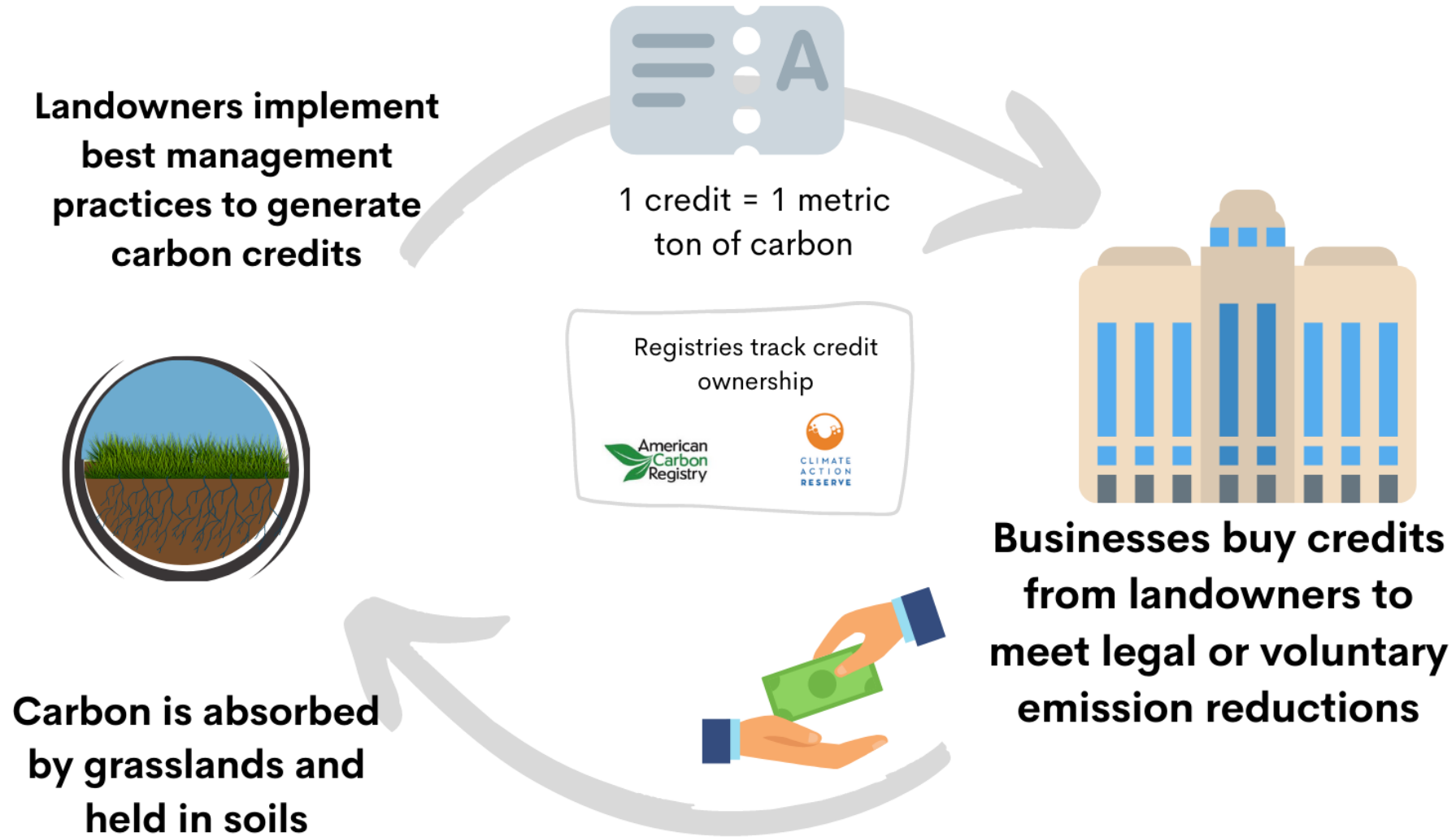


Carbon Markets Finance Rangeland Health Assessments



Carbon Markets



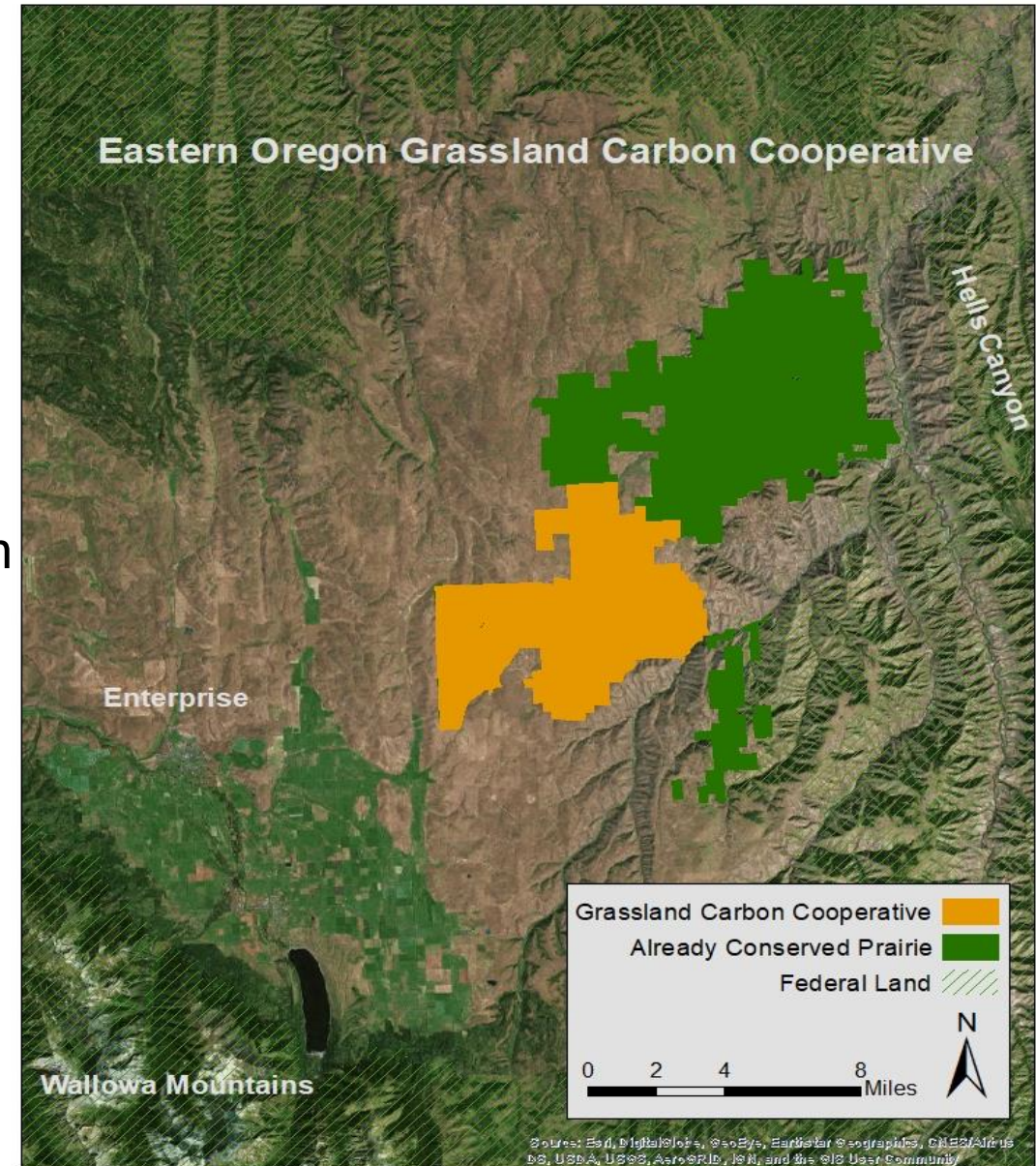
Zumwalt Prairie Carbon Cooperative

2017 Partnership

The Climate Trust and The Nature Conservancy

Goal: Protect Zumwalt Prairie by purchasing conservation easements (CE) on ranches surrounding TNC fee property.

- Largest intact Pacific Northwest Bunchgrass Prairie in North America
- NRCS, donations and The Climate Trust carbon credits applied to \$550,000 purchase of 22,000-acre Midway Barn Easement
- Easement contains 3 carbon credit projects



Zumwalt Prairie Carbon Cooperative

The Climate Trust investment

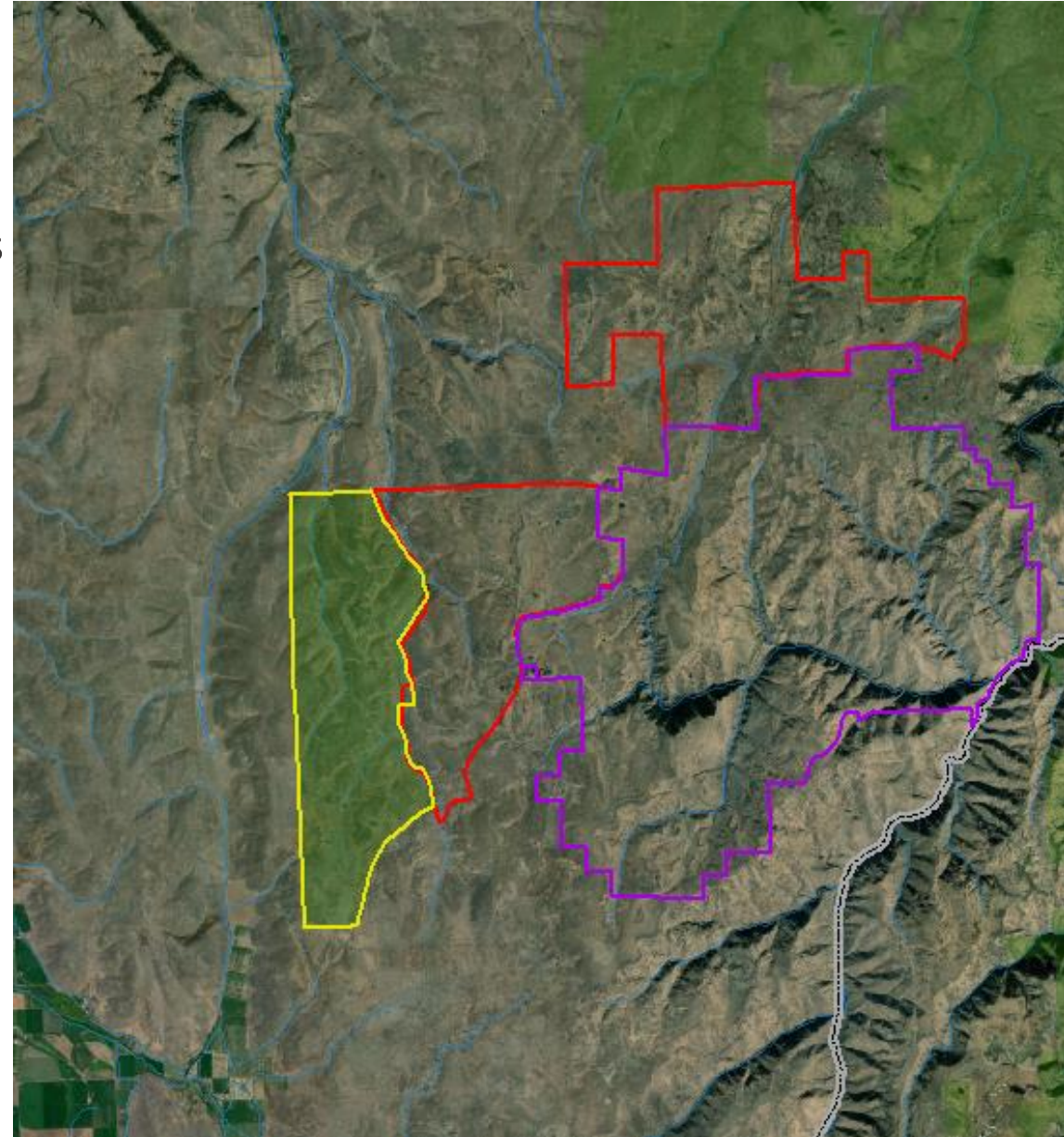
- Up-front cash investment for easement purchase
- Based on the *first 10 years* of projected carbon revenues
- Annual carbon revenues repay Climate Trust first, followed by revenue share among project partners

The Climate Trusts requires

- Clear title to carbon (i.e. in the CE)
- Long-term monitoring ability of project owner

The Climate Trust provides

- Marketing and sale of credits
- Long term relationships with voluntary buyers
- Reputation for high quality offsets



Zumwalt Prairie Carbon Cooperative

- Established rights to market carbon – TNC controls the carbon on eligible acres (non-irrigated land capability class)
- 1 carbon credit per acre; approx. 1 ton of carbon dioxide or credit per acre per year
- Based on forecasted carbon credit values from **Climate Action Reserve Avoided Conversion of Grassland Protocol**
- All credits generated to date have been verified by SCS Global and sold
- Revenue is shared by landowners and participating land trusts (TNC)
- The Climate Trust Partnership ends in 2027, at which time TNC has option to market credits independent of The Climate Trust.

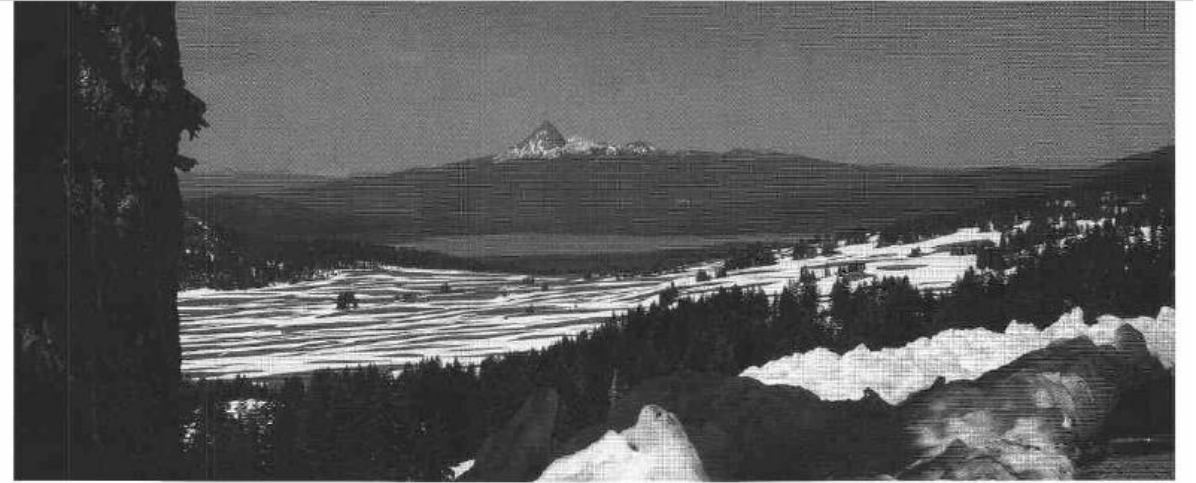


CLIMATE
ACTION
RESERVE

Zumwalt Prairie Carbon Cooperative

TNC Oregon's obligations include:

- Annually monitoring the easement
- Annually receiving summary data from landowner
- Confirm with Climate Action Reserve (CAR) that the easement is being monitored, and the soil has not been tilled for the next 100 years
- Monitoring ranch and grassland activities to ensure they continue to meet the terms of the conservation easement and carbon project
- Ensure that prescribed grazing management plans and Rangeland Health Assessments are developed or updated, reviewed, and conducted by appropriate entities and individuals at least once every 6 years

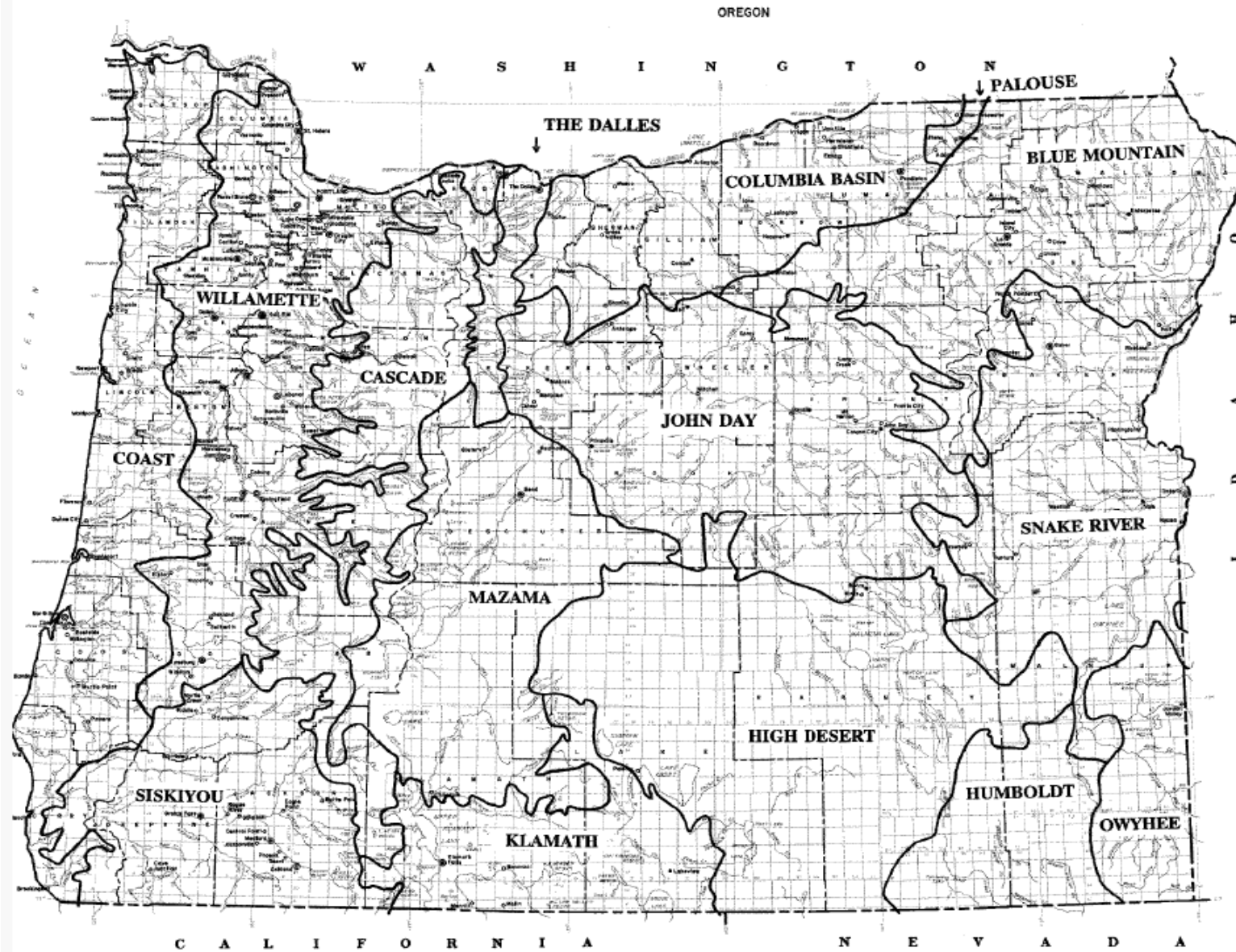


The Ecological Provinces of Oregon

A treatise on the basic ecological geography
of the state

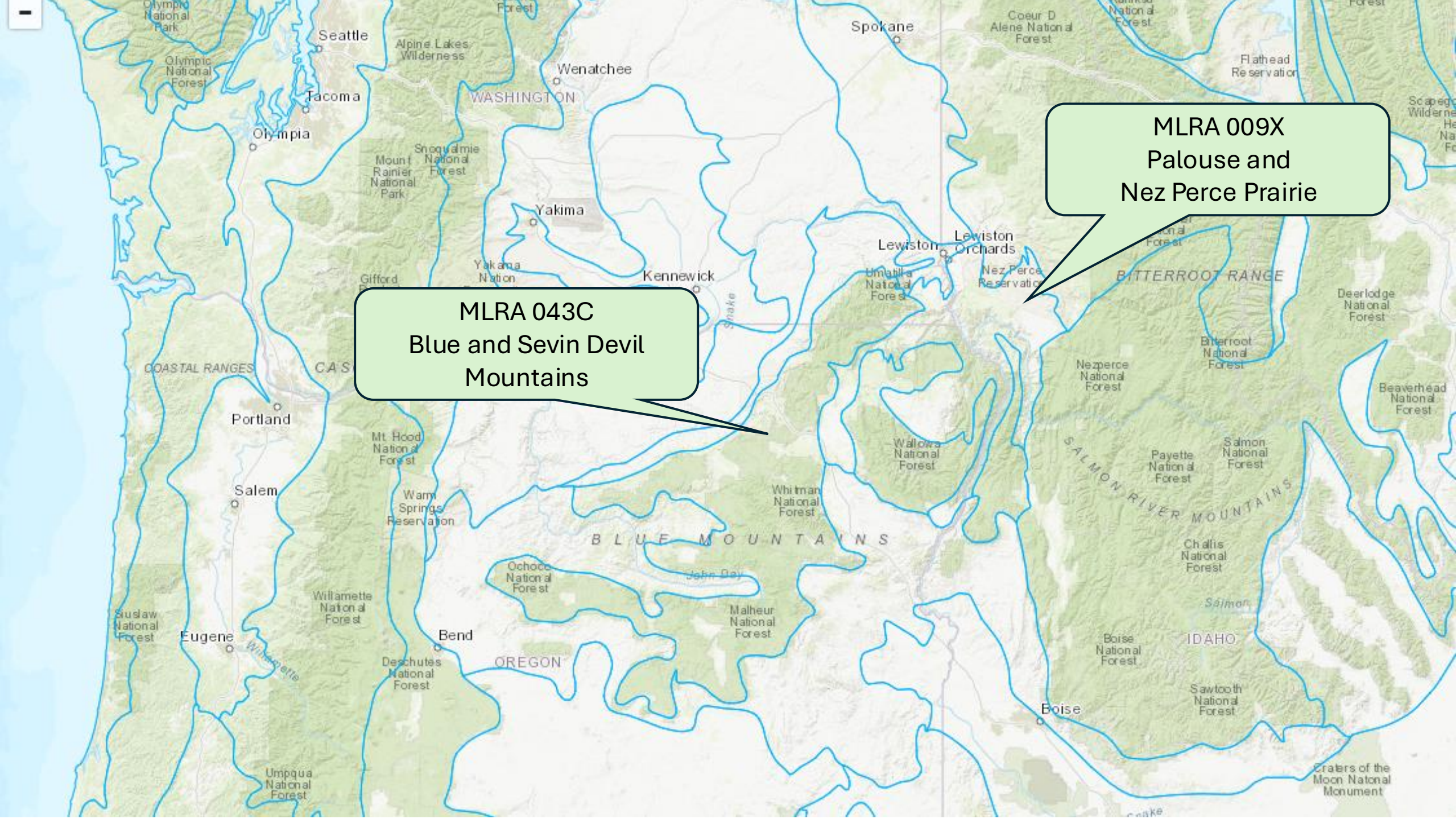
By
E. William Anderson,
Michael M. Borman,
and William C. Krueger

An ecological province is a subdivision of a region that has distinct combination of geological features and ecological sites



ECOLOGICAL PROVINCES OREGON

E. William Anderson - Michael M. Borman - William C. Krueger



MLRA 043C
Blue and Sevin Devil
Mountains

MLRA 009X
Palouse and
Nez Perce Prairie



An ecological site is a local combination of certain soils, climate, hydrology, topography and natural biotic factors (chiefly vegetation), that has management implications.

An ecological site has distinct physical characteristics that differ from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all environmental factors that are included in the ecological site description (ESD).

EDIT

Ecosystem Dynamics Interpretive Tool

The Ecosystem Dynamics Interpretive Tool (EDIT) is an online information system for the development and sharing of ecological site descriptions, ecosystem state and transition models, and land management knowledge.

<https://edit.jornada.nmsu.edu/>

General information

Next steps

MLRA list

MLRA map

MLRA photos

Ecological site list

Ecological site map

Ecological site keys

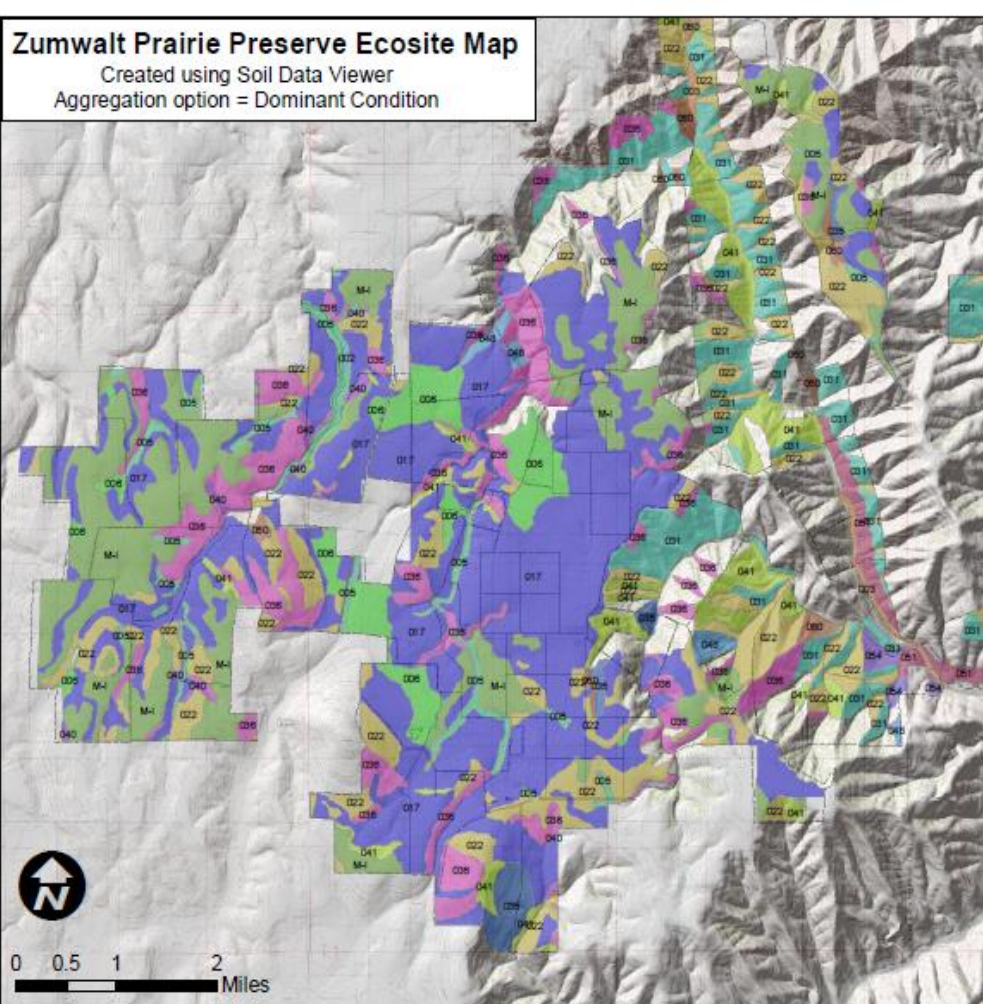
Ecological site photos

Palouse and Nez Perce Prairies

[HOME](#) / [ESD CATALOG](#) / [MLRA 009X](#)

Zumwalt Prairie Preserve Ecosite Map

Created using Soil Data Viewer
Aggregation option = Dominant Condition



EcoClass Name (in order of greatest to least area)

017	COLD LOAMY 13-17 PZ	051	LOAMY SOUTH 10-15 PZ
M-I	MOUND-INTERMOUND*	035	COLD SOUTH 17-24 PZ
022	COLD SHALLOW 13+ PZ	060	SHRUBBY NORTH 15+ PZ
036	COLD SHALLOW SOUTH 13+ PZ	048	SHALLOW NORTH 14+ PZ
031	SHALLOW SOUTH 14+ PZ	054	LOAMY NORTH 10-15 PZ
041	DEEP NORTH 14-17 PZ	003	FAN 10-15 PZ
006	COLD CLAYEY SWALE 13-17 PZ	040	NORTH 14-17 PZ
005	COLD SWALE 13-17 PZ	002	COLD MEADOW

* Not a recognized ecological site.
This is the Wallowa-Bocker complex (Map Unit 349).

Map created by H Schmalz
TNC NEOR Office
Enterprise, OR 97828
May 8, 2019

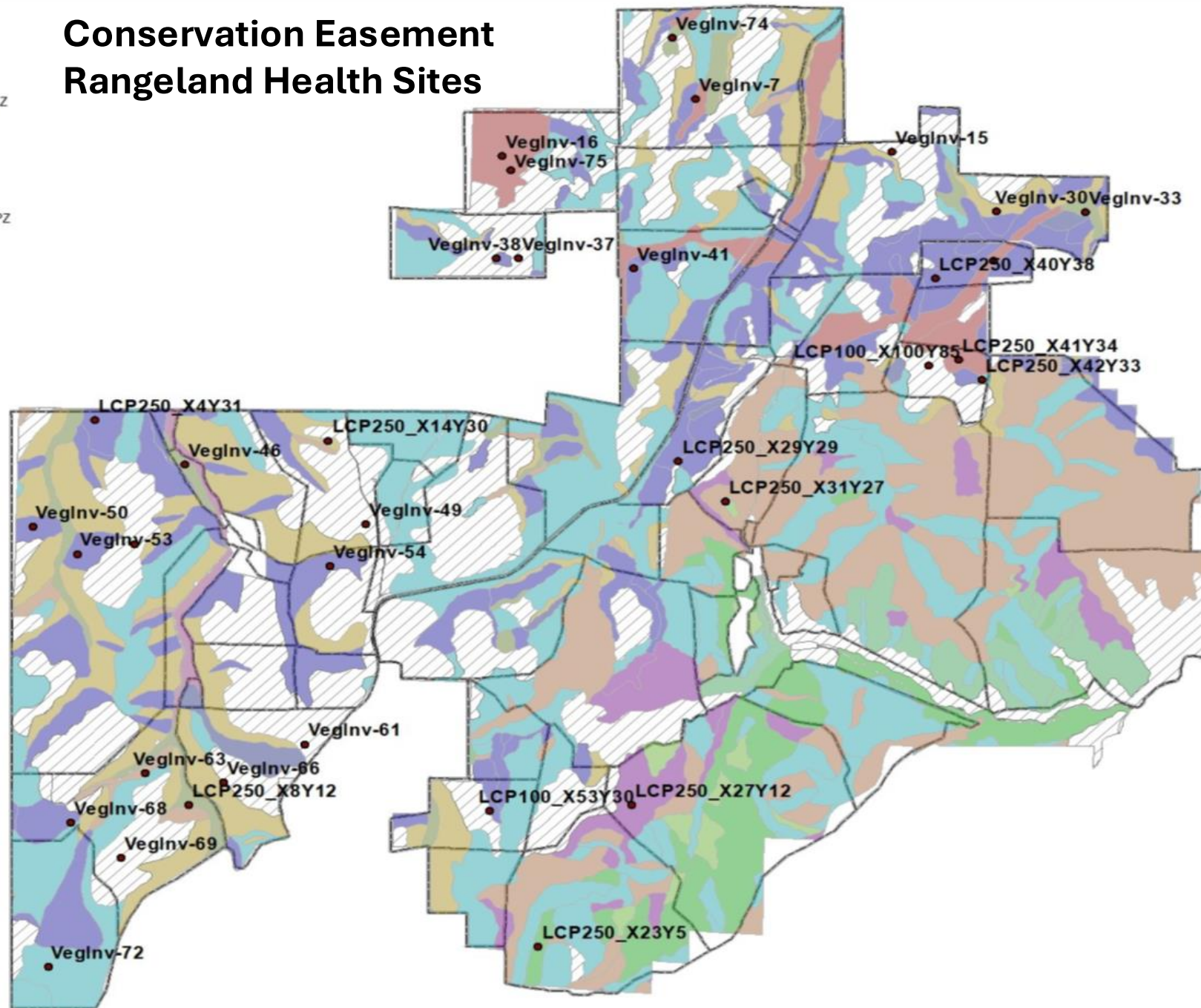


Conservation Easement Rangeland Health Sites

Legend

Eco Site Name

-  MOUND-INTERMOUND
-  COLD CLAYEY SWALE 13-17 PZ
-  COLD LOAMY 13-17 PZ
-  COLD LOAMY 17-24 PZ
-  COLD SHALLOW 13+ PZ
-  COLD SHALLOW SOUTH 13+ PZ
-  COLD SOUTH 17-24 PZ
-  COLD SWALE 13-17 PZ
-  DEEP NORTH 14-17 PZ
-  MOUNTAIN LOAMY BOTTOM
-  NORTH 14-17 PZ
-  SHALLOW SOUTH 14+ PZ
-  SHRUBBY NORTH 15+ PZ

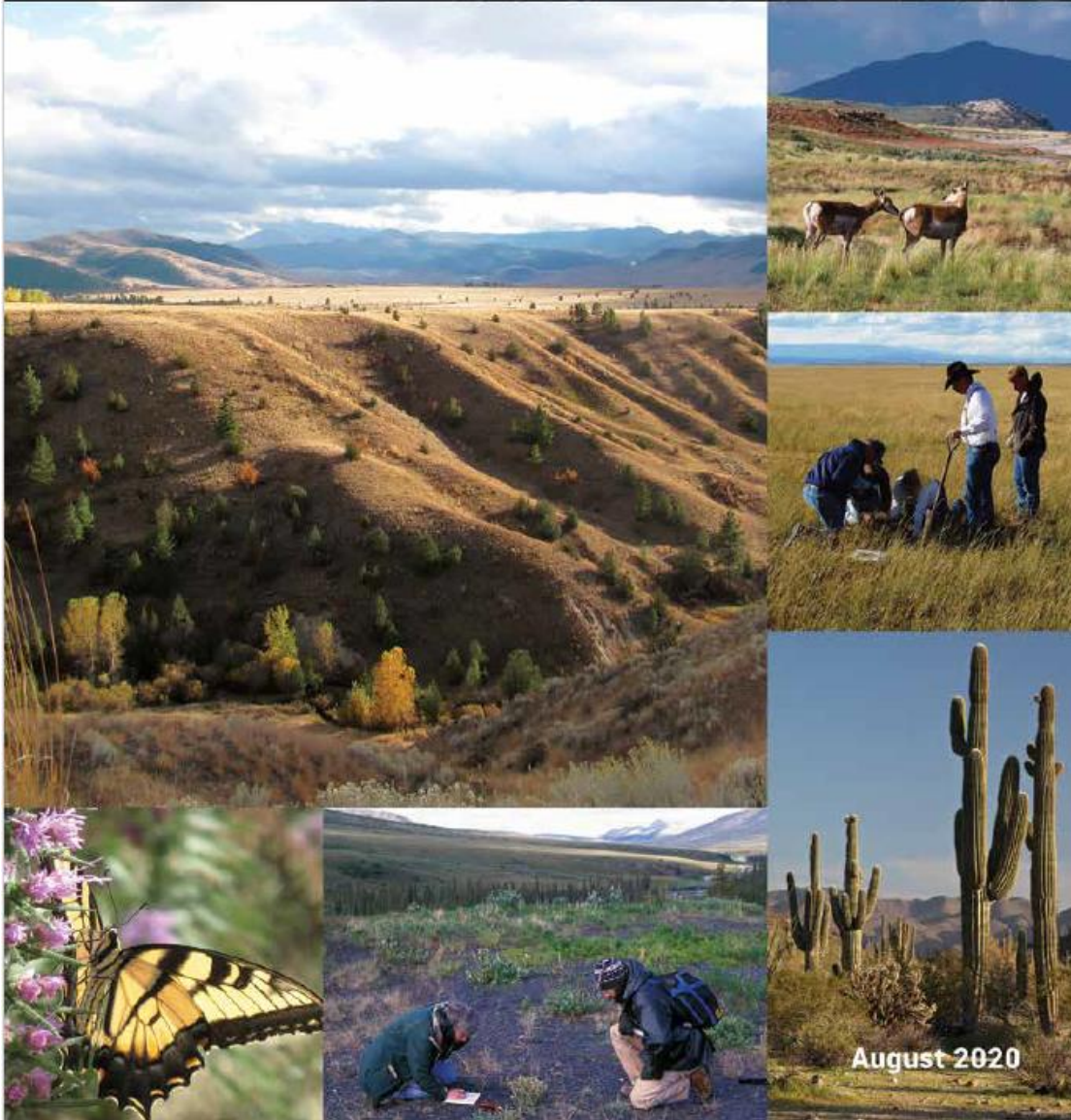






Interpreting Indicators of Rangeland Health

Technical Reference 1734-6, Version 5



The IIRH assessments are based upon ecological site potential and the observed or measured departure from the reference site potential.

Complete the following information as necessary for project documentation and assessment purposes.

Complete the following information as necessary for project documentation and assessment purposes.

Depth classes: Very shallow < 25 cm; Shallow 25-50 cm; Moderate 50-100 cm; Deep 100-150 cm; Very Deep > 150 cm
Oil effervescence (Eff) codes: NE - none eff; VS - very slightly eff; SL - slightly eff; ST - strongly eff; V - violently eff.
EIS symbol list is not completed, details reported reference documents. EIS symbol list is developed in this EIS.

File ID: VEG/INV 72	Date: 7/16/25
---------------------	---------------

Date: 7/16/25

² Soil effervescence (Eff) codes: NE – non-eff.; VS – very slightly eff.; SL – slightly eff.; ST – strongly eff.; V – violently eff.

³ If F/S worksheet is not completed, describe expected reference community F/S groups' relative dominance in this field.

³ If F/S worksheet is not completed, describe expected reference community F/S groups' relative dominance in this field.

INTERPRETING INDICATORS OF RANGELAND HEALTH VERSION 5
Functional/Structural Groups Worksheet

Evaluation Area ID: VEG/INV 72 Date: 7/16/25 Evaluator(s): MH

Instructions (Numbers correspond to fields in the worksheet; see Appendix 4 for detailed instructions.):

- Record the ecological site for the evaluation area. Considering the disturbance and land treatment history at the evaluation area, select the appropriate reference community phase from the F/S groups table in the reference sheet.
- Observe and list the F/S groups present in the evaluation area.
- Record the species within each F/S group present in the evaluation area. At the bottom of this section, record the number of expected F/S groups and number of species in expected dominant and subdominant groups observed in the evaluation area.
- Copy the relative dominance for the selected reference phase from the reference sheet to the **Expected** column. In the **Observed** column, document the relative dominance of F/S groups at the evaluation area. Use the **Comments** field to make notes, including any adjustments to relative dominance and rationale.
- For each subindicator, circle the departure category description that best fits the observed changes in F/S groups in the evaluation area.
- Rate the overall departure for the F/S groups indicator by choosing the greatest departure category of the four subindicators.

1) Ecological site:		Reference phase for evaluation area: 1.
2) F/S Groups in Evaluation Area	3) Species List	
Perennial Deep Rooted Dominant	FEAD	
Subdominant	PSSP6	
Shallow-rooted sub	BRIN Rhizomatous POSE, DAUN	
Perennial forbs	Antennaria dimorpha	
Biological soil crusts ¹		
Number of expected F/S groups present ² in evaluation area:		
Number of species in expected dominant and subdominant groups present in evaluation groups:		

¹ Biological soil crust dominance is determined based on cover, rather than production. If biological soil crusts are an expected dominant or subdominant group, the number of expected life forms (e.g., lichen, moss) is listed, rather than number of individual species.

² When an F/S group that is expected to be dominant, subdominant, or minor is reduced in the evaluation area to a few remnant individuals, the group is considered to not be "functionally present" and is not included in the number of F/S groups present (12c).

INTERPRETING INDICATORS OF RANGELAND HEALTH VERSION 5
Functional/Structural Groups Worksheet

Evaluation Area ID: VEG/INV 72 Date: 7/16/25 Evaluator(s): MH

4)	Expected relative dominance of F/S groups for Phase 1. _____ Based on: Production _____ Foliar Cover _____	Observed relative dominance of F/S groups in the evaluation area			
Dominant	FEID	old field cultivated in mid 1970. BRIN DOM			
Subdominant	Cool season bunch grass PSSP6				
Minor	DAUN KOMA POSE Perenn / forbs	AND1 in shallow soil patches			
Trace					
Comments:					
5) Indicator and subindicators rating (circle the appropriate departure category for each subindicator below).					
Subindicator	E-T	M-E	M	S-M	N-S
12a. Relative dominance	All expected dominant F/S groups are now minor, trace, or missing.	Dominant F/S group(s) has become minor or trace, or a minor or trace group is now dominant.	Dominant F/S group(s) has become subdominant.	Subdominant F/S group has become minor or trace, or a minor or trace F/S group has become subdominant.	Resembles expected relative dominance for appropriate reference phase.
12b. F/S groups not expected at the site	F/S group(s) not expected is now dominant.	F/S group(s) not expected is now subdominant.	F/S group(s) not expected is now minor.	F/S group(s) not expected is now trace.	None.
12c. Number of expected F/S groups	Severely reduced (missing $\geq 76\%$ of expected F/S groups).	Greatly reduced (missing 51-75% of expected F/S groups).	Moderately reduced (missing 26-50% of expected F/S groups).	Slightly reduced (missing $\leq 25\%$ of expected F/S groups).	All expected F/S groups for appropriate phase are present.
12d. Total combined number of species expected in dominant and subdominant F/S groups	Severely reduced (missing $\geq 76\%$).	Greatly reduced (missing 51-75%).	Moderately reduced (missing 26-50%).	Slightly reduced (missing 10-25%).	Missing less than 10% of expected # of species in dominant and subdominant F/S groups for appropriate reference phase.
6) Overall departure category for F/S groups indicator:					

Data Entry Date: _____ By: _____ Error Check Date: _____ By: _____

Observed Apparent Trend (OAT)

VIGOR		
10 points	Desirable grasses, forbs and shrubs are vigorous, showing good health	
6 points	Desirable grasses, forbs and shrubs have moderate vigor	6
2 points	Desirable grasses, forbs and shrubs have low vigor	

SEEDLINGS		
10 points	There is seedling establishment of desirable grasses, forbs and shrubs. Few seedlings of invader or undesirable plants are present.	
6 points	Some seedlings of desirable grasses are present; some seedlings of invader or undesirable plant species may be present.	6
2 points	Few if any seedlings of desirable grasses, forbs and shrubs are present; seedlings of invader or undesirable plants are present in open spaces between plants	

SURFACE LITTER		
5 points	Surface litter is accumulating in place.	5
3 points	Moderate movement of surface litter is apparent and deposited against obstacles.	
2 points	Very little surface litter is remaining.	

PEDESTALS		
5 points	There is little evidence of pedestalling.	4
3 points	Moderate plant pedestalling	
1 point	Most rocks and plants are pedestalled.	

GULLIES		
5 points	Gullies may be present in stable condition with moderate sloping or rounded sides. Perennial plants should be establishing themselves on bottom and side of channel.	0
3 points	Gullies are well developed with small amounts of active erosion. Some vegetation may be present.	
1 point	Sharply incised V-shaped gullies cover most of the area with most actively eroding and mostly devoid of perennial plants.	

21

TOTAL POINTS	RATING:	26-35 UPWARD	17-25 STABLE	16 > DOWNWARD
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VEG INV 72 7/16/25

Need GULLIES NA factor 21 = 25 w/o gullies



RangeSAT

Satellite-based Assessment Tools for Rangelands

Rangeland Vegetation Monitoring Tools for Adaptive Management



FEEDBACK

To view tools, select a site above.

Compare annual production (lbs./acre observed) with
RangeSAT biomass

This map displays all pixels (30 x 30 meters) for an individual Landsat image and chosen vegetation indicator.

Pixel View Map

Management Unit: Midway

Vegetation Indicator: Biomass

Opacity: 0% 100%

Pasture boundary color: white

Valid Scene Date:

2025 May 28

BIOMASS:

0 2500 lbs/acre

Value at mouse click point is: 1133 lbs/acre

SCENE METADATA

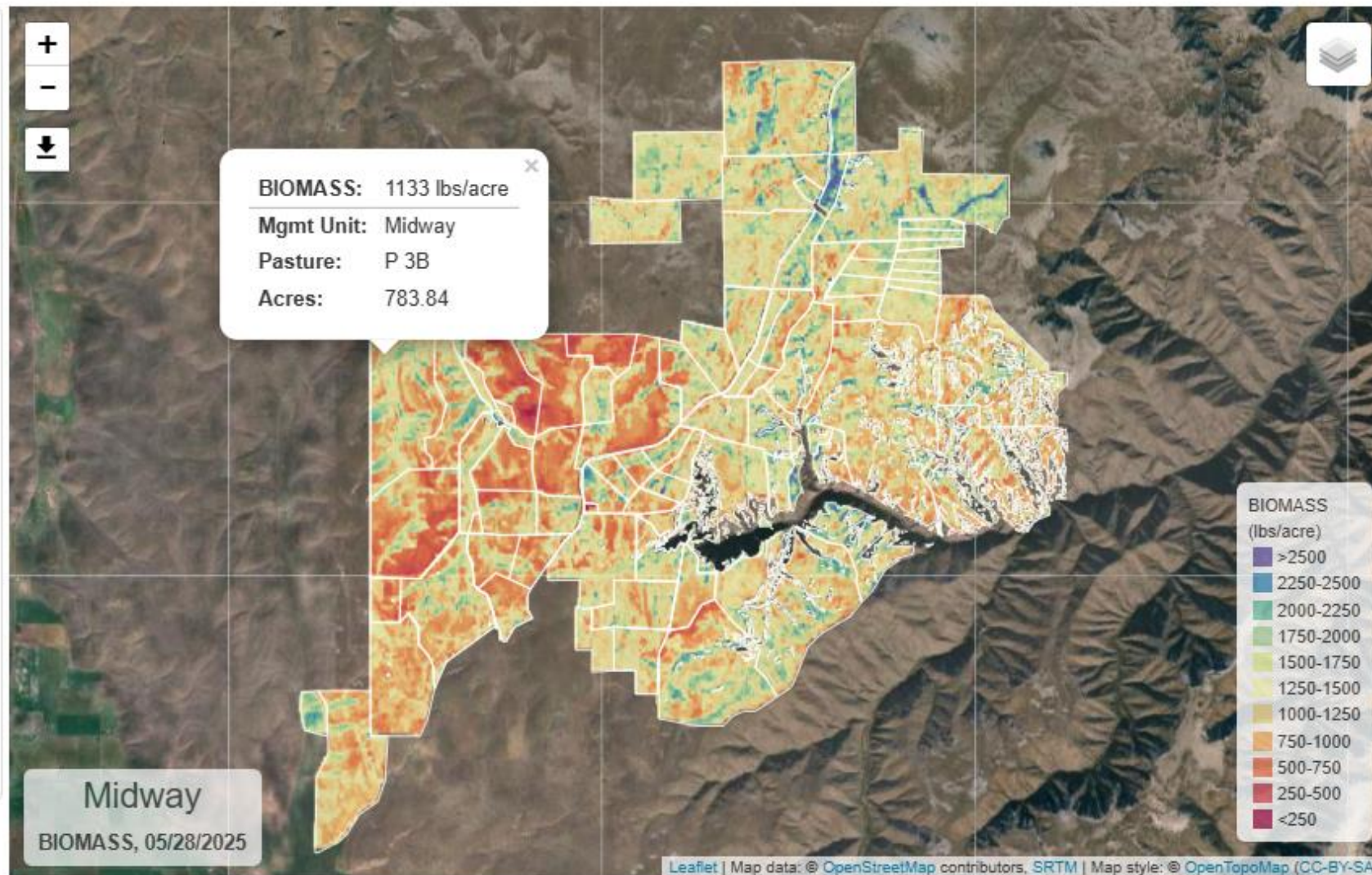
Satellite: Landsat 8

Date: 20250528 (yyyymmdd)

Measure: BIOMASS

Scene: LC08_L2SP_043028_20250528_20250603_02_T1

Download GeoTIFF



NOTE: Landsat 7 data from May 31, 2003 to present have data gaps, resulting in stripes across the image.

This map displays average biomass values by pasture for a given month or across a season. Pastures are color-coded by averaged biomass values. Click within an area for pasture name, acreage, and biomass value. See table of values for all pastures at bottom of page.

Pasture Averages Map

Management Unit: Midway ▼

Select Year/Month:

2025 ▼

☒ Average for April-October

Biomass (lbs/acre)

>2000

1750-2000

1500-1750

1250-1500

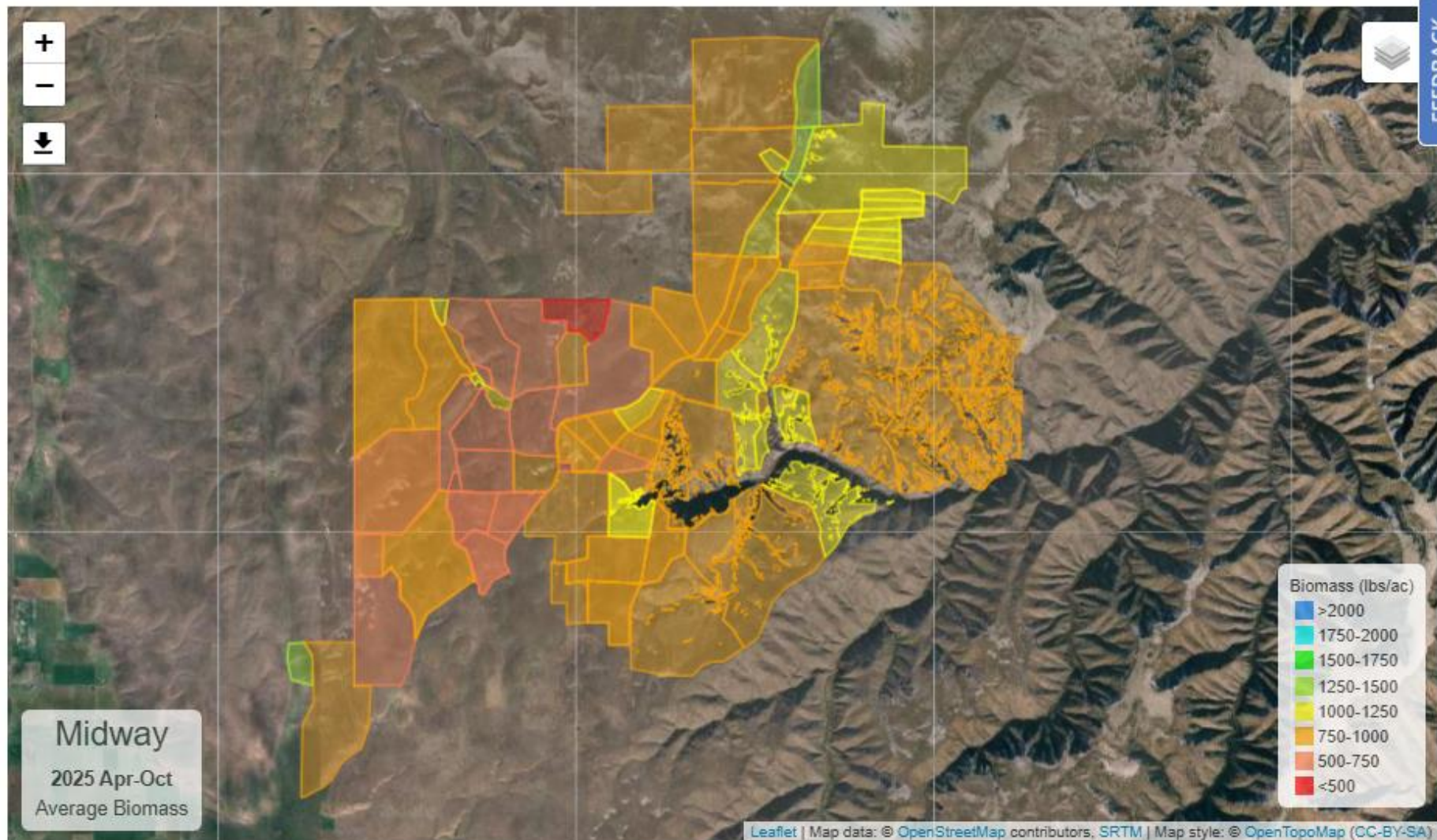
1000-1250

750-1000

500-750

<500

No data



Summary Report - Comparison every 5 to 6 years; 2020 -2025

- Comments on moderate or greater departures from reference conditions
- Describes how deficiencies will be addressed
- External forces such as drought, wildfire and floods are taken into consideration.



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mike.hale@tnc.org

