

Conservation Ecology, 11:216:317  
Wednesdays 9:15-12:15, 123 ENR  
3 credits, SEBS/SAS Core Curriculum, 21st Century Challenges, Writing and  
Communication  
Professor Rachael Winfree  
128 ENR, rwinfree@rutgers.edu

## SYLLABUS SPRING 2018

**1, jan 17 course intro / lecture: biodiversity**  
no readings

**2, jan 24 biodiversity / lecture: ecosystem function and services**  
readings: 54 pages

Soulé, Michael E. 1985. "What is Conservation Biology?" *BioScience* 35: 727-734

May, Robert M. 1992. "How many species inhabit the Earth?" *Scientific American*,  
October 1992, 18-24

O'Neill, John P., Daniel F. Lane, Andrew W. Kratter, Angelo P. Capparella, and Fox Joo  
Cecilia. 2000. "A Striking New Species of Barbet (Capitoninae: Capito) from the Eastern  
Andes of Peru." *The Auk* 117 (3): 569-577

Hunter, Malcolm L. and Sara L. Webb. 2002. "Enlisting Taxonomists to Survey Poorly  
Known Taxa for Biodiversity Conservation: A Lichen Case Study." *Conservation Biology*  
16 (3): 660-665

Kareiva, Peter and Michelle Marvier. 2012. "What is Conservation Science?" *Bioscience*  
62 (11): 962-969.

Costello, Mark J., Robert May and Nigel E. Stork. 2013. "Can we name Earth's species  
before they go extinct?" *Science* 339: 413-416

Harrison, T., Jason Gibbs and Rachael Winfree, 2017. "Anthropogenic landscapes  
support fewer rare bee species." *Landscape Ecology*, 1-12.

**3, jan 31 ecosystem function and services / lecture: habitat loss**  
readings: 44 pages

Balmford, Andrew, Aaron Bruner, Philip Cooper, Robert Costanza, Stephen Farber,

Rhys E. Green, Martin Jenkins, et al. 2002. "Economic Reasons for Conserving Wild Nature." *Science* 297 (5583): 950-953

Elmqvist, Thomas, Carl Folke, Magnus Nyström, Garry Peterson, Jan Bengtsson, Brian Walker, and Jon Norberg. 2003. "Response diversity, ecosystem change, and resilience." *Frontiers in Ecology and the Environment* 1, no. 9: 488-494

Bateman, Ian J., Amii R. Harwood, Georgina M. Mace, Robert T. Watson, David J. Abson, Barnaby Andrews, Amy Binner, et al. 2013. "Bringing Ecosystem Services into Economic Decision-Making: Land use in the United Kingdom." *Science* 341 (6141): 45-50

Kleijn, David, Rachael Winfree, Ignasi Bartomeus, Lusa G. Carvalheiro, et al. 2015. "Delivery of Crop Pollination Services is an Insufficient Argument for Wild Pollinator Conservation." *Nature Communications* 6: 1-8

Chang, Junning, William S. Symes, Felix Lim, and L. R. Carrasco. 2016. "International Trade Causes Large Net Economic Losses in Tropical Countries Via the Destruction of Ecosystem Services." *Ambio* 45 (4): 387-397

Naidoo, Robin, Brendan Fisher, Andrea Manica, and Andrew Balmford. 2016. "Estimating Economic Losses to Tourism in Africa from the Illegal Killing of Elephants." *Nature Communications* 7: 13379

#### **4, feb 7 habitat loss / lecture: overharvesting**

readings: 86 pages

Diamond, Jared M. 1975. "The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Reserves." *Biological Conservation* 7 (2): 129-146

Wilson, E. O. and E. O. Willis. 1975. "Applied Biogeography." In *Ecology and Evolution of Communities*, edited by M. L. Cody and J. M. Diamond, 522-534. Cambridge, MA, USA: The Belknap Press

Diamond, Jared M., John Terborgh, Robert F. Whitcomb, James F. Lynch, Paul A. Opler, Chandler S. Robbins, Daniel S. Simberloff, and Lawrence G. Abele. 1976. "Island Biogeography and Conservation: Strategy and Limitations." *Science* 193 (4257): 1027-1032

Robinson, Scott K., Frank R. Thompson, Therese M. Donovan, Donald R. Whitehead, and John Faaborg. 1995. "Regional Forest Fragmentation and the Nesting Success of Migratory Birds." *Science* 267 (5206): 1987-1990

Hanski, Ilkka. 1998. "Metapopulation Dynamics." *Nature* 396 (6706): 41-49.

Terborgh, J., L. Lopez, P. Nunez, M. Rao, G. Shahabuddin, G. Orihuela, M. Riveros, et al. 2001. "Ecological Meltdown in Predator-Free Forest Fragments." *Science* (New York, N.Y.) 294 (5548): 1923-1926

Levey, Douglas J., Benjamin M. Bolker, Joshua J. Tewksbury, Sarah Sargent, and Nick M. Haddad. 2005. "Effects of Landscape Corridors on Seed Dispersal by Birds." *Science* 309 (5731): 146-148

Wright, S. Joseph and Helene C. Muller-Landau. 2006. "The future of tropical forest species." *Biotropica* 38(3), 287-301

Moore, R. P., W. D. Robinson, I. J. Lovette, and T. R. Robinson. 2008. "Experimental Evidence for Extreme Dispersal Limitation in Tropical Forest Birds." *Ecology Letters* 11 (9): 960-968.

DeFries, Ruth S., Thomas Rudel, Maria Uriarte, and Matthew Hansen. 2010. "Deforestation Driven by Urban Population Growth and Agricultural Trade in the Twenty-First Century." *Nature Geosci* 3 (3): 178-181.

Estes, James A., John Terborgh, Justin S. Brashares, Mary E. Power, Joel Berger, William J. Bond, Stephen R. Carpenter, et al. 2011. "Trophic Downgrading of Planet Earth." *Science* 333 (6040): 301

## **5, feb 14 overharvesting / lecture: invasive species**

readings: 25 pages

**1-PAGE TOPIC FOR RESEARCH PAPER DUE - bring printed to class**

Redford, Kent H. 1992. "The empty forest." *Bioscience* 42(6): 412-422

Pauly, Daniel, Villy Christensen, Johanne Dalsgaard, Rainer Froese, and Transisco Torres Jr. 1998. "Fishing down marine food webs." *Science* 279: 860-863

Brashares, Justin S., Peter Arcese, Moses K. Sam, Peter B. Coppolillo, A. R. E. Sinclair, and Andrew Balmford. 2004. "Bushmeat Hunting, Wildlife Declines, and Fish Supply in West Africa." *Science* 306 (5699): 1180.

Myers, Ransome A., et al., 2007. "Cascading effects of the loss of apex predatory sharks from a coastal ocean." *Science* 315: 1846-1850

Golden, Christopher D., Lia C. H. Fernald, Justin S. Brashares, B. J. Rodolph Rasolofoniaina, and Claire Kremen. 2011. "Benefits of Wildlife Consumption to Child Nutrition in a Biodiversity Hotspot." *Proceedings of the National Academy of Sciences* 108 (49): 19653-19656

**6, feb 21 invasive species / lecture: extinction** (for 2 weeks from now)

readings: 21 pages

"Biological invasion," S. Lowe, et al., *Aliens* 12, 3-11, Dec., 2000.

"The Galápagos Islands kiss their goat problem goodbye," Jerry Guo (I), *Science* 313: 1567, 2006

"Cane toad invasion: ugly, but not so bad," W. Zukerman, *New Scientist* 207 (No. 2777): 18, 11 Sept. 2010

"Don't judge species on their origins," M. Davis, et al., *Nature* 474, 153-154, 2011

Correspondence (Simberloff; Lockwood; Wickham), *Nature* 475, 36-37, 2011

"The 18-km<sup>2</sup> rat trap," H. Nicholls, *Nature* 497, 306-308, 2013.

"Forest management plans in a tangle," D. Venton, *Nature* 501, 15, 2013.

**7, feb 28 climate change / lecture: climate change**

*Guest lecturer, Dr Mark Genung*

*readings: 29 (+ Economist readings) pages*

Jankowski, Jill E., Scott K. Robinson, and Douglas J. Levey. 2010. "Squeezed at the Top: Interspecific Aggression may Constrain Elevational Ranges in Tropical Birds." *Ecology* 91 (7): 1877-1884

Turner, Will R., Bethany A. Bradley, Lyndon D. Estes, David G. Hole, Michael Oppenheimer, and David S. Wilcove. 2010. "Climate Change: Helping Nature Survive the Human Response." *Conservation Letters* 3 (5): 304-312

"Cool it," S. Battersby, *New Scientist* 215, 31-35, 2012.

Palumbi, S. R., D. J. Barshis, N. Traylor-Knowles, and R. A. Bay. 2014. "Mechanisms of Reef Coral Resistance to Future Climate Change." *Science* (New York, N.Y.) 344 (6186): 895-898.

"Bumblebees aren't keeping up with a warming planet," C. Carswell, *Science* 349, 126-127, 2015.

"Relocation risky for bumblebee colonies." J.D. Lozier, S.A. Cameron M.A. Duennes, J.P. Stranfe, P.H. Williams, P. Goulson, M.J.F. Brown, C. Morales and S. Jepsen, Science 350, 286-287, 2015.

recent articles from The Economist

12 sept 2017, the dalai lama's planet

25 oct 2017, scott pruit seeks to weaken independent scientific review at EPA

4 nov 2017, once considered a boon to democracy, social media

2 nov 2017, climate change lawsuits

16 nov 2017, negative emissions technology

16 nov 2017, sucking up carbon: greenhouse gases must be scrubbed from the air

16 nov 2017, calculating behavior: the EPA

## **8, mar 7 extinction / lecture: human population growth, food, and energy**

readings: 33 pages

**MIDTERM PAPER DUE - upload to Sakai, Assignments folder by 11:59pm**

"Circling in on a vulture killer," F. Proffitt and P. Bagla, Science 306: 223, 2004.

"Last days of the locust," S. Levy, New Scientist 181, 21 Feb. 2004, 48-49.

"A question of breeding," Editorial, Nature 449: 6 Sept. 2007, 2.

"Parasites from fish farms driving wild salmon to extinction," E. Stokstad, Science 318, 1711, 2007.

"Year of the tiger," J. Guo (II), Nature 449: 6 Sept. 2007, 16-18.

Barnosky, Anthony D., et al. 2011. "Has the Earth's sixth mass extinction already arrived?" Nature 471: 51-57

"Plight of the bumblebee," A. King, New Scientist 215, 42-45, Aug. 11, 2012.

"Polar bears are in trouble - and ice melt's not the half of it," C. Dybas, BioScience 62 (12), 1014-1018, 2012.

Ceballos, Gerardo, Paul R Erlich and Rodolfo Dirzo. 2017. "Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines." PNAS 114(30): E6089-E6096

**mar 14 NO CLASS SPRING BREAK**

**9, mar 21 human population growth, food, and energy / lecture: conservation practice**

readings: 120 pages (16 population, 51 food, 53 energy)

**Human Population Growth**

Vitousek, Peter M., Harold A Mooney, Jane Lubochenco, and Jerry M. Melillo. 1997. "Human domination of Earth's ecosystems." *Science* 277: 494-499

"Planet and population," Sir David Attenborough, Population Press, <http://www.populationpress.org/> Spring 2011, 6 pgs

"China ends one-child policy after 35 years," T. Phillips, *The Guardian*, Oct. 29, 2015, 4 pgs.

**Food**

Genes From the Wild: Using Wild Genetic Resources For Food and Raw Materials, R. and C. Prescott-Allen. 1983. (London: Earthscan (International Institute for Environment and Development), 9-20, 71-73.

"The evolution of insecticide resistance: Have the insects won? J. Mallet, *Trends in Ecology and Evolution* 4: 336-340, 1989.

"New antibiotics and new resistance," C.F. Amábile-Cuevas, *Am. Scientist* 91: 138-149, 2003.

"The DNA era," R.C. Lewontin, *GeneWatch* 16: 3-7, 2003.

"Concentration of agricultural markets," Mary Hendrickson and William Heffernan, Dept. Rural Sociology, Univ. of Missouri/Columbia, 2007. + 2011 update.  
[HendricksonM@missouri.edu](mailto:HendricksonM@missouri.edu)

"Emerging conflicts between biodiversity conservation laws and scientific research: the case of the Czech entomologists in India," D. Kothamasi and E.T. Kiers, *Cons. Biology* 23(5): 1328-1330, 2009.

"How to get even with pests," Lindsay A. Turnbull and Andy Hector, *Nature* 466: 36-37, 2010.

"Closed-source crops," Paul Salopek, *Conservation*, Summer 2011: 18-25.

"The next dust bowl," Joseph Romm, *Nature* 478: 450-451, 2011.

"Silent spring," R. Dunn, *Nature* 485, 578-579, 2012.

"Get pigs off antibiotics," F. Aarestrup, *Nature* 486, 465, 2012.

"War on weeds loses ground," H. Thompson, *Nature* 485, 430, 2012.

"Supreme Court rules out patents on 'natural' genes," E. Marshall, *Science* 340: 1387-88, 21 June, 2013.

"The trouble with neonicotinoids," F. Sanchez-Bayo, *Science* 346, 806, 2014.

Hendrickson, M.K., Howard, P.H. and Constance, D.H. 2017. "Power, Food and Agriculture: Implications for Farmers, Consumers and Communities." University of Missouri, College of Agriculture, Food & Natural Resources, Division of Applied Social Sciences Working Paper: 14-32.

## **Energy**

"Forgotten fundamentals of the energy crisis," A.A. Bartlett, *Am. J. Physics* 46, 876-888, 1978.

"Normal Accidents: Living with High-Risk Technologies," C. Perrow Princeton University Press, 3-12, 84-89, 1999.

"The end of cheap coal," R. Heinberg II and D. Fridley, *Nature* 468: 367-369, 2010.

"Concerns over nuclear energy are legitimate," C. Macilwain, *Nature* 471, 549, 2011.

"Global energy: The latest infatuations," Vaclav Smil, *American Scientist* 99: 212-219, 2011.

*Green Illusions*, O. Zehner, U. Nebraska Press, 7-28, 2012.

## **10, mar 28 conservation practice / lecture: restoration & conservation in human-dominated habitats**

readings: 74 pages

**1-PAGE PROGRESS REPORT ON RESEARCH PAPER DUE - bring printed to class**

Terborgh, John. 1974. "Preservation of Natural Diversity: The Problem of Extinction Prone Species." *Bioscience* 24 (12): 715-722

Prendergast, J. R., R. M. Quinn, J. H. Lawton, B. C. Eversham, and D. W. Gibbons. 1993. "Rare Species, the Coincidence of Diversity Hotspots and Conservation Strategies." *Nature* 365 (6444): 335-337

Weimerskirch, Henri, Nigel Brothers, and P. Jouventin. 1997. "Population Dynamics of

Wandering Albatross *Diomedea Exulans* and Amsterdam Albatross *D. Amsterdamensis* in the Indian Ocean and their Relationships with Long-Line Fisheries: Conservation Implications." *Biological Conservation* 79 (2): 257-270

Ando, Amy, Jeffrey Camm, Stephen Polasky, and Andrew Solow. 1998. "Species Distributions, Land Values, and Efficient Conservation." *Science* 279: 2126-2128

Wilcove, David S. and Linus Y. Chen. 1998. "Management Costs for Endangered Species." *Conservation Biology* 12 (6): 1405-1407

Margules, C. R. and R. L. Pressey. 2000. "Systematic Conservation Planning." *Nature* 405 (6783): 243-253

Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. da Fonseca, and J. Kent. 2000. "Biodiversity Hotspots for Conservation Priorities." *Nature* 403 (6772): 853-858

Hoekstra, Jonathan M., Timothy M. Boucher, Taylor H. Ricketts, and Carter Roberts. 2005. "Confronting a biome crisis: global disparities of habitat loss and protection." *Ecology Letters* 8: 23-29.

Orme, C. D., Richard G. Davies, Malcolm Burgess, Felix Eigenbrod, Nicola Pickup, Valerie A. Olson, Andrea J. Webster, et al. 2005. "Global Hotspots of Species Richness are Not Congruent with Endemism Or Threat." *Nature* 436 (7053): 1016-1019

Watson, James E.M., Nigel Dudley, Daniel B. Segan, and Marc Hockings. 2014. "The performance and potential of protected areas." *Nature* 515: 67-73

Green, Jonathan M. H., Siriya Sripanomyom, Xingli Giam, and David S. Wilcove. 2015. "The Ecology and Economics of Shorebird Conservation in a Tropical Human-Modified Landscape." *Journal of Applied Ecology* 52 (6): 1483-1491

#### **11, apr 4 restoration & conservation in human-dominated habitats / lecture: human culture & ideas**

readings: 88 pages

Soulé, Michael and Reed Noss. 1998. "Rewilding and Biodiversity: Complementary Goals for Continental Conservation." *Wild Earth* 8: 18-28

Balmford, Andrew, Joslin L. Moore, Thomas Brooks, Neil Burgess, Louis A. Hansen, Paul Williams, and Carsten Rahbek. 2001. "Conservation Conflicts Across Africa." *Science* 291 (5513): 2616-2619

"Restoring wetland habitats with cows and other livestock," J. Tesauro, *Cons. Biol. in Practice* 2: 26-30, 2001.



Green, Rhys E., Stephen J. Cornell, Jrn P. W. Scharlemann, and Andrew Balmford. 2005. "Farming and the Fate of Wild Nature." *Science* 307 (5709): 550-555

"Re-wilding North America," J. Donlan et al., *Nature* 436, 913-14, 2005; letters (C. Smith; G. Chapron; S. Shay; E. Dinerstein; M. Schlaepfer) *Nature* 437: 15, 22 Sept., 13 Oct., 2005.

"Into the wild: Reintroduced animals face daunting odds," Virginia Morell, *Science* 320: 742-743, 9 May 2008.

Edwards, David P., Trond H. Larsen, Teegan D. S. Docherty, Felicity A. Ansell, Wayne W. Hsu, Mia A. Derhé, Keith C. Hamer, and David S. Wilcove. 2010. "Degraded Lands Worth Protecting: The Biological Importance of Southeast Asia's Repeatedly Logged Forests." *Proc Biol Sci. B*. Published online 2010: 1-9 doi:10.1098/rspb.2010.1062

"Home, home outside the range?" R. Stone, *Science* 329, 1592-1594, 2010.

"Nurturing nature," N. Schultz, *New Scientist* 208 (No. 2785): 32-37, 6 Nov. 2010.

Phalan, B., M. Onial, A. Balmford, and R. E. Green. 2011. "Reconciling Food Production and Biodiversity Conservation: Land Sharing and Land Sparing Compared." *Science* (New York, N.Y.) 333 (6047): 1289-1291

"Six-legged giant finds secret hideaway, hides for 80 years," R. Krulwich, [www.npr.org/blogs/krulwich/2012/02/24/147367644/six-legged-giant-finds-secret-hideaway-hidesfor-80-years?sc=tw](http://www.npr.org/blogs/krulwich/2012/02/24/147367644/six-legged-giant-finds-secret-hideaway-hidesfor-80-years?sc=tw) pp. 1-9, 2012.

"As threats to corals grow, hints of resilience emerge," C. Schmidt, *Science* 339, 1517-1519, 2013.

"Fluttering from the ashes?" R. Stone, *Science* 340, 19, 2013.

"Mechanisms of Reef Coral Resistance to Climate Change." S.R. Palumbi, D.J. Barshis, N. Traylor-Knowles, and R.A. Bay. 2014. *Science* 344(6186): 895-898.

"Lazarus," C. Brahic, *New Scientist* 227, 38-41, 2015.

"Return of the Native," L.E. Ogden, *New Scientist* 228, 44-45, 2015.

"Beaver Fever," M. Campbell, *New Scientist* 232, 36-39, 2016.

Harrison, T, J Gibbs, R Winfree. 2017. Forest bees are replaced in agricultural and urban landscapes by native species with different phenologies and life history traits. *Global Change Biology*24(1): 287-296

**12, apr 11 human culture & ideas / no lecture**

readings: 36 pages

Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* 162 (3859): 1243

Janzen, Daniel H. 1987. "Editorial." *Conservation Biology* 1 (2): 95-96

"Rights," in: *Beginning Again: People and Nature in the New Millennium*, D. Ehrenfeld (IV), Oxford, 1993, 127-131.

Janzen, Daniel H. 2000. "Costa Rica's Area De Conservacin Guanacaste: A Long March to Survival through Non-Damaging Biodevelopment." *Biodiversity* 1 (2): 7-20

Dietz, Thomas, Elinor Ostrom and Paul C. Stern. 2003. "The struggle to govern the commons." *Science* 302(5652): 1907-1912

Janzen, Daniel H. 2010. "Hope for Tropical Biodiversity through True Bioliteracy." *Biotropica* 42 (5): 540-542

Tilman, David and Michael Clark. 2014. "Global Diets Link Environmental Sustainability and Human Health." *Nature* 515 (7528): 518-522. doi:10.1038/nature13959

**13, apr 18 in-class writing workshop / no lecture**

readings: 130 pages

**COMPLETE FIRST DRAFT OF RESEARCH PAPER DUE - bring printed copy to class**

Jan Pechenik 2010, *A Short Guide to Writing about Biology*, Pearson. ch6, Revising  
Jan Pechenik 2010, *A Short Guide to Writing about Biology*, Pearson. ch8, Writing a review paper

Jan Pechenik 2010, *A Short Guide to Writing about Biology*, Pearson. ch9, Writing a research paper

not assigned but as needed; copies available for 1-week borrowing from Dr Winfree  
Bryan A. Garner 2009, *Garner's Modern American Usage: The authority on grammar, usage, and style* (third edition), Oxford University Press

**14, apr 25 no class / or snow day makeup**

**FINAL RESEARCH PAPER DUE - upload to Sakai Assignments folder by 11:59pm**