

FAS 6932 Fisheries Enhancement

Course Syllabus, Summer A 2012, 2 Credits

Block course: Monday May 21 to Friday May 25, 2012, 08:30 AM –17:00 PM daily;
Some preparation and report writing required before and after the course week.

FAS Conference Room, 7922 NW 71st Street, Gainesville, FL 32653

Course Description

Fisheries enhancements are a set of fisheries management approaches involving the release of cultured organisms to enhance or restore fisheries. If developed under suitable conditions and managed appropriately, enhancements can contribute effectively to fisheries management goals. On the other hand, poorly conceived and managed enhancements can be wasteful of resources, and may even exacerbate existing fisheries problems. The course aims to provide participants with the knowledge and skills required for assessing where and when enhancements can contribute to fisheries management goals, and for developing and managing such initiatives effectively. Within the framework of the ‘updated responsible approach’ to fisheries enhancement (Lorenzen et al., *Rev. Fish. Sci.* 18: 189-210, 2010), the course emphasizes integrative systems approaches and the key elements of population dynamics, aquaculture production, release strategies, genetic management, governance, and social and economic costs and benefits. Lectures and discussions are used to introduce students to key concepts and methods. Throughout the course, students apply those concepts and methods to an enhancement fishery case study of their choice and present results of their assessments orally and in writing.

Course objectives

At the end of the course the participants will be able to:

1. Describe the scientific basis of fisheries enhancements
2. Determine conditions under which enhancements may contribute to fisheries and ecosystem management goals
3. Evaluate the performance of existing fisheries enhancements
4. Plan for the development of new, or the reform of existing fisheries enhancements

Instructor

Dr. Kai Lorenzen (Professor)
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Guest lecturers

Dr. Kenneth M. Leber (UF Courtesy Professor), Associate Vice President, Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota, FL 34236. Phone: 941-388-4441 x406
Email: KLeber@mote.org

Dr. Michael D. Tringali, Research Scientist (Genetics), Florida Fish & Wildlife Conservation Commission, 100 Eighth Avenue S.E., St. Petersburg, FL 33701. Phone: 727- 896-8626. Email: mike.tringali@myfwc.com

E-learning support

Sakai site is being developed

Format, Evaluation and Feedback

Classes will consist of lectures with discussions, labs and presentations. Throughout the course, students will analyze and prepare a development plan for a fisheries enhancement of their choice. The case study enhancement may be already operational, in development, or proposed.

Grades will be allocated as: A (93 - 100 %), A- (90 - 92 %), B+ (86 - 89 %), B (82 - 85 %), B- (78 - 81 %), C+ (74 - 77 %), C (67 - 73 %), C- (63 - 66 %), D+ (59 - 62 %), D (55 - 58 %), D- (51 - 54 %), E (< 50 %).

Click here for UF grading information for students:
<http://www.registrar.ufl.edu/hubstudents.html>

Coursework, tests and due dates:

Due Date	Activity	% of total grade
5/16/2012, 10:00 pm	Discuss and confirm case study and syllabus	5
5/21//2012	Initial presentation	15
Class week	Participation in class	20
5/25/2012	Synthesis presentation	20
6/06/2012 10:00 pm	Submit Synthesis paper	40
Total		100

Further details on course work requirements including grading criteria is provided below.

Academic honesty

All students are required to abide by the Academic Honesty Guidelines which have been accepted by the University of Florida:

(<http://www.dso.ufl.edu/judicial/procedures/honestybrochure.html>).

Failure to comply strictly to these guidelines can result in failure of the course.

UF Counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling; and
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Accommodations for Students with Disabilities

Students requesting classroom or laboratory accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Course Schedule Overview

Date	Lectures, labs and activities
Prior to course week	<ul style="list-style-type: none"> • Select case study enhancement • Confirm case study selection and understanding of course requirements with instructor • Collate basic information on case study fishery and prepare initial presentation
Monday May 21, 2012	<p>Course overview and introductions (0.5 hour) (K. Lorenzen)</p> <p>Lecture 1: Introduction to fisheries enhancements and the ‘Responsible Approach’ (1 hour)</p> <p>Initial presentations and discussions on case study enhancements (2 hours)</p> <p>Lecture 2: Understanding enhancement fisheries systems (1 hour) (K. Lorenzen)</p> <p>Lab 1: Practical analysis of enhancement fisheries systems (2 hours) (K. Lorenzen)</p>
Tuesday May 22 2012	<p>Lecture 3: Population dynamics and quantitative assessment of stocked fisheries (2 hours) (K. Lorenzen)</p> <p>Lab 2: Modeling and assessment using the EnhanceFish tool (4 hours) (K. Lorenzen)</p>
Wednesday May 23, 2012	<p>Lecture 4: Aquaculture production and enhancement system types (1 hour) (K. Lorenzen)</p> <p>Lectures 5&6: Release strategies, empirical evaluation and the use of tagging programs (2 hours) (K.M. Leber)</p> <p>Interim exam (1 hour)</p> <p>Lab3: Reviewing release procedures and designing experimental strategies to assess release effectiveness and ecological impacts (2 hours) (K.M. Leber, K. Lorenzen).</p>
Thursday May 24, 2012	<p>Lecture 7: History of enhancement (1 hour) (K.M. Leber)</p> <p>Tutorial 1: Social and ecological impacts of enhancements and other topics as required by case studies (2 hours) (K. Lorenzen)</p> <p>Lecture 8: Governance and development of fisheries enhancement and restoration initiatives (1 hour) (K. Lorenzen) [lecture subsumed into tutorial in 2012]</p> <p>Lab 4: Planning ahead: future development of the case study fisheries (K. Lorenzen & K.M. Leber).</p>
Friday May 25, 2012	<p>Lecture 9: Genetic aspects of fisheries enhancement & genetic resource management (2 hours) (M.D. Tringali)</p> <p>Lab 5: Applying the Florida Genetics Policy (2 hours) (M.D. Tringali)</p> <p>Final presentations (1-2 hours)</p> <p>Concluding session and outlook (0.5 hours) (K. Lorenzen)</p>
After course week	<ul style="list-style-type: none"> • Complete report on assessment and development/reform of case study fishery enhancement

Course Schedule Details and Key Readings

Prior to course week

Select case study enhancement. Confirm case study selection and understanding of course requirements with instructor. Collate basic information on case study fishery and prepare initial presentation.

Selection of case study: You may select any fisheries enhancement, located anywhere in the world, whether proposed, in development, or fully operational. The only requirement is that you should be able to gain good information on this fishery enhancement from published material, professional contacts (e.g. fisheries or hatchery managers, scientists), or your own professional work. Different types of information will be available for different fisheries: for some proposed marine enhancements, there may quantitative assessments of the wild stock but not experimental hatchery or release data. For others, there may be experimental release data but little information on the wild stock or the fishery. It is fine if the information available for your case study fishery is unbalanced in this way (you will develop plausible scenarios and research plans for areas where the information is limited), but DO NOT select a case study for which there is very little information on anything!

Monday May 21, 2012

Course overview and introductions (0.5 hour)
Overview of course and introductions of participants.

Lecture 1: Introduction to fisheries enhancements and the Responsible Approach (1 hour) (K. Lorenzen)
Definition and status of fisheries enhancements, typology of enhancement systems: restocking, stock enhancement, etc.; Responsible Approach.

Lorenzen, K., Leber, K.M. & Blankenship, H.L. Responsible approach to marine stock enhancement: an update. *Reviews in Fisheries Science* 18: 189-210. (2010)

Initial presentations on case study fisheries (2 hours)
Students present initial overviews of their case study enhancements.

Lecture 2: Understanding enhancement fisheries systems (1 hour) (K. Lorenzen)
Why we need to understand enhancement fisheries systems; what can we learn from case studies?, components of enhancement fisheries system; framework for analysis; application of framework.

Lorenzen, K. Understanding and managing enhancement fisheries systems. *Reviews in Fisheries Science* 16:10-23. (2008)

Lab 1: Practical analysis of enhancement fisheries systems (3 hours) (K. Lorenzen)

Participants present information on 'their' chosen fisheries enhancements; use institutional analysis framework to analyze and synthesize their system; group discussion.

Tuesday May 22, 2012

Lecture 3: Population dynamics and quantitative assessment of stocked fisheries (2 hours) (K. Lorenzen)

Fish life histories and population dynamics; a basic stock enhancement model; dynamics of ranching, stock enhancement, restocking, etc.; quantitative assessment; how to get the data: comparative studies, stock assessments, release experiments.

Lorenzen, K. (2005) Population dynamics and potential of fisheries stock enhancement: practical theory for assessment and policy analysis. *Philosophical Transactions of the Royal Society B* 360: 171-189.

Lorenzen, K. (2006) Population management in fisheries enhancement: gaining key information from release experiments through use of a size-dependent mortality model. *Fisheries Research* 80: 19-27.

Lab 2: Modeling and assessment using the EnhanceFish tool (4 hours) (K. Lorenzen)

Participants use the *EnhanceFish* package to analyze the dynamics of case study fisheries.

Medley, P.A.H. & Lorenzen, K. (2006) EnhanceFish: A decision support tool for aquaculture-based fisheries enhancement. Open-source freeware, available from <http://www.aquaticresources.org/enhancefish.html>

Wednesday May 23, 2012

Lecture 4: Aquaculture production for fisheries enhancement (1 hour) (K. Lorenzen)

Fish culture, domestication and feralization; managing domestication effects; promoting seed quality: environmental enrichment, life skills training, etc.; transport and release.

Fleming, I. A. and E. Petersson. The ability of released, hatchery salmonids to breed and contribute to the natural productivity of wild populations. *Nordic J. Freshw. Res.*, 75: 71-98 (2001).

Lorenzen, K., Beveridge, M.C.M. & Mangel, M. Cultured fish: integrative biology and management of domestication and interactions with wild fish. *Biological Reviews* (in press).

Olla, B. L., M. W. Davis and C. H. Ryer. Understanding how the hatchery environment represses or promotes the development of behavioral survival skills. *Bull. Mar. Sci.* 62: 531-550 (1998).

Lectures 5&6: Release strategies, empirical evaluation and the use of tagging programs (2 hours) (K.M. Leber)

Historical approaches to planning release strategies; release variables: critical uncertainties; experimental assessment of release strategies; empirical generalizations about release success; challenges to implementing responsible release strategies

Leber, K. M., H. L. Blankenship, S. M. Arce, and N. P. Brennan. Influence of release season on size-dependent survival of cultured striped mullet, *Mugil cephalus*, in a Hawaiian estuary. *Fish. Bull. US.*, 95: 267-279 (1997).

Leber, K. M., R. N. Cantrell and P.S. Leung. Optimizing cost-effectiveness of size at release in stock enhancement programs. *N. Am. J. Fish. Manage.*, 25:1596-1608 (2005).

Leber, K. M. and H. L. Blankenship. 2011. How Advances in Tagging Technology Improved Progress in a New Science: Marine Stock Enhancement. *American Fisheries Society Symposium* 76:1-12.

Interim exam (1 hour)

Lab 3: Reviewing release procedures and designing experimental strategies to assess release effectiveness (2 hours) (K.M. Leber, K. Lorenzen).

Thursday May 24, 2012

Lecture 7: History of enhancement (K.M. Leber)

History of marine fisheries enhancements and the development of enhancement science.

Leber, K.M. Marine fisheries enhancement: Coming of age in the new millennium. In: R. A. Meyers (ed), *Encyclopedia of Sustainability Science and Technology*. Springer Science. 20 pages. (in press).

Tutorial 1: Social and ecological impacts of enhancements and other topics as required by case studies (2 hours) (K. Lorenzen)

Social outcomes of enhancements, ecological impacts beyond the target stock.

Lecture 8: Governance and development of fisheries enhancement and restoration initiatives (1 hour) (K. Lorenzen)

Development approaches; programmed vs. adaptive implementation; engaging stakeholders; conducting a broad-based systems analysis; identifying objectives of intervention; assessing options; decision making; monitoring and adaptive management

Lorenzen, K., Leber, K.M. & Blankenship, H.L. Responsible approach to marine stock enhancement: an update. *Reviews in Fisheries Science* 18: 189-210. (2010)

- Mobrand, L.E., J. Barr, L. Blankenship, D.E. Campton, T.T.P. Evelyn, T.A. Flagg, C.V.W. Mahnken, L.W. Seeb, P.R. Seidel and W.W. Smoker. Hatchery Reform in Washington State. *Fisheries*, 30(6): 11-23 (2005).
- Paquet, P. J. Flagg, T. Appleby, A. Barr, J. Blankenship, L. Campton, D. Delarm, M. Evelyn, T. Fast, D. Gislason, J.Kline, P. Maynard, D. Mobrand, L. Nandor, G. Seidel, P. & Smith, S. Hatcheries, Conservation, and Sustainable Fisheries—Achieving Multiple Goals: Results of the Hatchery Scientific Review Group's Columbia River Basin Review. *Fisheries* 36(11): 547-561 (2011).

Lab 4: Planning ahead: future development of enhancements in the participant's fisheries. Participants work in small groups to set out priorities for management, research, planning of their case study enhancements (K.lorenzen, K.M. Leber).

Friday May 25, 2012

Lecture 9: Genetic aspects of fisheries enhancement & genetic resource management (2 hours) (M.D. Tringali)

Evolution and genetic structure of wild and cultured fish populations; genetic impacts of transfer into aquaculture; alternative goals of management; genetic management for stock enhancement and conservation; genetic management for culture-based fisheries and ranching; genetic impacts of releases on natural populations; overview of FL genetics policy.

- Ortega-Villaizan, M.D., D. Noguchi, and N. Taniguchi. Minimization of genetic diversity loss of endangered fish species captive broodstocks by means of minimal kinship selective crossbreeding. *Aquaculture*. 318(1-2):239-243. (2011).
- Ryman, N. and L. Laikre. Effects of supportive breeding on the genetically effective population size. *Conservation Biology* 5:325-329. (1991).
- Tringali, M. D., T. M. Bert, F. Cross, J. W. Dodrill, L. M. Gregg, W. G. Halstead, R. A. Krause, K. M. Leber, K. Mesner, W. Porak, D. Roberts, R. Stout and D. Yeager. Genetic Policy for the Release of Finfishes in Florida. Florida Fish and Wildlife Conservation Commission, Florida. (2007).
- Ward R. The importance of identifying spatial population structure in restocking and stock enhancement programmes. *Fisheries Research* 80(1): 9-18. (2006).

Lab 5: Applying the Florida Genetics Policy (2 hours) (M.D. Tringali)

Participants apply the FL genetics policy to their case study fishery, using all available information and/or identifying further information needs.

Final presentations (2 hours)

Concluding session and outlook (0.5 hour) (K. Lorenzen)

Coursework

Initial discussion on course requirements and choice of case study enhancement.

Discuss the course work requirements and your choice of case study enhancement with the instructor, in person or by telephone or Skype. Confirm by email that you have discussed and understood the course requirements, and your choice of case study enhancement.

Grading criteria: Comprehension of coursework requirements, consideration of criteria for selecting a case study enhancement, student is proactive in identifying a case study and seeking clarification of requirements and criteria as appropriate. Weight: 5 % of final grade. Deadline: confirmation by 16 May 2012, 22:00.

Initial presentation on your case study enhancement

Prepare and present an initial overview of your chosen enhancement case study. This presentation should provide the wider management context of your enhancement and provide key information on the status of the target stock, aquaculture production, genetic information and management, stakeholders and governance, social and economic dimensions. Also provide an overview of data availability on these aspects.

Grading criteria: Presentation provides a good overview of the case study enhancement and its context. A systematic effort to locate and summarize information on the case study enhancement is evident. Existing information is summarized succinctly and information gaps are clearly identified. The presentation is structured and presented clearly. Weight: 15 % of final grade. Deadline: Presentation on 21 May 2012. 10:00 am.

Synthesis presentation on the analyses conducted on your case study enhancement and outline of further development/reform plan

Present a synthesis of the analyses you have conducted on your case study enhancement during the course labs. Outline your suggestions for the further development or reform of your case study enhancement.

Grading criteria: Presentation provides evidence of competent application of concepts and methods learned during the course to the case study enhancement. Results are synthesized well and development or reform options for the enhancement clearly outlined. The student responds constructively to questions from peers and instructors. Weight: 20 % of final grade. Deadline: Presentation on 25 May 2012. 2:00 pm.

Report on assessment of the fisheries enhancement and outline of further development/reform plans

A report presenting a clear and concise, fully referenced assessment of the case study enhancement and outline of suggested development/reform plans. The report will draw mostly on the material already presented orally during the course week, but must be fully written and referenced in the style of management or consultancy report.

Grading criteria: The report provides a clear and concise assessment of the enhancement fishery. Results are synthesized well and development or reform options for the enhancement clearly outlined. Methods are described in appropriate detail and all material is appropriately referenced. Weight: 40 % of final grade. Deadline: 6 June 2012, 22:00.

Participation in Class

Students are expected to participate actively and constructively in class.

Grading criteria: Students make regular constructive contributions to class by asking pertinent questions, synthesizing knowledge and results, and taking on facilitation and leadership roles in class activities. Weight: 20 % of final grade.