Controversies in Marine Science , MSL F605P
Spring 2018 1 credit Location: Fishbowl Time: Tuesdays 3-4pm

Instructor: Brenda Konar
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Office Hours: 4-5pm on Wednesdays… if you can't make this time, let me know and we'll make other arrangements

Course Description:
Goal: This course will introduce students to the idea that science is fluid and controversies and disagreements do occur. These disagreements are often published in the primary literature. The general philosophy of doing science will also be discussed.

Instructional methods: The course is a **discussion** of various controversial topics in marine science. Each week, students will read papers involving one specific controversy. Students will informally discuss/debate the various issues around the controversy. At the end of each class session, a general vote will be taken to determine which side had the most compelling arguments.

Student Learning Outcome: Students will learn about controversial issues in marine science and will conduct informal discussions around these topics. These discussions should broaden student knowledge on topical issues and should assist students in their critical thinking about science.

Prerequisites: Graduate standing recommended

Required Books: None. Papers will be supplied electronically and are required reading.

Course policies: Attendance is required. Failure to attend 2 classes without prior instructor approval will result in a failure.

Grading: Pass/Fail
A Fail will result in students being absent for 2 or more seminars. Coming unprepared to seminar (i.e., didn't read the papers or don't participate in discussions) count as an absence. Arrangements can be made ahead of time for extenuating circumstances. If a class is missed, the student must read the papers and summarize them (in a 1-2 page paper) that will be turned into the instructor no more than one week after the class meeting. There is no final exam.

Support and Disability Services:
The Office of Disability Services (203 WHIT 474-7043) implements the Americans with Disabilities Act and insures that UAF students have equal access to the campus and course materials. Students with disabilities can be assured that they will be provided with reasonable accommodation.

Schedule

Date	Topic
Jan 19	**Orientation**
Jan 23	**AMSS**
Jan 30	**Generality vs. heterogeneity in natural ecosystems; the role of keystone species** (26) The Paine 1969 and Estes and Palmisano papers are classics. The others are the controversies.

Paine, RT. 1969. A note on trophic complexity and community stability. The American Naturalist 103:91-93.

Estes JA and JF Palmisano. 1974. Sea otters: Their role in structuring nearshore communities. Science 185:1058-1060.

Foster MS. 1990. Organization of macroalgal assemblages in the Northeast Pacific: the assumption of homogeneity and the illusion of generality. Hydrobiologia 192:21-33.

Paine RT. 1991. Between Scylla and Charybdis: do some kinds of criticism merit a response? Oikos 62:90-92.

Foster MS. 1991. Rammed by the *Exxon Valdez*: a reply to Paine. Oikos 62:93-96.

Feb 6 **Top-down vs. bottom-up forcing in marine ecosystems** (21)

The Merrick paper brings this topic to Alaska. Halpern et al. was the original California paper. The others are the rebuttals and response.

Merrick RL. 1997. Current and historical roles of apex predators in the Bering Sea ecosystem. J. Northw. Atl. Fish. Sci. 22:343-355.

Halpern BS, K Cottenie and BR Broitman. 2006. Strong top-down control in southern California kelp forests. Science 312:1230-1232.

Foster MS, MS Edwards, DC Reed, DR Schiel and RC Zimmerman. 2006. Top-down vs. bottom-up effects in kelp forests. Science 313:1737-1738.

Steele MA, SS Schroeter, RC Carpenter and DJ Kushner. 2006. Top-down vs. bottom-up effects in kelp forests. Science 313:1738.

Halpern BS, K Cottenie and BR Broitman. 2006. Response. Science 313:1738-1739.

Feb 13 **Ocean Sciences…**

The causes and consequences of declines in large marine predators (51)
The Estes et al. paper started this discussion and ultimately the controversy. The Springer et al. 2003 paper really got the controversy going. Read at least two of the three “comment” papers (Trites, Mizroch, and DeMaster). Try to read all three. There were actually more comment papers, these were the shortest.

Estes JA, MT Tinker, TM Williams, DF Doak. 1998. Killer whale predation on sea otters linking oceanic and nearshore ecosystems. Science 282:473-476.

Springer AM, JA Estes, GB vanVliet, TM Williams, DF Doak, EM Danner, KA Forney and B Pfister. 2003. Sequential megafaunal collapse in the North Pacific Ocean: an ongoing legacy of industrial whaling? PNAS 100:12223-12228.

Trites AW, VB Deecke, EJ Gregr, JKB Ford and PF Olesiuk. 2007. Killer whales, whaling, and sequential megafaunal collapse in the North Pacific: a comparative analysis of the dynamics of marine mammals in Alaska and British Columbia following commercial whaling. Marine Mammal Science 23 751-765.

Mizroch SA and DW Rice. 2006. Have North Pacific killer whales switched prey species in response to depletion of the great whale populations. Marine Ecology Progress Series 310:235-246.

DeMaster et al. 2006. The sequential megafaunal collapse hypothesis: Testing with existing data. Progress in Oceanography 68:329-342.

Feb 20 **Continued from last week…** (47)
Springer et al. is a rebuttal to the comments we read last week. Wade et al. is a rebuttal to Springer et al. Finally, Estes et al. is the final published comment on the controversy.

Springer AM, JA Estes, GB vanVliet, TM Williams, DF Doak, EM Danner, KA Forney and B Pfister. 2008. Mammal-eating killer whales, industrial whaling, and the sequential megafaunal collapse in the North Pacific Ocean: a reply to critics of Springer et al 2003. Marine Mammal Science 24:414-442.

Wade PR, JM VerHoef and DP DeMaster. 2009. Mammal-eating killer whales and their prey-trends for pinnipeds and sea otters in the North Pacific Ocean do not support the sequential megafaunal collapse hypothesis. Marine Mammal Science 25:737-747.

Estes JA, DF Doak, Springer AM, TM Williams, GB vanVliet. 2009. Trend data do support the sequential nature of pinniped and sea otter declines in the North Pacific ocean, but does it really matter? Marine Mammal Science 25:748-754.

Feb 27 **Serendipity… what one scientist learned the hard way….**

Mar 6 **Over fishing and its causes and consequences** (21)

Yodzis is food for thought. Worm et al. was the paper that started the discussions. The rest are the controversy. The Stokstad is a truce (of sort).

Yodzis P. 2001. Must top predators be culled for the sake of fisheries? Trends in Ecology and Evolution 16:78-84.

Worm B, EB Barbier, N Beaumont, JE Duffy, C Folke, BS Halpern, JBC Jackson, HK Lotze, M Fiorenza, SR Palumbi, E Sala, KA Selkoe, JJ Stachowicz and R Watson. 2006. Impacts on biodiversity loss on ocean ecosystems services. Science 314:787-790.

Jaenike J. 2007. Comment on ‘Impacts of biodiversity loss on ocean ecosystem services”. Science 316:1285.

Wilberg MJ and TJ Miller. 2007. Comment on ‘Impacts of biodiversity loss on ocean ecosystem services”. Science 316:1285.

Longhurst A. 2007. Doubt and certainty in fishery science: Are we really headed for a global collapse of stocks? Fisheries Research 86:1-5.

Worm B, EB Barbier, N Beaumont, JE Duffy, C Folke, BS Halpern, JBC Jackson, HK Lotze, M Fiorenza, SR Palumbi, E Sala, KA Selkoe, JJ Stachowicz and R Watson. 2007. Response to comments on ‘Impacts of biodiversity loss on ocean ecosystem services”. Science 316:1285.

Stokstad E. 2009. Détente in the Fisheries War. Science 324:170-171.

Mar 13 **Spring Break**

Mar 20 **Faith Based Fisheries** (25)

This is an interesting discussion on faith-based research… i.e., no real data. It also includes the on-going debate on the decline of large predatory species.

Hilborn R. 2006. Faith-based fisheries. Fisheries 31:554-555.

Myers RA and B Worm. 2003. Rapid worldwide depletion of predatory fish communities. Nature 423:280-283.

Walters CJ. 2003. Folly and fantasy in the analysis of spatial catch rate data. Canadian Journal of Fisheries and Aquatic Science 60:1433-1436.

Hampton J, JR.Sibert, P Kleiber, MN Maunder and SJ Harley. 2005. Decline of Pacific tuna populations exaggerated? Nature 434:E1-E2.

Polacheck T. 2006. Tuna longline catch rates in the Indian Ocean: did industrial fishing result in a 90% rapid decline in the abundance of large predatory species? Marine Policy 30:470-482.

Mar 27 **Climate change vs. "hidden" factors such as celestial movements** (15)

The Barry et al. paper was a very hot topic when it came out. It was one of the first to propose climate change impacting intertidal communities. Then came Denny and Paine and this took some of the wind out of Barry et al. How does this relate to what Sanford has shown?

Barry JP, CH Baxter, Rd Sagarin and SE Gilman. 1995. Climate-related, long-term faunal changes in a California rocky intertidal community. Science 267:672-675.

Denny MW and RT Paine. 1998. Celestial mechanics, sea-level changes, and intertidal ecology. Biological Bulletin 194:108-115.

Sanford E. 1999. Regulation of keystone predation by small changes in ocean temperature. Science 283:2095-2097.

Apr 3 **Climate change effects on marine mammals** (41)

There are two other papers that began this discussion but we will just start with the actual debate because of length of papers.

Dyke, MG, W Soon, RK Baydack, DR Legates, S Baliunas, TF Ball and LO Hancock. 2007. Polar bears of western Hudson Bay and climate change: Are warming spring air temperatures the "ultimate" survival control factor? Ecological Complexity 4:73-84.

Stirling, I, AE Derocher, WA Gough and K Rode. 2008. Response to Dyke et al (2007) on polar bears and climate change in western Hudson Bay. Ecological Complexity 5: 193-201.

Dyke, MG, W Soon, RK Baydack, DR Legates, S Baliunas, TF Ball and LO Hancock. 2008. Reply to response to Dyke et al (2007) on polar bears and climate change in western Hudson Bay by Stirling et al (2008). Ecological Complexity 5:289-302.

Stirling I and AE Deroucher. 2007. Melting under pressure. The real scoop on climate warming and polar bears. The Wildlife Professional Fall.

Apr 10 **Assisted Migrations** (23)

This is an interesting debate that extends beyond the marine systems. Should we assist Mother Nature?

Minteer BA and JP Collins. 2010. Move it or lose it? The ecological ethics of relocating species under climate change. Ecol. Appl. 20:1801-1804.

McLachlan JS, JJ Hellmann and MW Schwartz. 2007. A framework for debate of assisted migration in an era of climate change. Conservation Biology 21:297-302.

Hoegh-Guldberg O, L Hughes, S McIntyre, DB Lindenmayer, C Parmesan, HP Possingham and CD Thomas. 2008. Assisted colonization and rapid climate change. Science 321:345-346.

Richardson DM, et al. 2009. Multidimensional evaluation of managed relocation. Proceedings of the National Academy of Sciences USA 106:9721-9724.

Sax DF, KF Smith and AR Thompson. 2009. Managed relocation: a nuanced evaluation is needed. Trends in Ecology and Evolution 24:472-473.

Schlaepfer MA, WD Helenbrook, KB Searing and KT Shoemaker. 2009. Assisted colonization: evaluating contrasting management actions (and values) in the face of uncertainty. Trends in Ecology and Evolution 24:471-472.

Davidson I and C Simkanin. 2008. Skeptical of assisted colonization. Science 322:1048-1049.

Ricciardi A and D Simberloff. 2009. Assisted colonization is not a viable conservation strategy. Trends in Ecology and Evolution 24:248-253.

Apr 1 **The New Conservation** (32)

Soule 1985 is the background and sets the scene. Kareiva and Marvier revisit the topic and then the debate begins.

Soule ME. 1985. What is conservation biology? BioScience 35:727-734.

Kareiva P and M Marvier. 2012. What is conservation science? BioScience 62:962-969.

Greenwald N, DA Dellasala and JW Terborgh. 2013. Nothing new in Kareiva and Marvier. BioScience 63: 241

Soule M. 2013. The “New Conservation”. Conservation Biology 27:895-897.

Kareiva P. 2014. New Conservation: Setting the record straight and finding common ground. Conservation Biology 1-3

Soule M. 2014. Also seeking common ground in conservation Conservation Biology 1-2

Miller B, ME Soule and J Terborgh. 2014. “New conservation” or surrender to development. Animal Conservation 17:509-515.

Apr 24 **Tolerance in Marine Ecology** (16)

This will be a general discussion and course wrap-up.

Arntz WE and JM Gili. 2001. A case for tolerance in marine ecology: let us not put out the baby with the bathwater. Scientia Marina 65:283-299.