

# Habitat Reserves

- What are they?
- Why do we need them?
- How do we design them?

# Objectives

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

# Habitat Reserves

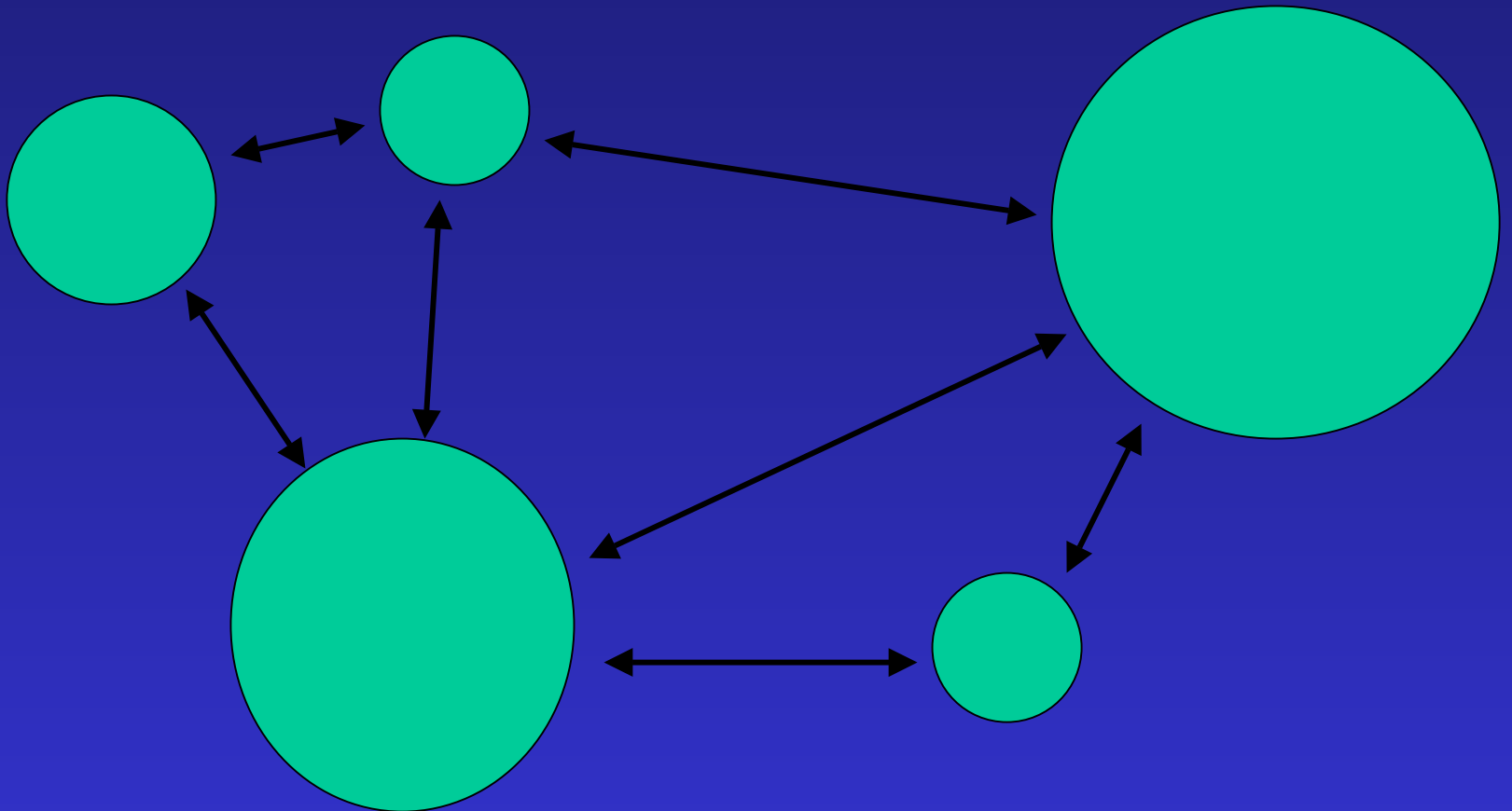
Land set aside and protected or managed for the primary purpose of conservation of one or more species of plants and animals.

# 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

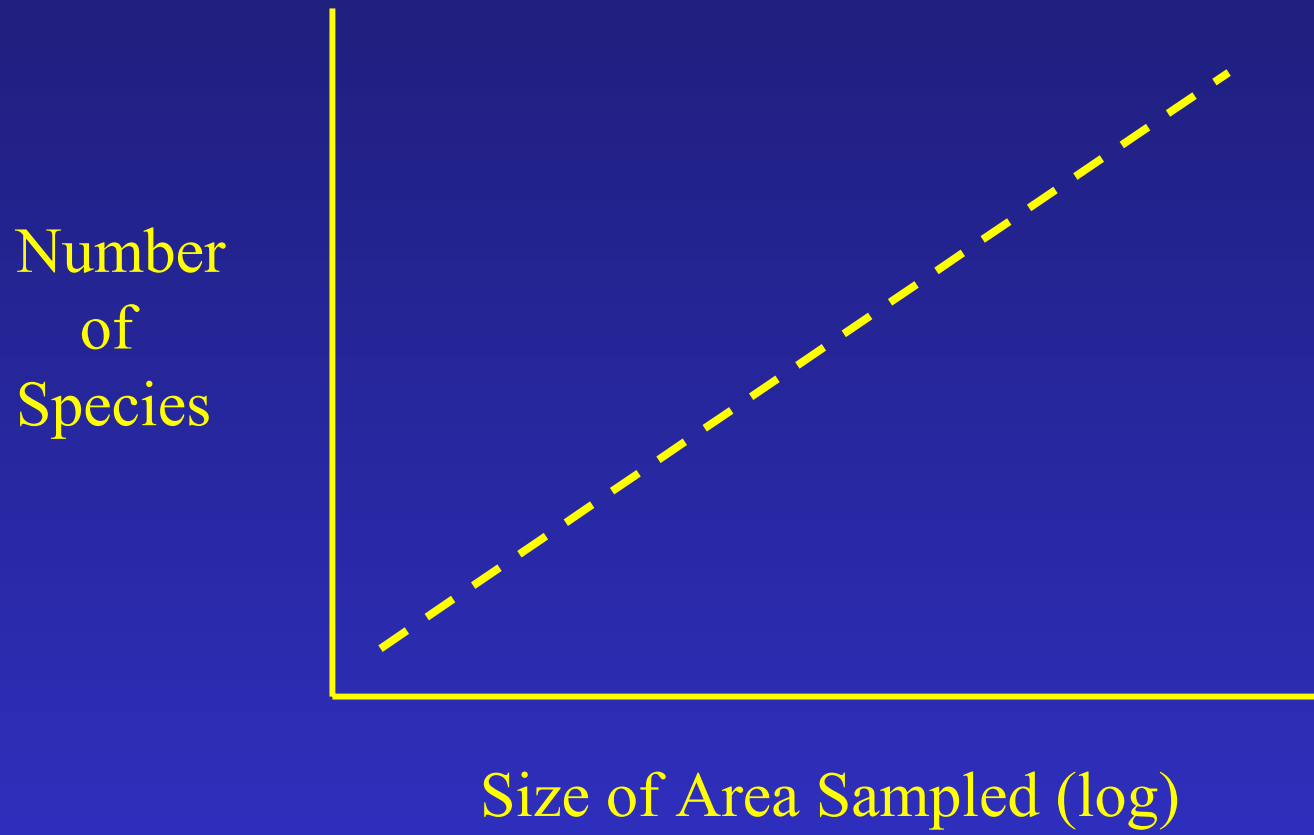
- Answers to the questions outlined above should be objective driven –usually to maintain one or more species.
- If information is limited about the species for which the reserve is intended to support, use general design rules.
- Design the reserve based on the needs of the species for which the reserve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



# General Design Rules – Where do They Come From?

- Model of Island Biogeography
- Species-Area Relationships

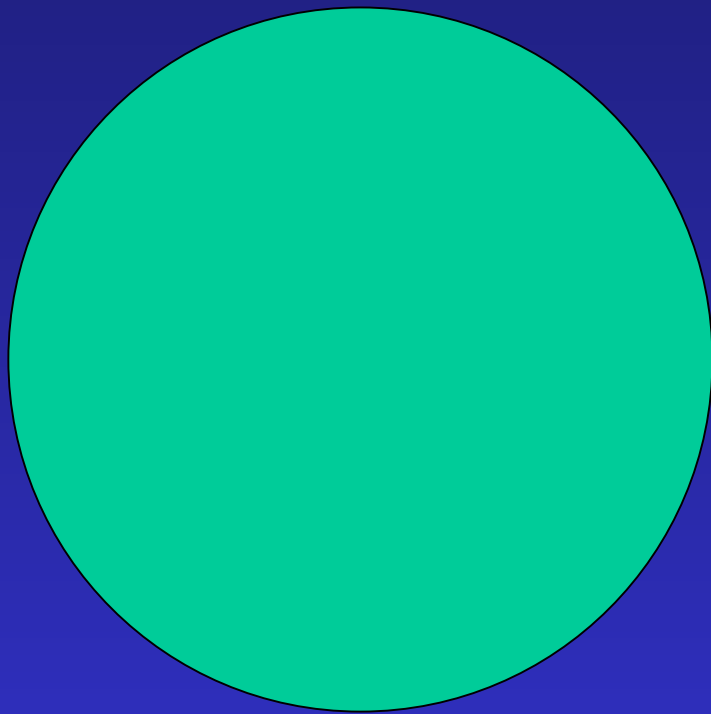
# Species-Area Relationship



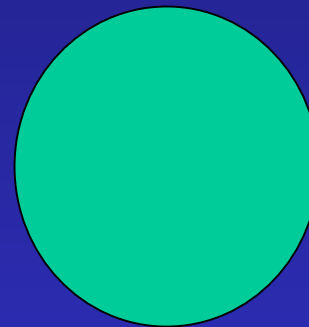
# Number of species increases as area sampled increases – **WHY?**

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

Bigger is better than smaller

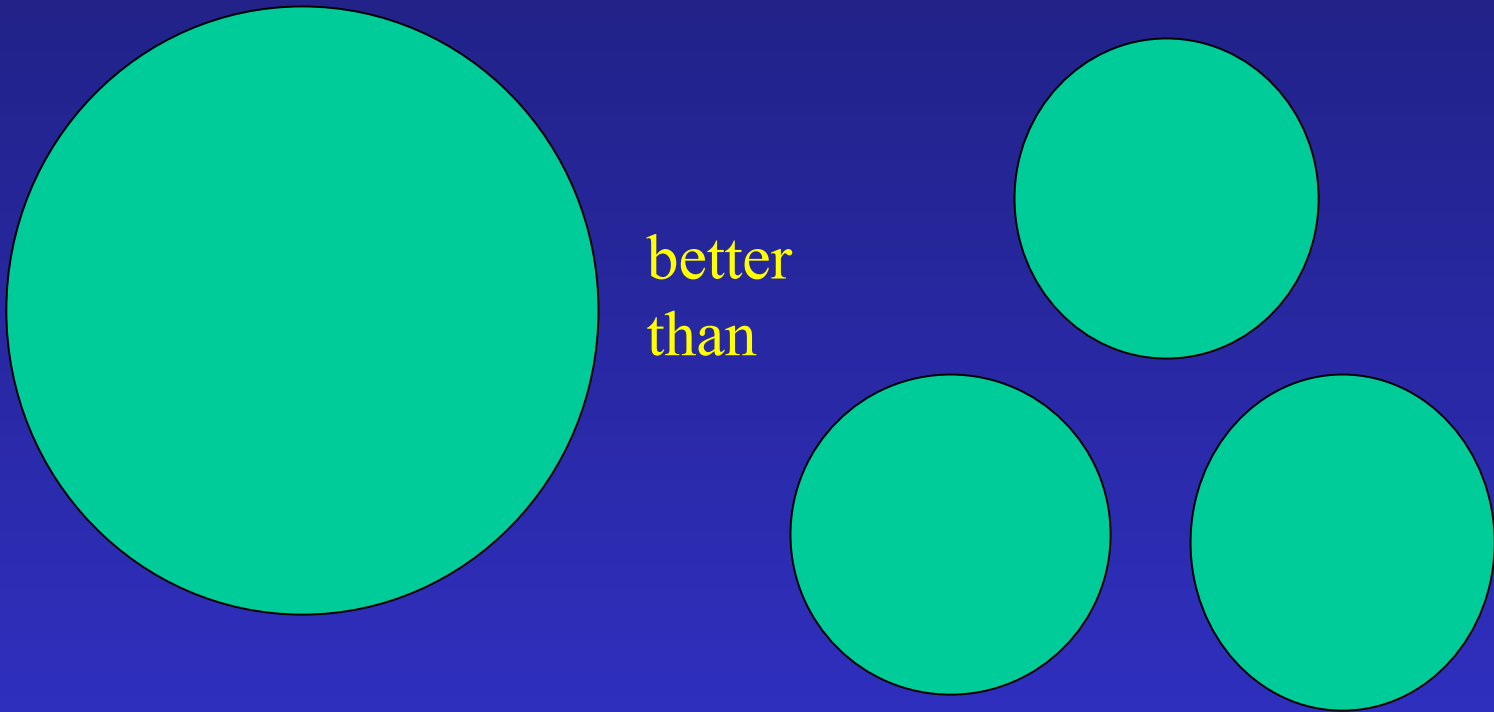


better  
than



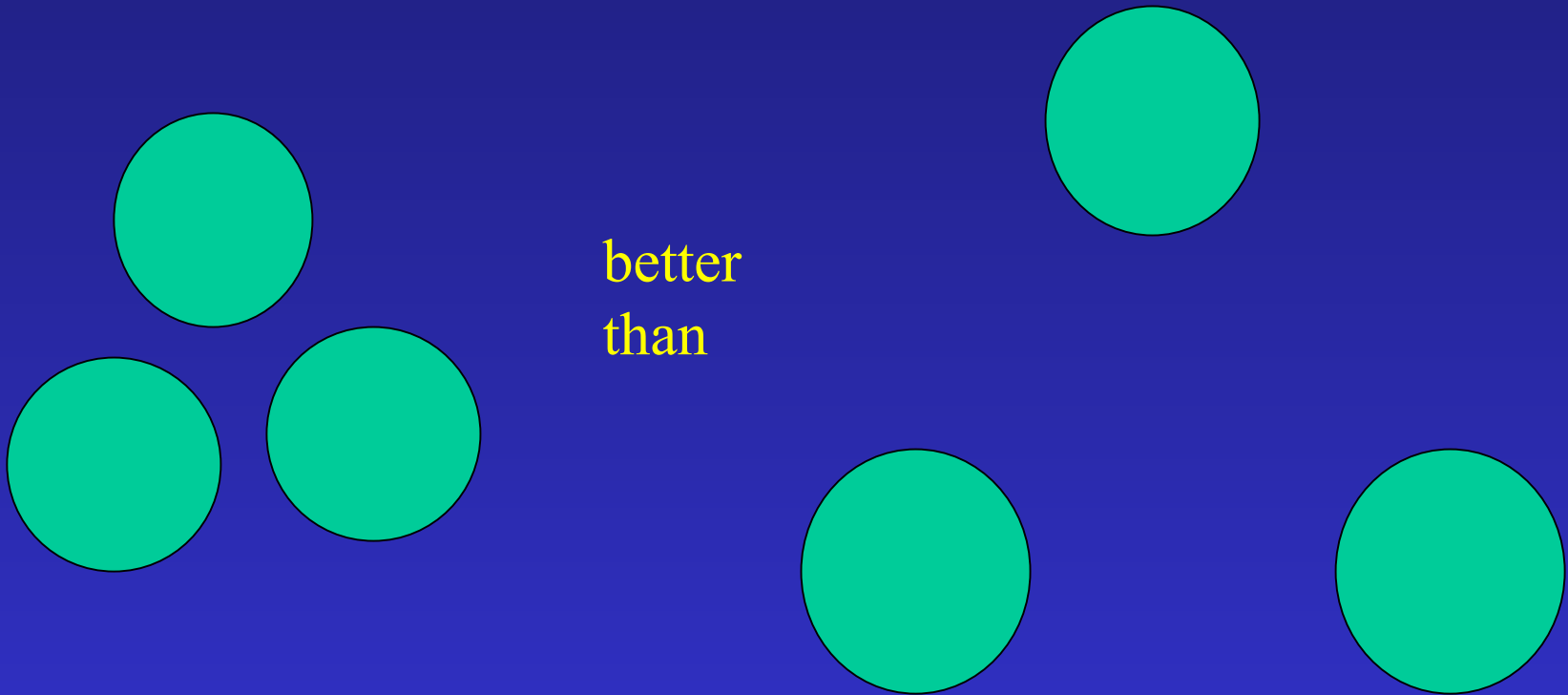
# One large patch better than divided patches of equal size

This argument is scale dependent



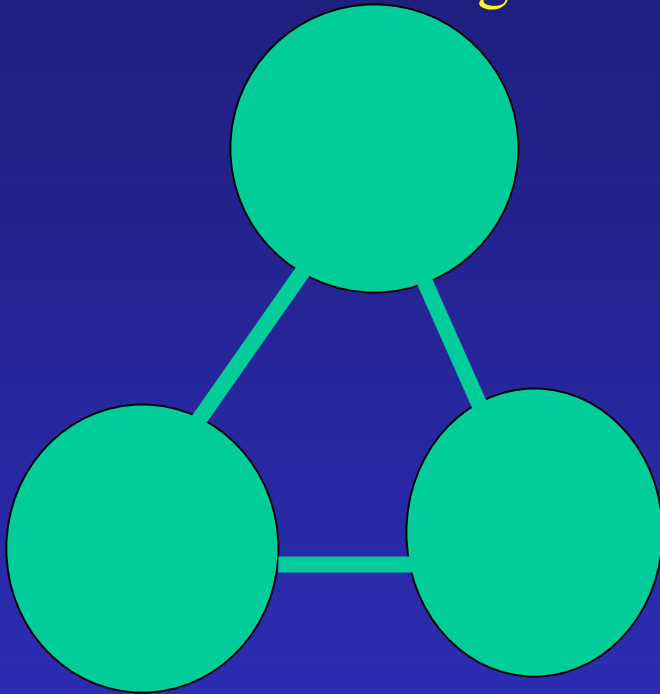
# If patches are necessary, closer is better

This argument is scale dependent

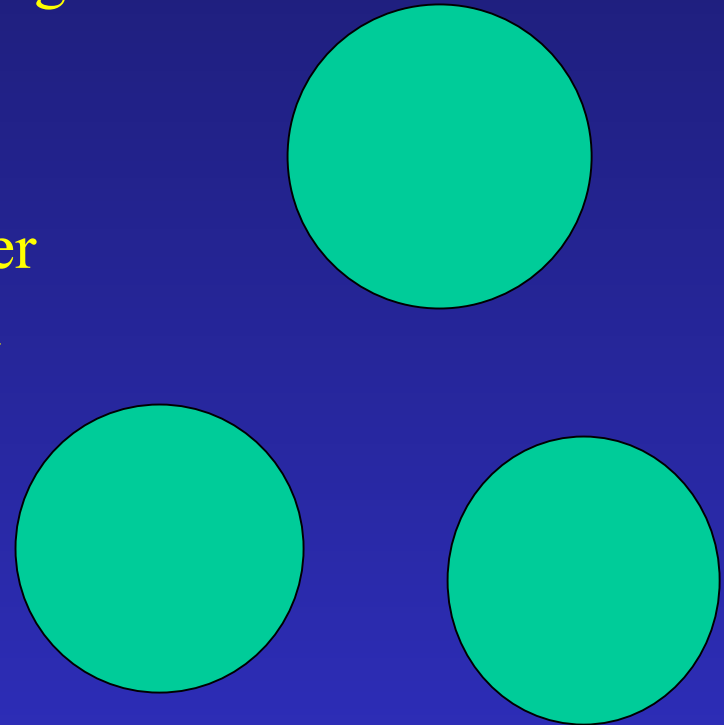


# Connect patches when possible.

Arguments for and against this rule



better  
than



# Advantages of Corridors

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

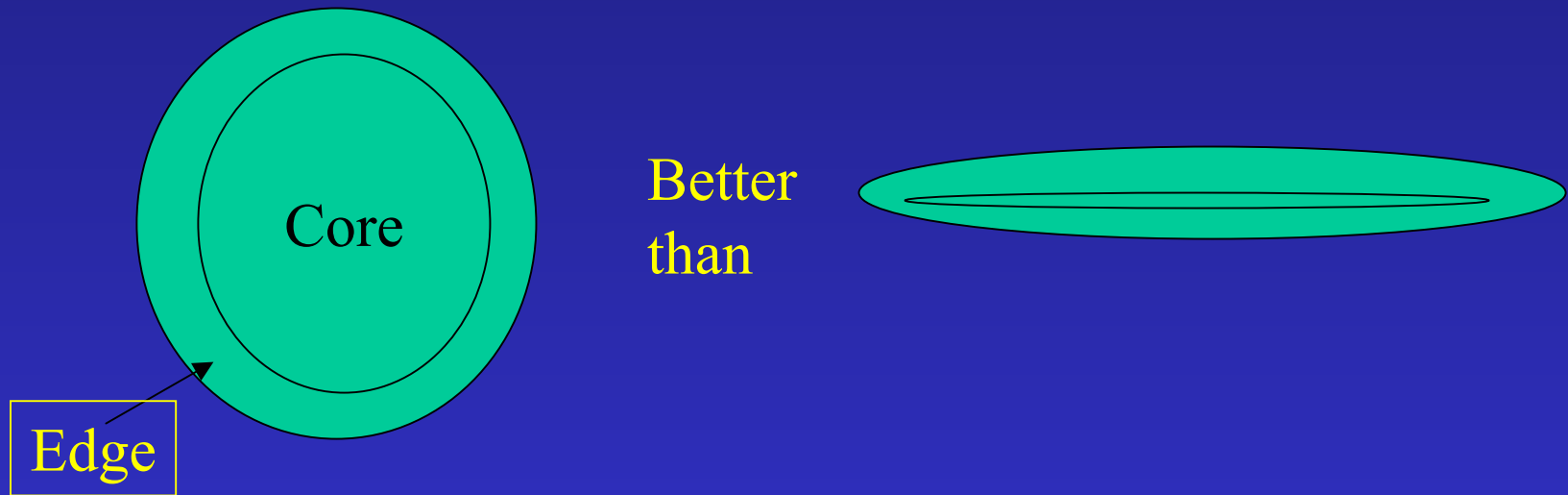


# Disadvantages of Corridors

- 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

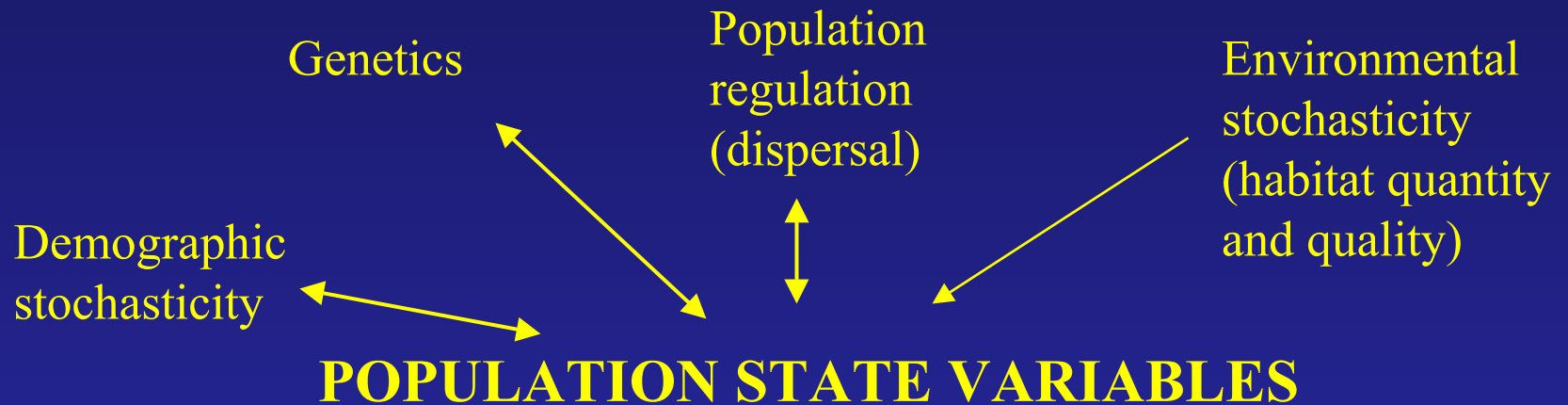
- ID needed population size (analysis of viability)
- Keep an area that can maintain a viable population
- Keep patches close enough to allow movement between them (based on dispersal abilities and conditions between patches)

# How much habitat is needed?

## Population Viability Analyses (PVA)

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

# PROCESSES AFFECTING POPULATIONS



Population size  
Age structure  
Sex ratio  
Productivity  
Survival

**POPULATION PERSISTENCE**

# 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

