DROUGHT ASSESSMENT FOR RECREATION & TOURISM: SOUTHWESTERN COLORADO REPORT

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ABSTRACT

Tourism/recreation is a major contributor to the economic and social well-being of communities across Colorado. At the same time, drought cycles consistently affect water and water supplies on a regular basis. Yet, perhaps because drought is a much more subtle type of hazard than other dramatic events, it is normally not associated with direct impacts on this important economic sector. Importantly, linkages between drought and tourism/recreation are not well documented or understood, even though anecdotal evidence suggests significant linkages (Knutson et al., 1998; Wilhelmi et al. 2008). Thus, the lack of any mechanisms or processes for documenting, monitoring, and assessing the interactions between drought and tourism/recreation is particularly concerning.

From October, 2011, through April, 2012, a pilot project was conducted in the southwestern region of Colorado in order to better understand the interactions between drought and tourism/recreation, to evaluate the metrics used for assessing impacts on the tourism/recreation sector in the Colorado State Drought Mitigation and Response Plan, to identify existing data and processes for drought management, and to make recommendations for improving drought impacts data collection as related to tourism and recreation. The project included four main components: 1) development of a stakeholder list, 2) survey of drought awareness and planning, perceptions and resources, 3) two focus groups conducted in Durango, CO, and 4) follow-up interviews.

The pilot project presents the findings from the survey, focus groups, and interviews, offering a model of stakeholder engagement for addressing drought/tourism/recreation linkages. Taken together, the findings suggest a distinct need for increased education, data collection, and the development of robust, integrated adaptive strategies for drought vulnerability reduction. This clearly illustrates the need for expanded work surrounding the drought/tourism/recreation nexus, along with the influences of climate change, in Southwestern Colorado and across the entire state. Not nearly enough is known about the interactions, even though tourism and recreation are precious state resources. The current 2012 drought provides both an opportunity to spur drought/tourism/recreation planning and a case study of impacts on tourism/recreation.

INTRODUCTION

As a dominant economic driver and a direct contributor to a community's economic and social vitality, tourism and recreation underpin livelihoods for communities across the United States. Colorado is one of the leading states for nature-based tourism, boasting 10 national recreation areas, 42 state parks, 11,000 miles of trails, 35 winter recreation areas, and several out-flowing rivers (Economic Development Databook, 2010). Much of the tourism and recreation is related to the beauty and health of natural settings. As such, Colorado is a principle travel destination for hiking, biking, wild-life and nature viewing, white-water rafting, and ranks number one in the nation for skiing, snowboarding and other winter activities. In 2010, the travel industry in Colorado totaled over $14.6 billion in direct spending, supporting 136,900 jobs which generated approximately $3.9 billion in earnings (Dean Runyan Associates, 2011). This industry also contributed $750 million in local and state tax revenue in the same year and comprised approximately 19% of the state's economy.

These outdoor recreation activities are intimately linked with water availability and accessibility. In many ways, "climate…is the natural resource on which the tourism industry is predicated" in Colorado (Scott & McBoyle, 2001; p. 69). Droughts occur frequently in Colorado, happening somewhere across the state an estimated nine out of every ten years (CWCB, 2011). While large statewide events are less common, Colorado has experienced seven significant droughts since the end of the 19th century when moisture data recording began, with the most recent droughts occurring across the state between 1996 and 2003 (Henz et al., 2003), and most recently in 2012. In addition to the current 2012 Drought with the entire state of Colorado experiencing 'extreme drought' conditions (NOAA, 2012), the relatively recent 2002 Drought highlighted the effects on tourism/recreation (Schneckenburger & Aukerman 2002; Wilhelmi et al. 2008).

Regular drought cycles combined with a reliance on tourism/recreation as a major contributor to the economic and social well-being of communities means drought directly shapes the very resources that attract much of the tourism and recreation to Colorado. By extension, drought has numerous influences on tourism and recreation (Ding et al, 2011). Yet, perhaps because drought is a much more subtle type of hazard than other dramatic events, it is normally not associated with direct impacts on this important economic sector. Further, linkages between drought and tourism/recreation are not well documented or understood, even though anecdotal evidence suggests significant linkages (Knutson et al., 1998; Wilhelmi et al. 2008). Thus, the lack of any mechanisms or processes for documenting, monitoring, and assessing the interactions between drought and tourism/recreation is particularly concerning.

PURPOSE

From October, 2011, through April, 2012, a pilot project was conducted in the southwestern region of Colorado in order to better understand the interactions between drought and tourism/recreation, to evaluate the metrics used for assessing impacts on the tourism/recreation sector in the Colorado State Drought Mitigation and Response Plan, to identify existing data and processes for drought management, and to make recommendations for improving drought impacts data collection as related to tourism and recreation. The project included four main components: 1) development of a stakeholder list, 2) survey of drought awareness and planning, perceptions and resources, 3) two focus groups conducted in Durango, CO, and 4) follow-up interviews.

STAKEHOLDER LIST DEVELOPMENT

The identification of potential stakeholders is critical to a successful stakeholder engagement process. Beginning in fall, 2011, an iterative process began to compile a comprehensive stakeholder list for the tourism and recreation sector in the southwestern Colorado region. The compilation of such a list is no small task and ever-evolving; identifying strategic and key non-profit organizations, businesses, and government agencies, along with current and relevant contact information, is time-consuming. The original list consisted of 29 complete listings, and 23 organizations without any contact information. As the entire pilot progressed, this list was continually updated and refined and went through six (6) renditions using a snowball sampling approach (people recommending other people) and Internet searches, each time, confirming contact information and adding organizations. In the end, the list represents 85 unique organizations/agencies from the study region with a total of 100 entries with some type of contact information (e-mail address or phone number), and 88 people were listed as a point of contact. Stakeholder lists are never static, but should evolve over time to incorporate new organizations, to refine the organizational contact list, and to update points of contact, as people change positions. While the list is a fundamental baseline for the project, this does not ensure participation, nor did it initially include key players across all types of tourism/recreation organizations (public, private, and non-profit). This is why expansion of the baseline list is necessary, so as to not limit the potential for educational opportunities around drought for those who may not recognize a connection between drought-tourism/recreation.

DROUGHT SURVEY

The survey was administered between November 4, 2011, and February 1, 2012. The first invitation to participate was sent via e-mail to 59 people on November 4, with an additional 16 in the subsequent days. A reminder e-mail was sent on November 20 to those who had not completed the survey. As of December 1, 2011 when the focus groups took place, 20 people had responded (26.6% response rate). The initial goal was to close the survey prior to the focus groups in early December, but in order to collect additional responses, it remained open through February 1, 2012. An additional 7 people participated, bringing the overall response rate to 36%. Because an individual's name was not recorded with survey responses, it is unknown if all of those who participated in the focus groups also filled out a survey. However, the focus group invitation did include a request to complete the survey prior to participation.

Of the 27 respondents, 20 completed the entire set of survey questions. Two surveys were deleted because the only question answered was about the organization, with nothing additional provided, reducing the overall response rate to 33.3%. Although this is somewhat lower than hoped, it is consistent with, and even slightly higher than response rates in survey work. We did not follow up with individual phone calls to explain the project and attempt to recruit additional participants due to time and budget constraints, which would likely have improved the response rate. Individual phone calls would also have provided an opportunity to explain the project and convey the relevance of drought to tourism/recreation, perhaps increasing awareness of the connection. In more than a few informal e-mail exchanges and conversations, people conveyed not really understanding what they could contribute to a survey on drought, since their "expertise is tourism". Additionally, the winter tourism and recreation cohort was not as represented in the survey responses, as summer or summer/winter combined. This may have been due to sending the survey in November, just as the winter season starts to become busy. So, in the survey responses, three obvious biases exist, including more summer tourism/recreation represented, few private for profit businesses participated (more public and non-

profit entities are represented), and a lack of representation from those who perceived a lack of connection to drought.

Responses represented thirteen (13) non-profit, three (3) private for profit business, and nine (9) government organizations. Three of these were water authority/conservation districts that likely have a high degree of interest in drought. Twenty-three primarily operate in the state of Colorado and they have some activities distributed across the southwestern set of counties, concentrating on La Plata County. For the respondents, peak operations occur in June/July/August. In defining drought, nearly all noted a lack of precipitation or reduced water supply as the primary driver, with almost a third describing wildfire occurrence or increased wildfire risk as the principle threat to tourism. There was a high level of drought experience among participants; eighteen (18) organizations had experience with a previous drought, many listing the 2002 drought. Still, only five (5) responded that they have a drought mitigation and/or response plan, and only four (4) organizations participate in any local or regional drought planning. Nobody reported a drought plan that is synchronized with either the state's or the region's, with only two (2) actual written plans, and an additional 8 verbal plans. Just under half of respondents do not plan for drought. Yet, while a majority of respondents do not believe their organizations have a great deal of exposure to drought (nearly half of those who answered this question), more agree that drought will impact the organization's operations in the future and that the organization's revenues are dependent on water availability (Figure 1).

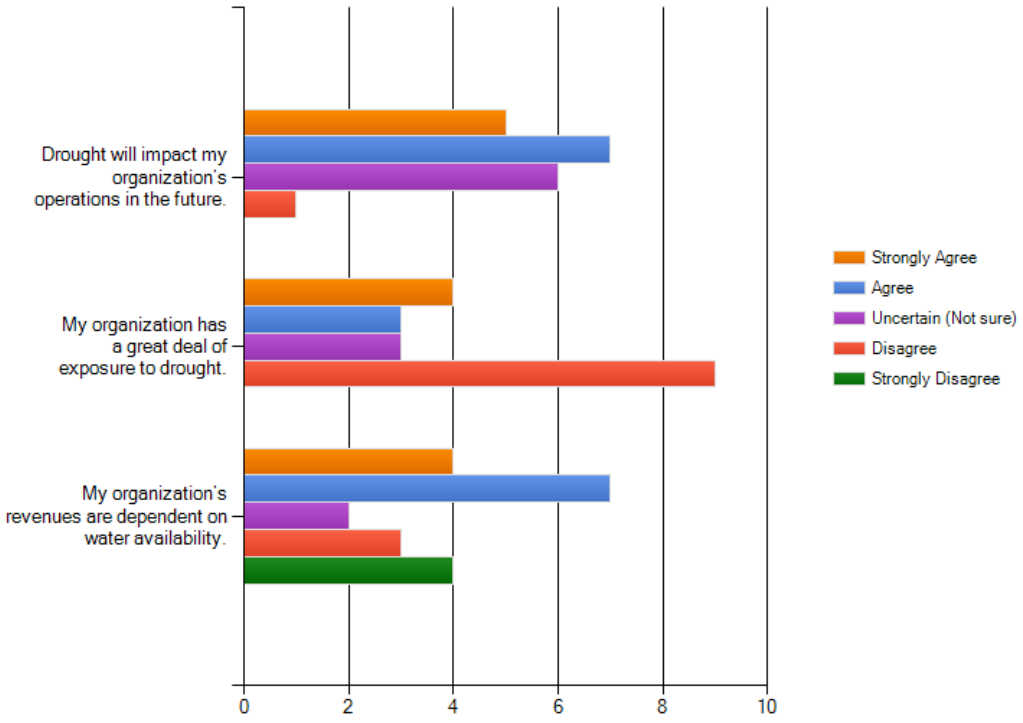

Figure 1. Respondents' perceptions about drought impacts, exposure and reliance on water supply.

A set of questions specifically addressed data, including measurements and resources for drought monitoring and potential sources for monitoring and assessing impacts on tourism/recreation. In terms of awareness of drought monitoring products, and then the use of these, respondents predominately

identified stream flow data (84.2%), followed by weather forecasts and long-term outlooks (73.7%), and then National Resources Conservation Service's (NRCS) Snow Telemetry Network (SNOTEL) sites (63.2%). Stream flow data were the most commonly used by far (92.9%) followed by the NRCS Snow Telemetry Network (SNOTEL) sites (57.1%). In terms of drought prediction for both awareness and use, weather forecasts and long-term outlooks (66.7% and 87.5% respectively) were the most common responses followed by stream flow and NRCS Snow Telemetry Network (SNOTEL) sites. In terms of potential data sources for monitoring trends in the tourism/recreation sector and evaluating linkages to drought over time to understand impacts, participants were asked about systems for tracking various types of tourism/recreation data, and whether they would be willing to share it. The most commonly tracked data were operating expenses (63.6%), followed by employment addition/reduction (45.5%), visitations (40.9%), lodging receipts (31.8%), and sales tax revenues (31.8%). Ten respondents indicated that they would be willing to share their data, and an additional seven (7) indicated that they might, with only two (2) indicating an outright no (five (5) respondents had no data to share) (Figure 2).

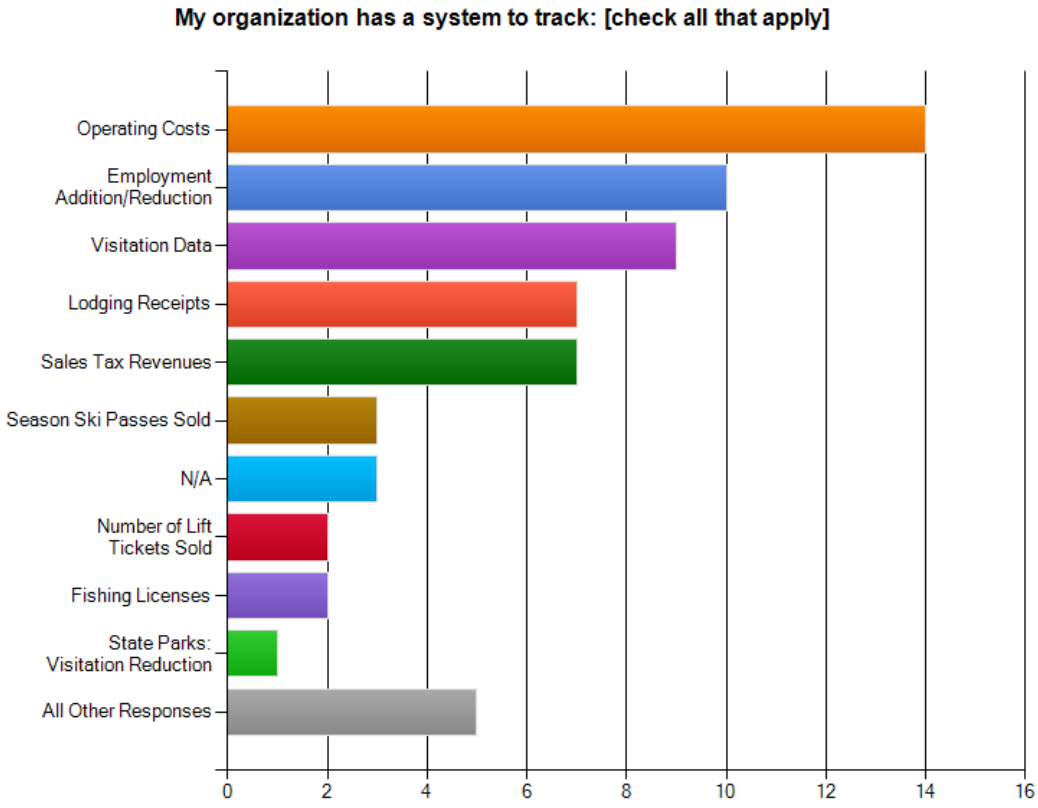

Figure 2. Quantitative measures that are used to track tourism and recreation operations.

The potential and need for drought planning is highlighted by a set of questions asking about the level of preparedness and response for drought in the tourism/recreation sector. Of the 15 people who responded to how successful the tourism/recreation sector has been in drought preparedness, the consensus was either 'somewhat successful' (60%) or not successful' (40%). Nobody responded 'successful', 'very successful', or 'completely successful'. The results were nearly identical for drought response, with two (2) people responding 'successful' and the rest in the 'somewhat successful' or 'not successful' categories. This was fairly consistent across government and non-profit organizational types (the private sector had minimal representation in the survey).

FOCUS GROUPS & INTERVIEWS

On December 1, 2011, two focus groups were conducted in Durango, Colorado, each lasting approximately 90 minutes in length. One session focused on summer tourism /recreation and the other on winter tourism / recreation. In total, twelve (12) people participated, seven (7) in the summer group and five (5) in the winter group, with representation from a wide variety of organization types, from government to non-profit to for-profit private business. As with the survey responses, the proportion of private businesses was smaller than government or non-profit organizations, and the representation for winter less than for summer tourism/recreation. While the number of participants was somewhat smaller than anticipated, the focus groups generated rich and interesting dialogue with regard to the opportunities and challenges of planning for and responding to drought in the tourism/recreation sector. To supplement the focus group conversations, two interviews were conducted with mountain ski resort representatives in order to incorporate this important perspective.

THEMES FROM FOCUS GROUPS & INTERVIEWS

Taken together, several overarching themes emerged from the focus groups and interviews, which were also underscored by the responses in the survey. Importantly, the tourism/recreation sector is far from a single economic entity, particularly with regard to drought and water resources; it is nuanced and diverse in terms of operations and the ways in which it interacts with, and depends on, water resources. Not only is there a distinct seasonality of the tourism/recreation from summer to winter, but a seasonal interaction also exists, particularly with regard to precipitation interactions. For example, a dry winter not only affects the ski season, but also in turn determines run-off and therefore impacts summer recreation and tourism.

Impacts

Drought has both direct and indirect impacts on the tourism/recreation sector, and spans all seasons. Reduction in water-dependent activities, such as boating, rafting, canoeing, fishing, skiing, snowmobiling, or skiing, resulting from lower water levels or snow amounts, are the easiest to identify. Intangible relationships are harder to quantify and link back to drought. Some examples include: decreased visitations to communities, cancelations in hotel stays stemming from negative perceptions of dryness, vacation cancellations (or never booked) because of wildfires occurring in the state (even if far away from the destination), a reduction in campground reservations as a result of negative perceptions of fire bans, or even reduced attendance at community festivals. Wildlife viewing or hunting can also be affected through changes in animal migratory patterns, causing reduced revenues for nearby towns and communities. Agritourism is also highly interlinked with drought, including wineries, peach orchards, or any farming/ranching activities that attract tourists. Additionally, the health of an eco-system (beetle kill, for example) and the occurrence of other natural events (wildfires or flash flooding) can influence the visitor experience. Drought-wildfire connections were commonly mentioned, whereby the wildfire really 'makes the drought known', and the direct impacts on tourism/recreation more easily identified. In the end, if drought results in negative experiences for visitors, perhaps from water restrictions or viewing a drought-stressed, brown landscape when they think it should be green, people may convey this to others, thereby even reducing future visits. With negative effects, the ensuing outcomes ultimately result in lowered infusion of money into the economy and a reduction on sales taxes, potentially even leading to unemployment or societal and psychological impacts in the community.

Conversely, potential benefits of lower precipitation exist for some subgroups. For example, less precipitation in the spring or earlier melting means more spring visits and the ability to hike or mountain bike at higher elevations earlier. In the southwestern corner of Colorado, reduced precipitation produces less mud and erosion to trails, as well as increased road access. And, while a shortened ski season is not necessarily desirable, it produces a shift to a longer summer tourist season. Ultimately, this points to the potential for diversification as an adaptive strategy, and marketing the multiple opportunities that exist for recreating.

The Challenge

The diversity of the tourism/recreation sector produces distinct challenges for the drought-tourism/recreation nexus, particularly for incorporating all the various types of activities into drought planning. Water recreation activities, such as fishing or rafting seem to identify more closely with natural resource management and by extension with water management. As a consequence, the link to drought is more readily acknowledged. On the other hand, activities that are oriented towards tourism are perhaps less directly tied to non-consumptive water use and so linkages less acknowledged, though still certainly interconnected. For example, on more than one occasion during the focus groups and interviews, someone would say something along the lines of "I'm an expert in tourism, but not drought, so don't know what I can offer". Or, as another person phrased it, "It's hard to see the realistic links between tourism as a business & drought planning". In fact, comprehensive planning for the drought/tourism/recreation nexus requires increasing awareness of, and promoting dialogue about, the connections and linkage across the continuum of expertise. The process should include those with a drought/resource management emphasis who do not necessarily recognize or understand the tourism/recreation and those in tourism/recreation who do not participate in drought /resource management activities. The first step is establishing and illustrating the connection between drought and tourism/recreation in order to convince stakeholders of the relevance, building on a core group already active in this type of planning and response.

Drought Relevance

The first challenge is educating stakeholders of the relevance of drought planning for tourism/recreation, even when small business owners or those involved in non-profits do not necessarily view this as a top-priority due to time and monetary constraints. Increasing awareness through education and communication, along with illustrating interconnections with other hazard types would likely increase the participation of this sector in drought planning. However, it is not just about awareness, but also about demonstrating these connections in concrete ways so that people can see the benefits of participating. One way is through data and analysis that documents how drought affects the tourism/recreation sector. Unfortunately, to this point, relevant data are not collected or compiled in a way to provide evidence for the associations.

Indicators and Trends

Establishing the connection between drought and lowered visitations, reduced tax revenues, operating expenses, employment, or hotel visits (the most commonly collected data from the survey) is a daunting task. Other indicators that were mentioned included visitation data from a variety of sources (parks, trail logbooks, number of people floating, train ticket sales, etc), traffic data, or hunting tags. Table 1 lists

potential data sources and indicators described in the focus groups. Significantly, there is not an indicator of singular importance, but rather a combination of indicators, and their relevance may vary for a business, community, or region (different indicators for different scales). One focus group did prioritize visitation as the most important, but recognized visitations represent a variety of data sources (state park visitations, national park visitations, etc.) and acknowledged the relevance of other indicators. Visitations were identified as data that could be readily collected and compiled.

Table 1. Potential Data Sources and Indicators for Drought Impacts on Tourism/Recreation

• Retail sales • Restaurant and bar receipts • Winter drought equals less water sales for providers • Lodger's tax (city of Durango tracks sales tax from lodging) • Lodging revenues • Sales tax receipts and revenue • Employment numbers by sector/community/county/region (region 9 economic development) • Train ticket sales • Spending per person (book stores, shops) • Number of fishing licenses • Number of repeat customers • Number of licensing for hunting (in-state vs. out of state) (Oct – Nov – Dec big game)	• Visitations to national and state parks • Number of people rafting on river • Counts of hikers on trails • Interstate visitation interactions • Visitor experiences • Critical failures of ecosystems (eg. overgrazing and the tree kill) • Invasive species • Agricultural yields (particularly as it relates to tourism, for example wineries) • Ski visitations • Numbers of opened trails and acreage at ski operations • Ski season length • Cross-country ski trail closures • Attendance at community events

Data collection requires that the indicators are established, obtainable, and compiled. These data could then be compared with drought cycles and patterns, as well as seasonality, examining trends rather than cross sections of information. Additionally, distinguishing drought impacts from broader economic trends is a distinct challenge. However, since tourism/recreation data are not consistently and systematically collected and associated with drought, it is challenging to evaluate how these trends and cycles connect at this time.

Coping Strategies for Drought

At the same time, it is precisely the diversity in this sector that provides the greatest potential for adaptive capacity in this sector. A repeated theme related to economic diversification, ensuring a business or community is not tied to any one revenue generating activity. Even when a drought occurs, visitors may not be able to partake in an anticipated activity, but there are always other options. For example, if a person cannot raft due to low water levels, then perhaps they can mountain bike. Further, sometimes drought, or at least dry weather, is positive for some activities. Several cited examples included increased visitation to Mesa Verde, hiking, or camping. In the view of one participant, "visitor's don't really care about drought in terms of impacts on the eco-system, that doesn't drive their decision

making and it does not result in a long-term planning effect; rather it is 'what are the conditions right now' in the specific area that I want to visit. It is at that point that a visitor will decide to book travel (and activity), not the other way around."

Ultimately, it is incumbent for the community to market and communicate multiple options, and to also coordinate strategies for attracting visitors even when drought occurs. This requires deliberate planning, establishing decision points as business or community based upon precipitation conditions related to operations, rather than "just hoping for the best". Ensuring a good marketing message and strategy are in place for the entire community is fundamental. This includes both the publication of accurate data and the advertisement of the full range of tourism/recreational opportunities. Though focusing on one resort, an advertisement for Durango Mountain Resort from the 2011 *"Northern Arizona and Beyond"* magazine highlights the year-round and multitude of activities at this resort (Figure 3). Additionally, the drought and fire interface can be used as an educational tool in a semi-arid environment, illustrating how they are part of the natural ecosystem. Just because an area is dry, fires have occurred in the past, or fires are currently occurring in another area, does not mean a region cannot be visited and enjoyed. This must be strategically conveyed in a coordinated manner.

Figure 3. Advertisement for Durango Mountain Resort.

Certainly, the survey, focus groups, and interviews all indicate that drought planning within the context of tourism/recreation has a lot of room for improvement. Identifying underlying vulnerabilities provides an opportunity for planning for multiple hazards and purposes. Important elements of this include: 1) increase awareness of the need to link tourism/recreation and drought, 2) improve metrics and assessment methods for understanding the interconnections over time and at relevant spatial scales, 3) establish case study models of success strategies when businesses and non-profits have survived tough times ("i.e., best practices"), 4) respect of local processes and priorities through stakeholder engagement, 5) attract tourism/recreation sector to drought planning processes, 6) create strategies and recommendations for the tourism/recreation sector for drought preparedness, response, mitigation and recovery, and 7) establish small granting programs by the state for strategic drought planning and mitigation at the local level across all types of activities in this sector.

MODEL OF STAKEHOLDER ENGAGEMENT

Stakeholder engagement underpins the entire data collection process for ultimately arriving at improved adaptive strategies for drought/tourism/recreation vulnerability reduction. The model of stakeholder engagement represents a path forward for data collection and evaluation based on the approach undertaken for the pilot project in Southwestern Colorado (Figure 4). Importantly, the process is not linear, but rather operates continually, whereby data collection and information dissemination on exposure measures, sensitivity, and adaptive strategies is cornerstone. Community engagement, informed by available data: 1) interprets and evaluates current data sources, 2) identifies additional data that could be relatively easily collected, 3) establishes priorities for the development of new data sources, and 4) documents best practices and adaptive strategies.

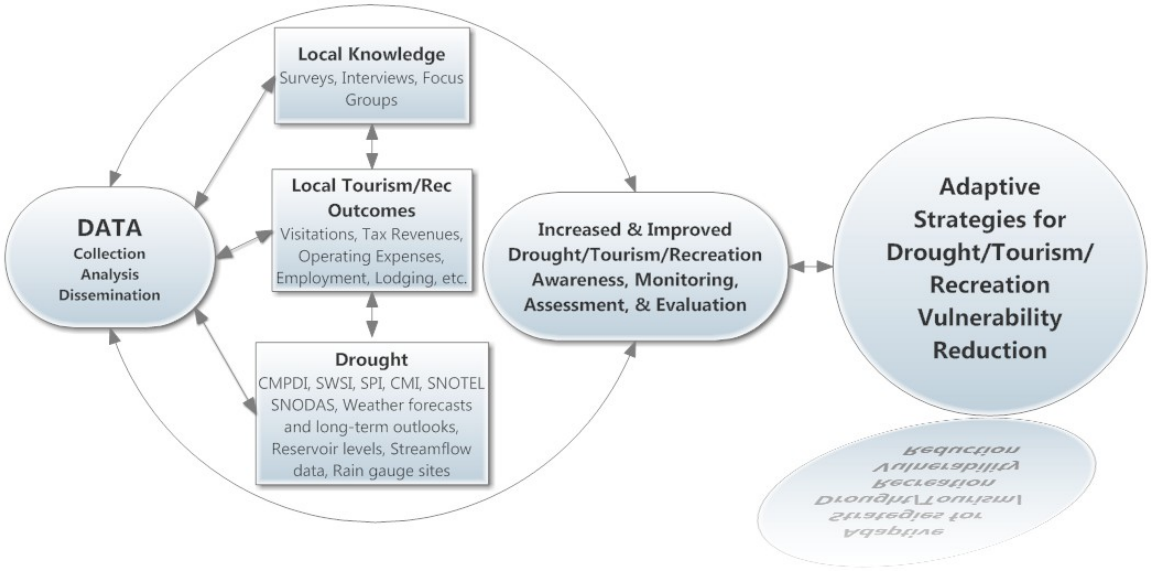

Figure 4. Model of Stakeholder Engagement.

Sustained stakeholder engagement hinges on effective and multipronged participation strategies, the generation of meaningful products from data, and an intentional dissemination strategy. Significantly, a formalized community-based iterative process cannot occur without the infusion of time and monetary resources.

Involvement and Participation

At its foundation, stakeholder engagement for minimizing drought impacts must be inclusive across a wide range of tourism and recreation activities, including public, private and non-profit groups. The development of a stakeholder list as a foundation requires significant time and resources; it is not easy, straightforward, or finite. Multiple mechanisms for recruitment with several explicit strategies for garnering successful involvement and participation lead to a more successful engagement process.

Identifying and utilizing champions in related drought/tourism/recreation activities has multiple possibilities. Creating a catalogue that demonstrates successful approaches provides models for others. Further, establishing best practice examples for integrating public and private sector data that informs vulnerability assessment and dialogue creates a baseline for developing adaptive capacity strategies for targeted intervention and generates recommendations for drought planning and mitigation opportunities. Knowing who could be potential champions may occur through professional networks; however, this should be expanded to avoid the 'same people talking to the same people' effect. Attending professional meetings outside of the typical drought or water planning meetings, a small business association for example, is a prospect for identifying and recruiting champions, expanding out from those who might normally be involved in drought planning. This is also an opportunity for building relationships and generating interest.

Creating meaningful incentives for participation to remove barriers can improve the level of engagement. This might include small stipends for repeated meeting attendance, commenting on documents, and data provision, which could be granted to the organization rather than the individual to ensure equitable access across government and non-governmental groups. Another option is the establishment of seed grant programs for drought planning and mitigation that are offered to both public and private projects. This would initially be accessed through the drought/tourism/recreation participation and planning process. Ultimately, they could evolve into competitive granting opportunities. For the private sector, setting up small business granting programs (perhaps using, adapting, or modeling after the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program: http://www.sbir.gov/) for drought-related business continuity planning would be an option. The creation and conveyance of co-benefits for planning for multiple hazards is also fundamental, for example linking drought with wildfire planning.

Process of Stakeholder Engagement

A series of focus groups would initiate the process, using a modified version of the focus group guide developed for the pilot project to start conversations about connections, interactions, and concerns about drought/tourism/recreation linkages. Initially, the first set of focus groups would be stratified by business owners, water managers, resource managers, emergency management, non-profits, and government representatives in order to garner views and perspectives within these subgroups. Since the subgroups have some commonality in terms of operations and possibly views on the relevance of drought to their organization, this provides an opportunity to utilize the focus groups for awareness and

education where needed, or for more sophisticated conversations . Because participants will likely be in groups with more similar backgrounds with regard to subsector, this would potentially minimize dominance by people with more experience. While some division exists between summer and winter tourism/recreation in terms of types of activities and reliance on water, the seasons are also interrelated with spring and fall also contributing to tourism/recreation. Additionally, many organizations work across seasons. As such, stratifying by season at this point in addition to organization type does not make sense.

The initial SWDART survey would then be modified based on the first set of sub-sector focus groups, ensuring regional and local relevance, and would be administered widely to a broad stakeholder group to systematically capture views, perceptions, ideas, and practice for drought/tourism/recreation planning. A series of follow-on focus groups would be composed of people from across these subgroups to highlight integration issues, as well as data sources and sharing. At this point, it may make sense, depending on the community and stakeholder groups, to pay particular attention to summer and winter activities independently in addition to the fully integrated sessions. These focus groups would include a guided integrated discussion of data needs, opportunities and challenges to drought planning in tourism/recreation, and existing and potential adaptive strategies. Ideally, as education and awareness increase, along with systematic data collection, additional follow-on meetings and workshops would also occur. Importantly, this would not just be asking people to a meeting on the topic of drought/tourism/recreation, but would also include adding this topic to the agendas of meetings and workshops that already occur regularly.

Dissemination

The reporting back of meaningful information through relevant outlets is essential for buy-in and continued participation. People and organizations must get consequential and pertinent information out of the process that is directly applicable to their organization. As such, this requires creating effective products that are actively distributed through outlets already utilized by different groups, for instance a Chamber of Commerce newsletter. Additionally, reporting back should occur in a variety of venues in the community to continue and to expand the dialogue on drought/tourism/recreation vulnerability assessment and planning. This might include town hall meetings, participation in professional meetings, and information dissemination through a variety of professional associations. In other words, success will emerge from education and communication occurring through relevant venues (going to their table, rather than asking them to come to the drought table). Taking advantage of social media and the Internet are also key strategies for success, both for the stakeholder engagement process and for communication and marketing to broader audiences.

Data & Information

Data lay the foundation for the entire stakeholder engagement process. However, data must be converted to relevant information and incorporated into meaningful dialogue about drought/tourism/recreation vulnerability reduction strategies. Initially, a voluntary system of data collection should be designed and established around a few key indicators on drought tourism/recreation outcome measures. Based on the pilot project, starting with visitations, lodging receipts, and licenses would provide a baseline. Visitations and licenses to public resources would likely be the easiest place to begin. Thus, data collection is a phased process, where step one includes identifying the full range of impacts and how they can be measured and then starting with the

documentation of a few. Step two then expands these through the stakeholder engagement process to more fully and comprehensively understand interactions.

Like with other aspects of the stakeholder process, this cannot be an unfunded mandate; establishing, maintaining, and disseminating data and information takes significant effort. However, data collection and information dissemination is the only path towards an engagement process that values understanding trends and has evidence for informing planning and policy within this vital economic sector.

CONCLUSION

The SWDART pilot project clearly illustrates the need for expanded work surrounding the drought/tourism/recreation nexus, along with the influences of climate change, in Southwestern Colorado and across the entire state. Not nearly enough is known about the interactions, even though tourism and recreation are precious state resources. The current 2012 drought provides both an opportunity to spur drought/tourism/recreation planning and a case study of impacts on tourism/recreation. Further, comprehensive drought/tourism/recreation planning must address linkages with other hazard types, particularly wildfires. Importantly, vulnerability reduction necessitates coordinated and integrated cross-sector communication plans that take advantage and mobilize social media and the Internet. Significantly, drought impacts are not just economic, but extend to the very livelihoods of communities and social well-being. A formalized process of stakeholder engagement is needed to understand and reduce drought vulnerability of this sector to ensure community vitality.

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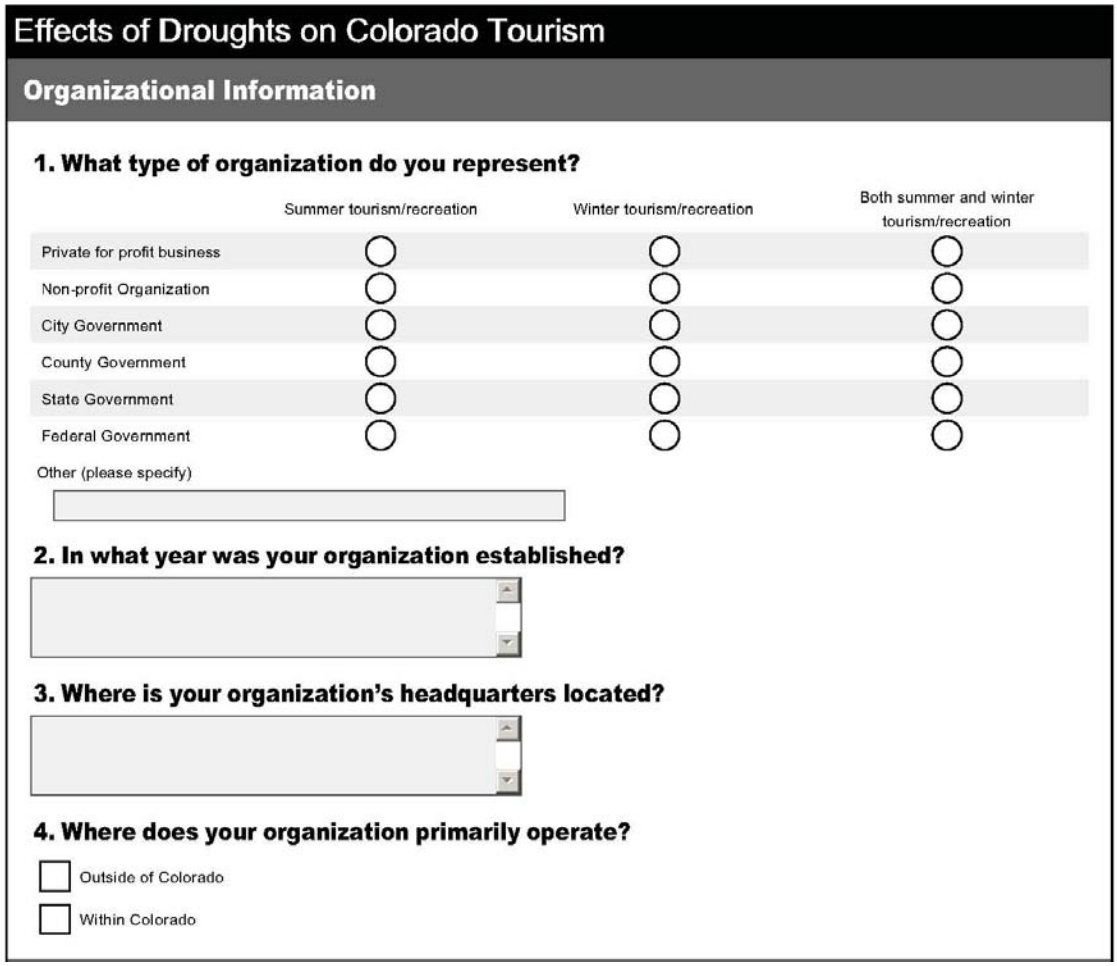
Appendix 1. Survey



Effects of Droughts on Colorado Tourism

Organizational Information

1. What type of organization do you represent?

	Summer tourism/recreation	Winter tourism/recreation	Both summer and winter tourism/recreation
Private for profit business	○	○	○
Non-profit Organization	○	○	○
City Government	○	○	○
County Government	○	○	○
State Government	○	○	○
Federal Government	○	○	○

Other (please specify)

2. In what year was your organization established?

3. Where is your organization's headquarters located?

4. Where does your organization primarily operate?

☐ Outside of Colorado

☐ Within Colorado

Effects of Droughts on Colorado Tourism

5. Which county, or set of counties, is most central to your operations? [check all that apply]

- [ ] N/A
- [ ] Mesa County
- [ ] Montrose County
- [ ] San Miguel County
- [ ] Dolores County
- [ ] San Juan County
- [ ] Montezuma County
- [ ] La Plata County
- [ ] Archuleta County
- [ ] Mineral County
- [ ] Hinsdale County

6. Of these locations, which ONE is the most central to your operations?

- ◯ None
- ◯ Mesa County
- ◯ Montrose County
- ◯ San Miguel County
- ◯ Dolores County
- ◯ San Juan County
- ◯ Montezuma County
- ◯ La Plata County
- ◯ Archuleta County
- ◯ Mineral County
- ◯ Hinsdale County

Operations

Effects of Droughts on Colorado Tourism

7. Which month(s) would you consider the peak operation for your organization? [check all that apply]

- ☐ January
- ☐ February
- ☐ March
- ☐ April
- ☐ May
- ☐ June
- ☐ July
- ☐ August
- ☐ September
- ☐ October
- ☐ November
- ☐ December

8. Which month(s) is the highest revenue generating? [check all that apply]

- ☐ January
- ☐ February
- ☐ March
- ☐ April
- ☐ May
- ☐ June
- ☐ July
- ☐ August
- ☐ September
- ☐ October
- ☐ November
- ☐ December

Effects of Droughts on Colorado Tourism

9. My organization has a system to track: [check all that apply]

- ☐ Visitation Data
- ☐ Lodging Receipts
- ☐ State Parks: Visitation Reduction
- ☐ Number of Lift Tickets Sold
- ☐ Hunting Licenses
- ☐ Sales Tax Revenues
- ☐ State Parks: Boat Ramp Closures
- ☐ State Parks: Closures
- ☐ Season Ski Passes Sold
- ☐ Operating Costs
- ☐ Employment Addition/Reduction
- ☐ State Parks: Camp Ground Closures
- ☐ State Parks: Trail Closures
- ☐ Fishing Licenses
- ☐ N/A

10. If applicable, would your organization be willing to share some form of these data in the future as part of drought planning processes?

- ○ Yes
- ○ Maybe
- ○ No
- ○ N/A

Adaptive Capacity, Sensitivity, and Exposure

***11. For your operations, how would you define drought?**

12. Has your organization ever experienced a drought?

- ○ Yes
- ○ No

Effects of Droughts on Colorado Tourism

13. List when your organization experienced drought.

14. Describe any actions that your organization took in response to a drought.

15. Describe any adjustments that became a permanent part of your organization's operations as a result of your drought experience.

16. Does your organization have a drought mitigation and/or response plan?

- ◯ Yes
- ◯ No

17. What are the main components of your drought plan?

18. Would you be willing to share your drought plan?

- ◯ Yes
- ◯ No

19. Do you participate in any local or regional drought planning?

- ◯ Yes
- ◯ No

Effects of Droughts on Colorado Tourism

20. Please list drought planning efforts in which you participate.

21. Which of the following statements best captures your organization's current drought plan?

- ◯ We have a written drought plan that is synchronized with the state's drought plan and is revised on an established schedule.
- ◯ We have a written drought plan that is synchronized with a SW regional drought planning efforts.
- ◯ We have a written drought plan but it is not linked to other drought planning efforts.
- ◯ We do not have a written drought plan, but we discuss how we will change our operations if there is a drought.
- ◯ We do not plan for drought.

22. Please indicate which best describes your organization's experience with drought.

	Strongly Agree	Agree	Uncertain (Not sure)	Disagree	Strongly Disagree
Drought will impact my organization's operations in the future.	◯	◯	◯	◯	◯
My organization has a great deal of exposure to drought.	◯	◯	◯	◯	◯
My organization's revenues are dependent on water availability.	◯	◯	◯	◯	◯

23. In your opinion, what aspects of your organization/operations are most sensitive to drought?

Effects of Droughts on Colorado Tourism

24. Which of the following measurements or resources are you aware of for MONITORING drought? [check all that apply]

- [ ] Colorado Modified Palmer Drought Index (CMPDI)
- [ ] Surface Water Supply Index (SWSI)
- [ ] Standardized Precipitation Index (SPI)
- [ ] Crop Moisture Index (CMI)
- [ ] U.S. Drought Monitor
- [ ] U.S. Seasonal Drought Outlook
- [ ] Colorado Monthly Water Supply Report
- [ ] Colorado Monthly Climate Report
- [ ] Historical norms
- [ ] Weather forecasts and long-term outlooks
- [ ] Reservoir levels
- [ ] Streamflow data
- [ ] Rain gauge sites
- [ ] NRCS Snow Telemetry Network (SNOTEL) sites
- [ ] USBRM Snow Data Assimilation System (SNODAS)
- [ ] Other
- [ ] I am not familiar with any of these.

25. Please list other drought MONITORING measurements or resources you are aware of.

Effects of Droughts on Colorado Tourism

26. Which, if any, does your organization use regularly for MONITORING drought conditions? [check all that apply]

- [ ] Colorado Modified Palmer Drought Index (CMPDI)
- [ ] Surface Water Supply Index (SWSI)
- [ ] Standardized Precipitation Index (SPI)
- [ ] Crop Moisture Index (CMI)
- [ ] U.S. Drought Monitor
- [ ] U.S. Seasonal Drought Outlook
- [ ] Colorado Monthly Water Supply Report
- [ ] Colorado Monthly Climate Report
- [ ] Historical norms
- [ ] Weather forecasts and long-term outlooks
- [ ] Reservoir levels
- [ ] Streamflow data
- [ ] Rain gauge sites
- [ ] NRCS Snow Telemetry Network (SNOTEL) sites
- [ ] USBRM Snow Data Assimilation System (SNODAS)
- [ ] Other

27. If your organization uses "Other" drought MONITORING tools, please list them here.

Effects of Droughts on Colorado Tourism

28. Which of the following measurements or resources are you aware of for PREDICTING drought? [check all that apply]

- [ ] Colorado Modified Palmer Drought Index (CMPDI)
- [ ] Surface Water Supply Index (SWSI)
- [ ] Standardized Precipitation Index (SPI)
- [ ] Crop Moisture Index (CMI)
- [ ] U.S. Drought Monitor
- [ ] U.S. Seasonal Drought Outlook
- [ ] Colorado Monthly Water Supply Report
- [ ] Colorado Monthly Climate Report
- [ ] Historical norms
- [ ] Weather forecasts and long-term outlooks
- [ ] Reservoir levels
- [ ] Streamflow data
- [ ] Rain gauge sites
- [ ] NRCS Snow Telemetry Network (SNOTEL) sites
- [ ] USBRM Snow Data Assimilation System (SNODAS)
- [ ] Other
- [ ] I am not familiar with any of these.

29. Please list other drought PREDICTING measurements or resources you are aware of.

Effects of Droughts on Colorado Tourism

30. Which, if any, does your organization use regularly for PREDICTING drought conditions? [check all that apply]

- [ ] Colorado Modified Palmer Drought Index (CMPDI)
- [ ] Surface Water Supply Index (SWSI)
- [ ] Standardized Precipitation Index (SPI)
- [ ] Crop Moisture Index (CMI)
- [ ] U.S. Drought Monitor
- [ ] U.S. Seasonal Drought Outlook
- [ ] Colorado Monthly Water Supply Report
- [ ] Colorado Monthly Climate Report
- [ ] Historical norms
- [ ] Weather forecasts and long-term outlooks
- [ ] Reservoir levels
- [ ] Streamflow data
- [ ] Rain gauge sites
- [ ] NRCS Snow Telemetry Network (SNOTEL) sites
- [ ] USBRM Snow Data Assimilation System (SNODAS)
- [ ] Other

31. If your organization uses "Other" drought PREDICTION tools, please list them here.

Effects of Droughts on Colorado Tourism

32. Please rate the usefulness of the drought measurement tools.

	Very useful	Somewhat useful	A little useful	Rarely useful	Not at all useful	Not familiar with it
Colorado Modified Palmer Drought Index (CMPDI)	◯	◯	◯	◯	◯	◯
Surface Water Supply Index (SWSI)	◯	◯	◯	◯	◯	◯
Standardized Precipitation Index (SPI)	◯	◯	◯	◯	◯	◯
Crop Moisture Index (CMI)	◯	◯	◯	◯	◯	◯
U.S. Drought Monitor	◯	◯	◯	◯	◯	◯
U.S. Seasonal Drought Outlook	◯	◯	◯	◯	◯	◯
Colorado Monthly Water Supply Report	◯	◯	◯	◯	◯	◯
Colorado Monthly Climate Report	◯	◯	◯	◯	◯	◯
Historical norms	◯	◯	◯	◯	◯	◯
Weather forecasts and long-term outlooks	◯	◯	◯	◯	◯	◯
Reservoir levels	◯	◯	◯	◯	◯	◯
Streamflow data	◯	◯	◯	◯	◯	◯
Rain gauge sites	◯	◯	◯	◯	◯	◯
NRCS Snow Telemetry Network (SNOTEL) sites	◯	◯	◯	◯	◯	◯
USBRM Snow Data Assimilation System (SNODAS)	◯	◯	◯	◯	◯	◯
Other (rate those measurement tools that you use but are not listed)	◯	◯	◯	◯	◯	◯

33. Are there any measurements or indicators that you wish were available to assist your organization in predicting drought?

Resources and Needs

34. What resources (networks, information, guidelines, etc.) would help your organization prepare for, and respond to, drought?

Effects of Droughts on Colorado Tourism

35. What barriers exist that prevent your organization from effectively preparing or responding to drought?

36. Are there associations, professional organizations, and/or regional networks that are useful to your organization for drought planning?

- ◯ Yes
- ◯ No

37. Please list the organizations and networks that you find useful as a resource for your organization for drought planning.

38. How successful has the tourism and recreation sector been at PREPARING for drought?

- ◯ Not Successful
- ◯ Somewhat Successful
- ◯ Successful
- ◯ Very Successful
- ◯ Completely Successful

39. How successful has the tourism and recreation sector been at RESPONDING to drought?

- ◯ Not Successful
- ◯ Somewhat Successful
- ◯ Successful
- ◯ Very Successful
- ◯ Completely Successful

Effects of Droughts on Colorado Tourism

40. Are there associations, professional organizations, and/or regional networks that you feel are particularly effective in drought planning?

- ◯ Yes
- ◯ No

41. Please list the organizations and networks that you feel are effective drought planners.

Thank you for your time.

***42. Are you interested in receiving the results of this study?**

- ◯ Yes
- ◯ No

43. Please enter your e-mail address so that we can send a digital report to you.

***44. May we contact you to be part of future stakeholder involvement activities?**

- ◯ Yes
- ◯ No

45. Please enter your contact information, including e-mail address, so that we can follow up with you in the future as activities are organized.

Appendix 2: Survey Administration

Sent/Scheduled Messages

Message Subject	Send Date	Sent
re: drought planning	Mailed on December 30, 2011 4:11 PM	52
re: Drought Planning Survey Request	Mailed on November 30, 2011 1:07 PM	1
re: Drought Planning Survey Request	Mailed on November 30, 2011 1:06 PM	2
re: Drought Planning Survey Request	Mailed on November 28, 2011 12:13 PM	1
re: Drought Planning Survey Request	Mailed on November 21, 2011 9:20 PM	1
re: Drought Planning Survey Request	Mailed on November 21, 2011 9:53 AM	1
re: Drought Planning Survey Request	Mailed on November 20, 2011 11:24 PM	65
Drought Planning Survey Request	Mailed on November 18, 2011 11:49 AM	10
re: Drought Planning Survey Request	Mailed on November 15, 2011 2:35 PM	4
re: Drought Planning Survey Request	Mailed on November 15, 2011 10:59 AM	2
re: Drought Planning Survey Request	Mailed on November 4, 2011 5:10 PM	59

Initial Message Sent:

Below is a preview of your message based on the first recipient in your list ([Email]).

To: [Email]
From: "COswdart@gmail.com via surveymonkey.com" <member@surveymonkey.com>

Subject: re: Drought Planning Survey Request
Body: You are being asked to be in this study because of your affiliation with a tourism/recreation organization.

The results will help record, analyze, and track the way tourism and recreation organizations are affected by drought, and how they collaborate and work together to address drought issues. The idea of local capacity in drought management is increasingly important, and the responses to this survey, when analyzed together, will provide some insights into organizational needs and capacity in SW Colorado. The findings have implications beyond this region and can suggest recommendations that could apply elsewhere. Because of the interest in stakeholder involvement in drought planning across the State of Colorado this study is being conducted by the Colorado Water Conservation Board.

The benefits of participating in this survey include:
• A review of needs and opportunities for drought planning into the future
• A review of partnerships and measures of connectivity between organizations
• An understanding of what type of organizational relationships might contribute to capacity in drought planning, and what datasets and indicators are the most valuable in this process

This survey should take approximately 20-25 minutes to complete.

Risk to participants is minimal, as this is not a study of individual views or perceptions, but rather about organizations and drought planning. However, as with any survey, there is some risk of psychological discomfort and/or to professional job security since the questions are based on opinions of organizational preparedness and response to drought. There may also be risks the researchers have not thought of. Every effort will be made to protect your privacy and confidentiality by exclusion of personal identifiers from analyzed and reported data. We will not reveal that you participated in the study, unless you agree to be part of follow-up meetings as part of the stakeholder engagement process for drought planning. You have a choice about being in this study and you do not have to participate in this study if you are not interested. Your participation in this survey is completely voluntary.

Reminder #1 on 11/20/2011:

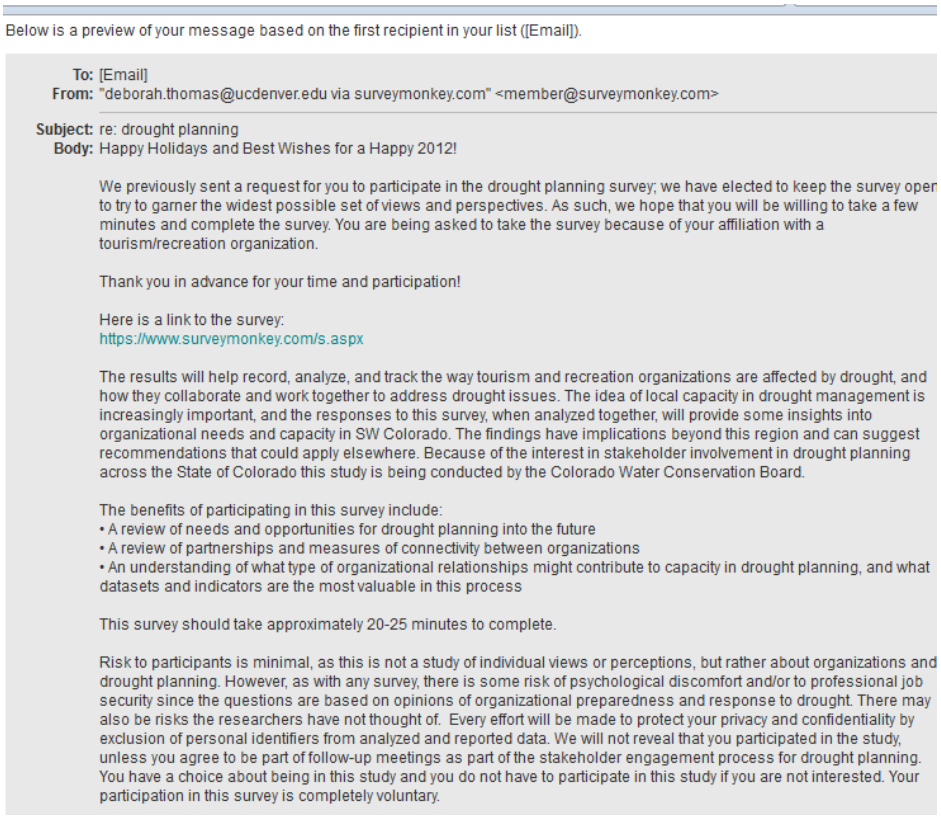
Below is a preview of your message based on the first recipient in your list ([Email]).

To: [Email]
From: "coswdart@gmail.com via surveymonkey.com" <member@surveymonkey.com>

Subject: re: Drought Planning Survey Request
Body: We know you are extremely busy, but hope that given your expertise and involvement in tourism/recreation, you can take approximately 20-25 minutes to answer this survey on how organizations and agencies in the this sector plan for, and respond to, drought. We thank you in advance for your time!

Here is a link to the survey:
https://www.surveymonkey.com/s.aspx

Reminder #2 on 12/30/2011:



Below is a preview of your message based on the first recipient in your list ([Email]).

To: [Email]
From: "deborah.thomas@ucdenver.edu via surveymonkey.com" <member@surveymonkey.com>

Subject: re: drought planning
Body: Happy Holidays and Best Wishes for a Happy 2012!

We previously sent a request for you to participate in the drought planning survey; we have elected to keep the survey open to try to garner the widest possible set of views and perspectives. As such, we hope that you will be willing to take a few minutes and complete the survey. You are being asked to take the survey because of your affiliation with a tourism/recreation organization.

Thank you in advance for your time and participation!

Here is a link to the survey:
https://www.surveymonkey.com/s.aspx

The results will help record, analyze, and track the way tourism and recreation organizations are affected by drought, and how they collaborate and work together to address drought issues. The idea of local capacity in drought management is increasingly important, and the responses to this survey, when analyzed together, will provide some insights into organizational needs and capacity in SW Colorado. The findings have implications beyond this region and can suggest recommendations that could apply elsewhere. Because of the interest in stakeholder involvement in drought planning across the State of Colorado this study is being conducted by the Colorado Water Conservation Board.

The benefits of participating in this survey include:
• A review of needs and opportunities for drought planning into the future
• A review of partnerships and measures of connectivity between organizations
• An understanding of what type of organizational relationships might contribute to capacity in drought planning, and what datasets and indicators are the most valuable in this process

This survey should take approximately 20-25 minutes to complete.

Risk to participants is minimal, as this is not a study of individual views or perceptions, but rather about organizations and drought planning. However, as with any survey, there is some risk of psychological discomfort and/or to professional job security since the questions are based on opinions of organizational preparedness and response to drought. There may also be risks the researchers have not thought of. Every effort will be made to protect your privacy and confidentiality by exclusion of personal identifiers from analyzed and reported data. We will not reveal that you participated in the study, unless you agree to be part of follow-up meetings as part of the stakeholder engagement process for drought planning. You have a choice about being in this study and you do not have to participate in this study if you are not interested. Your participation in this survey is completely voluntary.

Appendix 3: Survey Response Summary

1. What type of organization do you represent?

	Summer tourism/recreation	Winter tourism/recreation	Both summer and winter tourism/recreation	Response Count
Private for profit business	**66.7% (2)**	0.0% (0)	33.3% (1)	3
Non-profit Organization	22.2% (2)	0.0% (0)	**77.8% (7)**	9
City Government	0.0% (0)	0.0% (0)	**100.0% (4)**	4
County Government	0.0% (0)	0.0% (0)	0.0% (0)	0
State Government	0.0% (0)	0.0% (0)	**100.0% (1)**	1
Federal Government	0.0% (0)	0.0% (0)	**100.0% (4)**	4
			Other (please specify)	9
			answered question	**21**
			skipped question	**6**

2. In what year was your organization established?

	Response Count
	24
answered question	**24**
skipped question	**3**

3. Where is your organization's headquarters located?

	Response Count
	25
answered question	25
skipped question	2

4. Where does your organization primarily operate?

	Response Percent	Response Count
Outside of Colorado	8.0%	2
Within Colorado	92.0%	23
answered question		25
skipped question		2

5. Which county, or set of counties, is most central to your operations? [check all that apply]

	Response Percent	Response Count
N/A	8.3%	2
Mesa County	12.5%	3
Montrose County	29.2%	7
San Miguel County	45.8%	11
Dolores County	29.2%	7
San Juan County	25.0%	6
Montezuma County	33.3%	8
La Plata County	**54.2%**	**13**
Archuleta County	16.7%	4
Mineral County	20.8%	5
Hinsdale County	29.2%	7
	answered question	**24**
	skipped question	**3**

6. Of these locations, which ONE is the most central to your operations?

	Response Percent	Response Count
None	0.0%	0
Mesa County	0.0%	0
Montrose County	9.1%	2
San Miguel County	27.3%	6
Dolores County	0.0%	0
San Juan County	4.5%	1
Montezuma County	9.1%	2
La Plata County	**45.5%**	**10**
Archuleta County	0.0%	0
Mineral County	4.5%	1
Hinsdale County	0.0%	0
	answered question	**22**
	skipped question	**5**

7. Which month(s) would you consider the peak operation for your organization? [check all that apply]

	Response Percent	Response Count
January	20.8%	5
February	16.7%	4
March	20.8%	5
April	20.8%	5
May	45.8%	11
June	**91.7%**	**22**
July	**91.7%**	**22**
August	87.5%	21
September	62.5%	15
October	41.7%	10
November	25.0%	6
December	20.8%	5
	answered question	**24**
	skipped question	**3**

8. Which month(s) is the highest revenue generating? [check all that apply]

	Response Percent	Response Count
January	10.0%	2
February	5.0%	1
March	10.0%	2
April	0.0%	0
May	20.0%	4
June	60.0%	12
July	**85.0%**	**17**
August	75.0%	15
September	40.0%	8
October	25.0%	5
November	10.0%	2
December	20.0%	4
	answered question	**20**
	skipped question	**7**

9. My organization has a system to track: [check all that apply]

	Response Percent	Response Count
Visitation Data	40.9%	9
Lodging Receipts	31.8%	7
State Parks: Visitation Reduction	4.5%	1
Number of Lift Tickets Sold	9.1%	2
Hunting Licenses	4.5%	1
Sales Tax Revenues	31.8%	7
State Parks: Boat Ramp Closures	4.5%	1
State Parks: Closures	4.5%	1
Season Ski Passes Sold	13.6%	3
Operating Costs	**63.6%**	**14**
Employment Addition/Reduction	45.5%	10
State Parks: Camp Ground Closures	4.5%	1
State Parks: Trail Closures	4.5%	1
Fishing Licenses	9.1%	2
N/A	13.6%	3
	answered question	**22**
	skipped question	**5**

10. If applicable, would your organization be willing to share some form of these data in the future as part of drought planning processes?

	Response Percent	Response Count
Yes	41.7%	10
Maybe	29.2%	7
No	8.3%	2
N/A	20.8%	5
answered question		24
skipped question		3

11. For your operations, how would you define drought?

	Response Count
	24
answered question	24
skipped question	3

12. Has your organization ever experienced a drought?

	Response Percent	Response Count
Yes	85.7%	18
No	14.3%	3
answered question		21
skipped question		6

13. List when your organization experienced drought.

	Response Count
	17
answered question	17
skipped question	10

14. Describe any actions that your organization took in response to a drought.

	Response Count
	16
answered question	16
skipped question	11

15. Describe any adjustments that became a permanent part of your organization's operations as a result of your drought experience.

	Response Count
	15
answered question	15
skipped question	12

16. Does your organization have a drought mitigation and/or response plan?

		Response Percent	Response Count
Yes		22.7%	5
No		77.3%	17
		answered question	22
		skipped question	5

17. What are the main components of your drought plan?

	Response Count
	5
answered question	5
skipped question	22

18. Would you be willing to share your drought plan?

		Response Percent	Response Count
Yes		80.0%	4
No		20.0%	1
		answered question	5
		skipped question	22

19. Do you participate in any local or regional drought planning?

	Response Percent	Response Count
Yes	20.0%	4
No	80.0%	16
answered question		20
skipped question		7

20. Please list drought planning efforts in which you participate.

Response Count
11
answered question 11
skipped question 16

21. Which of the following statements best captures your organization's current drought plan?

	Response Percent	Response Count
We have a written drought plan that is synchronized with the state's drought plan and is revised on an established schedule.	0.0%	0
We have a written drought plan that is synchronized with a SW regional drought planning efforts.	0.0%	0
We have a written drought plan but it is not linked to other drought planning efforts.	10.5%	2
We do not have a written drought plan, but we discuss how we will change our operations if there is a drought.	42.1%	8
We do not plan for drought.	**47.4%**	**9**
	answered question	**19**
	skipped question	**8**

22. Please indicate which best describes your organization's experience with drought.

	Strongly Agree	Agree	Uncertain (Not sure)	Disagree	Strongly Disagree	Response Count
Drought will impact my organization's operations in the future.	26.3% (5)	**36.8% (7)**	31.6% (6)	5.3% (1)	0.0% (0)	19
My organization has a great deal of exposure to drought.	21.1% (4)	15.8% (3)	15.8% (3)	**47.4% (9)**	0.0% (0)	19
My organization's revenues are dependent on water availability.	20.0% (4)	**35.0% (7)**	10.0% (2)	15.0% (3)	20.0% (4)	20
					answered question	**20**
					skipped question	**7**

23. In your opinion, what aspects of your organization/operations are most sensitive to drought?

	Response Count
	19
answered question	**19**
skipped question	**8**

24. Which of the following measurements or resources are you aware of for MONITORING drought? [check all that apply]

	Response Percent	Response Count
Colorado Modified Palmer Drought Index (CMPDI)	26.3%	5
Surface Water Supply Index (SWSI)	31.6%	6
Standardized Precipitation Index (SPI)	31.6%	6
Crop Moisture Index (CMI)	5.3%	1
U.S. Drought Monitor	26.3%	5
U.S. Seasonal Drought Outlook	21.1%	4
Colorado Monthly Water Supply Report	31.6%	6
Colorado Monthly Climate Report	31.6%	6
Historical norms	47.4%	9
Weather forecasts and long-term outlooks	73.7%	14
Reservoir levels	57.9%	11
Streamflow data	**84.2%**	**16**
Rain gauge sites	52.6%	10
NRCS Snow Telemetry Network (SNOTEL) sites	63.2%	12
USBRM Snow Data Assimilation System (SNODAS)	26.3%	5
Other	5.3%	1
I am not familiar with any of these.	10.5%	2
	answered question	**19**
	skipped question	**8**

25. Please list other drought MONITORING measurements or resources you are aware of.

	Response Count
	5
answered question	5
skipped question	22

26. Which, if any, does your organization use regularly for MONITORING drought conditions? [check all that apply]

	Response Percent	Response Count
Colorado Modified Palmer Drought Index (CMPDI)	14.3%	2
Surface Water Supply Index (SWSI)	7.1%	1
Standardized Precipitation Index (SPI)	7.1%	1
Crop Moisture Index (CMI)	7.1%	1
U.S. Drought Monitor	35.7%	5
U.S. Seasonal Drought Outlook	28.6%	4
Colorado Monthly Water Supply Report	21.4%	3
Colorado Monthly Climate Report	21.4%	3
Historical norms	28.6%	4
Weather forecasts and long-term outlooks	50.0%	7
Reservoir levels	42.9%	6
Streamflow data	**92.9%**	**13**
Rain gauge sites	21.4%	3
NRCS Snow Telemetry Network (SNOTEL) sites	57.1%	8
USBRM Snow Data Assimilation System (SNODAS)	14.3%	2
Other	0.0%	0
	answered question	**14**
	skipped question	**13**

27. If your organization uses "Other" drought MONITORING tools, please list them here.

	Response Count
	1
answered question	1
skipped question	26

28. Which of the following measurements or resources are you aware of for PREDICTING drought? [check all that apply]

	Response Percent	Response Count
Colorado Modified Palmer Drought Index (CMPDI)	20.0%	3
Surface Water Supply Index (SWSI)	13.3%	2
Standardized Precipitation Index (SPI)	6.7%	1
Crop Moisture Index (CMI)	0.0%	0
U.S. Drought Monitor	33.3%	5
U.S. Seasonal Drought Outlook	26.7%	4
Colorado Monthly Water Supply Report	26.7%	4
Colorado Monthly Climate Report	26.7%	4
Historical norms	46.7%	7
Weather forecasts and long-term outlooks	**66.7%**	**10**
Reservoir levels	33.3%	5
Streamflow data	46.7%	7
Rain gauge sites	13.3%	2

NRCS Snow Telemetry Network (SNOTEL) sites		53.3%	8
USBRM Snow Data Assimilation System (SNODAS)		20.0%	3
Other		0.0%	0
I am not familiar with any of these.		13.3%	2
		answered question	15
		skipped question	12

29. Please list other drought PREDICTING measurements or resources you are aware of.

Response Count
2
answered question 2
skipped question 25

30. Which, if any, does your organization use regularly for PREDICTING drought conditions? [check all that apply]

	Response Percent	Response Count
Colorado Modified Palmer Drought Index (CMPDI)	12.5%	1
Surface Water Supply Index (SWSI)	0.0%	0
Standardized Precipitation Index (SPI)	0.0%	0
Crop Moisture Index (CMI)	0.0%	0
U.S. Drought Monitor	25.0%	2
U.S. Seasonal Drought Outlook	25.0%	2
Colorado Monthly Water Supply Report	12.5%	1
Colorado Monthly Climate Report	25.0%	2
Historical norms	37.5%	3
Weather forecasts and long-term outlooks	**87.5%**	**7**
Reservoir levels	25.0%	2
Streamflow data	75.0%	6
Rain gauge sites	25.0%	2
NRCS Snow Telemetry Network (SNOTEL) sites	50.0%	4
USBRM Snow Data Assimilation System (SNODAS)	12.5%	1
Other	0.0%	0
	answered question	**8**
	skipped question	**19**

31. If your organization uses "Other" drought PREDICTION tools, please list them here.

	Response Count
	1
answered question	1
skipped question	26

32. Please rate the usefulness of the drought measurement tools.

	Very useful	Somewhat useful	A little useful	Rarely useful	Not at all useful	Not familiar with it	Rating Average	Response Count
Colorado Modified Palmer Drought Index (CMPDI)	11.1% (1)	11.1% (1)	0.0% (0)	11.1% (1)	0.0% (0)	**66.7% (6)**	4.78	9
Surface Water Supply Index (SWSI)	0.0% (0)	12.5% (1)	12.5% (1)	0.0% (0)	12.5% (1)	**62.5% (5)**	5.00	8
Standardized Precipitation Index (SPI)	0.0% (0)	0.0% (0)	12.5% (1)	0.0% (0)	0.0% (0)	**87.5% (7)**	5.63	8
Crop Moisture Index (CMI)	0.0% (0)	12.5% (1)	0.0% (0)	0.0% (0)	12.5% (1)	**75.0% (6)**	5.38	8
U.S. Drought Monitor	22.2% (2)	22.2% (2)	22.2% (2)	0.0% (0)	0.0% (0)	**33.3% (3)**	3.33	9
U.S. Seasonal Drought Outlook	33.3% (3)	11.1% (1)	11.1% (1)	0.0% (0)	0.0% (0)	**44.4% (4)**	3.56	9
Colorado Monthly Water Supply Report	11.1% (1)	22.2% (2)	11.1% (1)	11.1% (1)	0.0% (0)	**44.4% (4)**	4.00	9
Colorado Monthly Climate Report	11.1% (1)	22.2% (2)	11.1% (1)	0.0% (0)	0.0% (0)	**55.6% (5)**	4.22	9
Historical norms	**33.3% (3)**	**33.3% (3)**	22.2% (2)	0.0% (0)	0.0% (0)	11.1% (1)	2.33	9
Weather forecasts and long-term outlooks	30.0% (3)	**50.0% (5)**	10.0% (1)	0.0% (0)	0.0% (0)	10.0% (1)	2.20	10

Reservoir levels	**44.4% (4)**	33.3% (3)	11.1% (1)	0.0% (0)	0.0% (0)	11.1% (1)	2.11	9
Streamflow data	**55.6% (5)**	44.4% (4)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1.44	9
Rain gauge sites	**37.5% (3)**	12.5% (1)	12.5% (1)	0.0% (0)	25.0% (2)	12.5% (1)	3.00	8
NRCS Snow Telemetry Network (SNOTEL) sites	40.0% (4)	**50.0% (5)**	0.0% (0)	0.0% (0)	0.0% (0)	10.0% (1)	2.00	10
USBRM Snow Data Assimilation System (SNODAS)	25.0% (2)	0.0% (0)	12.5% (1)	0.0% (0)	0.0% (0)	**62.5% (5)**	4.38	8
Other (rate those measurement tools that you use but are not listed)	**50.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	**50.0% (1)**	3.50	2
						answered question		**11**
						skipped question		**16**

33. Are there any measurements or indicators that you wish were available to assist your organization in predicting drought?

	Response Count
	4
answered question	**4**
skipped question	**23**

34. What resources (networks, information, guidelines, etc.) would help your organization prepare for, and respond to, drought?

	Response Count
	10
answered question	**10**
skipped question	**17**

35. What barriers exist that prevent your organization from effectively preparing or responding to drought?

	Response Count
	9
answered question	9
skipped question	18

36. Are there associations, professional organizations, and/or regional networks that are useful to your organization for drought planning?

		Response Percent	Response Count
Yes		50.0%	8
No		50.0%	8
answered question			16
skipped question			11

37. Please list the organizations and networks that you find useful as a resource for your organization for drought planning.

	Response Count
	11
answered question	11
skipped question	16

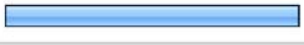
38. How successful has the tourism and recreation sector been at PREPARING for drought?

	Response Percent	Response Count
Not Successful	40.0%	6
Somewhat Successful	**60.0%**	**9**
Successful	0.0%	0
Very Successful	0.0%	0
Completely Successful	0.0%	0
	answered question	**15**
	skipped question	**12**

39. How successful has the tourism and recreation sector been at RESPONDING to drought?

	Response Percent	Response Count
Not Successful	26.7%	4
Somewhat Successful	**60.0%**	**9**
Successful	13.3%	2
Very Successful	0.0%	0
Completely Successful	0.0%	0
	answered question	**15**
	skipped question	**12**

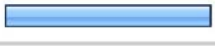
40. Are there associations, professional organizations, and/or regional networks that you feel are particularly effective in drought planning?

		Response Percent	Response Count
Yes		42.9%	6
No		57.1%	8
		answered question	14
		skipped question	13

41. Please list the organizations and networks that you feel are effective drought planners.

	Response Count
	6
answered question	6
skipped question	21

42. Are you interested in receiving the results of this study?

		Response Percent	Response Count
Yes		60.0%	12
No		40.0%	8
		answered question	20
		skipped question	7

43. Please enter your e-mail address so that we can send a digital report to you.

	Response Count
	12
answered question	12
skipped question	15

44. May we contact you to be part of future stakeholder involvement activities?

	Response Percent	Response Count
Yes	70.0%	14
No	30.0%	6
answered question		20
skipped question		7

45. Please enter your contact information, including e-mail address, so that we can follow up with you in the future as activities are organized.

	Response Count
	14
answered question	14
skipped question	13

Appendix 4: Focus Group Invite

We hope that you will be willing to participate in a meeting on December 1 from 10:00-11:30 am at the Durango Library that is focused on understanding the impacts of drought on the tourism/recreation sector in the Southwest Basin of Colorado.

Recreation and tourism is a vital economic sector and asset for Southwest Colorado, and yet is highly vulnerable to impacts from drought, but has only been evaluated on a limited basis. Your expertise and involvement with an organization/agency in the tourism/recreation sector makes your insights invaluable in considering how this sector can best plan for, and respond to, drought.

Project highlights:

- Evaluate the measurements, data, and information used in the State Drought Plan Vulnerability Assessment for recreation and tourism in Southwest Colorado
- Recommend additional data and information to fill the gaps for a more complete vulnerability assessment
- Review needs and opportunities for drought planning into the future
- Document and understand what type of organizational relationships might contribute to capacity in drought planning, and what datasets and indicators are the most valuable in this process

The meeting is being conducted by the University of Colorado Denver and is sponsored by the Colorado Water Conservation Board. For more information, please email DT.

Please let us know if you are able to participate by November 22. We will also follow up with a call in the next day or two to answer any questions you might have. Thank you for your consideration. We look forward to seeing you in Durango.

Best,
DT

Appendix 5: Focus/Interview Guide

Drought Impacts:

1) Please describe to what degree drought impacts the winter tourism/recreation sector.
2) Please describe drought and water availability impacts on the ski resort specifically.
3) How would you measure these impacts? If not explicitly provided, follow up requesting specific data examples in their organization.
4) How would you prioritize these measures?

Metrics of Vulnerability:

5) What's driving these impacts? What are the underlying causes?
6) How would measure the causes of these impacts? If not explicitly provided, follow up requesting specific examples in their organization. Try to move from the speculative to what they are actually doing.
7) How would you prioritize these?

Challenges and Opportunities for Moving Forward:

8) Do you plan for drought? If so, how?
9) What would you view as some of the challenges for operations planning for a drought?
10) What other external activities, resources, or data would help you prepare for, and respond to, drought?
11) Do you have any other ideas and/or comments related to drought mitigation and response planning for this sector?