

## **Landscape Ecology (note worksheet)**

Landscape ecology:

Region:

Landscape:

Landscapes are often heterogeneous or a mosaic of different patches.

Patch =

Landscape patterns and processes can be studied within and among patches.

consider:

### **Spatial patterns of landscapes**

#### Patch size

Large vs. small patches—advantages and disadvantages

Species area curve

#### Patch shape

Relating form to function:

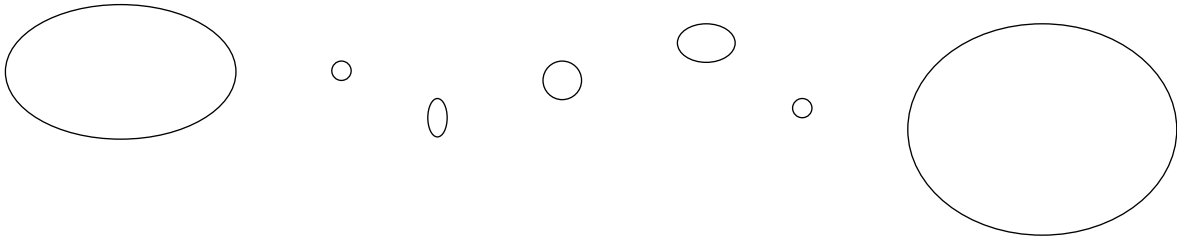
1. compact form
2. convoluted form

#### Patch Orientations and Species Movements

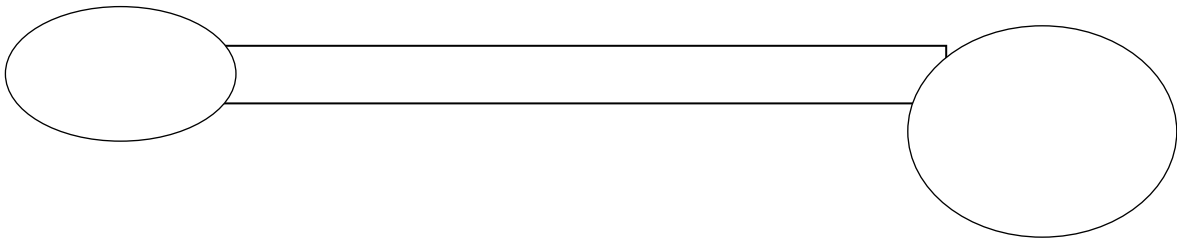
1. encounter rate
2. dispersal
3. networks

Patch connectivity

Stepping stone model



Corridors



*Some positive effects:*

Rescue effect (Brown and Kodric-Brown 1977)

Genetic diversity

*Some negative effects:*

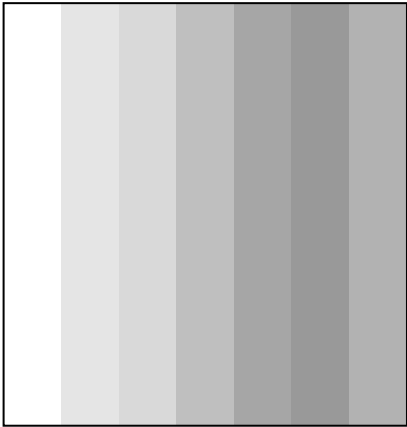
Landscape Fragmentation and Patch Edges

Patchy or “fragmented” landscapes can occur naturally.

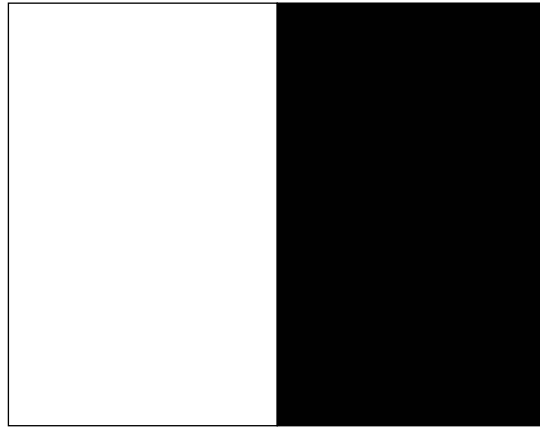
However humans contribute to habitat fragmentation.

Effects:

Soft Boundary:



Hard Boundary:



Edge can be quantified

Area, edge, and shape should not be viewed independently when designing nature reserve.

Quantifying area, edge, and shape is considerably more challenging than simply measuring shape.

### **Landscape processes**

Patch size may be importance

Within-patch rate of change

Within-patch disturbance

Intermediate disturbance hypothesis – (Review)

Houston (1979) simulation model assumes species with low  $r$  are good competitors; species with high  $r$  are poor competitors. Disturbance resets the system, permitting coexistence.

## **Prairie Conservation and Management**

Potential conflict between science and land management.

### Matrix Connectivity and Mosaic Patterns

A single nature reserve often forms a patch within the landscape.

However, it may be undesirable to establish a “stand-alone” preserve. (Why?)

The large scale management and planning of connectivity between preserves can come from two broad directions:

(1) heterogeneous landscapes

(2) homogenous landscapes

For the 1<sup>st</sup> type, a hierarchical approach can be used.

For the 2<sup>nd</sup> type, consider development and management within and around the area.

When designing or restoring nature reserves, geology should be taken into account.  
(Why?)

### Land Planning and Management

Forman (1983) and Forman and Collinge (1995) have proposed a general model for the landscape scale

The model is applicable to relatively large, arid, semiarid, grassland, and forested landscapes

The model contains seven salient features:

- 1.
- 2.
- 3.

- 4.
- 5.
- 6.
- 7.

Suburbia: Ecological vs. Other Values

Chicago Wilderness and Northeast Illinois Planning Commission (NIPC)

“Environmentally friendly” housing

### Managing

Managing for the big picture.

One proposed approach is to use indicator species

Should preserves be established were **no** humans can go?

A basis for planning regimes needs to be developed:

- 1.
- 2.
- 3.
- 4.