



Perspectives on Agricultural Decision-making for Environmental Practices

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Theoretical Perspectives on Agricultural Decision- making



Diffusion of innovation



Theory of planned behavior



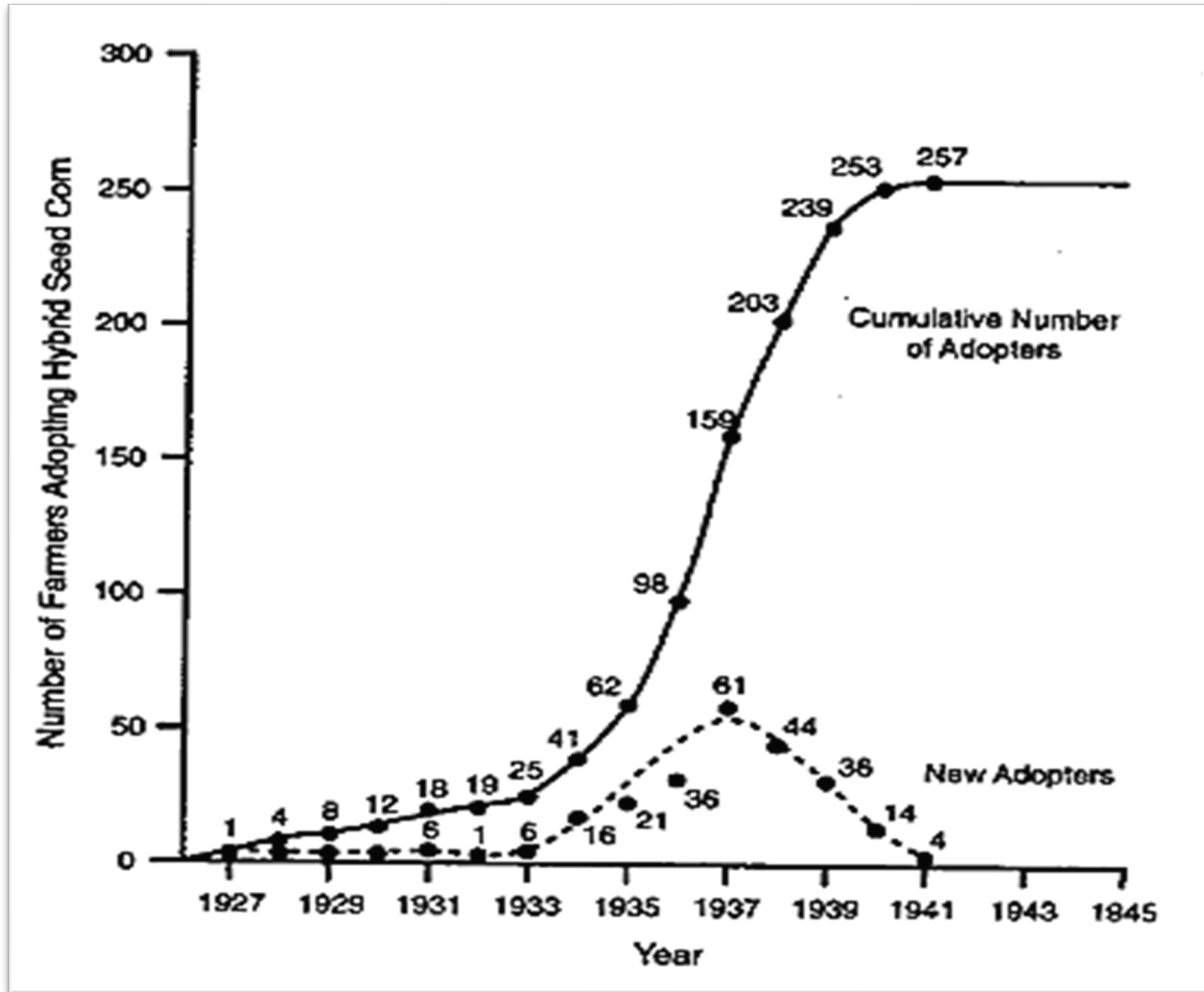
Cooperation and collective-action



Social Learning and Culture



Adaptive Decision-making



Ryan & Gross 1943

Classical Diffusion Theory Assumptions

Choose behaviors where benefits outweigh costs

Information about innovations transmitted via networks

Psychological variables

Early/late adopters

Theory of Planned Behavior

Intention → Action

Attitude: Perceived Benefits

Norms: Social Pressure

Behavioral Control: Easy or difficult to engage in behavior

In this paper, the authors individual attitudes to institutional context

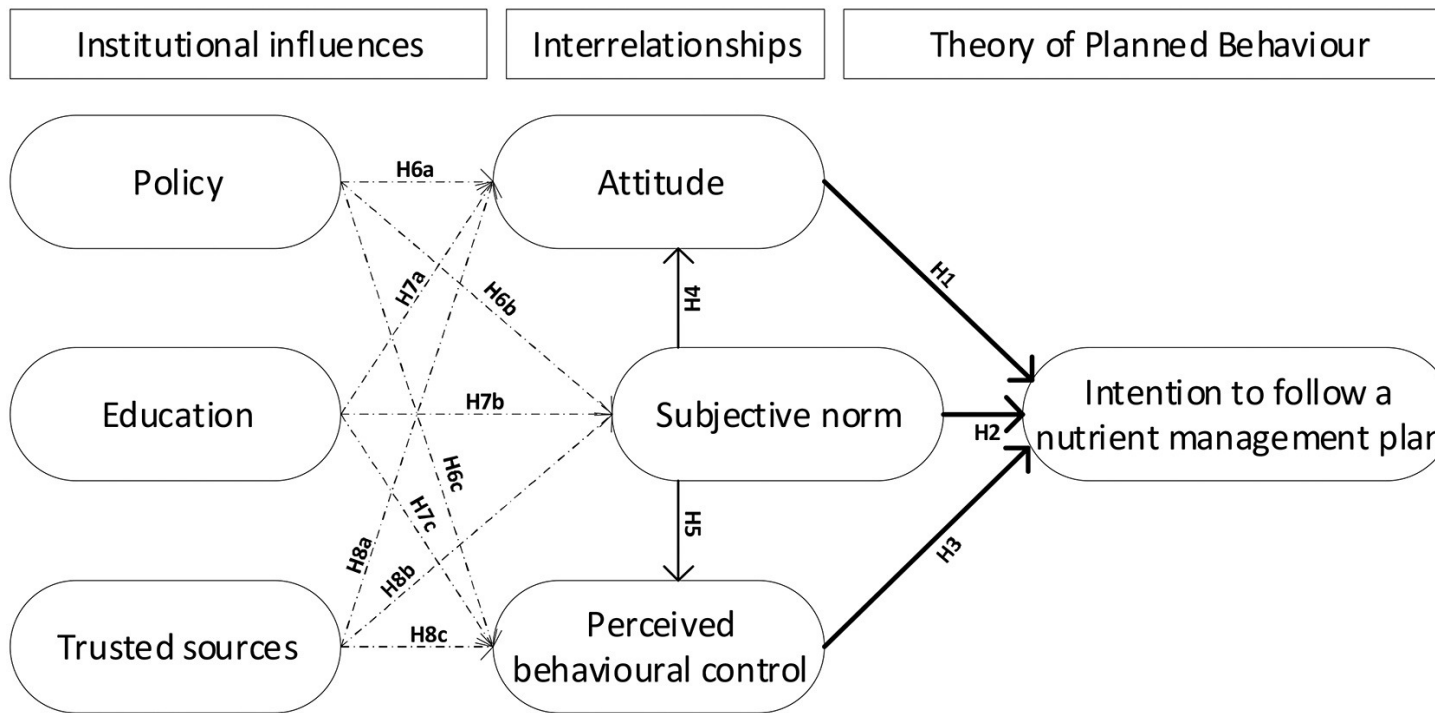
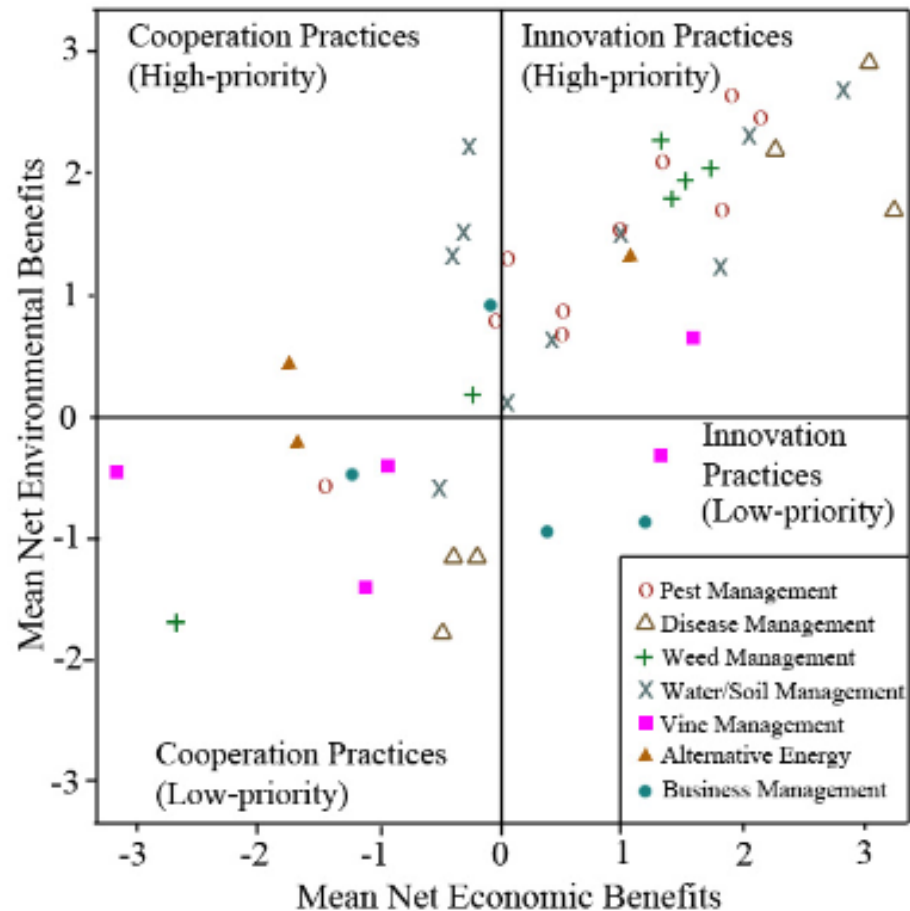


Fig. 2. Categorization of practices by net benefits.



Cooperation and Collective Action

Practices where the benefits depend on collective effort

Practices have social costs and benefits that go beyond individual grower

Examples non-point source pollution, nitrate management

Often requires some type of policy incentive (regulation or economic incentive) to shift behavior

Social Learning and Culture

Culture= change in behavior in population over time

Social Learning: Learning from other people, typically through networks

Social learning strategies

- Conformity
- Prestige-based social learning
- Success-based social learning

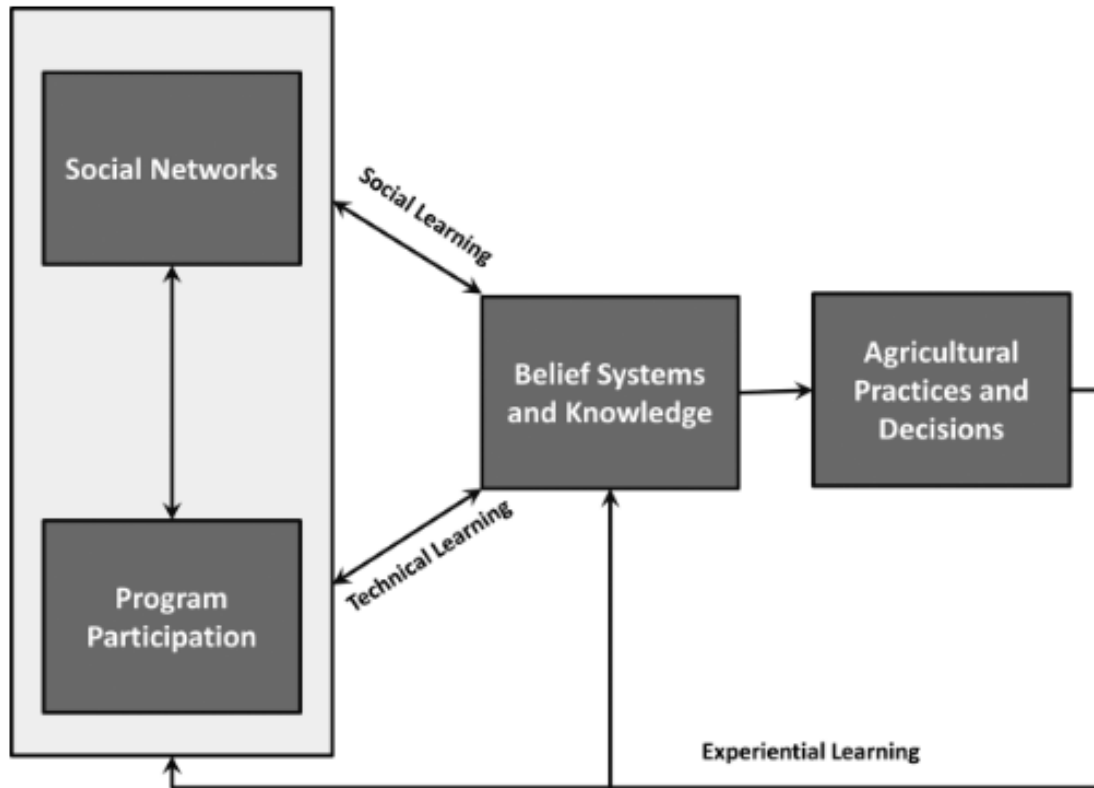


Figure 1. Theoretical framework for agricultural knowledge systems.

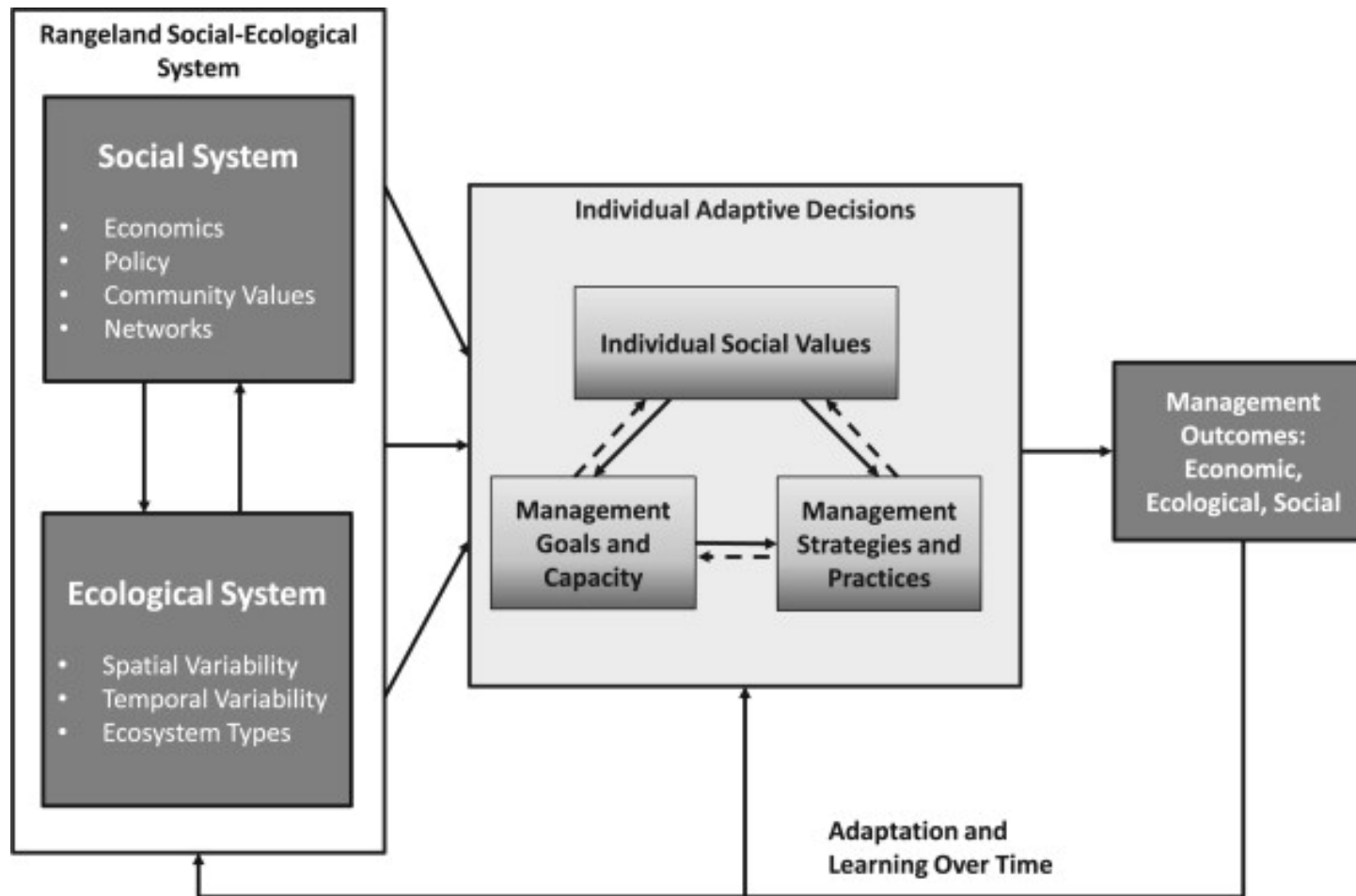
Adaptive Decision-making in Agriculture

Emphasizes social-ecological systems

Variability in ecological system

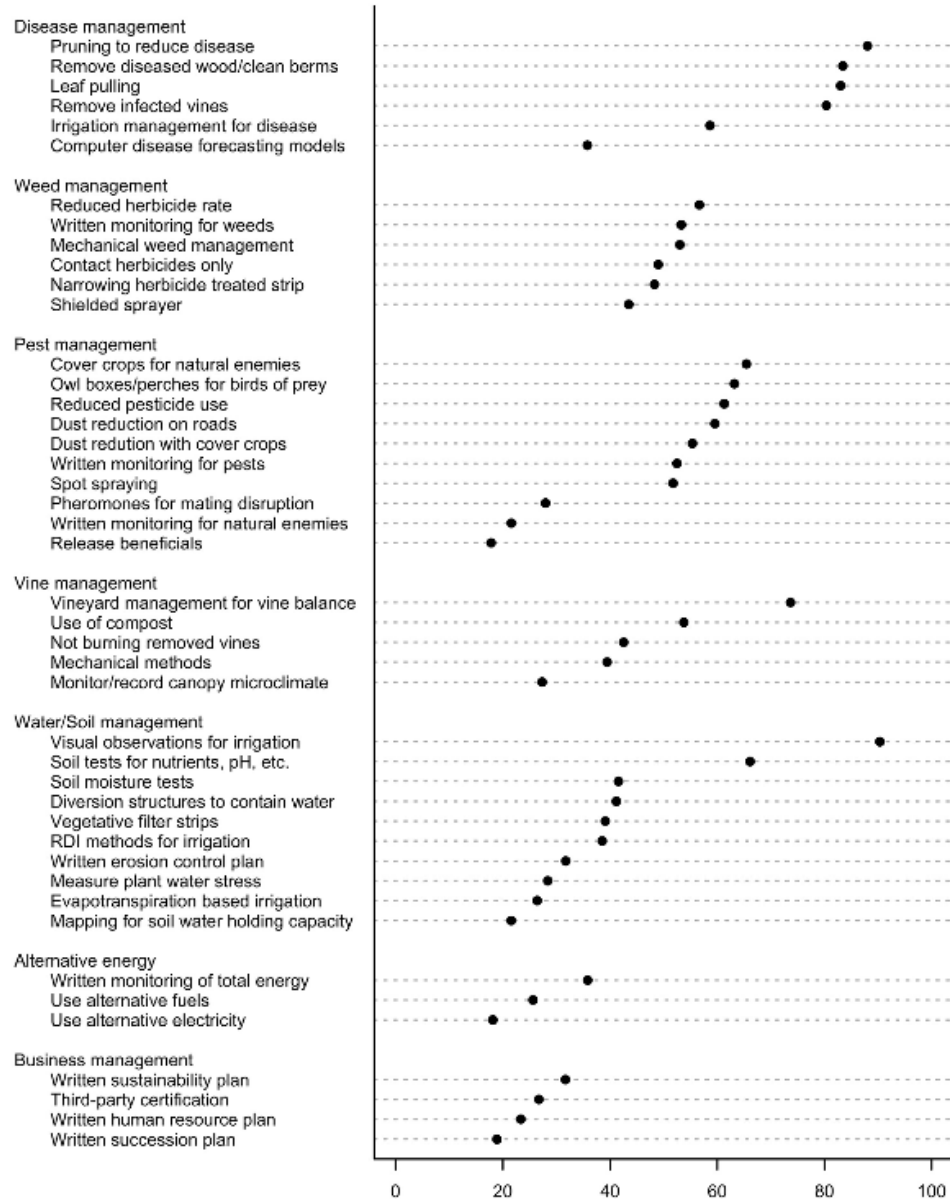
“If you’ve seen one farm...you’ve seen one farm” (Karen Ross, CA Sec of Agriculture, 5/1/2024)

Change and learning over time



UC Davis Agricultural Surveys

Farmer Type	Issue Focus	Year	Sample Size	Response Rate
Sacramento Valley Farmers	Water Quality Regulation	2004	1,229	24%
Central Coast Farmers	Water Quality Regulation	2006	453	27%
Lodi Winegrape Growers	Sustainability Partnerships	2011	227	53%
Central Coast Winegrape Growers	Sustainability Partnerships	2012	358	32%
Napa County Winegrape Growers	Sustainability Partnerships	2012	237	42%
California Ranchers	Rangeland Ecosystem Services	2011	511	34%
Yolo County Farmers	Climate Change Mitigation and Adaptation	2011	162	33%
Note: All response rates calculated according American Association of Public Opinion guidelines including estimate of ineligible non-respondents. For Central Coast, the 27% response rate refers to 425 mail survey respondents only; remaining observations are for Spanish language respondents who received survey during workshops and had response rate of 11%.				



Practice Adoption as Key Dependent Variable

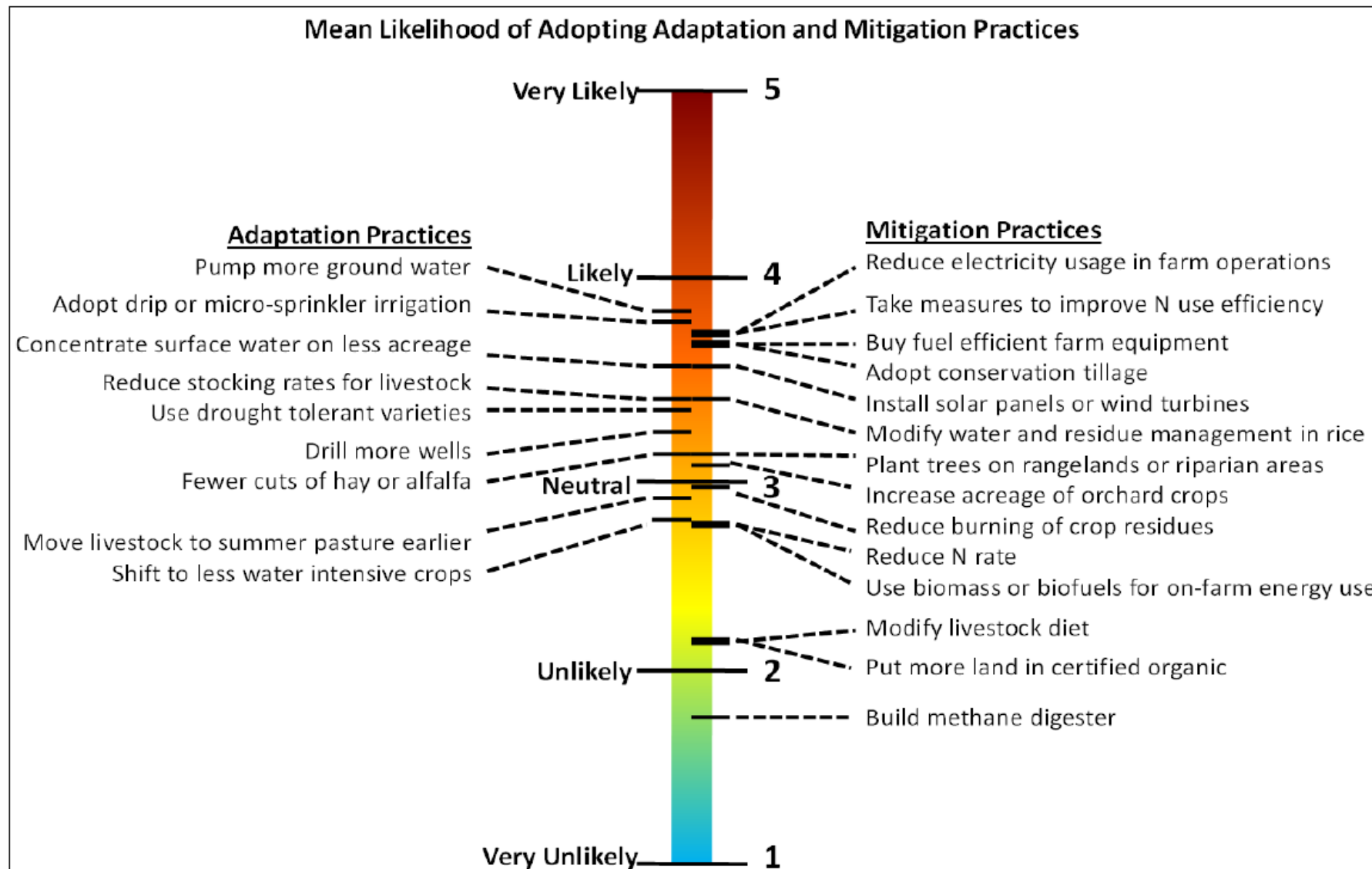
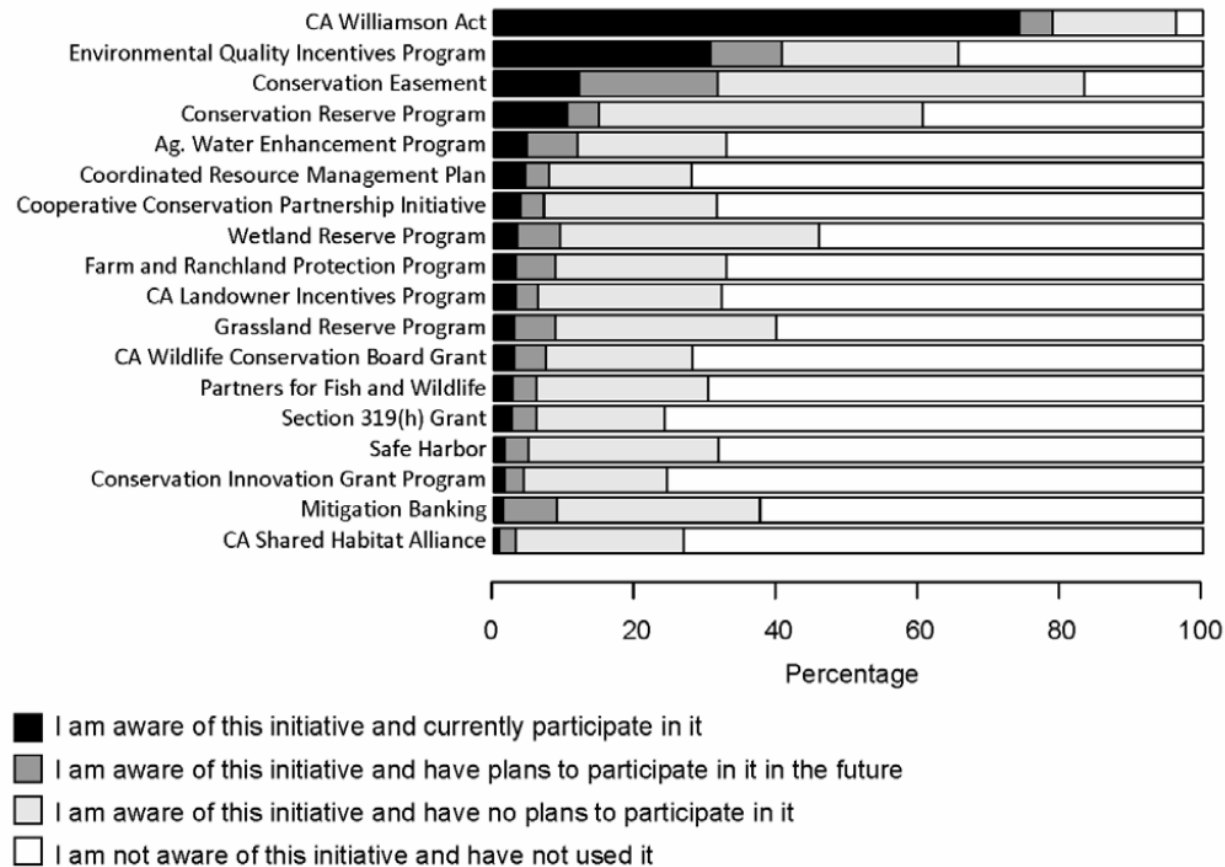
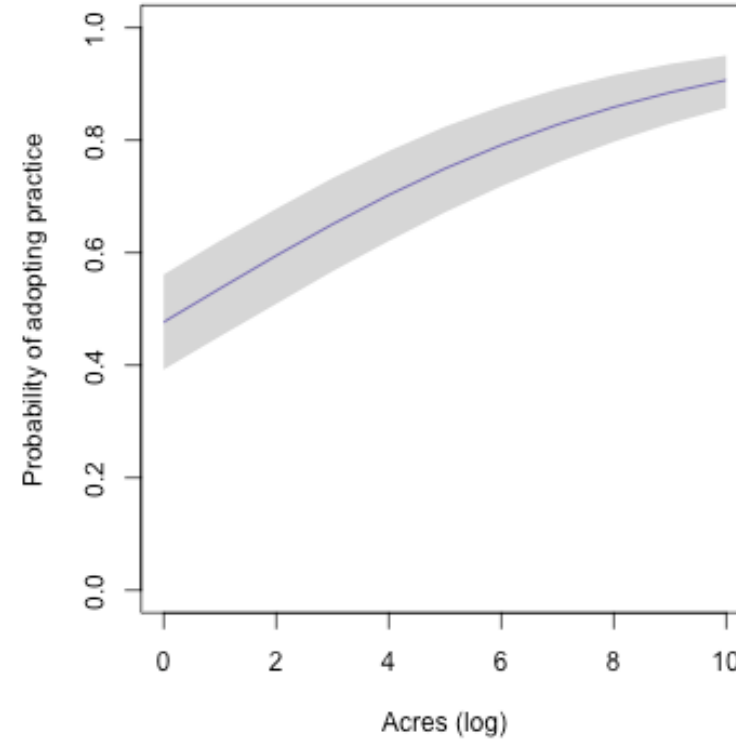
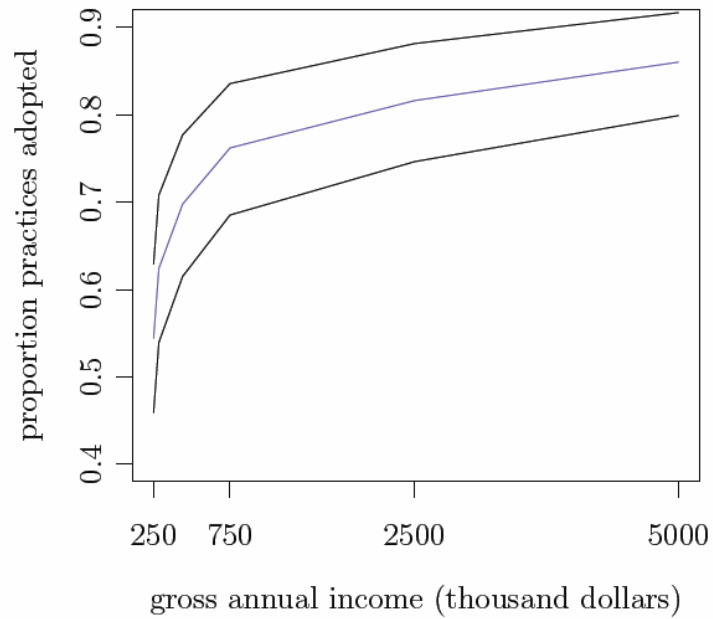


Figure 3. Average likelihood to adopt adaptation and mitigation practices among farmers in Yolo County, CA.

Figure 3: Participation Choices in Conservation Programs in California



California Ranchers Conservation Program Participation



Farmer Demographics: Scale Matters!

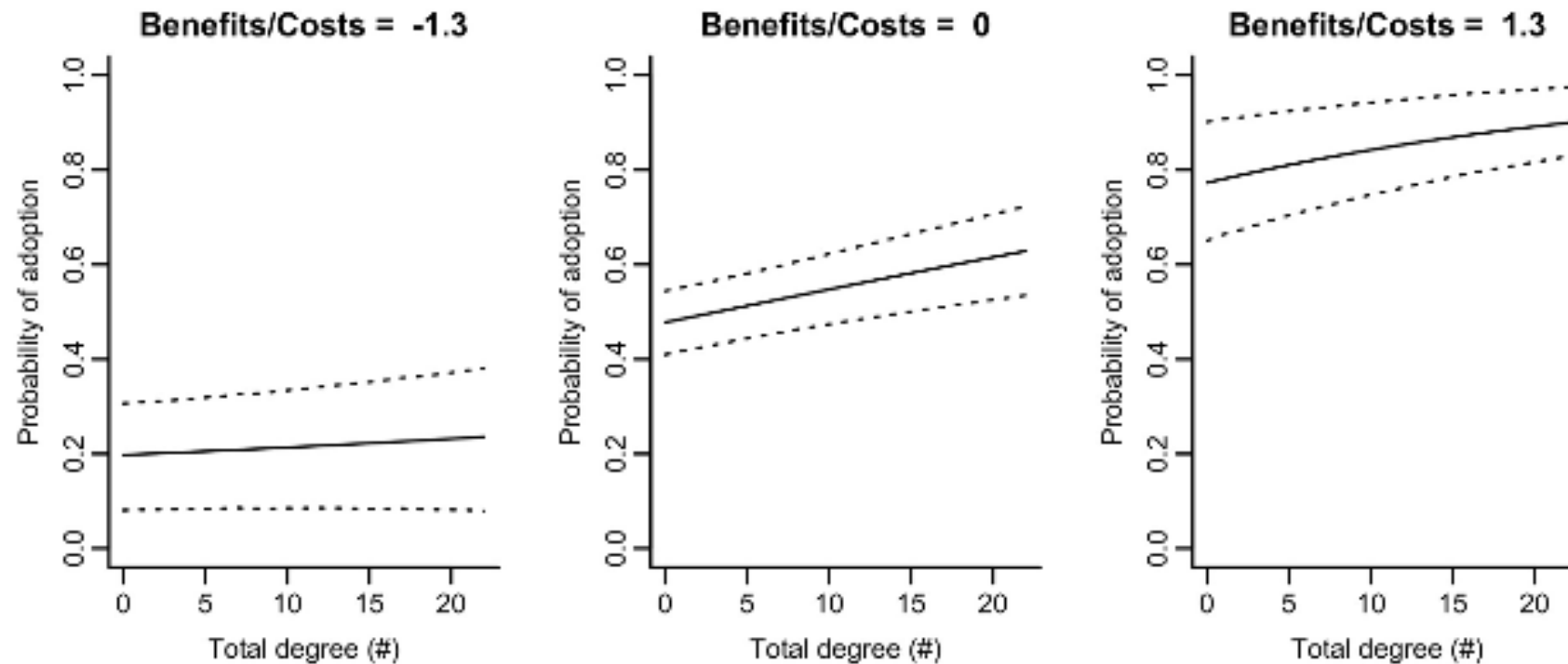


Fig. 3. Predicted probability of adopting a practice (blue lines) and 95% confidence regions (shaded areas) as a function of degree, for three different levels of net costs and benefits. Predictions were generated using AIC-based model averaging from the top four fitted models. The x-axis is scaled to match the range of observations in the data.

Network Connections Linked to Practice Adoption

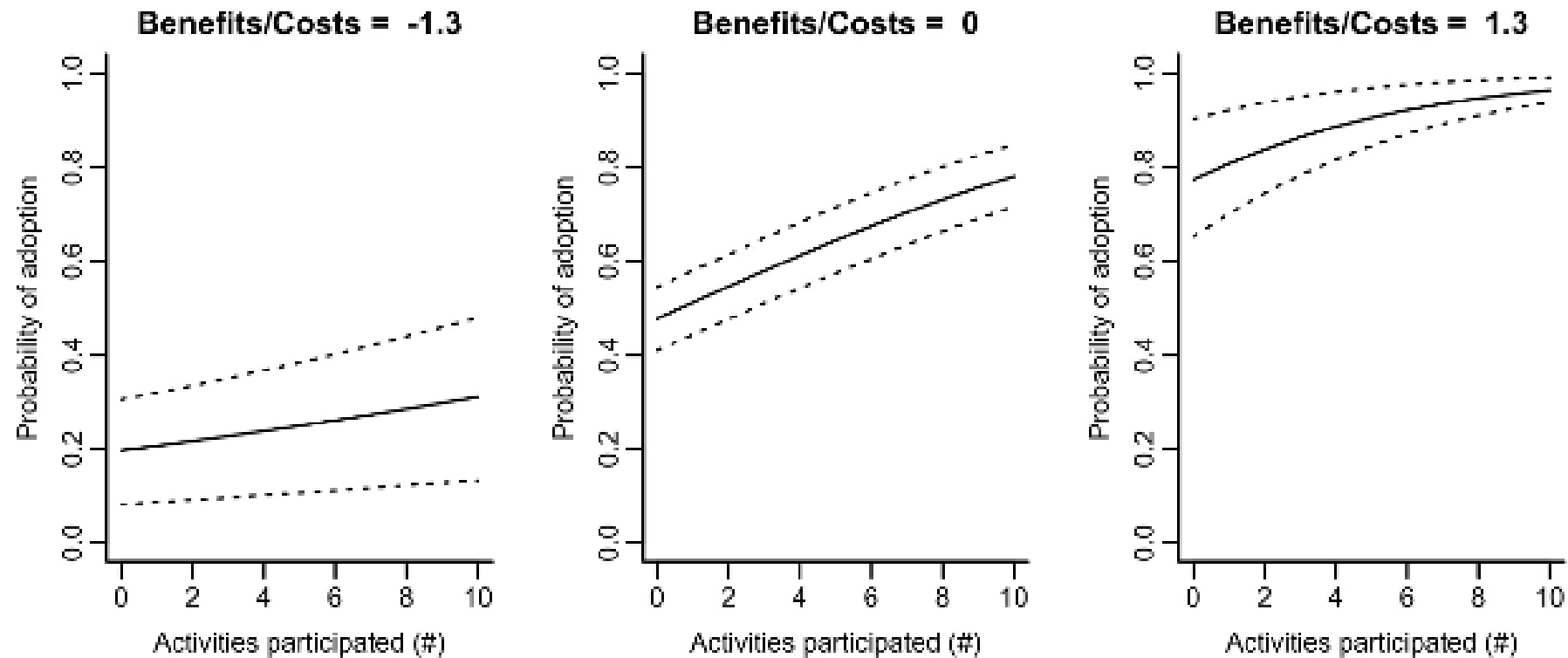


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Program Participation Linked to Practice Adoption

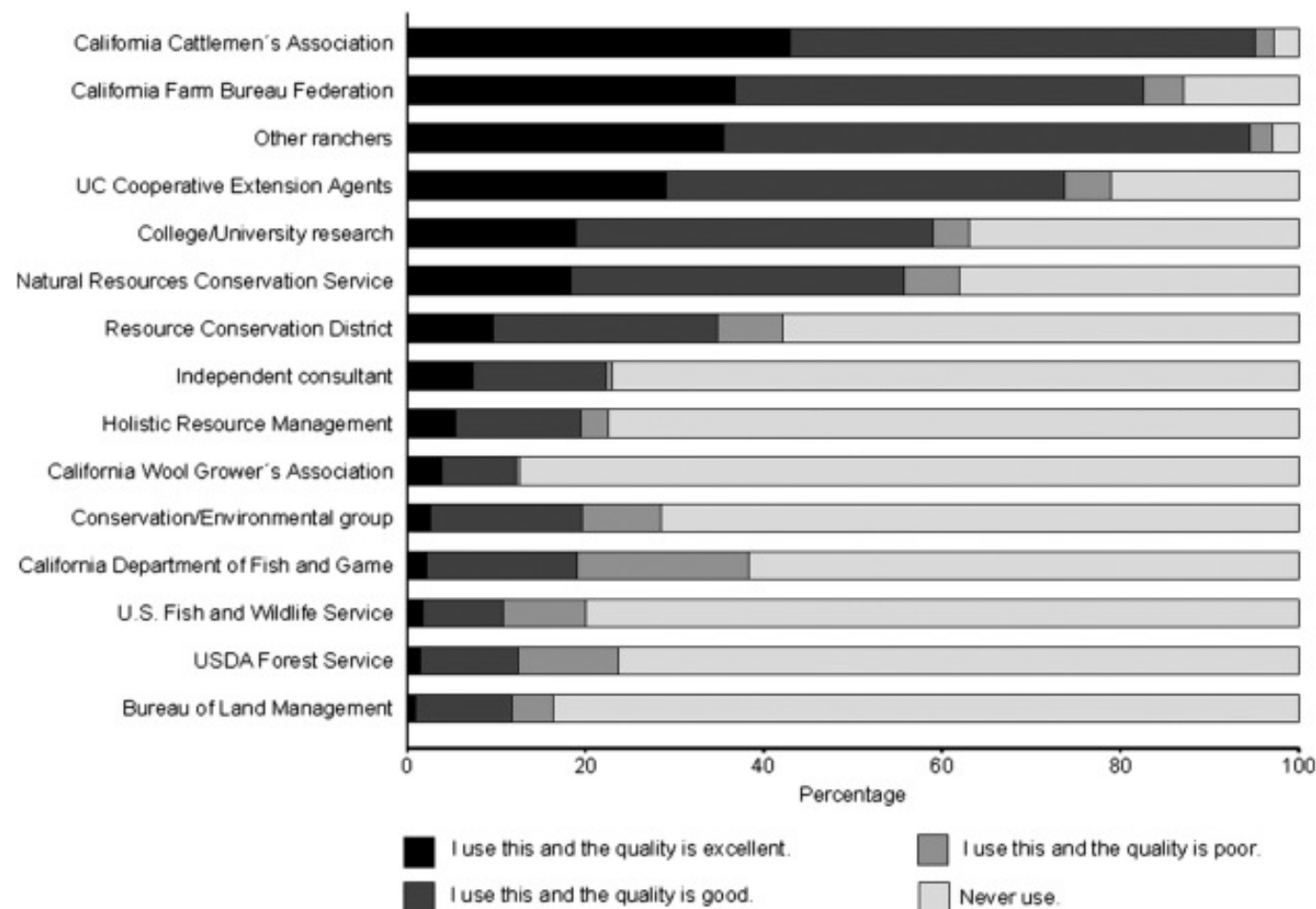


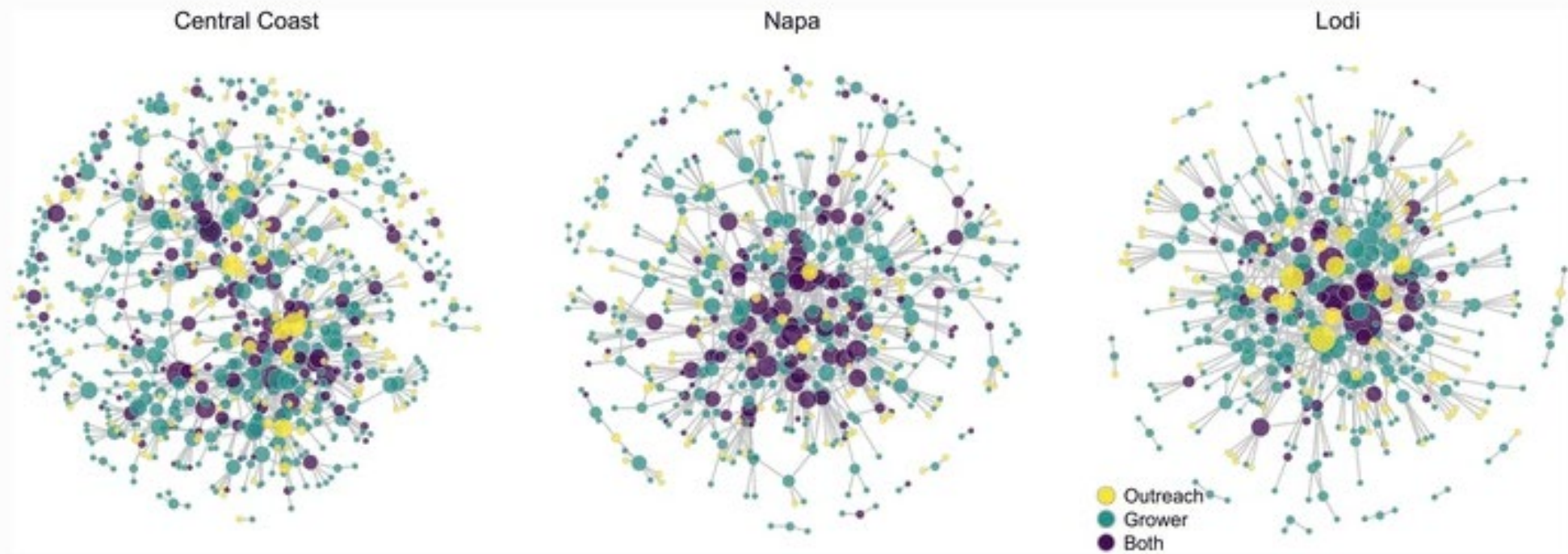
Social Networks as learning Pathways

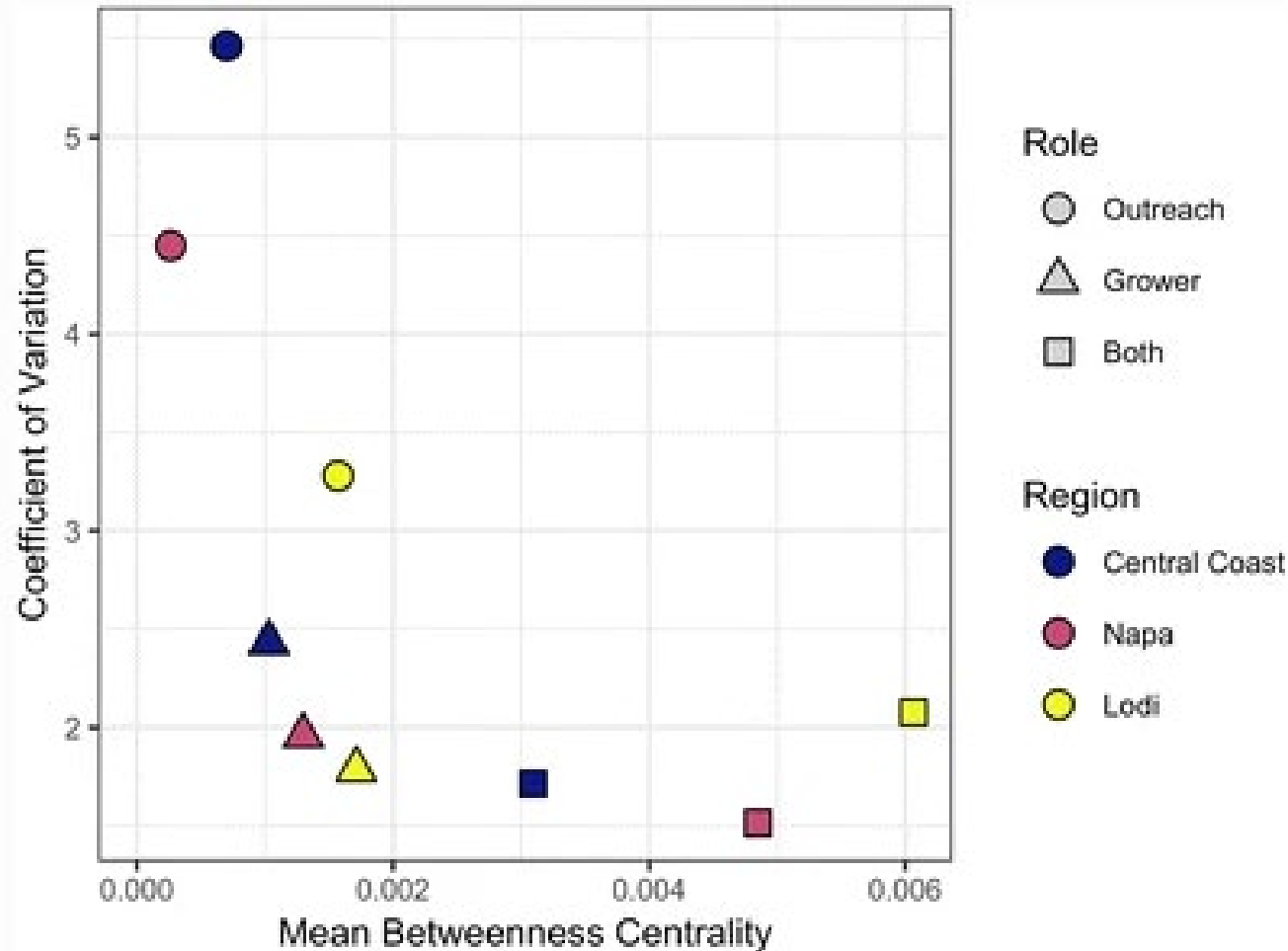
TABLE 2. Survey respondents' ratings of the usefulness of 21 information resources

Information resource	"Very useful" rating (% of all respondents)	Top 10 ratings by region		
		Central Coast	Lodi	Napa Valley
Observations of own vineyard conditions	89.8	1	1	1
Pest control adviser	72.3	4	2	10
Vineyard field crew	71.2	6	5	2
Other wine grape growers (not family)	71.1	2	7	3
Trial and error	69.5	5	4	5
Field research trials conducted in own vineyard	68.3	7	9	6
Winery personnel	67.9	3	6	9
Observations of others' vineyard conditions	67.2	8	10	4
Other wine grape growers (family)	64.4	9	8	
Viticulture consultant	63.5	10		7
UC Cooperative Extension farm advisor	62.7		3	8
Internet resources	60.5			
University publications	58.7			
Viticulture text or reference books	58.5			
Written records of vineyard performance	56.8			
Field research trials conducted in others' vineyards	55.1			
Trade journals	47.2			
Lodi Winegrower's Workbook	44.4			
Sustainability in Practice (SIP) Workbook	42.5			
California Code of Sustainable Winegrowing Workbook	34.0			
Newspapers	17.2			

Color key: ■ Social ■ Experiential ■ Formal

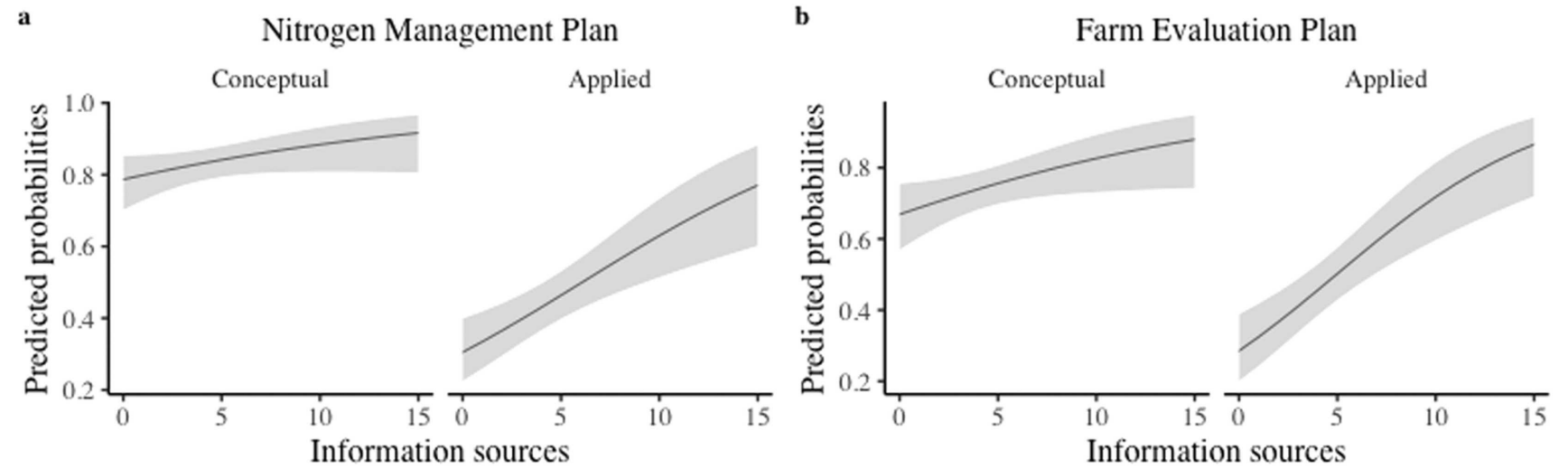
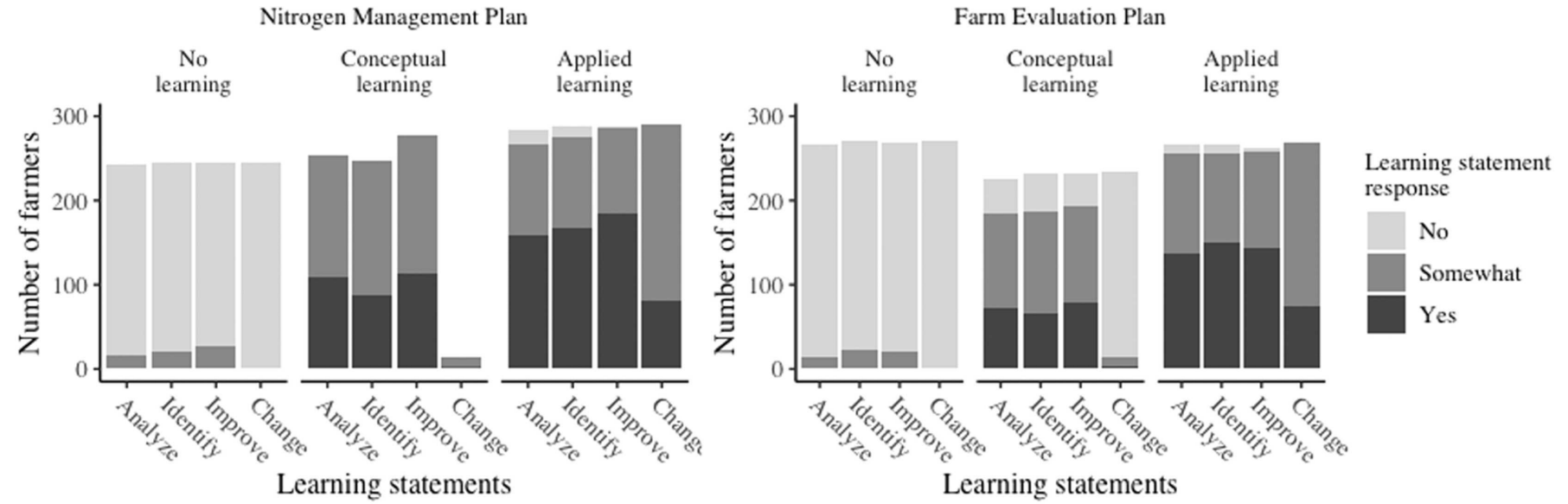






Boundary-Spanning Actors are More Central

Learning about Nitrogen Management



Conclusions

Agricultural practice adoption involves multiple social processes

Practice costs weigh more heavily in decision-making than benefits

Local social networks and programs are keys to behavior change but effectiveness depends on type of practice

Larger and more wealthy farms usually more likely to adopt/participate

Uncertainty is greatest for high cost/low benefit practices, and opinion leaders are most important for practices and programs with low awareness/high uncertainty

Dynamic relationships over time between perceptions, practices, networks, and programs

Selected Publications

Hoffman, Matthew, Mark Lubell, and Vicken Hillis. 2015. "Network-smart extension could catalyze social learning." *California Agriculture* 69(2):113-122.

Roche et al. 2015. "Sustaining Working Rangelands: Insights from Rancher Decision-Making." *Rangeland Ecology and Management*, Forthcoming

Roche, Leslie, Bethany Cutts, Mark Lubell, Justin Derner, Ken Tate. 2015. "On-ranch grazing strategies: context for the rotational grazing dilemma." *Rangeland Ecology & Management*, In press

Niles, Meredith, Mark Lubell, and Margaret Brown. 2015. "How Limiting Factors Drive Agricultural Adaptation to Climate Change". *Agriculture, Ecosystems, and Environment* 200(1): 178-185.

Hoffman, Matthew, Mark Lubell, and Vicken Hillis. 2014. "Linking Knowledge and Action through Mental Models of Sustainable Agriculture." *Proceedings of the National Academy of Sciences* 111(36): 13016-13021.

Lubell, Mark, Meredith Niles, and Matthew Hoffman. 2014. "Extension 3.0: Managing Agricultural Knowledge Systems in the Age of Connectivity." *Society and Natural Resources* 27(10): 1089-1103

Lubell, Mark., Bethany Cutts, Leslie Roche, Matt Hamilton, Justin Derner, Emily Kachergis, and Kent Tate. 2013. "Conservation Program Participation and Adaptive Rangeland Decision-Making." *Rangeland Ecology and Management* 66(6): 609-620.

Niles, Meredith, Mark Lubell, and Van Ryan Haden. 2013. "Perception and Responses to Climate Policy Risks Among California Farmers." *Global Environmental Change* 23(6): 1752-1760

Haden VR, Niles MT, Lubell M, Perlman J, Jackson LE. 2012. "Global and Local Concerns: What Attitudes and Beliefs Motivate Farmers to Mitigate and Adapt to Climate Change?" *PLoS ONE* 7(12):e52882.

Lubell, Mark, Vicken Hillis, and Matthew Hoffman. 2011. "Innovation, Cooperation, and the Perceived Benefits and Costs of Sustainable Viticulture Practices." *Ecology and Society* 16(4): 23.

Shaw, Lauren, Mark Lubell, and Cliff Ohmart. 2011. "The Evolution of Local Partnerships for Sustainable Agriculture". *Society and Natural Resources* 24:1078–1095

Lubell, Mark, and Allan Fulton. 2008. "Local Policy Networks and Agricultural Watershed Management." *Journal of Public Administration Research and Theory* 18 (4):673-96.