ANNOTATED BIBLIOGRAPHY

CLIMATE CHANGE AND SPECIES

Parmesan, C. (2006). "Ecological and evolutionary responses to recent climate change." Annual Review of Ecology Evolution and Systematics 37: 637-669.

A long, easy-to-read, and comprehensive review of the already-visible impacts of climate change on species. Provides explanations and examples of changes in species distributions, phenology, extinctions, and evolution. Broken down by landscape (eg arctic, tropics, marine) and by type of species. If you read one journal article about effects of climate change on species, it should be this one.

Heller, N. E. and E. S. Zavaleta (2009). "Biodiversity management in the face of climate change: A review of 22 years of recommendations." Biological Conservation 142(1): 14-32.

A review of all published literature on recommendations for management of biodiversity in the face of climate change. Provides a list of more than 100 different management recommendations, and the articles from which they are drawn. Ranks management recommendations based on how common they are. For example “increase connectivity” is the most common, found in 24 articles, while many are unique to only one or a few studies. There is also a discussion of the appropriate scales for many of the recommended actions. Non-technical and very readable.

Hannah, L. (2008). Protected areas and climate change. Year in Ecology and Conservation Biology 2008. 1134: 201-212.

A focused and accessible review of the implications of climate change for protected areas. Deals largely with big picture and policy-level actions, including reserve location, design, and connectivity. Also discusses assisted migration, captive breeding, and other species-level approaches.

Inkley, D., M. G. Anderson, et al. (2004). Global climate change and wildlife in North America. K. E. M. Galley. Bethesda Maryland, The Wildlife Society.

A more detailed and technical approach to assessing the impacts of climate change on species in the US. Provides some climate models and likely effects on wildlife, broken down into types of species. Then provides in-depth case studies, describing how climate change will affect species and regions, and a broad list of recommendations for policy and management.

Hoegh-Guldberg, O., L. Hughes, et al. (2008). "Assisted colonization and rapid climate change." Science 321(5887): 345-346.

There are dozens of articles on assisted migration, both for and against the practice (see bibliographies). This short article advocates management by assisted migration, but is clear, non-technical, and presents a well-reasoned decision-making framework for weighing risks and benefits.

CLIMATE CHANGE AND ECOSYSTEMS

Folke, C., S. Carpenter, et al. (2004). "Regime shifts, resilience, and biodiversity in ecosystem management." Annual Review of Ecology Evolution and Systematics 35

Great discussion of regime shifts – when ecosystems flip from one state to another – and resilience, the ability of ecosystems to maintain function in the face of change. Examples from a range of ecosystems, analyses of ecosystem processes, and broad management recommendations. Detailed scientific analysis, but take-home points are clear.

Saunders, S., T. Easley, et al. (2007). "Losing ground: western national parks endangered by climate disruption." The George Wright Forum 24(1): 41-81.

Fascinating and readable assessment of what climate change means for national parks in the Western US, including glacier loss, ecosystem shifts, and loss of key species, as well as effects on cultural heritage and recreation. Provides a short list of recommendations for management or mitigation actions at national, regional, state, and local scales.

Millar, C. I., N. L. Stephenson, et al. (2007). "Climate change and forests of the future: Managing in the face of uncertainty." Ecological Applications 17(8): 2145-2151.

Presents a holistic picture of potential strategies for resistance, resilience, and adaptation to climate change in forests. Provides a list of possible actions, and suggestions for prioritization. While specific to forests, much of this is applicable to any type of ecosystem. The reading is dense and full of information, but largely non-technical.

Hobbs, R. J. and V. A. Cramer (2008). "Restoration Ecology: Interventionist Approaches for Restoring and Maintaining Ecosystem Function in the Face of Rapid Environmental Change." Annual Review of Environment and Resources 33: 39-61.

Hobbs is a strong proponent of active management in the face of climate change, and his positions are often controversial. This is a good summary of potential interventions from wetland creation and fire manipulation to species relocation and eradication of invasive species. Goes into detail on ecological theory, but main points are clear and readable.

Frelich, L. E. and P. B. Reich (2009). "Wilderness Conservation in an Era of Global Warming and Invasive Species: a Case Study from Minnesota's Boundary Waters Canoe Area Wilderness." Natural Areas Journal 29(4): 385-393.

Location-specific case study of threats to a wilderness ecosystem. Details specific threats, presents well-grounded possibilities for management. Goes into depth on species and climate models, but remains largely non-technical. One of the best case studies out there with specific impact assessments and weighing the trade-offs of management actions.

Galatowitsch, S., L. Frelich, et al. (2009). "Regional climate change adaptation strategies for biodiversity conservation in a midcontinental region of North America." Biological Conservation 142(10): 2012-2022.

An equally good assessment of climate change impacts and adaptation strategies at a larger scale. Detailed, readable analysis of climate change models, and discussion of management actions in terms of resistance, resilience, and facilitation strategies.

CLIMATE CHANGE AND INVASIVE SPECIES

Dukes, J. S. and H. Mooney (1999). "Does global change increase the success of biological invaders?" Trends in Ecology & Evolution 14(4).

An early, seminal, and short summary of the reasons why climate change may exacerbate the spread of invasive species. Written for a scientific, rather than management, audience, but good background for those looking to understand climate change-invasion linkages.

Bradley, B. A., D. Blumenthal, et al. (2009). "Predicting plant invasions in an era of global change." Trends in Ecology & Evolution 25(5).

A more recent, descriptive, and accessible assessment of the link between climate change and invasive species. Ties together what we can learn from models and what we have learned from observation and experimentation.

Hellmann, J. J., J. E. Byers, et al. (2008). "Five potential consequences of climate change for invasive species." Conservation Biology 22(3): 534-543.

Provides clear explanation of major ways in which climate change may alter the location and impact of invasive species, using scientific but readable language. Also addresses how management of invasive species may change in response to climate change – this section is short, but thorough, well-explained, and useful.

Mainka, S. and G. Howard (2010). "Climate change and invasive species: double jeopardy." Integrative Zoology 5: 102-111.

Readable and interesting discussion of how climate change and invasive species will affect ecosystems and people, both alone and in combination. Provides broad recommendations for research, policy, and management linking climate change and invasions.

Botkin, D. B. (2001). "The naturalness of biological invasions." Western North American Naturalist 61(3): 261-266.

Readable and conversational discussion of the grey area between invasive species and the natural movement and migration of species and populations, and how these distinctions affect USNPS policies on invasive species. Provides a good discussion of the need to set clear and accurate policy and management goals when dealing with invasive species.

Bentz, B. J., J. Regniere, et al. (2010). "Climate change and bark beetles of the western United States and Canada: direct and indirect effects." Bioscience 60(8): 602-613.

A thorough assessment of the effects of climate change on bark beetle infestations on pine, spruce, and other trees. Provides data from climate models, tree and beetle physiology, and specific case studies, and identifies the need for identification of thresholds. Technical, scientific article, but clear and well-written.

CLIMATE CHANGE AND FIRE

Flannigan, M. D., B. J. Stocks, et al. (2000). "Climate change and forest fires." Science of the Total Environment 262(3)

Provides clear description of the current fire regime in the US, and the role of fire in ecosystems. Then discusses the effects of climate change on wildfire frequency and intensity. Uses technical approach to fire models, but is easily readable, and worth the trouble.

Whitlock, C., S. L. Shafer, et al. (2003). "The role of climate and vegetation change in shaping past and future fire regimes in the northwestern US and the implications for ecosystem management." Forest Ecology and Management 178: 5-21.

A rich and dense, and sometimes technical, explanation of fire history, changing fire regimes, and effects of fire on vegetation in the western US. Discusses the complex relationship between climate and fire in both the past and the future using a number of different methods, including paleoecological methods and climate and vegetation modeling. Ends with a long discussion of what these complex interactions mean for ecosystem management – largely focusing on flexibility and the potential for rapid change.

Fulé, P. (2008). "Does it make sense to restore wildland fire in changing climate?" Restoration Ecology 16(4): 526-531.

An in-depth and interesting article on whether fire can and should be used as a tool for ecosystem management and restoration in response to climate change. Discusses whether historical conditions can be used to determine management for future climates. Straight-forward and interesting reading.

Noss, R. (2001). "Beyond Kyoto: Forest management in a time of rapid climate change." Conservation Biology 15(3): 578-590.

Discusses goals for forest management for biodiversity conservation, with a focus on how these may change in the face of rapid climate change. Provides detailed but non-technical explanations of the resistance, resilience, and adaptation potential of forests to climate shifts, and the ways in which forest fragmentation, degradation, and destruction decrease ability of ecosystems to adapt to change. Includes a long discussion of management options, with a focus on connectivity, preservation of climate refugia, and conservation of genetic diversity and representative landscapes.

Bachelet, D., J. Lenihan, et al. (2000). "Interactions between fire, grazing, and climate change at Wind Cave National Park, SD." Ecological Modelling: 299-244.

An interesting case study of the way in which changing fire regimes can lead to changes in plant communities. Examines interactions between climate change, fire, and grazing regimes. The article has a fair amount of technical detail about the models that were used, but the story and conclusions can be understood without too much concern about these details.

CLIMATE CHANGE AND WATER

Strayer, D. L. and D. Dudgeon (2010). "Freshwater biodiversity conservation: recent progress and future challenges." Journal of the North American Benthological Society 29(1): 344-358.

One of the best discussions out there on the state of freshwater biodiversity; written for a scientific audience, but written well. Describes geographic patterns, anthropogenic threats, existing policy and management. This is followed by a specific discussion of the severity and urgency of the threat posed by climate change to freshwater biodiversity including extinctions and continued human exploitation of water resources. Calls for urgent action in the realm of research, policy, and management.

Heino, J., R. Virkkala, et al. (2009). "Climate change and freshwater biodiversity: detected patterns, future trends and adaptations in northern regions." Biological Reviews 84(1): 39-54.

Describes global patterns of biodiversity in aquatic ecosystems, and the vulnerability of freshwater ecosystems to climate change. Discusses how shifts in species' ranges and distributions may play out in lakes and rivers, and how those effects may be exacerbated by other stresses on waterways, such as eutrophication. This discussion is somewhat technical, but very useful. Then provides a lengthy discussion on policy and management for aquatic biodiversity, including reserve design, location, and connectivity, and population management and relocation.

Wilby, R., H. Orr, et al. (2010). "Evidence needed to manage freshwater ecosystems in a changing climate: Turning adaptation principles into practice." Science of the Total Environment 408: 4150-4164.

A dense, detailed discussion of the uncertainties involved in freshwater management, and some guiding principles for adaptation. Recommendations involve management and restoration of banks surrounding waterways to maintain shaded microclimates and proactive management of flow patterns to decrease the effects of climate change, as well as the design of protected areas and strategies for species conservation.

Abell, R. (2007). "Unlocking the potential of protected areas for freshwaters." Biological Conservation 134: 28-63.

Readable discussion of several aspects of current and potential protected area strategies for freshwater systems. Suggests different types of protected areas designed for different types of management; for example for focal species or overall ecosystem function. Provides suggestions for integration of freshwater and terrestrial protected areas.

Pearlstine, L., E. Pearlstine, et al. (2010). "A review of the ecological consequences and management implications of climate change for the Everglades." Journal of the North American Benthological Society 29(4): 1510-1526.

Clear and specific case study of climate change impacts and management implications in Florida's Everglades. Provides detailed and site-specific management actions, including reserve design, restoration, adaptive breeding, and assisted migration. An interesting and readable analysis.