

OCSC 7400 Fisheries Resource Management

Instructor: Dr. Joe Wroblewski, Dept. Ocean Sciences, Memorial University

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Office hours (by Webex or by synchronous Online Rooms): 1 hr before scheduled class time
Please use jwroblew@mun.ca rather than D2L Brightspace course shell Communications for emailing the instructor.

Course Outline

Course Description:

This Graduate Studies course takes a global view of marine fisheries resource management. The objectives, principles and quantitative theories of fisheries management are reviewed. Classroom discussions include the role of industry, federal and regional governments, and non-governmental organizations (NGOs) in managing living marine resources, both wild stocks and aquacultured species. The course has a special focus on how fishery managers could adjust to the risks associated with anthropogenic climate change.

Evaluation method:

First narrated PowerPoint student presentation	30%
Second narrated PowerPoint student presentation	30%
Assignments (2 calculation problems each worth 20%)	40%

All readings are available online through the D2L Brightspace shell for the course.

Reference Books:

Chalmers, A. 1999. *What Is This Thing Called Science*. 3rd Ed, Hackett Publishing Co., Inc., Indianapolis/Cambridge. 266 p.

Hilborn, R. and C.J. Walters. 1992. *Quantitative Fisheries Stock Assessment: choice, dynamics and uncertainty*. Chapman and Hall, N.Y. 570 p. (2nd Edition published in 2001).

Video narrated Lectures posted asynchronously on Brightspace course shell:

Topic 1:

Global distribution of demersal fish catches, coastal pelagic fish catches, catches of tuna-like fishes and crustacean catches

Atlas of the Living Resources of the Seas. 1972. Prepared by the FAO Department of Fisheries, Rome.

Ryther, J.H. 1969. Photosynthesis and fish production in the sea. *Science* 166: 72-76.

Topic 2:**Present state of the world's fisheries**

Food and Agriculture Organization of the United Nations. Fisheries Department (2020). In Brief: The State of World Fisheries and Aquaculture (FAO, Rome). 28p

Topic 3:**Define “fisheries management, fisheries ecology, fisheries stock assessment”****The difference between fisheries science and fisheries management**

Hardin, G. 1968. The tragedy of the commons. *Science* 162: 1243-1248

Platt, J.R. 1964. Strong inference. *Science* 146: 347-353.

Hilborn and Walters, 1992. Chapters 1 and 2, pages 1-43.

Chalmers, 1999. Chapters 1 and 2.

Topic 4:**Type I errors; Type II errors in fisheries science.**

Dayton, P.K. 1998. Reversal of the burden of proof in fisheries management. *Science* 279: 821 – 822.

Peterman, R.M. 1990. Statistical power analysis can improve fisheries research and management. *Can. J. Fish. Aquat. Sci.* 47: 2-15.

Nielsen, K.N. et al., 2018. A framework for results-based management in fisheries. *Fish and Fisheries* 19: 363-376.

Topic 5:**Define “adaptive management”**

Parma, A.M. et al. 1998. What can adaptive management do for our fish, forests, food and biodiversity? *Integrative Biology*: 16-26.

Hilborn, R. and C. Walters. Chapter 17, pages 487-514.

Define “ecosystem-based fishery management”

Pikitch, E.K. and 16 others. 2004. Ecosystem-based fishery management. *Science* Vol. 305: 346-347.

Public policy and scientific uncertainty

Hilborn, R., J.-J. Maguire, A.M. Parma and A.A. Rosenberg. 2001. The Precautionary Approach

and risk management: can they increase the probability of successes in fishery management? *Can. J. Fish. Aquat. Sci.* 58: 99-107.

Define “risk assessment, decision analysis”

Shelton, P.A. 2007. The weakening role of science in the management of groundfish off the east coast of Canada. *ICES J. Marine Science* 64: 723-729.

Francis, R. and R. Shotton. 1997. “Risk” in fisheries management: a review. *Can. J. Fish. Aquat. Sci.* 54: 1699-1715.

Topic 6:

The role of NGOs in promoting sustainable fisheries and aquaculture

Marine Stewardship Council

Aquaculture Stewardship Council

Topic 7:

Canada’s Fisheries Act

Canada’s proposed Aquaculture Act

Topic 8:

Canada’s Oceans Act

Jessen, S. 2011. A review of Canada’s implementation of the Oceans Act since 1997. *Coastal Management* 39: 1,20-56.

Topic 9:

Canada’s Species at Risk Act

References:

Shank, C.C. 1999. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC): a 21-year retrospective. *Canadian Field-Naturalist* 113: 318-341.

Wade, P.R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. *Marine Mammal Science* 14: 1-37

Topic 10:

Large-scale marine ecosystem domains, fisheries resources and climate change

Belkin, I.M. 2009. Rapid warming of large marine ecosystems. *Progress in Oceanography* 81: 207-213.

Stenseth, N.C., et al. 2002. Ecological effects of climate fluctuations. *Science* 297: 1292-1296

Topic 11:

Implications of natural climate fluctuations for fisheries management

DeYoung, B. and 6 others. 2008. Regime shifts in marine ecosystems: detection, prediction and management. *Trends in Ecology and Evolution* 23(7): 403-409.

Topic 12:

Predicted effect of climate change and ocean acidification on fish and shellfish fisheries production

Drinkwater, K.F. 2005. The response of Atlantic cod (*Gadus morhua*) to future climate change. *ICES Journal of Marine Science* 62: 1327-1337.

Jewett, L. and A. Romanov. 2017. Ocean acidification and other ocean changes. In: *Climate Science Special Report: Fourth National Climate Assessment, Vol. I. US Global Change Research Program*. Washington DC. pp. 364-393.

Pershing, A.J. and 11 other authors. 2015. Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery. *Science* 350: 809-812.

Rheuban, J.E., et al. 2018. Projected impacts of future climate change, ocean acidification, and management on the US Atlantic sea scallop fishery. *PLOS (Public Library of Science) ONE*.

Mills, K. and 10 others. 2013. Fisheries management in a changing climate. *Oceanography* 26: 191-195.

Moore, J. and 9 others. 2018. Sustained climate-warming drives declining marine biological productivity. *Science* 359: 1139-1143.

Richards, R. Anne. 2012. Climate change and northern shrimp recruitment variability in the Gulf of Maine. *Marine Ecology Progress Series* 464: 167-178.

Topic 13:

Evaluating predictions of the impact of climate change on fisheries

UN FAO. 2018. Impacts of climate change on fisheries and aquaculture. Synthesis of current knowledge, adaptation and mitigation options. Technical Paper 627. Rome, Italy

Barange, M. 2019. Avoiding misinterpretation of climate change projections of fish catches. *ICES J. Marine Science*.

Capotondi, A. and 30 others. 2019. Observational needs supporting marine ecosystems modeling and forecasting: from the global ocean to regional and coastal systems. *Frontiers in Marine Science* 6: article 623.

Cheung, W. and 6 others. 2010. Large-scale redistribution of maximum fisheries catch potential in the global ocean under climate change. *Global Change Biology* 16: 24-35.

Hayhoe, K. and 6 others. 2017: Climate models, scenarios, and projections. In: *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 133-160.

Park, J-Y. and 4 others. 2019. Seasonal to multiannual marine ecosystem prediction with a global earth system model. *Science* 365: 284-288.

Classroom etiquette and Memorial Policies relevant to this course:

This classroom provides a safe learning environment to all students, regardless of religious, linguistic and economic backgrounds, lifestyle choices, gender, nationality, physical ability or learning differences.

Memorial University is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities (www.mun.ca/policy/site/policy.php?id=239). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre (www.mun.ca/blundon).

Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.

Land Acknowledgement, Memorial University

We acknowledge that the lands on which Memorial University's campuses are situated are in the traditional territories of diverse Indigenous groups, and we acknowledge with respect the diverse histories and cultures of the Beothuk, Mi'kmaq, Innu, and Inuit of this province.