Habitat Reserves

1. What are they?
2. Why do we need them?
3. How do we design them?

Objectives

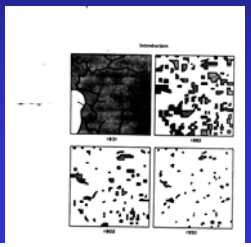
1. Know the definition of a habitat reserve.
2. Know what habitat fragmentation is.
3. Know what the species-area curve looks like and the reasons underlying it.
4. Now some of the general rules for designing reserves, and the reasons underlying them.
5. Know how the "focal species" approach to reserve design works.
6. Know how disturbance regimes and external influences can affect habitat reserves.

Habitat Reserves

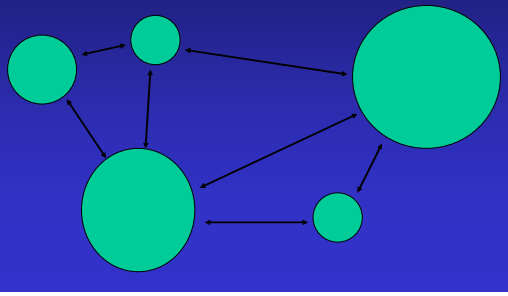
Land set aside and protected or managed for the primary purpose of conservation of one or more species of plants and animals.

Fragmentation and Loss of Natural Environments

The reduction and isolation of patches of natural environments (e.g., forests or grasslands)



Metapopulation = a group of populations maintained by the interchange of individuals



Strategies for Habitat Conservation

- Set aside land and protect it – effective, but only 3-6% of the earth is under some form of protection.
- Attempt to soften the effects of human use and combine human use of lands with habitat conservation.

Design Considerations for Habitat Reserves

- How much land do we need to set aside?
- How big should the patches be, if the reserve is to be divided?
- How should the patches be distributed relative to one another?
- How can the reserve be maintained over time?

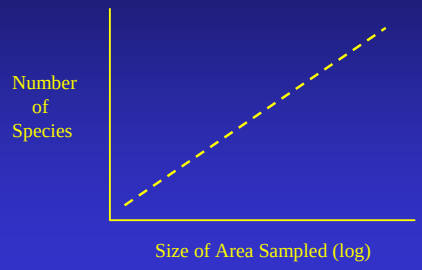
Approaches to Reserve Design

- Answers to the questions outlined above should be objective driven –usually to maintain one or more species.
- If information is limited about the species for which the reserve is intended to support, use general design rules.
- Design the reserve based on the needs of the species for which the reserve is intended to support.

General Design Rules – Where do They Come From?

- Model of Island Biogeography
- Species-Area Relationships

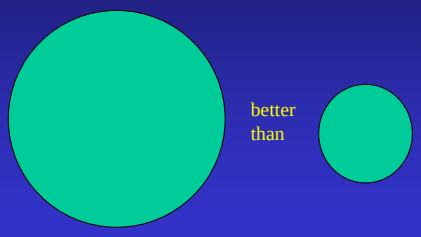
Species-Area Relationship



Number of species increases as area sampled increases – **WHY**?

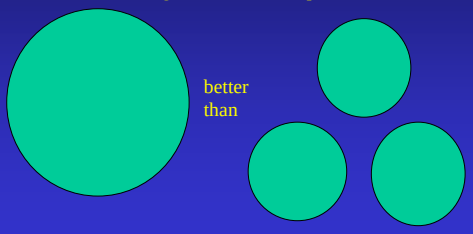
- Environmental diversity and complexity
- Minimum area requirements
- Small population problems
- Colonization rates

Bigger is better than smaller



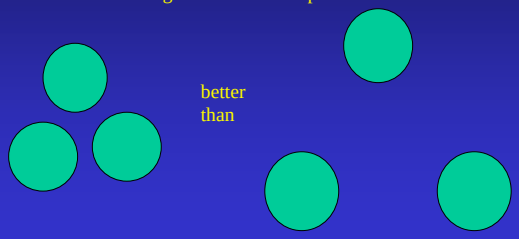
One large patch better than divided patches of equal size

This argument is scale dependent



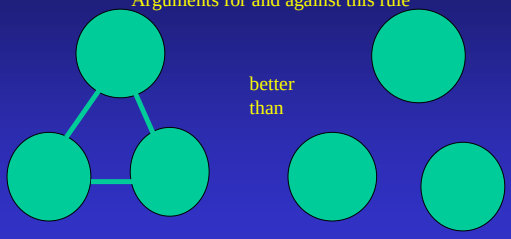
If patches are necessary, closer is better

This argument is scale dependent



Connect patches when possible.

Arguments for and against this rule



Advantages of Corridors

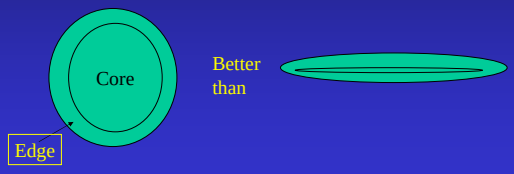
- Potentially increases movement among patches
- Potentially creates habitat for wide-ranging species
- Potentially maintains habitat within corridors

Disadvantages of Corridors

- Potentially spreads problems (diseases, exotic species, fire)
- May not be effective for some species
- Cost can be high

Round is better than long and narrow

This argument is scale dependent

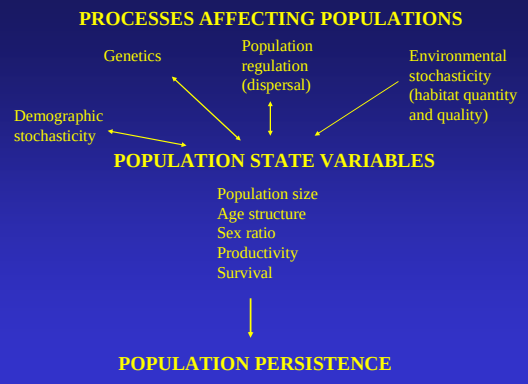


Focal Species Approach

- ID needed population size (analysis of viability)
- Keep an area that can maintain a viable population
- Keep patches close enough to allow movement between them (based on dispersal abilities and conditions between patches)

How much habitat is needed? Population Viability Analyses (PVA)

- PVA models estimate population size, or rate of change (lambda = λ).
- PVA models can be deterministic or stochastic
- Most complex PVA models are spatially explicit



Management plan for the Northern Spotted Owl is an example of the focal species approach

- PVA indicated that 1,500 breeding pairs would have a high likelihood of persistence over the long term.
- Old-growth forests on public lands sufficient to support 1500 pairs were identified.
- The patches were large enough to support at least 20 pairs/patch.
- Patches were no more than 11 miles apart (distance young, emigrating spotted owls were capable of moving)\
- Matrix was maintained in a condition that would facilitate movement.

Other Considerations for Persistence of Habitat Reserves

- Disturbance regimes
- External influences

Core areas plus buffer zones