

Site Descriptions

History, Concepts and Emerging Issues

Ecological Site Description
Interagency Work Group
Jornada Experimental Range
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History- *how did we get here?*

Concepts - *important principles*

Emerging issues- *what is standing
in the way of progress?*



Exploitation phase

- How much forage is there?
- How many cattle can we carry?
- How can we get the cattle to the forage?



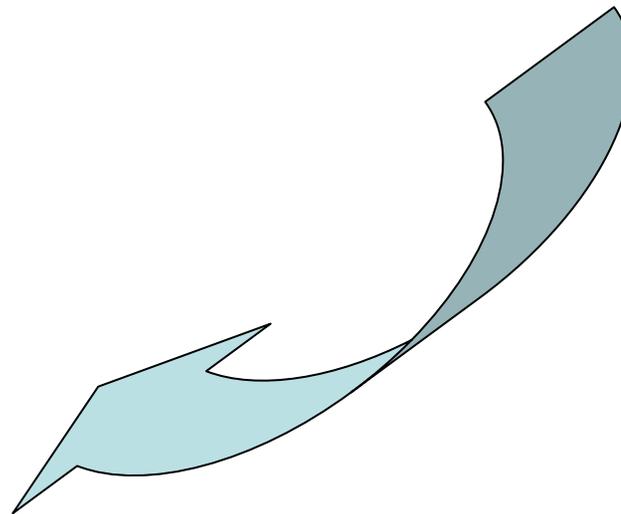
Sustainable Yield Phase

- Range Condition/Range Sites
 - Long term carrying capacity
 - Plant succession as a basis for assessment
 - Included sources of forage loss other than direct consumption by livestock

Livestock production and performance remained the focus during this period, but from an ecological dynamics standpoint

ECOLOGICAL SITE DESCRIPTIONS

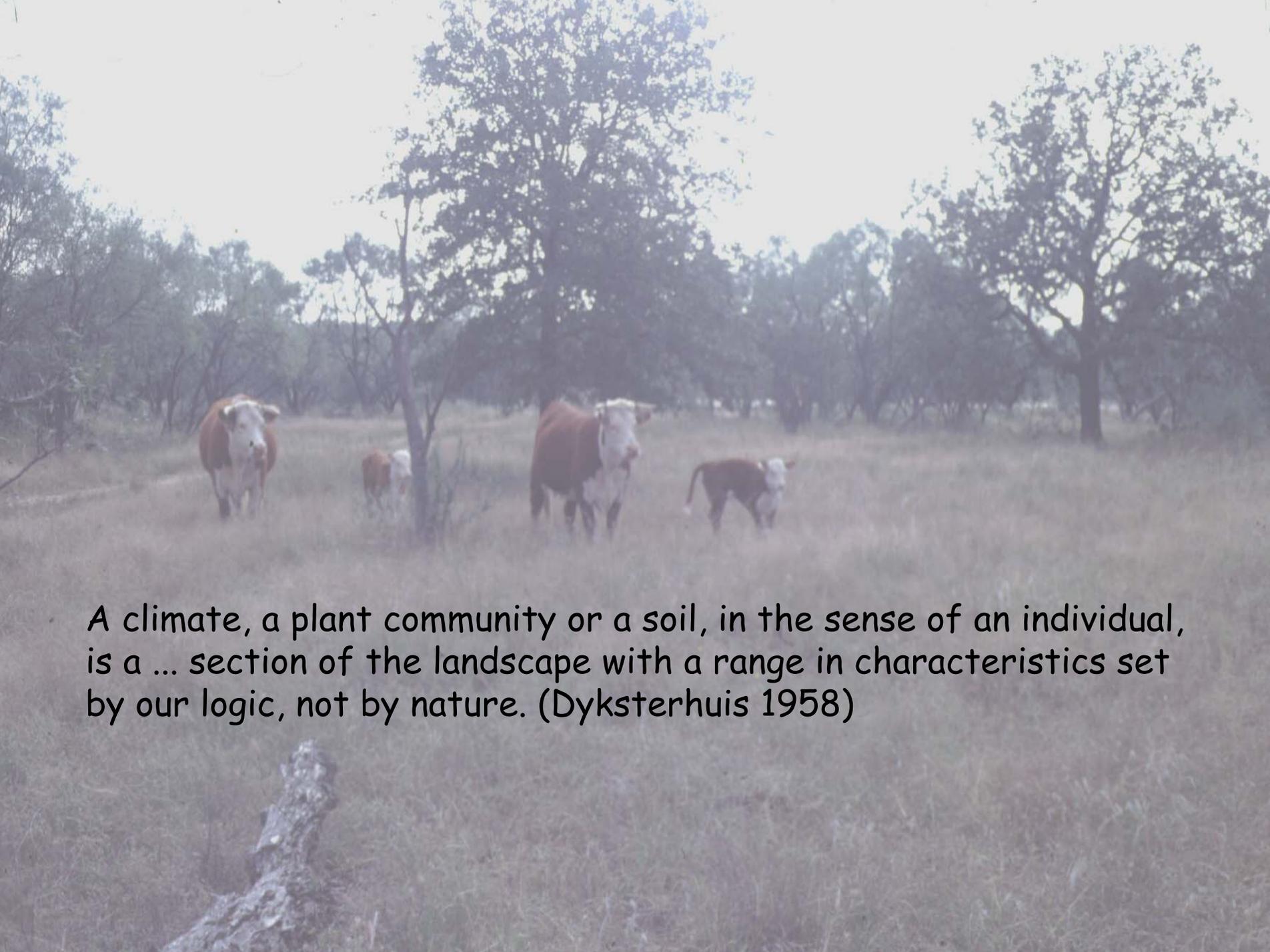
- Allows for multiple stable states and nonequilibrium dynamics
 - Includes multiple values
 - Recognizes multiple objectives for planning purposes
- Livestock production is one of many potential uses



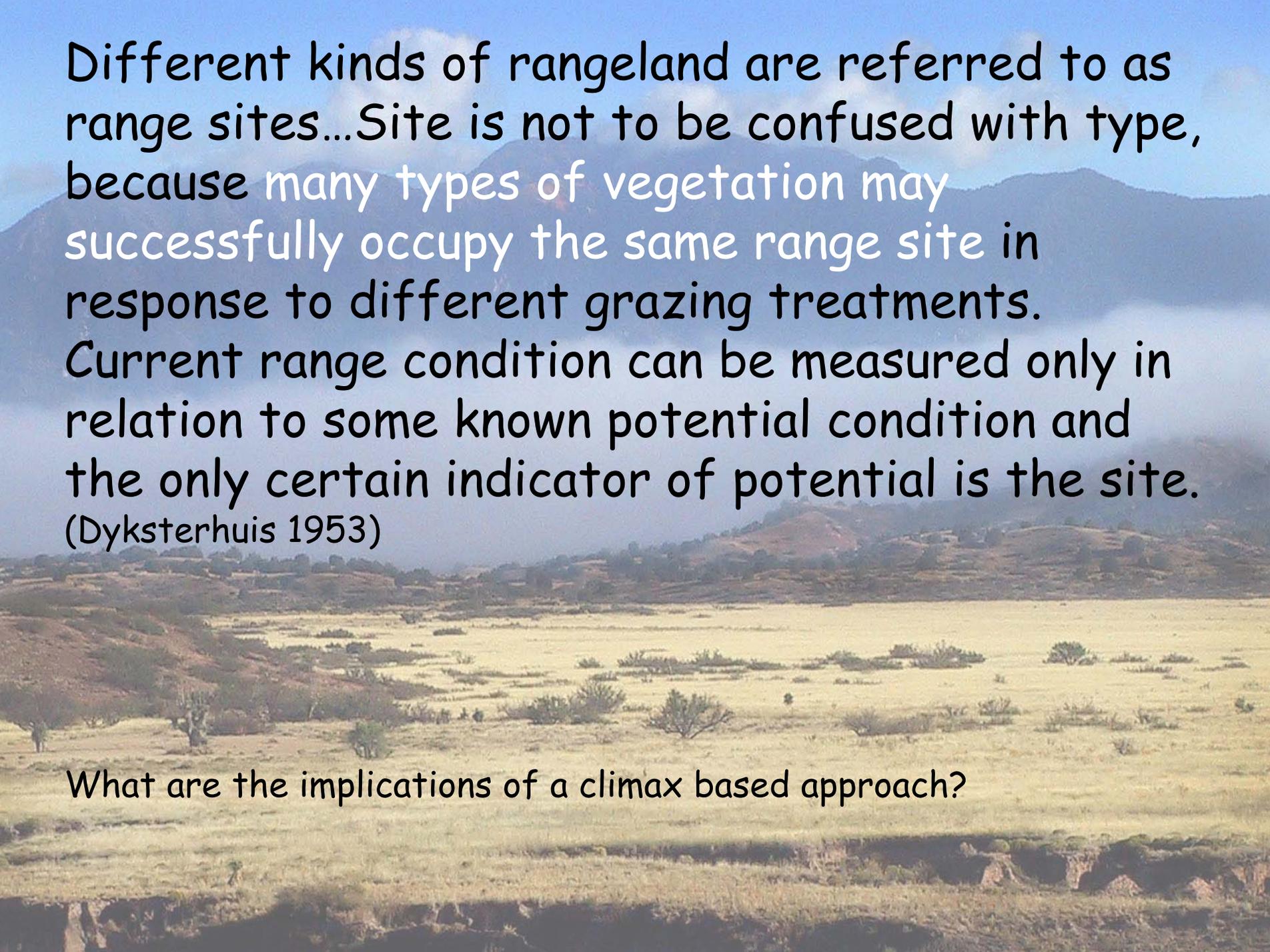
Derivation of the Site Concept

An early publication on forest sites by Korstian (1919) is thought to have provided the basic concept for range sites...The concept of "site" as an ecological or management entity **based on climax plant communities** was transposed from forestlands to rangelands in the 1930-40s...Range Site was first used in the literature without definition. Renner and Johnson (1942) implied different kinds of rangeland existed without defining the differences. Later, Renner (1949) referred to sites as kinds of rangelands with **inherently different soil and vegetation characteristics that result in different potential productivity**. (Shiflet 1973)

A more definitive description was used by Dyksterhuis (1949) characterizing range sites as types of rangeland that differ from each other in their **ability to produce a significantly different kind or amount of climax ... vegetation**...A similar concept was presented later in which sites were described as different kinds of rangeland resulting from **complexes** of soil and climate whose **functional differences** are based on measurable differences in kind or amount of **climax vegetation**. (Shiflet 1973)



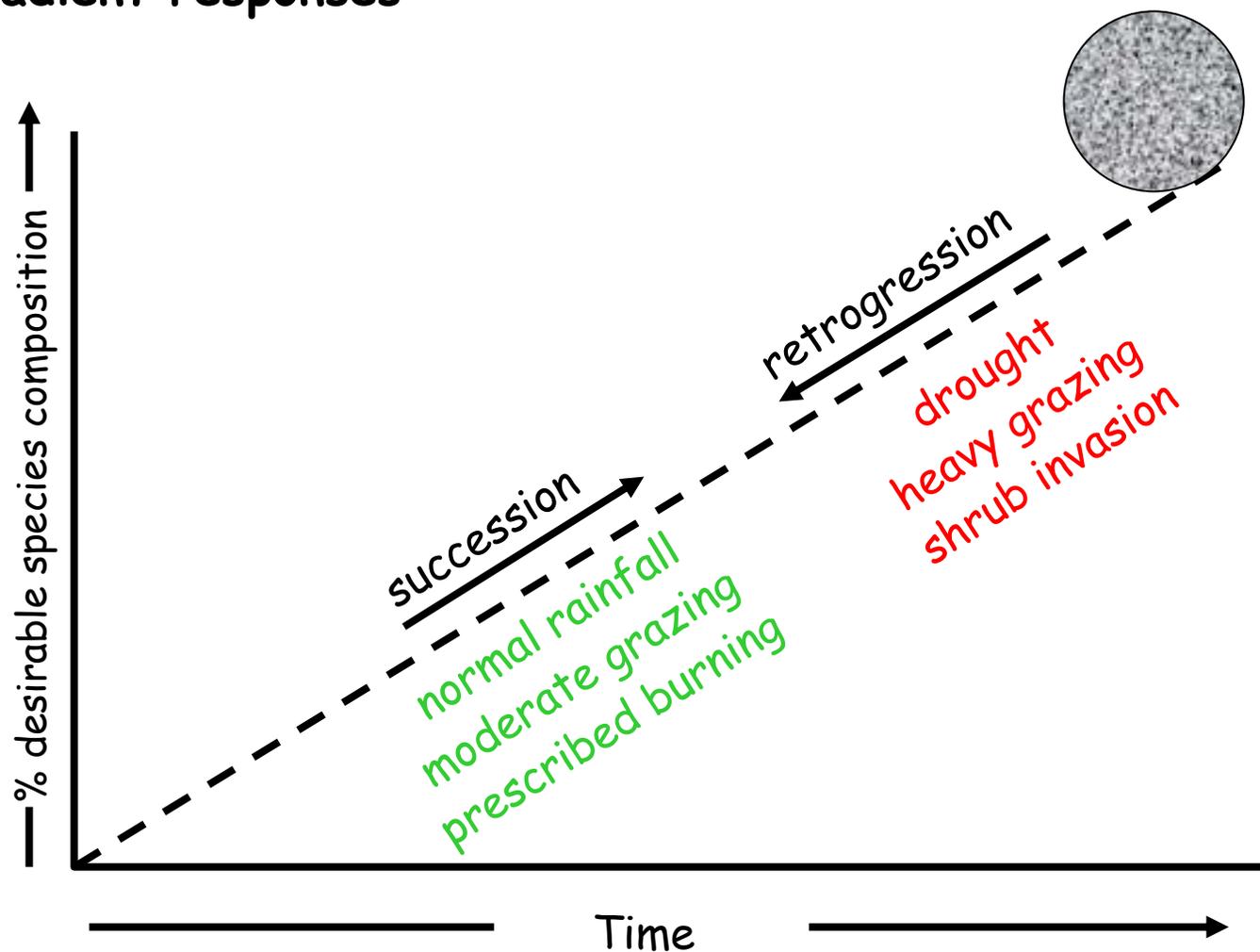
A climate, a plant community or a soil, in the sense of an individual, is a ... section of the landscape with a range in characteristics set by our logic, not by nature. (Dyksterhuis 1958)

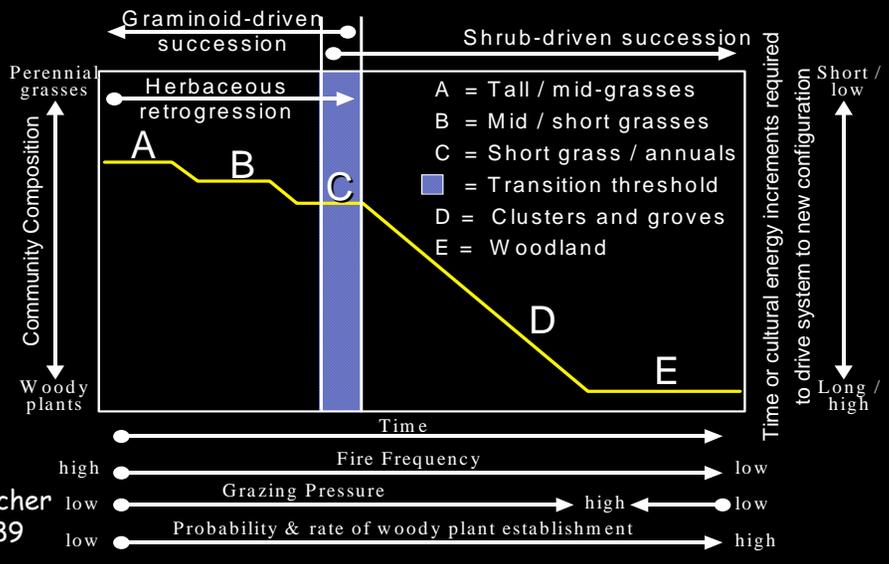


Different kinds of rangeland are referred to as range sites...Site is not to be confused with type, because many types of vegetation may successfully occupy the same range site in response to different grazing treatments. Current range condition can be measured only in relation to some known potential condition and the only certain indicator of potential is the site. (Dyksterhuis 1953)

What are the implications of a climax based approach?

1. Allows for grouping soils in response to **lack** of disturbance
2. Assumes change is linear
3. Gradient responses





Holling 1973 'Stability and resilience of ecological systems'

May 1977 'Multiple stable states in ecological system'

Westoby et al 1989 'Opportunistic management for rangelands not at equilibrium'

Archer 1989 'Have south Texas savannas recently been converted to shrublands'

Archer 1989



Concept development to date has relied on temporal dynamics
 Need to build a similar framework for spatial change

Emerging issues in the development of Ecological Site Descriptions

1. Artificial separation of forest and range sites

Variation in shrub and tree cover

2. Grouping soil map units into ecological sites

New soil surveys-lower order includes more variability

Existing surveys need to be reexamined

3. Lack of transparent, logical decision making

Extant examples of reference states (HCPC)

Relevant supporting data

Distribution of reference and sampling sites



4. Reliance on non-spatially explicit species composition and productivity data

Importance of spatial distribution of attributes-scale

Decoupled or loosely coupled overstory/understory relationships
Asymmetrical interactions between overstory/understory
Grass/shrub/tree layers



Criteria for grouping soils together

Behavior - dynamics in response to disturbance, HCPC-response to lack of disturbance, (dynamic) soil properties?



No concrete examples of 'HCPC' or similarly vague term

Weak supporting information

Permanent plots



When is a transition so severe that a new ecological site should be created?

Never: because then a rangeland can be degraded into a healthy state with a new potential. For instance, mesquite and juniper dominance could be the 'potential' for a new site.

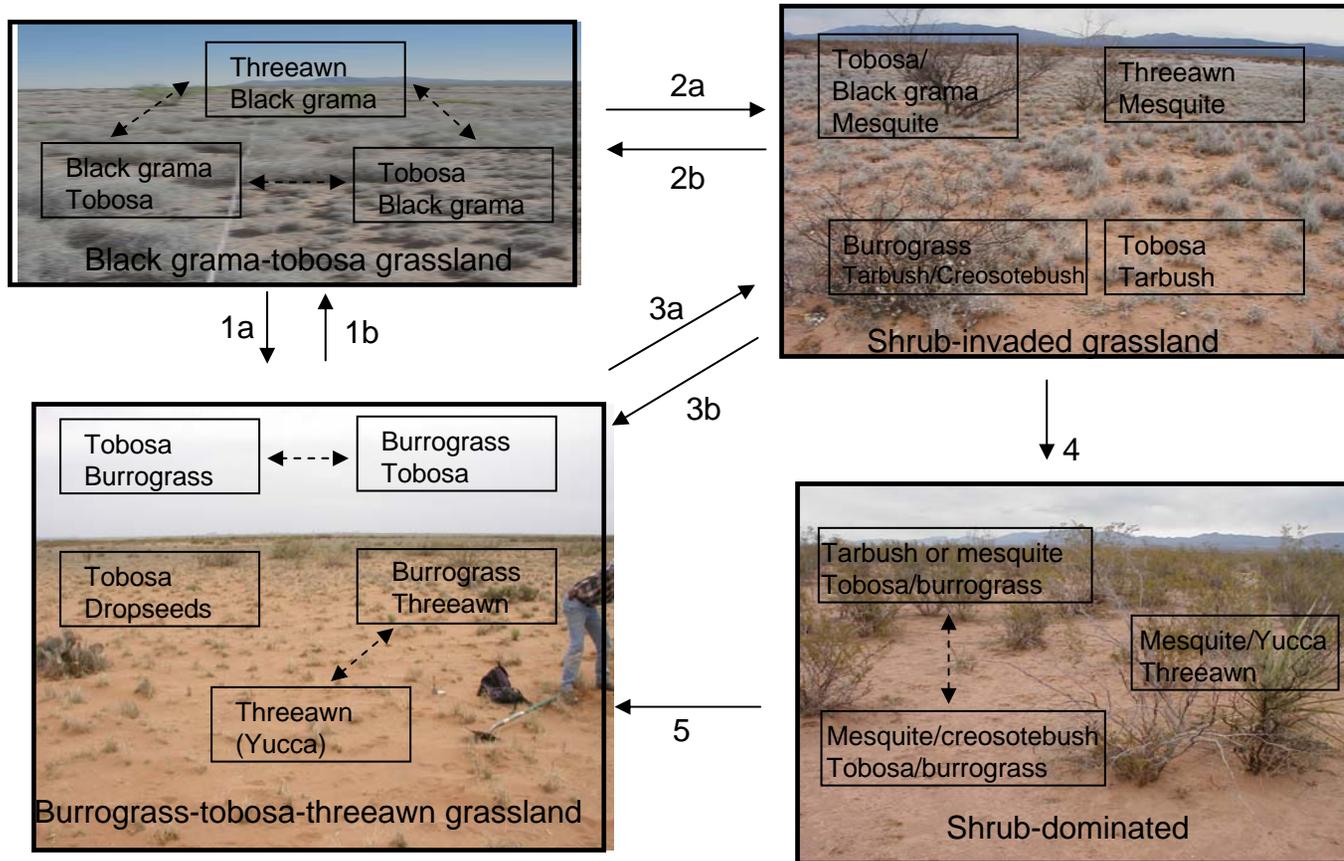
Alternative: When soil morphology is severely altered, establish a new site but maintain its connection as a degraded state of its ancestral site

Danger: When is soil morphology "severely altered" --and isn't this a value judgment?



Formulation of Alternative Hypotheses

Loamy SD-2



- 1a-Overgrazing, soil fertility loss, erosion and sand loss; 1b-Soil stabilization or modification
 2a-Shrub invasion due to overgrazing and/or lack of fire; 2b-Shrub removal, restore cover
 3a-Shrub invasion; 3b-Shrub removal with grass recovery
 4. Persistent reduction in grasses, competition by shrubs, erosion and soil truncation
 5. Shrub removal with soil addition?
 (Bestelmeyer et al 2003)

SUMMARY

- Excellent progress to date
- Wide variety of approaches is generating confusion and resulting in novel creative solutions
- Broad guidelines for consistency are needed-should be based in logic and general ecological principles
- Current ESDs should be viewed as 'testable hypotheses'-incentives to try something new
- We need a spatial framework for decisions

