Fragmentation and Corridors Discussion
Landscape Ecology of Forests and Rangelands – RNGE 527
February 14, 2008

Discussion Leader: Andi Stebleton (??'s, email me: steb2007@vandals.uidaho.edu)

Required readings (All readings are available online)**:**

Rosenberg, D.K., B.R. Noon, and E.C. Meslow. 1997. Biological corridors: form, function, and efficacy. BioScience 47(10): 677-687.

Simberloff, D., and J. Cox. 1987. Consequences and costs of conservation corridors. Conservation Biology 1:63-71.

Individually assigned readings (background for your assigned role for the discussion) *Notice NREPA is fully enclosed in the defined Y2Y corridor:*

Adam: Herrero, S. 1998. Large Carnivore Conservation. In A Sense of Place: Issues, Attitudes and Resources in the Yellowstone to Yukon Ecoregion. Edited by L. Willcox, B. Robinson, and A. Harvey. pp. 65-69. Available at: http://www.y2y.net/science/conservation/y2yatlas.pdf.

Amanda: Holroyd, G. 1998. Bird conservation in the Yellowstone to Yukon. In A Sense of Place: Issues, Attitudes and Resources in the Yellowstone to Yukon Ecoregion. Edited by L. Willcox, B. Robinson, and A. Harvey. pp. 71-75. Available at:http://www.y2y.net/science/conservation/y2yatlas.pdf.

Joel: Read Title 1—Designation of Wilderness Areas Sections 2, 3, 102, 103, and 104. Available at: http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1975:

Katie: Read sections 2a, 2b, 2c, 4c, & 4d of the Wilderness Act. Available http://www.wilderness.net/index.cfm?fuse=NWPS&sec=legisAct#1

Kea: Read sections 401-404 under NREPA Title IV—National wildland restoration and recovery system. Available http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1975:

Penny: Willcox, L. 1998. A summary of issues facing the Yellowstone to Yukon. In A Sense of Place: Issues, Attitudes and Resources in the Yellowstone to Yukon Ecoregion. Edited by L. Willcox, B. Robinson, and A. Harvey. pp. 137-138. Available at: http://www.y2y.net/science/conservation/y2yatlas.pdf.
- Read Title II –Biological connecting corridors Section 201 of the NREPA. Available http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1975:

Steve: Schindler, D.W. 1998. Aquatic issues in the Yellowstone to Yukon. In A Sense of Place: Issues, Attitudes and Resources in the Yellowstone to Yukon Ecoregion. Edited by L. Willcox, B. Robinson, and A. Harvey. pp. 93-97. Available at: http://www.y2y.net/science/conservation/y2yatlas.pdf.
- Skim Title III -- Wild and Scenic River designations proposed in NREPA Section 301 for ID, MT and WY. Available http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1975:

Please be familiar with:
NREPA brochure available at: http://www.wildrockies.org/nrepa/brochure/nrepa.html. Please read through all 7 sections (Each one is brief).

Willcox, L. B. Robinson, and A. Harvey. 1998. A sense of place: Issues, attitudes and resources in the Yellowstone to Yukon Ecoregion. **pp. 1-8.** Available at: http://www.y2y.net/science/conservation/y2yatlas.pdf.

Discussion:

The Northern Rockies Ecosystem Protection Act (NREPA) is currently being voted on the in the House of Representatives. During our discussion I will act as your representative senator who has called a meeting of professionals and concerned citizens, yourselves, to discussion the benefits and implications of passing NREPA through congress. Read the literature keeping in mind your assigned professional role, below, and assume your role in the discussion. It is up to you to decide if support NREPA or not. Feel free to further define your role, however, stick to the main topic assignment to you (Ex: Katie = Wilderness representative; she defines herself as Wilderness Ranger from the Bob Marshall Wilderness that was instrumental in pushing the Wilderness Act of 1964 through Congress). Please bring questions to the table that maybe I can answer, being most familiar with NREPA but not a scientist, or that other professionals and citizens in the room could answer from their individual reading.

Individual roles during the discussion:

Adam: Large game biologist with Y2Y.
Amanda: Small mammal and bird biologist with the federal government
Joel: Concerned citizen; retired scientist who now resides on Flathead Lake in MT.
Katie: Wilderness representative
Kea: Restoration ecologist
Penny: Well known fire ecologist and current executive director of Y2Y
Steve: Professor of Range Science; passion for fishing throughout ID, MT and WY.

Discussion questions:

- Since fragmentation is comprised of habitat loss and alterations in habitat arrangement often resulting in patch isolation, can we effectively recover lost habitat and connect existing habitat islands? Can the theory of island biogeography and/or metapopulations help us in this process (*Turner et al 2001)*? How? If we can restore a system, what do we use as our benchmark and how do we determine what species we will manage for, since some species do well in fragmented landscapes while others do not?
- How should 'corridors' be defined? What determines the effectiveness of a corridor, and how can we measure this? What's the difference between corridors and connectivity?
- How do we incorporate the ecological, social and economic values assigned to habitats when engineering corridors? How can we distinguish between the ecological value of the habitat as a corridor and/or as a patch?
- Based on scientific evidence on corridors, the current work of the Yellowstone to Yukon group, and other conservation efforts, would this NREPA be beneficial for the bioregional protection of 5 defined Northern Rockies ecosystems? Why or why not?

Key Points:

- Fragmentation occurs naturally and through human influences on the landscape. Although consequences can be both positive and negative, often these consequences are similar regardless of the cause of fragmentation.
- Biological consequences of fragmentation can include altered habitat arrangement, including increased isolation, and pure habitat loss.
- The term 'corridor' has many definitions, often causing confusion when it is discussed.
- The efficacy of corridors is often based on physical and social criteria, and the supporting science is frequently species dependant.

Other helpful readings

Turner, M.G., R.H. Gardner, and R.V. O'Neill. 2001. Landscape ecology in theory and practice. Springer-Verlag, New York. Chapter 8: Organisms and landscape patterns. Pages 201-247.

More background on Y2Y:

Dean, C. 2006. Home on the range: A corridor for wildlife. The New York Times. Available: http://www.nytimes.com/2006/05/23/science/earth/23corr.html?_r=1&oref=slogin.

Y2Y homepage: http://www.y2y.net/.

More background on NREPA:

H.R.1975, Northern Rockies Ecosystem Protection Act (Introduced in House beginning April 20, 2007). Available: http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1975:.

Wilderness Legislation: The Wilderness Act of 1964. Available: http://www.wilderness.net/index.cfm?fuse=NWPS&sec=legisAct&error=404.

***Corridors*:**

Beier, P. and R.F. Noss. 1998. Do habitat corridors provide connectivity? Conservation Biology 12:1241-1252.

Bennett, A.F. 1990. Habitat corridors and the conservation of small mammals in a fragmented forest environment. Landscape Ecology 4(2-3): 109-122.

Collinge, S.K. 1998. Spatial arrangement of habitat patches and corridors: clues from ecological field experiments. Landscape and Urban Planning 42:157-168.

Haddad, N.M. 1999. Corridor and distance effects on interpatch movements: A landscape experiment with butterflies. Ecological Applications 9(2): 612-622.

Haddad, N.M., D.R. Bowne, A. Cunningham, B.J. Danielson, D.J. Levey, S. Sargent, and T. Spira. 2003. Corridor use by diverse taxa. Ecology 84(3): 609-615.

Hilty, J.A., W.Z. Lidicker, Jr., and A.M. Merenlender. 2006. Corridor ecology: the science and practice of linking landscapes for biodiversity conservation. Island Press, Washington, DC.

Lindenmayer, D.B. and H.A. Nix. 1993. Ecological principles for the design of wildlife corridors. Conservation Biology 7(3): 627-631.

Noss, R.F. 1987. Corridors in real landscapes: A reply to Simberloff and Cox. Conservation Biology 1(2): 159-164.

Tewksbury, J.J., Levey, D.J., Haddad, N.M., Sargent, S., Orrock, J.L., Weldon, A., Danielson, B.J., Brinkerhoff, J., Damschen, E.I., and Townsend, P. 2002. Corridors affect plants, animals, and their interaction in fragmented landscapes. Proceedings of the National Academy of Sciences 99:12923-12926. Available on the web at: http://www.pnas.org/cgi/reprint/99/20/12923.pdf

Tischendorf, L.; Fahrig, L. 2000. On the usage and measurement of landscape connectivity. Oikos 90(1): 7-19.

Fragmentation:

Andrén, H. 1994. Effects of Habitat Fragmentation on Birds and Mammals in Landscapes with Different Proportions of Suitable Habitat: A Review. Oikos 71: 355-366.

Debinski, D.M. and Holt, R.D. 2000. A survey and overview of habitat fragmentation experiments. Conservation Biology 14:342-355.

Fahrig, L. 1997. Relative effects of habitat loss and fragmentation on population extinction. Journal of Wildlife Management 61:603-610.

Fahrig, L. 2003. "Effects of Habitat Fragmentation on Biodiversity." Annu. Rev. Ecol. Evol. Syst. 34:487–515.

Haila, Y. 2002. A conceptual genealogy of fragmentation research: From island biogeography to landscape ecology. Ecological Applications 12:321-334.

Harrison. S. and E. Bruna. 1999. Habitat Fragmentation and Large-scale Conservation: What do We Know for Sure? Ecography 22: 225-232.

MacArthur, R.H., and E.O. Wilson. 1967. The theory of island biogeography. Princeton University Press. Princeton, NJ. 203p.

Ricketts, T.H. 2001. The matrix matters: Effective isolation in fragmented landscapes. The American Naturalist 158: 87-99.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5:18-32.

Wiens, J.A. 1996. Wildlife in patchy environments: Metapopulations, mosaics, and management. Pages 53-84 In D.R. McCullough, ed. Metapopulations and Wildlife Conservation. Island Press, Washington, D.C.