*Course Material*

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| Date |  | Module | Topic | Reading I | Reading II | Leader I | Leader II |
| 6-Jan | W | Overview | Introduction | Syllabus | None | None | None |
| 11-Jan | M |  | The climate system and ongoing changes in climate | Williams et al. 2007 PNAS | Dobrowski et al. 2013 | Liz | Dan |
| 13-Jan | W |  | Climate change and biodiversity | Thomas et al. 2004 | Sala et al. 2000 | Irene | Zachary |
| 18-Jan | M |  | MLK Jr. Holiday |  |  |  |  |
| 20-Jan | W |  | Climate & Extinction in Deep Time | Crowley & North 1988 | Svensen et al. 2009 | Dan | Dylan |
| 25-Jan | M | Abiotic Interactions | Thermal Tolerances | Duetsch et al. 2008 | Khaliq et al. 2014 | Rachel D. | Sydney |
| 27-Jan | W |  | Bioclimatic envelope modeling | Cordellier et al. 2012 | Reside et al. 2012 | Corrina | Catrina |
| 1-Feb | M |  | Fundamental v. realized niche, equilibrum, and niche tracking | Schloss et al. 2012 | Tingley et al. 2009 | Sydney | Rachel D. |
| 3-Feb | W | Biotic Interactions | Biotic interactions I: Direct effects | Duggins and Dethier 1985 | Palmer et al. 2008 | Lauren A. | Lauren K. |
| 8-Feb | M |  | Biotic interactions II: Indirect effects | Terborgh et al. 2001 | Wittmer et al. 2005 | Daniella | Liz |
| 10-Feb | W |  | Climate change and biotic interactions I | Milazzo et al. 2013 | Rockwell et al. 2011 | Rachel R. | Zach |
| 15-Feb | M |  | Climate change and biotic interactions II | None | Harley et al. 2011 | None | Rachel M. |
| 17-Feb | W |  | Incorporating biotic interactions into species distribution models | Cormont et al. 2013 | Hof, Jansson, Nilsson 2012 | Andrew | McKenzi |
| 22-Feb | M |  | Elevational Gradients as study systems | Colwell et al. 2008 | None | Andrew | None |
| 24-Feb | W |  | Exam (In class) | None | None | None | None |
| 29-Feb | M |  | UM Break |  |  |  |  |
| 2-Mar | W |  | UM Break |  |  |  |  |
| 7-Mar | M | Extinction Risk & Conservation | Extinction in the Anthropocene | Hoffmann et al. 2010 | None | Carina | None |
| 9-Mar | W |  | Climate change and extinction in the Anthropocene | None | Munday 2004 | None | Erin |
| 14-Mar | M |  | Multiple extinction threats | Hof et al. 2011 | None | Chau | None |
| 16-Mar | W |  | Connectivity, Restoration, Assisted Migration | Willis et al. 2009 | None | Joe | None |
| 21-Mar | M |  | Multi-nation conservation planning | None | Hole et al. 2009 | None | Mayank |
| 23-Mar | W |  | Precautionary principle | Struebig et al. 2015 | Tingley et al. 2012 | Swapna | Mayank |
| 28-Mar | M |  | Guest Speaker, Dr. Nina Lany, Postdoctoral Fellow, Michigan State University, "Temperature and predator-prey interactions" | Culler et al. 2015 | None |  |  |
| 30-Mar | W |  | Scientific writing and presentations | None | None |  |  |
| 4-Apr | M |  | Student Presentations (15 minutes each) | None | None | None | None |
| 6-Apr | W |  | Student Presentations (15 minutes each) | None | None | None | None |
| 11-Apr | M |  | Student Presentations (15 minutes each) | None | None | None | None |
| 13-Apr | W |  | Student Presentations (15 minutes each) | None | None | None | None |
| 4/18/16 | M |  | Student Presentations (15 minutes each) | None | None | None | None |

**Reading List**

Burkhead, N. M. 2012. Extinction Rates in North American Freshwater Fishes, 1900-2010 (vol 62, pg 798, 2012). Bioscience **62**:933-933.

Colwell, R. K., G. Brehm, C. L. Cardelus, A. C. Gilman, and J. T. Longino. 2008. Global warming, elevational range shifts, and lowland biotic attrition in the wet tropics. Science **322**:258-261.

Cordellier, M., A. Pfenninger, B. Streit, and M. Pfenninger. 2012. Assessing the effects of climate change on the distribution of pulmonate freshwater snail biodiversity. Marine Biology **159**:2519-2531.

Cormont, A., G. W. W. Wamelink, R. Jochem, M. F. WallisDeVries, and R. M. A. Wegman. 2013. Host plant-mediated effects of climate change on the occurrence of the Alcon blue butterfly (Phengaris alcon). Ecological Modelling **250**:329-337.

Crowley, T. J., and G. R. North. 1988. Abrupt Climate Change and Extinction Events in Earth History. Science **240**:996-1002.

Deutsch, C. A., J. J. Tewksbury, R. B. Huey, K. S. Sheldon, C. K. Ghalambor, D. C. Haak, and P. R. Martin. 2008. Impacts of climate warming on terrestrial ectotherms across latitude. Proceedings of the National Academy of Sciences of the United States of America **105**:6668-6672.

Dobrowski, S. Z., J. Abatzoglou, A. K. Swanson, J. A. Greenberg, A. R. Mynsberge, Z. A. Holden, and M. K. Schwartz. 2013. The climate velocity of the contiguous United States during the 20th century. Global Change Biology **19**:241-251.

Duggins, D. O., and M. N. Dethier. 1985. Experimental Studies of Herbivory and Algal Competition in a Low Intertidal Habitat. Oecologia **67**:183-191.

Durance, I., and S. J. Ormerod. 2010. Evidence for the role of climate in the local extinction of a cool-water triclad. Journal of the North American Benthological Society **29**:1367-1378.

Harley, C. D. G. 2011. Climate Change, Keystone Predation, and Biodiversity Loss. Science **334**:1124-1127.

Hof, A. R., R. Jansson, and C. Nilsson. 2012. Future Climate Change Will Favour Non-Specialist Mammals in the (Sub)Arctics. Plos One **7**.

Hof, C., M. B. Araujo, W. Jetz, and C. Rahbek. 2011. Additive threats from pathogens, climate and land-use change for global amphibian diversity. Nature **480**:516-U137.

Hoffmann, M., C. Hilton-Taylor, A. Angulo, M. Bohm, T. M. Brooks, et al. 2010. The Impact of Conservation on the Status of the World's Vertebrates. Science **330**:1503-1509.

Hole, D. G., S. G. Willis, D. J. Pain, L. D. Fishpool, S. H. M. Butchart, Y. C. Collingham, C. Rahbek, and B. Huntley. 2009. Projected impacts of climate change on a continent-wide protected area network. Ecology Letters **12**:420-431.

Kark, S., N. Levin, H. S. Grantham, and H. P. Possingham. 2009. Between-country collaboration and consideration of costs increase conservation planning efficiency in the Mediterranean Basin. Proceedings of the National Academy of Sciences of the United States of America **106**:15368-15373.

Khaliq, I., C. Hof, R. Prinzinger, K. Bohning-Gaese, and M. Pfenninger. 2014. Global variation in thermal tolerances and vulnerability of endotherms to climate change. Proceedings of the Royal Society B-Biological Sciences **281**.

Kratina, P., H. S. Greig, P. L. Thompson, T. S. A. Carvalho-Pereira, and J. B. Shurin. 2012. Warming modifies trophic cascades and eutrophication in experimental freshwater communities. Ecology **93**:1421-1430.

Mantyka-Pringle, C. S., T. G. Martin, and J. R. Rhodes. 2012. Interactions between climate and habitat loss effects on biodiversity: a systematic review and meta-analysis. Global Change Biology **18**:1239-1252.

Milazzo, M., S. Mirto, P. Domenici, and M. Gristina. 2013. Climate change exacerbates interspecific interactions in sympatric coastal fishes. Journal of Animal Ecology **82**:468-477.

Moritz, C., J. L. Patton, C. J. Conroy, J. L. Parra, G. C. White, and S. R. Beissinger. 2008. Impact of a century of climate change on small-mammal communities in Yosemite National Park, USA. Science **322**:261-264.

Munday, P. L. 2004. Habitat loss, resource specialization, and extinction on coral reefs. Global Change Biology **10**:1642-1647.

Nunez, T. A., J. J. Lawler, B. H. Mcrae, D. J. Pierce, M. B. Krosby, D. M. Kavanagh, P. H. Singleton, and J. J. Tewksbury. 2013. Connectivity Planning to Address Climate Change. Conservation Biology **27**:407-416.

Palmer, T. M., M. L. Stanton, T. P. Young, J. R. Goheen, R. M. Pringle, and R. Karban. 2008. Breakdown of an ant-plant mutualism follows the loss of large herbivores from an African Savanna. Science **319**:192-195.

Reside, A. E., J. VanDerWal, and A. S. Kutt. 2012. Projected changes in distributions of Australian tropical savanna birds under climate change using three dispersal scenarios. Ecology and Evolution **2**:705-718.

Rockwell, R. F., L. J. Gormezano, and D. N. Koons. 2011. Trophic matches and mismatches: can polar bears reduce the abundance of nesting snow geese in western Hudson Bay? Oikos **120**:696-709.

Sala, O. E., F. S. Chapin, J. J. Armesto, E. Berlow, J. Bloomfield, R. Dirzo, E. Huber-Sanwald, L. F. Huenneke, R. B. Jackson, A. Kinzig, R. Leemans, D. M. Lodge, H. A. Mooney, M. Oesterheld, N. L. Poff, M. T. Sykes, B. H. Walker, M. Walker, and D. H. Wall. 2000. Biodiversity - Global biodiversity scenarios for the year 2100. Science **287**:1770-1774.

Schloss, C. A., T. A. Nunez, and J. J. Lawler. 2012. Dispersal will limit ability of mammals to track climate change in the Western Hemisphere. Proceedings of the National Academy of Sciences **109**:8606-8611.

Struebig, M. J., A. Wilting, D. L. A. Gaveau, E. Meijaard, R. J. Smith, M. Fischer, K. Metcalfe, S. Kramer-Schadt, and B. M. D. Consort. 2015. Targeted Conservation to Safeguard a Biodiversity Hotspot from Climate and Land-Cover Change (vol 25, pg 372, 2015). Current Biology **25**:678-678.

Svensen, H., S. Planke, A. G. Polozov, N. Schmidbauer, F. Corfu, Y. Y. Podladchikov, and B. Jamtveit. 2009. Siberian gas venting and the end-Permian environmental crisis. Earth and Planetary Science Letters **277**:490-500.

Terborgh, J., L. Lopez, P. Nunez, M. Rao, G. Shahabuddin, G. Orihuela, M. Riveros, R. Ascanio, G. H. Adler, T. D. Lambert, and L. Balbas. 2001. Ecological meltdown in predator-free forest fragments. Science **294**:1923-1926.

Thomas, C. D., A. Cameron, R. E. Green, M. Bakkenes, L. J. Beaumont, Y. C. Collingham, B. F. N. Erasmus, M. F. de Siqueira, A. Grainger, L. Hannah, L. Hughes, B. Huntley, A. S. van Jaarsveld, G. F. Midgley, L. Miles, M. A. Ortega-Huerta, A. T. Peterson, O. L. Phillips, and S. E. Williams. 2004. Extinction risk from climate change. Nature **427**:145-148.

Tingley, M. W., L. D. Estes, and D. S. Wilcove. 2013. Climate change must not blow conservation off course. Nature **500**:271-272.

Tingley, M. W., W. B. Monahan, S. R. Beissinger, and C. Moritz. 2009. Birds track their Grinnellian niche through a century of climate change. Proceedings of the National Academy of Sciences of the United States of America **106**:19637-19643.

Williams, J. W., S. T. Jackson, and J. E. Kutzbacht. 2007. Projected distributions of novel and disappearing climates by 2100 AD. Proceedings of the National Academy of Sciences of the United States of America **104**:5738-5742.

Willis, S. G., J. K. Hill, C. D. Thomas, D. B. Roy, R. Fox, D. S. Blakeley, and B. Huntley. 2009. Assisted colonization in a changing climate: a test-study using two UK butterflies. Conservation Letters **2**:45-51.

Wittmer, H. U., A. R. E. Sinclair, and B. N. McLellan. 2005. The role of predation in the decline and extirpation of woodland caribou. Oecologia **144**:257-267.