Some Ideas on How to be a Data Detective (for ESD Development)

Shane A. Green
Vegetation Data (Plant Communities section)

- One major criticism of ESDs is that they are not based on (enough) data
  - More data = better credibility
    - Expertise should be applied to data interpretation (no black boxes, no “data-less” theories)

- Some data is more valuable than other data
  - no data is useless
How to Gauge the Value of Data for ESDs

- **What data was collected?**
  - What metrics were recorded (production, cover, density, frequency)
    - Which concepts were used? (annual production vs. peak standing crop, foliar vs. canopy cover)
    - What techniques were used (double sampling vs. comparative yield vs. ocular estimates, point vs. linear vs. plot cover techniques)

- **Where was the data recorded?**
  - Ecological Site identification
  - Soil Identification
  - Geographic Location (coordinates, T, R & Section)
  - Random or deliberate site selection
How to Gauge the Value of Data for ESDs

• Why was the data collected?
  • Monitoring vs. assessment
  • Wildlife / watershed / livestock purpose and focus
  • Ground truth for remote sensing

• When was the data collected?
  • Concepts and techniques change over time
    • i.e. density = cover in old terminology
  • Temporal context
    • i.e. Pre or post-settlement, pre or post-invasive plants, management history
How to Gauge the Value of Data for ESDs

- Who collected the data?
  - Agency or individual reputation or bias
What parts of the ESD can data inform?

- **Plant Communities Section**
  - Annual production and cover by species
  - State and transition models
  - Plant community structure

### Annual Production by Plant Type:

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Low</th>
<th>Representative Value</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass/Grasslike</td>
<td>203</td>
<td>349</td>
<td>450</td>
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<tr>
<td>Forb</td>
<td>45</td>
<td>78</td>
<td>100</td>
</tr>
<tr>
<td>Shrub/Vine</td>
<td>203</td>
<td>349</td>
<td>450</td>
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</tbody>
</table>
Where to get data for ESDs

- Range Sites – they were based on some data
  - Old dusty files need to be examined and organized

- Historical data
  - Journals and accounts, survey notes

- Partner agencies
  - Division of Wildlife, BIA, BLM, USFS, Universities

- NRCS sources
  - Field offices, NRI
Examples – Range Sites

Relationships Between Soil, Plant Community, and Climate on Rangelands of the Intermountain West


Abstract

Studies were made to determine the range of soil, climate, and vegetation characteristics consistently associated under natural conditions. Eighty-five study sites were selected within 32 relict areas in northern Utah, southern Idaho, northeastern Nevada, and west-central Wyoming. Studies were confined to climax plant communities characterized by associations of sagebrush, bluebunch wheatgrass, Sandberg bluegrass, and Idaho fescue and by Entisol, Aridisol, and Mollisol soil orders. Soil subgroups provided the most meaningful level of soil classification for correlation with broad plant associations. The presence of different species or subspecies of sagebrush provided the most meaningful grouping of plant communities.

Vegetation production and composition data were recorded for 10 consecutive years on 17 key study sites. Annual and periodic fluctuations in total production and yield of individual species in response to climatic variations were analyzed. Year-to-year differences in production were greater on sites with deeper soils and higher precipitation than on sites with shallower soils and lower precipitation. Fluctuations in production of individual plant species were inconsistent and erratic. Growing conditions favorable to some species were unfavorable to others. Production was positively related to precipitation, but the relationship was too broad to be of practical interpretive value for range management. Broad positive correlations also were observed between total annual production and soil organic-matter content, soil nitrogen content, amount of plant litter, percentage of soil covered by plants, and basal area of plants.

Soil properties modify the effects of climate on plant communities; likewise, variations in weather conditions modify or mask the effects of specific soil properties on plant growth and distribution. Nevertheless, climax plant communities protected from abnormal disturbance serve as valuable benchmarks for soil survey interpretations on rangeland. Effects of soil, plant, and climate relationships on relict areas may be used to approximate productive potential of other areas of the same or similar soils.
H.B. Passey and Vern K. Hugie

SCS Plant/Soil Relationships Team

Some Plant-Soil Relationships on an Ungrazed Range Area of Southeastern Idaho

The data presented will be useful in the technical description of range sites represented by the relicts and, through interpolation and extrapolation of these data, the place of sagebrush in potential native plant communities may be approximated for range sites not represented by suitable relict areas.
General View of Vegetation

Close Up of Vegetation
Plot 1-60 Upland Gravelly Loam

“The inventory location has burned within the last few years, removing most of the native shrub species and releasing the Bluebunch wheatgrass. Broom snakeweed has increased in spots as expected following a wildfire.”

1960

2010
Plot UT1-60 Upland Gravelly Loam

HP UT1-60
Passey-Hugie revisited site locations
Upland Gravelly Loam (Bonneville Big Sagebrush) R028AY306UT
## Plot UT1-60 Upland Gravelly Loam

<table>
<thead>
<tr>
<th>Species</th>
<th>Symbol</th>
<th>H-P two-year average lbs/ac</th>
<th>H-P two-year average % comp</th>
<th>2009 Inventory in lbs/acre</th>
<th>2009 Inventory in % comp</th>
<th>2009 Ecological Status</th>
<th>2009 Forage Value</th>
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<td>7</td>
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<td>Utah juniper</td>
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<td><strong>Totals:</strong></td>
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<td>752</td>
<td>100</td>
<td>58</td>
<td>214</td>
<td>999</td>
<td>100</td>
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</tbody>
</table>

*H-P: Holistic productivity*
What parts of the ESD can data inform?

1. Reference State
   1.1 Bonneville big sagebrush / Bluebunch wheatgrass / Slender Wheatgrass
   1.2 Bonneville big sagebrush / other shrubs / perennial grasses / juniper may be present
   1.3 Perennial Grasses and forbs dominate / Fire tolerant shrubs present

2. Current Potential State
   2.1 Bonneville big sagebrush / Bluebunch wheatgrass / Slender Wheatgrass / non-native species
   2.2 Bonneville big sagebrush / other shrubs / perennial grasses / non-native species
   2.3 Perennial grasses and forbs dominate / Fire tolerant shrubs present / non-native species

3. Utah Juniper / Invasive Annual State
   3.1 Utah juniper / Bonneville big sagebrush / invasive annuals / native perennials
   3.2 Utah juniper / invasive annuals

4. Bonneville Big Sagebrush / Broom Snakeweed State
   4.1 Bonneville big sagebrush / Broom snakeweed / Sandberg bluegrass
   4.2 Broom snakeweed / Sandberg bluegrass

5. Sprouting Shrub / Invasive Annual State
   5.1 Yellow rabbitbrush / Snowberry / Invasive annuals / Native perennials
   5.2 Yellow rabbitbrush / Snowberry / Invasive annuals

6. Seeded Range State
   6.1 Introduced perennial herbaceous
   6.2 Native shrubs / Introduced perennial herbaceous understory
Examples – Historical Journals

[Image of book cover and map]
P.P. Pratt Expedition – January 16th 1850 entry

- Campbell: “Pass down thro a bottom of beautiful wheat grass 4&5 inches above the snow”
- Haight: “Came over a sage plain 5 miles to (Cove) Creek”
P.P. Pratt Expedition – January 16\textsuperscript{th} 1850 entry

- Campbell: “Pass down thro a bottom of beautiful wheat grass 4&5 inches above the snow”
- Haight: “Came over a sage plain 5 miles to (Cove) Creek

Upland loam (Mountain big sagebrush)

<table>
<thead>
<tr>
<th>Grass/Grasslike</th>
<th>Annual Production in Pounds Per Acre</th>
<th>Foliar Cover Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Name</td>
<td>Common Name</td>
<td>Symbol</td>
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<tr>
<td>0 - Primary Grasses</td>
<td></td>
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<tr>
<td></td>
<td>Indian ricegrass</td>
<td>ACHY</td>
</tr>
<tr>
<td></td>
<td>squirreltail</td>
<td>ELE5</td>
</tr>
<tr>
<td></td>
<td>Sandberg bluegrass</td>
<td>PONE3</td>
</tr>
<tr>
<td></td>
<td>bluebunch wheatgrass</td>
<td>PSSP6</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Shrub/Vine</th>
<th>Annual Production in Pounds Per Acre</th>
<th>Foliar Cover Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Name</td>
<td>Common Name</td>
<td>Symbol</td>
</tr>
<tr>
<td>0 - Primary Shrubs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>mountain big sagebrush</td>
<td>ARTRV</td>
</tr>
<tr>
<td></td>
<td>antelope bitterbrush</td>
<td>PUTR2</td>
</tr>
</tbody>
</table>
GENERAL DESCRIPTION.

This township is mountainous throughout and the soil is generally rocky on the ridges, while the slopes of the canyons are generally sandstone ledges. The eastern portion of the township fall into the Green River breaks which is nearly all a sandstone formation cut by box canyons, impossible to survey, I do not survey this portion.

A heavy growth of cedar and pinon timber is found on the slopes which are not steep and on the steep slopes a scattering growth of timber is found.

Sage Brush Flat, a sandy flat, sloping south, covered with a dense growth of sage brush, is located in secs. 4-5-8 and 9, area about 400 acres, this flat also extends into T.12 S., R.16 E.
Example – Repeat Photography

U of U Ph. D. in Geography

Used old photography taken by H.L Shantz, from the U of A Herbarium archives. 1908-1925. Botanical notes were found with each photograph.
1912 Green molly dominance

1978 Bur buttercup, Cheatgrass, Sand dropseed, Western Wheatgrass, Sagebrush
Hi Shane,

I spoke with you at the Soil Survey Planning Meeting there, back in November. I am the one doing the rangeland inventory on the Uintah & Ouray Reservation. Sorry it took so long to get back to you. I figured I would just wait until after the holidays and other chaos before I reconnected with folks regarding the soil survey and range inventory. This also gave me a chance to go through some of the field data more and get things better organized. I am still in the process of working in GIS creating tables with slopes etc and calculating actual usable acreages.

You mentioned you would be interested in our field data to help with ecological site descriptions, and I would be interested in getting your input on some of our methods and the best ways to make sense of all this data. I don’t know what your schedule is like, or what ideas you may have on exchanging information, but I was thinking if you are ever in this part of Utah perhaps we could set up a meeting and I could show you what is going on from our end. At that point maybe we could set up a plan for working together going forward. Let me know what your thoughts are and what would work best for you. With budgets being the way they are travel is becoming more difficult, but otherwise I am fairly flexible.

Paul Starkey  
Rangeland Management Specialist  
Bureau of Indian Affairs  
Uintah & Ouray Agency
More Examples

- NRCS sources
  - Old 417s
  - Conservation Plans
  - Soil/Vegetation relationships team
  - NRI
- BLM sources
  - SVIM Data
  - Ecological Site Inventory Data
  - Monitoring Data
- University sources
  - GAP analysis (ground truth photos and data)
More Examples

- USFS sources
  - TEUI data
  - Monitoring data
- BIA sources
  - Range inventory data
- State Agency sources
  - DWR Big Game Range Trend
- Historical sources
  - Journals
  - Survey notes
  - Photography
How do you find all this data?

- Go to your meetings and make the contacts with partners
- Be aware – browse the lit. cited of interesting papers and follow up on them
- Google
- BLM survey notes web page
- Be a snoop – open the dusty boxes
Summary

- Data is expensive and hard to acquire, therefore all sources of existing data should be exploited before we create new data.
- Even though a data source may not have been collected in a way that would be most useful to us (‘correct’ techniques and procedures), it still has value.
- Data can inform the mere presence or absence of a species, species dominance, expected amounts (cover and production), and plant community possibilities in the S&TM