## Integrating Ecosystem Services into Adaptive Rangeland Management

Mark Lubell, UC Davis
Bethany Cutts, University if Illinois
Justin Derner, ARS
Matt Hamilton, UC Davis
Leslie Roche, UC Davis
Kenneth Tate, UC Davis

Study Goals

- Understand decision-making process of ranchers

- Identify variables linked to integration of ecosystem services into rangeland management goals and practices

- Develop theoretical framework for adaptive rangeland management
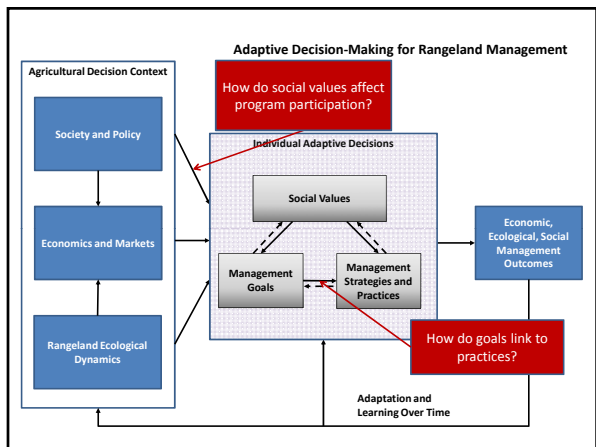
Survey Process

- Partner with California Cattleman's Association to send out surveys

- Semi-structured qualitative interviews of 10 ranchers

- Mail survey using Dillman process sent out to 1725 CCA Regular Members

- Promoted through CCA and Farm Bureau newsletters, communication with County Specialists, and attending rangeland conferences

Response Rates

Table 3. Rangeland decision-making response frequencies and response rates

	Aggregated response category	Frequency
I	Complete survey (code 1.1)	475
P	Partial survey (code 1.2)	24
R	Known respondent-level refusal (code 2.112)	61
NC	n/a	n/a
U	Unknown Eligibility, "non-interview" (code 3.0-3.99)	1086
NE	Selected respondent screened out of sample (4.0-4.01)	93
	Volunteered survey response (not included in response rate – code 4.9)	20
e		0.86
		Percent
	Response Rate 1 (RR1)	30.0
	Response Rate 4 (RR4)	33.4

Response Distribution

3-digit zipcode boundaries
number of households in sample frame

1 - 10
11 - 30
31 - 51
53 - 114
115 - 236

3-digit zipcode boundaries
number of responses

1 - 4
5 - 10
11 - 19
27 - 35
46 - 85

3-digit zipcode boundaries
number of responses normalized by households in sample frame

No responses
fewer responses than expected (0.01-0.75)
proportional response (0.75-1.25)
more responses than expected (1.25- 2.00)
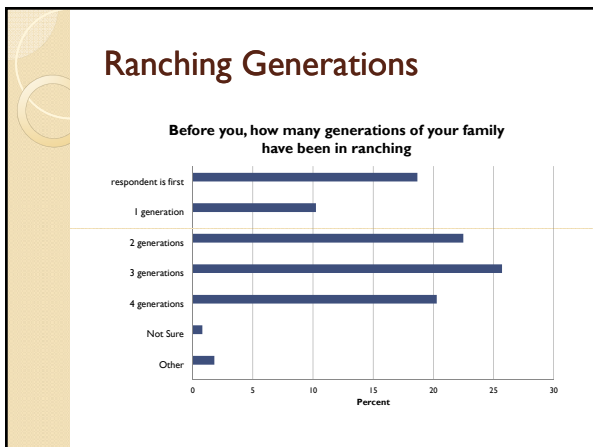large response (2.00-3.00)
very large response (3.00-4.00)

Role of Rancher Demographics and Operation Character tics

- Personal background of rancher affects values and knowledge

- Structure of operation affects costs and benefits of different management goals and practices

---

Rancher Demographics

|	
Age (mean)	61.42 (±12.1 sd)
Female	16.2%
with 4 year degree or higher	51.1%
Grew up in a rural area or small town	34%
First rancher in family	18.7%
Modal household income	50-99K
Modal portion of off-ranch income	51-75%

Ranching Generations

Before you, how many generations of your family have been in ranching

---

Operation Characteristics

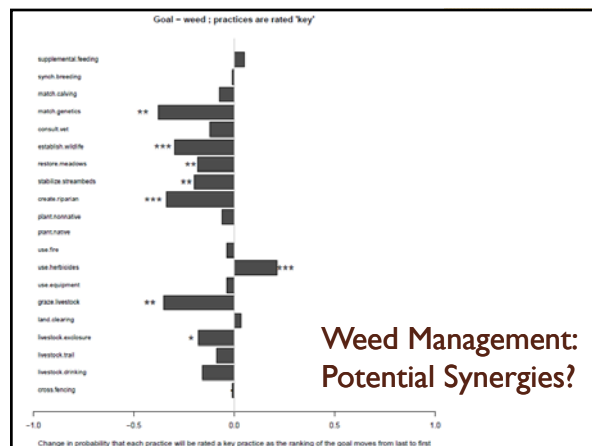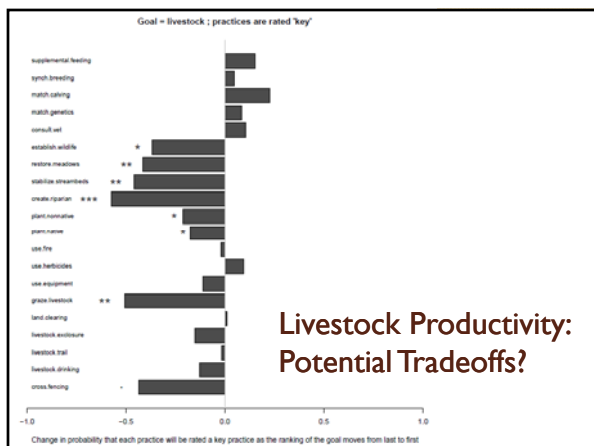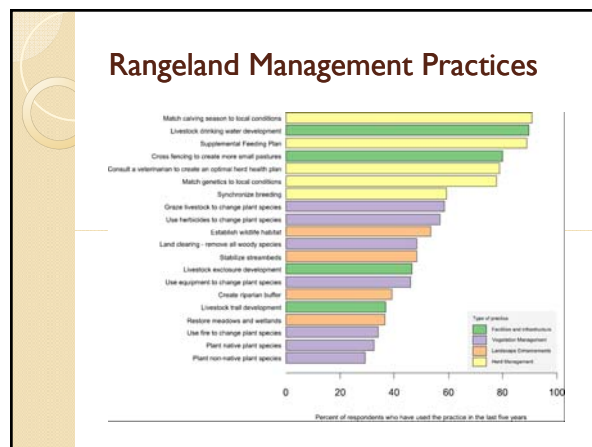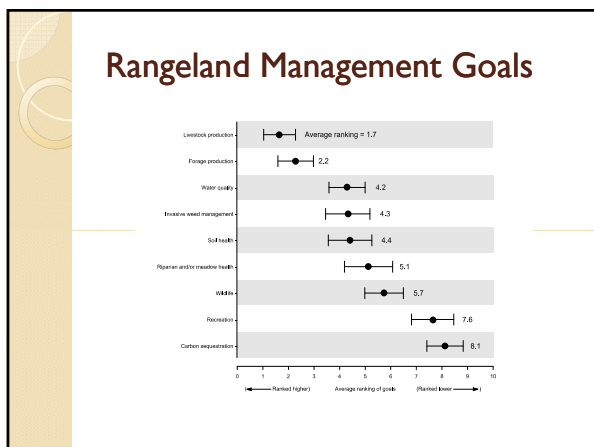|	Private owned	Private leased	Public leased	Hired to manage grazing
total acres managed for grazing				
Respondents with this land type	422	299	101	13
min	3	9	10	1
max	40000	100000	600000	5000000
sum	1290204	1580017	3545620	5029921

	Yes
Does your ranching operation include...	
Other agricultural production	152
Non-extractive recreation (hiking, birding, horseback riding)	59
Conventional energy development (e.g. oil, coal, natural gas)	13
Extractive recreation (hunting, fishing).	104
Alternative energy development (e.g. solar, wind, biofuel)	25
Other	50

Type of Livestock

	dairy	sheep	cow/calf	stocker
Mean	364	251	301	812
Median	150	60	150	200
Mode	0	100	300	200
Minimum	1	3	2	2
Maximum	1000	3000	8000	15000

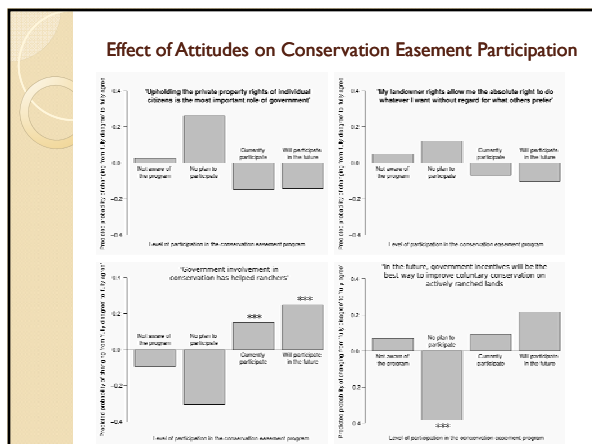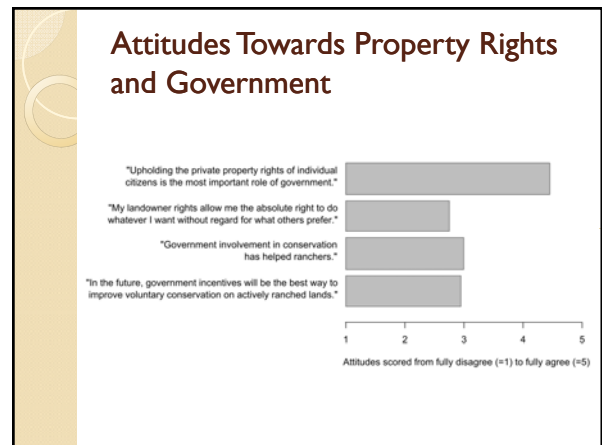## Private Land Location

Privately Owned Land - Largest Parcel
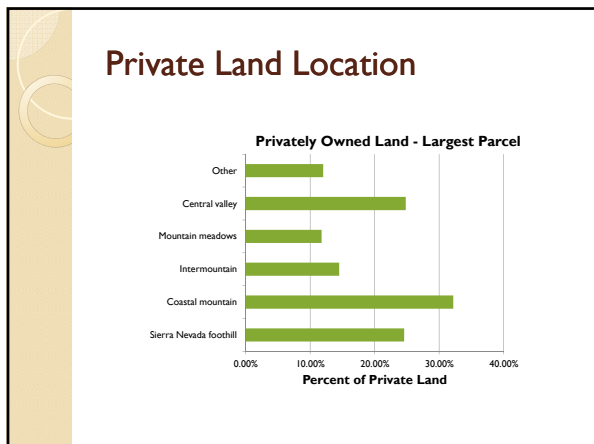
Linking Goals and Practices

- Link between intentions and behavior a central issue in decision-making

- Match between scope of goals and practices; e.g.; managing for riparian health leads to practices designed to meet that goal

- Potential tradeoffs and synergies between different goals

Rangeland Management Goals

Rangeland Management Practices

Livestock Productivity: Potential Tradeoffs?

Weed Management: Potential Synergies?

Matching Scope of Goals and Practices
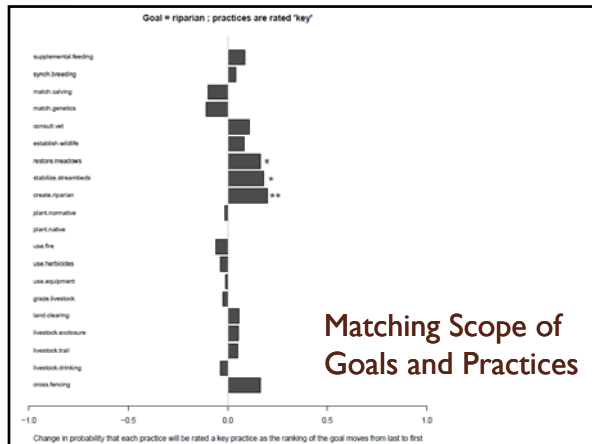
Social Values and Conservation Program Participation

- Reshape incentives and provide information

- Build social network connections with conservation managers and other ranchers

- Attitudes about private property rights and government often portrayed as barriers to participation

---

Conservation Easement Participation

Attitudes Towards Property Rights and Government

Effect of Attitudes on Conservation Easement Participation
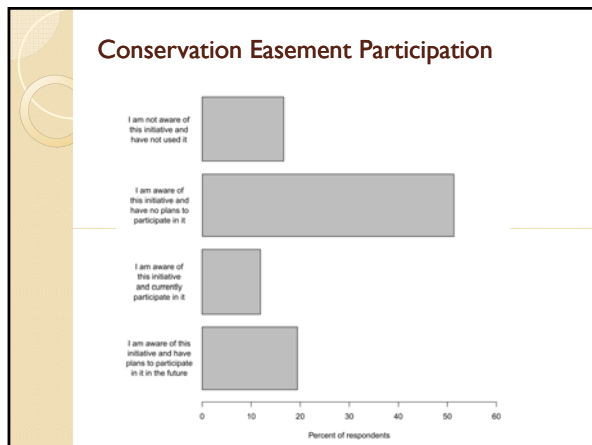
Conclusions and Next Steps

- Rangeland management must adapt to spatial and temporal variability in environment, economy, and policy

- Economic viability is central goal, and reflected in practices

- Management practices and grazing strategies mixed in complex ways

- Relatively infrequent use of available incentive programs, with the exception of Williamson Act and EQIP

- Next steps are to explore correlations between different predictor variables and goals, strategies, practices