



Objectives

By the end of this lesson each students should be able to:

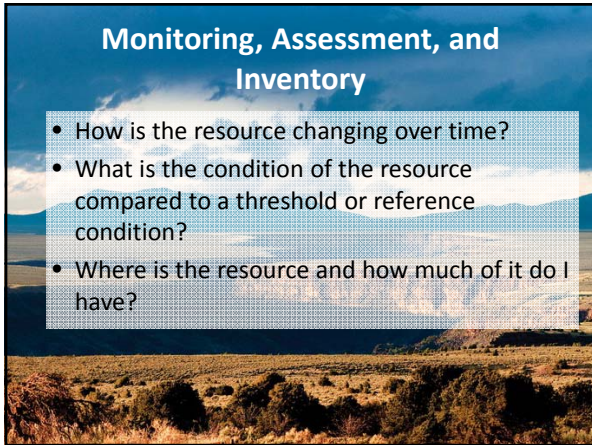
- Explain the importance of assessment, inventory, and monitoring.
- Identify the key features of assessment, inventory, and monitoring.
- Explain the importance of attributes, indicators, and methods for determining rangeland health.
- Identify attributes, indicators, and methods of/for determining rangeland health.
- Give examples of attributes, indicators, and methods of/for determining rangeland health.
- Describe the characteristics/give examples of a core indicator(s).
- Describe how qualitative and quantitative data collection work together

Outline

- Monitoring, assessment, and inventory
- Attributes, indicators, and methods
- Qualitative and quantitative data collection
- Additional Learning and Resources

Monitoring, Assessment, and Inventory

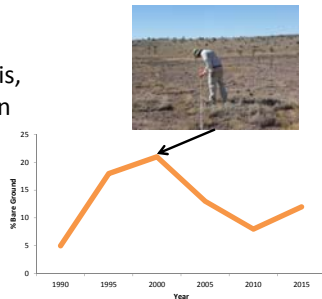
- How is the resource changing over time?
- What is the condition of the resource compared to a threshold or reference condition?
- Where is the resource and how much of it do I have?



Monitoring

How is the resource changing over time?

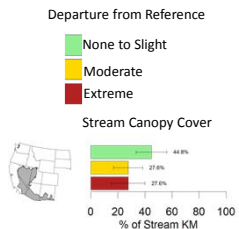
- Consistent data collection, analysis, and interpretation
- Indicator change over time



Assessment

What is the condition of the resource compared to a threshold?

- One point in time
- Compare an indicator or attribute to a threshold or reference condition



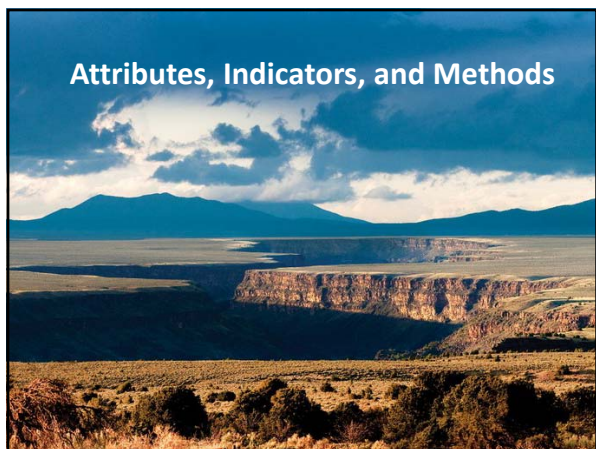
Inventory

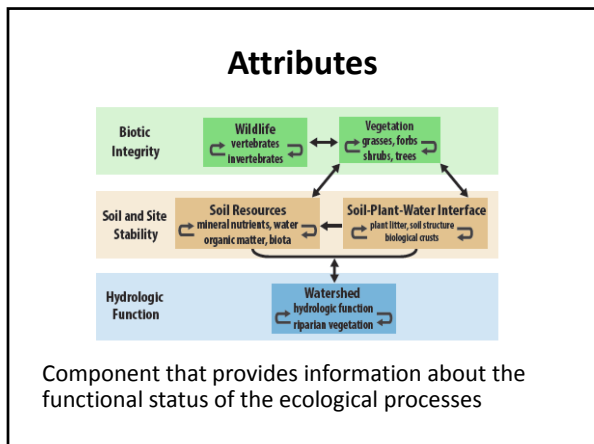
How much of the resource do I have? Where is the resource located?

- Systematic
- Can include monitoring and assessment data
- Describe the amount, location, and condition of a resource




Attributes, Indicators, and Methods






Attribute: Soil/Site Stability

The capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water. (NRC 1994 Rangeland Health Report)




Desert grassland-
good stability




Desert grassland-
loss of stability

Attribute: Hydrologic Function

The capacity of an area to capture, store, and safely release water from rainfall, run-on, and snowmelt (where relevant), to resist a reduction in this capacity and to recover this capacity when a reduction does occur. (NRC 1994 Rangeland Health Report)



Sagebrush "captures" snow



Grasses have reduced ability (structure) to "capture" snow

Attribute: Biotic Integrity

The capacity of a site to support characteristic functional communities (above and below ground) in the context of normal variability, to resist loss of this function and structure, due to disturbance, and to recover following such disturbances.

(NRC 1994 Rangeland Health Report)



Joshua tree/blackbrush site



Integrity diminished by exotic grasses and increased fire

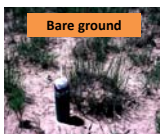
How can we easily and economically describe how ecological processes are functioning?



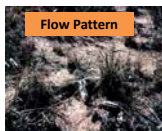
Sensors attached to a yoke enable Samuel Smith, of Oklahoma State University, to gather data on vegetation and soil properties at the ARS Great Plains Research Laboratory at El Reno, Oklahoma.

Indicators

- Index of an ecosystem attribute or process that is too difficult or expensive to measure directly.
- What you are measuring
- May be more than one indicator for an attribute



Bare ground



Flow Pattern



Compaction Layer

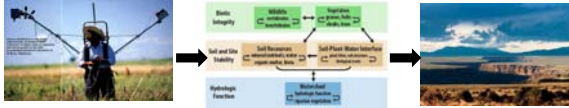
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- 1 Need something here to qualify "functioning". Most ecological processes are always functioning. Just not always in a healthy (or helpful) manner.

Jason Karl, 2/13/2015

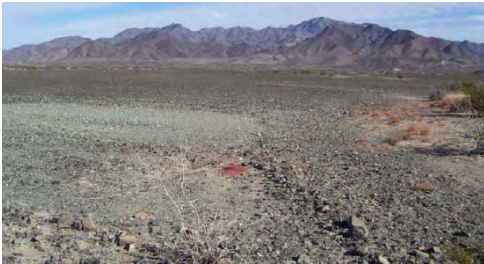
Core Indicators...

...are classes of indicators that are informative of many aspects of range health and are useful for answering many other resource management questions.



Core Indicators...

...are based on land health concepts



Core Indicators...

...are based on land health concepts
...can be measured consistently in all rangeland ecosystems



Arctic Tundra



Mojave Desert

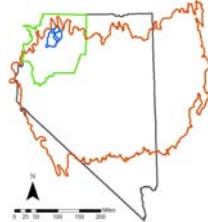
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- 3 Um... I'm not sure about this one. There's a lot they don't say about the range health attributes. They are a set of indicators (actually, classes of indicators) that are informative of many aspects of range health and are useful for answering many other resource management questions. (Not a very elegant def...)

Jason Karl, 2/13/2015

Core Indicators...

-are based on land health concepts
-can be measured consistently in all many ecosystems
-are scalable
-apply to many different objectives

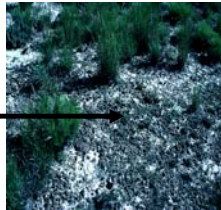


Supplemental Indicators

- Additional indicators to evaluate when needed

EXAMPLE:

In the Colorado Plateau, biological crusts may be a useful supplemental indicator to help evaluate soil and site stability and biotic integrity.



Choosing Supplemental Indicators



Bare Ground




Vegetation Height



Canopy Gaps

Vegetation Composition
Plants of Mgmt. Concern
Nonnative Invasive Sp.

Choosing Supplemental Indicators



Bare Ground

Vegetation Composition

Plants of Mgmt. Concern

Nonnative Invasive Sp.


Vegetation Height

Plant Density

Canopy Gaps


Methods

- Technique for measuring an indicator
- How to measure an indicator
- May be more than one method for an indicator
- Qualitative or quantitative




Quantitative & Qualitative Methods

- Quantitative
 - Objective
 - Measure features
- Qualitative
 - Observations
 - Describe, rate, or rank features



"Cheatgrass cover is 85%"



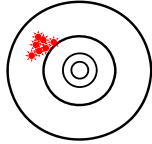
*"Cheatgrass is rated as **abundant**"*

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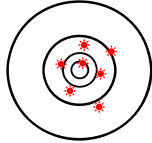
- 5 Title of this slide doesn't seem to match the content.
Jason Karl, 2/13/2015

Quantitative and Qualitative Data Collection

- Quantitative methods are more **precise**



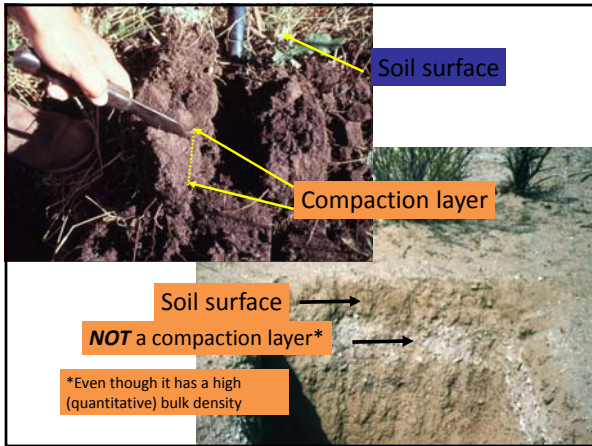
- Either qualitative OR quantitative methods can be more **accurate**

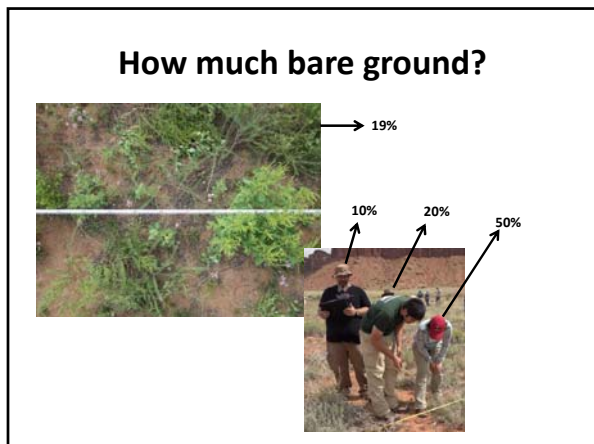


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Attribute	Core qualitative indicators	Core quantitative indicators	Selected measurements and references
Soil and site stability	<ul style="list-style-type: none"> •Rills •Water flow patterns •Pedestals/terraces •Bare ground •Gullies •Litter movement •Wind-scoured, blowouts and/or deposition areas •Soil surface resistance to erosion •Soil surface loss or degradation •Compaction layer •Litter amount 	Bare ground	Line point intercept (1, 2)
		Litter amount	
		Proportion of soil surface covered by canopy gaps longer than a defined minimum	Canopy gap intercept (2)
		Proportion of soil surface covered by basal gaps longer than a defined minimum	Basal gap intercept (2)
		Soil macroaggregate stability in water	Soil stability kit (2)

1. Elzinga et al. 1998 (Measuring & Monitoring Plant Populations)
 2. Herrick et al. 2005 (Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems)

Next Learning Steps

- Watch the IIRH Indicators and Attributes videos:
<http://www.ntc.blm.gov/krc/uploads/415/IndicatorsOfRangelandHealth.html>
- Watch the core quantitative methods videos on the Landscape Toolbox:
<http://www.landscapetoolbox.org/training/resources/>

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- 9 Typo on second bullet
Jason Karl, 2/13/2015

Indicators and Attributes Resources

- *Monitoring Manual for Grassland, Shrubland, and Savannah Ecosystems, 2nd Edition*
<http://www.landscapetoolbox.org/manuals/monitoring-manual/>
- *Interpreting Indicators of Rangeland Health, version 4*
<http://www.blm.gov/nstc/library/pdf/1734-6rev05.pdf>
- *BLM Core Terrestrial Indicators and Methods, Technical Note 440*
<http://www.blm.gov/nstc/library/pdf/TN440.pdf>

Conclusion

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