Managing Habitats for Sage-Grouse: Do We Need a Sagebrush Management Decision Support Tool?

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What are Sagebrush Management Implications for Sage-Grouse Conservation?
Questions:

• How do we assess and implement sagebrush management options to enhance sage-grouse habitats?
  – Where do we focus habitat management that will have meaningful outcomes for sage-grouse?
  – What are the implications for management given changes in landscapes and disturbance regimes?
  – What are the array of management options?
  – When is vegetation treatment appropriate?
  – What are the uncertainties and risks associated with management?
Discussion Main Points

• Listing of Greater Sage-Grouse and Rationale
• Multi-scale considerations in managing habitats for sage-grouse
  – Landscape Scale Considerations
  – Site Scale Considerations
• Availability of Information
• Need for integration of information into a decision support process
2010 Listing Finding

• FWS proposes listing of sage-grouse
• “Warranted, but precluded...”
  – Greater sage-grouse
    • Ranked as a Category 8 Candidate Spp.
  – Bi-state sage-grouse
    • 3% range of Greater Sage-Grouse
    • Identified as a Distinct Population Segment
    • Ranked as a Category 3 Candidate Spp.
Primary Threats

- Loss and Fragmentation of Habitats
  - Energy Development (i.e. 79% decline in NE WY)
  - Invasive Species and Fire
    - Disruption of historic fire cycles
    - Shift from shrub-steppe to annual grassland
      - 27% of sagebrush habitats in the Great Basin have burned since 1981
  - Agriculture
    - Conversion of sagebrush habitat
Relative Ranking of Threats to Sage-Grouse in Idaho

- Wildfire
- Infrastructure
- Annual Grassland
- Livestock Impacts
- Human Disturbance
- West Nile Virus
- Prescribed Fire
- Seeded Perennial
- Climate Change
- Conifer Encroachment
- Isolated Populations
- Predation
- Urban/Exurban Development
- Sagebrush Control
- Insecticides
- Agricultural Expansion
- Sport Hunting
- Mines/Landfills/Gravel Pits
- Falconry

Average Score

The overall goal of the Range-wide Strategy is to maintain and enhance populations and distribution of sage-grouse by protecting and improving sagebrush habitats and ecosystems that sustain these population.
Greater Sage-Grouse Comprehensive Strategy

- Conservation Sub-Strategy
  - Local, State / Province, Tribal, Federal, Range-Wide Issues

- Adaptive Management Sub-Strategy

- Communication & Outreach Sub-Strategy

- Research & Technology Sub-Strategy

- Funding Sub-Strategy

- Implementation Monitoring Sub-Strategy

- Effectiveness Monitoring Sub-Strategy

- Local, State / Province, Tribal, Federal, Range-Wide Issues
Greater Sage-Grouse Comprehensive Conservation Strategy

Habitat Management and Monitoring

Population Monitoring
Habitat Assessment Framework

Primary Goals

• Understanding the life history requisites of sage-grouse
• Understanding ecological processes and function of the sagebrush ecosystem
• Assessing species/habitat relationships at multiple scales (e.g. species, populations, home ranges, site)
• Identify limiting factors for sage-grouse at these various scales
THE SEARCH FOR CONTEXT
(Fine and Coarse Scale Considerations)
Habitat Assessment Framework

Orders of Selection for Greater Sage-Grouse

Landscape

Coarse Scale

Site

Fine Scale

First Order Selection:
Species and population range

Second Order Selection:
Subpopulation areas, dispersal between sub-populations

Third Order Selection:
Home-range of small/isolated populations, sub-populations, or group of birds associated with a cluster of sites; movement between seasonal ranges (breeding to summer)

Fourth Order Selection:
Seasonal habitats; movement between daily use areas (feeding to roosting, nesting to feeding; feeding to loafing)
Coarse (Landscape) Scale
Sage-Grouse as a Landscape Species

• Northern and Southern Great Basin Management Zones comprise a large portion of the western population stronghold
• Require large extensive sagebrush landscapes
• Life History Requisites can occur over large areas
  – Importance of sagebrush landscapes for food and cover during specific life history periods
  – Connectivity of sagebrush habitats within and between seasonal habitats
• Fine scale management actions in sagebrush habitat need to consider this larger landscape
Distribution of Sagebrushes

Mostly in Mountains

(Early -late brood-rearing)

Mostly in Foothills

(Nesting, early brood-rearing)

Mostly in Basins

(Winter, breeding, and nesting)
Key Landscape Issues In the Great Basin

• Loss and fragmentation of sagebrush habitats due to wildfire and the establishment of annual grassland communities
• Loss and fragmentation of sagebrush habitats due to encroachment of pinyon and juniper habitats
• Loss and fragmentation of sagebrush habitats due to infrastructure development
Selected Landscape Attributes for Comparing Sage-Grouse Occupied vs Extirpated Habitats

Comparison of selected landscape variables in 239 historical populations in occupied range and 136 historical populations in extirpated range.

(Wisdom et al. 2010)
Importance of Patch Assemblages and Connectivity

Subpopulation Area A
Area = 3,500 km²
Habitat = 1,500 km²
# Patches = 1
Average Patch Size = 2428 km²

Subpopulation Area B
Area = 3,500 km²
Habitat = 1,500 km²
# Patches = 6
Average Patch Size = 250 km²

Habitat Patch
Unsuitable Habitat
Pinyon/Juniper and Cheatgrass Risk Analysis
Great Basin Ecoregion

Wisdom et al. 2003
Pinyon/Juniper and Sagebrush Types
Humboldt-Toiyabe National Forest (GAP Analysis)
Fine Scale (Home Ranges and Sites )
Sage-Grouse Habitat Selection in

- Site scale characteristics that comprise sage-grouse habitats – fitting species to habitat
- Site potential of these sagebrush communities
- Biotic and abiotic factors affecting the composition and structure of these communities
# Fitting Sage-Grouse Guidelines to Habitats - Fine Scale Considerations

<table>
<thead>
<tr>
<th></th>
<th>Nesting</th>
<th>Brood Rearing</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height(cm)</td>
<td>Canopy(%)</td>
<td>Height(cm)</td>
</tr>
<tr>
<td><strong>Mesic Sites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass-Forb</td>
<td>≥ 18</td>
<td>≥ 25</td>
<td>Variable</td>
</tr>
<tr>
<td><strong>Arid Sites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass-Forb</td>
<td>≥ 18</td>
<td>≥ 15</td>
<td>Variable</td>
</tr>
<tr>
<td><strong>% of Area</strong></td>
<td>&gt;80</td>
<td></td>
<td>&gt;40</td>
</tr>
</tbody>
</table>

Connelly et al. (2000)
Distribution of Sagebrushes

David Tart  5/15/2003

Mostly in Mountains

A. tridentata  ssp. spiciformis  winter
   precip  deep snow

A. tridentata  var. vaseyana  winter
   precip  deep loam soil

A. cana  ssp. viscidula  winter
   precip  saturated period

Mostly in Foothills

A. arbuscula  ssp. thermopola  winter
   precip  shallow soil

A. tripartita  ssp. rupicola  summer
   precip  shallow soil

A. arbuscula  ssp. arbuscula  winter
   precip  shallow claypan

A. arbuscula  ssp. longiloba  winter
   precip  shallow claypan

A. arbuscula  ssp. arbuscula  summer
   precip  shallow soil

Mostly in Basins

A. nova  calcic / alkali shallow soil

A. spinescens  alkali / saline
   shallow soil

A. peditifida  summer precip
   shallow claypan

A. tridentata  var. pauciflora  winter
   precip  deep coarse soil

A. tripartita  ssp. tripartita  winter
   precip  deep soil

A. tridentata  ssp. tridentata  deep soil
   topo moisture

A. tridentata  ssp. wyomingensis  winter
   precip  deep soil

A. cana  ssp. cana  summer
   precip  saturated period

A. filifolia  summer precip
   sandy soils

A. cana  ssp. thermopola  winter
   precip  shallow soil
Herbaceous vs Shrub Canopy Cover
Mountain Sagebrush Community - WY

Herbaceous Canopy Cover (%)

Range of Variability

Upper bounds of shrub canopy/herbaceous cover

Lower bounds of shrub canopy/herbaceous cover

Sagebrush Canopy Cover (%)
Example: Sage Grouse Brood Rearing Habitat

[Sagebrush Canopy Cover (%) vs. Herbaceous Canopy Cover (%)]

- **Late Seral**
- **Mid & Early Seral**

Tart (1996)
Example: Sage Grouse Nesting Habitat

Sagebrush Canopy Cover (%) vs. Herbaceous Canopy Cover (%)

- Late Seral
- Mid & Early Seral

Tart (1996)
The challenge in managing sage-grouse habitats is to ensure habitat requisites are met at both fine and coarse scales, and account for seasonal habitats at these scales.

Yet, even when we understand the limiting factors, management options should assess uncertainties and risks to sage-grouse at various scales.
## Assessing Uncertainty and Risks

<table>
<thead>
<tr>
<th>Recovery or Restoration Probability</th>
<th>None to Slight (Functioning)</th>
<th>Moderate (Functioning at Risk)</th>
<th>State Changed Occurred (Non-functioning)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td><strong>No Action.</strong> Monitor and adapt management as necessary</td>
<td><strong>Passive Restoration.</strong> If unsuccessful, use active restoration.</td>
<td><strong>Active Restoration.</strong> High priority, as potential for success is high.</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><strong>No Action.</strong> Monitor and adapt management as necessary</td>
<td><strong>Passive Restoration.</strong> If unsuccessful, use active restoration.</td>
<td><strong>Active Restoration.</strong> Lower priority as potential for success is lower.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><strong>No Action.</strong> Monitor and adapt management as necessary</td>
<td><strong>No Action.</strong> Monitor and adapt management as necessary</td>
<td><strong>Inventory.</strong> Adjust management for new site conditions.</td>
</tr>
</tbody>
</table>
“Consequently, all adaptive management models need significant commitment and rigorous application of technique so managers can “learn by doing” at each conservation scale.”
Current Literature To Guide Management
Some Examples:

• Habitat Framework Assessment
  – Multi-scale Habitat Assessment Tool (2010)

• Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitat

• State Conservation Planning Efforts
Prioritizing Conservation in Nevada
Fitting It All Together Into a Process
(Need for a Decision Support Tool Field Guide)

- Considers scale in addressing the context of proposed management actions
- Links to sage-grouse habitat requisites
- Considers site characteristics relative to management actions
- Assesses treatment as just one facet of management actions
- Sets the stage for how we can manage habitats in an integrated manner
- Useful for managers when making decisions on management approaches
The End