify biases only with coaching. Student rarely recognizes assumptions in an argument.
3. Student can recognize biases and assumptions in other work and generally identifies assumptions in his or her own work. She or he can distinguish between anecdotal and rigorously derived information.
4. Student can easily identify and discuss biases and assumptions in his or her own work as well as in critiquing the work of others. Scientific rigor used as a criterion in evaluating studies in the literature or by peers.

#### Use of Logic and Reasoning, Analysis and Synthesis to Arrive at Defensible Conclusions

1. Student recognizes pieces of a larger problem, but rarely uses logic to form an integrated whole.
2. Student is able to develop a simple argument to explain a resource-related question. Singular analyses used to explain natural phenomena. Little application to larger issues

- or further inquiry.
3. Student easily develops simple arguments, and tries to explain complex problems. He or she tries multiple analyses to explain natural phenomena with moderate success. Attempts to describe implications for larger issues, but applications not always on target.
  4. Student readily develops well documented, logical arguments that explain simple and complex natural phenomena. Multiple analyses applied appropriately. Easily recognizes implications for larger issues related to further scientific inquiry or societal actions.

### **ASSESSMENT SCHEDULE**

Learner outcome assessment will be conducted a recurring basis following the schedule in Table 2. Employment and continuing education goals will be evaluated every three years, while learner competencies will be evaluated annually.

## Spare parts

### Electronic Portfolio

Approach: Students will submit assignments or work of their choice that address particular objectives. The portfolios will provide each student an individual record of their improvement during their undergraduate program. The portfolios will be ready for departmental review at the end of the student's sophomore and senior year. A random sample of 20 anonymous portfolios at each level will be evaluated by a faculty committee each summer. Results will be reviewed at the annual faculty retreat in the fall.

Freshman or sophomore year; first year transfer students:

Purpose: evaluate student written communication skills, ability to analyze natural resource phenomena and using basic mathematical skills in a resource application.

Data: All students will submit assignments of their choice that represents each of these skills.

Potential assignments that would fulfill these requirements: Statement of career goals (FW207 and specialty option requirement); written narrative with graph from FW251, FW255 or BI370;

### Senior year

Purpose: to evaluate written communication skills, ability to critically analyze a complex problem, and synthesize technical information; to identify student appreciation for human values or philosophies in nature or natural resource decision making.

Data: Prior to graduation all students will submit examples of independent work that demonstrate their best efforts in these more advanced skills. Examples can come from any class work or independent efforts that they wish to choose. Class assignments from FW systems classes are likely to fulfill these requirements. Assignments from baccalaureate core classes (e.g. FW340, FW(global issues), consensus) may be used, particularly to address human values.

Criteria for departmental evaluation will be based on outcomes specified under departmental themes described in the FW Curriculum, particularly 3) Conservation and Management, 4) Human constructs, 5) Analysis, 7) Mathematical skills, 8) Observation & Perception, 9) Communication 10) Synthesis, and 11) Critical Thinking.

## ASSESSMENT SCHEDULE

Learner outcome assessment will be conducted a recurring basis following the schedule in Table 2. Employment and continuing education goals will be evaluated every three years, while

learner competencies will be evaluated annually.

Table. 2. Learner Outcome Assessment schedule for the Department of Fisheries and Wildlife.

Goal	Schedule	Assessment Instrument
Employment	Every 3 years	Survey of graduates
Continuing education	Every 3 years	Survey of graduates
Satisfaction with program	Annually	Exit interviews
Skill area competencies	Annually	


Appendix A. Skill areas presented in courses within the Fisheries and Wildlife undergraduate curriculum that will be assessed for learner outcome competencies.

	Skill areas									
	Mathematical skills									
Assessment approach and course	Conservation and Management	Translate Problems	Model Building and Interpretation	Tabular and Graphic Summaries	Statistical Concepts		Observation & Perception	Communication	Leadership & Team Building	Critical Thinking
Embedded assessment in FW core curriculum and senior systems/applications courses										
FW 255 Field Sampling of Fish and Wildlife										
FW 320 Introduction to Population Dynamics										
FW 322 Investigations in Population Dynamics										
FW 425										

Capstone Group Problem Solving teams						?	X	X	X	X