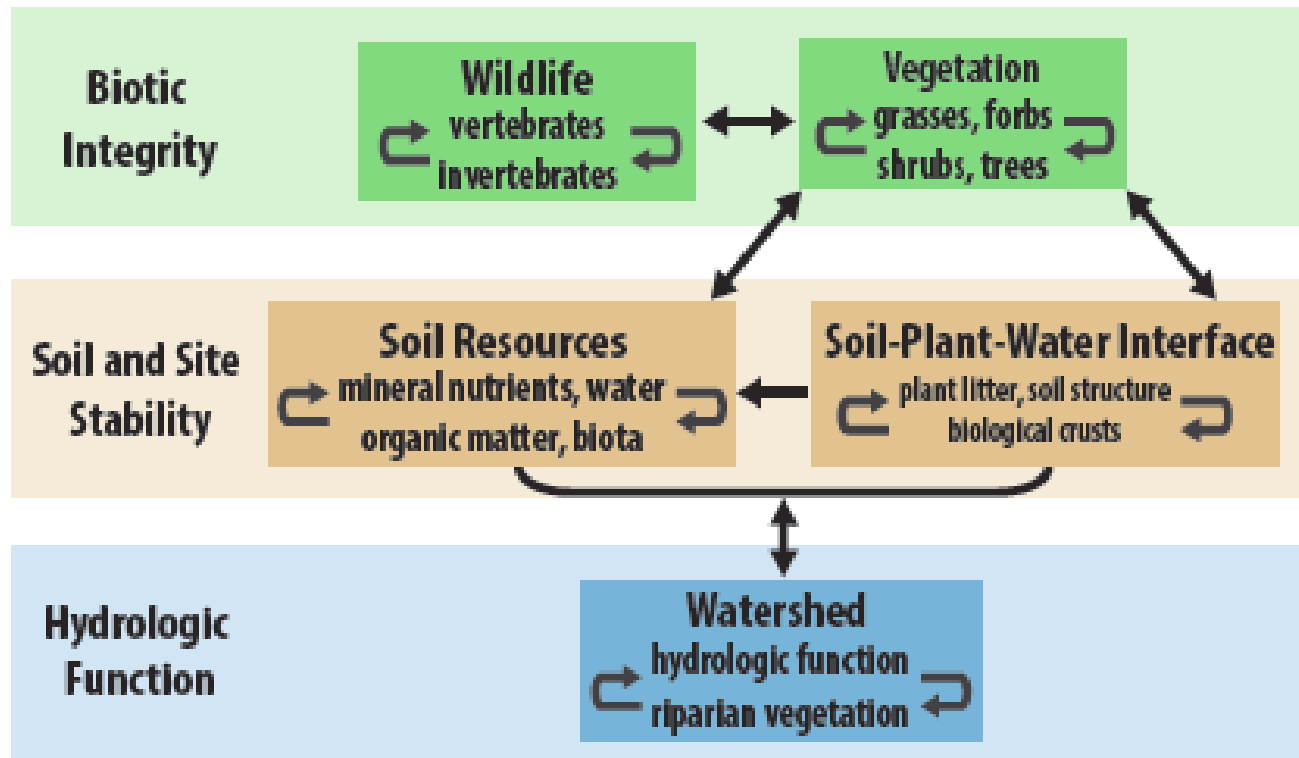


Indicators



Attributes



Component that provides information about the functional status of the ecological processes

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



Sensors attached to a yoke enable Ahmed Fashi, of Alabama A&M University, to gather data on vegetation and soil properties at the ARS Grazinglands 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



Macroinvertebrates

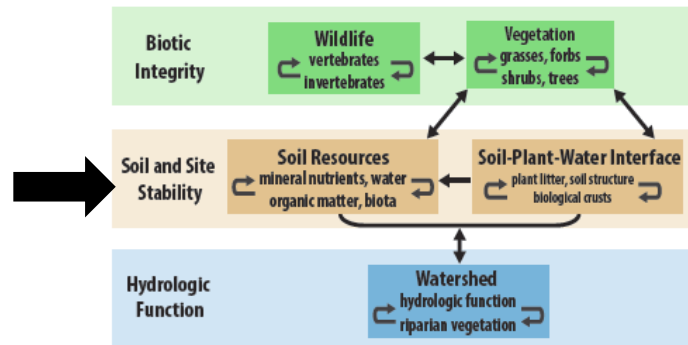


Types of Indicators

- Core measured everywhere, scalable, meet many monitoring objectives, quantitative, consistent methods
- Contingent measured contingent on a known problem or concern, scalable, consistent methods
- Supplemental measured for a specific resource, may not be scalable, may not be a standard method

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



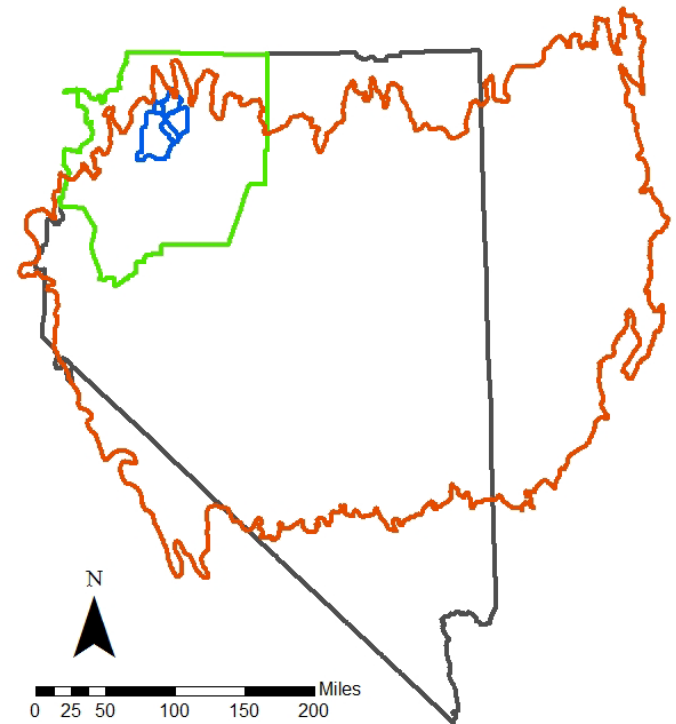
Arctic Tundra



Mojave Desert

Core Indicators...

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



Core Terrestrial Indicators



Bare Ground



Vegetation Height



Canopy Gaps

Vegetation Composition
Plants of Mgmt. Concern
Nonnative Invasive Sp.

Core Aquatic Indicators



Acidity, Salinity and Temperature,
Pool Dimensions, Stream Bed Substrate, Bank Stability,
Floodplain Interaction,
Macroinvertebrates, Riparian Vegetation, Canopy Cover

Contingent Indicators

- Indicators which are evaluated where there is a concern



turbidity



Soil aggregate stability

Supplemental Indicators

- Additional indicators to evaluate to meet a local or resource specific objective

EXAMPLE:

Depth of active layer

Plant density



Choosing Supplemental Indicators



Bare Ground

Vegetation Composition

Plants of Mgmt. Concern

Nonnative Invasive Sp.

Vegetation Height

Canopy Gaps

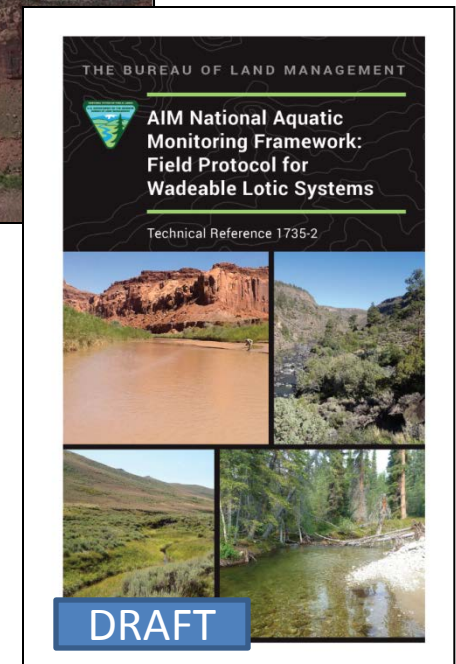
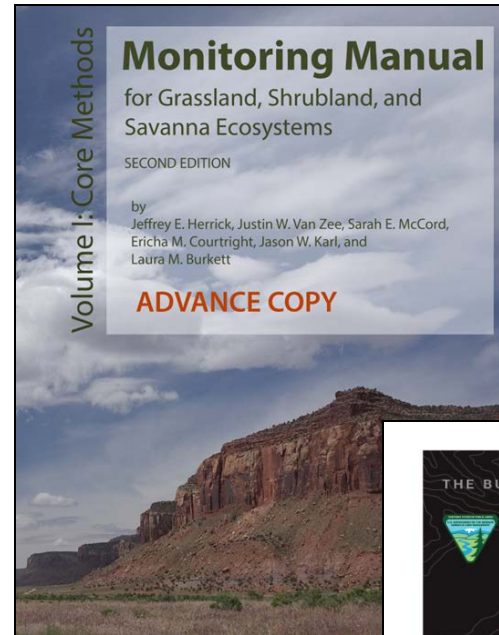
Choosing Supplemental Indicators

- Tied to explicit objectives and benchmarks
- Complementary to the core indicators
- Tied to established protocols
- Training and calibration plan
- Data management plan



Methods

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



Core Methods

- Quantitative
- Straightforward to teach and implement
- Allow observer calibration
- Consistently measure indicators across ecosystems
- Used by other national monitoring programs

Core Co-Variates

- Terrestrial
 - GPS coordinates
 - Slope
 - Landform
 - Soil pits
 - Observations
 - Photos
- Aquatic
 - GPS coordinates
 - Slope
 - Bankfull width
 - Photos



Summary

- 3 Types of Indicators
 - Core
 - Contingent
 - Supplemental
- Core Indicators measured with core methods
- → Consistent, scalable data to answer many resource objectives



Core Indicators

Terrestrial

- Vegetation Composition
- Non-native invasive plant species
- Plants of management concern
- Intercanopy gaps
- Vegetation Height

Aquatic

- Acidity
- Salinity
- Temperature,
- Pool Dimensions
- Stream Bed Substrate
- Bank Stability
- Floodplain Interaction
- Macroinvertebrates
- Riparian Vegetation
- Canopy Cover