

Where the Wild things Were...

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Parcelization, Fragmentation, and Biodiversity Loss

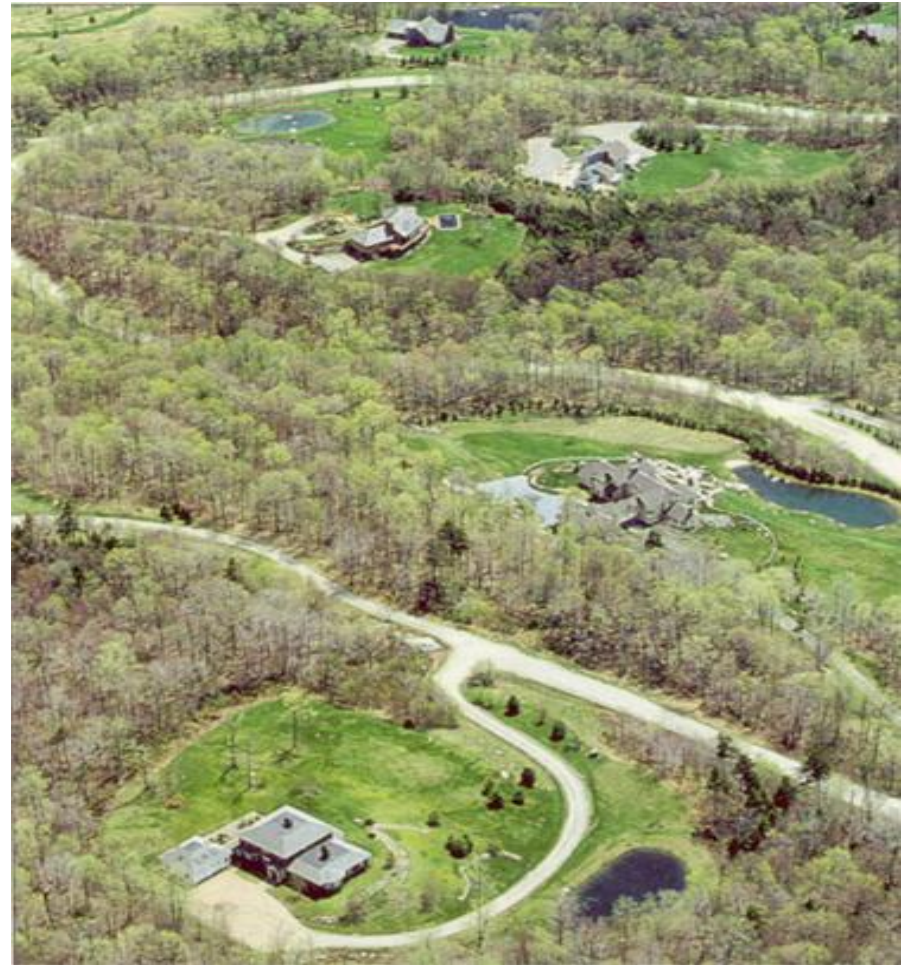
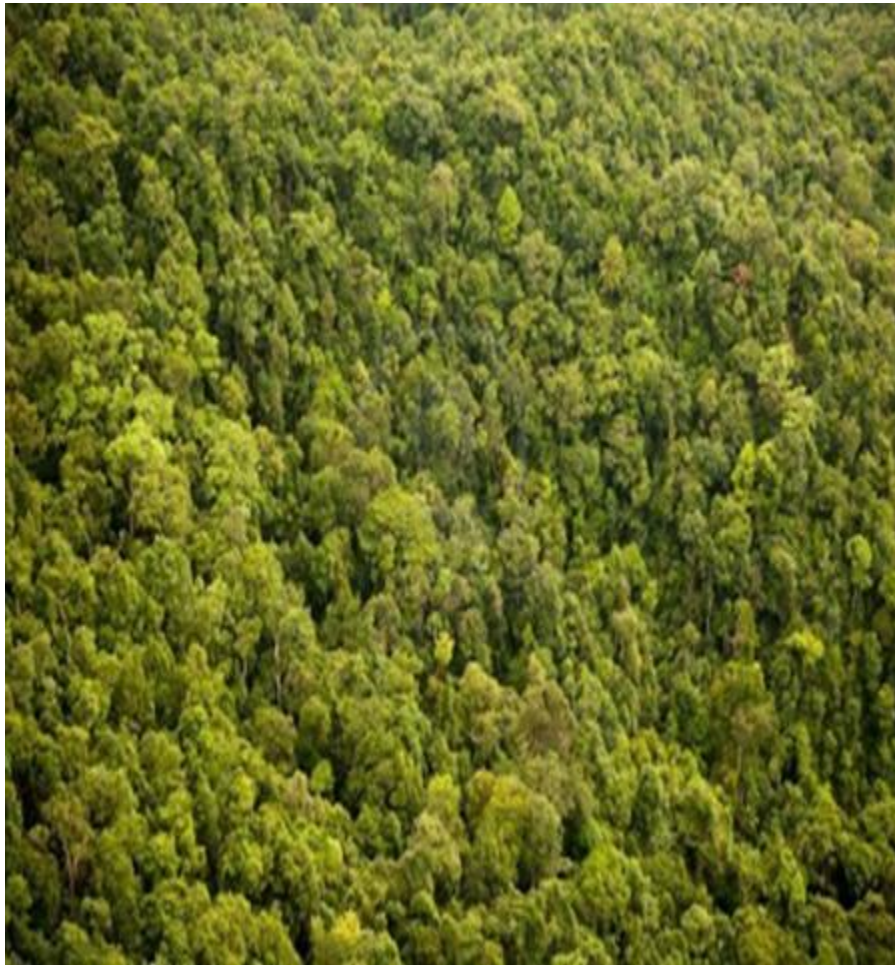


Fair Chase and Conservation
SINCE 1887

Outline

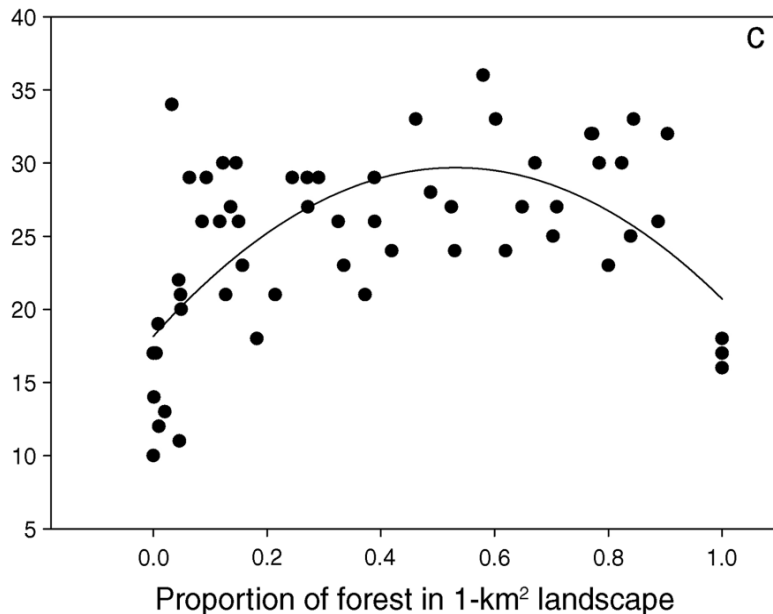
- What do we mean by biodiversity?
 - Ecological Integrity...
- Defining Parcelization
 - Rural Residential Development
- Some known effects of Rural Residential Development
- How the process works
- Why do we care?

Parcelization that Leads to Development, Fragmentation, and Changes in Ecosystem Structure and Function



A word about “biodiversity”

- Not just the number of species...
- Refers to the loss of native species and replacement by a simplified community



Rural Residential Development

- **Low-density housing**
6–25 /km²
(15–64/mi²)
- **Small parcel size**
4–16 ha
(10–50 acres)

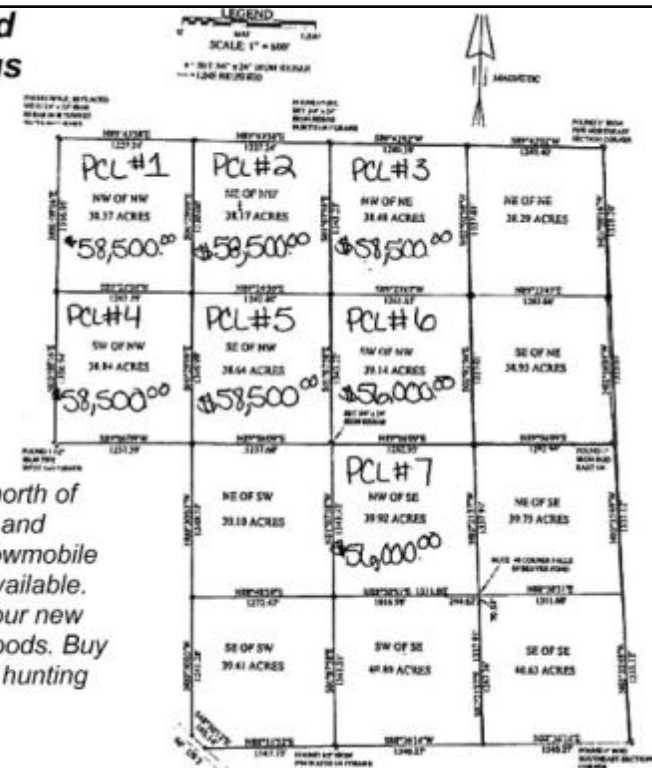
“This is the perfect place to build your new recreational cabin in the Northwoods!!”

Wisconsin Vacant Land Non-Waterfront Listings

Price: \$58,500.00
Size: 38.37 +/- Acres

Location: Off Brule Landing Rd.
Florence, WI
County: Florence

Very private parcel located just north of Florence, WI. Close to the Brule and Menominee River, access to snowmobile and ATV trails and utilities are available. This is a perfect place to build your new recreational cabin in the Northwoods. Buy now and start enjoying excellent hunting opportunities today.





Not Parceled or
Fragmented



Parceled but not
Fragmented



Parceled and
Fragmented



Changes in human use

- Elimination of Forest Management Options
- Loss of Hunting and Trapping Opportunities



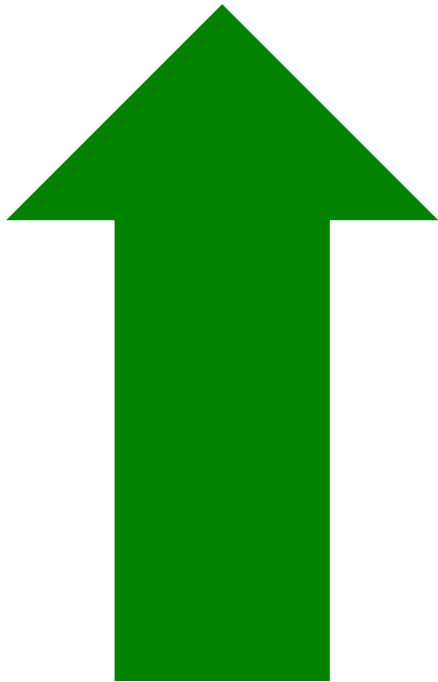
What Happens: White-tailed Deer

- Easily Become 'overabundant' in human-altered areas
- 30 – 50 per mi²
- Keystone Species

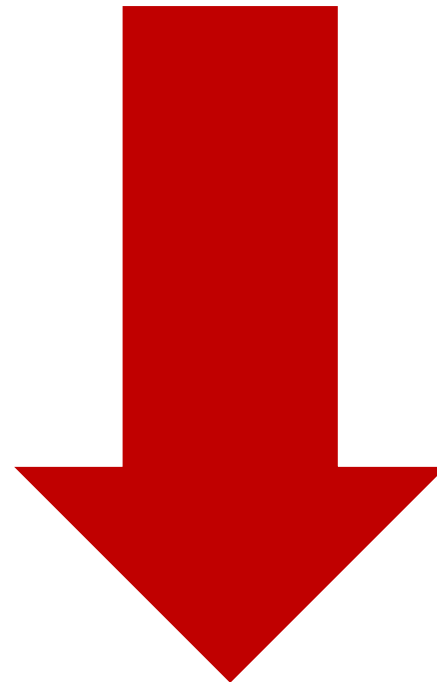


Impacts are both ecological and social

Deer Numbers



Hunting Access



What Happens: Black Bear

- Altered Activity Patterns
- Better Nutrition
- Increased Mortality



What Happens: Bird Community

- Loss of interior forest species
- Forestry tends to maintain bird community
- **Fragmentation** leads to alteration/simplification



The Mechanism

Parcelization

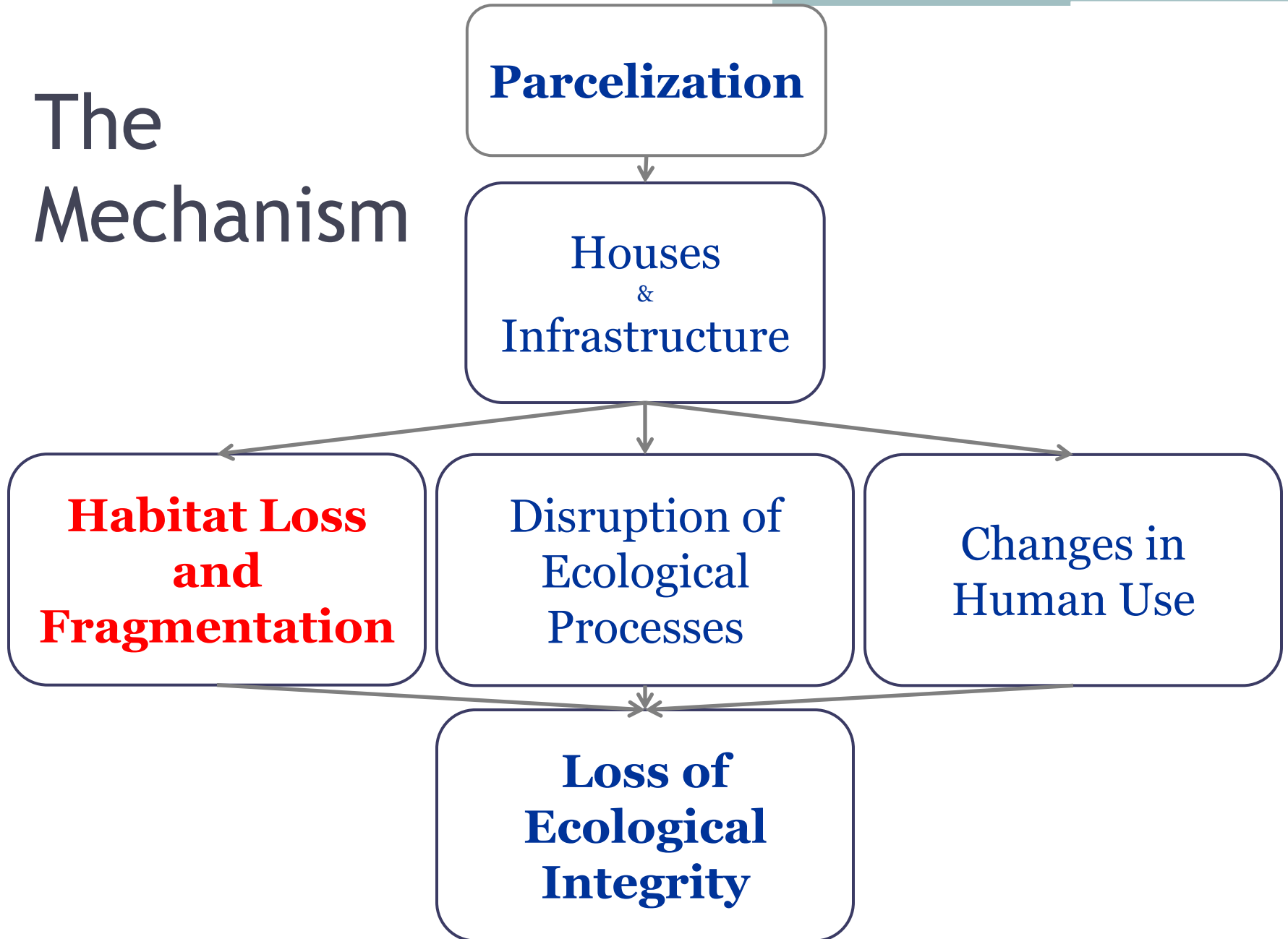
Houses
&
Infrastructure

**Habitat Loss
and
Fragmentation**

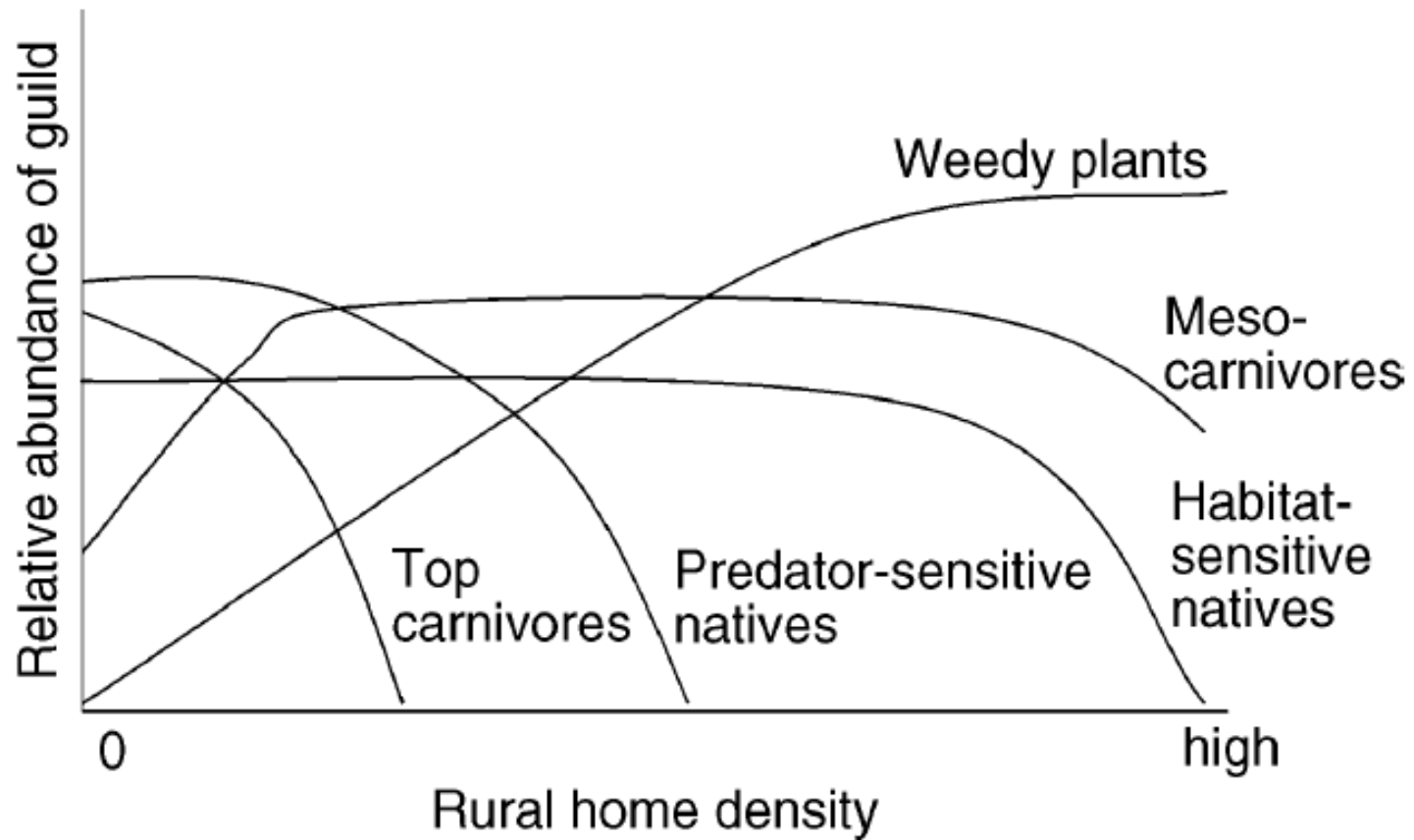
Disruption of
Ecological
Processes

Changes in
Human Use

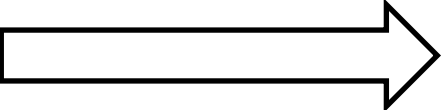
**Loss of
Ecological
Integrity**

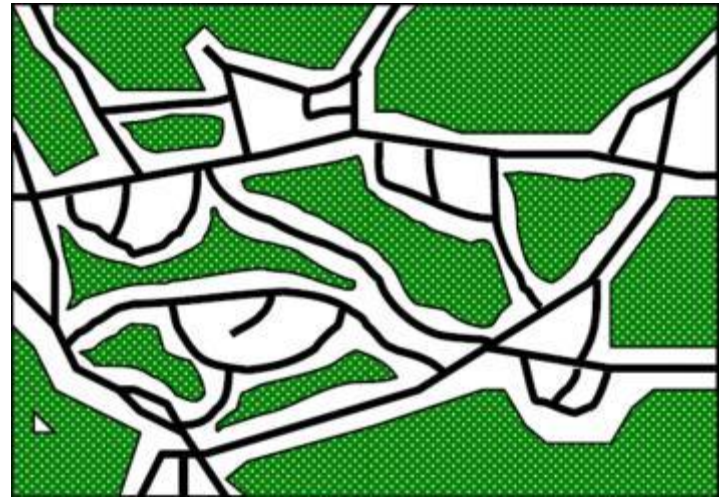
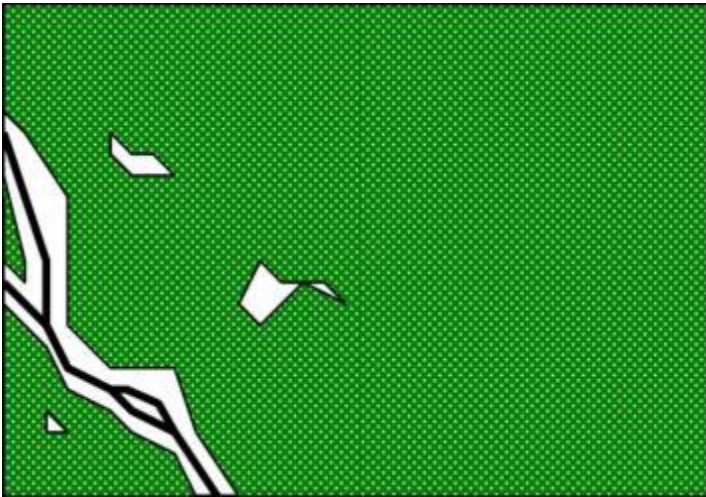


General impacts (Hansen et al. 2005)



Houses and infrastructure

Parcelization  Infrastructure



(Perlman and Milder 2005)

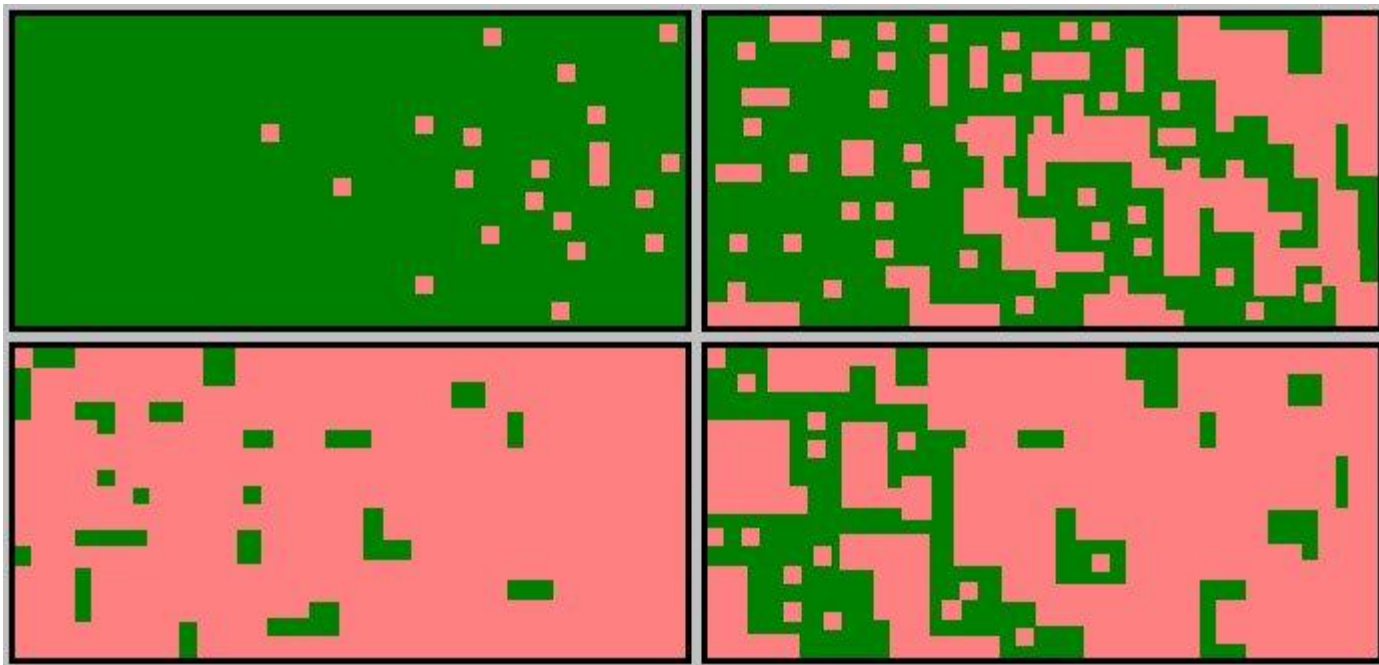
Habitat loss and fragmentation

- Reduction in the total amount of habitat within a given area
- “Inevitably” leads to fragmentation



Forest fragmentation - Definition

The simultaneous loss of forest area and separation of forest patches

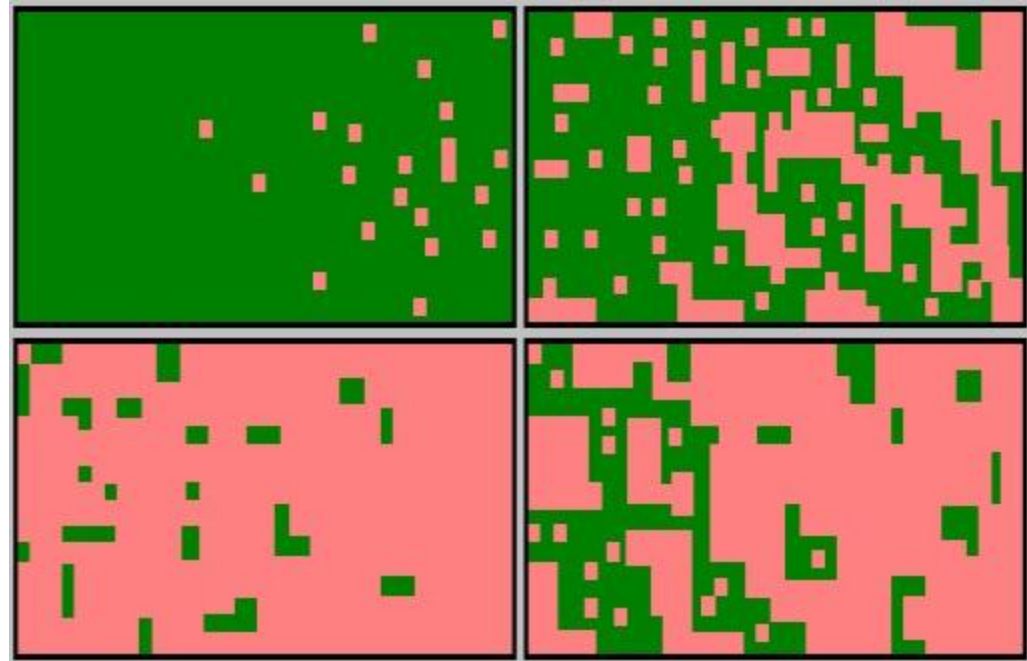


(MICHIGAN FORESTS FOREVER TEACHERS GUIDE)

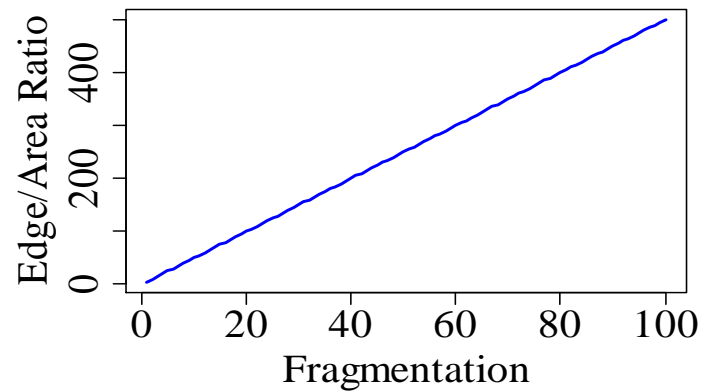
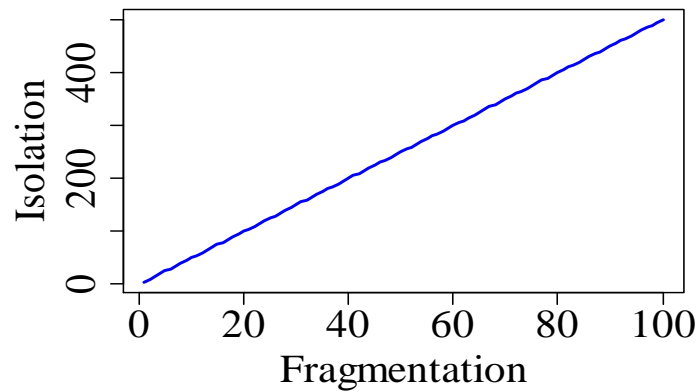
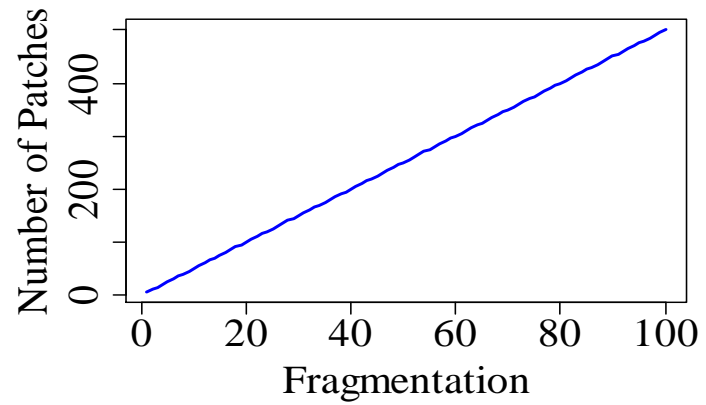
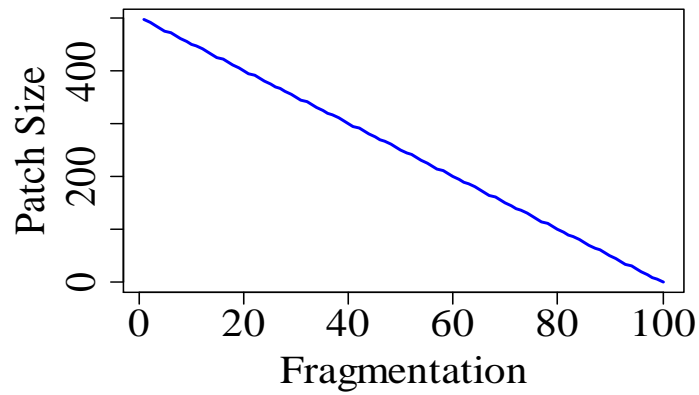
<http://mff.dsisd.net/Environment/EcologyForests.htm>

Measuring fragmentation

- Patch Area
- Number of Patches
- **Patch Isolation**
- **Edge/Area Ratio**

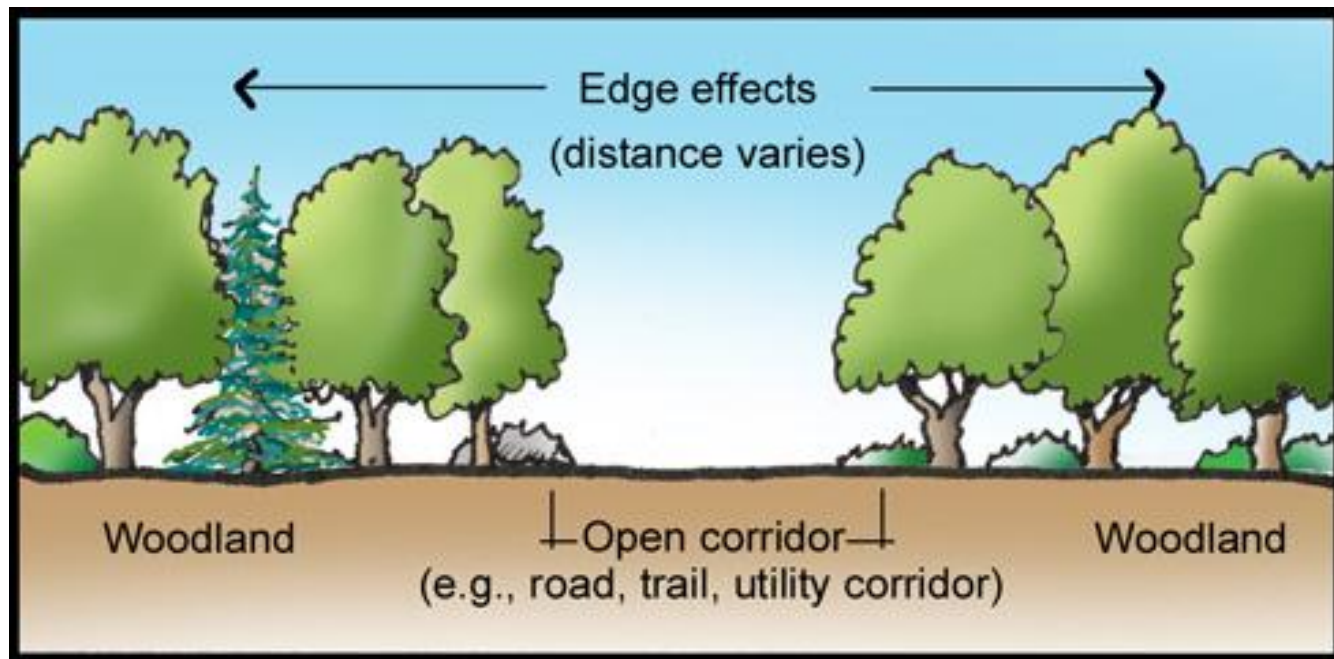


Fragmentation indices

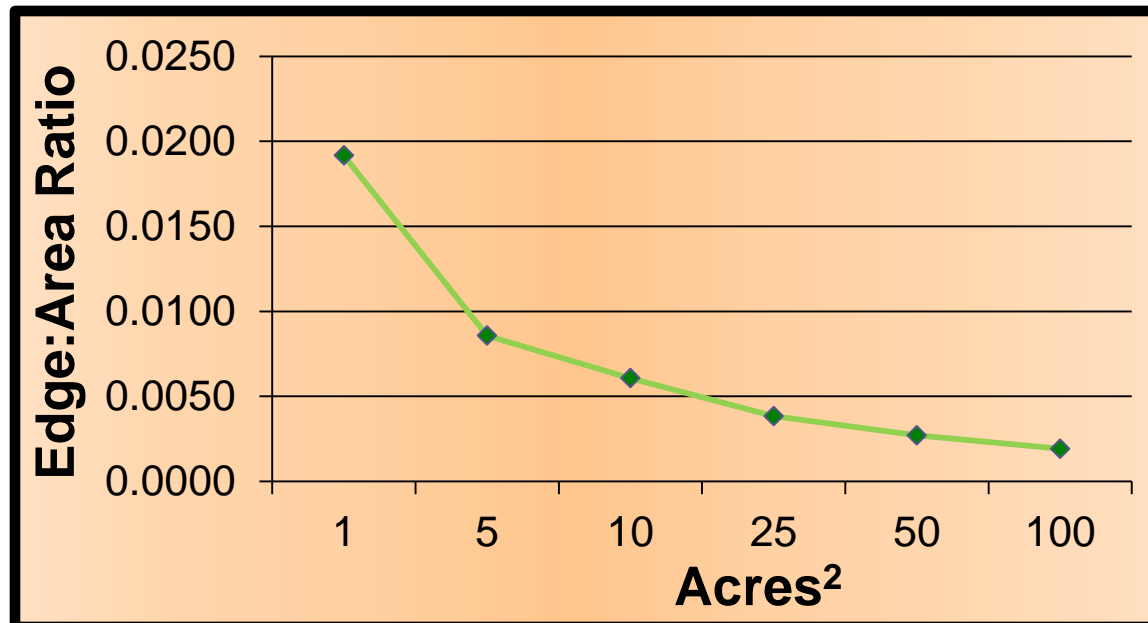
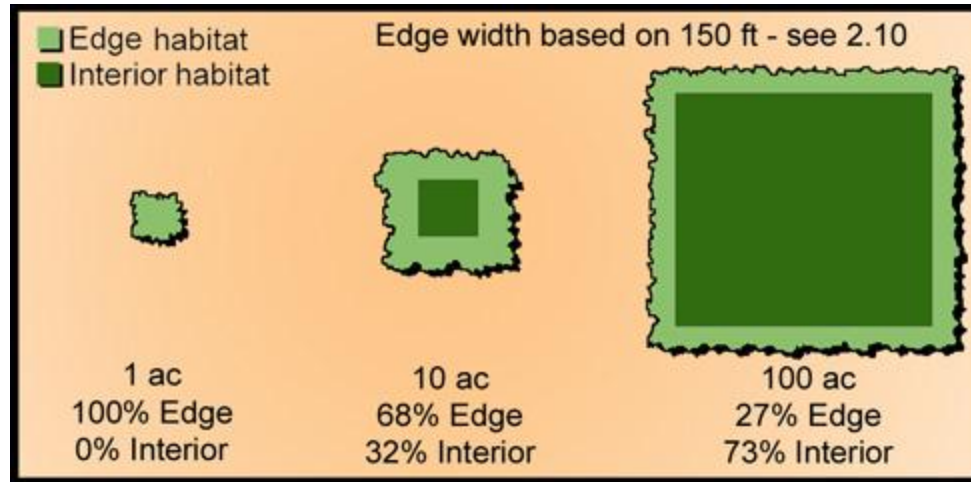


Edge Effects

- “Changes in biological and physical conditions that occur at an ecosystem boundary and within adjacent ecosystems” (Lindenmayer 2006)



Edge/Area and Core Area



What are the effects?

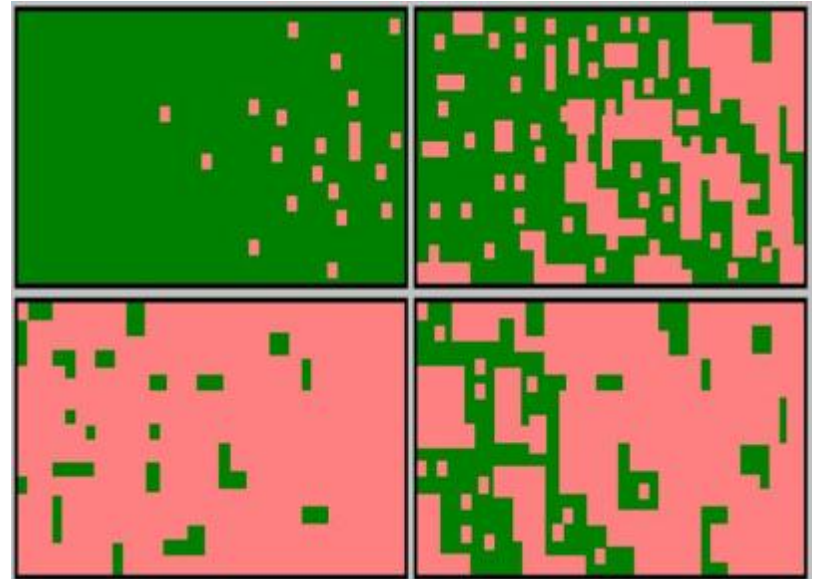
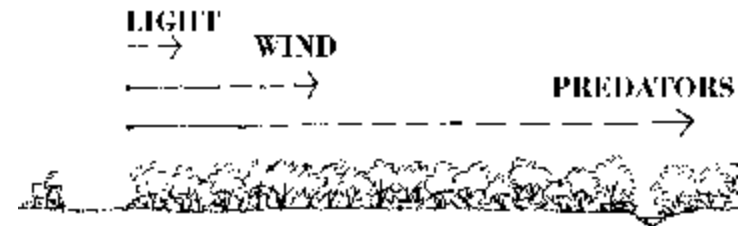
- Abiotic changes

- Temperature
- Light
- Humidity



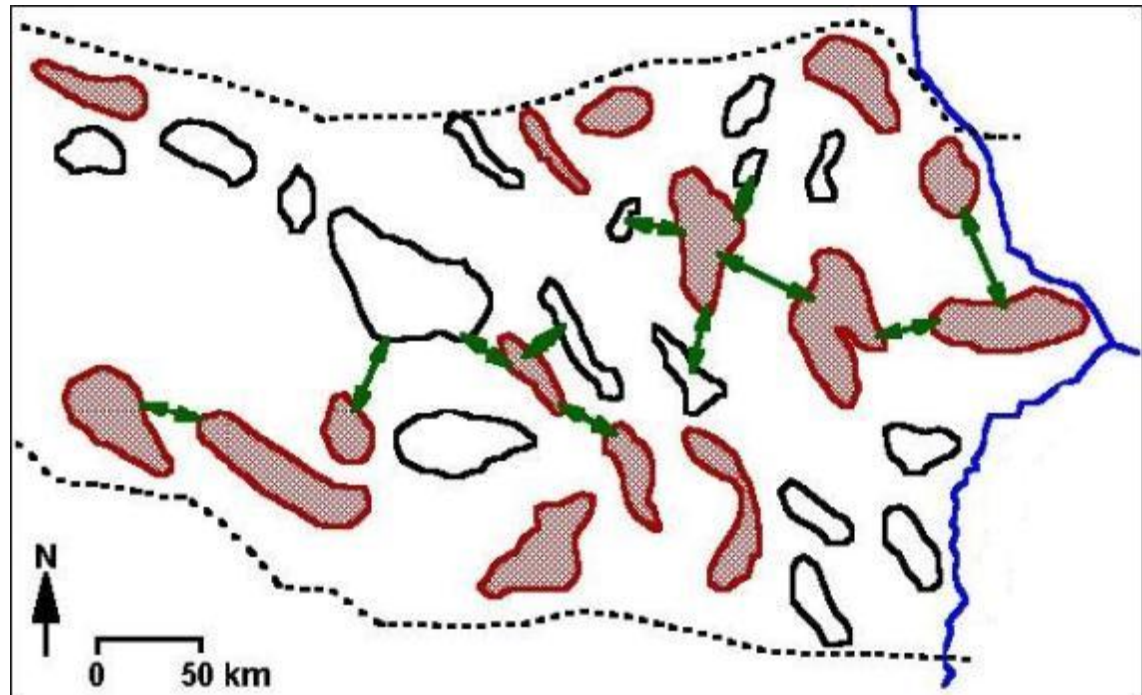
- Biotic Changes

- Shrub density
- Exotic Invasives
- Mesocarnivores
- Interior Specialists



Area and Isolation Effects

- Density, breeding success, connectivity
 - Ruffed Grouse
 - Amphibians
 - Small Mammals



What it means:

- Analytically, it is very difficult to separate the effects of habitat loss and fragmentation.
- It is the same with area and edge effects
- Best to consider them together and not get into sticky theoretical arguments

Disruption of ecological processes

- Natural Disturbance Regimes
 - Fire
- Dispersal of Organisms
- **Forest Regeneration**



Cascade Effects of Deer Overabundance

- Species Composition
- Understory Structure
- Regeneration
- Succession



Increase in Invasive Species

Buckthorn

**Wanted dead, not alive
INVADING SPECIES**

Common Buckthorn, *Rhamnus cathartica*;
Glossy Buckthorn, *R. frangula*



Aliases: *Unknown*

Garlic Mustard



UGA0002039

Increased densities of meso-predators:

- Fox, raccoon, skunk, opossum, weasels
- These are primary nest predators for ground-nesting bird species (including Ruffed Grouse and Woodcock)



Human Disturbance

- Pets
- Activity
(recreation, traffic, etc..)
- Wildlife/Vehicle Collisions



Increasing Parcelization

Heterogeneous
Forest

Highly
Fragmented
(Homogenized)

Diverse Natural
Community

Simplified
Urban
Community

Beyond Biodiversity...

...To Ecological Integrity

- “...the completeness of ecosystems and their capability of maintaining a community of organisms with structural, functional, and compositional qualities comparable to that of natural habitat of the region.” (Glennon 2002)

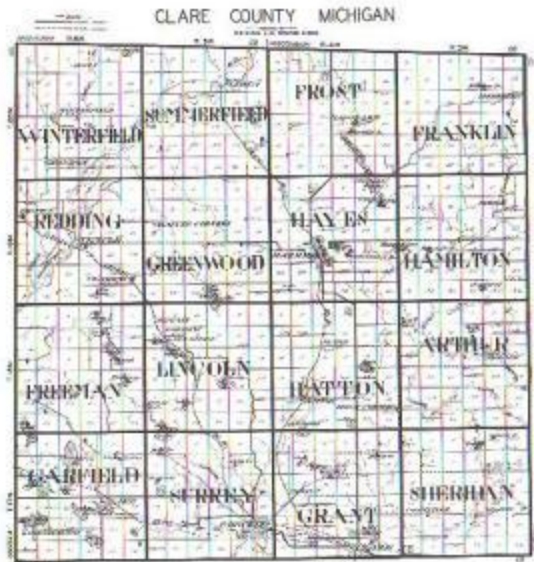
Why Worry?

- Ecosystem Services
 - Forest Products
 - Water Quality
 - Wildlife Resources



What's the answer?

- “Participation among township entities is necessary if public, private, and protected forest areas are to coalesce into a biologically meaningful and self-sustaining ecological network.” (Drzyzga and Brown 1999).



“If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.”

— [Aldo Leopold](#)

