Rangeland Management and...

Livestock performance, water quality, soil health, vegetation dynamics, habitat quality, & sensitive species conservation.

More Recently...

Social-ecological aspects of ranching
- Goal setting
- Decision-making
- Adaptation strategies

Rangeland Watershed Laboratory
http://rangelandwatersheds.ucdavis.edu
Adaptive Rangeland Decision-Making

Rancher mail survey
• Spring 2011
• 1700 producer members of CA Cattleman's Association
• 509 surveys returned

Semi-structured rancher interviews and field surveys
• Spring 2013-Fall 2014
• 102 ranching families across CA

Sustaining Working Rangelands

Management of rangelands has become increasingly complex
• Economically and ecologically complex
• Growing societal demand for sustainable food systems
• Expanding expectations for conservation practices

Ongoing dialogue on sustaining working rangelands
• Critical need to include the ranching community
  • Perceptions
  • Experiential knowledge
Today’s Roadmap: Adaptive Decision-Making

- Ranch and Rancher Demographics
- Information Resources
- Management Goals and Practices
- Grazing Management Strategies
- Concerns for the Future

Adaptive Rangeland Decision-Making

Diversity and complexity of ranching operations.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total size(^1) (ac)</td>
<td>23,240</td>
<td>2400</td>
<td>5,090,000</td>
</tr>
<tr>
<td>Private owned(^1) (ac)</td>
<td>2,660</td>
<td>620</td>
<td>40,000</td>
</tr>
<tr>
<td>Private leased(^1) (ac)</td>
<td>3,230</td>
<td>250</td>
<td>100,000</td>
</tr>
<tr>
<td>Public leased(^1) (ac)</td>
<td>17,300</td>
<td>0</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Irrigated(^1) (ac)</td>
<td>360</td>
<td>2</td>
<td>12,000</td>
</tr>
<tr>
<td>Total livestock(^1)</td>
<td>643</td>
<td>200</td>
<td>22,000</td>
</tr>
<tr>
<td>Cow/calf pairs(^1)</td>
<td>288</td>
<td>145</td>
<td>8,000</td>
</tr>
<tr>
<td>Stockers(^2)</td>
<td>295</td>
<td>0</td>
<td>15,000</td>
</tr>
<tr>
<td>Sheep(^2)</td>
<td>181</td>
<td>0</td>
<td>8,200</td>
</tr>
</tbody>
</table>

\(^1\)n = 494
\(^2\)n = 492

Roche et al. In Review.
Adaptive Rangeland Decision-Making

Demographics
- Median age: 62 (range of 25-93)
- 70% are 3rd generation ranching
- 20% are 1st generation ranching

Ranch Economics
- 80% have off-ranch employment
- 33% have other agricultural production
- 65% consider ranching a critical source of income
- 45% have a succession plan in place (26% in progress)

Ranching Information Resources

Roche et al. In Review.
Agricultural and Natural Resources Goals

Bubble size corresponds to number of respondents indicating goal is #1 priority.
Value is average ranking for all respondents.

n = 488.

Roche et al. In Review.

Key Management Practices

Roche et al. In Review.
Conservation Programs Participation

- Williamson Act most critical conservation program for ranchers (>75%).
- ~40% of ranchers are actively involved or have plans to enroll in NRCS EQIP.
- ~35% of ranchers have or plan to enter into a conservation easement (~10% currently participate).
- Ranches with larger amounts of land, orientation toward future (multigenerational, succession plan in place), and access to conservation information are more likely to participate in conservation programs (Lubell et al. 2013).

Characterizing On-Ranch Grazing Strategies

Identify distinct classes of grazing strategies based on practices employed

- Number of pastures
- Number of herds
- Livestock density
- Timing of rest & grazing

Strategies ~ Analogous to fingerprints

- Each is unique, but share identifiable patterns (classes)

Roche et al. In Review.
Characterizing On-Ranch Grazing Strategies

3 classes of on-ranch grazing strategies emerged (n = 473).

<table>
<thead>
<tr>
<th>Strategy</th>
<th>% Ranchers</th>
<th>No. Herds</th>
<th>No. Pastures</th>
<th>Grazing Duration</th>
<th>Livestock Density (ac/AU)</th>
<th>Timing of Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive Rotation</td>
<td>46</td>
<td>1 to 5</td>
<td>2 to &gt;10</td>
<td>Weeks</td>
<td>&lt;5 to 11</td>
<td>Growing season</td>
</tr>
<tr>
<td>Season Long Continuous</td>
<td>35</td>
<td>1 to 5</td>
<td>2 to 5</td>
<td>Months</td>
<td>6 to 11</td>
<td>Dormant season</td>
</tr>
<tr>
<td>Year Long Continuous</td>
<td>19</td>
<td>1 to 5</td>
<td>2 to 5</td>
<td>Year</td>
<td>11 to 20</td>
<td>None</td>
</tr>
</tbody>
</table>

Roche et al. In Review.

Characterizing On-Ranch Grazing Strategies

Possible underlying variables driving grazing strategy preference.

*Operation and operator demographics*
- USEPA Level III Ecoregion
- Dependence on ranch as a source of income
- Total number of livestock
- Number of generations ranching
- Operation includes publicly leased land

*Information sources and social networking*
- Educational level
- Number of good or excellent information sources
- Opinion leadership
- Information sharing with other ranchers

*Operator attitudes and values*
- Views on experimenting with new strategies/practices
- Views on economic viability and environmental protection
- Views on risk taking
- Rank of livestock production goal
Characterizing On-Ranch Grazing Strategies

Conditional inference tree model for Rotational Strategy

Characterizing On-Ranch Grazing Strategies

Conditional inference tree model for Season Long Continuous Strategy
Characterizing On-Ranch Grazing Strategies

Conditional inference tree model for Year Long Continuous Strategy

With respect to business, I always choose the option with lowest risk.

“disagree”

0.12

Year long
n = 149

“neutral” or “agree”

0.27

Year long
n = 268

Operation includes publicly leased land

No

Yes

0.08

Year long
n = 56

Characterizing On-Ranch Grazing Strategies

Mean values of ranches assigned to each class (n = 473).

<table>
<thead>
<tr>
<th>Strategy</th>
<th>% Ranchers</th>
<th>No. Livestock</th>
<th>Private Acres</th>
<th>Total Acres (private + public)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive Rotation</td>
<td>46</td>
<td>630</td>
<td>7,500</td>
<td>19,500</td>
</tr>
<tr>
<td>Season Long Continuous</td>
<td>35</td>
<td>950</td>
<td>6,000</td>
<td>43,500</td>
</tr>
<tr>
<td>Year Long Continuous</td>
<td>19</td>
<td>220</td>
<td>3,100</td>
<td>3,900</td>
</tr>
</tbody>
</table>

Roche et al. In Review.
# Adaptive Rangeland Decision-Making: Surviving Drought

![U.S. Drought Monitor Map](image1.jpg)

<table>
<thead>
<tr>
<th>Drought Adaptation Strategies</th>
<th>% (n = 490)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proactive</strong></td>
<td></td>
</tr>
<tr>
<td>Employ conservative stocking rates</td>
<td>34</td>
</tr>
<tr>
<td>Incorporate pasture rest into grazing system</td>
<td>23</td>
</tr>
<tr>
<td>Incorporate both cow-calf and stockers for flexibility</td>
<td>21</td>
</tr>
<tr>
<td>Grass bank/Stockpile forage</td>
<td>12</td>
</tr>
<tr>
<td>Use 1-3 month weather predictions to adjust stocking</td>
<td>11</td>
</tr>
<tr>
<td>Add other livestock types for flexibility</td>
<td>3</td>
</tr>
<tr>
<td><strong>Reactive</strong></td>
<td></td>
</tr>
<tr>
<td>Reduce herd size</td>
<td>70</td>
</tr>
<tr>
<td>Purchase feed</td>
<td>69</td>
</tr>
<tr>
<td>Apply for government assistance programs</td>
<td>39</td>
</tr>
<tr>
<td>Wean early</td>
<td>39</td>
</tr>
<tr>
<td>Rent additional pasture</td>
<td>26</td>
</tr>
<tr>
<td>Move livestock to another location</td>
<td>24</td>
</tr>
<tr>
<td>Earn off-ranch income</td>
<td>23</td>
</tr>
<tr>
<td>Sell retained yearlings</td>
<td>22</td>
</tr>
<tr>
<td>Place livestock in a feedlot</td>
<td>8</td>
</tr>
<tr>
<td>Allow livestock condition to decline</td>
<td>7</td>
</tr>
<tr>
<td>Add alternative on-ranch enterprise</td>
<td>4</td>
</tr>
</tbody>
</table>

Roche et al. In Prep.
Surviving Drought

Past Experience with Drought

Management Toolbox

Goal Setting

Information Sources

- Education level
- No. good/excellent info. sources
- Generations ranching

- Ranking of forage production
- Average ranking of supporting goals
  - weed management, water quality, soil health, riparian health, wildlife

Drought Adaptation

- No. conservation programs
- No. key management practices
- No. land ownership types

- No. reactive/proactive drought practices
- Drought management plan in place

Farmer and Rancher Voices from the Drought

*A chronicle of oral stories of farming and ranching families.*

https://soundcloud.com/groups/farmer-and-rancher-voices-from-the-drought
“Biggest concerns for the future of your operation?”
“Biggest concerns for the future of your operation?”

- 49% Government regulations/environmental policy (>90% of interviewees)
- 43% Economic viability
- 21% Succession planning
- 21% Water/rainfall/weather—Security of water supply

Sustaining Working Rangelands

Management flexibility
- Diversity in ranch structure, management goals, and adaptive decision-making.
- Large toolbox and diversity of response options.
- No single policy or management panacea.

Collaborative, trust-based partnerships
- Build on shared economic and ecological goals.
- Negotiating potential differences between groups and addressing individual concerns of regulation.
**Collaborators and Partners**

**Collaborators:** Tracy Schohr, Justin Derner, Mark Lubell, Bethany Cutts, Emily Kachergis, Rick Standiford, Lynn Huntsinger, Mel George, Toby O’Geen, Valerie Eviner, Ken Tate.

**UCCE Partners:** Sheila Barry, Theresa Becchetti, Josh Davy, Morgan Doran, Julie Fenzel, John Harper, Roger Ingram, Royce Larsen, David Lewis, David Lile, Fadzayi Mashiri, Glenn Nader, Scott Oneto, Steve Orloff, Jeff Stackhouse.

**Stakeholder Advisory Groups**

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http://rangelandwatersheds.ucdavis.edu

