

ANNOUNCEMENTS

- Lecture Today and Tuesday:
 - Range condition
 - State and Transition Models
 - Rangeland health
- Lab today: Range condition (in classroom)
- Lab Tuesday: TWO-PART REVIEW!
 - Part 1: Synthesize information as a class about vegetation measurement methods
 - Part 2: Student-driven Q & A

ANNOUNCEMENTS

- Final Exam on Thursday:
 - 100 pts.
 - 1 hour and 30 minutes
 - Cumulative
 - Opportunity for you to:
 - Master what you struggled with from last exam
 - Incorporate new knowledge from last couple of lectures

ANNOUNCEMENTS

- Remaining points in RS332 course:
 - 50 pts: Lab Report #3: Due Tuesday
 - 25 pts: Pseudo Lab Report #4: Due Thursday
 - 100 pts: Final Exam on Thursday
 - 25 pts: Course evaluation on Thursday (EASY PTS!)

= 200 pts remaining!

Range Condition State and Transition Models Rangeland Health

Rangeland Monitoring and Measurements
RS332 & RS532

Helpful and supportive readings for lecture material:
Dyksterhuis 1949
Smith et al. 1995
Westoby et al. 1989
Interpreting Indicators of Rangeland Health 2005 (pg. 1-16)

Early History of Range Assessment

1895	Jared Smith	Survey of Western rangelands
1899	H.C. Cowles	Describes plant succession on Michigan dunes
1905	F.E. Clements	Studies succession on Great Plains
1917	J.T. Jardine	Develops first scientific range survey method
1923	A.W. Sampson	Introduces succession as a way to assess grazing capacity

Early History of Range Assessment

1930		Dust Bowl
1934		Taylor Grazing Act
1935		Soil Conservation Service created
1936		Senate Report on the condition of rangelands
1949	E.J. Dyksterhuis	Proposed "quantitative climax method" as basis for assessing range condition

Dyksterhuis 1949: Quantitative Climax Method

- Range (ecological) site:
 - soil, climate, topography & vegetation
 - supports a specific plant community
- Quantitative assessment of successional status based on proportions of:
 - increasers
 - decreaseers
 - invaders

Dyksterhuis 1949: Quantitative Climax Method

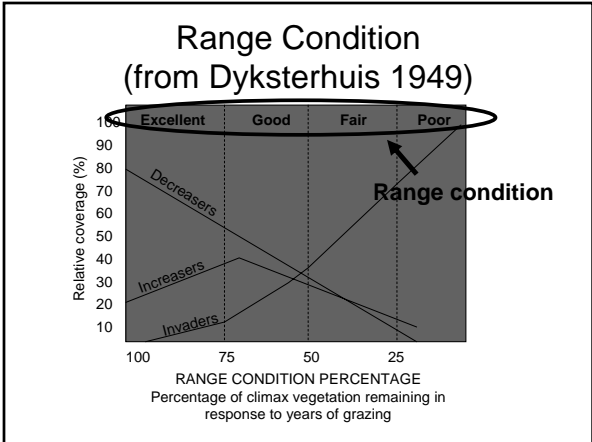
- Assumptions:
 - succession is linear, continuous, and reversible
 - all disturbances have similar and additive effects

Climax

- Final (or stable) biotic community
- Self-perpetuating
- In equilibrium with physical habitat

Potential Natural Community

- Historical term indicating the stable vegetation community which could occupy a site under current climatic conditions without further influence by humans



Range Condition

- Generic term
- Relates present plant community to climax (potential natural) plant community

Range Condition

Dyksterhuis 1949	SRM 1982	Range Cond
Excellent	Climax (PNC)	76-100%
Good	Late seral	51-75%
Fair	Mid seral	26-50%
Poor	Early seral	0-25%

Range Condition Score

Species	Max. allowable	Measured	Score (% of HCPC)
Big bluestem	20	10	10
Little bluestem	15	21	15
Juniper	10	0	0
etc			
Total			Total = % similarity to HCPC

Critiques of Range Condition

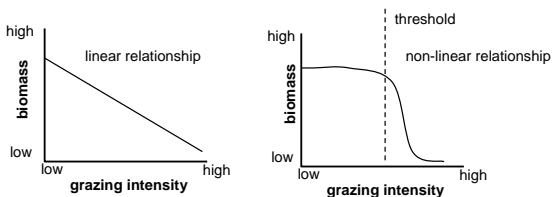
1. Fails to describe or predict vegetation dynamics in some cases
 - e.g. removal of herbivores did not result in retrogression

Critiques of Range Condition

2. Assumes only one possible endpoint for succession, instead of multiple steady states.

Critiques of Range Condition

3. Assumes successional change is linear; doesn't account for non-linear change and thresholds.



Critiques of Range Condition

4. Assumes that management objective is always climax or PNC

Critiques of Range Condition

- 5. Doesn't account for non-native species

Critiques of Range Condition

- 6. Does not tell us about ecosystem functions (only structure/composition)
 - Biodiversity
 - Erosion potential
 - Nutrient cycling
 - Etc.

Critiques of Range Condition

- 7. Information on the historic climax plant community (or PNC) may not exist.
- 8. Global climate change may affect what climax (or PNC).

Question

- Why hasn't range condition been replaced?
- "Success of alternative models of range condition may require an underlying theory linked to a field method to successfully capture the consensus of the range community." Linda Joyce 1993 JRM

Alternatives to Range Condition

- Rangeland Health Assessment
- State and Transition Models

History of Rangeland Health

- 1994: NRC and SRM call for national rangeland assessment using common methodology
- 1995: BLM & NRCS identify need for rapid assessment technique while quantitative indicators developed
- 1997: BLM, NRCS & USFS sign MOU to develop common national range assessment technique

History of Rangeland Health

- 1997: NRCS and BLM develop and then merge 2 separate protocols
- 2000: Rangeland Health technical reference published
- 2002: David Pyke and others write review
- 2005: Most recent Rangeland Health technical reference published

Rangeland Health

- The degree to which the integrity of the soil, vegetation, water, and air as well as the ecological processes of the rangeland ecosystem are balanced and sustained.

Rangeland Health

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Rangeland Health

Integrity: maintenance of the functional attributes characteristic of a locale, including normal variability

Rangeland Health

Determine if rangeland is healthy, at risk, or unhealthy based on 3 criteria:

1. Soil or site stability
2. Hydrologic function
3. Integrity of the biotic community

Rangeland Health

Soil or site stability: The capacity of the site to limit the redistribution and loss of soil resources (including nutrients and organic matter) by wind or water.

Rangeland Health

Hydrologic function: The capacity of the site to capture, store, and safely release water from rainfall, run-on, and snowmelt, to resist a reduction in this capacity and to recover this capacity following degradation.

Rangeland Health

Integrity of the biotic community: The capacity of the site to support characteristic functional and structural communities in the context of normal variability and to resist loss of this function and structure caused by disturbance, and to recover following each disturbance.

Rangeland Health Assessment

- Each criteria has a set of indicators
- 17 indicators in total
- Each indicator is rated:
 - based on degree of departure from ecological site description or reference area
 - Based on 1-5 scale from none/slight to extreme
- Preponderance of evidence rates site as:
 - healthy
 - at risk
 - unhealthy

Rangeland Health Indicators

- Rills
- Water flow patterns
- Pedestals and/or terracettes
- Bare ground
- Gullies
- Wind scoured, blowouts etc.
- Litter movement
- Soil surface resistance to erosion
- Soil surface loss or degradation
- Plant community composition & distribution relative to infiltration & runoff
- Compaction layer
- Functional/structural groups
- Plant mortality/decadence
- Litter amount
- Annual aboveground production
- Invasive plants
- Reproductive capability of perennial plants

Rangeland Health: Intended Uses

- Point in time, qualitative assessment of rangeland status
- Communication and education tool
- By experienced and knowledgeable people
- Management should not be changed solely on basis of RH assessment
- **NOT** intended for monitoring
- Repeated assessments over time to determine trend

Rangeland Health

- Does Rangeland Health represent a theory linked to a method?
- Can it replace the range condition model as a practical assessment tool?