

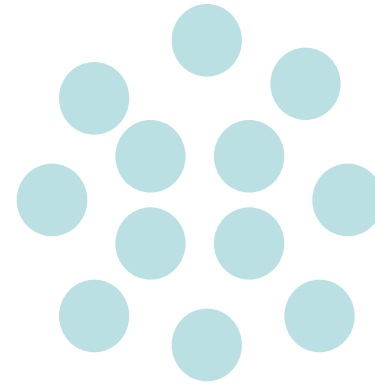
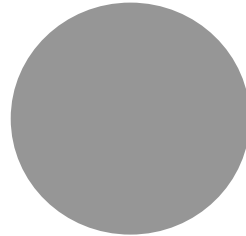
Species Diversity

- **Important factors influencing diversity:**
 - **Historical perturbations**
 - **Area**
 - **Productivity**
 - **Harshness**
 - **Climatic stability**
 - **Habitat heterogeneity**
 - **Competition**

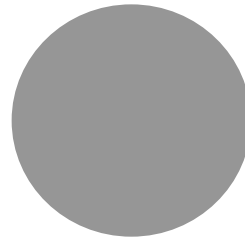
Optimal design of Nature reserves: the SLOSS debate

Continuous vs fragmented

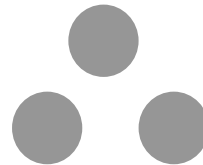
(Preferred design)



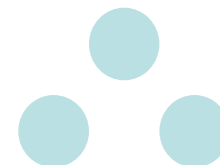
Maximize ratio area:edge



Minimize distance between reserves



Dispersal corridors between isolated fragments



(Wilson and Willis, 1975)

Island Biogeography and Conservation Design

- **Landscape-level processes and the idea of the Minimum Dynamic Area (MDA)**
 - **Disturbance:** a discrete event that disrupts the structure of an ecosystem, community or population and changes resource availability or physical environment Gergel and Turner 2002
 - **MDA:** “the smallest area with a natural disturbance regime, which maintains internal recolonization sources, and hence minimizes extinction” Picket and Thompson 1978

Yellowstone Fires of 1988



Island Biogeography and Conservation Design

- **Disturbance and Diversity**
 - **Intermediate Disturbance Hypothesis: Intermediate levels of disturbance support the highest levels of diversity**
 - **Why?**
 - **Habitat heterogeneity/succession**
 - **Competition and dominance can suppress diversity**
 - **Balance between extinction and immigration**

Yellowstone Fires of 1988



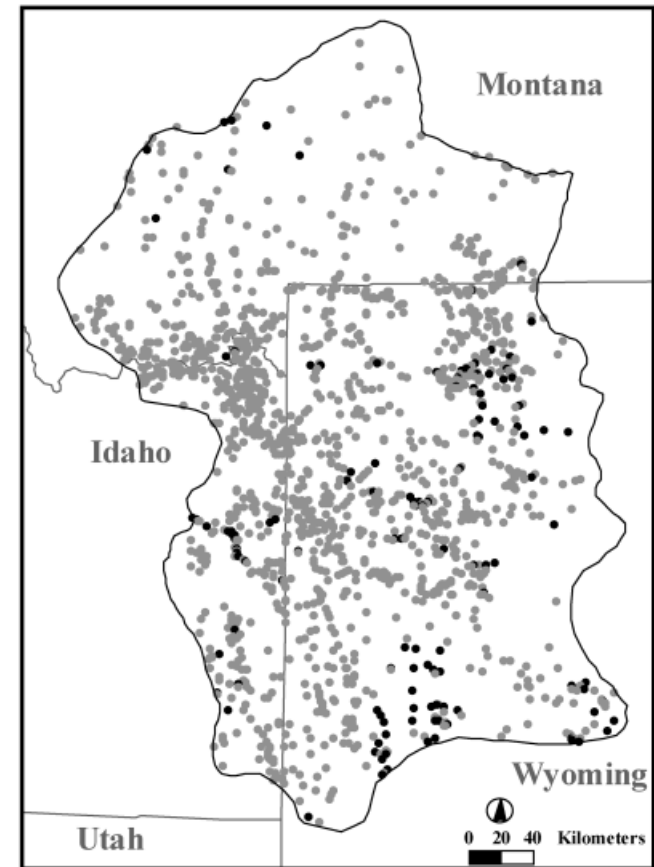
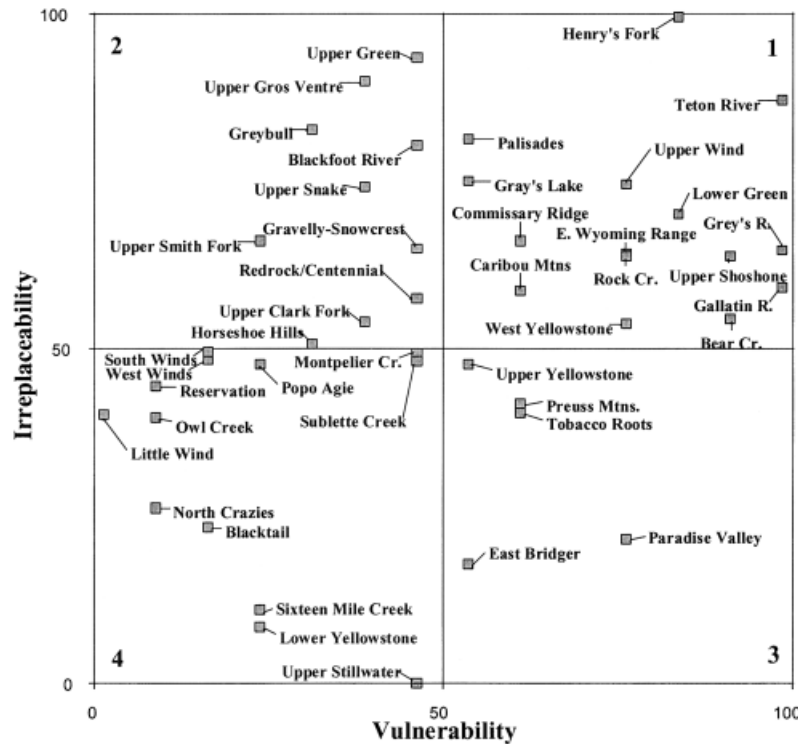
Island Biogeography and Conservation Design

- **Coarse filter-fine filter approach**
 - **Coarse filter-identify and protect representatives of all the different community types; by protecting communities, you will protect about 85-90% of all species (e.g. Northwest Forest Plan; Greater Yellowstone Ecosystem Plan)**
 - **Fine filter-protect species not caught by the coarse filter; focuses on endangered species (e.g. Endangered Species Act)**

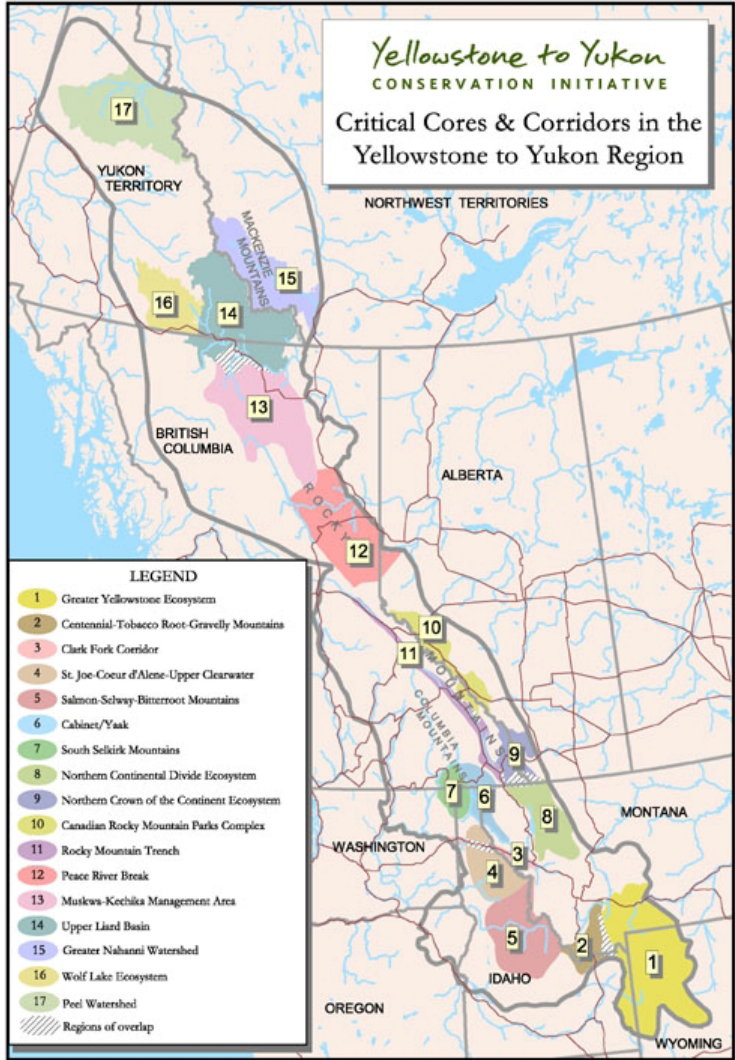
Island Biogeography and Conservation Design

- Irreplaceability vs. Vulnerability

– Noss et al. 2002

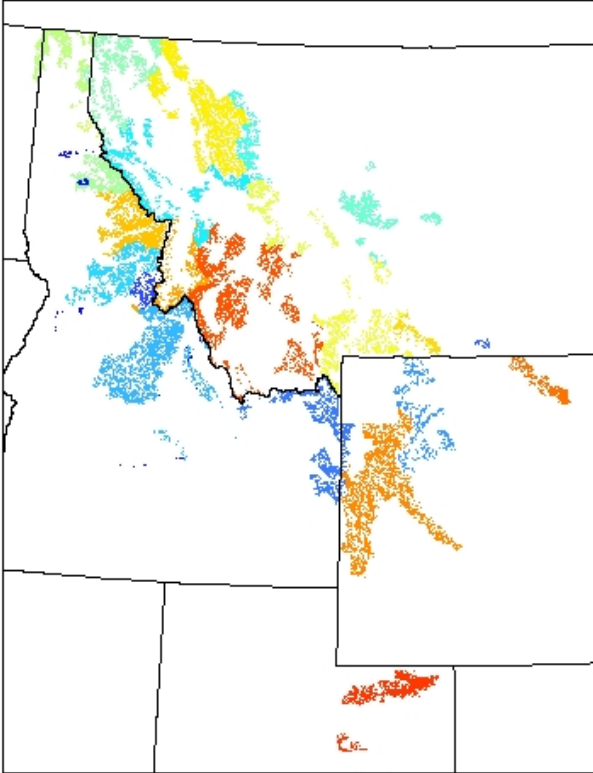


Coarse Filter Approach

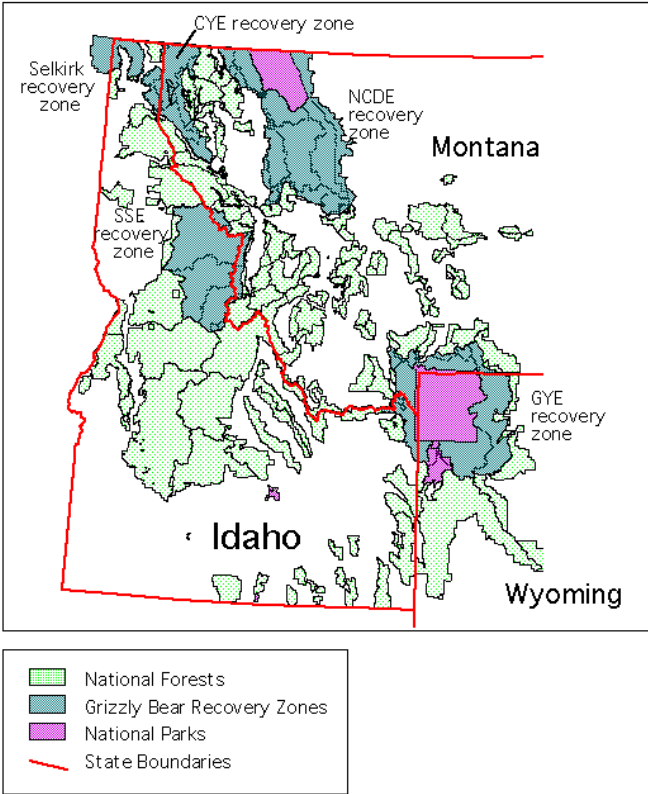


Coarse Filter/Fine-Filter

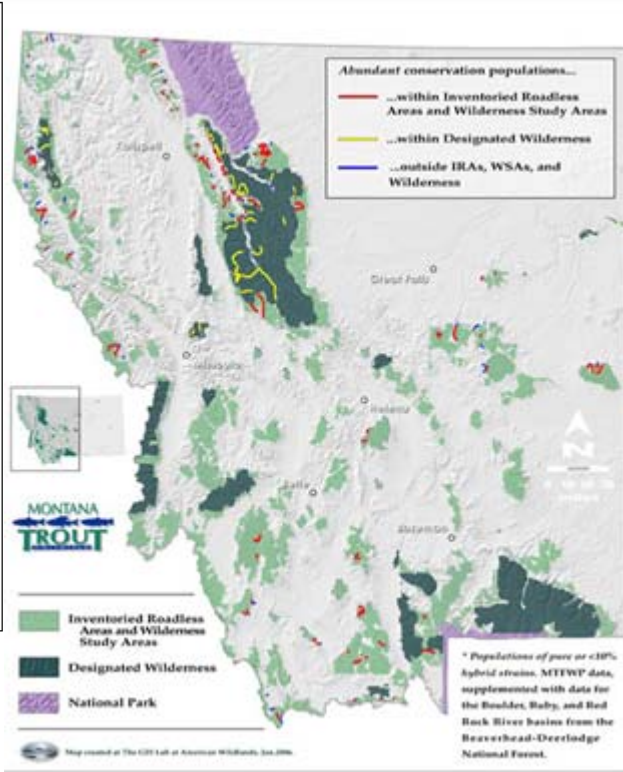
Canada Lynx



Grizzly Bear

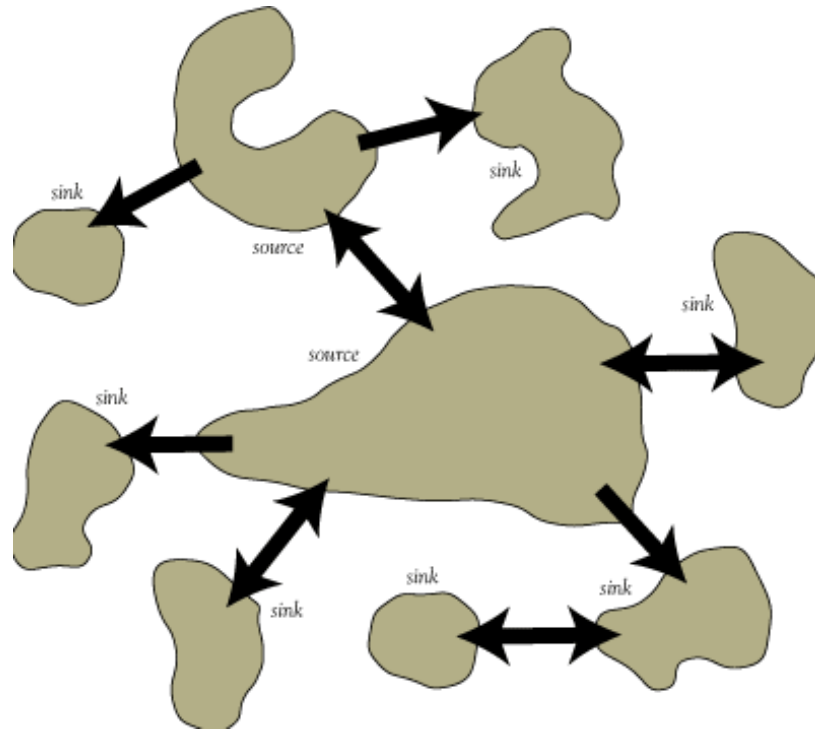


Yellowstone Cutthroat Trout



Island Biogeography and Conservation Design

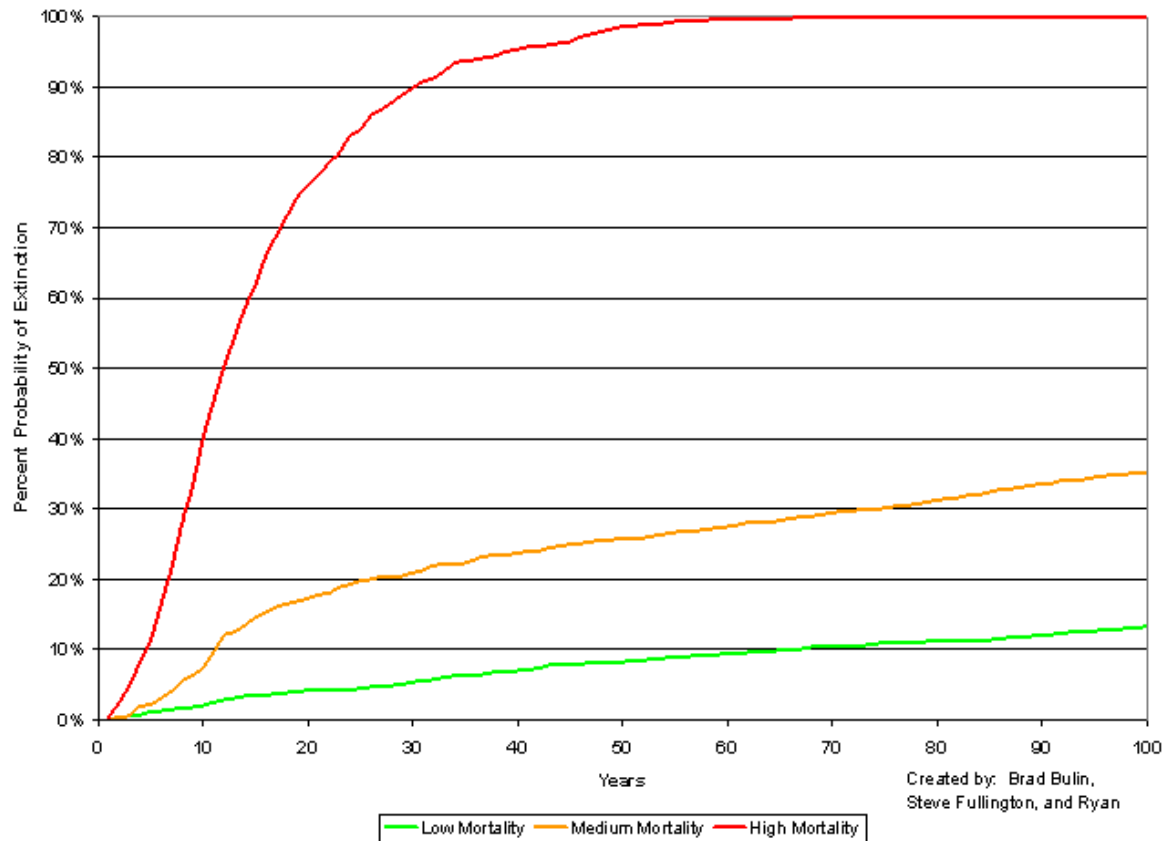
- **Metapopulation: a system of local populations linked by dispersal**



Island Biogeography and Conservation Design

- **Population Viability and Persistence:**

Mountain Lion Probability of Extinction



Island Biogeography and Conservation Design

- **Summary: Important elements of a reserve design strategy**

- **Coarse Filter**

- Area and representation
- Environmental gradients (e.g. productivity...)
- Ecosystem processes (e.g. disturbance...)

- **Fine-Filter**

- Unique features
- Rare species
- Population viability of species of concern

