Reclamation and Rangeland Health

#makeamericafartagain

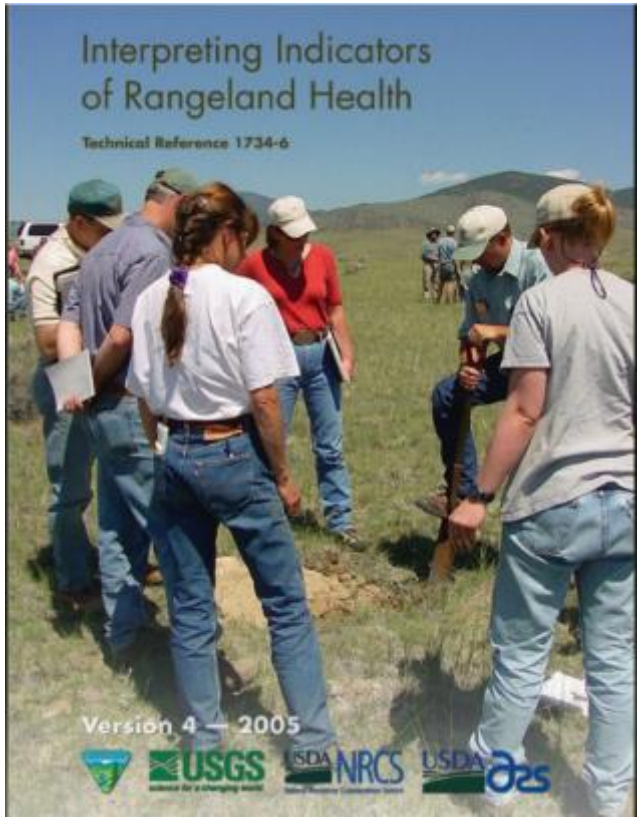
David Toledo, Erin Espeland

2016 ND Reclamation Conference

USDA
United States Department of Agriculture

Interpreting Indicators of Rangeland Health

USDA NRCS Natural Resources Conservation Service

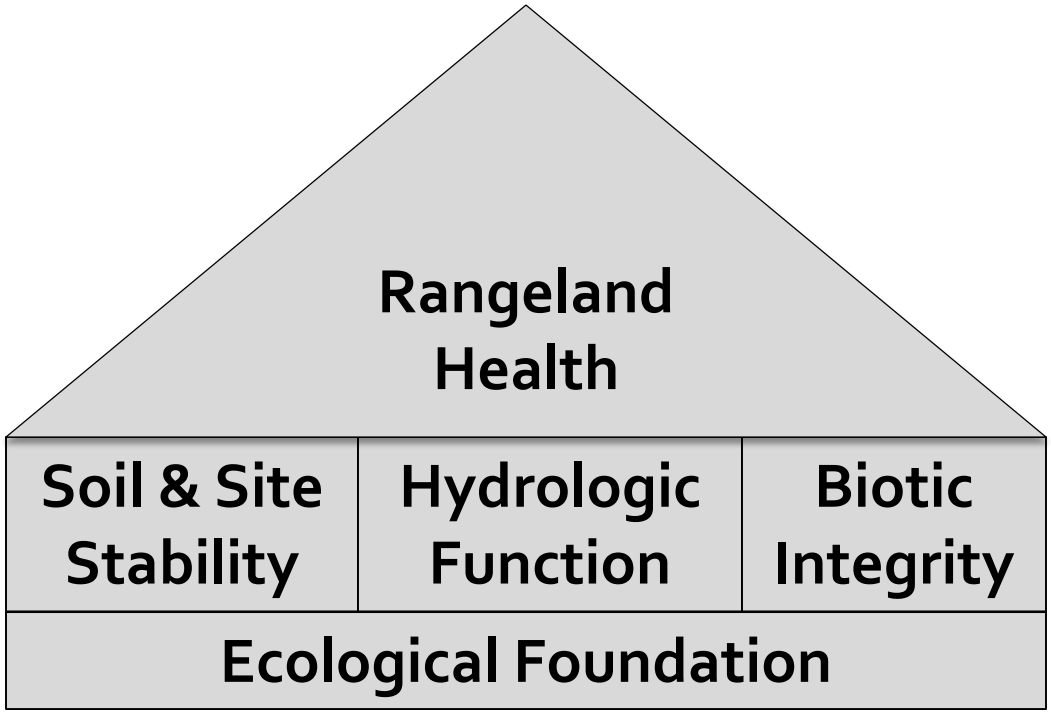


U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

ARS

USGS science for a changing world

Ecological Attributes of Rangeland Health



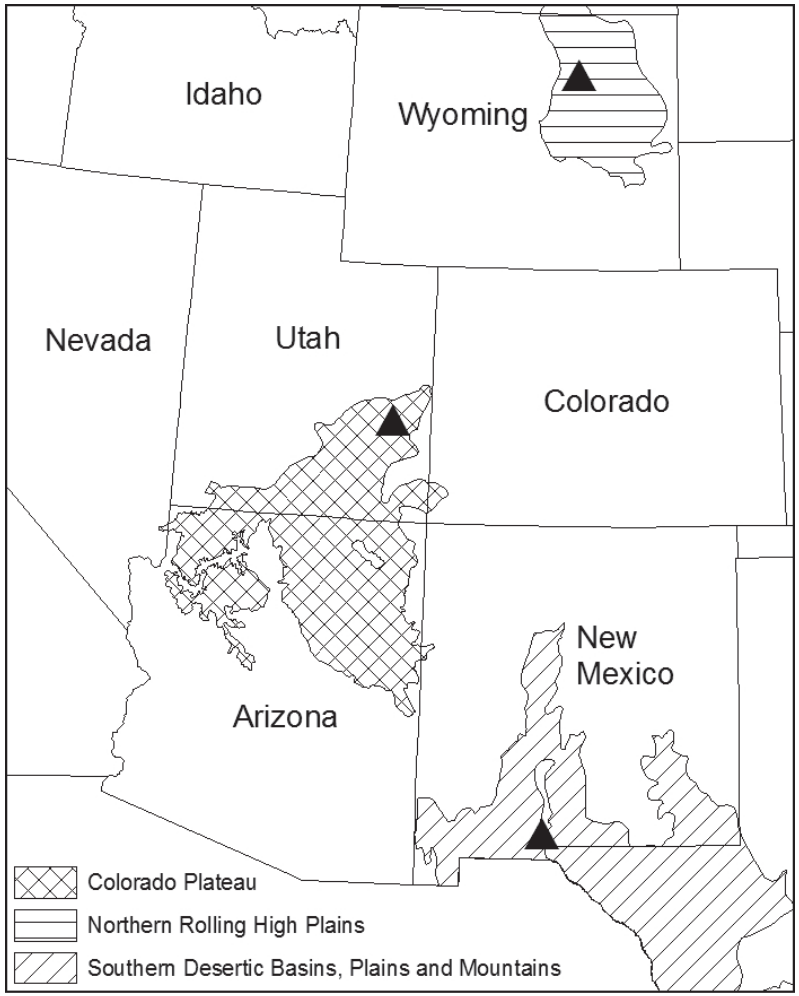
Indicators and Attributes

Indicator	SSS	HF	BI
Rills			
Water-flow patterns			
Pedestals and/or terracetes			
Bare ground ____%			
Gullies			
Wind-scoured blowouts, and/or deposition areas			
Litter movement			
Soil surface resistance to erosion			
Soil surface loss or degradation			
Plant comm. comp. and dist. rel. to infiltration			
Compaction layer			
Functional/structural groups			
Plant mortality/decadence			
Litter amount			
Annual production			
Invasive plants			
Reproductive capability of perennial plants			

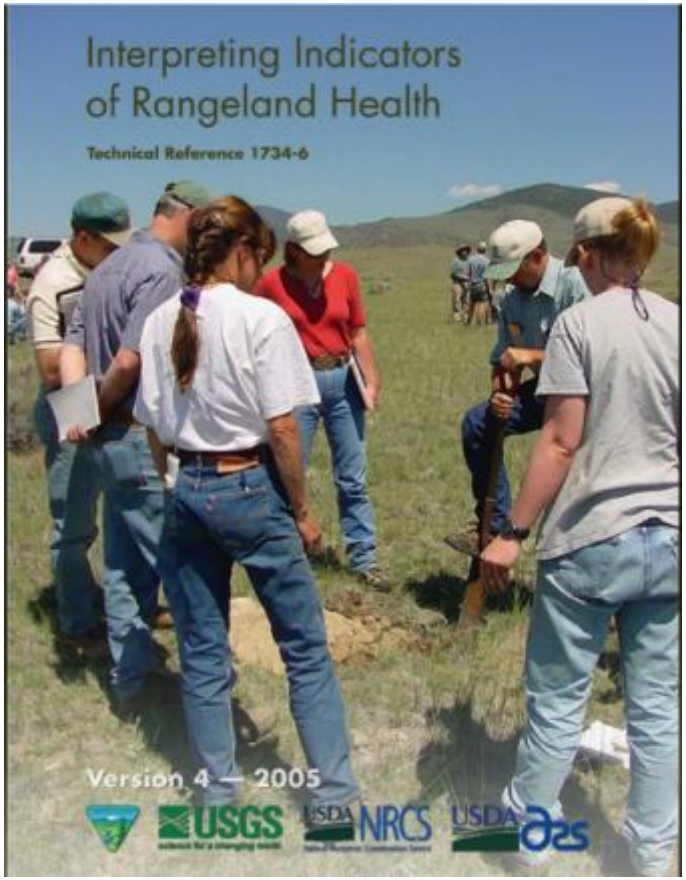
Rangeland Ecol Manage 63:524–536 | September 2010 | DOI: 10.2111/REM-D-09-00176.1

Assessing Transportation Infrastructure Impacts on Rangelands: Test of a Standard Rangeland Assessment Protocol

Michael C. Duniway,[1] Jeffrey E. Herrick,[1] David A. Pyke,[2] and David Toledo P.[3]



Interpreting Indicators of Rangeland Health



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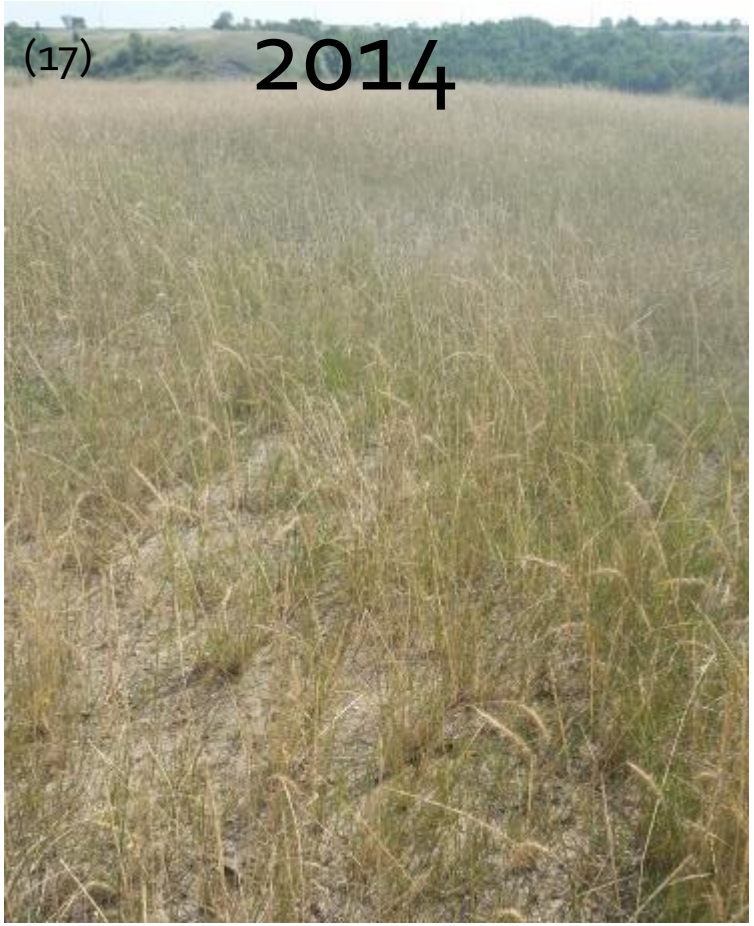
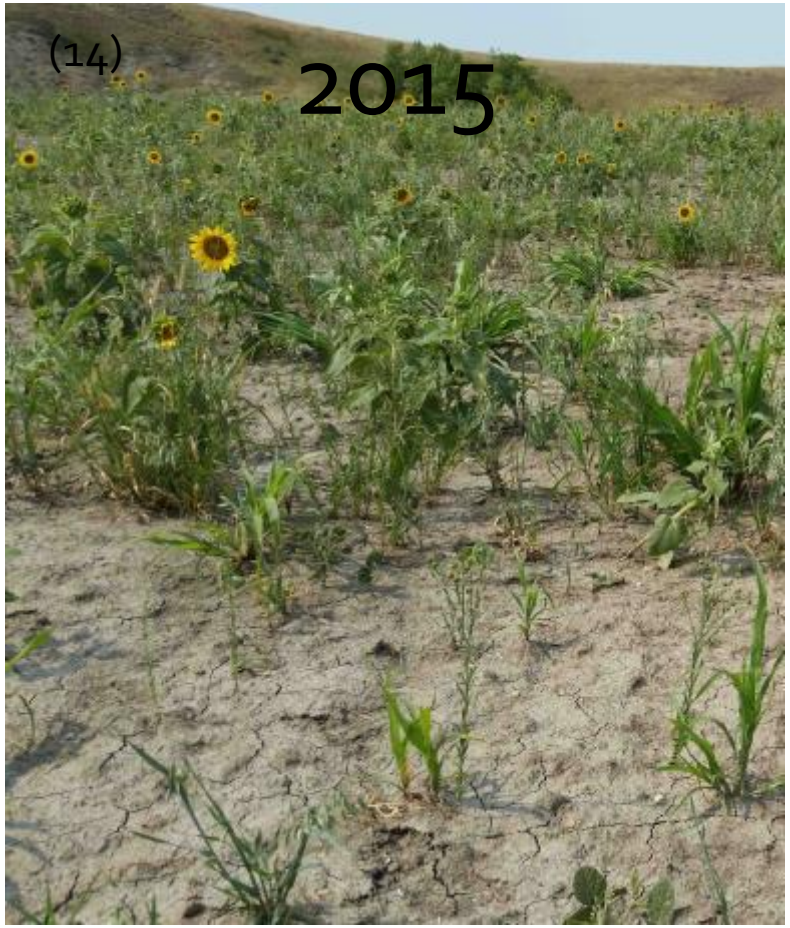
North Dakota Study Site

Number of Sites



Oat vs. no oat

N= 2 N= 6



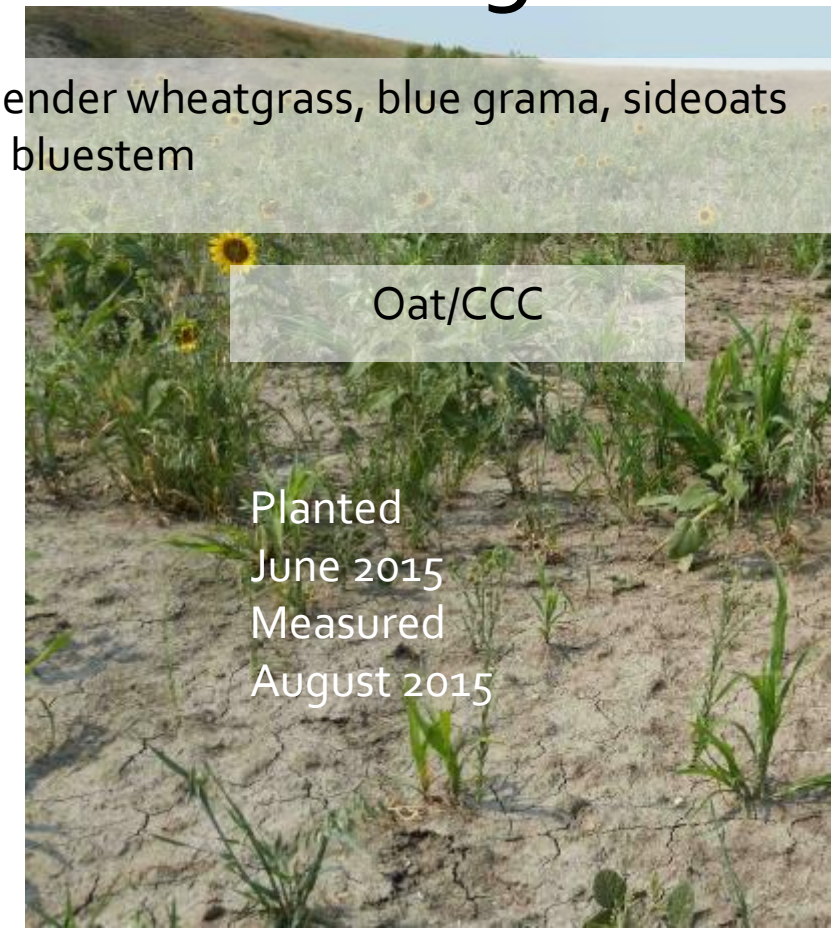
Oat vs. CCC (cover crop cocktail)

N= 3 N= 3

Planting and Measurement Dates

2014

2015



western wheatgrass, green needlegrass, slender wheatgrass, blue grama, sideoats grama, little bluestem

Step 1 – Determine Soil and Ecological Site

- Matrix of potential Ecological Sites
- Disturbed soils
- Restrictive soil horizon
- Loamy texture
- **Thin Loamy -> Site ID**: R053BY015ND

Step 2 – Reference Sheet

- **What is it?**
  - Describes the expected variation for each of the 17 indicators
    - Incorporates variation among vegetation phases in an Ecological State that is resistant & resilient to disturbance
  - Ecological site-specific
- **Where do I get it?**
  - Included in Ecological Site Descriptions.

Reference Matrix

Indicator	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
1. Rills	Rill formation is severe and well defined throughout most of the site	Rill formation is moderately active and well defined throughout most of the site	Active rill formation is slight at infrequent intervals; mostly in exposed areas	No recent formation of rills on slopes less than 25%; old rills have blunted or muted features. Steeper slopes have some long rills present.	None on slopes less than 25%. On slopes> 25% rills may be visible but are short (12 to 20 inches) and discontinuous.

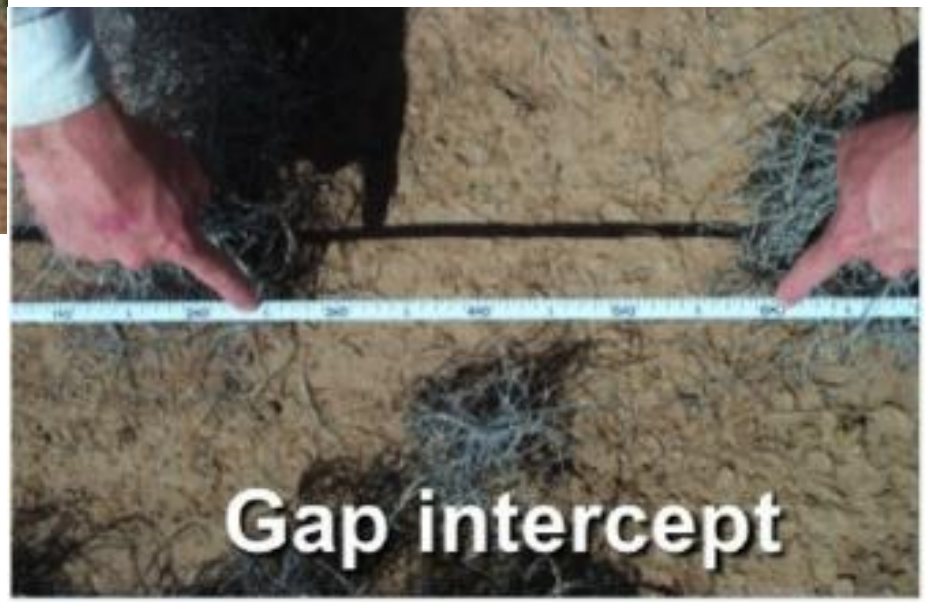
Step 3 – Collect Quantitative Data

- Indicator #4 (bare ground)
- Indicator #8 (soil surface resistance to erosion)
- Indicator #14 (litter amount)

- Use data to help determine indicator ratings.

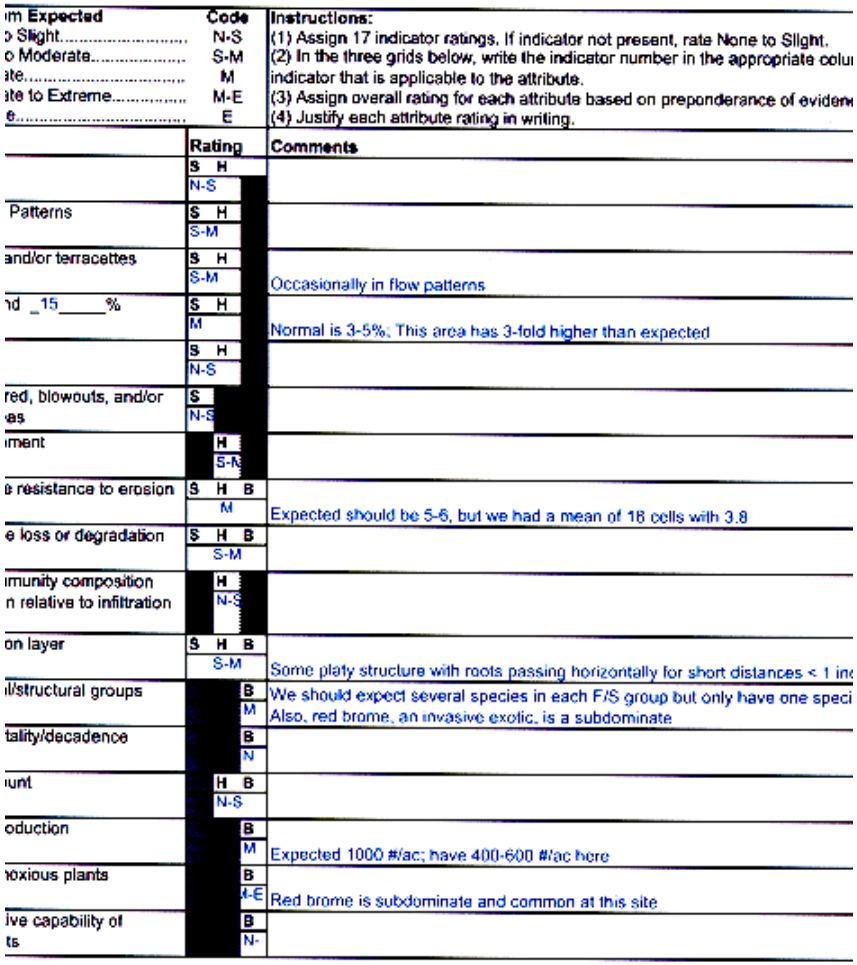
Soil Stability

Gap Intercept and Line-point intercept (cover vs. no cover)



Step 4 – Rate the 17 Indicators

- Complete reconnaissance
- Use Evaluation Matrix
- Rate each deviation:
  - None-to-Slight
  - Slight-to-Moderate
  - Moderate
  - Moderate-to-Extreme
  - Extreme
- Record comments



m Expected	Code	Instructions:
o Slight.....	N-S	(1) Assign 17 indicator ratings. If indicator not present, rate None to Slight.
o Moderate.....	S-M	(2) In the three grids below, write the indicator number in the appropriate colu
ate.....	M	indicator that is applicable to the attribute.
ate to Extreme.....	M-E	(3) Assign overall rating for each attribute based on preponderance of evidem
e.....	E	(4) Justify each attribute rating in writing.

	Rating	Comments
	S H N-S	
Patterns	S H S-M	
and/or terracettes	S H S-M	Occasionally in flow patterns
nd _15_____%	S H M	Normal is 3-5%; This area has 3-fold higher than expected
	S H N-S	
red, blowouts, and/or eas	S N-S	
ment	H S-M	
e resistance to erosion	S H B M	Expected should be 5-6, but we had a mean of 16 cells with 3.8
e loss or degradation	S H B S-M	
munity composition n relative to infiltration	H N-S	
on layer	S H B S-M	Some platy structure with roots passing horizontally for short distances < 1 in
l/structural groups	B M	We should expect several species in each F/S group but only have one speci Also, red brome, an invasive exotic, is a subdominate
tality/decadence	B N	
unt	H B N-S	
oduction	B M	Expected 1000 #/ac; have 400-600 #/ac here
oxious plants	B M-E	Red brome is subdominate and common at this site
ive capability of ts	B N-	

Step 5 – Rate Attributes

E	M-E	M	S-M	N-S
			11	
			9	6
		8	3	5
		4	2	1

S (8 indicators):
Soil/Site Stability
Rating: S-M

Attribute Rating Justification
Soil & Site Stability: _____
_Majority in the Slight to Moderate Class. No weighting applied.

E	M-E	M	S-M	N-S
			11	
			9	14
			7	10
		8	3	5
		4	2	1

H (11 indicators):
Hydrologic Function
Rating: S-M

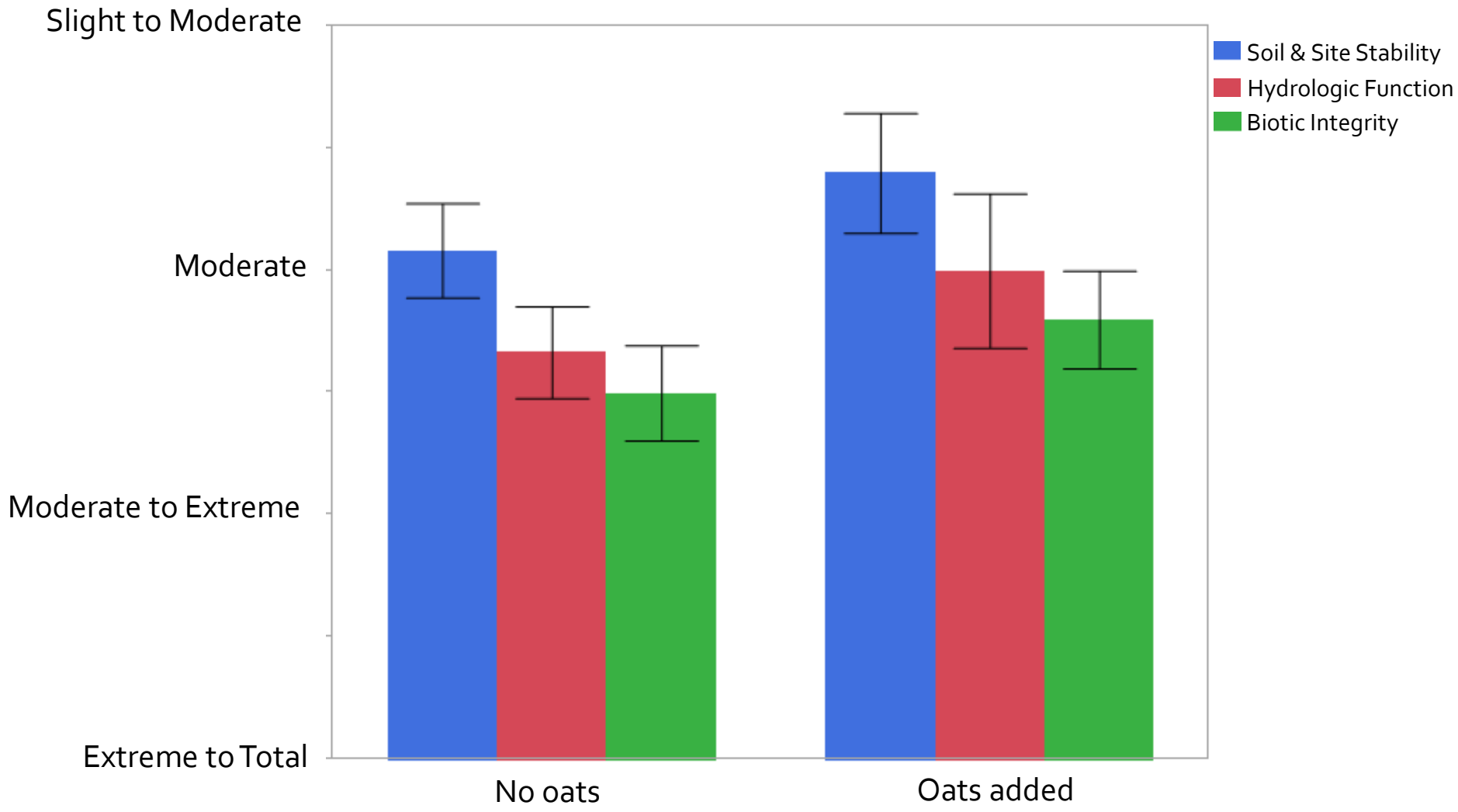
Attribute Rating Justification
Hydrologic Function: Majority in the Slight to Moderate Class. No weighting applied. _____

E	M-E	M	S-M	N-S
		15		17
		12	11	14
	16	8	9	13

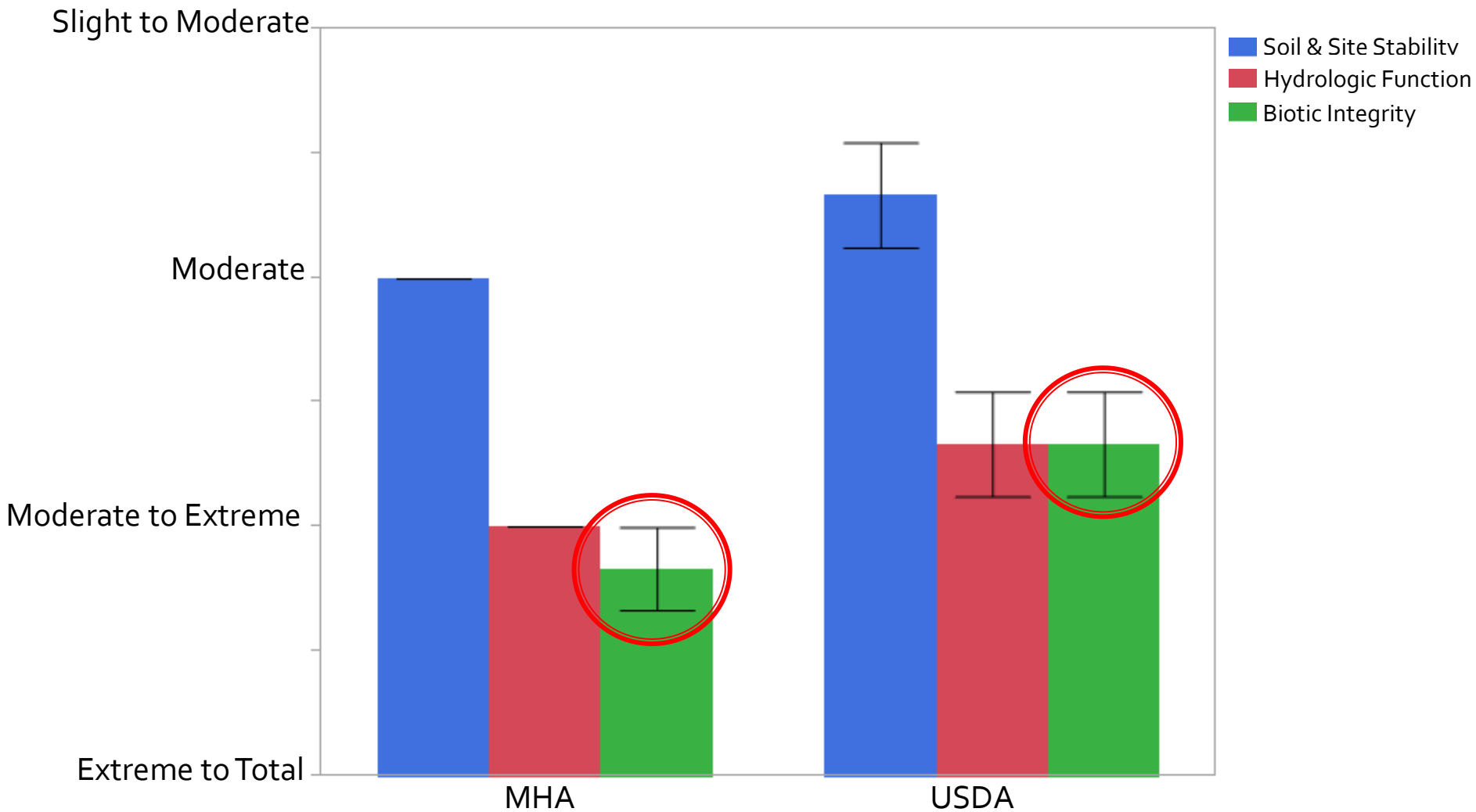
B (9 indicators):
Biotic Integrity
Rating: M

Attribute Rating Justification
Biotic Integrity: Red brome is strongly impacting the vegetation and the production of this site.

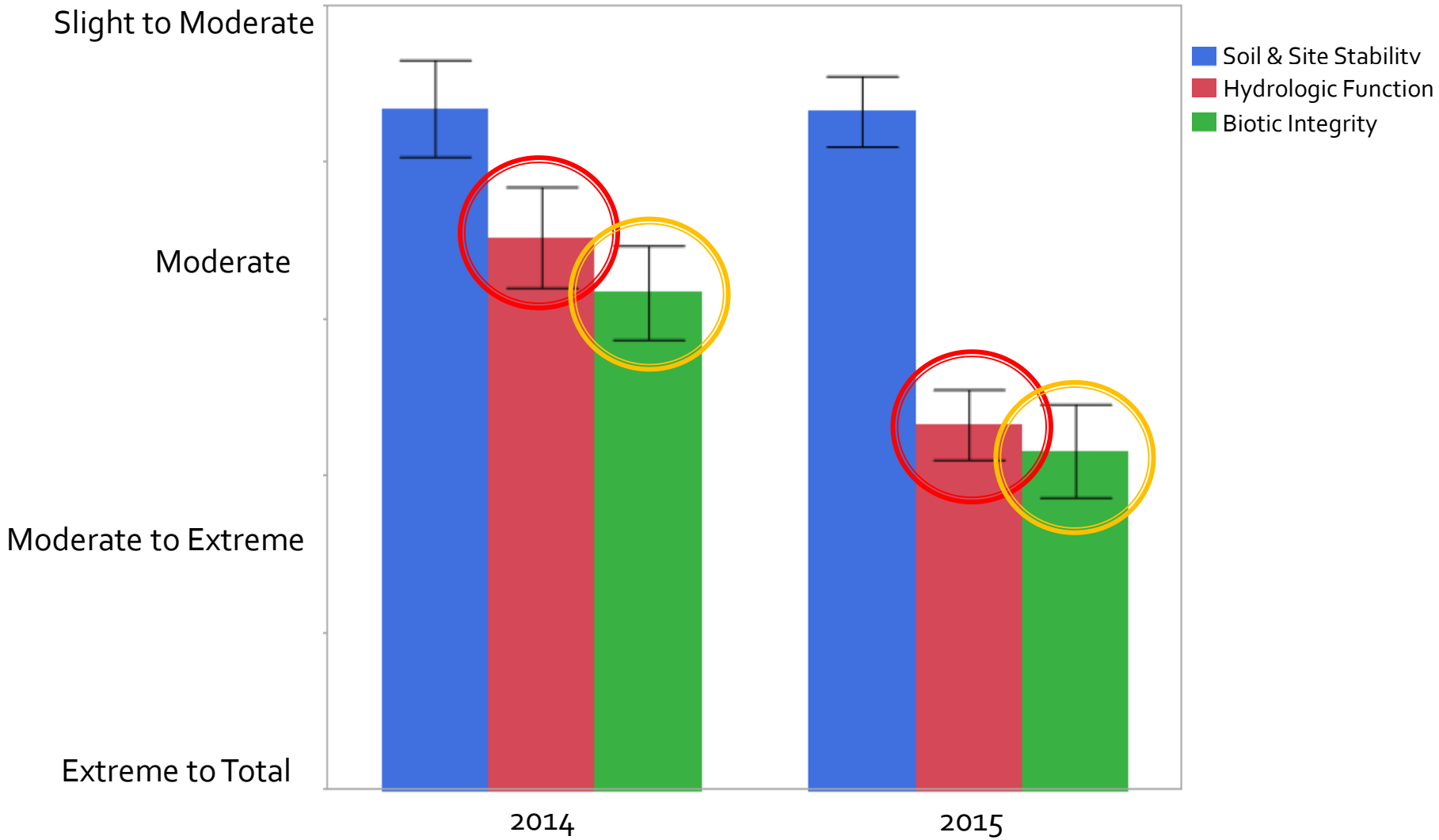
Results – Range Health of Plots Reseeded in 2014 (oats vs. no oats)



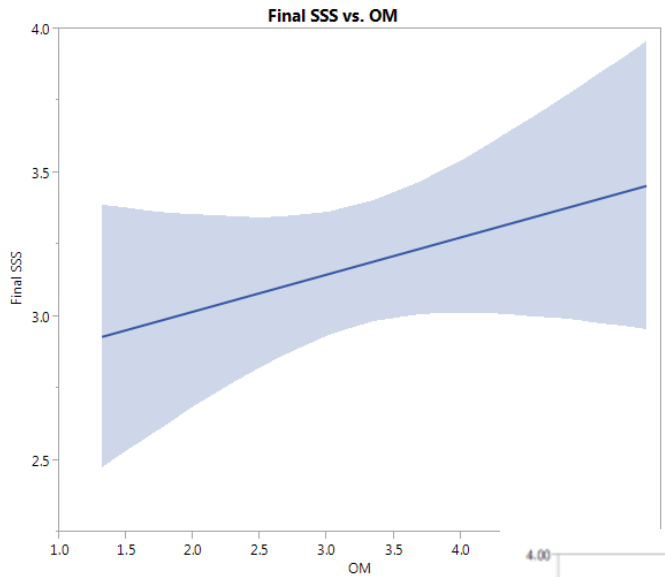
Results – Range Health of Plots Reseeded in 2015 (cover crop mix)

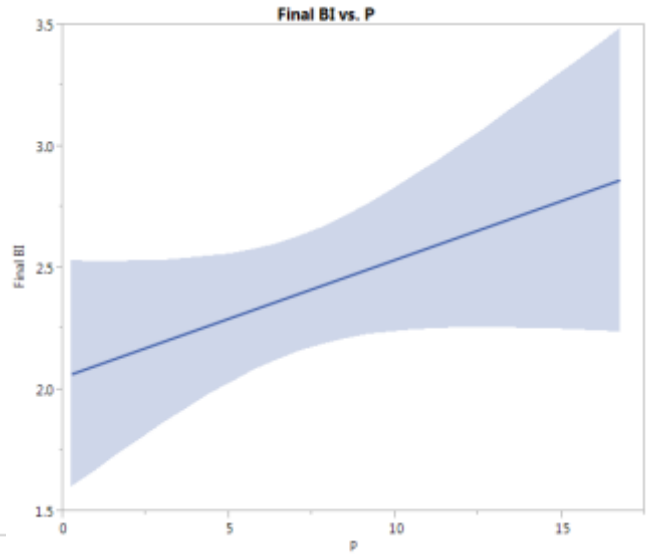


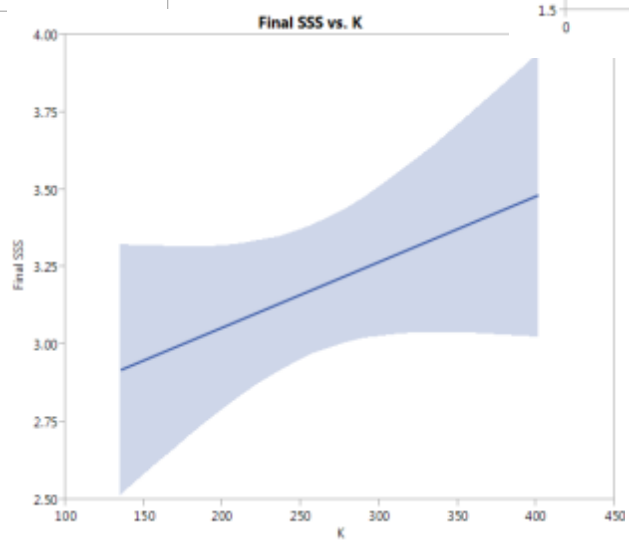
Time Matters!



Soil Fertility

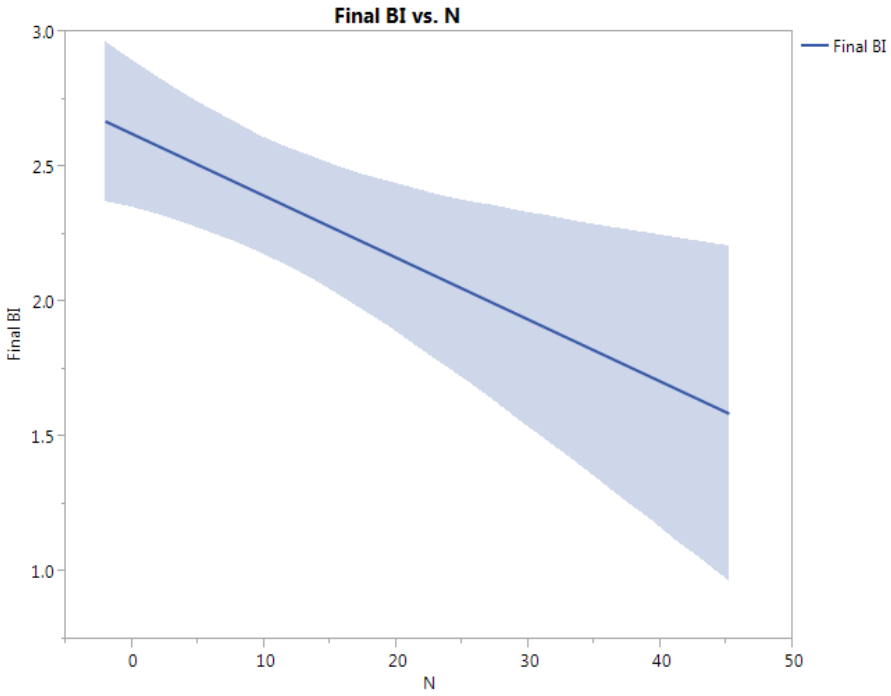






Weeds Respond to Increased Fertility

- Biotic integrity decreased as plant available nitrogen increased.
- This difference in biotic integrity was attributable to the invasive species indicator.
- Plots with oats rated better than those without oats.



Conclusions

- Novel approaches to deal with disturbed soils
- Oat effects on invasives
- Cover crop coctail improved biotic integrity but still to early to tell definitively
- Effectiveness of IIRH method for evaluating reclamation success

Acknowledgements

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- Three Affiliated Tribes (Mandan, Hidatsa, Arikara)

Thank you!

David Toledo
David.Toledo@ars.usda.gov