Syllabus

Course:	NRM 552 Fisheries Management (3 credits)	
Semester:	Winter 2017	
Lecture:	6:00-7:15 PM, Tuesday &Thursday, 2225 Kindshi Hall of Science (KHS)	
Instructors:	Drs. Carl Ruetz & James McNair	
Office/Telephone:	*Muskegon*:	Ruetz—136 Lake Michigan Center/616-331-3946[1]
		McNair—133 Lake Michigan Center/616-331-3987
	Allendale:	Ruetz—3394 KHS/616-331-9357
		McNair—B-4-225 Mackinac Hall/616-331-8824
E-mail:	Ruetz:	ruetzc@gvsu.edu
	McNair:	mcnairja@gvsu.edu
Office Hours:	Ruetz:	3:45 - 4:45 PM, Tuesday (3394 KHS)
	McNair:	5:00 - 5:50 PM, Thursday (B-4-225 Mackinac Hall)
	If these times are not convenient, then please contact us to schedule an appointment.	
Blackboard:	Announcements, schedule changes, and grades will be posted online.	

Text:

Guy, C.S., and M.L. Brown, editors. 2007. Analysis and interpretation of freshwater fisheries data. American Fisheries Society, Bethesda, Maryland. (Optional)

Hubert, W.A., and M.C. Quist, editors. 2010. Inland fisheries management in North American, 3rd edition. American Fisheries Society, Bethesda, Maryland. (Optional)

Prerequisites: Graduate standing; or (BIO 362 Fisheries Biology, STA 215 Introductory Applied Statistics, and permission of instructor).

Goals & Objectives: This course is an introduction to the principles of fisheries science and management, focusing on the process and tools for managing fish populations and their habitat as well as emphasizing quantitative methods for fisheries assessment. The course objectives are that students will be able to following at the end of this course:

1. Identify and conduct quantitative analyses associated with fisheries assessments;
2. Identify challenges to and recommend actions for the sustainable management of fish populations;
3. Summarize and critically evaluate published scientific papers related to fisheries management;
4. Identify the literature required to stay current in the field of fisheries science at any time in the future.

[1] Please call my Muskegon telephone number to leave messages.

Tentative Schedule (lecturer is indicated in brackets):

Date	Topic
1/10	*Lecture*: Process of fisheries management (Hubert & Quist, Ch. 5) [Ruetz]
1/12	*Lecture*: Statistics for fisheries management—experimental design & hypothesis testing (Guy & Brown, Ch. 1, 3) [Ruetz] *Discussion*: MDNR 2015 Annual Report
1/14 (Fri.)	*Seminar*: Robert DeVries—Growth rates of pallid sturgeon and shovelnose sturgeon and the management of an endangered species
1/17	*Lecture*: Statistics for fisheries management—experimental design & hypothesis testing (cont.) [Ruetz] *Discussion*: Statistics (Hoenig and Heisey 2001); Fisheries journals (Mather et al. 2008)
1/19	*Lecture*: Introduction to R [McNair]
1/24	*Lecture*: Statistics for fisheries management—linear regression & maximum likelihood [McNair]
1/26	*Lecture*: Statistics for fisheries management—model selection & repeated measures [Ruetz] *Discussion*: Human dimensions (Hyman et al. 2016; Hunt et al. 2017)
1/31	*Lecture*: Condition—length-weight, condition factor, & relative weight (Guy & Brown, Ch. 10) [Ruetz]; Age & growth (Guy & Brown, Ch. 5) [Ruetz]
2/2	*Lecture*: Age & growth (cont.) [Ruetz] *Discussion*: Populations genetics in fisheries management (Wilson et al. 2016)
2/7	*Lecture*: Age & growth—von Bertalanffy model [McNair]
2/9	*Lecture*: Estimating mortality rates (Guy & Brown, Ch. 6) [McNair/Ruetz] *Discussion*: Effects of air exposure on fish (Graves et al. 2016; Lamansky & Meyer 2016)
2/14	*Lecture*: Estimating mortality rates (cont.) [Ruetz]
2/16	Lecture: Gear bias [Ruetz] *Discussion*: Demographics (McCubbins et al. 2016; Uthe et al. 2016)
2/21	*Lecture:* **Quiz 1**
2/23	*Lecture*: Abundance estimation—Depletion methods [McNair]
2/28	*Lecture*: Abundance estimation—mark-recapture methods [McNair]
3/2	*Lecture*: Abundance estimation—mark-recapture methods (cont.) [Ruetz] *Discussion*: Abundance estimation (Ruetz et al. 2015; Hain et al. 2016)
3/7 & 3/9	**Spring Break**
3/14	*No class! Annual meeting of the Michigan Chapter of the American Fisheries Society*
3/16	*Lecture*: Population growth & harvest [McNair]
3/21	*Lecture*: Population growth & harvest (cont.) [McNair]
3/23	*Lecture*: Recruitment (Guy & Brown, Ch. 4) [McNair] *Discussion*: Gear bias (Bies et al. 2016; Bouska et al. 2017)
3/28	*Lecture*: Yield-per-recruit model (Hubert & Quist, Ch. 2) [McNair]
3/30	*Lecture*: Yield-per-recruit model (cont.) [McNair] *Discussion*: Lake Michigan fisheries management (Clark et al. 2016)
4/4	*Lecture*: Bioenergetic models [McNair]

4/6	*Lecture*: Management actions—stocking & regulations (Hubert & Quist, Ch. 7, 9) [Ruetz]; **Reference Set or Quantitative Method Prospectus due** *Discussion*: Bioenergetics (Keskinen et al. 2008)
4/11	*Lecture*: Management actions—stocking & regulations (cont.) [Ruetz]
4/13	*Lecture*: To be determined *Discussion*: Modeling (Dippold et al. 2016; Schmalz et al. 2016)
4/18	*Lecture*: **Quiz 2**
4/20	*Lecture*: To be determined *Discussion*: Regulations (Oele et al. 2016; Sánchez-Hernández et al. 2016)
4/25 Tues.	*Presentations*: "Areas of Future Research" 6 – 7:50 PM

Discussion Papers: Papers will be available on the course Blackboard page.

Bies, J.M., C.N. Fox, & J.W. Neal. 2016. Comparison of electrofishing and gill nets for sampling cichlid species. North American Journal of Fisheries Management 36:975-981.

Bouska, W.W., D.C. Glover, K.L. Bouska, & J.E. Garvey. 2017. A refined electrofishing technique for collecting silver carp: implications for management. North American Journal of Fisheries Management 37:101-107.

Clark, R.D., Jr., J.R. Bence, R.M. Claramunt, & 4 co-authors. 2016. A spatially explicit assessment of changes in Chinook salmon fisheries in lakes Michigan and Huron from 1986 to 2011. North American Journal of Fisheries Management 36:1068-1083.

Dippold, D.A., R.T. Leaf, & M.S. Peterson. 2016. Evaluating management regimes using per-recruit models and relative stock density for Mississippi's spotted seatrout. North American Journal of Fisheries Management 36:1178-1189.

Graves, J.E., B.J. Marcek, & W.M. Goldsmith. 2016. Effects of air exposure on postrelease mortality rates of white marlin caught in the U.S. offshore recreational fishery. North American Journal of Fisheries Management 36:1221-1228.

Hain, E.F., B.A. Lamphere, M.J. Blum, & 3 coauthors. 2016. Comparison of visual survey and mark-recapture population estimates of a benthic fish in Hawaii. Transactions of the American Fisheries Society 145:878-887.

Hoenig, J.M., & D.M. Heisey. 2001. The abuse of power: the pervasive fallacy of power calculations for data analysis. American Statistician 55:19-24.

Hunt, L.M., A.E. Bannister, D.A.R. Drake, S.A. Fera, & T.B. Johnson. 2017. Do fish drive recreational fishing license sales? North American Journal of Fisheries Management 37:122-132.

Hyman, A.A., S.L. McMullin, & V. DiCenzo. 2016. Dispelling assumptions about stocked-trout fisheries and angler satisfaction. North American Journal of Fisheries Management 36:1395-1404.

Keskinen, T., J. Jääskeläinen, T.J. Marjomäki, T. Matilainen, & J. Karjalainen. 2008. A bioenergetics model for zander: construction, validation, and evaluation of uncertainty caused by multiple input parameters. Transactions of the American Fisheries Society 137:1741-1755.

Lamansky, J.A., Jr., & K.A. Meyer. 2016. Air exposure time of trout released by anglers during catch and release. North American Journal of Fisheries Management 36:1018-1023.

Mather, M.E., D.L. Parish, & J.M. Dettmers. 2008. Mapping the changing landscape of fish-related journals: setting a course for successful communication of scientific information. Fisheries 33(9):444-453.
McCubbins, J.L., M.J. Hansen, J.M. DosSantos, & A.M. Dux. 2016. Demographic characteristics of an adfluvial bull trout population in Lake Pend Oreille, Idaho. North American Journal of Fisheries Management 36:12699-1277.
Oele, D.L., A.L. Rypel, J. Lyons, P. Cunningham, & T. Simonson. 2016. Do higher size and reduced bag limits improve northern pike size structure in Wisconsin Lakes? North American Journal of Fisheries Management 36:982-994.
Ruetz, C.R., III, B.S. Harris, J.N. McNair, & J.J. Homola. 2015. Removal and mark-recapture methods for estimating abundance: empirical and simulation results for mottled sculpin in streams. North American Journal of Fisheries Management 35:62-74.
Sánchez-Hernández, J., S.L. Shaw, F. Cobo, & M.S. Allen. 2016. Influence of a minimum-length limit regulation on wild brown trout: an example of recruitment and growth overfishing. North American Journal of Fisheries Management 36:1024-1035.
Schmalz, P.J., M. Luehring, J.D. Rose, J.M. Hoenig, & M.K. Treml. 2016. Visualizing trade-offs between yield and spawners per recruit as an aid to decision making. North American Journal of Fisheries Management 36:1-10.
Uthe, P., R. Al-Chokhachy, A.V. Zale, B.B. Shepard, T.E. McMahon, & T. Stephens. 2016. Life history characteristics and vital rates of Yellowstone cutthroat trout in two headwater basins. North American Journal of Fisheries Management 36:1240-1253.
Wilson, C.C., A.P. Liskauskas, & K.M. Wozney. 2016. Pronounced genetic structure and site fidelity among native muskellunge populations in Lake Huron and Georgian Bay. Transactions of the American Fisheries Society 145:1290-1302.

Grading & Evaluation: Grades will be calculated as a percentage of the total points possible (e.g., 93-100% = A, 90-92.9% = A-, 88-89.9% = B+, 82-87.9% = B, 80-81.9% = B-, etc). As a general policy, grades on all work are considered final (i.e., they will not be changed) 2 weeks after the work is returned to the student.

Quiz 1	50
Quiz 2	50
Reference Set or Quantitative Method	50
Presentation	50
Facilitations (25 pts. each)	50
Class Participation	50
Assignments (25 pts. each)	150
TOTAL	**450**

Quizzes—The quizzes will be closed book, although a 1-page formula sheet can be used on each. The format of quizzes will be a combination of short answer, essay, and mathematical problems.

Reference Set or Quantitative Method/Presentation—Students will be required to compile an annotated bibliography or teach the class a quantitative method that was not covered in lecture. The *Reference Set* should contains at least 20 references from the primary literature (i.e., journal article) on a topic of their choice related to fisheries management (10 of which must be published

on or after 2010). For each reference, the student should briefly state the purpose of the article and its main findings in 2-4 sentences. At the end of the document, a section on "Areas for Future Research" should identify gaps in the current understanding of the topic and propose studies that could best address these gaps (maximum of 2 pages, double spaced). Your essay will serve as an outline for a more in-depth analysis of the topic that will be presented orally to the class. If you choose to present a *Quantitative Method* relevant to fisheries management, then you should turn in a 2-3 page prospectus (double spaced) discussing the method you will teach the class with citations. You also will be required to turn in your slides from your presentation to the class.

Facilitation—Each student will facilitate at least two class discussions of an article from the primary literature. Discussions of individual papers will last 15-20 min. Discussions will further explore topics covered in lecture and allow students an opportunity to better develop critical thinking skills. In addition to leading the discussion, the facilitator will turn in a typed (≤2 pages single spaced) critical review (covering scientific concepts, methods, and writing style) of the article. The job of the facilitator is to provide a brief (<5 min) overview of the paper (which may include a brief PowerPoint slide presentation highlighting key graphs or tables) and, *more importantly*, generate discussion on the paper. The facilitator should not monopolize the discussion. Additionally, the facilitator should provide appropriate background on the paper, which may require consulting texts or other articles.

Class Participation—This includes involvement in and facilitation of discussions, asking questions during lecture, and contributing to the understanding of concepts. Students are expected to read all papers and prepare for all class discussions.

Assignments—There will be (about) six problem sets due throughout the semester. The likely topics are: Statistics, Abundance Estimation, Estimating Mortality, Estimating Growth, Population Models, and Stock-Recruitment Models. The problem sets will focus on quantitative methods. The goal of these exercises is to provide students an opportunity to apply the techniques and models covered in class. The emphasis of these exercises will be on both mathematical calculations and interpreting results. Problem sets will typically be due 1 week after the topic is covered in class.

Late work: Late assignments will be penalized 5 points/day.

Special Needs: Any student who requires accommodation because of a physical or learning disability must contact Disability Support Resources (www.gvsu.edu/dsr) at 616-331-2490 as soon as possible. After the student has documented their disability, please make an appointment or see the instructor during office hours to discuss the student's specific needs.

Emergency Information: Immediately proceed to the nearest exit during a fire alarm. Do NOT use elevators. Additional emergency information is available at www.gvsu.edu/emergency.

Academic Honesty: Students are expected to follow GVSU's Student Code (www.gvsu.edu/studentcode/).