

Forb Counts in Grassland are Sensitive to Analytical Method



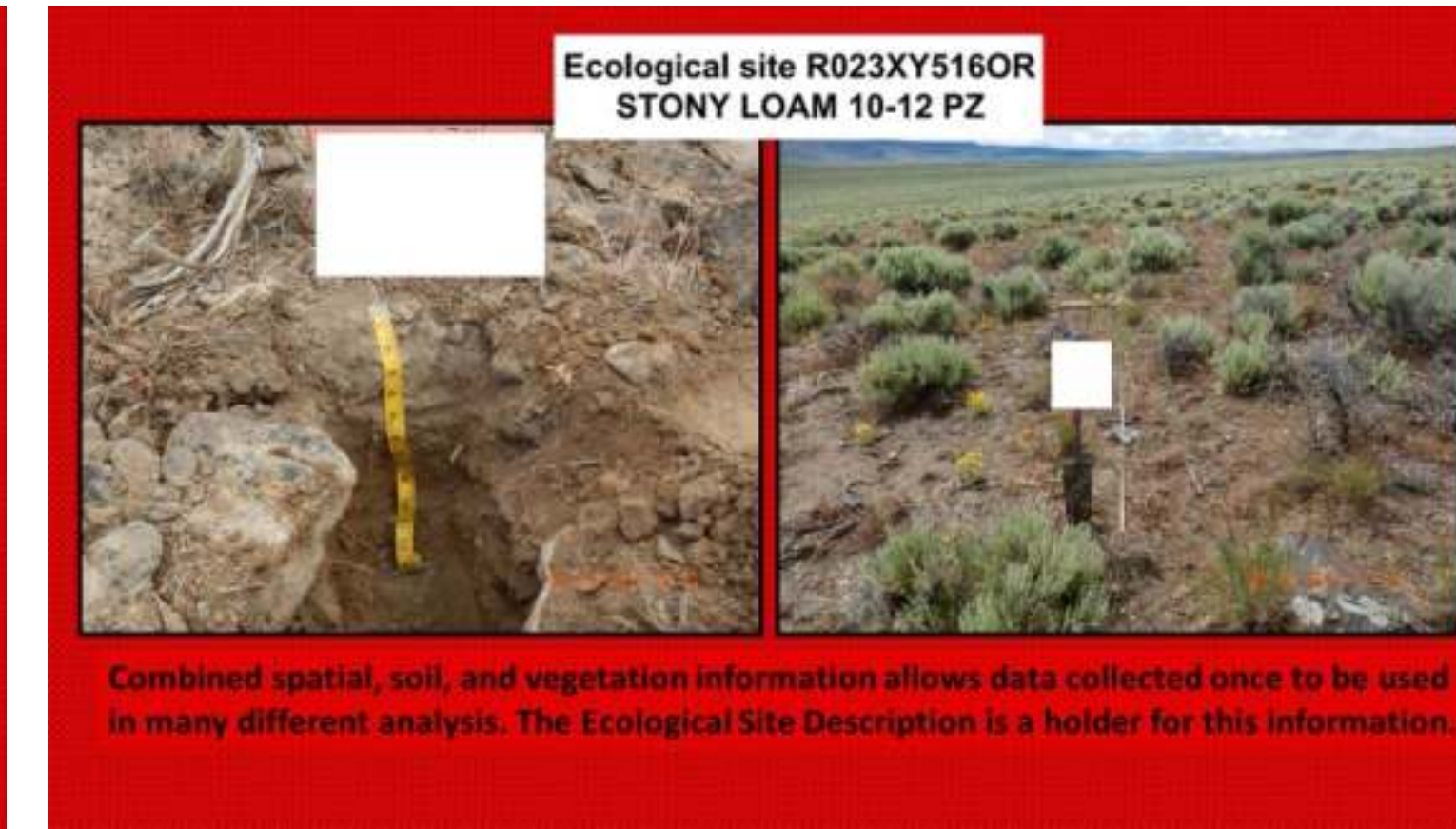
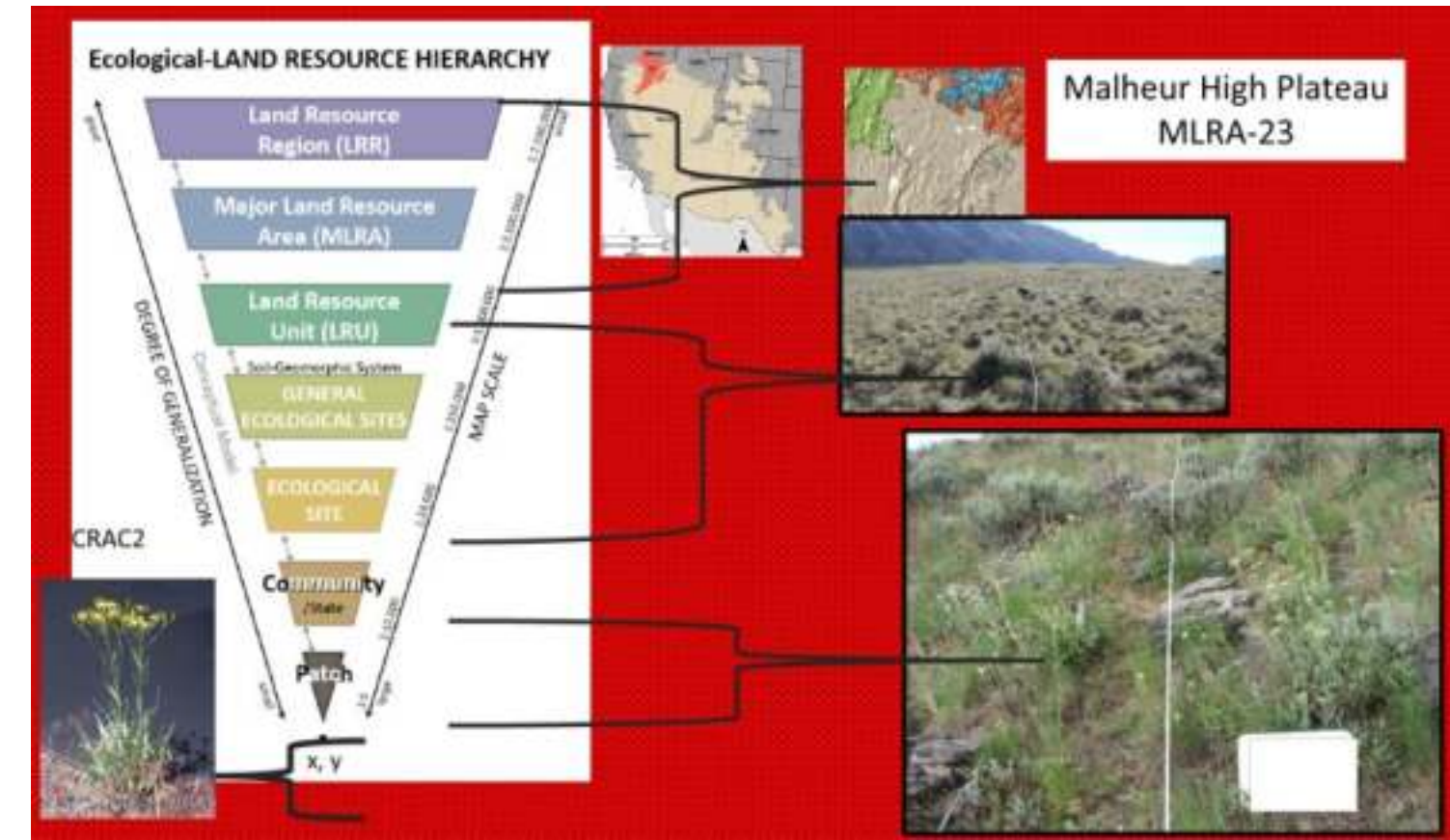
THE JOINT XXIV INTERNATIONAL GRASSLAND AND XI RANGELAND VIRTUAL CONGRESS
Sustainable Use of Grassland and Rangeland
Resources for Improved Livelihoods
23rd - 29th October 2021

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Hierarchy of Where Data is Collected and Stored



ECOLOGICAL SITE DESCRIPTIONS (ESD)

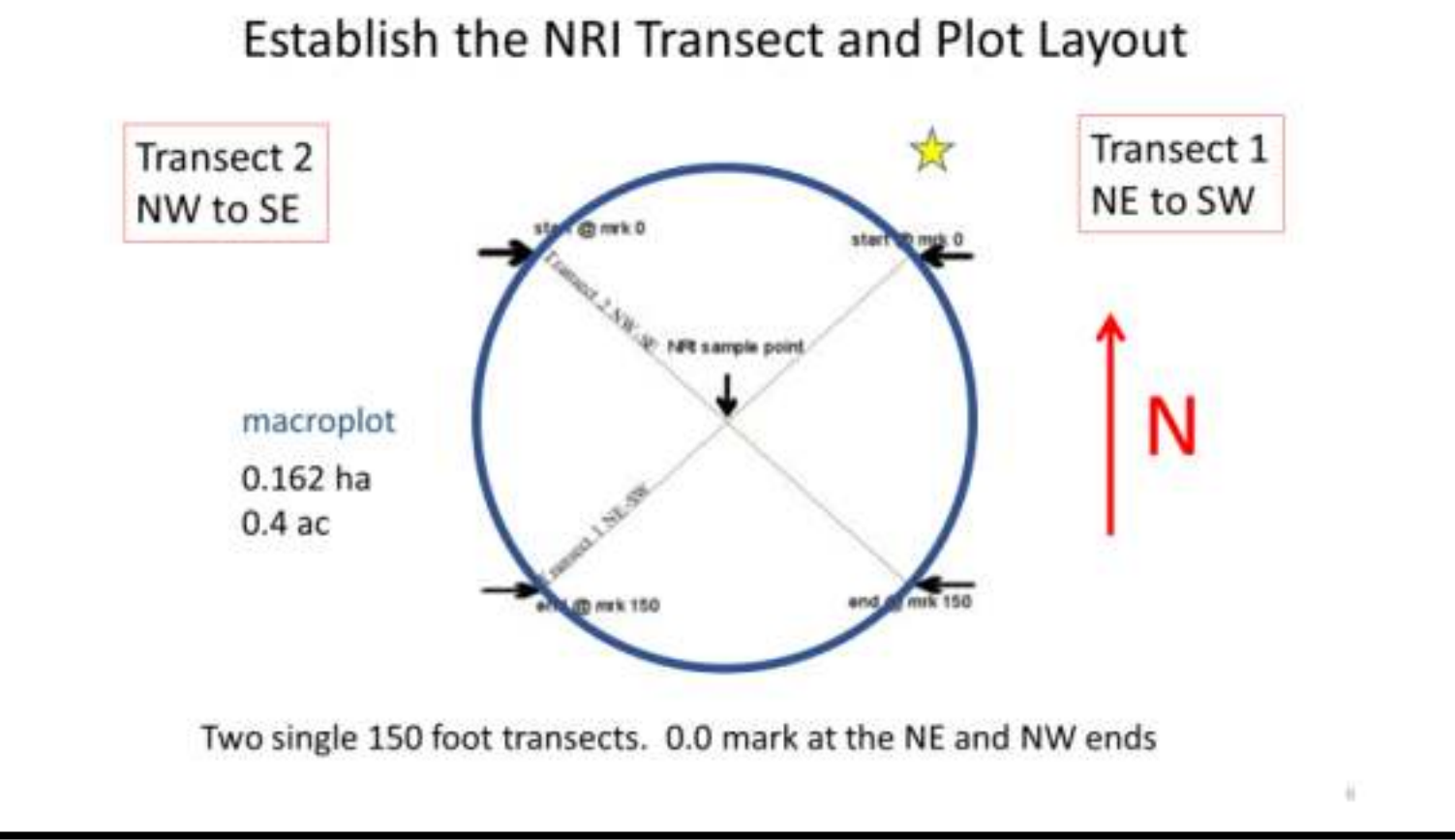
EDIT

Ecosystem Dynamics Interpretive Tool (EDIT) is an online information system for the development and sharing of ecological site descriptions.

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

Plant	Abundance	Height	Age
Other perennial forbs			0-30
Artemisia tridentata	AC002	Artemisia tridentata	0-30
Artemisia tridentata	AR000	Artemisia tridentata	0-30
Artemisia tridentata	AR001	Artemisia tridentata	0-30
Artemisia tridentata	AR002	Artemisia tridentata	0-30
Artemisia tridentata	AR003	Artemisia tridentata	0-30
Artemisia tridentata	AR004	Artemisia tridentata	0-30
Artemisia tridentata	AR005	Artemisia tridentata	0-30
Artemisia tridentata	AR006	Artemisia tridentata	0-30
Artemisia tridentata	AR007	Artemisia tridentata	0-30
Artemisia tridentata	AR008	Artemisia tridentata	0-30
Artemisia tridentata	AR009	Artemisia tridentata	0-30
Artemisia tridentata	AR010	Artemisia tridentata	0-30

Plant Census and Line Point Intercept Protocol Comparison of Results



Plant Census

15 minute timed-search

Line Point Intercept (LPI)

30-60 minutes to complete 2 150 ft (60 m) transects

LPI is well worth the time and effort:

- ✓ Up to Six species pin intercept of foliar canopy per transect mark
- ✓ Litter layer
- ✓ Basal layer
- ✓ Protocol is consistent across multiple data collectors

Comparison of functional group numbers shows increases for Plant Census compared to Line Point Intercept

Functional Group	Plant Census species count	Line Point Intercept species count	% increase in species
Forb	257	180	30
Grass	76	77	0
Woody	85	62	28
Total	420	321	24

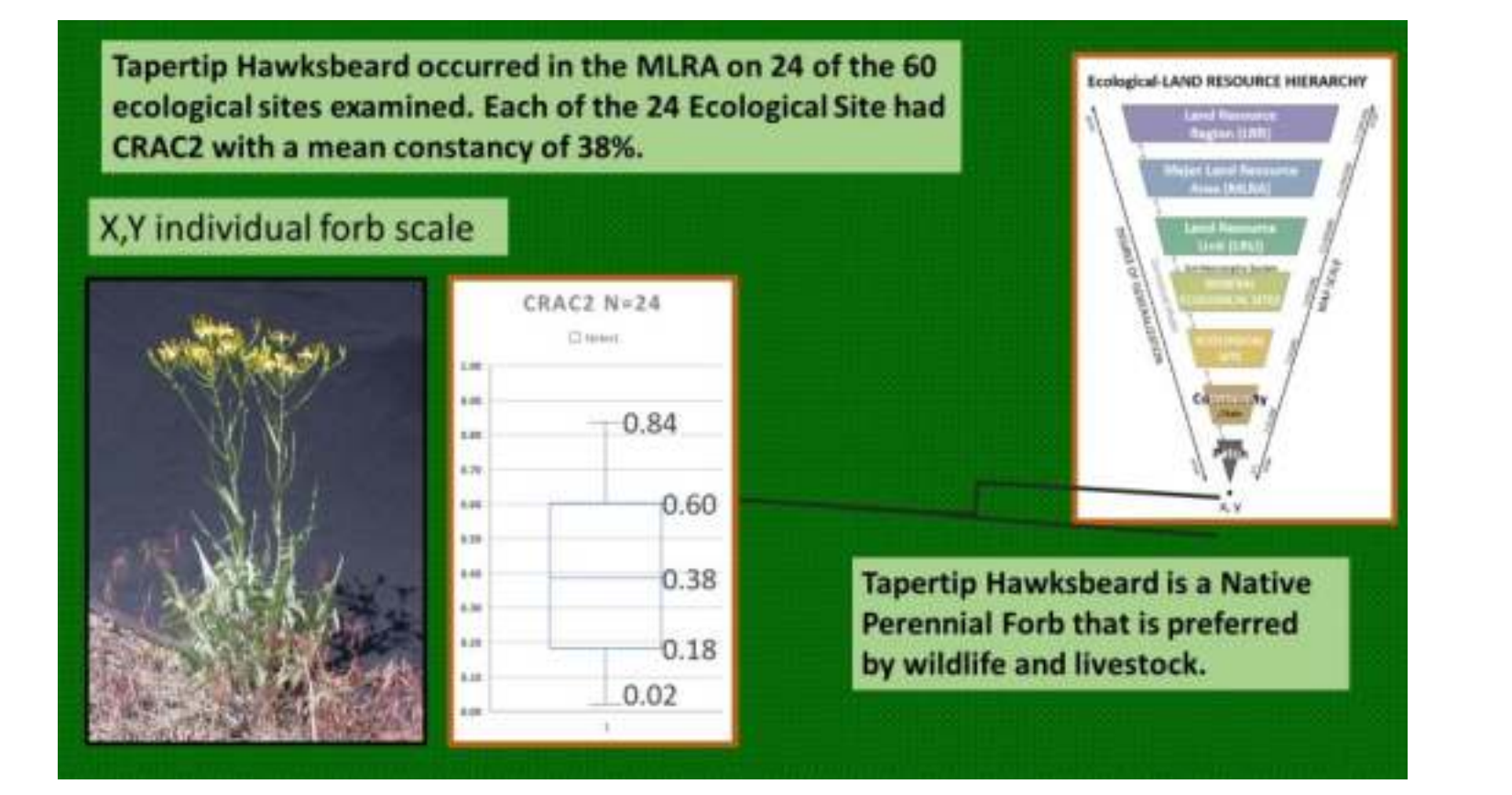
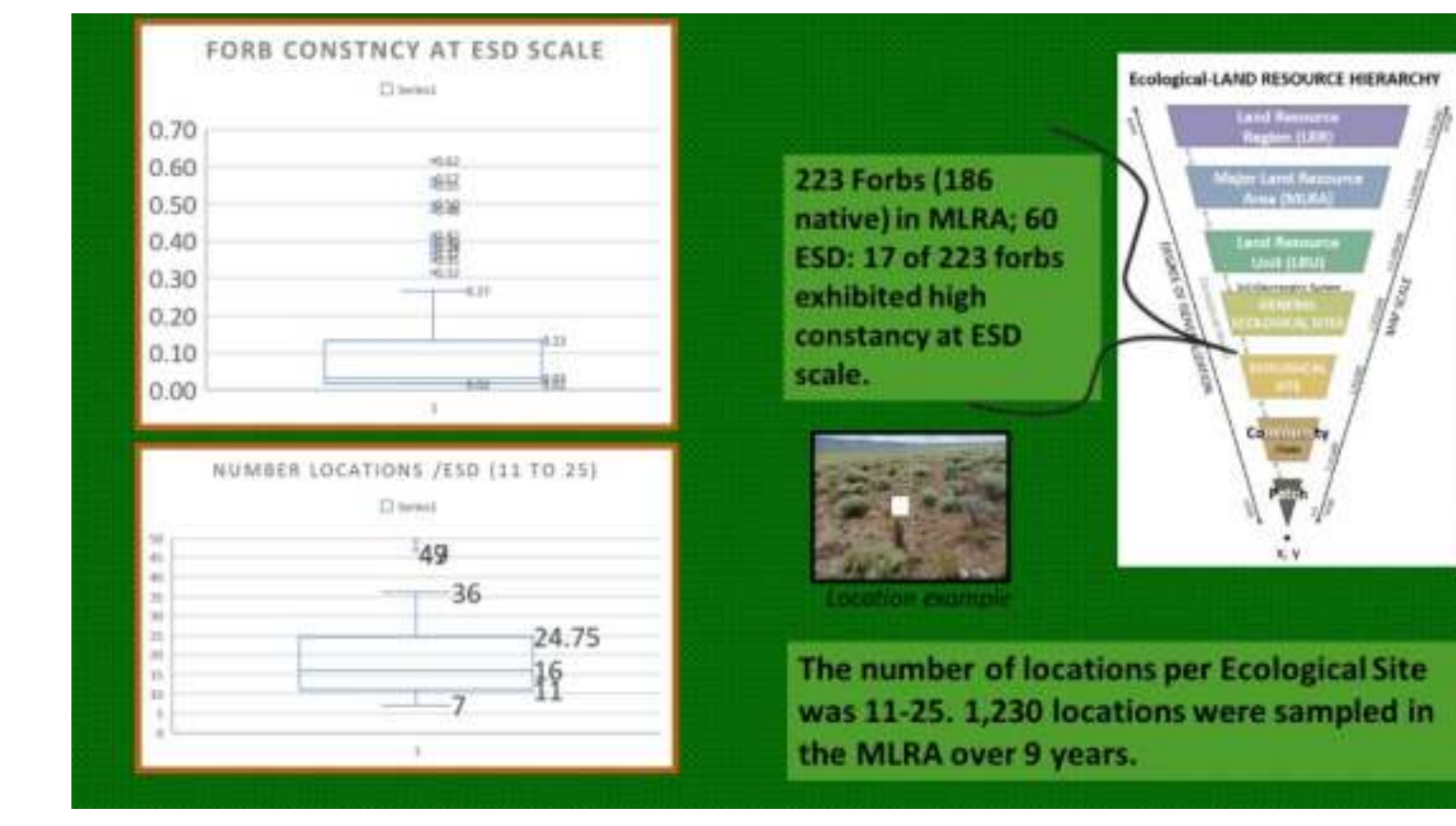
Constancy Results

MLRA FUNCTIONAL GROUPS

Functional Group	Number of Species in Functional Group	Group Constancy Average
Spring Perennial Forbs	71	0.08
Spring Perennial Forb	33	0.14
Annual Forb	26	0.11
Summer Perennial Forb	21	0.13
Spring Annual Forb	20	0.08
Spring Annual Forb introduced	13	0.10
Perennial Monocot Forb	10	0.11
Annual Forb introduced	9	0.11
Spring Perennial Forb introduced	8	0.09
Perennial Forb introduced	5	0.11
Summer Annual Forb	5	0.06
Summer Annual Forb introduced	2	0.06

Plant Census is a timed protocol for searching the macroplot for species and estimating a tally of plants per species at 10, 100, 500, 1,000, > 1,000 plants.

Plant Tally Categories	Functional Group	Average Tally
1-1-10 plants	Forb	2.2 or about 100 plants/0.4 ha
2-11-100 plants		
3-101-500 plants	Grass	2.9 or about 500 plants/0.4 ha
4-501-1000 plants		
5-> 1000 plants	Woody (SST)	1.9 or slightly < 100 plants/0.4 ha



Forb Constancy Groups

<p>grp1 ERIGE2 21/60 Ecological Sites constancy percent 14 (26) 47</p> <table border="1"> <thead> <tr> <th>X,Y Grouped Constancy</th> <th>Mean Constancy</th> <th>% of Total Forbs</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.21 - 1.0</td> <td>11</td> </tr> <tr> <td>2</td> <td>0.11 - 0.2</td> <td>26</td> </tr> <tr> <td>3</td> <td>0.06 - 0.1</td> <td>42</td> </tr> <tr> <td>4</td> <td>< 0.05</td> <td>20</td> </tr> </tbody> </table>	X,Y Grouped Constancy	Mean Constancy	% of Total Forbs	1	0.21 - 1.0	11	2	0.11 - 0.2	26	3	0.06 - 0.1	42	4	< 0.05	20	<p>grp1 LUPIN 23/60 Ecological Site constancy percentage 13 (23) 44</p> <p>Lupinus sp.; 28 species in PNW; Toxicity; Annual Forb, Perennial Forb</p>	<p>grp1 ASTRA 25/60 Ecological Site constancy percentage 18 (31) 40</p> <p>Astragalus milkvetch; 84 species in PNW; Toxicity; Spring Perennial Forb, Perennial Forb</p>	<p>grp2 COGR2 11/60 Ecological Sites constancy percentage 6 (23) 33</p> <p>Collinsia grandiflora Giant blue-eyed Mary 4 species PNW; Annual Forb</p>	<p>grp3 MACA2 10 / 60 Ecological Site constancy percentage 2 (3) 8</p> <p>Machaeranthera canescens Hoary tansyaster; 6 species in the PNW; Spring Perennial Forb</p>	<p>grp3 LEDI2 7 / 60 Ecological Site constancy percentage 3 (4) 14</p> <p>Lepidium dictyotum Alkali Pepperweed; Annual Forb</p>	<p>grp3 NAVAR 10 / 60 Ecological Sites constancy percentage 4 (5) 9</p> <p>Navaretia sp. Pincushion plant; 6 species in the PNW; Spring Annual Forb</p>	<p>grp3 CALCO2 8 / 60 Ecological Site constancy percentage 2 (5) 19</p> <p>Calochortus sp. Mariposa lily; 13 species in the PNW; Perennial Monocot Forb</p>	<p>grp4 has 42 forbs with constancy 0.03 or less.</p> <p>Is it rare or is it wrong?</p> <p>Data Quality Control opportunity.</p>
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Additional Reasons to Include Plant Census Protocol

- Uniform quadrat size and time allows baseline for population studies across grassland and shrubland plant communities within a geospatial area
- Multiyear repetitive data collection will increase chances to observe species life cycle variations and biota interactions.
- Maintain genetic pool for species selected for restoration projects.
- Increased detectability of rare plants.

Restoration planting seed increase Sulfor buckwheat *Eriogonum umbelliformis* is the Yellow flower in the background; Venus pentstemon *Pentstemon venustus* is the foreground Purple; Gooseberry-leaf globe mallow *Sphaeralcea grossularifolia* is the Orange flowered forb in the foreground

Pollinator nectar plants are commonly Forbs.

- Training resource for plant identification.
- Quality control of plant species lists for nomenclature updates and preventing the inclusion of false identification.
- Geospatial presence data for true Flora distribution studies
- The expense of getting to the site is offset by the relatively low effort of a 15-minute walk across the macroplot that results in 29% increase in data.

Ecological forb studies document limitations beyond just plant identification issues. Forbs with distinctive leaves like Silky lupine may be recognized throughout the data collection season. The basal leaves of Few-flowered shooting star blend in with the green and may go unrecognized when its showy flowers are not present.

Dodecatheon pulchellum Few-flowered shooting star

Lupinus sericeus Silky lupine

References

NRI (2020) <https://grazingland.csm.iastate.edu/site-data-collection-handbook-instructions>

Salley, Shawn & Talbot, Curtis & Brown, Joel (2015). The Natural Resources Conservation Service Land Resource Hierarchy and Ecological Sites. Soil Science Society of America Journal, 80. 10.2136/sssaj2015.05.0305.

Siebert, Frances & Dreber, Niels (2019). Forb ecology research in dry African savannas: Knowledge, gaps, and future perspectives. Ecology and Evolution, 9. 10.1002/ece3.5307.

Photo credits for Forbs: Gary A. Monroe