The Lookout, Gray Wolf

Trophic Cascades, Habitat Fragmentation and Climate Change, the Need to Reconnect, Rewild and Restore Terrestrial Landscapes Keith Bowers, Biohabitats, Inc.

CEER 2014

Dhotograph Courtoout All About

Top 10 large ecosystem restoration efforts in the US;

- encompassing 27 states
- affecting 125 + million people (45% of US population
- Investing \$100b over a 25-50 yrs

Great Lakes Chesapeake Bay Puget Sound Missouri River Upper Mississippi San Francisco Bay Delta Florida Everglades Ohio River New York Harbor Lower Columbia Louisiana Coastal The one process now going on that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us.

Edward O. Wilson, Biophilia, 1984, p, 121



OR-7 – A Lone Wolf's Story



(AP Photo/Mail Tribune, via Allen Daniels, File) The Associated Press









California DFG Compilation Historic Grey Wolf Range



Center for Biological Diversity



























Indian Peaks Wilderness Mt. Evans Wilderness Lost Creek Wilderness

Rocky Mtn Nat'l Park

Smaller the patch = higher and faster the rate of extinction

Core Design Principles



A Guide to Urban Habitat Conservation Planning

Thomas G. Barnes, Extension Wildlife Specialist Lowell Adams, National Institute for Urban Wildlife



Fig. 1. An experimentally isolated forest fragment in central Amazonia, part of the Biological Dynamics of Forest Fragments Project (photo by R.O. Bierregaard). This long-term experiment was inspired by a heated debate over the relevance of Island Biogeography Theory to nature conservation.



Glacier National Park >

Seasonal Use:

10 Bears over 4 years in Montana's Swan Valley







NPS chart of where grizzly bears live in the Greater Yellowstone Ecosystem (the blue outline) in 2008:



Square Miles of Home Range

WOLF	BLACK BEAR	MT LION
40	3	30









Connectivity: The degree to which a landscape facilitates movement of species, populations and genes among resource patches, from ecological to evolutionary time scales.



Habitat



Barrier



Conduit



Filter



Source



Biohabitats









Landscape Connectivity







COUGARS

Always watching, waiting for you to let your guard down

The "Ecology of Fear" **Cougars Common Cougars Rare**

Bill Ripple, Bob Beschta -OSU



Restoration of wolves to Yellowstone has changed ungulate grazing, benefiting riparian veg, other species.

Source: Ripple and Breshta 2004



Glacier National Park 100 m. from wolf den

> ~1920 – Prior to extirpation (cored)

Post 1984 – Wolf reintroduction



C. Eisenberg



- Focus on keystone species -plants or animal whose presence helps maintain the diversity and resilience of ecosystems.
- Removal triggers the unraveling of ecological communities—an ecological – or trophic – cascade.
- Carnivores are classic examples



FOUR CONTINENTAL WILDWAYS

Pacific

Western (Spine of the Continent)

Arctic/Boreal

Eastern

NORTH AMERICAN



North American Wildlands Network's Goals

- **Continental-scale vision** to protect and restore the ecological integrity of North America
- Maintenance and restoration of landscape connectivity – at all scales
- Restoration of species habitat
- **Reintroduction** of extirpated species
- Organizational **capacity** and long term management.



The Four 'Cs' of Wildway's Design

1.CORES2.CORRIDORS3.COMPATIBLE USE AREAS4.CARNIVORES



The Western Wildway

Partners working to connect wildlife habitat along the Spine of the Continent

View all

Western Wildway Conservation Planning Boundaries Brooks - Richardson Ranges Taku River

Yellowstone to Yukon Greater Crown of the Continent Heart of the West Southern Rockles Colorado Plateau Grand Canyon New Mexico Highlands Skyl slands Sierra Madre

Western Wildway

The Spine of the Continent Initiative store



Climate Change, Modeling & Corridor Mapping



Implementation Gap Analysis



Networking, Collaboration, Coalition Building

BIOhabitats

2012

ILDLANDS



Y2Y – Yellowstone to Yukon Conservation Initiative

Vision An interconnected system of wild lands and waters stretching from Yellowstone to Yukon, harmonizing the needs of people with those of nature.





Québec

THE EASTERN WILDWAY



THE EASTERN WILDWAY

is a vision for wildlife habitat connectivity in the eastern U.S./Canada. Comprised of six ecoregions, the Eastern Wildway provides a framework within which local, state, federal and private land managers can collaborate to connect and restore habitat to ensure the survival of native species and the health of local communities.

Eastern Wildway Ecoregions:

Northern Appalachians Central Appalachians Northeast Atlantic Southern Appalachians Southeast Atlantic Central Gulf Coast and Interior Southeast



PRIVATE LANDS CONSERVATION NETWORK

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Wildlands Network Designsct, Rewild & Restore





Currently Protected Areas (Cores)





Identifying Implementation Gaps

AB

SK

MT

ND

NE

KS

OK

TX

CO

NM



Science-based Corridor mapping & Restore



Society for Ecological Restoration and Wildlands Network Partnership

- Landscape connectivity counteracts trophic cascades by allowing dispersal and migration of keystone species over large areas, restoring ecological diversity and resilience to lands and waters.
- The most efficient, economical means for doing this is by restoring ecological connectivity, often in the form of ecological corridors.
- Goal is to build on the pattern of restoration of individual landscape patches to now focus on:
 - the restoration of entire ecosystems, landscapes, and regions
 - re-establish landscape patch connectivity and large scale migration corridors for keystone species.



Wild LifeLines™



Kenyon Fields

Strategy Director Spine of the Continent Initiative Wildlands Network



David M. Theobald

Department of Human Dimensions of Natural Resources & Natural Resource Ecology Lab Warner College of Natural Resources Colorado State University

Movement will be least restricted across "natural" areas, most restricted across "human-modified" areas



Ellis & Ramankutty 2008



1. "Naturalness" base =

land cover types + proximity to roads + highway traffic volume + housing density + canopy closure, slope, etc.

- 2. Calculate resistance as inverse of naturalness
- **3.** Run **iterations** from random start location



Highway Intersection Importance Rank

<5k ο Traffic 5-10k 0 Flow 10-100k \cap >100k

150°10 15°10 15.90°10 05.95°10 10°10

Photo by Dwight Forsyth

Applications for Ecological Restoration

•Envision the Whole – look beyond the project boundaries for opportunities to reconnect fragmented linkages, provide stepping stones and/or improve the quality of the landscape matrix.

•Determine the keystone species in the area you are working in and identify strategies you can do to facilitate their conservation and restoration.

•Design for keystone species while considering the full breath of biodiversity

(Reprinted from *Conservation Corridor Planning at the Landscape Level Handbook*, USDA NRCS.)

Applications for Ecological Restoration

•In many highly developed landscapes designing for a permeable landscape matrix is key

•Don't ignore terrestrial linkages to connect riparian corridors and habitat patches

•Use landscape features to serve as stepping stones or for enhancing the matrix (street trees, land use buffers, stormwater management, buildings, greenways, land management)

•Integrate the sciences of landscape ecology and conservation biology into restoration projects

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Thank You

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