

THESIS

COMMUNICATION ABOUT NOXIOUS WEEDS AMONG PROPERTY OWNERS
IN TETON COUNTY, WYOMING

Submitted by

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ABSTRACT

COMMUNICATION ABOUT NOXIOUS WEEDS AMONG PROPERTY OWNERS IN TETON COUNTY, WYOMING

A survey, conducted in cooperation with the Teton County Weed & Pest District, was mailed to property owners (n = 414) in Teton County (Jackson Hole), Wyoming, to explore how and why this audience seeks information about noxious weeds. Prior to the survey, a model was developed based on concepts and relationships adapted from the Risk Information Seeking and Processing model (Griffin, Dunwoody, & Neuwirth, 1999). High levels of concern about the risk posed by weeds, coupled with a low perceived knowledge, were correlated with the need for information about this topic. Consistent with the RISP model, the likelihood of seeking information was highly correlated with perceived social pressure to be informed about invasive plants. However, information need as measured here, which varied from the approach used in the RISP model, was negatively correlated to information seeking, suggesting that self-identity, or a sense of duty to others or the community, might better explain information seeking.

Perceived knowledge was related to a higher frequency of controlling weeds (defined as 3 or more times a year), whether the respondent worked in a weed-related industry, and membership (versus non-membership) in a conservation organization. Concern was mostly explained by frequency of controlling weeds. Perceived social pressure to be informed was driven by owning a larger parcel (>1 acre), by working in a weed-related industry, and by membership in a conservation organization. A higher frequency of controlling weeds was the best predictor of information seeking, while owning more than 1 acre, working in a weed-related

industry, and membership in a conservation organization were predictors of information sharing. No statistically significant differences were discerned based on gender.

Property owners, who were notably older (mean age of 58 years) and better educated (73.3% completed college) than the American population as a whole, indicated brochures and websites as the tools they prefer for learning and sharing information about weeds. Little support was found for using social media, such as Facebook, for spreading the word about weeds among property owners. Participants did report a strong willingness, however, to share information with family, friends, and neighbors, suggesting social networks do have potential for disseminating information about invasive plants. Property owners expressed a need to know more about control options other than herbicides and for help with identification. While they had only a moderate concern about weeds in general, property owners did express a high level of concern for the negative impacts weeds pose to desirable vegetation.

Practical implications for communicating about noxious weeds with property owners are discussed.

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CHAPTER 1: INTRODUCTION

Public outreach and education are considered to be critical components of an effective weed management program (DiTomaso, 2000; Westbrooks, 1998; Hershendorfer, Fernandez-Gimenez, & Howery, 2007). Case studies of public outreach activities have started to emerge from Extension offices (Donaldson & Wharton, 2002), natural resource agencies (Gunasekera & Bonila, 2001), and universities (Call, Henderson, & Philips, 2006) in the United States and abroad. These case studies reveal that weed managers are using an array of communication tools to provide information to the public. Despite limited resources available to create and manage these tools (Hershendorfer et al., 2007), little research exists on how people prefer to learn about weeds, or what factors prompt them to seek information about weeds in the first place.

Property Owners: A Critical Audience

When conducting public outreach and education, noxious weed managers may target a variety of different audiences: anglers who spread aquatic invasive species (Hills, 2004), K-12 teachers who can influence a younger generation (Call et al., 2006), gardeners who plant non-native, invasive ornamentals (Reichard & White, 2001), or eco-conscious citizens who can donate time to monitoring, control, and restoration projects (Tidwell & Brunson, 2008). While these individuals can all aid in efforts to prevent and manage the spread of noxious weeds, one audience is especially important for managers to reach out to: private property owners.

Noxious weed managers who work for – or partner with – local, state, and federal agencies can gain access to public lands to monitor and control plant invasions. But when the weeds show up on private lands, the onus is placed on the property owners to remedy the problem. Without the cooperation of private landowners, noxious weed managers must rely on

these individuals to manage their own weeds or grant access to their lands so managers can control the infestations themselves, which creates a drain on agency resources.

This becomes a particularly pressing issue when private property borders public land. Like a wildfire, weed infestations start from “ignition points” and spread outward as wind, animals, and other vectors carry seeds and create peripheral “hotspots” (Dewey, Jenkins, & Tonioli, 1995, p. 19; Tidwell & Brunson, 2008). When ignition points fester on private property bordering public land, hotspots of new weed infestations can appear on public land and become the managers’ problem. This becomes an even bigger concern when weeds designated as high priority species targeted for eradication thrive on private property (Figure 1). Without the cooperation of property owners, managers may never be able to snuff out these species.

Managers do have options, though, for dealing with non-compliant property owners who don’t manage their weeds. Some states have passed laws requiring private individuals to remove noxious weeds from their lands, but enforcing these regulations might not always be the best course of action. After surveying 42 coordinators of local weed management programs in the southwestern U.S., Hershendorfer et al. (2007) concluded that “the presence of locally enforceable weed regulations was important, but programs that used a light-handed approach to enforcement conducted more weed control than those that used more punitive measures” (p. 232). While flexing regulatory authority may be necessary, educating landowners presents another, more collaborative option that doesn’t rely on negative incentives to spur compliance.



Above: Leafy spurge (*Euphorbia esula* L.) spreads outward from the root ball of a tree on private property in Teton County, Wyoming. Designated a Priority 1 species, leafy spurge has been targeted for eradication by the Teton County Weed & Pest District.

Right: Cypress spurge (*Euphorbia cyparissias* L.), also a Priority 1 species, grows on a private in-holding in Grand Teton National Park.



(Photos courtesy Amy Collett, Education Supervisor, Teton County Weed & Pest District)

Figure 1. Examples of High Priority Noxious Weeds on Private Land

Information Delivery Conundrum

Given the important role they can play in weed management, it is essential for property owners to have access to information about invasive plants so they have the capacity to control weeds when necessary. In Teton County, Wyoming, the location for this study, and elsewhere in the West (Hershdorfer et al., 2007), local weed management organizations are responsible for providing much of this “on-the-ground” information about weeds to landowners (p. 226). While public outreach and education may have lower costs compared to other elements of a noxious weed program, such as control and eradication, budget restrictions can still limit the possibilities for outreach (Hershdorfer et al., 2007). Managers must be selective when deciding what tools to use for providing information to property owners, or other segments of the public.

To compound this problem, managers have vastly more tools to consider in today's tech-savvy world. The number of media for providing information to the public has "exploded" recently (Hallahan, 2010, p. 624). More organizational communication has gone online (e.g., websites, e-mail, text messages, and podcasts), audiences' media use has become more fragmented, and people expect better, 24/7 access to information (Hallahan, 2010). Interactive media, such as websites, e-newsletters, social media sites, and online forums, offer new opportunities for managers to provide information about weed abatement and promote events and volunteer programs. However, little is known about landowners' demand for and use of these online tools for seeking and sharing information about weeds (Daab & Flint, 2010).

To improve the delivery of information about weed management to property owners, it is also important to consider why they seek this information in the first place. Research shows weed control is a topic sought after by landowners (Mealor, Meiman, Hild, Taylor, & Thompson, 2011), but little is known about the factors prompting them to seek this information. While scholars have noted the negative impacts weeds have on people (DiTomaso, 2000; Westbrooks, 1998), more research is needed on the specific factors motivating property owners to learn about invasive plants. That way, managers can ensure they are meeting the informational needs of this critical audience and craft messages that encourage more effortful processing, leading to more persuasive communication (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006).

Study Purpose

Despite the importance of public outreach and education for effective weed management, little research exists on how and why property owners seek information about weeds. Managers are left to assume the same old delivery channels, such as workshops and pamphlets, still work,

or invest resources in the latest and greatest technology, such as social media and e-newsletters, without knowing if a demand exists for it.

To address this need, this study investigates the factors that prompt property owners to learn about invasive plants, what informational tools they prefer when seeking information about weeds, and their likelihood of sharing this information. The results of this study can advance our understanding of public communication of weeds and be used to enhance the public outreach and education program at the Teton County Weed & Pest District in Wyoming.

CHAPTER 2: LITERATURE REVIEW

The following review draws on literature from natural resources management and mass communication, particularly public relations and risk communication.

How People Learn About Noxious Weeds

With an increasing emphasis being placed on the human dimension of invasive plants, researchers have begun to explore the public's awareness, concern, and behaviors toward weeds (e.g., Colton & Alpert, 1998; Reichard & White, 2001; Sheley, Jacobs, & Floyd, 1996; Steele, Chandran, Grafton, Huebner, & McGill, 2006). On occasion, these studies reveal what sources individuals turn to for weed-related information.

Daab and Flint (2010) conducted a survey of north-central Colorado residents to gauge awareness and attitudes toward invasive plants, with 81.5% of respondents being primary homeowners. They found newspapers, word-of-mouth, and my own observations to be the most common sources of information about invasive plant issues. However, respondents who sought information from organizations and agencies (e.g., county Extension office, county government, the Colorado Weed Management Association, the Department of Agriculture, etc.) had a much higher awareness of locally targeted species.

In a survey of exurban residents in Wyoming (living on 1.7 to 40 acres of land), Meador et al. (2011) asked about information sources and also included a measure of what tools people prefer for learning about land management. They found that 46% of respondents had sought information about land management, with weed control being the most needed or desired topic. Consistent with Daab and Flint's (2010) findings, respondents noted local organizations (county weed and pest, cooperative Extension service, and conservation districts) and other people

(neighbors, family, or friends) as the top sources they turn to for information. As for tools, they indicated preferences for a fact sheet, magazine, or newsletter, followed by websites, one-on-one interactions, workshops or field trips, and radio or television.¹ The top land management practice implemented by respondents was weed control.

The Meador et al. (2011) study is particularly applicable because the sample included Teton County property owners, the population for this study. But the Meador et al. (2011) study, conducted in the fall of 2006, did not differentiate between websites and the abundance of other online, interactive media available to managers. For example, in April 2011, the Teton County Weed & Pest District, the partner agency for this study, started a Facebook page, and the district sporadically sends out e-newsletters. Whether Teton County property owners will use these tools to communicate with the district or obtain and share weed-related information is unknown.

Meador et al. (2011) point out that different audiences use different tools when seeking information, so they recommend a multi-pronged approach to public outreach and education. A review of case studies of campaigns and education programs reveals that managers indeed use a variety of tools to inform the public (Table 1).

As indicated in Table 1, the number of tools for communicating information about invasive plants is vast. To help make sense of them, possible tools for public outreach can be placed into five categories (public media, controlled media, interactive media, events, and one-on-one) using the Integrated Public Relations Media Model (Hallahan, 2010). Each media type has its own distinct benefits and challenges, offering managers criteria to consider when selecting tools. For example, public media (e.g., print, radio, and TV publicity) are a low-cost

¹ It is worth noting the mode was “most likely to be used” for both print media (i.e., newsletter, fact sheet, or magazine) and websites.

Table 1. Informational Tools Used to Promote Noxious Weeds

This table lists informational tools (i.e., media or channels) mentioned in seven published case studies of noxious weed campaigns and education programs and three websites from weed management organizations.

<u>Public Media</u>	Traveling exhibit ^{1, 2}
Print publicity ^{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	Stationary exhibit ⁷
Radio publicity ^{1, 2, 4, 5, 7, 8, 10}	
Television publicity ^{2, 4, 5, 6, 7, 8, 10}	<u>Interactive Media</u>
Print ads ^{4, 8}	Website ^{1, 2, 4, 7, 9, 10}
Radio ads ⁸	
Television ads ⁸	<u>Events</u>
Billboards ²	Workshops ^{1, 2, 3, 4, 5, 6, 9}
	Field tours ^{1, 2, 4, 6, 9}
<u>Controlled Media</u>	Classroom programs ^{1, 6, 7, 9, 10}
Weed ID cards ^{1, 3}	Weed pulls ^{2, 3, 6, 9}
Field guides/brochures ^{1, 4, 5, 7, 8, 10}	Presentations/speeches ^{2, 3, 4, 6, 9}
Fact sheets/flyers ^{2, 3, 5, 8, 9, 10}	Weed fair ⁶
Advertising specialty ²	Popular theater ⁷
Posters/signs ^{2, 4, 7, 8}	
Promotional items ^{2, 4, 5, 8}	<u>One-on-One</u>
Direct mail ³	Personal visits ^{3, 6}
 <u>Sources</u>	
1. Call, Henderson, & Philips (2006)	6. Marler, Supplee, Wessner, & Marks (2005)
2. Donaldson & Wharton (2002)	7. Nang'alelwa (2008)
3. Beck, Noble, & Miller (1996)	8. Zero Spread (n.d.)
4. Hills (2004)	9. Community Weed Awareness Campaign (n.d.)
5. Gunasekera & Bonila (2001)	10. Idaho Weed Awareness Campaign (n.d.)

way to raise awareness and build credibility, while events (e.g., workshops, presentations, weed pulls, and classroom programs) have higher costs but are more likely to foster motivation and reinforce attitudes in people (Hallahan, 2010).

Why People Learn About Noxious Weeds

So far, this literature review has explored *where* (sources) and *how* (tools/media) people access information about weeds. But *why* might someone seek information about this topic? To answer this question, insights can be gained from mass communication theories, particularly information seeking and processing about risks.

Noxious Weeds As a Risk to Property Owners

One factor that may prompt individuals to seek information about a topic is the desire to mitigate a risk (Tucker & Napier, 2002). Risk refers to “things, forces, or circumstances that pose danger to people or to what they value” (Stern & Fineberg, 1996, p. 215). Weeds create a risk because they pose a hazard to humans and what they care about. Certain weeds can cause internal poisoning, skin rashes, and airborne-induced allergic reactions (Westbrooks, 1998). Weeds can poison livestock and reduce land values (DiTomaso, 2000; Olson, 1999), and they may be costly and time consuming to manage (Mealor et al., 2011). They also may result in legal headaches for people when laws require removal of weeds from private property (Daab & Flint, 2010). Therefore, risks from noxious weeds can be related to the health of humans or animals, asset depletion, costs, time, and legal issues, among other hazards.

Landowners might be prompted to seek out information about weed control to mitigate a perceived risk to their land, their livestock, or possibly themselves (see DiTomaso, 2000; Westbrooks, 1998, for more on the negative impacts of weeds on humans and their activities). Tucker and Napier (2002) argue that the perceived risk of a hazard, such as weeds, will be predictive of increased use of information sources. From the risk communication perspective,

they contend people will seek relevant information to help mitigate the impacts of the hazard and reduce risks.

Given the consequences associated with failing to control weeds, the topic of invasive plants can become personally relevant to property owners. One of the strongest predictors of whether individuals will be motivated and interested to learn more about a topic is perceived personal relevance or consequence (Petty, Briñol, & Priester, 2009). People tend to seek information that is relevant and useful to them in some way (Kahlor et al., 2006). For property owners who are concerned about noxious weeds on their land, obtaining information about weed control can be both relevant and useful.

This study frames noxious weeds as a risk to property owners. The desire to mitigate the hazards of a risk – or concern over the consequences of not managing a weed infestation – is likely not the only reason property owners seek information about weeds. They may simply want to be good stewards of their land. But approaching this topic from a risk communication perspective offers insights into the factors that prompt information seeking.

Risk Information Seeking and Processing Model

Communication scholars have explored the factors that predict information seeking using the Risk Information Seeking and Processing (RISP) model (Griffin, Dunwoody, & Neuwirth, 1999). This model takes concepts from the Heuristic-Systematic Model of information processing (Eagly & Chaiken, 1993) and the Theory of Planned Behavior (Ajzen & Fishbein, 1980) to better understand how risk communication can influence behavior change. This study adapts several concepts from the RISP model (Figure 2) to understand information seeking about noxious weeds.

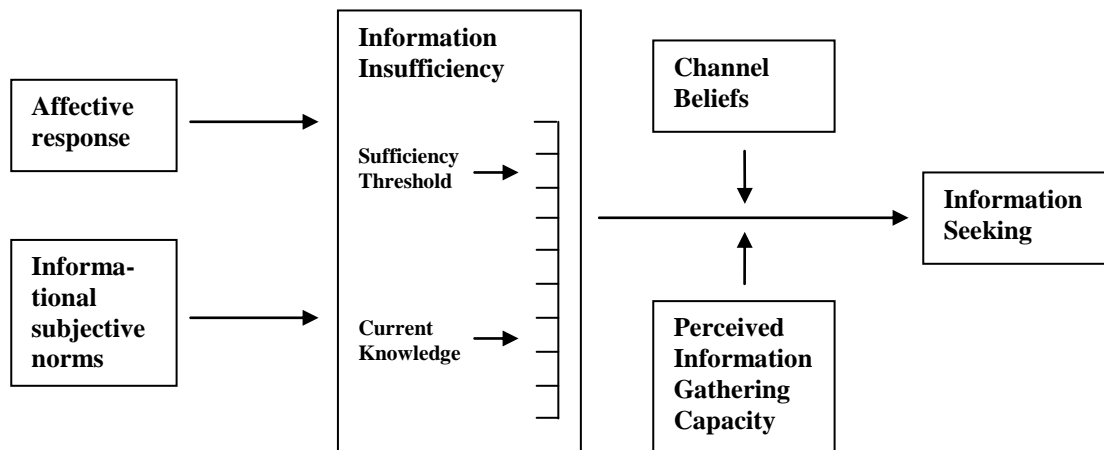


Figure 2. Concepts found in the Risk Information Seeking and Processing Model (Griffin et al., 1999)

According to the RISP model, an emotional reaction to a risk, such as worry, anger, or uncertainty (affective response), and perceived social pressure to be informed about a risk (informational subjective norms) can influence a person's confidence in his or her knowledge about the topic. This leads to the person making a judgment about the amount of information needed to cope with the risk (information insufficiency). If a large enough gap in knowledge is perceived, the person will be motivated to seek information about the topic (information seeking) until enough knowledge has been learned to cope effectively. The desire to seek information is mediated by the person's ability to access the information (perceived information gathering capacity) and the person's confidence in where the information is derived (channel beliefs) (Griffin et al., 1999). Studies testing these relationships show support for the model, with only channel beliefs and information gathering capacity lacking consistent support (see Kahlor & Rosenthal, 2009).

Griffin et al. (1999) developed the RISP model to explore information seeking and processing about risks in the context of health. However, the model has since been applied to

other topics, including the environment. Researchers have applied concepts in the RISP model to climate change (Kahlor, 2007), river flooding (Griffin et al., 2008), and the health of the Great Lakes (Kahlor et al., 2006).

Adapting the RISP Model to Noxious Weeds

This study adapts concepts from the RISP model (Griffin et al., 1999), but differs in respect to certain concepts due to its purpose and the context of noxious weeds. Channel beliefs and perceived information gathering capacity have been excluded given the lack of support for them (Kahlor & Rosenthal, 2009). Also, the current knowledge component of information insufficiency has been separated from this concept so knowledge can act as an antecedent variable. Other concepts were added or altered to better understand how people obtain and share information about weeds. The model for this study is depicted in Figure 3. Following the model, definitions are provided for all concepts.

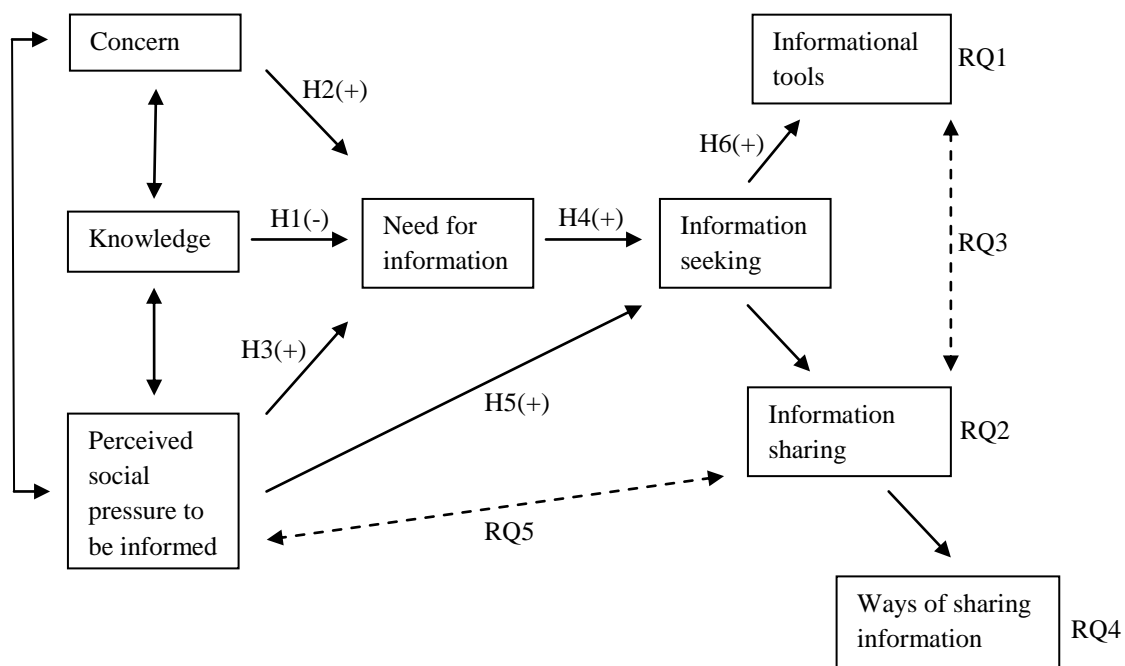


Figure 3. Concepts and Relationships in This Study

Knowledge

In this study, knowledge acts as an antecedent variable because it is assumed property owners must be able to recognize weeds before they can diagnose them as a problem and, consequently, perceive a need to learn more about them.

This study investigates property owners' perceived knowledge of weeds, or how they assess their knowledge about weeds in general and certain species (i.e., whether they believe they are knowledgeable or not knowledgeable about this topic). Meador et al. (2011) found 54% of their survey respondents (exurban residents in Wyoming) had not sought information about land management. Given that more landowners had engaged in land management practices than expected, they questioned whether these respondents did not seek information because they felt they had sufficient knowledge already. This study explores that question by focusing on perceived, or self-reported, knowledge.

It is important to note that perceived knowledge differs from other measures of knowledge used in weed-related studies. While different conceptually, these measures can still offer useful insights about the public's understanding of invasive plants.

Awareness, for example, measures whether people have heard or read about weeds. While Steele et al. (2006) found only 34% of woodland landowners in West Virginia were aware of weeds, Daab and Flint (2010) found that 88% of the public in north-central Colorado had heard or read about weeds. They also found a significant, positive correlation between awareness of weeds in general and awareness of weeds targeted for management by county agencies, with Canada thistle being the species of which respondents were most aware.

Other researchers have gauged actual knowledge of weeds, or the facts people hold in memory and their ability to identify priority species. Meador et al. (2011) tested respondents'

actual knowledge by measuring their level of agreement on factual statements about land management. Then, the authors presented respondents with color photographs of noxious weeds and asked them to choose the correct name for the weed in the picture. Respondents, in general, agreed with common factual statements about land management, and 87% of them could identify Canada thistle.

Although insightful, these studies are confined to their specific populations and times, so conclusions cannot be drawn about the general public's knowledge of weeds – or knowledge held by property owners in Teton County. Daab and Flint (2010) point out that the “levels of the public's invasive plant awareness are most likely as diverse as the regions they inhabit” (p. 398). It is assumed, however, the Teton County Weed & Pest District's efforts to educate the public over the last decade have had a positive impact on knowledge among property owners.

Concern

According to the model, property owners must be worried about noxious weeds before they will feel a need for information about them. Even if they are aware of an invasive plant problem on their land, property owners may not feel compelled to exert the effort to learn about weeds. Concern, therefore, is a critical initial component to the information seeking process.

The concept of concern is derived from the affective response component found in the RISP model (Griffin et al., 1999). Affect refers to feeling states that people experience, and emotions fall under this category (Manfredo, 2008). In the health context in which the RISP model was developed, an emotional response to a risk makes a great deal of sense; individuals may experience feelings of worry or anger toward a possible threat to their health or the health of a loved one (Griffin et al., 1999). It is assumed, however, that most property owners – or other

members of the public, for that matter – do not feel deep, moving emotions toward weeds like they do personal health problems.

It is more likely they possess not a strong emotion but a negative attitude toward weeds, which may prompt them to be concerned about the risks posed by them. An attitude is an evaluation of an object, or the degree to which a person likes or dislikes something (Ajzen & Fishbein, 1980). In this case, the object is noxious weeds and the threats associated with them. Therefore, this study seeks to understand property owners' attitude of concern toward weeds, not their emotions. Although attitudes can have both affective and cognitive components, the mix between them can vary, and topics with only moderate or low levels of consequence are low in affect and mostly cognitive.

Prior research can shed some light on whether property owners in Teton County are concerned about weeds, and the results are somewhat promising. In a 2006 survey, 19% of residents indicated noxious weeds as a major problem in the county, with 33% of them citing weeds as a moderate problem (Teton County Citizen Survey). Only 12% of respondents indicated that weeds are not a problem at all in Teton County.

Outside of the geographic region for this study, other researchers have attempted to gauge the public's concern toward weeds and their attitudes toward the threats posed by invasive plants. In August 1996, Colton and Alpert (1998) surveyed 206 visitors to the University of California Bodega Marine Laboratory about weeds. The researchers concluded that "the public remains largely unaware of the ecologic and economic impacts of biological invasions by plants" (p. 262). Respondents, however, noted that weeds cause problems to themselves (73%) or the environment (71%), with salient problems being health (e.g., allergies) for adults and impacts to native species for youths.

In a survey of woodland landowners in West Virginia, respondents noted that certain weed species can encroach on desirable plants, look displeasing, interfere with agricultural practices, reduce land values, and create a problem for walking and riding (Steele et al., 2006). In a study of Montanans' reactions to weeds, researchers found 80% of respondents could identify at least one problem caused by weeds, most commonly mentioning harm to biodiversity (Sheley et al., 1996).

In their study of north-central Colorado residents, Daab and Flint (2010) found that residents in this part of the country were generally concerned about weeds when asked this question directly. They were more concerned, however, with damages to ecosystems and the loss of native plants than impacts to themselves, such as laws that require the removal of noxious weeds and time and costs associated with weed control. Echoing the public sentiment found in prior studies, respondents found noxious weeds to be undesirable because they crowd out plants desired for wildlife or beauty, disrupt agricultural practices, and simply “look bad” (Daab & Flint, 2010, p. 397).

These studies offer insights into why property owners in Teton County might be concerned about weeds. They have been used to develop measures of specific concerns toward weeds in this study, with a focus on personal impacts to landowners as opposed to societal level impacts to the environment (Tyler & Cook, 1984). Tyler and Cook (1984) argue that people differentiate between the societal and personal dimensions of a risk when making a risk judgment, so this study emphasizes the personal.

Perceived social pressure to be informed

The perceived social pressure to be informed is derived directly from the RISP model (Griffin et al., 1999) and is defined the same way as informational subjective norms. Perceived

social pressure to be informed is the definition Kahlor et al. (2006) used for informational subjective norms, and this more explicit nomenclature was chosen for this study for its clarity. It is, in essence, the “perceptions that others believe that we should be or should become informed about a particular topic” (Kahlor et al., 2006, p. 172). This pressure can stem from explicit or implicit comments from others or internally derived motivations to know about a topic.

This concept has been included in this study given the support for it in research using the RISP model (Kahlor & Rosenthal, 2009). For example, in the Great Lakes study investigating information seeking and impersonal risks, Kahlor et al. (2006) discovered an unexpected, strong relationship between informational subjective norms and seeking information. This finding is especially relevant to this study, since the introduction of invasive species poses a major threat to the health of the Great Lakes (see Mills, Leach, Carlton, & Secor, 1994).

It is also quite possible some property owners in Teton County may feel pressured to be informed about weeds given the high profile of natural resource issues on the public agenda. The local economy is driven (at least partly) by natural amenity and tourist activities (Jackson Hole Almanac, n.d.; Meador et al., 2011), with high ecological, economic, aesthetic, and recreational values placed on land in the area. The county not only boasts pricey residences and ranches, but Grand Teton National Park, the Bridger-Teton National Forest, and the National Elk Refuge.

Need for information

In this study, the need for information refers to the degree with which property owners perceive an inadequacy in their level of knowledge about weeds to be able to manage them on their land, as well as the types of information they would need.

Case (2002) defines an information need as “a recognition that your knowledge is inadequate to satisfy a goal that you may have” (p. 5). When people need information, a gap exists between what they know and what they think they should know about a topic, or in this case, a risk. In the RISP model, Griffin et al. (1999) refer to this as “information insufficiency,” or “the gap between what people know about a given risk (*current knowledge*) and what they say they need to know for their own purposes (the *sufficiency threshold*)” (Kahlor et al., 2006, p. 171). When this knowledge gap is wide enough, individuals will seek information until they feel confident in their ability to cope with the risk (Griffin et al., 1999), or satisfy the goal at hand.

In the context of weeds, property owners might experience this knowledge gap – and recognize the need for information – because they are concerned about weeds and lack certainty in their ability to mitigate the risks posed by weeds, or they feel pressured to know more about the topic. They, in turn, may be more likely to seek out information about weeds. However, it’s quite possible that these factors will not prompt information seeking because property owners perceive that they have enough information about weeds already. Therefore, this concept may act as a mediator between the factors prompting information seeking and the motivation to seek information about weeds.

Information seeking

When people recognize a need for information, they may engage in information seeking behaviors (Griffin et al., 1999; Case, 2002). Information seeking refers to “a conscious effort to acquire information in response to a need or gap in ... knowledge” (Case, 2002, p. 5). In this study, information seeking refers to property owners’ motivation to seek out information about noxious weeds.

When looking for information, people may exert a great deal of effort or very little effort. In other words, information seeking can vary in intensity (Kahlor, 2007). McGuire (1974) dichotomized seeking into two categories of intensity: active and passive.² Active seeking is more goal-driven and purposive, while passive seeking is more of a habitual behavior. Rather than thinking of seeking as either active *or* passive, Kahlor (2007) recommends conceptualizing seeking intensity along a continuum.

Understanding what tools individuals use when actively seeking information can be useful for weed managers. Research on information seeking and processing shows individuals who are highly motivated to learn about a topic tend to process information more systematically, leading to stronger, more enduring attitudes about the topic that are predictive of behaviors (Petty et al., 2009; Eagly & Chaiken, 1993). Making sure active seekers, like property owners, have better access to information may lead to more aware, concerned citizens, who may share this information with others.

Scholars have found that individuals turn to numerous sources, including media and interpersonal channels, when actively seeking information (Gantz, Fitzmaurice, & Fink, 1991). When property owners seek information about weeds, they might look to *both* organizations and other people, a notion supported by research on information sources for weeds (Mealor et al., 2011; Daab & Flint, 2010; Steele et al., 2006). Therefore, information seeking leads to both informational tools and information sharing in the model for this study.

² See also Rubin's (2009) instrumental and ritualized dichotomy of information seeking.

Informational tools

Informational tools refer to the vehicles used to provide information about weeds to the public (see Table 1 for examples). What tools individuals prefer for learning about weeds was discussed in the opening of this literature review; the terms tools, media, and channels were used interchangeably, referring to the mode in which information is delivered (Mealor et al., 2011).

For the sake of clarity to respondents, the tools referred to in the survey for this study were called sources. However, tools differ from sources. Tucker and Napier (2002) state that “*sources* provide the content or expertise of interest to the information seeker, while *channels* refer to the methods or vehicles by which information is transferred or received” (p. 299). Sources include federal agencies, weed districts, Extension offices, and mass media, while channels (i.e., media or tools) include fact sheets, websites, workshops, and newspapers. The same source can distribute information using multiple tools.

Information sharing

Since studies indicate individuals turn to family, friends, neighbors, or other people to learn about weeds and land management (Mealor et al., 2011; Daab & Flint, 2010; Steele et al., 2006), it can be assumed individuals actively share information about this topic. Willingness, therefore, must exist in the public to spread the word about weeds. In this study, information sharing refers to the act of passing along knowledge by property owners or others, and the frequency or likelihood that people will share information about weeds can vary.

According to the research, other people are used as a source for learning about weed management, alongside agencies and public media. For example, a person might ask a neighbor or family member for help identifying a plant (Is this a weed?), how to manage a weed problem

(What herbicide would you use?), what risks exist from a weed (Has this plant made your horses sick?), or what sources to use to obtain information (Where can I learn more about weed control?). When this happens, information about weeds is shared through interpersonal channels that exist within social systems (Clarke, 1973).

Ways of sharing information

If property owners are likely to pass along information about weeds provided by an agency or organization, then encouraging them to do so would be a valuable strategy for weed managers. Several of the informational tools found in Table 1, such as e-newsletters, websites, and brochures, could be employed as ways of forwarding weed-related information through interpersonal channels. This concept, therefore, refers to the likelihood property owners will use certain tools to share information about weeds with other people.

Hypotheses and Research Questions

With its theoretical background in the RISP model (Griffin et al., 1999), the model for this study posits that three concepts influence the motivation to seek information about noxious weeds: knowledge, concern, and the perceived social pressure to be informed. These concepts, or factors, prompting information seeking are posited to be mediated by individuals' perceived need for information about the topic. If they perceive a sufficient level of knowledge about weeds, then individuals are less likely to need information about the topic. If they are concerned about noxious weeds and/or feel pressured to be informed about the topic, then they are more likely to feel a need to learn more about it. This leads to the first set of hypotheses for this study:

Hypothesis 1: Knowledge will be negatively related to need for information.

Hypothesis 2: Concern will be positively related to need for information.

Hypothesis 3: Perceived social pressure to be informed will be positively related to need for information.

Once individuals perceive a need for information, they are likely to be more motivated to seek information about the topic. This relationship, while commonsense in nature (Kahlor et al., 2006), is predicted and supported in the RISP model (Griffin et al., 1999). Therefore, based on this reasoning, it is assumed that:

Hypothesis 4: Need for information will be positively related to information seeking.

The perceived social pressure to be informed is an interesting concept, since research has shown a strong, direct relationship between this concept and information seeking (Kahlor et al., 2006; Kahlor, 2007). An alternate route to information seeking that bypasses the need for information may exist. Therefore, it is expected that:

Hypothesis 5: Perceived social pressure to be informed will be positively related to information seeking.

As suggested in this literature review, individuals turn to agencies and organizations to learn about invasive plants. They are also likely to use multiple tools when seeking information about weeds (Gantz et al., 1991), so it is predicted that:

Hypothesis 6: Information seeking will be positively related to the preference for a higher number of informational tools.

Since little research exists on how people prefer to learn about weeds, the investigation of what tools individuals prefer will be exploratory:

Research Question 1: What tools do individuals prefer when seeking information about weeds?

Studies show individuals turn to others to learn about weed control (e.g., Daab & Flint, 2010), but little is known about this exchange of information. To better understand information sharing about weeds, this study will explore:

Research Question 2: How likely are property owners to share newly acquired information about weeds with others?

Research Question 3: How does the preference for certain informational tools relate to information sharing?

Research Question 4: What are different ways that property owners are likely to share information about weeds?

The perceived social pressure to be informed was not explored in relation to information sharing in the research reviewed for this study. However, it is possible individuals who are likely to discuss a topic feel pressure to know something about it. Therefore, this study will explore:

Research Question 5: How does the likelihood of sharing information about weeds relate to the perceived social pressure to be informed about the topic?

CHAPTER 3: METHODS

To examine these hypotheses and research questions, a survey of property owners in Teton County, Wyoming, was conducted from May to mid-July of 2012 with materials and procedures approved by Colorado State University's Institutional Review Board (IRB).

Population and Sampling

The population universe included roughly 8,900 residential property owners in Teton County (L. Carroll, personal communication, February 21, 2012). The Teton County Weed & Pest District specifically wanted to survey property owners because they pay the mill levy that funds the district. However, given the prevalence of condo, townhome, and absentee second-home property owners in the county, the researcher and district decided to recruit only property owners who owned land (vacant or with improvements) and were permanent residents of Teton County. Thus, the issue of weeds would be more relevant to them because it was more likely they were personally responsible for weed control on their property.

The researcher worked with a mailing house in Teton County, FBN Mailings, which has extensive experience generating mailing lists of Teton County residents. The mailing house provided a clean list of all names and addresses based on the Teton County Assessor's Tax Roll. A systematic random sampling technique was then used to generate a sample list, with each person on the master list assigned a number (Vaske, 2008). A random number was generated; then every seventh property owner on FBN's list was selected for the sample. If the property owner had a street address of a condo or townhome, or if the mailing address was outside of Teton County, then the name was skipped and the selection of every seventh name continued. Using this technique, 1,200 property owners were selected for this study.

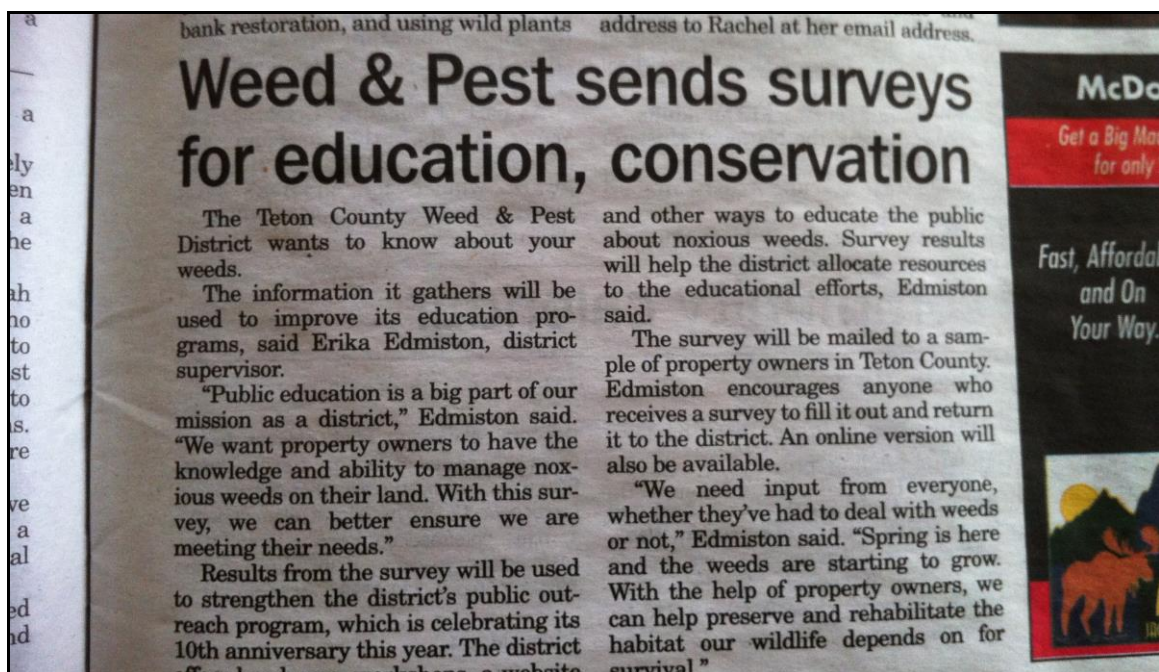
Data Collection

A four-page survey was used to collect information (Appendix A). It was printed on an 11- by 17-inch sheet of paper folded in half. The survey was developed with the assistance of staff at the Teton County Weed & Pest District and designed to take no longer than 10-12 minutes to complete.

Along with the hard-copy version, the survey was made available online via the Survey Monkey website. The online version contained the same questions as the hard copy, with only a slight modification to questions with semantic differential scales (Survey Monkey did not allow for semantic differential scales at the time of this study). The online version took no longer than 10-12 minutes to complete.

Data collection was modeled after Dillman's Tailored Design Method (2000). Given budget constraints, three contacts with respondents were planned at the outset of the study instead of the recommended four. Rather, to let property owners know about the coming survey, the researcher wrote a news release announcing the study, which was distributed to local media and other district contacts in Teton County. The release appeared in the *Jackson Hole Daily* newspaper on May 3, 2012 (Figure 4).

The first contact consisted of a mailing to respondents sent via first class mail the week of May 7, 2012, with a personalized cover letter, the survey, and a self-addressed, stamped envelope. The outside mailing envelope showed a return address from the Teton County Weed & Pest District and included this phrase printed on it to encourage respondents to open it: "Keep Jackson Hole beautiful. We need your input!" The cover letter was signed by the district supervisor and requested property owners' participation in the study. The letter explained the



(Photo courtesy Amy Collett, Education Supervisor, Teton County Weed & Pest District)

This photo shows the news release as it appeared in the May 3, 2012, issue of the *Jackson Hole Daily*. The survey for this study was mailed the following week.

Figure 4. Photo of News Release

study's significance and usefulness, the partnership with Colorado State University, the option to complete the survey online, and confidentiality.

The second contact consisted of a postcard asking respondents to complete the survey and thanking those who had already done so. The postcard contained the web address to prompt respondents to complete it online. It was 5.5- by 8.5-inches in size and sent via bulk mail the week of May 21, 2012 (see Appendix B for copies of the letter and postcard).

About two weeks after the postcard was mailed, the researcher counted returned surveys. Prior to implementing the survey, the researcher and district decided that if 300 or more usable surveys were returned, then the third contact would not be mailed given budget constraints. The count exceeded 300 usable surveys at that time, so the third contact was not sent.

By early August, a total of 414 usable surveys were returned, along with 15 blank or unusable surveys and 46 undeliverable surveys. This resulted in a 35.88% response rate of usable surveys, which met the expectations of the researcher and was consistent with the response rate for Teton County's 2006 Citizen Survey and response rates from comparable studies devoted to weed management (Table 2).

Tracking Responses

Administration of the survey was conducted with the assistance of FBN Mailings. While the researcher generated the list of names for the sample, the mailing house assigned the control

Table 2. Studies and Response Rates with Similar Populations and Topics

Study	Population	Sent/Received/ Undeliverable	Response Rate
Teton County Mosquito Abatement (2010)	Teton County property owners	Sent: 8,485 Received: 1,549 Undeliverable: N/A	~18.3%*
Teton County Citizen Survey (2006)	Teton County residents	Sent: 1,200 Received: 303 Undeliverable: 126	28%
Mealor et al. (2011)	Wyoming residents owning 1.7-40 ac of land (1/6 of sample were Teton County residents)	Sent: 4,800 Received: N/A Undeliverable: N/A	42.8%
Daab & Flint (2010)	North-central Colorado residents about weeds	Sent: 4,027 Received: 1,346 Undeliverable: 569	39%
Steele et al. (2006)	West Virginia woodland owners about weeds	Sent: 1,500 Received: N/A Undeliverable: N/A	44%

* This response rate is an estimate, since the number of undeliverable surveys is unknown. Also, this survey was conducted using only one mailing. All other studies involved three mailings.

number to each participant. The researcher, thus, did not have access to the mailing list once the control numbers were assigned. The number was printed on each survey. It was also printed on the cover letters and reminder/thank you postcard, since respondents were asked to enter the control number if they chose to take the survey online. A list of control numbers from returned and undeliverable surveys was not generated after the postcard was sent, as planned, because a third contact was unnecessary.

Instrumentation and Operationalizations

Background information. The survey began by asking respondents about their property. They were given four options: *Condo or townhome, Single family home, Ranch, Vacant land only*, and *Other*. Respondents also were asked how long they had owned the property (in years), how many acres they own (if any), and how frequently they attempt to control weeds on their property: *Never, Once a year, Twice a year, 3 or more times a year, or Not applicable*.

Measures: Independent Variables

Knowledge. To measure respondents' perceived knowledge of weeds, a 4-item, 7-point semantic differential scale was developed by the researcher for this study. Respondents were asked to indicate their responses to four antonyms for Your Overall Knowledge About Weeds: *Know Nothing/Know a lot, Not Informed/Informed, Novice/Expert, and Not Educated/Educated*. For perceived knowledge (and other measures in this study), a mean index score was computed using the scores of the four items (see CHAPTER 4: RESULTS).

In addition, respondents were asked about their familiarity with species commonly found in Teton County and targeted by the district using a 7-point Likert-type scale (1 = Never Heard

Of, 7 = Very Familiar). The five species included Canada thistle, houndstongue, spotted knapweed, leafy spurge, and dyer's woad. Respondents were also given the option to list other species they had heard of.

Concern. Respondents' concern about weeds was measured using a 4-item, 7-point semantic differential scale designed by the researcher. They were asked to rate their responses to four antonyms for concern, or Weeds on Your Property Are: *Not a Problem/A Problem, Not Harmful/Harmful, Low Risk/High Risk, and Not Damaging/Damaging.*

Separately, to gauge what impacts of weeds may be concerning to property owners, respondents were asked to indicate their agreement with seven statements using a 7-point Likert-type scale (1 = Strongly Disagree, 7 = Strongly Agree). The statements, based off specific concerns about weeds derived from prior studies (Daab & Flint, 2010; Steele et al., 2006), suggestions from district staff, and the researcher's own experiences working with property owners, included: *I believe weeds ... Encroach on desirable plants, Discourage wildlife from visiting, Reduce the resale value of my land, Threaten my health or my family's health (rash, allergies, etc.), Are harmful to horses or other animals, Are too expensive to control, and Could result in a fine if not controlled.*

Perceived social pressure to be informed. To determine whether respondents felt any pressure from others to be informed about weeds, they were asked to rate their agreement with three statements using a 7-point Likert-type scale (1 = Strongly Disagree, 7 = Strongly Agree). The statements, adapted from the single-item measure used by Kahlor et al. (2006) to gauge informational subjective norms, included: *Others expect me to learn about the impact of weeds, People I know care if I'm aware of weeds on my property, and I owe it to others to be informed about weeds.*

Measures: Moderating Variable

Need for information. To gauge whether they perceived a need for information about weeds, respondents were asked to rate their agreement with three statements using a 7-point Likert-type scale (1 = Strongly Disagree, 7 = Strongly Agree). The statements included: *I need more information to control weeds on my property*, *I would need more information to be able to manage weeds*, and *I am confident in my ability to control weeds on my property based on the information I have* (reversed item).

Also, to better understand what types of information property owners might need, respondents were asked to indicate their agreement with seven statements using a 7-point Likert-type scale (1 = Don't Need Any Info, 7 = Need a lot of Info). The statements, based upon suggestions from district staff and the researcher's own experiences working with property owners, included: *What herbicides to use*, *Other control options to try*, *Use of weed control equipment*, *Weed identification*, *Impacts to human health*, *Impacts to animal health*, and *Impacts to the environment*.

Measures: Dependent Variables

Information seeking. To determine whether respondents were motivated to seek out information about noxious weeds, they were asked to rate their agreement with three statements using a 7-point Likert-type scale (1 = Strongly Disagree, 7 = Strongly Agree). The statements, adapted from measures used by Kahlor et al. (2006) to gauge the same concept, included: *If I need information about weeds, I'm likely to seek it*; *I try to learn about problems that may negatively impact my property*; and *Learning more about controlling weeds is a waste of time* (reversed item).

Informational tools. To determine which tools they prefer for learning about weeds, respondents were asked about their likelihood of using specific tools offered by the district and other weed management organizations (see Table 1). They responded using a 7-point Likert-type scale (1 = Very Unlikely, 7 = Very Likely). The informational tools listed were: *Brochure/pamphlet, Workshop, Weed/wildflower identification hike, Group presentation by district, Booth at local event (e.g., county fair), One-on-one consultation, District website, Online field guide, District social media sites (Facebook), E-newsletter, Newspaper ads, Newspaper stories, Radio, Talk to a landscaper, and Ask someone at the hardware store.*

The district also wanted to know how property owners had actually learned about weeds in the past, so respondents were asked to check all of the following informational tools and sources that applied: *Newspaper ads, Radio interviews, Booth at local events, One-on-one consultation, Signs at trailheads, District website, Workshop on weeds, Group presentation, Weed/wildflower identification hike, From kids after a school lesson, and Landscaper or hardware store.* There was also an *Other* option where respondents could write in previously used tools for learning about weeds.

Information sharing. To gauge their likelihood of sharing information about weeds, respondents were asked to rate their agreement with three statements using a 7-point Likert-type scale (1 = Strongly Disagree, 7 = Strongly Agree). The statements included: *I am likely to talk about weed control with family, friends, or neighbors, I am likely to talk to others about weeds if they ask me, and I am likely to share with others what I have learned about weeds.*

Ways of sharing information. To gauge how they might share information with others, respondents were asked to indicate their likelihood of engaging in six activities using a 7-point Likert-type scale (1 = Very Unlikely, 7 = Very Likely). The activities included: *Forward an e-*

newsletter from us, Recommend the district website, Connect with us on social media, Recommend a consultation, Share an educational brochure, and Forward an e-mail or text message.

Demographics

Along with background information on their property, respondents were asked to provide personal demographics, including factors identified as possible confounds in prior studies (Daab & Flint, 2010; Meador et al., 2011). Respondents were asked if they work in an industry involving weeds. They could check either: *Agriculture/ranching, Landscaping, Forestry, Plant nursery, Other industry involving weeds (please list), or I do not work in an industry involving weeds*. They were also asked their age in years, their sex, and whether or not they belonged to environmental or conservation organizations. Then, respondents were asked their highest level of education completed. They could check: *High school, Some college, Bachelor's degree, and Graduate degree*.

At the request of the district, an open-ended question concluded the survey: *Tell us! Do you have any suggestions for us? Is there any information about noxious weeds you need to know or sources you might use not covered in this survey?*

Statistical Analysis

The researcher was responsible for collecting surveys returned to the Teton County Weed & Pest District and Survey Monkey website. Data was then compiled, edited, and analyzed using the SPSS software. Scale measures that were reversed in the survey were recoded so all scales ran consistently negative (1) to positive (7). Upon completion of data entry and verification of

accuracy, the completed surveys were placed in secured storage by the Department of Journalism and Technical Communication and will be retained for three years in compliance with IRB and federal regulations.

Data were analyzed by first running frequencies and descriptive statistics showing means and standard deviations. Indices were created for scale measures of concepts by combining the scores and computing a mean for each index, after a Cronbach's α was computed for each index to ensure reliability. Hypotheses were tested and research questions were explored primarily using Pearson's r correlations. Analysis of variance (ANOVA) tests were run to investigate the effects of certain demographic variables on key concepts in the study. In addition, factor analysis was used to explore how property owners might categorize and assess certain variables, primarily impacts of weeds on their property and preferred informational tools.

In keeping with social science standards, findings were deemed significant if there was less than a 1 in 20 probability that the findings were the result of chance. In other words, findings were considered statistically significant if the resulting p value was equal to or less than .05.

CHAPTER 4: RESULTS

Profile of Participants

A total of 414 property owners participated in the study. Having controlled for type of property owned during sampling, 90.6% of respondents owned a single-family home, and only 5.1% owned just a condo or townhome. Respondents reported owning their property for an average of 22 years, but length of ownership varied widely, with a standard deviation of 13.16 years. Although respondents owned an average of 5.5 acres, this number was skewed by a few large properties; 51.6% of respondents owned 1 acre or less.

The property owners in this study tended to be older, with a mean age of 58. Sex was fairly even: 195 respondents were female (48.5%) and 207 were male (51.5%). Most respondents had attended college, with 79 of them having some college (19.2%), 160 a bachelor's degree (38.8%) and 142 a graduate degree (34.5%). Eighty-three percent of respondents reported not working in an industry involving weeds, and 40.1% belonged to an environmental organization. Regarding prior behavior involving weed eradication, property owners in this study reported frequently controlling weeds on their property – once a year (23.7%), twice a year (22.2%), or 3 or more times a year (46.6%). See Appendix C for tables of demographics.

Independent Variables

Knowledge

Respondents were asked about their perceived, or felt, knowledge of weeds using a 4-item, 7-point scale (Table 3). The items consisted of four pairs of antonyms: *Know Nothing/ Know a lot*, *Not Informed/Informed*, *Novice/Expert*, and *Not Educated/Educated*. When tested, the scale demonstrated a high reliability (Cronbach's $\alpha = .96$), and the items were combined into

Table 3. Knowledge of Noxious Weeds in General

	<i>n</i>	Mean*	S.D.
Know Nothing / Know a lot	377	4.05	1.47
Not Informed / Informed	374	4.21	1.56
Novice / Expert	374	3.65	1.46
Not Educated / Educated	363	3.96	1.61
Index (4 items; Cronbach's $\alpha = .96$)	356	3.96	1.42

* Means are on semantic differential scales from 1 (negative) to 7 (positive).

a Knowledge Index. Based on this index, respondents reported a moderate level of knowledge about noxious weeds ($M = 3.96$, $S.D. = 1.42$).

Next, the effects of two demographic variables – “acres owned” and “frequency of controlling weeds” – on general knowledge of weeds were considered. Respondents were separated into those who owned 1 acre or less of land and those who owned more than 1 acre, and a new “acres owned” variable was created. Respondents were also separated into those who controlled their weeds less than 3 times a year and those who controlled weeds 3 or more times a year, and a new “frequency of controlling weeds” variable was created. The analysis was limited to the 280 respondents who answered both demographic questions and was based on the 4-item Knowledge Index. Details of the analysis of variance are reported in Table 4.

Overall, property owners in this analysis were fairly knowledgeable about weeds ($M = 4.07$). The data suggest owning more than 1 acre did not have an effect on knowledge about weeds (more than 1 acre: $M = 4.16$; 1 acre or less: $M = 3.99$, $F_{(1,276)} = 1.83$, $p = .18$), but those property owners who controlled their weeds 3 or more times a year were significantly more knowledgeable about weeds (3 or more times a year: $M = 4.45$; less than 3 times a year: $M =$

Table 4. Effects of Acres Owned and Frequency of Controlling Weeds on General Knowledge of Noxious Weeds

a) Means and Standard Deviations*

	General Knowledge of Noxious Weeds		
	3 or more times a year ($n = 130$)	less than 3 times a year ($n = 150$)	All ($n = 280$)
More than 1 acre ($n = 127$)	4.65 (1.00)	3.79 (1.29)	4.16 (1.24)
1 acre or less ($n = 153$)	4.29 (1.42)	3.71 (1.52)	3.99 (1.50)
	4.45 (1.26)	3.74 (1.41)	4.07 (1.39)

* Means for knowledge are on semantic differential scales from 1 (low) to 7 (high).

b) Analysis of Variance (Between-Subjects Effects)

	F Table					
	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.	Eta ²
<i>Main Effects</i>						
Acres Owned	3.30	3	3.30	1.83	.18	.01
Frequency of Control	35.76	3	35.76	19.80	.001	.07
Error	498.43	276	1.81			

3.74, $F_{(1,276)} = 19.80$, $p \leq .001$). This explained 7% of the variance of frequency of controlling weeds on knowledge (partial Eta² = .07).

Respondents were then asked to rate their familiarity with specific, or targeted, weed species commonly found in Teton County using a 7-point scale (1 = Never Heard Of, 7 = Very Familiar). As shown in Table 5, Canada thistle was the most widely known noxious weed ($M = 5.72$) followed by spotted knapweed ($M = 3.95$), houndstongue ($M = 3.81$), leafy spurge ($M =$

Table 5. Familiarity with Targeted Species of Weeds

Species	<i>n</i>	Mean*	S.D.
Canada thistle	413	5.72	1.59
Spotted knapweed	413	3.95	2.04
Houndstongue	409	3.81	2.18
Leafy spurge	410	3.33	1.88
Dyer's woad	406	2.51	1.70

* Means are on a scale from 1 (Never Heard Of) to 7 (Very Familiar).

** 98% of respondents were familiar with at least 1 weed.

*** Mean score for total weeds known was 4.4 (min. = 0, max. = 11) based on the number of weeds with a score of 2 or higher and the number of written-in weed species.

3.33), and dyer's woad ($M = 2.51$). Respondents were familiar (score of 2 or higher) with 4 weeds on average, and 98% of them were familiar with at least one weed.

Concern

To gauge concern about noxious weeds, respondents were asked to respond to a 4-item, 7-point scale (Table 6). The items consisted of four pairs of antonyms: *Not a Problem/A Problem*, *Not Harmful/Harmful*, *Low Risk/High Risk*, and *Not Damaging/Damaging*. When tested, the scale demonstrated a high reliability (Cronbach's $\alpha = .94$) and the items were combined into a Concern Index. Based on this index, respondents reported a moderate level of concern about noxious weeds ($M = 4.06$, $S.D. = 1.76$).

Respondents were then asked to rate their concern about seven impacts of weeds using a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree) (Table 7). Respondents were most concerned with weeds encroaching on desirable plants ($M = 6.22$, $S.D. = 1.2$) and least concerned with expenses from weed control ($M = 3.27$, $S.D. = 1.74$).

Table 6. Concern about Noxious Weeds

	<i>n</i>	Mean*	S.D.
Not a Problem / A Problem	399	4.48	1.96
Not Harmful / Harmful	382	4.13	1.91
Low Risk / High Risk	377	3.98	1.95
Not Damaging / Damaging	375	3.74	1.85
Index (4 items; Cronbach's $\alpha = .94$)	369	4.06	1.76

* Means are on semantic differential scales from 1 (negative) to 7 (positive).

Table 7. Concern about Impacts to Property Owners

Impacts	<i>n</i>	Mean*	S.D.	Factor Analysis	
				I	II
				Direct Personal Impacts	Indirect Monetary Impacts
Encroach on desirable plants.	410	6.22	1.20	.651	
Reduce the resale value of my land.	394	4.96	1.54	.720	
Are harmful to horses or other animals.	386	4.94	1.55	.749	
Discourage wildlife from visiting.	381	4.50	1.54	.705	
Could result in a fine if not controlled.	363	4.15	1.79		-.491
Threaten my health or my family's health (rash, allergies, etc.).	393	4.08	1.60	.788	
Are too expensive to control.	397	3.27	1.74		.921

* Means are on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree).

When the seven impacts were factor analyzed (principal components extracted with varimax rotation), two distinct groups emerged as shown on the right side of Table 7. Together, these factors explained 57% of the variance. The first factor was identified as “direct personal

impacts” and included *impacts to plants, land value, horses, wildlife, and human health* (Eigenvalue = 2.91, accounting for 41.5% of the variance). The second factor was identified as “indirect monetary impacts” and included impacts from *expenses* and *finances* (Eigenvalue = 1.08, accounting for 15.5% of the variance). This data suggest property owners consider impacts to what they feel a sense of ownership over, such as their land, differently than impacts that might be imposed on them, such as fines.

Perceived social pressure to be informed

To assess how social considerations impacted their sense of the importance of weed-related information, respondents were asked to rate their agreement with three statements using a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). As shown in Table 8, these statements could be reliably combined into a Social Pressure Index (Cronbach’s $\alpha = .76$). Based on this index, respondents reported a moderate level of pressure from others to be informed about weeds (M = 4.09, S.D. = 1.45).

Table 8. Perceived Social Pressure to be Informed about Noxious Weeds

	<i>n</i>	Mean*	S.D.
Others expect me to learn about the impact of weeds.	381	3.47	1.73
People I know care if I’m aware of weeds on my property.	392	4.12	1.83
I owe it to others to be informed about weeds.	395	4.80	1.73
Index (3 items; Cronbach’s $\alpha = .76$)	373	4.09	1.45

* Means are on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree).

Moderating Variable

Need for information

To assess the need for information about weeds among property owners, respondents were asked to rate their agreement with three statements using a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). These statements could be reliably combined into a Need for Information Index (Cronbach's $\alpha = .76$). As shown in Table 9, based on this index, respondents reported a moderate level of information need ($M = 4.06$, $S.D. = 1.36$).

Respondents were then asked about what specific information they need about noxious weeds. They responded to seven types of information using a 7-point scale (1 = Don't Need Any Info, 7 = Need a lot of Info). As shown in Table 10, respondents indicated a need for information about control options other than herbicides ($M = 5.34$, $S.D. = 1.7$) and weed identification ($M = 5.19$, $S.D. = 1.73$).

Given this finding, the seven types of information were tested for reliability with strong results (Cronbach's $\alpha = .91$). The types were combined into a Specific Information Index. Based

Table 9. Need for Information about Noxious Weeds

	<i>n</i>	Mean*	S.D.
I need more information to control weeds on my property.	402	4.43	1.70
I would need more information to be able to manage weeds.	405	4.34	1.67
I am confident in my ability to control weeds on my property based on the information I have. (reversed)	405	3.40	1.66
Index (3 items; Cronbach's $\alpha = .76$)	396	4.06	1.36

* Means are on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree).

Table 10. Specific Information Needed by Property Owners

Type of Information	<i>n</i>	Mean*	S.D.
Other control options to try	396	5.34	1.70
Weed identification	399	5.19	1.73
What herbicides to use	397	5.08	1.79
Impacts to the environment	394	5.06	1.74
Impacts to human health	392	4.99	1.67
Impacts to animal health	391	4.96	1.73
Use of weed control equipment	385	4.44	1.94
Index (7 items; Cronbach's $\alpha = .91$)	370	4.97	1.43

* Means are on a scale from 1 (Don't Need Any Info) to 7 (Need a lot of Info).

on this index, respondents reported a higher level of information need ($M = 4.97$, $S.D. = 1.43$) compared to the general index ($M = 4.06$, $S.D. = 1.36$).

Dependent Variables

Information seeking

To gauge property owners' motivation to seek information about noxious weeds when needed, respondents were asked to rate their agreement with three statements using a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree) (Table 11). When tested for reliability, the three statements failed to produce a significant Cronbach's α , so an index for information seeking was not created as planned. Instead, individual items from the planned index were used to test hypotheses. These items demonstrated a strong motivation in respondents to seek weed-related information when needed.

Table 11. Information Seeking about Noxious Weeds

	<i>n</i>	Mean*	S.D.
If I need information about weeds, I'm likely to seek it.	405	5.60	1.42
I try to learn about problems that may negatively impact my property.	404	5.68	1.32
Learning more about controlling weeds is a waste of time. (reversed)	409	6.01	1.41

* Means are on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree).

Informational tools

To determine which tools respondents prefer for learning about weeds, they were asked about their likelihood of using specific tools on a 7-point scale (1 = Very Unlikely, 7 = Very Likely). As shown in Table 12, respondents showed a strong preference for a brochure/pamphlet ($M = 5.83$), online field guide ($M = 5.11$), and the district website ($M = 5.09$). They expressed little interest in using the radio ($M = 3.10$) or social media sites like Facebook ($M = 2.46$).

When the 15 tools were factor analyzed (principal components extracted with varimax rotation), five distinct groups emerged as shown on the right side of Table 12. Together, these factors explained 68% of the variance. The first factor was identified as “district in-person tools” and included a *consultation*, *booth*, *group presentation*, *hike*, and *workshop* (Eigenvalue = 3.99, accounting for 26.6% of the variance). The second factor was identified as “public media” and included *newspaper stories*, *newspaper ads*, and *radio* (Eigenvalue = 2.00, accounting for 13.4% of the variance). The third factor was identified as “online media” and included an *online field guide*, *website*, and *e-newsletter* (Eigenvalue = 1.67, accounting for 11.1% of the variance). The fourth factor was identified as “other in-person tools” and included consulting a *landscaper* and

Table 12. Property Owners' Likelihood of Using Informational Tools

Tools	<i>n</i>	Mean*	S.D.	Factor Analysis				
				I	II	III	IV	V
				District In- Person Tools	Public Media	Online Media	Other In- Person Tools	Social Media
Brochure/pamphlet	408	5.83	1.46					
Online field guide	398	5.11	1.89			.892		
District website	396	5.09	1.81			.897		
Newspaper stories	393	4.79	1.81		.853			
One-on-one consultation	397	4.66	2.00	.471				
Booth at local event (e.g., county fair)	395	4.44	1.81	.450				
Newspaper ads	397	4.32	1.85		.884			
E-newsletter	391	4.15	2.05			.668		
Talk to a landscaper	396	4.13	2.01				.835	
Group presentation by district	387	3.78	1.79	.856				
Weed/wildflower identification hike	394	3.73	1.86	.795				
Workshop	394	3.54	1.77	.859				
Ask someone at the hardware store	397	3.40	1.90				.739	
Radio	390	3.10	1.83		.630			
District social media sites (Facebook)	385	2.46	1.78					.723

* Means are on a scale from 1 (Very Unlikely) to 7 (Very Likely).

someone at the *hardware store* (Eigenvalue = 1.38, accounting for 9.2% of the variance). The fifth factor was identified as “social media” and included only the district’s social networking site, Facebook (Eigenvalue = 1.08, accounting for 7.2% of the variance).

Further support was found for these factors when reliability tests were conducted on the groupings of tools. A consultation, booth, group presentation, hike, and workshop could be reliably combined into a District In-Person Tools Index (Cronbach’s $\alpha = .77$). Newspaper stories, newspaper ads, and radio could be reliably combined into a Public Media Index (Cronbach’s $\alpha = .77$), and an online field guide, website, and e-newsletter could be reliably combined into an Online Tools Index (Cronbach’s $\alpha = .79$).

This data suggest property owners think about informational tools in clusters that were similar to the categories found in Hallahan’s (2010) public relations media model, except online publishing tools and social media grouped separately. These results suggest property owners think about websites and online field guides as being different from Facebook in the context of informational tools about noxious weeds. District in-person tools grouped both one-on-one interactions and events. The common thread among these tools is that information is provided through face-to-face interactions between a district representative and property owner, whether it’s a one-on-one meeting on a person’s land or a conversation during an event.

Next, respondents were asked where they had learned about noxious weeds in the past (Table 13). Thirty-six percent of them reported having seen the signs at trailheads, but very few of them had heard a radio interview with district staff about weed control (3.6%). Respondents were given the option of writing in a previously used tool with an open-ended “other” response. The responses to this option were categorized, tallied, and included at the bottom of Table 13, with a brochure/pamphlet being the most reported tool with 31 responses (7.5%).

Table 13. Informational Tools Previously Used to Learn About Weeds

Informational Tools (<i>n</i> = 414)	Count	Percent
Signs at trailheads	149	36.0
Newspaper ads	144	34.8
Landscaper or hardware store	144	34.8
One-on-one consultation	141	34.1
Booth at local events	114	27.5
District website	46	11.1
Weed/wildflower identification hike	42	10.1
Workshop on weeds	34	8.2
Group presentation	26	6.3
From kids after a school lesson	18	4.3
Radio interviews	15	3.6
Brochure/pamphlet*	31	7.5
Family, friends, or neighbors*	24	5.8
Call or visit to district office*	24	5.8
Book/guidebook*	20	4.8

* Write-in responses. Others included personal experience (self-education) with 13 (3.1%), work or education with 12 (2.9%), other organizations with 12 (2.9%), mailing with 7 (1.7%), and online search with 6 (1.4%).

Information sharing

To gauge property owners' willingness to spread the word about weeds through social networks, respondents were asked to rate their agreement with three statements using a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). As shown in Table 14, these statements could be reliably combined into an Information Sharing Index (Cronbach's $\alpha = .88$). Based on this index, respondents showed a strong willingness to talk with family, friends, or neighbors about weeds ($M = 5.42$, $S.D. = 1.29$).

Table 14. Information Sharing about Noxious Weeds

	<i>n</i>	Mean*	S.D.
I am likely to talk about weed control with family, friends, or neighbors.	406	5.22	1.56
I am likely to talk to others about weeds if they ask me.	408	5.50	1.38
I am likely to share with others what I have learned about weeds.	404	5.53	1.35
Index (3 items; Cronbach's $\alpha = .88$)	401	5.42	1.29

* Means are on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree).

Ways of sharing information

To investigate what tools property owners are willing to use to share information about weeds, respondents were asked to indicate their likelihood of engaging in six activities using a 7-point scale (1 = Very Unlikely, 7 = Very Likely). The preferred ways for *sharing* information, summarized in Table 15, mirrored the tools preferred by respondents for *seeking* information about weeds (Table 12). The top tools for sharing information included an educational brochure ($M = 5.29$) and the district website ($M = 4.55$), with little preference shown for using social media ($M = 2.38$).

Given the strong willingness to share information about weeds found in this study, the six activities for sharing information were tested for reliability (Cronbach's $\alpha = .77$) and combined into a Sharing Tools Index. This index demonstrated only a moderate willingness to share information about weeds ($M = 3.98$, $S.D. = 1.27$). Notably, social media and forwarding an e-newsletter were rated appreciably below more traditional or familiar tools.

Table 15. Property Owners' Likelihood of Engaging in Activities to Share Information about Noxious Weeds

Ways of Sharing Information	<i>n</i>	Mean*	S.D.
Share an educational brochure	404	5.29	1.6
Recommend the district website	395	4.55	1.85
Forward an e-mail or text message	394	4.06	2.05
Recommend a consultation	391	4.04	1.87
Forward an e-newsletter from us	398	3.70	2.05
Connect with us on social media	390	2.38	1.70
Index (6 items; Cronbach's $\alpha = .77$)	373	3.98	1.27

* Means are on a scale from 1 (Very Unlikely) to 7 (Very Likely).

Open-Ended Question

At the request of the district, an open-ended question concluded the survey giving property owners the opportunity to offer feedback. Ninety-five respondents provided a written response. These responses were transcribed, and common themes were identified among the responses. The themes included comments about the district's staff, seasonal crew, informational tools, neighbors, herbicide, spray equipment, weed identification, partnerships, questions to the district, and the survey itself. Responses were placed into one or more categories based on their main theme(s). The responses were provided to the district, but not published to protect the confidentiality of respondents as several comments included incriminating information.

Comparison of Demographic Variables on Key Concepts

To explore the effects of demographic variables on important concepts in this study, one-way analysis of variance tests were run for five demographic variables (acres owned, frequency of controlling weeds, work in weed-related industry, member of conservation organization, and

sex) on five key concepts (knowledge, concern, social pressure to be informed, information seeking [single-item measure], and information sharing). Prior to the tests, all demographic variables were dichotomous except for classifying the industry in which the respondent worked. The five industry categories used in the survey (agriculture/ranching, landscaping, forestry, plant nursery, and other industry involving weeds) were recoded into a new variable as to whether the respondent did or did not work in an industry that dealt with noxious weeds in some way.

The data, summarized in Table 16, suggest that all demographic variables except sex have at least some influence on the concepts in this study. As already indicated in Table 4, owning a larger plot of land (more than 1 acre) has no impact on property owners' knowledge of weeds, but frequency of weed control does. Those who control their weeds 3 or more times a year perceive a greater level of knowledge (3 or more times a year: $M = 4.30$; less than 3 times a year: $M = 3.70$, $p \leq .001$). This further analysis also indicated property owners who work in a weed-related industry or belong to conservation organizations have a higher perceived knowledge of weeds, which makes sense given these affiliations.

As for other concepts, the data suggest that owning more land and controlling weeds more frequently result in a greater concern about weeds. These property owners may be more concerned about plant invasions because they have land that is more susceptible to weeds – and likely worth more money – and they may be dealing with weed problems already, giving them firsthand exposure to the negative impacts of weeds.

The data also suggest that working in a weed-related industry or belonging to environmental groups result in property owners feeling a greater pressure to know about weeds, as well as a greater likelihood of sharing information about them. This makes sense because these property owners are more likely to associate with individuals who are knowledgeable about

Table 16. Effects of Demographic Variables on Important Concepts*Mean Scores Comparison Between Groups Based on One-Way Analysis of Variance*

Index	Acres Owned	Frequency of Controlling Weeds	Work in Weed-Related Industry	Member of Conservation Organization	Sex
	≤ 1 acre > 1 acre Total	< 3 times/yr. ≥ 3 times/yr. Total	No Yes Total	Non-Member Member Total	Female Male Total
Knowledge	3.98	3.70***	3.81***	3.70***	3.97
	4.12	4.30***	4.63***	4.31***	3.97
	4.05	3.98***	3.95***	3.95***	3.97
Concern	3.78***	3.87*	3.99	4.07	4.05
	4.81***	4.33*	4.23	4.05	4.09
	4.27***	4.09*	4.03	4.06	4.07
Social pressure to be informed	3.97*	4.00	3.90***	3.87***	4.11
	4.35*	4.20	4.87***	4.42***	4.09
	4.14*	4.10	4.06***	4.08***	4.10
Information seeking	5.57	5.45*	5.59	5.50	5.68
	5.68	5.75*	5.69	5.73	5.53
	5.62	5.59*	5.60	5.59	5.60
Information sharing	5.20**	5.35	5.34**	5.25**	5.39
	5.61**	5.51	5.88**	5.66**	5.43
	5.40**	5.43	5.43**	5.42**	5.41

* Significant at $p \leq .05$
** Significant at $p \leq .01$
*** Significant at $p \leq .001$

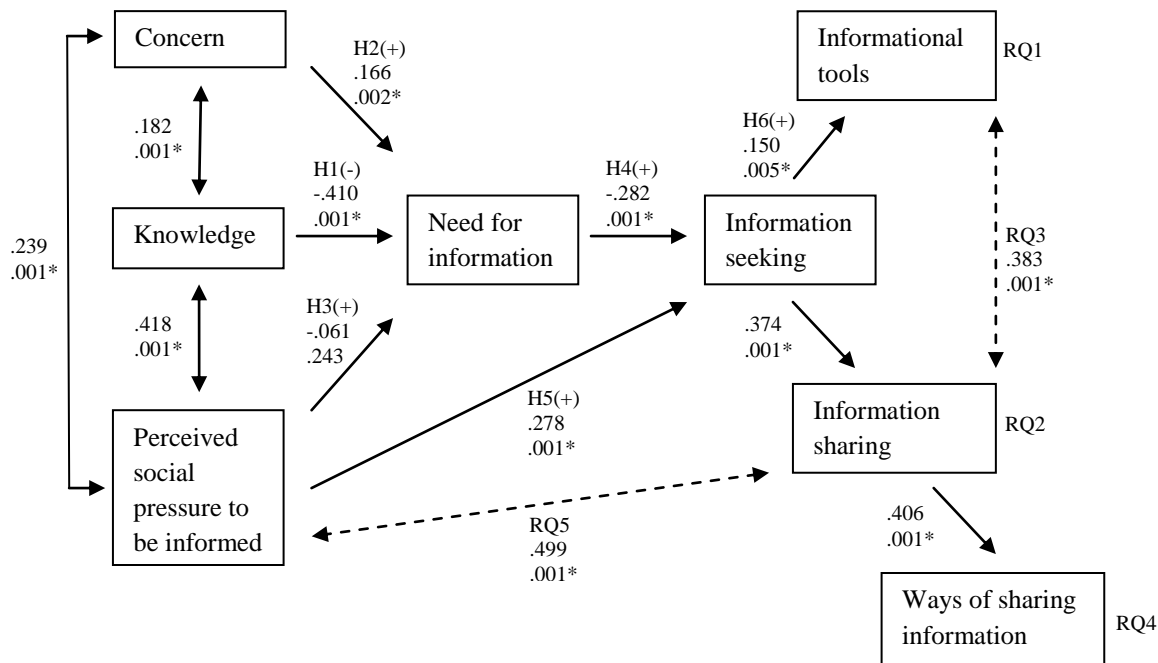
natural resource issues if they belong to environmental groups. They may also feel pressure to know about weeds and more willing to field questions about them given their career, especially if they work in an industry such as landscaping, agricultural, forestry, or horticulture.

Hypotheses Tests and Research Questions

Correlations were run for concepts in this study's model. Results are summarized in Figure 5. Relationships were explored for both hypotheses and research questions.

Hypothesis 1

Hypothesis 1 predicted that knowledge would be inversely related to need for information and was supported. A significant, negative relationship was found between the 4- item Knowledge Index and the 3-item Need for Information Index ($r = -.410, p \leq .001$). As predicted, property owners with a higher perceived knowledge of noxious weeds indicated a lower need for information about the topic.



* p value is significant

Figure 5. Correlations and p Values for Model

Hypothesis 2

Hypothesis 2 predicted that concern would be positively related to need for information and was supported. A significant, positive relationship was found between the 4-item Concern Index and the Need for Information Index ($r = .166, p = .002$). Property owners with a higher level of concern about weeds indeed reported a greater need for information.

Hypothesis 3

Hypothesis 3 predicted perceived social pressure to be informed would be positively related to need for information, but it was not supported. Instead, a non-significant, negative relationship was found between the 3-item Social Pressure Index and the Need for Information Index ($r = -.061, p = .243$). This is not a big surprise, given prior research has found a significant, direct relationship exists between the perceived social pressure to be informed and information seeking, as opposed to a relationship moderated by an information need (Kahlor et al., 2006; Kahlor & Rosenthal, 2009).

It is also possible property owners who felt compelled to know about weeds for social reasons had already sought out information, so they did not perceive a need to learn more. A strong, significant, positive relationship was found between the Knowledge Index and the Social Pressure Index ($r = .418, p \leq .001$), supporting this reasoning.

Hypothesis 4

Hypothesis 4 predicted that the need for information would be positively related to information seeking, but it was not supported. Since an index for information seeking was found to be unreliable, the Need for Information Index was compared to the single-item measure “If I

need information about weeds, I'm likely to seek it," since it directly captures the motivation to seek information. The relationship was significant, but in the opposite direction ($r = -.282, p \leq .001$). This may be the result of the way need for information was conceptualized and measured in this study. Prior studies using the RISP model (Kahlor et al., 2006; Kahlor, 2007) measured a perceived information need by calculating the gap between current knowledge and knowledge needed, while this study measured the information need using a 3-item index.

Hypothesis 5

Hypothesis 5 predicted perceived social pressure to be informed would be positively related to information seeking and was supported. A significant, positive relationship was found between the 3-item Social Pressure Index and the single-item measure for information seeking ($r = .278, p \leq .001$). This finding is consistent with other studies that explore those concepts using the RISP model (Kahlor et al., 2006; Kahlor, 2007), and confirms this more direct relationship.

Hypothesis 6

Hypothesis 6 predicted information seeking would be positively related to the preference for a higher number of informational tools. To be able to investigate this, the tools in Table 12 had to be recoded into a new variable that captured the number of tools each respondent was likely to use. To do this, tools scored as 5, 6, or 7 (Likely or Very Likely to be used) by a respondent were coded as 1. Then, all tools with a score of 1 were added for each person. As shown in Table 17, respondents ended up with a score ranging from 0 (likely to use no tools) to 15 (likely to use all 15 tools). The data reveal only 8 property owners would not use any of the

Table 17. Number of Informational Tools Likely to Be Used by Property Owners

Number of Tools Likely to Be Used* (<i>n</i> = 357)	Count	Percent
0	8	1.9
1	5	1.2
2	12	2.9
3	17	4.1
4	23	5.6
5	36	8.7
6	39	9.4
7	55	13.3
8	37	8.9
9	46	11.1
10	30	7.2
11	21	5.1
12	10	2.4
13	10	2.4
14	2	.50
15	6	1.4

*Scored 5, 6, or 7 on scale from 1 (Very Unlikely) to 7 (Very Likely).

tools listed, while only 6 were willing to use all of them. Most fell in the middle, likely to use a handful of those tools listed.

To test Hypothesis 6, this new variable of number of tools likely to be used was compared to the single-item measure, “If I need information about weeds, I’m likely to seek it,” for information seeking. A significant, positive relationship was found between the two variables ($r = .150, p = .005$). The hypothesis was supported. As an additional check, the number of tools variable was compared to the other two items for information seeking, “I try to learn about

problems that may negatively impact my property” and the reversed item “Learning more about controlling weeds is a waste of time.” Both items resulted in significant, positive relationships ($r = .186, p \leq .001$ and $r = .244, p \leq .001$, respectively). As shown in Table 18, this data suggest property owners who are motivated to learn about noxious weeds are willing to use multiple informational tools.

Research Question 1

Research Question 1 asked what tools individuals prefer when seeking information about weeds. As shown in Table 12, respondents indicated the strongest preference for a brochure/pamphlet, which had the highest mean score ($M = 5.83$) and lowest standard deviation ($S.D. = 1.46$). A brochure/pamphlet was followed by an online field guide ($M = 5.11$), the district website ($M = 5.09$), newspaper stories ($M = 4.79$), a consultation ($M = 4.66$), and a booth ($M = 4.44$). These results mirrored popular tools found in other studies (Mealor et al., 2011; Daab & Flint, 2010).

Table 18. Correlations of Information Seeking and Number of Tools Likely to Be Used by Property Owners

Pearson's r	
Information Seeking	Number of Tools Likely to Be Used
If I need information about weeds, I'm likely to seek it.	.150**
I try to learn about problems that may negatively impact my property.	.186***
Learning more about controlling weeds is a waste of time. (reversed)	.244***
** Significant at $p \leq .01$	
*** Significant at $p \leq .001$	

When asked about the tools they'd used in the past, respondents noted many of the same tools as those they're likely to use in the future. Table 13 reports that signs at trailheads (36%), newspaper ads (34.8%), a landscaper or hardware store (34.8%), a one-on-one consultation (34.1%), and a booth at a local event (28%) were the most previously used tools. This data suggest that consultations and booths are actually more likely to be used than their moderate mean scores may indicate. It's worth noting, too, that while property owners reported a strong preference for a website or online field guide, only 11.1% of them had taken the time to visit the district's website in the past.

Research Question 2

Research Question 2 explored the likelihood that property owners will share information about weeds. As indicated by the high mean score for the 3-item Information Sharing Index ($M = 5.42$, $S.D. = 1.29$), respondents showed a strong willingness to talk with family, friends, and neighbors about weeds. These results were consistent with other studies that found word-of-mouth as a common source for learning about weeds (Mealor et al., 2011; Daab & Flint, 2010). In addition, a significant, positive relationship was found between the Information Sharing Index and the 6-item Sharing Tools Index ($r = .406$, $p \leq .001$), suggesting property owners who are willing to spread the word about weeds may do so using various informational tools.

Research Question 3

Research Question 3 asked how the preference for certain informational tools relates to information sharing. To answer this question, correlations were run between the tools in Table 12 and the Information Sharing Index. As shown in Table 19, significant, positive relationships

Table 19. Correlations of Property Owners' Likelihood of Sharing Information about Weeds with the Preference for Certain Informational Tools

Informational Tools	<i>n</i>	Pearson's <i>r</i>
Brochure/pamphlet	397	.301***
Workshop	384	.297***
Group presentation by district	378	.278***
Newspaper stories	383	.268***
One-on-one consultation	386	.251***
Online field guide	387	.238***
District website	386	.221***
Weed/wildflower identification hike	385	.202***
E-newsletter	382	.193***
Booth at local event (e.g., county fair)	385	.170***
Radio	380	.169***
Newspaper ads	387	.166***
Talk to a landscaper	386	.147*
Ask someone at the hardware store	387	.042
District social media sites (Facebook)	375	.013
* Significant at $p \leq .05$		
*** Significant at $p \leq .001$		

were found between information sharing and 12 of the 15 tools at the $p \leq .001$ level, with the strongest relationships found for brochures ($r = .301$), workshops ($r = .297$), and presentations ($r = .278$). This data suggest that while large numbers of property owners may not attend workshops ($M = 3.54$) or presentations ($M = 3.78$), those who do attend may be more likely to share information learned, or pass around informational tools picked up at these events, like a brochure. It's worth noting, too, that the relationship between information sharing and social

media was insignificant, suggesting property owners may be willing to share information about weeds through social networks, just not using social media sites like Facebook.

Research Question 4

Research Question 4 looked at the various ways property owners share information about weeds. As indicated in Table 15, respondents continued to express a preference for brochures and online tools, while showing little willingness to use social media for learning or sharing information about weeds.

Research Question 5

Research Question 5 explored the relationship between the social pressure to know about weeds and the likelihood of talking about them. To answer this question, a correlation was run between the 3-item Social Pressure Index and the Information Sharing Index. The result was the strongest relationship found in the entire model for this study ($r = .499, p \leq .001$). The positive direction of the relationship suggests those who feel social pressure are the ones most likely to talk about weeds. It's possible, therefore, those who think it's important to know about weeds feel validated about their knowledge by talking about weeds with others.

CHAPTER 5: DISCUSSION

This study investigated how and why property owners seek information about weeds. Specifically, it explored the factors that prompt property owners to learn about invasive plants, what informational tools they prefer, and their likelihood of sharing this information.

Factors Prompting Information Seeking

Results did not support the need for information as a mediating variable between knowledge, concern, and social pressure to be informed and information seeking. Despite this finding, it is assumed many property owners seek information about weeds because they need to learn about them. In other words, they lack sufficient knowledge on the topic to satisfy their goals (Case, 2002). When asked about what they need to know about weeds, property owners indicated a strong need to know about control options other than spraying, weed identification, and what herbicides to use. These findings were echoed in responses to the open-ended question that closed the survey, with several respondents indicating a general fear about using herbicides, the need for easier ways to identify weeds, and the desire to learn about organic herbicides.

Property owners showed only a moderate concern about weeds in general. When asked about specific threats from weeds, however, they indicated much stronger concern, especially with impacts weeds have on desirable plants. They also expressed concerns about negative impacts weeds have on land values, horses, and wildlife, with any of these threats being potential reasons property owners might seek out information about weeds. Factor analysis showed that they consider direct personal impacts differently than indirect monetary impacts, suggesting some property owners might not feel a threat from fines or expenses down the road, at least

enough to learn about or control weeds. This could be the result of a lax approach to regulation taken by the district in Teton County.

A strong, positive correlation was found between the social pressure to be informed about weeds and seeking information on the topic. This direct relationship is consistent with other studies utilizing the RISP model (Kahlor et al., 2006; Kahlor, 2007). This finding suggests social pressure plays a role in information seeking about weeds. Results further suggest this may be derived, at least in part, by guilt to be informed about noxious weeds derived from internal – not external – pressure. Property owners reported a higher mean score for owing it to others to be informed about weeds versus others expecting them to be informed.

Finally, the effects of demographic variables were considered on information seeking. An ANOVA test indicated that property owners who control their weeds three or more times a year were more likely to seek information. This may be because they have more weed problems on their land and, therefore, a greater likelihood to learn about the topic, or they are more concerned about weeds given their experience with them. Additional ANOVA tests indicated property owners who frequently control their weeds perceive a greater knowledge about the topic and are more concerned about invasive plants than those who control them less often.

Informational Tools Preferred

Based on the results presented in Chapter 4, this study found property owners prefer a variety of different tools when seeking information about noxious weeds. As shown in Table 12, the top six tools preferred represent all five categories of media types in Hallahan's (2010) public relations media model: brochure/pamphlet (controlled), online field guide (interactive), district website (interactive), newspaper stories (public), consultation (one-on-one), and booth (event). In

addition, significant, positive correlations were found between all three measures of information seeking and a preference for a higher number of tools, which is consistent with other studies showing the use of a variety of tools to learn about weeds (e.g., Meador et al., 2011).

As for specific tools, a strong preference was found for controlled media, such as brochures and pamphlets, and interactive media, such as websites and online field guides, although little support was found for using social media. Factor analysis further indicated that property owners view Facebook differently than other interactive media, such as the district's website or e-newsletter, when seeking information about weeds.

Results also showed that property owners prefer tools where they can interact face-to-face with a representative from the district, such as a consultation or booth at a local event. As for face-to-face activities where the source was not the district, only a moderate preference was found for consulting a landscaper or visiting a hardware store. This is a bit surprising, since nearly 35% of respondents reported doing these activities in the past. Other popular tools previously used by property owners to learn about weeds were signs at trailheads and ads in the newspaper, suggesting managers should continue using these tools that are convenient to access and widely distributed.

Sharing Information

Property owners indicated a strong willingness to share information about weeds with family, friends, and neighbors. This finding is consistent with studies showing word-of-mouth as a common source for learning about weeds (Daab & Flint, 2010; Meador et al., 2011) and lends support to the notion that individuals turn to both organizations and other people when seeking information (Gantz et al., 1991). It is also consistent with research in mass communication

related to diffusion and the two-step flow of information and the role played by people in sharing information (Katz & Lazarsfeld, 1955).

Results from this study showed expertise and involvement play important roles in the willingness to talk about weeds among property owners. An ANOVA test found property owners who own more than 1 acre of land, work in a weed-related industry, or belong to a conservation organization are more likely to talk about weeds with others. This finding makes sense because weeds are likely more relevant to property owners with more land. In addition, people whose work involves noxious weeds or who belong to an environmental organization were found to be more knowledgeable about the topic and, therefore, may feel more confident about discussing weeds with others.

Results also showed that providing certain tools – and making a variety of tools available – may facilitate this sharing of information. Property owners indicated a strong preference for passing along a brochure or referring someone to the district’s website, with again little support found for using social media. Follow-up correlations confirmed the use of these tools for sharing information about weeds. In addition, a strong, positive correlation was found between information sharing and the use of tools to do so.

Practical Implications

Public outreach and education have become essential components of an effective weed management program (DiTomaso, 2000; Westbrooks, 1998; Hershendorfer et al., 2007). As an audience, property owners can play a vital role in helping or hindering the efforts of weed managers. When communicating with this audience – or others, for that matter – managers must be savvy about which tools they utilize to ensure messages both reach the intended audience and

are persuasive, while maximizing limited resources (Hershdorfer et al., 2007). When planning an outreach and education program for weeds, it is valuable to consider three recommendations based on this study's findings:

Use a variety of tools and choose them wisely. Property owners' use of tools to learn about weeds is fragmented. Different people prefer different tools, and they are willing to use multiple tools to get educated about invasive plants, as well as word-of-mouth. Therefore, managers should heed the advice of Meador et al. (2011) and employ a multi-pronged approach to ensure they reach a wide sample of the audience.

Each of these tools takes resources to be successful, but resources for outreach and education are often limited (Hershdorfer et al., 2007). It's better to do a few tools really well than many ineffectively, so managers must choose them wisely. At the very least, they should offer a website and brochures. These tools are essential for providing and facilitating the sharing of information. In addition, they should utilize tools that are commonly used and widely accessed, such as signs at popular trailheads and stories in widely read newspapers. Opportunities to interact with someone from the district, such as consultations and booths, are important, too. Interactive media, such as e-newsletters and social media, cost less money, but little support was found for their use, although they may be appropriate for other audiences.

Disseminate information through existing social networks. One of the most important findings of this study is the strong willingness among property owners to talk with family, friends, and neighbors about weeds. Interpersonal channels present a potentially persuasive, cost-effective means of spreading information on this topic. It's worth noting, however, relationships among landowners may be strained, as indicated by complaints about negligent neighbors in

several responses to the open-ended question. Managers cannot assume information will flow freely across fences, from neighbor to neighbor. Instead, they should tap into existing social networks, where information can be shared among like-minded individuals at appropriate times.

Results from this study point to several networks with strong potential, including homeowners' associations, landscapers, and partners. Managers should consider targeting HOAs in neighborhoods where weeds are a problem; landscapers who can pass along information to their customers, including brochures and web addresses; and partners who work at other conservation organizations and agencies. Individuals whose work involves weeds or who belong to an environmental group are much more likely to spread the word about weeds through interpersonal channels. Also, they likely have pre-existing tools, such as meetings, newsletters, and websites, where managers can disseminate information.

Make messages personal and relevant. People are more likely to pay attention to messages they perceive to be both personal and relevant (Petty et al., 2009; Kahlor et al., 2006). To craft messages that possess these qualities, managers should consider what factors prompt property owners to seek information about weeds. For example, managers should speak to the concerns individuals have about weeds, such as impacts to desirable plants, horses, wildlife, and land values, so messages can be personalized and more likely to resonate with the audience. Managers might also want to include pictures of easily identifiable weeds, like Canada thistle, with higher priority species in communications. That way, property owners are more likely to identify a weed on their land and discover that the problem of invasive plants is more relevant to them than they thought. Finally, managers must be sure they are providing the information people want, such as guides to help with plant identification and facts about organic herbicides.

While these strategies can lead to more persuasive communication, managers should be wary when relying solely on fear-based messaging focusing on the negative impacts of weeds (e.g., landscaping will be ruined, horses will be poisoned, elk habitat will disappear, etc.). While this may resonate with some, it may fail to do so with others. Gobster (2005) suggests managers move away from negative messaging and focus on the benefits of ecological restoration, so people feel empowered to be a part of the solution, not just scared into caring about the problem. A blend of messaging that is tailored to the individual or group is, therefore, essential, as well as providing opportunities for people to get involved and build capacity, such as weed pulls and educational workshops.

Limitations and Directions for Future Research

This study found robust support for most of its hypotheses and intriguing answers to its research questions. However, its findings are limited for a number of reasons. Given the survey methodology, the results cannot be generalized beyond the population sampled for this study: property owners in Teton County. Respondents tended to be older (mean age of 58) and well educated (92.5% had attended at least some college) and clearly do not reflect the United States population as a whole. It would be useful to replicate this study in other, more rural counties in Wyoming, or elsewhere in the western U.S., and use a shorter survey form administered in-person. There could also be variation in preferences for certain tools based on age, so replicating this study with a younger population would be valuable. A younger sample might have a stronger preference for more non-traditional tools, such as social media and e-newsletters.

This study only included property owners, who represent just one – albeit important – audience for a weed manager to address in an outreach and education program. It would be

beneficial to give this survey to other audiences, including HOA presidents, landscapers, partners, and others who can help spread the word about weed control. This study aimed to exclude condo, townhome, and second homeowners. These people pay the mill levy funding the district in Teton County, so they remain important audiences, too.

As for methods, several limitations exist. Since so few respondents used the Survey Monkey website, it was difficult to ascertain reliably whether a difference exists between people who used mail or online to respond to the survey. Also, no third mailing was sent out, which breaks from Dillman's Tailored Design Method (2000) and other studies where a second copy of the survey was mailed to non-respondents. However, the 35.88% response rate was acceptable at a time when survey researchers are reporting a consistent decline in response rates and especially low rates for online surveys. Finally, no follow-up telephone survey was conducted with non-respondents because the response rate was acceptable and phone numbers were unknown. However, differences might exist between respondents and non-respondents, which might be determined for at least the most critical measures.

When looking at the concepts in this study, it would be useful to try different measures for knowledge and need for information in future research. Exploring property owners' actual knowledge of weeds, as opposed to perceived knowledge, could be useful. It might also be valuable to test this study's model with a different measure for need for information. One possibility would be measuring the gap between current knowledge and knowledge needed, which is the way this concept is typically measured using the RISP model (Griffin et al., 1999; Kahlor et al., 2006; Kahlor, 2007).

While a survey was useful for drawing general conclusions about Teton County property owners, researching this population using qualitative methods could be valuable. The responses

to the open-ended question proved to be insightful, revealing frustrations with negligent neighbors and the need for facts about organic herbicides. Scholars should consider in-depth interviews, focus groups, or other qualitative methods when studying public perception of noxious weeds. Most research on this topic is quantitative.

Finally, this study framed weeds as a risk to property owners. It explored the threats weeds pose and the social pressure to be informed, which produced results that are useful for crafting fear- and guilt-based messages. For some individuals, messaging like this will work to garner their attention and spur action. For others, however, it will fail to resonate or be persuasive. Future research needs to look at other reasons why people seek out information about weeds (e.g., to be good stewards of their land) or work with weed managers (e.g., to feel the satisfaction of restoring habitat). Results from these studies could help managers craft more inclusive, positive messages that engage property owners and other conservation-minded citizens in weed management.

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APPENDIX A

Four-Page Survey

Control Number:

Teton County Weed & Pest District 2012 Property Owner Survey

The Teton County Weed & Pest District is conducting this survey to provide you with better service. Your participation is totally voluntary and your answers will be confidential. Thank you for your help!

Part 1: First, we'd like to know about your property.

1. Which of the following best describes the property you own in Teton County? Check all that apply.
☐ Condo or townhome ☐ Ranch ☐ Other (please list) _____
☐ Single family home ☐ Vacant land only
2. About how many years have you owned property in Teton County? _____ years
3. If you own land, about how many acres do you own? _____ acres ☐ Check if none
4. How frequently do you attempt to control weeds on your land? Check the best response.
☐ Never ☐ Once a year ☐ Twice a year ☐ 3 or more times a year ☐ Not applicable

Part 2: Next, we'd like to know your thoughts about weeds. By weeds, we are referring to noxious weeds, or plants designated by law as detrimental to the public. Examples include Canada thistle and spotted knapweed. Dandelions are not a noxious weed.

5. Some people know a lot about weeds, while others know very little. On a 1 to 7 scale, please indicate your knowledge about weeds in general. For each item, circle the best response.

Your Overall Knowledge About Weeds:

Know Nothing	1	2	3	4	5	6	7	Know a lot
Not Informed	1	2	3	4	5	6	7	Informed
Novice	1	2	3	4	5	6	7	Expert
Not Educated	1	2	3	4	5	6	7	Educated

6. Several **species of weeds** are found in Teton County. How familiar are you with the following weed species? Use a 1 to 7 scale where 1 = Never Heard Of and 7 = Very Familiar. Circle your answer.

Weed Species	Never Heard Of		Somewhat Familiar			Very Familiar	
Canada thistle	1	2	3	4	5	6	7
Houndstongue	1	2	3	4	5	6	7
Spotted knapweed	1	2	3	4	5	6	7
Leafy spurge	1	2	3	4	5	6	7
Dyer's woad	1	2	3	4	5	6	7

If you have heard of other weeds found in Teton County, please list them here:



When completed, please fold the survey and return it in the enclosed envelope. Or mail it to: Teton County Weed & Pest District, P.O. Box 1852, Jackson, WY 83001



7. On a 1 to 7 scale, please indicate **how concerned you are about weeds** on your property. For each item, circle the best response.

Weeds on Your Property Are:

Not a Problem	1	2	3	4	5	6	7	A Problem
Not Harmful	1	2	3	4	5	6	7	Harmful
Low Risk	1	2	3	4	5	6	7	High Risk
Not Damaging	1	2	3	4	5	6	7	Damaging

8. Weeds **impact property owners** in various ways. For each of the following statements, please indicate whether you agree or disagree with the statement. Use a 1 to 7 scale where 1 = Strongly Disagree and 7 = Strongly Agree. If the statement is not applicable to you, circle NA.

I believe weeds...	Strongly Disagree		Neutral		Strongly Agree		Not Applicable
Encroach on desirable plants.	1	2	3	4	5	6	7 NA
Discourage wildlife from visiting.	1	2	3	4	5	6	7 NA
Reduce the resale value of my land.	1	2	3	4	5	6	7 NA
Threaten my health or my family's health (rash, allergies, etc.).	1	2	3	4	5	6	7 NA
Are harmful to horses or other animals.	1	2	3	4	5	6	7 NA
Are too expensive to control.	1	2	3	4	5	6	7 NA
Could result in a fine if not controlled.	1	2	3	4	5	6	7 NA

9. Some people would like **more information about weeds**. For each of the following statements, please indicate whether you agree or disagree with the statement. Use a 1 to 7 scale where 1 = Strongly Disagree and 7 = Strongly Agree. If you don't know or it does not apply to you, circle DK.

	Strongly Disagree		Neutral		Strongly Agree		Don't Know
I need more information to control weeds on my property.	1	2	3	4	5	6	7 DK
If I need information about weeds, I'm likely to seek it.	1	2	3	4	5	6	7 DK
I would need more information to be able to manage weeds.	1	2	3	4	5	6	7 DK
I try to learn about problems that may negatively impact my property.	1	2	3	4	5	6	7 DK
Learning more about controlling weeds is a waste of time.	1	2	3	4	5	6	7 DK
I am confident in my ability to control weeds on my property based on the information I have.	1	2	3	4	5	6	7 DK

10. What specific **information might you need** to control weeds on your property? Please indicate the amount of information you might need about the following topics. Use a 1 to 7 scale where 1 = Don't Need Any Info and 7 = Need a lot of Info. If you don't know, circle DK.

<i>Information You Might Need</i>	<i>Don't Need Any Info</i>		<i>Neutral</i>			<i>Need a lot of Info</i>		<i>Don't Know</i>
What herbicides to use	1	2	3	4	5	6	7	DK
Other control options to try	1	2	3	4	5	6	7	DK
Use of weed control equipment	1	2	3	4	5	6	7	DK
Weed identification	1	2	3	4	5	6	7	DK
Impacts to human health	1	2	3	4	5	6	7	DK
Impacts to animal health	1	2	3	4	5	6	7	DK
Impacts to the environment	1	2	3	4	5	6	7	DK

Part 3: Now, we'd like to know how you prefer to learn about noxious weeds.

11. Please indicate your **likelihood of using each of the following information sources** to learn more about weeds. Use a 1 to 7 scale where 1 = Very Unlikely and 7 = Very Likely. If you don't know, circle DK.

<i>Sources You Might Use</i>	<i>Very Unlikely</i>		<i>Neutral</i>			<i>Very Likely</i>		<i>Don't Know</i>
Brochure/pamphlet	1	2	3	4	5	6	7	DK
Workshop	1	2	3	4	5	6	7	DK
Weed/wildflower identification hike	1	2	3	4	5	6	7	DK
Group presentation by district	1	2	3	4	5	6	7	DK
Booth at local event (e.g., county fair)	1	2	3	4	5	6	7	DK
One-on-one consultation	1	2	3	4	5	6	7	DK
District website	1	2	3	4	5	6	7	DK
Online field guide	1	2	3	4	5	6	7	DK
District social media sites (Facebook)	1	2	3	4	5	6	7	DK
E-newsletter	1	2	3	4	5	6	7	DK
Newspaper ads	1	2	3	4	5	6	7	DK
Newspaper stories	1	2	3	4	5	6	7	DK
Radio	1	2	3	4	5	6	7	DK
Talk to a landscaper	1	2	3	4	5	6	7	DK
Ask someone at the hardware store	1	2	3	4	5	6	7	DK

12. If you've learned about weeds in the past, how did you learn about them? Check all that apply.

- | | | |
|--|--|--|
| <input type="checkbox"/> Newspaper ads | <input type="checkbox"/> Signs at trailheads | <input type="checkbox"/> Weed/wildflower identification hike |
| <input type="checkbox"/> Radio interviews | <input type="checkbox"/> District website | <input type="checkbox"/> From kids after a school lesson |
| <input type="checkbox"/> Booth at local events | <input type="checkbox"/> Workshop on weeds | <input type="checkbox"/> Landscaper or hardware store |
| <input type="checkbox"/> One-on-one consultation | <input type="checkbox"/> Group presentation | <input type="checkbox"/> Other (please list) _____ |

13. People often **share information about controlling weeds** with family, friends, and neighbors. For each of the following statements, please indicate whether you agree or disagree with the statement. Use a 1 to 7 scale where 1 = Strongly Disagree and 7 = Strongly Agree. If you don't know, circle DK.

	<i>Strongly Disagree</i>			<i>Neutral</i>			<i>Strongly Agree</i>	<i>Don't Know</i>
I am likely to talk about weed control with family, friends, or neighbors.	1	2	3	4	5	6	7	DK
I am likely to talk to others about weeds if they ask me.	1	2	3	4	5	6	7	DK
I am likely to share with others what I have learned about weeds.	1	2	3	4	5	6	7	DK
Others expect me to learn about the impact of weeds.	1	2	3	4	5	6	7	DK
People I know care if I'm aware of weeds on my property.	1	2	3	4	5	6	7	DK
I owe it to others to be informed about weeds.	1	2	3	4	5	6	7	DK

14. Please indicate your likelihood of engaging in the following **activities to share information about weeds**. Use a 1 to 7 scale where 1 = Very Unlikely and 7 = Very Likely. If you don't know, circle DK.

<i>Ways to Share Information</i>	<i>Very Unlikely</i>			<i>Neutral</i>			<i>Very Likely</i>	<i>Don't Know</i>
Forward an e-newsletter from us	1	2	3	4	5	6	7	DK
Recommend the district website	1	2	3	4	5	6	7	DK
Connect with us on social media	1	2	3	4	5	6	7	DK
Recommend a consultation	1	2	3	4	5	6	7	DK
Share an educational brochure	1	2	3	4	5	6	7	DK
Forward an e-mail or text message	1	2	3	4	5	6	7	DK

Part 4: Finally, we'd like to know a bit about you.

15. Do you work in any of the following industries? Check the most appropriate response.

- ☐ Agriculture/ranching ☐ Forestry ☐ Other industry involving weeds (please list) _____
☐ Landscaping ☐ Plant nursery ☐ I do not work in an industry involving weeds.

16. What is your age? _____ years 17. What is your sex? ☐ Female ☐ Male

18. Do you belong to any conservation or environmental organizations? ☐ No ☐ Yes

19. What is the highest level of education that you have completed? Check the most appropriate response.

- ☐ High school ☐ Some college ☐ Bachelor's degree ☐ Graduate degree

20. **Tell us!** Do you have any suggestions for us? Is there any information about noxious weeds you need to know or sources you might use not covered in this survey? If so, please use the space below.

Thank you for your help!

APPENDIX B

Letter and Postcard for Mailings



P.O. Box 1852
7575 S. Highway 89
Jackson, WY 83001
ewells@tcweed.org

<ADDRESS BLOCK>

Dear <NAME>,

I am writing to ask your help in a survey of property owners that is very important for managing noxious weeds in Teton County, Wyoming. This survey is part of an effort to improve the way we provide information to you about weed management.

I sincerely appreciate your willingness to help us. You are one of a select sample of property owners being asked to complete the enclosed survey. The accuracy of decisions we make based on survey results depends on all opinions being represented. Even if you have never dealt with weeds on your property, your input matters!

The results of this survey will be used to improve the way we provide information about noxious weeds to property owners like you. While there is no direct benefit to you for participating, by better understanding how you prefer to learn about weeds, we can better allocate resources to communication efforts. To conduct the survey, we have partnered with researchers at Colorado State University. Along with helping us improve our public outreach program, the survey will fulfill the master's degree requirements for one of our seasonal employees who is attending CSU.

Please complete the enclosed survey and mail it to us in the stamped, return envelope. For your convenience, we have also made the survey available online at **TO BE INSERTED**. Please have this letter or your survey handy to be able to enter your unique control number: <CONTROL NUMBER>.

There are no known risks related to your participation. Your responses to this survey are voluntary and final data will be anonymous and confidential. Our findings will be released as summaries. When you return the survey, your name will be deleted from our mailing list and never connected to your answers in any way. If, for some reason, you prefer not to respond, please let us know by returning the blank survey in the enclosed envelope. The survey should take about 10-12 minutes to complete.

If you have any questions, feel free to contact me at (307) 733-8419 or ewells@tcweed.org. Thank you very much for your help. Your input is very important to us!

Sincerely,

Erika Edmiston
Supervisor

Keep Jackson Hole Beautiful. We need your input!

About two weeks ago, we mailed you a survey seeking your input about ways to improve communication about noxious weeds. You are one of a select sample of property owners asked to complete the survey.

If you have completed the survey in the last few days, please accept our sincere thanks. If not, please do so today. The accuracy of decisions we make based on survey results depends on all opinions being represented. Even if you have never dealt with weeds on your property, your input matters!

For your convenience, we have made the survey available online at **TO BE INSERTED**. Please have this postcard handy to be able to enter your control number: <CONTROL NUMBER>.

If you did not receive a survey or it was misplaced, please complete the survey online, or contact us at (307) 733-8419 and we will mail you another copy. Thank you for your cooperation!

Sincerely,



Erika Edmiston, Supervisor
Teton County Weed & Pest District
Jackson, WY 83002



***Keep Jackson Hole beautiful.
We need your input!***

P.O. Box 1852
Jackson, WY 83001

<NAME>
<ADDRESS BLOCK>

APPENDIX C

Tables of Demographic Information

	<i>n</i>	Mean	Median	S.D.
Age	404	58.18	59	11.95
Years owning land in Teton County	413	21.88	20	13.16
Acres of land owned	397	5.5	1	25.65

Type of property owned (*n* = 413)

	Count	Percent
Condo or townhome	21	5.1
Single family home	374	90.6
Ranch	11	2.7
Vacant lot only	2	0.5
Other	5	1.2

Frequency of controlling weeds (*n* = 410)

	Count	Percent
Never	20	4.9
Once a year	97	23.7
Twice a year	91	22.2
3 or more times a year	191	46.6
Not applicable	11	2.7

Industries worked (<i>n</i> = 384)	Count	Percent
Agriculture/ranching	17	4.4
Landscaping	7	1.8
Forestry	2	0.5
Plant nursery	0	0
Other industry involving weeds	38	9.9
Do not work in industry involving weeds	319	83.1

Gender (<i>n</i> = 402)	Count	Percent
Female	195	48.5
Male	207	51.5

Member of conservation or environmental organization (<i>n</i> = 409)	<i>n</i>	Percent
No	245	59.9
Yes	164	40.1

Education (<i>n</i> = 412)	<i>n</i>	Percent
High school	31	7.5
Some college	79	19.2
Bachelor's degree	160	38.8
Graduate degree	142	34.5