University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Great Plains Research: A Journal of Natural and Social Sciences

Great Plains Studies, Center for

Spring 2013

ROLES OF PERCEIVED CONTROL AND PLANNING IN RANCH DROUGHT PREPAREDNESS

Tonya Haigh
University of Nebraska-Lincoln, thaigh2@unl.edu

Cody Knutson
University of Nebraska-Lincoln, cknutson1@unl.edu

Follow this and additional works at: http://digitalcommons.unl.edu/greatplainsresearch


Part of the American Studies Commons, and the Geography Commons

Haigh, Tonya and Knutson, Cody, "ROLES OF PERCEIVED CONTROL AND PLANNING IN RANCH DROUGHT PREPAREDNESS" (2013). *Great Plains Research: A Journal of Natural and Social Sciences*. 1267.
http://digitalcommons.unl.edu/greatplainsresearch/1267

This Article is brought to you for free and open access by the Great Plains Studies, Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Great Plains Research: A Journal of Natural and Social Sciences by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Great Plains Research 23 (Spring 2013):51–58
© 2013 Copyright by the Center for Great Plains Studies, University of Nebraska-Lincoln

ROLES OF PERCEIVED CONTROL AND PLANNING IN RANCH DROUGHT PREPAREDNESS

Tonya Haigh and Cody Knutson

National Drought Mitigation Center
School of Natural Resources
University of Nebraska—Lincoln
810 Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0988
thaigh2@unl.edu

ABSTRACT—Ranchers in the Great Plains and across the United States face the threat of periodic drought. Though ranchers might minimize losses through drought-preparedness activities, many do not adequately prepare for drought, in part because of perceptions that the outcomes of drought management are not controllable. We explore how drought planning activities affect ranchers' perceptions of control and drought preparedness using the theories of planned behavior and goal attainment as guiding frameworks. Ten Great Plains ranchers who had engaged in drought management activities were interviewed about their plans. From the interviews, three activities emerged that appeared to increase ranchers' perceived control during drought: maximizing the health and flexibility of the ranch operation, monitoring precipitation and forage, and implementing "decision rules" as drought conditions became apparent and progressed. The actions supported greater perceived control in the face of drought by increasing the number of desirable options available to ranchers, increasing ranchers' confidence in predicting the effects of their actions, and providing "mental practice" for decision making during a drought event. This exploratory research demonstrates the value of incorporating theories of planned behavior and goal attainment into applied research on rangeland management and drought planning behavior, and suggests directions for future research and education.

Key Words: drought, planning, ranching, management, perceptions, control, preparedness

INTRODUCTION

Drought is a threat to the financial and natural resource health of Great Plains ranches that rely on nonirrigated rangeland. For example, during the drought of the early years of the first decade of the 21st century, ranchers in Wyoming and Nebraska experienced reductions in grazing capacity, irrigation capacity, and winter feed production, leading to reduced sale weights and weaning percentages, and reductions in brood herd numbers and owner equity (Bastian et al. 2006; Knutson et al. 2006). It has been demonstrated, though, that drought losses can be reduced through ranchers' management decisions. In a striking example of the benefits of drought preparedness, Coppock (2011) found that 25% of Utah ranchers reported only neutral or positive impacts following the especially severe 1999–2004 drought, because they had access to reliable water sources and ample feed supplies.

Despite the threat of drought-related losses and the potential for lessening those losses, Great Plains ranchers are often less prepared for drought than they should be (Thurow and Taylor 1999; Dunn et al. 2005). Dunn et al. (2005) observed that South Dakota ranchers differed greatly in their response to the 2002 drought, and the researchers explored barriers that may keep ranchers from responding to drought with uniform success. Building on past research on farmers' experience with drought (Saarinen 1966; Taylor et al. 1987; Woudenberg et al. 2008), Dunn et al. suggested that rangeland managers who lack drought experience or who have had a recent run of good years may have less awareness of drought as a hazard and the full range of potential effects, and thus undervalue drought preparedness. They also posited that a rancher who is more concerned with pounds of beef produced than the long-term health of their rangelands may delay or fail to take action during drought.

In addition, both Dunn et al. (2005) and Thurow and Taylor (1999) highlighted the unpredictability and uncontrollability of ranch drought management as a significant barrier. The nature of drought itself makes management problematic. Thurow and Taylor (1999:413) say, "The be-

Manuscript received for review, July 2012; accepted for publication, November 2012.

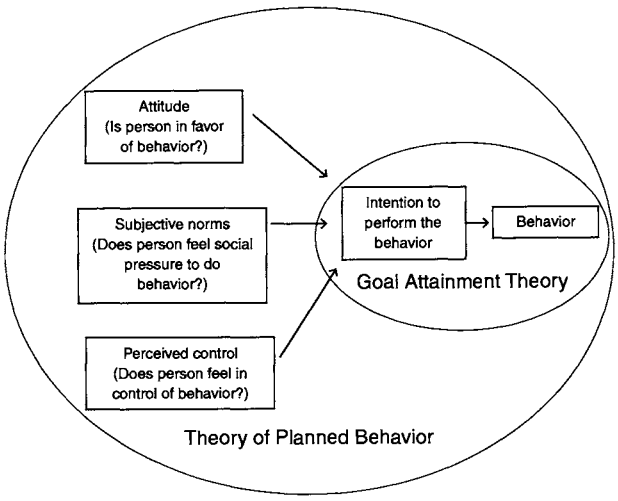

Figure 1: Simplified combined model of theory of planned behavior and goal attainment theory, based on Azjen 1991 and Gallo and Gollowitz 2007.

ginnings and the ends of drought are hard to recognize.... The effects of drought often accumulate slowly as a dry period begins and may linger after expected rainfall patterns have resumed." Cattle inventories, price cycles, other commodity markets, interest rates, and the chance of federal government intervention may also add to ranchers' perceptions that the outcomes of their actions during drought are unpredictable and uncontrollable, and keep ranchers from taking action in an effective manner.

We believe that the discussion of why ranchers don't adequately prepare for drought may benefit from the inclusion of social-psychological insights into planning behavior. In particular, research using the theory of planned behavior has provided insight into the influence that an individual's attitudes toward a behavior, beliefs about what others think he or she should do, and perceived control over the outcome of the behavior has on his or her intentions to perform a behavior (Ajzen 1991, 2002). Related work in goal attainment theory has further explained how individuals move from intending to perform a behavior to actually performing the behavior (Gollwitzer and Moskowitz 1996; Gallo and Gollwitzer 2007). A simplified diagram of the components and relationships between the two theories is shown in Figure 1.

This article focuses on one component of the theory of planned behavior that appears to be a problem for ranch drought preparedness, that of perceived behavioral control. Perceived behavioral control may describe both beliefs about one's ability to perform a behavior and beliefs about the "controllability" of the outcomes of the behavior (Sparks et al. 1997; Azjen 2002; Rodgers et al. 2008). The relationship between perceptions of control and behavior has potentially interesting applicability in ranch drought preparedness; however, rancher perceptions of control with regard to drought-preparedness behavior have not been extensively studied.

We are particularly interested in the connection between perceived behavioral control and planning. Many rangeland researchers and advisors have recommended the development of a drought plan as an essential component of ranch drought preparedness (Reece et al. 1991; Hamilton 2003; Pratt 2000; Hart and Carpenter 2001; Clark and Adams 2002; Thurow and Taylor 2003; Thorne et al. 2009; Knutson et al. 2011). Little has been done to document the effect of having a ranch drought plan, and again, we may need to look outside the discipline to explore how having a plan might actually help a rancher. Research in goal attainment theory has found that having a plan (or "implementation intentions" in the language of the theory) effectively moves people toward achieving their goals (Gollwitzer and Moskowitz 1996; Brandstätter et al. 2001; Jackson et al. 2005; Gollwitzer and Sheeran 2006; Gallo and Gollwitzer 2007). Further, having a plan may be particularly helpful in moving people toward behaviors in which they experience low perceived control (Gärling and Fujii 2002; Kidwell and Jewell 2010). Much of this research has been done in an experimental context, often with students, but effects have also been found related to health behavior goals (Jackson et al. 2005).

Intrigued by potential applications of behavioral theory to ranch drought planning, in this article we ask, How does having a drought plan affect a rancher's perceptions of control over drought and management during a drought?

METHODS

We used a qualitative approach to elicit ranchers' perceptions of their experiences with planning and drought management, per Berg (1995). Ranchers who had implemented a drought plan were identified using purposive sampling methods. Some of the ranchers identified themselves to the National Drought Mitigation Center at previous drought workshops. We also asked rangeland advisors and researchers to recommend ranchers they knew who were involved in drought planning and management. Ten ranchers from five Great Plains states (South Dakota, Nebraska, Kansas, Colorado, and Texas) were identified to interview. We focused the study on the Great Plains be-

cause ranchers in the region are relatively similar in their management of grass-dominated ecological landscapes and threats from drought. We obtained approval from the University of Nebraska—Lincoln Institutional Review Board to interview them about their planning activities.

Ranchers received an introductory letter by mail or e-mail, and were contacted by phone to request an interview. All the identified ranchers agreed to be interviewed. We conducted telephone interviews with these individuals during the summer of 2009 and spring of 2010. The interviews were conducted with a guiding script, but with flexibility to pursue the interests of the participant. During the interviews, ranchers were asked to tell us about their operations, and also to describe their drought plan, how they had put their drought plan together, how well they thought their drought plan (if implemented) had worked, what problems they encountered in planning for drought, and what they would recommend to other ranchers. Interview lengths ranged from approximately 30 minutes to 1 hour 15 minutes. From the interviews, the project team obtained approximately 8 hours of taped recordings.

The recordings were transcribed and open-coded by hand, first to identify ranchers' descriptions of the components of their drought plans, how effective they thought their drought plans were, and what barriers they had encountered. We further coded drought plan components based on emergent commonalities and characteristics, per Glaser and Strauss (1967) and Strauss and Corbin (1990).

The first round of interviews focused on ranchers from South Dakota, Nebraska, Kansas, and Texas during the summer of 2009. After the first round of seven interviews, in September 2012 the participating ranchers were invited to attend, at the researchers' expense, a workshop in Lincoln, NE, on ranch drought planning. Five of the ranchers were able to attend the workshop, along with nine ranch advisors who were also interested in ranch drought planning. The workshop included a presentation of interview results, including the categories and processes of drought planning highlighted in the pre-workshop interviews. The ranchers at the workshop verified the categories and process that had emerged through the coding process, and advisors verified that other ranchers had gone through similar processes. After the workshop, three additional interviews were conducted with ranchers in Colorado, Nebraska, and Texas to further verify the emergent drought planning tactics and perceptions.

Interview transcripts were then analyzed through the lens of the theories of planned behavior and goal attainment. Using guiding concepts from the literature (Francis et al. 2004), we examined, for example, how ranchers described their perceived control over drought management outcomes, and how they thought the components of their drought plan impacted their control over drought management. The outcomes of this analysis were compared to results from other fields of study to provide verification and depth of analysis.

RESULTS

The Ranchers

The ranchers we interviewed ran operations that were relatively diverse in type and size. Operations ranged from approximately 100 hectares to 100,000 hectares. Seven of the ten ranchers ran cow-calf operations, with some incorporating stockers, yearlings, bred heifers, custom grazing, or recreational hunting; the other three ranchers had custom grazing operations. Seven were exclusively range-based, while three of the ranchers also had crop ground or pivot irrigation.

Interviewees displayed attitudes consistent with their drought management intentions, per the theory of planned behavior framework. Specifically, the ranchers valued natural resources as highly as production, or showed appreciation of aspects of their ranch ecosystems beyond their livestock or forages. Six ranchers made it a point to mention that they were part of a larger family operation, that their children were involved in the operation, or that they were planning for the future of the ranch, with one saying, "This ranch will be here way after I'm gone. And my goal, my number one position in life, is to keep this property in good shape for the future, including my own."

Many of the ranchers noted experiences with drought that had led them to believe in the value of preparing for drought. A few had learned from the school of hard knocks. One rancher noted, "I've done it myself too many times, held onto them, put more feed in them. I've fed two cow herds up in drought. Instead of having 100 head of cows when I was through, the last time I had 15 cows paid for. Once you go through that. . . ." And another rethought her entire operation after experiencing financial loss during the 2002 drought. This rancher admitted that before her reorganization, "I'd always been cow-calf so I didn't have a clue to buy some stockers or understand what the undervalued animal was. . . . All I could think of was how was I going to buy back cows and calves."

All the ranchers used drought-preparedness strategies and saw those strategies pay off during earlier droughts, adding to the value they saw in the behavior. Most pointed to the health of their grass and quality of their rangeland.

One said, "I think that our country came back faster than the guy that just hunkered down, kept his cows there, went to feeding, [and] went to caking. [That] really did degrade the range conditions enough that it took longer to come back than country that [we] got off of right away." Four ranchers also said that because of their grazing methods and their efforts to adjust stocking rates at the earliest sign of drought, they had avoided having to destock to the extent that they would have had to without a drought plan. And another rancher said his drought planning process had helped reduce his debt level.

While their beliefs and attitudes may have predisposed these ranchers to value drought preparedness, some of the ranchers acknowledged the controllability and predictability problems that make the behavior difficult. One rancher called drought planning "the least precise and most troublesome" part of his overall ranch management. Two ranchers mentioned that uncertainty in weather prediction makes decision making difficult, and others said that uncertainty in predicting how the livestock markets would respond during a drought made drought planning difficult. One rancher noted that each drought is unique and may vary in its severity and impacts on resources and on livestock markets. And one rancher pointed out that when no rain falls, his ranch couldn't be considered drought-proof. He said,

> In 2002, on that ranch for that 12-month period we had 3.8 inches ([9.7 cm] of rain total, of precipitation of any kind. And I can tell you this, you cannot drought-proof a ranch. You can help and you can delay the effects and you can minimize them, but you can't drought-*proof* your ranch.

Strategies that Address Rancher Perceptions of Control

The ten ranchers described drought-preparedness strategies that were as diverse as the ranchers and their operations themselves; however, emerging from the interviews were three common strategies that ranchers used to increase their perceived control during drought. We focus here on ranchers' descriptions of maximizing the health and flexibility of their operations before drought, monitoring the health of their resources, and implementing decision rules on critical dates when drought conditions appear.

Maximizing Health and Flexibility of Operations Pre-Drought. All the ranchers said that one of the most important things they did to prepare for drought was to develop a healthy ranch operation. Each rancher used a grazing management system that is believed to increase pasture health, including rotation grazing, managed intensive grazing, rest deferral, stocking conservatively, or not grazing grass too short. Two ranchers also noted improving pastures through fertilizing, overseeding, or brush control. One rancher described how these actions improved his control over drought impacts: "Your root system of your plants is maintained much better in a planned system than it is in a season-long continuous grazing system, and so it gets you further into or through a drought. And as you come out of that drought, your recovery is quicker too." Five of the ranchers also emphasized making water improvements before drought occurred, either to facilitate their rotation grazing program or to meet livestock water requirements during drought.

Eight of the ten ranchers built flexibility into their operations as a way to increase the desirable options available to them when drought hit. Two ranchers diversified beyond cattle to other livestock and even wildlife for hunting operations. Three ranchers included custom grazing in their operations as a means to increase flexibility and improve range management during drought, with one explaining, "It gives us flexibility during drought. It's a more liquid asset that can be moved more quickly than a cow-calf pair can. It allows us to liquidate, or destock, in a much quicker fashion." Three ranchers stressed planning hay or forage reserves into their operations, to increase their options during drought. Regarding this strategy, one rancher said, "We build enough in the good years that we can stand a two-year drought. . . . In the good years we build lots of reserve. In the drought years we take off." One rancher also emphasized minimizing or eliminating debt as a way to improve flexibility during drought.

Monitoring Resources. Monitoring, a long-time cornerstone of conservation planning, was mentioned in almost every operation. Nine out of ten ranchers monitored precipitation or soil moisture to identify the onset of drought and to predict the amount of forage their rangelands would produce that season. Some said they used climate prediction resources in addition to their on-farm monitoring data. One rancher had been developing a historical record of rainfall and forage production on his ranch since the mid-1980s. As a result of monitoring, one rancher described the confidence he felt in making decisions early in the season: "Our big moisture months are April, May, and June. So . . . if you know you're dry in April and May, you've already lost two-thirds of your growth [window]."

In addition, many ranchers monitored their pastures

and forage production. One had been measuring how much forage had been harvested off his rangelands since the early 1990s. Another said that by tracking his forage production over time, he could see trends in time to act on them. He said, "I could see a steady decline over those [dry] years. And so I felt like I was more ready [to act] in 2006 than I would have been if I didn't have those records to fall back on." Another described a benefit of monitoring pasture composition: "Over time you gain experience in looking at grass and at your key species that you make decisions from." In these ways, monitoring appears to increase awareness of drought severity and impacts and to increase perception of the control ranchers had over range conditions and the timing of their actions.

Critical Dates and Decision Rules. All the ranchers described developing and implementing some form of decision rules, or *"if-then"* strategies. The decision rules, in general, outlined when decisions needed to be made, the conditions that would trigger decision making (the *"if"*), and what types of decisions should be made (the *"then"*).

Seven of the ten ranchers designated specific dates or months for monitoring and making grazing and other range management decisions. Some tied dates to key precipitation times or peak growth periods for their primary forages. One rancher said, "The most critical [date], if I might share that with you, is May 1. If we don't have good moisture by then, we know we've got trouble. Not that we can't come out of it, not that we can't manage around it. It just makes life a lot simpler if it's wet May 1." Other ranchers set dates based on marketing schedules or grazing contracts. For example, one rancher with a custom grazing operation said, "My decision point is back in March when I have to tell my customer how many cattle to bring." Another rancher with a large number of acres set his dates around cattle-working schedules.

The "if-then" was a blueprint of management alternatives that ranchers had thought through ahead of time. While all said they worked with some type of decision rule, the formality of the rules varied among ranchers. Seven of the ranchers had put their decision rules in writing, including two ranchers who wrote into their grazing contracts the actions to be implemented when monitoring indicated drought or forage deficiency. One rancher said, "I think it's real important to have that discipline, and writing it out is probably as good a way as any to get that discipline." Three ranchers said their decision rules were kept in their heads.

Ranchers said their decision rules included making stocking rate modifications when precipitation or forage deficits trigged the action. Some had general strategies for destocking or accessing alternative forages, while others had more specific plans. Two ranchers had also developed decision rules for other pasture management considerations, such as ceasing prescribed burns when forage and precipitation were below critical levels.

The ranchers emphasized that because they had worked on their ranch health and flexibility before drought, they knew they could take actions that would help them protect their range, finances, and other resources during drought. Those that had purposefully created flexibility in their operation knew they would bring in fewer contract grazers in the spring if it looked dry, and they wrote contracts to ensure that livestock would go home when drought conditions required it, or knew which stockers they would sell. Some planned to feed hay that had been stored for drought, graze meadows that were normally hayed, lease cornfields to graze, or even purchase feed when deemed cost effective.

Those ranchers who had a date or time of year when they monitored conditions and made decisions said that one of the main strengths of their drought management was their determination to make decisions based upon their best knowledge at that time and to not second-guess or delay their decisions. They emphasized that it was important, once conditions triggered the drought plan, to be committed to following the plan without second-guessing it or looking back. One rancher said, "The consequences are a lot better if you're prepared than . . . if you either don't make decisions or [if] the ones that you make are too late." Another gave an example: "We were so dry the first of March. The first of March I was on my last feeding, I had maybe 100 bales of hay left, and I was making decisions [that] everything I had, probably 75% of the livestock I had, was going to go by the 15th of April. . . . If it hadn't rained, these cattle were going to go, and yeah, you take a loss on it. But this has always been pretty well a fact, your first loss is your least loss. You've got to make the decision."

Another rancher said,

> I've never known I'm going into a drought. And you don't. Is this just a dry spell? Is it going to rain next week? Is it not going to rain for another five years? You know, there's no such thing as knowing you're going into a drought. And so what you've got to do is, you've got to say, for my present, current conditions, how do I need to adjust my stocking rate? You've got to say, what are my current conditions, and with the amount of grass I've got, what can I run? And I think that's a mindset that's

> important, because like I say, every time you get a little shower during a drought, that gives you false hope if you're not careful.

In some cases, having a date in mind kept the rancher from panicking and making a decision too soon, as described by this rancher: "Back in middle March, one of my customers called me [saying],"

> 'Oh, it's so terribly dry, what are we going to do?' I said, look, this website [predicts] normal weather rainfall. Yes, it's dry right now . . . but we still have the rest of March and April and May. I said, you don't generally bring the cows until the 10th of May, let's wait until mid-April to make that call. Well, the next six weeks we got eight inches of rain.

A few of the ranchers directly addressed the impact of the decision rules on the emotional side of making decisions during drought. One said, "I think you've got to have it to remove the emotional side of it. It's like when I'm hedging cattle in the futures market. I need to have a game plan to go in." Another said, "It's all that planning and understanding, so that you don't have to think about it when you are in the depths of the emotion. That is the number one key." The rancher added, "You'll only see and find the things to reinforce what you're thinking, rather than truly critical thinking, if you haven't done [your thinking] ahead of time."

DISCUSSION AND CONCLUSION

The ranchers we interviewed were engaged in activities that helped them prepare for, and minimize, the effects of drought. The actions they found helpful—maximizing the health and flexibility of their operations, monitoring precipitation and forage, and implementing decision rules on critical dates when drought conditions arise—are three factors that appear to affect their perceptions of their ability to control the outcomes of their drought management efforts.

First, by maximizing the health and flexibility of their operations, the ranchers positioned themselves to be able to take what they perceived to be the most desirable actions possible. By thinking through options ahead of time, they also may have increased the number of potential desirable actions available to them. According to Burton et al. (1993:117), "Often there is a significant difference in the number of alternatives when an individual is forced by rude circumstances, rather than by communicated information, to canvass ways of reducing loss." Perceiving more options, and more desirable options during drought, may have made it easier for ranchers to decide to take action.

Second, monitoring of rangeland and precipitation provided ranchers with information tailored to their operations, and provided evidence of the effects of their range management under different precipitation scenarios. Monitoring and evaluating the results of their actions appear to have increased the ranchers' confidence in predicting future conditions and what future actions will accomplish, increasing the ranchers' sense of perceived control.

Third, the creation of a drought plan, or "if-then" strategy, was perceived by ranchers to positively impact their ability to take timely and effective action during drought. This finding is consistent with goal attainment theory, which maintains that the development of a plan facilitates achievement of behavioral goals. Gärling and Fujii (2002) refer to planning as "mental practice." Further, according to Gallo and Gollwitzer (2007), the "if-then" link may make it easier to detect a need to act, and may make the process of acting more automatic. Experimental as well as observational research has indicated that people who have a plan may be able to act in a more efficient manner than people who do not have a plan, because they have already deliberated and evaluated the actions that might be taken to reach one's goal (Xaio et al. 1997; Webb and Sheeran 2007). Descriptions of ranchers' planning and decision making reflect similar processes.

This exploratory research demonstrates the value of incorporating theories of planned behavior and goal attainment into applied research on rangeland management and drought planning. This theoretical lens may be used to provide structure for identifying factors that affect behaviors and effective educational interventions in range management, just as it is currently used in other fields such as management of health behaviors. Additional research may consider whether learning about someone else's plan for drought affects an individual's perceived control; whether the process of developing the drought plan affects perceived control; or whether new technologies, such as grazing management software that allows ranchers to develop "if-then" scenarios, affect perceived control.

Further research might also explore how ranchers with and without a drought plan act during drought, and whether they are able to meet their ranch goals during drought. Additional research is also needed to explore these relationships in other geographic regions and among other types of agricultural producers.

Following on this research, the National Drought Mitigation Center at the University of Nebraska—Lincoln has developed an online drought planning resource called

Managing Drought Risk on the Ranch, found at www.drought.unl.edu/ranchplan. The resource offers guidance on monitoring ranch resources, maximizing ranch health and flexibility, identifying critical dates, and developing decision rules. It is our hope that efforts such as this will increase ranch drought preparedness and minimize future losses resulting from drought.

ACKNOWLEDGMENTS

This research was supported by funding support of the USDA Risk Management Agency. The authors would also like to acknowledge and thank the ranchers who agreed to be interviewed and often went beyond that by providing additional information, documents, and photos. Many of these ranchers are profiled in the Managing Drought Risk on the Ranch website (http://drought.unl.edu/ranchplan). In addition, the authors would like to thank two anonymous reviewers who provided valuable feedback, improving both the theoretical grounding of this article and the description of our methods. Any misrepresentations or other errors in this article remain solely the responsibility of the authors.

REFERENCES

Ajzen, I. 1991. Theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50:179–211.

Ajzen, I. 2002. Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology* 32:665–83.

Bastian, C., S. Mooney, A. Nagler, J. Hewlett, S. Paisley, M. Smith, V.M. Frasier, and W. Umberger. 2006. Ranchers diverse in their drought management strategies. *Western Economics Forum* 5:1–8.

Berg, B. 1995. *Qualitative Research Methods of the Social Sciences*. 2nd ed. Allyn and Bacon, Needham Heights, MA.

Brandstätter, V., A. Lengfelder, and P.M. Gollwitzer. 2001. Implementation intentions and efficient action initiation. *Journal of Personality and Social Psychology* 81:946–60.

Burton, I., R.W. Kates, and G.F. White. 1993. *The Environment as Hazard*. 2nd ed. Guilford Press, New York.

Clark, R.T., and D.C. Adams. 2002. Planning for beef cattle operations in the face of drought. *Cornhusker Economics*. University of Nebraska Cooperative Extension Paper 75. University of Nebraska—Lincoln.

Coppock, D.L. 2011. Ranching and multi-year droughts in Utah: Production impacts, risk perceptions, and changes in preparedness. *Rangeland Ecology and Management* 64:607–18.

Dunn, B., A. Smart, and R. Gates. 2005. Barriers to successful drought management: Why do some ranchers fail to take action? *Rangelands* 27:13–16.

Francis, J., M. Eccles, M. Johnston, A. Walker, J. Grimshaw, R. Foy, E. Kaner, L. Smith, and D. Bonetti. 2004. *Constructing Questionnaires Based on the Theory of Planned Behavior: A Manual for Health Services Researchers*. Centre for Health Services Research, University of Newcastle, UK.

Gallo, I.S., and P.M. Gollwitzer. 2007. Implementation intentions: A look back at fifteen years of progress. *Psicothema* 19:37–42.

Gärling, T., and S. Fujii. 2002. Structural equation modeling of determinants of planning. *Scandinavian Journal of Psychology* 43:1–8.

Glaser, B.G., and A.L. Strauss. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine De Gruyter, New York.

Gollwitzer, P.M., and G.B. Moskowitz. 1996. Goal effects of action and cognition. In *Social Psychology: Handbook of Basic Principles*, 361–99. Guilford, New York.

Gollwitzer, P.M., and P. Sheeran. 2006. Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology* 38:69–119. Academic Press.

Hamilton, W.T. 2003. Drought: Managing for and during the bad years. In *Ranch Management: Integrating Cattle, Wildlife, and Range*, ed. C.A. Forgason, F.C. Bryant, and P.C. Genho, 133–52. King Ranch Institute of Ranch Management, Kingsville, TX.

Hart, C.R., and B.B. Carpenter. 2001. *Planning: The Key to Surviving the Drought*. AgriLIFE Extension Publication E-61-04-01. Texas A&M University.

Jackson, C., R. Lawton, P. Knapp, D.K. Raynor, M. Conner, C. Lowe, and S.J. Closs. 2005. Beyond intention: Do specific plans increase health behaviours in patients in primary care? A study of fruit and vegetable consumption. *Social Science and Medicine* 60:2383–91.

Kidwell, B., and R.D. Jewell. 2010. The motivational impact of perceived control on behavioral intentions. *Journal of Applied Social Psychology* 40:2407–33.

Knutson, C.L., T. Haigh, M.J. Hayes, M. Widhalm, J. Nothwehr, M. Kleinschmidt, and L. Graf. 2011.

Farmer perceptions of sustainable agriculture practices and drought risk reduction in Nebraska, USA. *Journal of Renewable Agriculture and Food Systems* 26:255–66.

Knutson, C.L., M. Hayes, M. Melvin, J. Nothwehr, M. Kleinschmidt, and R. Hitchcock. 2006. Conversations about the 2000–2005 drought with Nebraska farmers and ranchers. National Drought Mitigation Center, University of Nebraska—Lincoln.

Pratt, D.W. 2000. Drought proofing your business. In *Ranching for Profit Newsletter,* February/March. Ranch Management Consultants.

Reece, P., J.D. Alexander, and J.R. Johnson. 1991. *Drought Management on Range and Pastureland.* Nebraska Cooperative Extension Publication EC-91-123. University of Nebraska—Lincoln.

Rodgers, W.M., M. Conner, and T.C. Murray. 2008. Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviors. *British Journal of Social Psychology* 47:607–30.

Saarinen, T.E. 1966. *Perception of the Drought Hazard on the Great Plains.* University of Chicago Press, Chicago.

Sparks, P., C. Guthrie, and R. Sheperd. 1997. The dimensional structure of the perceived behavioral control construct. *Journal of Applied Social Psychology* 27:418–38.

Strauss, A., and J. Corbin. 1990. *Basics of Qualitative Research: Grounded Theory, Procedures, and Techniques.* Sage Publications, Newbury Park, CA.

Taylor, J., T. Stewart, and M. Downton. 1987. Perceptions of drought in the Ogallala Aquifer region of the Western U.S. Great Plains. In *Planning for Drought: Toward a Reduction of Society Vulnerability,* ed. D. Wilhite, W. Easterling, and D. Wood, 409–23. Westview Press, Boulder, CO.

Thorne, M., L. Cox, and G. Fukumoto. 2009. Management of production risk for Hawaii ranchers. *Pasture and Range Management* PRM-5. College of Tropical Agriculture and Human Resources, University of Hawaii.

Thurow, T.L., and C.A. Taylor, Jr. 1999. Viewpoint: The role of drought in range management. *Journal of Range Management* 52:413–19.

Webb, T.L., and P. Sheeran. 2007. How do implementation intentions promote goal attainment? A test of component processes. *Journal of Experimental Social Psychology* 43:295–302.

Woudenberg, D.L., D.A. Wilhite, and M.J. Hayes. 2008. Perceptions of drought hazard and its sociological impacts in South-Central Nebraska. *Great Plains Research* 18:93–102.

Xiao, Y., P. Milgram, and D.J. Doyle. 1997. Planning behavior and its functional role in interactions with complex systems. *IEEE Transactions on Systems, Man, and Cybernetics, Part A: Systems and Humans* 27:313–24.