

# **Defining an Intact Sagebrush Community**

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# Intact for What?

## Wildlife in Sagebrush Grass Communities

- 100 bird species
- 88 mammal species
- 58 reptile species

## Sagebrush Obligates

- Sage Grouse
- Sage Sparrow
- Brewer's Sparrow
- Sage Thrasher
- Pygmy rabbit
- Sagebrush vole
- Pronghorn

## Sagebrush Near Obligates

- 33 avian species
- 19 mammalian species
- ?? Reptilian species

# **Intact for What?**

## **Structure Requirements for Sagebrush Obligate Mammals**

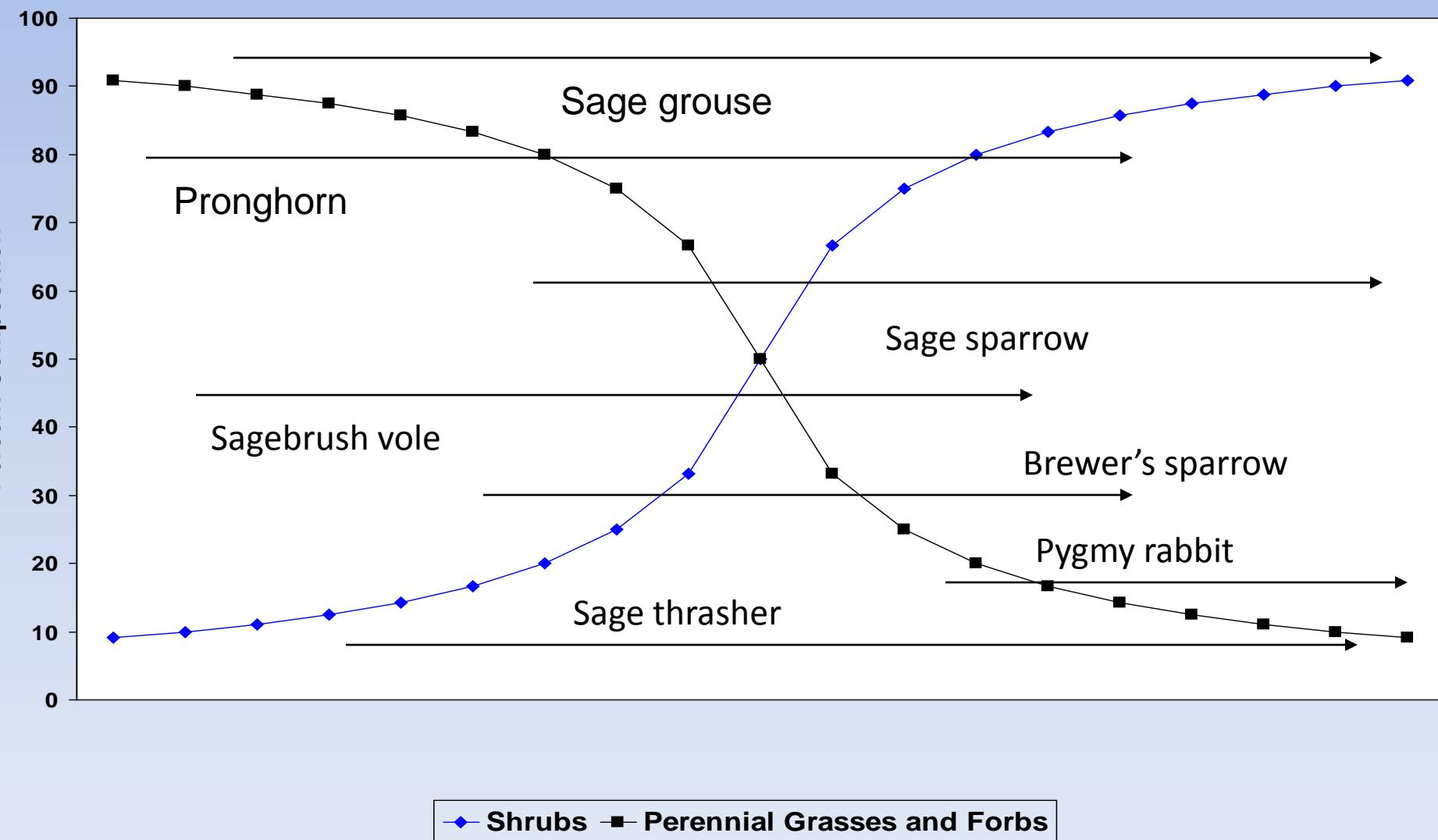
<b>Pygmy Rabbit</b>	<b>tall sagebrush clumps/friable soils</b>
<b>Sagebrush Vole</b>	<b>brushy country where sage, rabbitbrush, and wheat-grasses are common</b>
<b>Pronghorn</b>	<b>mostly consumes forbs, but sagebrush in winter; needs openness for visibility</b>

# **Intact for What?**

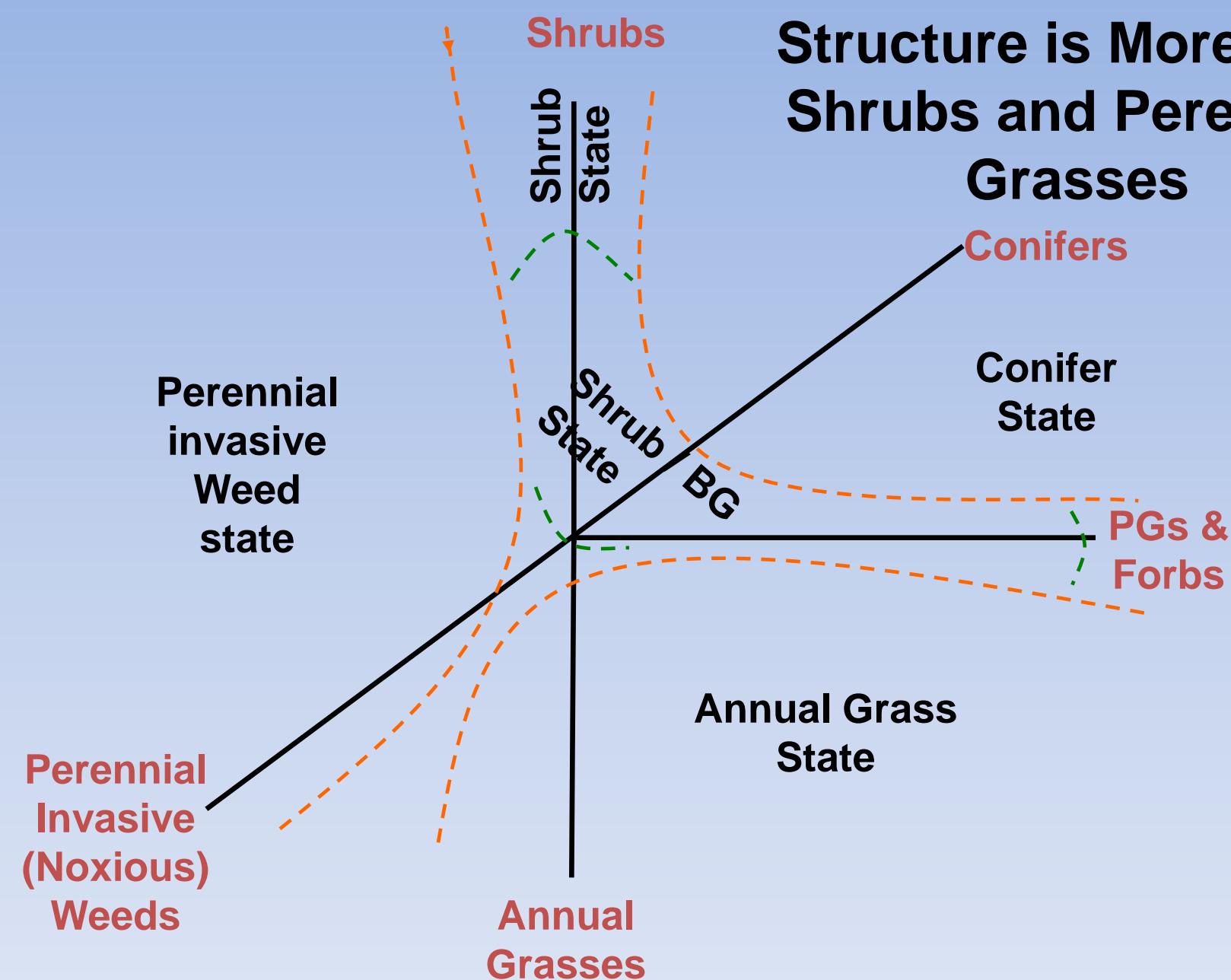
## **Structure Requirements for Shrub-Nesting Sagebrush Obligates**

<b>Sage Sparrow</b>	<b>large continuous sagebrush stands</b>
<b>Brewer's Sparrow</b>	<b>scattered shrubs/short grass</b>
<b>Sage Thrasher</b>	<b>tall dense sagebrush/bare ground</b>
<b>Sage Grouse</b>	<b>All of the above but with strict seasonal needs</b>

# Sagebrush Grass Communities and Sagebrush Obligate Species



# Structure is More than Shrubs and Perennial Grasses



# Conventional Levels of Organization

Level 8 (Largest)	Biosphere
Level 7	Biome
Level 6	Landscape
Level 5	Ecosystem
Level 4	Community
Level 3	Population
Level 2	Organism
Level 1 (Smallest)	Cell

Larger levels define context

Smaller levels provide understanding of mechanism

# **Intact for What?**

## **Major Ecological Processes**

- Disturbance
  - Size, intensity, frequency, dispersion, timing of
- Infiltration and water retention
  - Significant influence on all other processes
- Nutrient cycling
- Succession
  - PH » PH/S » S/PH » S

# **Intact for What?**

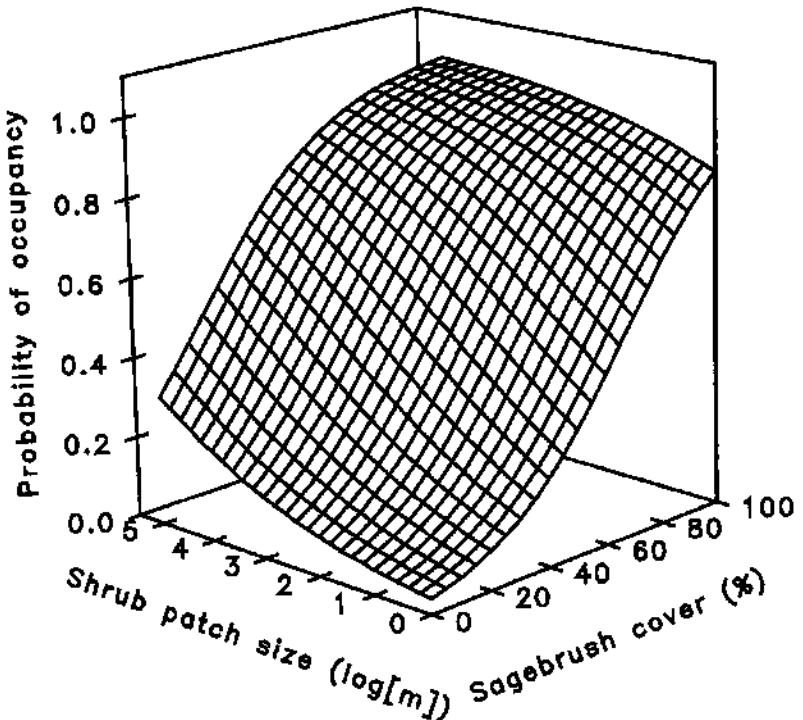
## **Major Ecological Processes**

- **Competition**
  - Exclude/retard invasive species
- **Reproduction/establishment**
  - Increase or replace desired species
- **Primary production**

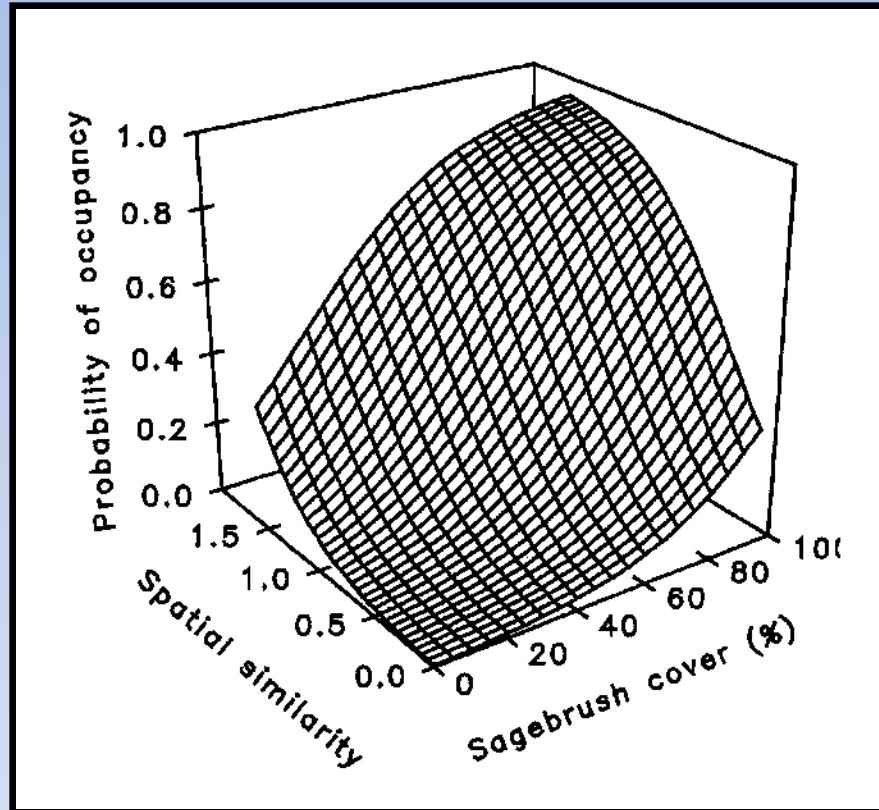
# The Patch

- Relatively homogeneous area that differs from its surroundings
- Attributes
  - Size
  - Shape
  - Type
    - disturbance, remnant, regenerated, environmental resource, introduced, ephemeral
  - Heterogeneity among
  - Boundary characteristics
- The attributes influence productivity, biodiversity, and ecological processes

# Importance of Patch Size



Sage Sparrow

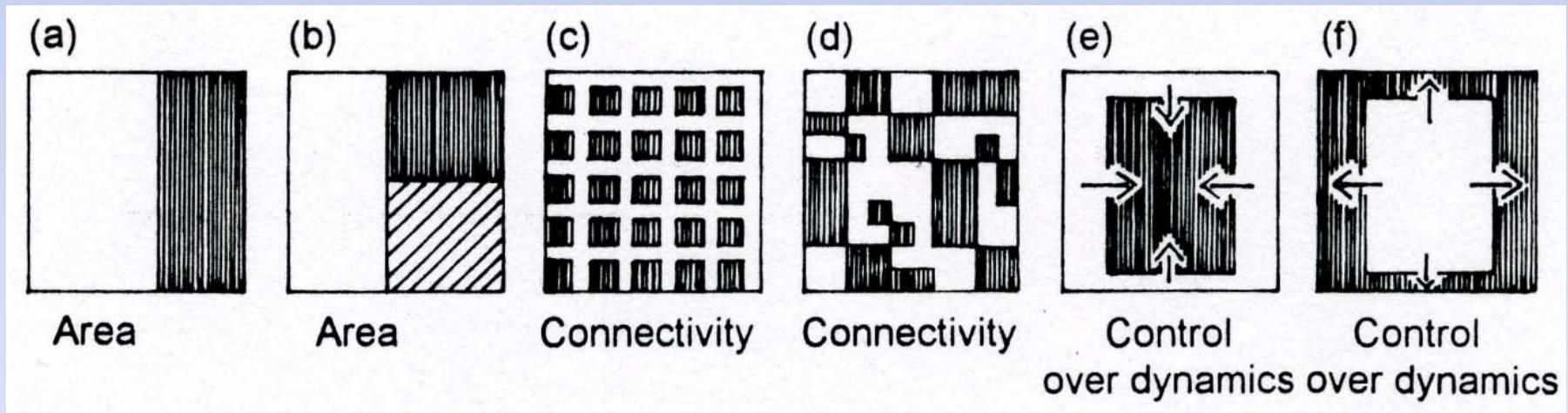


Sage Thrasher

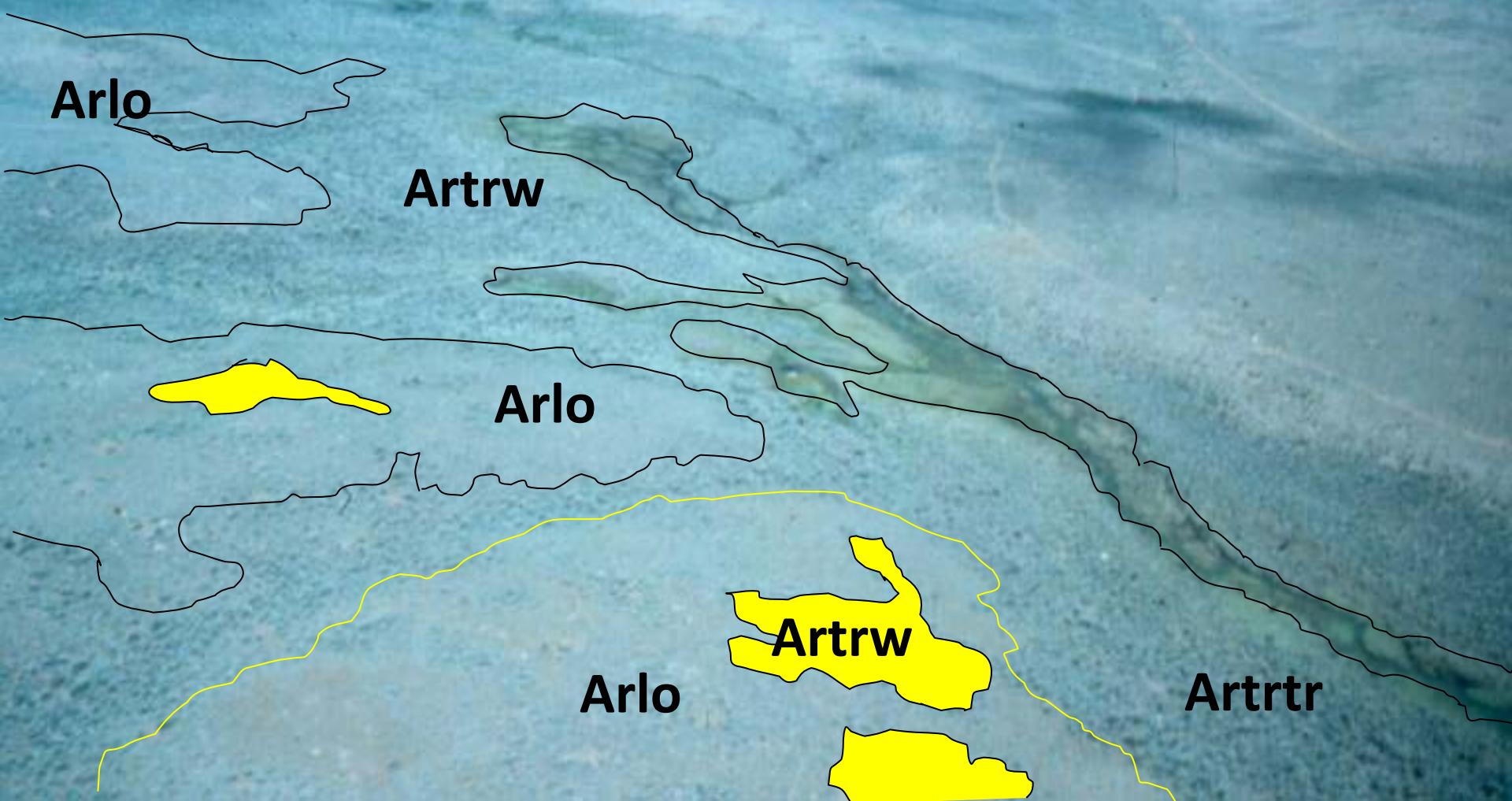
From: Knick and Rotenberry 1995. Conservation  
Biology

# The Matrix

- Extensive areas
- Highly connected
- Controls landscape dynamics



# Patches in a Matrix



# Disturbance Patches



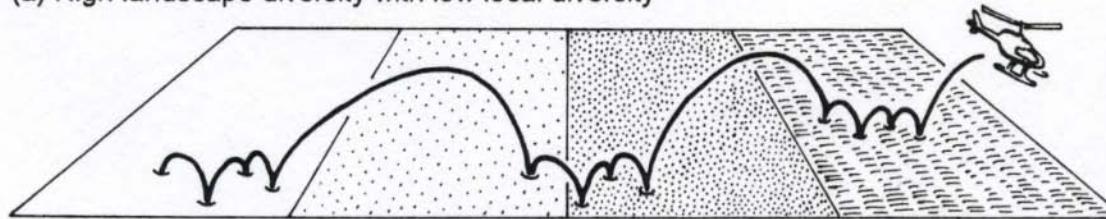
# Remnant Patches



# Landscape Grain in Time and Space

Coarse

(a) High landscape diversity with low local diversity

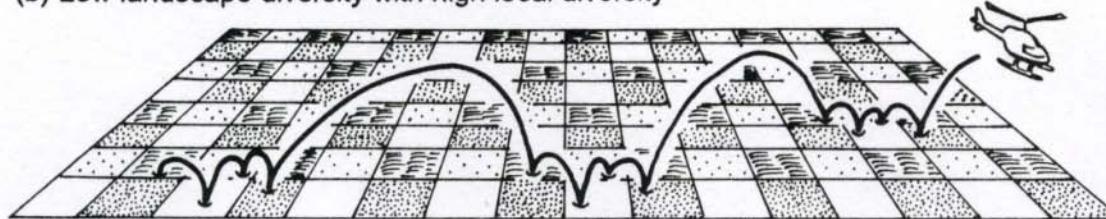


Good for:

Interior species  
Specialists  
High species richness  
Wide range of environmental conditions

Fine

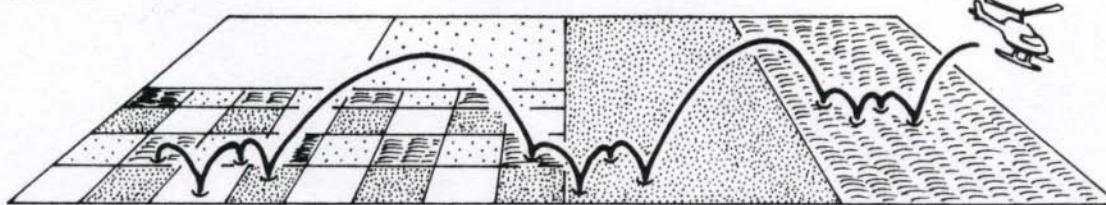
(b) Low landscape diversity with high local diversity



Edge species  
Multihabitat species  
Generalists  
Widespread pollution

Mix

(c) High landscape diversity with variable local diversity



All of the above except limited area of pollution

Fig. 14.3. Ecological effects of grain size. Helicopter stops for sampling at four local spots in three separated portions of each landscape.

SPECIES RICHNESS

(9)

(4)

(6)



# Sagebrush System is Complex

- Many scales and levels of organization are needed to adequately describe the SB system
- Individual organisms assigned to species are variously scaled, creating complex communities
  - Ant vs ground squirrel vs burrowing owl vs pronghorn vs mountain lion
  - Early seral vs mid seral vs late seral plants
- Same processes and mechanisms may occur across the entire system but intensity and rates and timing differ

# Mosaics

- A mosaic of fine and coarse grained habitats (patches), of different size, with multiple-aged stands of sagebrush and varying degrees of herbaceous and shrub cover provides the vegetation structure vegetation diversity components required by diverse wildlife species
- An abundant PH component maintains key ecological processes critical to site resistance and resilience
- Increased patch diversity typically leads to more resistant and resilient landscapes, provided the patches maintain the important ecological processes needed for resilience

# Shifting Mosaic

- Succession at both the community/patch and landscape scales
- Total area stays the same
- Patches, however, change location and successional status with disturbance regime and recovery
- Patches undergo routine vegetation change in response to the imposed disturbance regime
- Landscape remains largely stable but is always changing.

# Patches and Associated Heterogeneity are Not Always Present



# Disturbance is a Critical Process of the Sagebrush System



# Disturbance

- Ubiquitous on rangelands
- Non-human and human causes
- Many scales, both space and time
- Important ecological roles, but not well understood
- Fire is only one mechanism of a complex process
- Critical to maintaining perennial herbaceous component which sustains site resilience
- Critical to keeping patchy, heterogeneous habitats when soil variability facilitates patchiness

# Bio-Physical Disturbance

vs

# Ecological Disturbance

- Fire and insects are bio-physical disturbances that periodically remove shrubs which promotes perennial grasses and forbs and maintains site resilience
- Removing/altering the bio-physical disturbances from a landscape results in an ecological disturbance that damages system processes
  - A threat to intact community/landscape

**An intact sagebrush  
community/landscape will have  
periodic disturbance and the  
resilience to recover.**

**Disturbance is critical to managing  
vegetation to achieve heterogeneity  
(patches) on many sagebrush  
landscapes .**

# Sustaining Intact Sagebrush Communities

Requires active management of the type, distribution, and intensity of disturbance

to achieve resilient plant communities at different successional stages (patches) at landscape scales

# Dynamics of Succession

- The value of each landscape patch for various wildlife species changes over time as the dynamics of natural or prescribed disturbance and secondary plant succession occur
- When there are too many patches/communities and/or a landscape matrix with reduced resilience the landscape becomes vulnerable and eventually there is a loss of species and resource value
- Management objectives must identify what is tolerable?

# The Question Becomes

What specific actions can be taken that manage fuels, but maintain the ecological processes needed to achieve the vegetation composition and structure that benefits multiple species, our society's resource production needs, and promotes vigorous vegetation that retards the risk of invasion by weeds and/or excessive woody plants?

# Is this an Intact Sagebrush Community?



# Is this an Intact Sagebrush Community?



# Intact but is it Desired?



06. 23. 2006

# What is Needed for an Intact Sagebrush Community

- More than the mere presence/absence of SB
- Without an abundant perennial herbaceous understory the community cannot be intact, regardless of the amount of sagebrush
  - PH component provides critical ecological processes needed to sustain the site
- Succession toward a shrub-perennial herbaceous community cannot occur – annuals and/or other weeds will predominate
- Resistance to invasion is absent or largely so

# What is Needed for an Intact Sagebrush Community

- The absence of sagebrush following disturbance, but the presence of important ecological processes that promote succession toward a sagebrush-perennial grass state suggests the community is intact, but incomplete
  - lacks the desired long-term composition and structure but has the processes needed to obtain them
- What management steps are necessary to facilitate succession toward the desired outcome

# Conclusions

- One size fits all approaches will not work
  - We must understand the bio-physical constraints of the different landscape settings and work within the appropriate spatial and temporal scales, and ecological hierarchy.
- Maximum flexibility is essential
  - Ecological, social, political and legal
- Preserving ecological processes is the only possible way to maintain intact sagebrush communities and landscapes across time
  - Community resilience vs physical presence of SB

# Conclusions

- Society's demands for resources and multiple uses requires a pro-active approach to vegetation/landscape management
  - Large scale landscape architecture by managing the type, size, intensity, and dispersion of disturbance to maintain community resilience.

A wide-angle photograph of a natural landscape. In the foreground, there is a field of dry, yellowish-brown grass and scattered low-lying shrubs. Beyond the field, a range of hills or mountains stretches across the middle ground. These hills are covered in sparse vegetation and show distinct shadows from the sun. In the far distance, a range of mountains is capped with white snow. The sky above is a clear, pale blue.

# Questions

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