

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
~~Cave Wilderness Designation Values~~
~~DEFINING THE ELUSIVE: EXPLORING THE IDEA OF CAVE WILDERNESS~~
~~Identifying Values associated with the Creation of a Special Designation~~
~~Such as Cave Wilderness~~
~~Defining the Elusive~~
~~Conceptualizing Cave Wilderness and Designation Values~~

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ABSTRACT

~~*Much of the literature on defining cave wilderness has been confined to the legal definition of wilderness. To understand the phenomenon of cave wilderness it is necessary to explore the meanings and values associated with the idea of cave wilderness. Phenomenological The lack of a definition for cave wilderness that clearly describes the intent and purpose of such a definition may play a critical role in the lack of a congressionally designated cave wilderness. Rresearch involving stakeholders whose lives are affected by caves and/or cave management policies in two cave regions of Kentucky and New Mexico, resulted in the development of criteria for establishing a special designation such as cave wilderness. Using these criteria, the following definition of cave wilderness is proposed: cave and cave passages exhibiting exceptional scientific and cultural resources, and wilderness qualities. identification of values associated with the creation of a special designation, such as cave wilderness.*~~

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

BACKGROUNDINTRODUCTION

Wilderness caves are defined as caves found within a designated wilderness as opposed to caves designated specifically as wilderness (Seiser, 2003). No designated wilderness has been established based on the wilderness qualities inherent to the caves found there. Nor have the presence of caves been an important criterion in the determination of a wilderness designation.

For some, caves are one of the last remaining frontiers for adventure, wilderness, and exploration. In acknowledgment of these qualities, a few have sought national recognition for caves in the form of a wilderness designation. Their efforts have not resulted in any cave or portion thereof receiving wilderness designation.

During the years that the Wilderness Act was under Congressional consideration, numerous hearings were conducted. A report, submitted by de Saussure (1962) entitled Cave Resources, as well as testimony by representatives of the National Speleological Society, was taken under review during preparation of the final draft of the Wilderness Act (Stitt, 1982).

The Outdoor Recreation Resources Review Commission (ORRRC), in its 1962 Study Report No. 3 under the section: Summary of Major Findings and Recommendations, noted the potential wilderness value of caves:

Rivers and caves are considered in the report as important potential wilderness resources, and we have attempted a limited inventory of wilderness rivers and discussion of cave preservation in appendixes to the full report. It is apparent that special study is needed to develop suitable definitions for these recreation resources, which can be applied in survey and management efforts (ORRRC p. 4).

In the end, the Wilderness Act of 1964 made no reference to caves. However, cave conservationists felt that Congress was aware of caves' potential as wilderness and had intended

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to include them, just as other natural features were included without specific reference (Stitt, 1982).

Since then, attempts have been made to have caves or portions of caves declared wilderness (Stitt, 1991). Yet, no federally designated wilderness has been established based on the wilderness qualities inherent to the caves found there. Nor have the presence of caves been an important criterion in the determination of any wilderness designation (Seiser, 2003). This lack of designation suggests that cave wilderness is not an intuitive concept, at least not in the context of the Wilderness Act.

The lack of understanding, by the general public and policy makers, of caves ecological importance and associated wilderness values may play a role in the lack of a designation. Congressional testimony and other records indicate that values were a critical focal point in the passage of the Wilderness Act of 1964 (Cordell et al, 2003). Developing an understanding of values associated with caves may lead to better understanding of cave wilderness and the need for a congressionally legislated designation.

Justifications for wilderness preservation arise from values ascribed to wilderness. McCloskey, 1990, defines these values as reasons, based in philosophy and culture, for wanting wilderness.

In a 1961 Cave Research Foundation Report, Smith (1981), wrote “The application of wilderness philosophy to caverns is neither a well defined nor a widely thought about concept. It is not an easy concept to develop for speleological wilderness values are alien to much of the human experience.” The 1962 Outdoor Recreation Resources Review Commission (ORRRC) report on wilderness and recreation considered caves as important potential wilderness resources;

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Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

adding “it is apparent that special study is need to develop suitable definitions for these recreation resources, which can be applied in survey and management efforts” (ORRRC, 1962). Since that time, cave wilderness definitions have been proposed, none have gained wide acceptance (table 1). These tangible and intangible values are attributed to the benefits experienced by individuals, society, or nature. Various wilderness and protected areas related value typologies have been developed. Two specific typologies address national American and worldwide perspectives. As part of the National Survey on Recreation and the Environment, a thirteen item Wilderness Values Scale (WVS) was been used, as part of the American National Survey on Recreation and the Environment, -reference table one (Cordell et al. 2003; Cordell et al. 1998). The World Commission on Protected Areas (WCPA), a voluntary technical body of the IUCN, developed a typology of intangible values most commonly associated with protected areas, reference table one —(Putney, 2003). These typologies have contributed to the understanding of the diverse values associated with protected areas, both nationally and internationally. Cordell et al. (1998, 2003) work highlights the change, over time, in the relative importance of specific values associated with wilderness in the United States.

In a 1961 Cave Research Foundation Report, Smith (1981), wrote “The application of wilderness philosophy to caverns is neither a well defined nor a widely thought about concept. It is not an easy concept to develop for speleological wilderness values are alien to much of the human experience.” Other authors have discussed values associated with both caves and wilderness (Gamble, 1981; Huppert & Wheeler, 1992; Watson & Smith, 1971). The intrinsic values of caves make it evident that many caves do not meet the fulfill the necessary criteria as a wilderness site (Huppert & Wheeler, 1992). However, there has been little to no research

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~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
identifying which values are associated with the creation of a special cave designation such as cave wilderness.

Much of the research on cave wilderness has been confined to the legal definition of wilderness (Seiser, 2003). Several definitions for cave wilderness have been proposed, most are grounded in the Wilderness Act, and none have gained wide acceptance (table two+). To understand the phenomenon of cave wilderness, Seiser (2003) used a phenomenological research approach to explore the meanings associated with cave wilderness. In establishing the foundations of meaning for a phenomenon, it becomes possible to construct sound scientific and political theories, management practices and policy (Pickles, 1983). The defining of a concept, such as cave wilderness, is a way to enhance the knowledge base for the discipline of cave resources stewardship (Parse, 1997).

The lack of a federally designated cave wilderness may lie in the lack of a clear definition for cave wilderness defining both intent and purpose of such a designation, as well as, predication of the definition of cave wilderness on the Wilderness Act 1964. Additionally, research into the public's interest in establishing policies and procedures appropriate to the stewardship of specially designated caves is lacking.

The purpose of this study was to explore values and meanings associated with cave wilderness from the perspective of stakeholders who perceive their lives to be affected by caves and/or a cave wilderness designation. The study also examined stakeholder expectations of and concerns for regarding a special cave designation, such as cave wilderness. In establishing the foundations of meaning for a phenomenon, it becomes possible to construct sound scientific and

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~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

political theories, management practices and policy (Pickles, 1983). The defining of a concept, such as cave wilderness, is a way to enhance the knowledge base for the discipline of cave resources stewardship (Parse, 1997).

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~~The Wilderness Act of 1964 did not specifically address caves as wilderness sites.~~

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~~Difficulties exist in applying the legislation to caves. The Wilderness Act applies to surface environments typically capable of regeneration or renewal. Caves are fragile, finite resources; visitation generally results in some degree of permanent impact. The primary intent of the Wilderness Act is to protect recreational resources and associated values, with the protection of scientific, educational, scenic, or historical resources and values secondary. For cave wilderness, changing these priorities is necessary in order not to destroy the cave resources the special designation is intended to protect (Seiser, 2003).~~

~~The Wilderness Act is not designed to address a multi dimensional boundary system. A cave wilderness designation would need to consider both surface and subsurface zones, and allowable uses above and within the cave wilderness. Management of surface lands should be designed to protect the subsurface wilderness. Subsurface access and use restrictions may be necessary to protect cave related values and resources (Seiser, 2003).~~

~~The development of the 1964 Wilderness Act overlooked the historic influence that humans have had in shaping the landscape. It is not possible to disassociate humans from the "natural history" of caves having received visitation. Usage may or may not affect the perception of the cave's wildness or sense of a wilderness experience. Inclusion of the human component in a special designation recognizes the past, present, and future history humans have with caves (Seiser, 2003).~~

Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

~~To date, Congress has not established cave wilderness, despite attempts to have caves or~~
~~portions thereof declared wilderness. The problems may lie in the lack of a clear definition for~~
~~cave wilderness defining both intent and purpose of such a designation, as well as, predication of~~
~~the definition of cave wilderness on the 1964 Wilderness Act.~~

METHODSMETHODSTUDY DESIGN

~~This inquiry employed a phenomenological approach; laying the foundation for the~~
~~construction of sound empirical scientific and/or political theories, management practices, and~~
~~policies by seeking to clarify meanings associated with the idea of cave wilderness (Pickles,~~
~~1983; McDonald, 1993). Focus group dynamics stimulated discussions encouraged in depth~~
~~articulation of concerns, attitudes, and perceptions; providing insights into the research topic~~
~~(Fleitas, 1998; McDonald, 1993).~~

Cave regions of central Kentucky and southeast New Mexico were selected as study sites: for
a phenomenological investigation of cave-related stakeholders, using a focus group format.
Focus groups dynamics can stimulate discussions, encourage in-depth articulation of concerns,
attitudes, and perceptions; thus providing insights into the research topic (Fleitas, 1998;
McDonald, 1993). Discussion topics covered meanings and values associated with cave
wilderness; need for a congressional wilderness designation, and perceived benefits and risks
associated with a cave wilderness designation.

Both study sites contain a national 'cave' park: Mammoth Cave and Carlsbad Caverns
National Parks. Attempts to establish cave wilderness have occurred at both parks.

These cave areas regions differ culturally, historically, economically, ~~and~~ in population, land
ownership, and designated wilderness. ~~These karst regions~~ They differ in
speleogenesis mechanism of cavern development; resulting differences in the nature of these

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~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
caves and their relation to the surface landscape may affect individual awareness of caves. These
distinctly different regions provided a wide range of experiences and values from which
stakeholders drew upon in discussing their perspectives of caves and a special cave designation,
such as cave wilderness.

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Participants were recruited based on membership in selected target populations - stakeholders who may effect or be affected by cave ~~management~~ stewardship policies and legislation. Cave-related stakeholders fell into one of two, potentially overlapping, communities - the community of interest and the community of place (table ~~three~~ one). ~~Cave-related stakeholders fell into one of two, potentially overlapping, communities - the community of interest and the community of place (table 2).~~

Nine focus groups were conducted, involving ~~60~~ sixty participants. Four ~~'community of interest'~~ focus groups were held during a national caving event (~~39~~ thirty-nine participants, who had caved in one or both study regions). Five ~~'community of place'~~ focus groups were held within the specific study sites (~~21~~ twenty-one participants), three in Kentucky, and two in New Mexico. Effective focus groups comprise six to eight participants. For complex topics, or when participants have expertise on the subject smaller groups should be considered (Krueger, 1995). In this study, focus group sizes ranged from two to twelve. Variations in group numbers resulted from participants failing to attend or the inclusion of individuals invited by participants.

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addition to focus group participation, stakeholders were asked to complete a questionnaire covering demographics, caving experiences, and wilderness visitation.

Focus group sessions were taped using video and audio recorders. During focus groups the interview guide approach was used, which identifies topics and issues to be covered but does not identify a specific protocol for asking questions so that questions may be asked as appropriate to the progression of the interviews (Henderson, 1991). Discussion topics and questions are found in table 3.

NVivo[®], a qualitative data analysis computer program, was to analyze transcripts and questionnaires. An ethnographic approach for analysis was used due to the extensive quantity and depth of data collected. Transcripts of recordings, were first coded by the researcher to identify themes, reviewed by the research assistant, and then evaluated by two independent, non-caver reviewers. Identified themes and concepts that appear to link substantial portions of the data together served as a basis for a developing narrative (Winter, Palucki & Burkhardt, 1999; Fleitas, 1998). Transcripts were coded by the researcher and then reviewed by the research assistant. Two independent, non-caver reviewers evaluated the coded transcripts.

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RESULTS FINDINGS AND DISCUSSION

It is beyond the scope of this paper to report on all findings of this research. The intent of this paper is to identify values attached to associated with the establishment of a special designation such as cave wilderness based on themes identified from focus groups discussions. The paper will also criteria for a special designation derived from focus groups discussions. In addition, the research revealed a need for a clearly delineated definition for a special of cave

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~~designation wilderness. A purposed definition for cave wilderness is presented, based on values and meanings criteria derived from focus groups' discussions.~~

Focus Groups

The sociodemographic profile of focus groups participants was ~~mostly~~~~predominately~~ white (98%), male (78%), between the ages of 40 ~~to~~and 69 (77%), had a bachelors degree or higher (74%), an annual income of \$40,000 or higher (72%), had visited a wilderness site (90%), and identified themselves as a caver (76%); reference table ~~two~~~~three~~. Stakeholders from the three focus group venues provided similar responses. This similarity may be due to the high percentage of overlap within the communities of place and interest (figure 1). Other factors that may contribute to response similarities include the occurrence of cave related tourism in both regions and ties with the local national 'cave' park. Caving experience levels ranged from novice to very experienced to retired. They also indicated wide-ranging specializations (explorer, photographer, cave diver, etc...) (Seiser, 2003).

Designation Values Discussions-Themes

Seven value related themes were identified regarding a special cave designation, such as cave wilderness: 1) research and monitoring, 2) experiential, 3) resource protection, 4) educational, 5) future, 6) significance, and 7) existence. Themes often overlapped. The first four themes were discussed by all groups to varying degrees. Educational and future value themes were directly or indirectly addressed by seven groups. Existence value was discussed by only two groups.

Research and Monitoring

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Focus groups' discussions on the intent of a special designation centered on protecting physical and social scientific values and resources. This included establishment of baseline data for monitoring purposes. The preservation of future discoveries was an important component of scientific research. The value of research and monitoring is illustrated in this stakeholder comment:

Who cares that they're the last unexplored frontier, because of that we don't know enough about them. This is an opportunity to go into an environment that we have not impacted on our planet and study ecosystems that are undamaged. We've never really had an opportunity to do that before and now we have the tools to do it, and we are getting so much information from those environments... So, the scientific potential is vast for these areas, what we can learn. For most people, if you say the cave needs to be protected, it's very delicate, we have these formations, we have these complex ecosystems, they're not going to get that, but when you say it's this incredible scientific resource, which it really is, then they're like oh science well that's important please do that.

Experiential

Preservation of the experiential aspect of wilderness was another important component of a special designation. Such an experience offers the perceptions of solitude, remoteness, and self-sufficiency. This value is aptly discussed by this stakeholder comment:

If I'm in Fairy Cave and I'm way back in the most miserable part of Fairy Cave which is still like an hour from the entrance I don't feel like I am in the wilderness; I am in a wild cave there, but I'm not in wilderness. When I'm in Lech and I'm like four or five hours from the entrance, and we're camping down there, I absolutely do feel like we're in the wilderness. I think, for me, it's how far am I from the infrastructure of 'somebody else can take care of me,' when I feel like I'm getting away from that is when I feel like I'm in the wilderness. Maybe it's the same for Joe Blow public, at what point does he cross the boundary where it's like oh my goodness I'm taking care of myself now? This is wilderness.

Resource Protection

Resource protection discussions ranged from broad statements, such as "good for the health of the planet," to more specific benefits including protection of water quality and protection of fauna. Protection included the physical aspects of a cave – preservation of the cave's natural state

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and its original resources, and recognition of resource fragility. The following stakeholder comment discusses the value of resource protection;

...you know if you get a pass to go into what I would deem as a cave wilderness area, it just takes one person to go in there and take what he wants and that piece is nonrenewable... But, there is more chance of renewability on the surface, than there is, because in caves there's virtually no chance.

Educational

Focus groups discussed the importance of a special designation in generating public awareness of the significance of caves. Specially designated caves can serve as educational resources for land managers and the public (with or without visitation). The educational value is best illustrated by this stakeholder comment;

If we go through the process of trying to pursue some kind of designation, it should be for the purpose of creating broader community outreach and a broader forum for education about caves and karst, obviously for the protection of cave and karst. But in order to protect you've got to educate. So, the education aspect of any kind of designation would just be paramount.

Future

Discussions focused on the need to protect caves based on not only today's knowledge and values, but also on the preservation of cave resources for future generations' needs and values. Preservation would also protect the potential for future discoveries as noted in the following stakeholder comment:

Why do you want to preserve this, is it for current scientific study, is it for future scientific study? Let's don't exhaust all of resources. With science, we may discover in a hundred years, we may find that science in 2002 was just in its infancy. Let's do what we need to do to learn to as much as we can about what's beneath us and leave it in such a way so that two generations hence they won't say oh you've wiped out the footprints.

Significance

Discussions touched upon the need for the designation to be based on the overall quality of the resource to be protected, as opposed to one or two resource attributes (including scientific,

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aesthetic, and other intangible attributes). The following stakeholder comment discusses significance:

There has to be some value criteria in there too. It's got to be an outstanding example of something. Outstanding resources, outstanding geological speleothems, hydrology for the local area, whatever it is, you can't just take any little feature... it's got be of great value, significance.

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Existence

Two groups mentioned the value of knowing that wilderness existed even without actual visitation, as illustrated by the following comment: *"There's a lot of wilderness areas that I don't get any selfish thing from personally, but I feel good knowing that there are places out there that humans aren't [messing] up."* NOTE: actual term used: 'fucking'

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Designation Values Discussion

Wilderness Term

All focus groups expressed reservations with using the term wilderness in association with a special designation for caves. Although alternative terms were suggested, no consensus occurred within or among focus groups. Therefore, the phrase cave wilderness will continue to be used.

DEFINING CAVE WILDERNESS DISCUSSION AND CONCLUSIONS

With one exception, focus groups values associated with a special designation such as cave wilderness were similar to those of the WCPA Intangible Values Typology (Putney, 2003) and the Wilderness Values Scale (Cordell et al. 2003, Cordell et al. 1998) (reference table one).

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indicating that these values are not dissimilar from those associated with other types of protected areas.

The one exception was experiential value. The WCPA typology covers a wide variety of protected areas and it is understandable that experiential value would not be a primary value of all sites. Perhaps it is not included in the WVS typology because the perceptions of solitude, remoteness, and self-sufficiency, are integral components of wilderness.

Focus groups indicated difficulty with use of the phrase 'cave wilderness'. Two primary reasons were negative experiences associated with wilderness hearings and establishment of wilderness, and, the concern that such a designation would serve as an attractant, resulting in the ~~ruin~~ destruction of the resources intended to be protected. Such concerns may be why emphasis was placed on the experiential value by all focus groups. If a special designation did not use the term wilderness, it was still to protect the experience of wilderness.

Scientific research was a primary component of focus groups' discussions, indicating the importance of research and monitoring values to a special cave designation. This runs contrary to recent research indicating that scientific value was not a significant aspect of wilderness (Brown & Alessa, 2005, Cordell et al, 2003). In the case of this study, scientific value is significant to the establishment of cave wilderness.

Five of the nine focus groups discussed recreation; specifically noting that cave wilderness should not be established for recreational purposes, as illustrated by the following stakeholder comment: *"It's not for recreational use; it's for exploratory and documenting."* ~~Cordell et al (2003) findings indicated the public's growing interest in the nonuse values of wilderness. While it can be argued that cave explorers are recreating while they are mapping and inventorying a cave, they are producing scientific documents. However, it is questionable if cave users~~visitors,

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Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

whose primary interest in caves is for sport/adventure, would feel the same way about a non-recreation based wilderness designation.:

Values not identified in focus groups' discussions on cave wilderness, yet listed in the two the WCPA and WVS typologies should not be considered as unimportant to focus groups participants. Rather, these values are not significant in the establishment of a special cave designation. As noted by Harmon, 2003 "... no single protected area can cover the spectrum of intangible values" (pg.20). It is highly likely that additional values will be associated with cave wilderness once a designation is established. Understanding the values associated with a special designation begins to lay the foundation of cave wilderness. Such knowledge will aid in answering the question "What is cave wilderness?"

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Special Cave DesignationDesignation Criteria Theme

Research findings suggest the following goals are important in defining the intent of a special designation such as cave wilderness: 1) protection of cave resources and associated scientific values that occur within a wilderness setting for present and future research opportunities; and 2) protection of the wilderness experience. The sense of isolation, as defined by solitude and remoteness, and the sense of self-sufficiency are important elements in a cave wilderness experience.

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One discussion theme was that of a special cave designation. Within this category, the sub-theme of special designation criteria is of relevance to the focus of this paper.—

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Criteria important to the development of a special designation and its associated legislation were identified. These criteria comprised the following: 1) intent, 2) visionary impact, 3)

Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

scientific values, 4) experiential values, 5) access issues, 6) resource protection, and 7) educational values (table four2).

Designation Criteria Discussion~~Recreational value is not part of the criteria for establishing~~
cave wilderness.

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In that ~~it~~ a special cave designation should requires both surface and subsurface lands, as well as associated activities, be considered the established criteria addresses the multi-dimensional aspect of cave boundaries. It does not require that the surfaces lands meet wilderness qualifications, only that activities occurring on the surface do not adversely affect the subsurface cave wilderness.

The criteria indicate that research and education are integral components of cave wilderness stewardship. While this provides opportunities for research ~~institutes~~ers to pursue cave and karst investigations, there still exists the obligation of protecting the cave resources and wilderness experiences while managing research activities. Public education may require the expansion of current educational programs and the development of new programs.

The criteria ~~defines~~delineates cave wilderness stewardship goals without placing specific restrictions or requirements on how they are to be achieved, thus allowing each designated site to be managed as appropriate to protect the values and resources for which it was designated.

These criteria are consistent with the values associated with the establishment of a special designation such as cave wilderness: 1) research and monitoring, 2) experiential, 3) resource protection, 4) future, 5) educational, 6) existence, and 7) significance ~~(Seiser, 2006).~~

Defining Cave Wilderness

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Defining the Elusive Cave Wilderness Designation Values & Definition

Wednesday, May 20, 2020~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

Rodgers and Knafl (1993) described three elements of concepts. First, concepts are a human construct. Their meanings are not an inherent element that waits to be discovered and they are created to serve the intentions of their users. Second, a concept can convey an impression of a human experience or use experiences as an indicator. Concepts are separate from the phenomena; they are associated with it to affect how an individual comprehends the phenomenon (i.e. the idea of wilderness is not the site itself, it is a description of how the site is perceived and thus, managed). Third, the structure of concepts is such that it is possible to identify the ideas and empirical phenomena that are or are not included.

Various processes have been put forth in defining a concept, many based on the traditional detailed systematic approach, which includes concept identification and attribute verification (Parse, 1997). A different approach is one of concept inventing. The elucidation of a concept may result from the interpretation of literature arising from various disciplines, personal experience, and other sources, in order to discover associated meanings. The scholar selects which meanings to use in the definition and distinguishes the concept via a logical combination of these chosen meanings (Parse, 1997). In the first approach, the structure of the concept is generated from the research participants. In the second approach, the ideas arise from multiple sources (Bournes, 2000).

In developing the idea of cave wilderness, a combination of these two approaches was used. The traditional approach was used to identify values and meanings associated with the concept via focus groups. The findings were complimented with the researcher's personal experiences, reflections on wilderness and cave wilderness literature, and from the Wilderness Act of 1964, the Wild and Scenic Rivers Act of 1968, the Federal Cave Resources Protection Act of 1988, and the Lechuguilla Cave Resources Protection Act of 1993. Thus, values and meanings of the

Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

concept of cave wilderness developed from research participants inputs, as well as emanating from a synthesis of multiple sources.

The proposed definition of cave wilderness is also guided by an added component – the idea of exploration and discovery. Kerbo and Roth (1989) note that caves not only emphasize wilderness qualities and benefits; they also allow individuals to experience the spirit of exploration and adventure. Although alluded to in discussions regarding exploration and mapping, and other scientific activities, explicit expression of this idea by research participants as a specific value of cave wilderness did not occur. The idea that exploration and discovery be part of the wilderness experience is not a new one. Believing that the urge to explore was a basic to human nature, Aldo Leopold felt that designated wilderness would provide opportunities to safeguard the romance of exploration (Sutter, 2002). “And now, speaking geographically, the end of unknown is at hand... Is it to be expected that it shall be lost from human experience without something likewise being lost from human character?” (Leopold, 1991, p.124). In combining the possibility of adventure and wilderness preservation, Leopold envisioned the potential to prevent the loss of the idea of exploration from the average person’s life.

In defining the idea of cave wilderness, consideration is given to the physical conditions of the cave, its wilderness qualities, and stewardship goals. A definition should recognize that humans have a past, present, and future history with caves and recognize that scientific ventures can be intertwined with a wilderness experience.

The following preamble and definition of cave wilderness are proposed:

Caves are valuable, non-renewable resources. Wilderness caves and other significant wild caves exist and are protected to preserve their recreational and educational values for the perpetual use, enjoyment, and benefit of all people. There exist some caves and cave passages that are repositories of scientific and cultural resources of extraordinary value, known and unknown. These same caves and cave passages exhibit high degrees of wildness and naturalness (the physical

Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

reality of wilderness) and the intangible essence of wilderness (solitude, self-sufficiency and sense of remoteness) such that visitation evokes a wilderness experience. In order to protect these scientific and cultural resources, wilderness qualities, and opportunities for discovery, it is proposed that the designation of cave wilderness be established. In recognition of the spirit of exploration and discovery, cave wilderness shall be open to those who desire to meet the cave on its own terms, to explore, discover, and report, thereby contributing to the world's knowledge of speleology and other sciences. It is the hope that use of such knowledge will be for education, resource stewardship, and other additional beneficial purposes for all of humankind.

Cave wilderness is defined as those caves and cave passages exhibiting exceptional scientific and cultural resources, and wilderness qualities. These sites display a high degree of wildness, in which the physical structure and ecological systems are largely unimpacted by humans and in which there is a sense of remoteness from the ordinary activities and works of humankind. Cave Wilderness is to mean those caves and cave passages in which stewardship shall protect the cave resources, its wilderness values, and future discoveries. Stewardship goals include: sanction of exploration and other scientific research activities, while seeking to limit the impact of these activities and other visitation; protection of the sense of solitude, remoteness and self-sufficiency as well as other characteristics of a wilderness experience; recognition of the historic connection of humans and caves, such that evidence of historic human visitation and usage that does not detract from the cave's wildness or wilderness experience is acceptable; and management of surface activities to protect the cave resources and wilderness qualities.

The preceding preamble and definition is based on themes identified from discussion groups conducted in two cave regions of the US. The questions arise whether the same themes would be identified from focus groups conducted in other regions of the US, and are there issues and concerns not addressed by the KY and NM focus groups? Additional research would aid in determining the nation's level of interest in a cave wilderness designation. It would also provide an opportunity to evaluate the level of understanding and interest in cave stewardship, as well as determining cave related educational needs.

CONCLUSIONS

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Defining the Elusive Cave Wilderness Designation Values & Definition

Wednesday, May 20, 2020Saturday, October 08, 2005Wednesday, October 05, 2005Monday, September 26, 2005Wednesday, July 13, 2005

Research findings suggest the following stipulations are important components in defining the intent of a special designation such as cave wilderness: 1) protection of a cave's scientific values and resources for study, preserving both current and future discovery opportunities, should be a primary goal, and 2) protection of the wilderness experience. The sense of isolation, as defined by solitude and remoteness, and the sense of self sufficiency are important elements in a cave wilderness experience.

Based on focus groups' discussions, criteria important to the development of a special designation and its associated legislation were identified. Criteria revolved around the following concepts: 1) intent, 2) visionary impact, 3) scientific values, 4) experiential values, 5) access issues, 6) resource protection, and 7) educational values (table 4). These criteria were used to generate guidelines for defining cave wilderness (table 5).

DISCUSSION

The criteria derived from focus groups discussions address many of the perceived problems with applying the Wilderness Act of 1964. The criteria identify the primary intent of a cave wilderness designation be the protection of cave resources and associated scientific values that occur within a wilderness setting. Recreational value is not part of the criteria for establishing cave wilderness.

The established criteria address the multi-dimensional aspect of cave boundaries in that it requires both surface and subsurface lands and associated activities be addressed. It does not require that the surfaces lands meet wilderness qualifications, only that activities occurring on the surface do not adversely affect the subsurface cave wilderness. This should be considered

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Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

~~akin to requirements that activities on lands adjacent to designated wilderness not adversely impact the wilderness qualities of the site.~~

~~Based on the established criteria, research and education are integral components of cave wilderness stewardship goals. While this provides opportunities for research institutes to pursue cave and karst investigations, there exists the obligation of protecting the cave resources and wilderness experiences while managing research activities. Public education may require the expansion of current educational programs and the development of new programs.~~

~~The criteria defines cave wilderness stewardship goals without placing specific restrictions or requirements on how to achieve these goals, thus allowing for each designated site to be managed as appropriate to protect the values and resources for which it was designated. Cave-related stakeholders will need to come to a consensus on what a designation will entail (boundaries, stewardship goals, etc) for each proposed cave wilderness, prior to the establishment of a designated cave wilderness.~~

~~In defining the idea of cave wilderness, consideration is given to the physical conditions of the cave, its wilderness qualities, and stewardship goals. A definition should recognize that humans have a past, present, and future history with caves and recognize that scientific ventures can be intertwined with a wilderness experience.~~

~~The proposed definition of cave wilderness is guided by criteria derived from focus groups' discussions with an added component—the idea of exploration and discovery. Although alluded to in discussions regarding exploration and mapping, and other scientific activities, explicit expression of this idea by research participants as a specific value of cave wilderness did not occur. The proposed definition attempts to reconcile the scientific attribute of exploratory activities with its recreational attribute. The idea of recreation and exploration coming together in~~

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

~~wilderness is not a new one. Believing that the urge to explore was a basic to human nature, Aldo Leopold felt that designated wilderness would provide opportunities to safeguard the romance of exploration (Sutter, 2002). "Is it to be expected that [the unknown] shall be lost from human experience without something likewise being lost from human character? (Leopold, 1991)" In combining the idea of exploration and wilderness preservation, Leopold recognized the possibility to separate exploration from its long association with settlement and development activities (Leopold, 1991).~~

~~The researcher supplemented the established criteria and guidelines with her personal experiences, reflections from wilderness literature readings, and from the Wilderness Act of 1964, the Wild and Scenic Rivers Act of 1968, the Federal Cave Resources Protection Act of 1988, and the Lechuguilla Cave Resources Protection Act of 1993.~~

~~The following preamble and definition of cave wilderness are proposed:~~

~~—Caves are valuable, non renewable resources. Wilderness caves and other significant wild caves exist and are protected to preserve their recreational and educational values for the perpetual use, enjoyment, and benefit of all people. There exist some caves and cave passages that are repositories of scientific and cultural resources of extraordinary value, known and unknown. These same caves and cave passages exhibit high degrees of wildness and naturalness (the physical reality of wilderness) and the intangible essence of wilderness (solitude, self sufficiency and sense of remoteness) such that visitation evokes a wilderness experience. In order to protect these scientific and cultural resources, wilderness qualities, and opportunities for discovery, it is proposed that the designation of cave wilderness be established. In recognition of the spirit of exploration and discovery, cave wilderness shall be open to those who desire to meet the cave on its own terms, to explore, discover, and report, thereby contributing to the world's~~

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~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
knowledge of speleological and other sciences. It is the hope that use of such knowledge will be for education, resource protection and stewardship, and other additional beneficial purposes for all of humankind.

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~~—Cave wilderness is defined as those caves and cave passages exhibiting exceptional scientific and cultural resources, and wilderness qualities. These sites display a high degree of wildness, in which the physical structure and ecological systems are largely unimpacted by humans and in which there is a sense of remoteness from the ordinary activities and works of humans. Cave Wilderness is to mean those caves and cave passages in which stewardship shall protect the cave resources, its wilderness values, and future discoveries. Stewardship goals include: the sanction of exploration, discovery and other scientific research activities, while seeking to limit the impact of these activities and other human visitation; the protection of the sense of solitude, remoteness and self sufficiency as well as other characteristics of a wilderness experience; recognition of the historic connection of humans and caves, such that evidence of historic human visitation and usage that does not detract from the cave's wildness or wilderness experience is acceptable; and management of surface activities to protect the cave resources and wilderness qualities.~~

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~~Future Research~~

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~~This research was limited to two cave regions within the United States; it needs to be extended to include other cave regions, particularly regions of different speleogenesis (e.g., lava tubes), to determine the robustness of the established criteria and proposed definition. It is possible that additional criterion will need consideration or that the established criteria do not hold true for other cave regions~~

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

~~With the development of a clear understanding of cave wilderness and stakeholder issues, it will be useful to test the definition and significance of issues with groups outside of cave based communities of interest and place. This research would aid in determining the nation's level of interest in a cave wilderness designation. It would also provide an opportunity to evaluate the level of understanding and interest in cave stewardship, as well as determining educational needs for communities outside of cave regions.~~

~~CONCLUSION~~

~~This is one of the first scientific investigations to consider a specific landform as wilderness. This research emphasizes the need to expand the concept of wilderness to include non-traditional wildernesses such as caves, and the idea that wilderness can be managed with an emphasis on science, education, and exploration, instead of recreation. This research identified lays the foundation for the idea of cave wilderness and should aid in expanding the concept of wilderness, values associated with the establishment of a special designation such as cave wilderness. Hendee & Dawson (2001) noted that in the future, wilderness may represent remnants of ecosystems, wild conditions and opportunities for wilderness experiences; and is reflective of our stewardship of today. Threats to existing wilderness sites are similar to those faced in the stewardship of caves. The identified values associated with cave wilderness can guide today's stewardship practices to protect these nonrenewable environments. They can also be used to help identify caves on federal lands that deserve wilderness special designation (be it called wilderness or go by another name) and the protection associated with such a designation.~~

~~For some the world 'wilderness' is troubling. But whether a special cave designation goes by the a convoluted title such as "site of extraordinary interest for speleological exploration and~~

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Defining the Elusive Cave Wilderness Designation Values & Definition

~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

research” or other verbiage; the heart of the designation is still to protect the wilderness of cave and their associated values.

While this research needs to be expanded to other cave and non-cave regions of the US for further validation, it is a beginning for laying the foundation for cave wilderness. Such knowledge will aid in answering the question “What is cave wilderness?” There is also a need to understand the public’s knowledge of and perceptions regarding caves and caving activities, including exploration.

An understanding of the values associated with a special cave designation, as well as a clear definition of cave wilderness, may aid in legislators’ and the public’s appreciation for the need of a congressionally legislated special cave designation.

This is one of the first scientific investigations to consider a specific landform as wilderness. This research emphasizes the need to expand the concept of wilderness to include non-traditional wildernesses such as caves, and the idea that wilderness can be managed with an emphasis on science, education, and exploration, instead of recreation. This research lays the foundation for the idea of cave wilderness and should aid in expanding the concept of wilderness. The proposed definition of cave wilderness provides a framework upon which to base cave ecosystem management practices and policies.

Recently, Senate Bill 1170 was introduced to congress proposing to establish the Fort Stanton – Snowy River National Cave Conservation Area, located on BLM land near Capitan, NM, “to secure, protect, and conserve subterranean natural and unique features and environs for scientific, educational, and other appropriate public uses” (S.1170, June 6, 2005). The nature of Fort Stanton cave and its long history of recreational visitation do not lend much of the known cave to wilderness consideration. Of the eight criteria defining the idea of cave wilderness, the

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
~~bill specifically addressed six, lacking the criteria of 'visionary impact' and 'experiential values'.~~

~~While the bill seeks to establish protected status for a specific cave and does not specifically establish a land management category, it does not preclude that use.~~

~~The significance of the bill lies in the potential establishment of a designation for the protection of scientifically notable caves, regardless of their wilderness values. This could be the first step towards the establishment of a cave wilderness based designation.~~

~~1~~

~~THE PROPOSED DEFINITION OF CAVE WILDERNESS PROVIDES A FRAMEWORK UPON WHICH TO BASE CAVE ECOSYSTEM MANAGEMENT PRACTICES AND POLICIES.~~

~~RECENTLY, SENATE BILL 1170 WAS INTRODUCED TO CONGRESS PROPOSING TO ESTABLISH THE FORT STANTON SNOWY RIVER NATIONAL CAVE CONSERVATION AREA, LOCATED ON BLM LAND NEAR CAPITAN, NM, "TO SECURE, PROTECT, AND CONSERVE SUBTERRANEAN NATURAL AND UNIQUE FEATURES AND ENVIRONS FOR SCIENTIFIC, EDUCATIONAL, AND OTHER APPROPRIATE PUBLIC USES" (S.1170, JUNE 6, 2005). THE NATURE OF FORT STANTON CAVE AND ITS LONG HISTORY OF RECREATIONAL VISITATION DO NOT LEND MUCH OF THE CAVE TO WILDERNESS CONSIDERATION. OF THE EIGHT CRITERIONS DEFINING THE IDEA OF CAVE WILDERNESS, THE BILL SPECIFICALLY ADDRESSED SIX, LACKING THE CRITERIA OF 'VISIONARY IMPACT' AND 'EXPERIENTIAL VALUES'. WHILE THE BILL SEEKS TO ESTABLISH PROTECTED STATUS FOR A SPECIFIC CAVE AND DOES NOT SPECIFICALLY ESTABLISH A LAND MANAGEMENT CATEGORY, IT DOES NOT PRECLUDE THAT USE. THE SIGNIFICANCE OF THE BILL LIES IN THE POTENTIAL ESTABLISHMENT OF A DESIGNATION FOR THE PROTECTION OF SCIENTIFICALLY NOTABLE CAVES, REGARDLESS OF THEIR WILDERNESS VALUES. THIS COULD BE THE FIRST STEP TOWARDS THE ESTABLISHMENT OF A CAVE WILDERNESS BASED DESIGNATION.~~

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~~September 26, 2005~~~~Wednesday, July 13, 2005~~

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Table 1. Cave Wilderness Definitions

Cave Wilderness Definitions		
Author	Year	Definition
Watson & Smith	1971	Underground wilderness consists of cave systems that generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.
Stitt & Bishop	1972	Underground wilderness is that portion of a cave or karst area, lying below the surface of the earth, which meets the requirements of the Wilderness Act regarding value and impact on the observer.
Gamble	1981	Areas from which Man can derive the wilderness experience exists in the remote areas of cavern systems, where the impact of Man's activities is largely unnoticeable. Any cave or portion thereof, which has not been markedly disturbed by tourism or other exploitive activities, therefore includes substantial tracts of wilderness.
Wood	1983	[Cave] Wilderness is an area that can provide people with wilderness experience. The primary purpose of wilderness is recreational and cultural with ecological values important but secondary. Wilderness experience consists of feelings of freedom, beauty, empathy with wild nature, and remoteness from the ordinary works of man.
Millar	1994	Cave wilderness is a function of the difficulty of ingress/egress, travel within the cave and/or the feeling of remoteness from the surface.

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Table 1. Cave Wilderness Definitions

<u>Cave Wilderness Definitions</u>		
<u>Author</u>	<u>Year</u>	<u>Definition</u>
<u>Watson & Smith</u>	<u>1971</u>	<u>Underground wilderness consists of cave systems that generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.</u>
<u>Stitt & Bishop</u>	<u>1972</u>	<u>Underground wilderness is that portion of a cave or karst area, lying below the surface of the earth, which meets the requirements of the Wilderness Act regarding value and impact on the observer.</u>
<u>Gamble</u>	<u>1981</u>	<u>Areas from which Man can derive the wilderness experience exists in the remote areas of cavern systems, where the impact of Man's activities is largely unnoticeable. Any cave or portion thereof, which has not been markedly disturbed by tourism or other exploitive activities, therefore includes substantial tracts of wilderness.</u>
<u>Wood</u>	<u>1983</u>	<u>[Cave] Wilderness is an area that can provide people with wilderness experience. The primary purpose of wilderness is recreational and cultural with ecological values important but secondary. Wilderness experience consists of feelings of freedom, beauty, empathy with wild nature, and remoteness from the ordinary works of man.</u>
<u>Millar</u>	<u>1994</u>	<u>Cave wilderness is a function of the difficulty of ingress/egress, travel within the cave and/or the feeling of remoteness from the surface.</u>

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

Table 2-4. Community of Interest and Community of Place Stakeholders

<u>Defining Stakeholders by Community of Interest and Community of Place</u>	
<u>Community of Interest</u> (those who use and/or participate in the stewardship of caves and karst)	
<u>1. Individuals who utilize caves for recreation, exploration and/or research</u>	Formatted: Bullets and Numbering
<u>2. Individuals who own or manage wild or developed caves (regardless of ownership or commercial use).</u>	Formatted: Bullets and Numbering
<u>3. State and federal government officials responsible for decisions impacting caves or cave management.</u>	Formatted: Bullets and Numbering
<u>4. Special interest organizations that have an interest in cave and karst environments.</u>	Formatted: Bullets and Numbering
<u>Community of Place</u> (those who work, reside on, or own land in cave and karst regions)	
<u>1. Local individuals who earn a living via a non-resource extraction business.</u>	Formatted: Bullets and Numbering
<u>2. Local individuals who earn a living via a natural resource extraction industry.</u>	Formatted: Bullets and Numbering
<u>3. Local government officials who may have an impact on cave stewardship activities.</u>	Formatted: Bullets and Numbering
<u>4. Local residents.</u>	Formatted: Bullets and Numbering

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Table 23. Focus Groups Sociodemographics.

Focus Groups' Sociodemographics		
	Total Responses	Percentage of Total Responses
<u>Gender (n = 54)</u>		
<u>Female</u>	<u>12</u>	<u>22</u>
<u>Male</u>	<u>42</u>	<u>78</u>
<u>Ages (n = 48)</u>		
<u>20 - 29</u>	<u>1</u>	<u>2</u>
<u>30 - 39</u>	<u>7</u>	<u>15</u>
<u>40 - 49</u>	<u>15</u>	<u>31</u>
<u>50 - 59</u>	<u>12</u>	<u>25</u>
<u>60 - 69</u>	<u>10</u>	<u>21</u>
<u>70 - 79</u>	<u>2</u>	<u>4</u>
<u>80 - 89</u>	<u>1</u>	<u>2</u>
<u>No Response</u>	<u>6</u>	
<u>Education (n = 54)</u>		
<u>HS Grad/GED</u>	<u>6</u>	<u>11</u>
<u>Some College</u>	<u>8</u>	<u>15</u>
<u>Bachelor</u>	<u>20</u>	<u>37</u>
<u>Masters</u>	<u>15</u>	<u>28</u>
<u>Doctorate</u>	<u>5</u>	<u>9</u>
<u>Income Range (n = 46)</u>		
<u>< \$15,000</u>	<u>2</u>	<u>4</u>
<u>\$15 - 24,999</u>	<u>4</u>	<u>9</u>
<u>\$25 - 34,999</u>	<u>7</u>	<u>15</u>
<u>\$35 - 49,999</u>	<u>9</u>	<u>20</u>
<u>\$50 - 74,999</u>	<u>14</u>	<u>30</u>
<u>\$75 - 99,999</u>	<u>2</u>	<u>4</u>
<u>≥ \$99,999</u>	<u>8</u>	<u>18</u>
<u>No Response</u>	<u>8</u>	
<u>Visited Wilderness (n = 50)</u>		
<u>Yes</u>	<u>45</u>	<u>90</u>
<u>No</u>	<u>5</u>	<u>10</u>
<u>No Response</u>	<u>4</u>	
<u>Caver (n = 54)</u>		
<u>Yes</u>	<u>41</u>	<u>76</u>
<u>No</u>	<u>13</u>	<u>24</u>

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~

Table 43. Protected Areas Value Typologies

<u>Value Typologies</u>		
<u>Cave Wilderness Designation Values (2003)¹</u>	<u>WCPA (2003) Intangible Values of Protected Areas²</u>	<u>NSRE (2000) Wilderness Values Scale³</u>
<u>Experiential</u> <u>Research & Monitoring</u> <u>Existence</u> <u>Educational</u> <u>Future</u> <u>Resource Protection</u> “ “ “ “	<u>Research & Monitoring</u> <u>Existence</u> <u>Educational</u> <u>Recreational</u> <u>Aesthetic</u> <u>Spiritual</u> <u>Cultural</u> <u>Therapeutic</u> <u>Identity</u> <u>Artistic</u> <u>Peace</u>	<u>Scientific Study</u> <u>Knowing it Exists</u> <u>Option for Future Generations</u> <u>Protecting Water Quality</u> <u>Protecting Air Quality</u> <u>Protecting Wildlife Habitat</u> <u>Preserving Unique Wild Plants & Animals</u> <u>Protecting Rare & Endangered Species</u> <u>Recreation Opportunities</u> <u>Scenic Beauty</u> <u>Spiritual Inspiration</u> <u>Tourism Income</u> <u>Option for Personal Use</u>

¹ As Identified in this Paper
² See Putney (2003)
³ See Cordell et al. (2003)

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Table 2 Community of Interest and Community of Place Stakeholders

Defining Stakeholders by Community of Interest and Community of Place	
Community of Interest (those who use and/or participate in the stewardship of caves and karst)	
1. Individuals who utilize caves for recreation, exploration and/or research	
2. Individuals who own or manage wild or developed caves (regardless of ownership or commercial use).	
3. State and federal government officials responsible for decisions impacting caves or cave management.	
4. Special interest organizations that have an interest in cave and karst environments.	
Community of Place (those who work, reside on, or own land in cave and karst regions)	
1. Local individuals who earn a living via a non resource extraction business.	
2. Local individuals who earn a living via a natural resource extraction industry.	
3. Local government officials who may have an impact on cave stewardship activities.	
4. Local residents.	

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 Table 3 Focus Group Discussion Topics Questions

1. What purpose(s) and goals could a cave wilderness designation serve?
2. Is there a term other than “cave wilderness” that could be more appropriate in describing these purposes/goals? If so, what could it be?
3. Can an entire cave be considered wilderness? Can portions of caves be considered wilderness? At what point does cave wilderness begin? Is it separate from surface wilderness?
4. Is there a need for a wilderness designation by legislation, for caves? Why or why not?
5. What concerns (risks) are there in regard to a wilderness designation?
6. What benefits (rewards) are there in regard to a wilderness designation?
7. Could there be a difference in the management of cave wilderness from traditional wilderness practices? Why or why not? If so, what forms of management practices would be expected that differentiate from traditional wilderness management?

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Table 4. Criteria Important in Defining the Idea of Cave Wilderness.

Criteria Important in Defining the Idea of Wilderness as Established by Focus Groups
<i>Intent</i>
Is the designation for resource protection or recreation and knowledge? It is necessary to define what is being protected and from what activities or events. Cave wilderness should not be established primarily for recreational purposes.
<i>Visionary Impact</i>
Designation must protect caves based on today's knowledge and values and preserve caves and cave resources for future generations' needs and values
<i>Scientific Values</i>
Designation must provide protection of the cave's scientific values and resources, for study now and in the future, including preservation of future discovery opportunities.
<i>Experiential Values</i>
Designation must provide for the protection of individuals' ability to have a wilderness experience that offers the perceptions of solitude, remoteness, and self-sufficiency.
<i>Access</i>
Access restrictions should occur for the protection of the cave resources, but should not result in permanent closure of the cave. Rationales for limiting access include the existence of other caves open for recreational purposes and the ability to provide alternative ways to experience the cave via the use of photographic and videographic imagery.
<i>Resource Protection</i>
Designation will need to provide protection for physical, biological, and other components of a cave, preservation of the cave's natural state, its original resources, and recognition of resource fragility. The designation will address surface as well as subsurface activities that may impact upon the cave resources. It will also need to provide protection for the human dimension aspect of a cave—protection of physical and social sciences' values, aesthetic values, wilderness values, and other values.
<i>Education</i>
Specially designated caves can serve as educational resources (with or without requiring physical visitation); generating public awareness of the significance of caves
<i>Management</i>
Designation must recognize that each cave is different. It would be necessary to tailor management practices to meet specific cave needs. Specific management should evolve from cave resources (physical and social sciences), and skill requirements.

~~Defining the Elusive Cave Wilderness Designation Values & Definition~~
~~Wednesday, May 20, 2020~~~~Saturday, October 08, 2005~~~~Wednesday, October 05, 2005~~~~Monday, September 26, 2005~~~~Wednesday, July 13, 2005~~
 Table 5. Guidelines for Use in Defining Cave Wilderness

Guidelines for Defining Cave Wilderness Based on Criteria Established by Focus Groups	
1. Recognizes that caves are valuable, non-renewable resources.	Formatted: Bullets and Numbering
2. Protects caves that appear to have been affected primarily by the forces of nature, where the impact of human activities is substantially unnoticeable.	Formatted: Bullets and Numbering
3. Recognizes that impact is change and must be managed.	Formatted: Bullets and Numbering
4. Recognizes the potential for surface usage and activities that do not interfere with the cave environs.	Formatted: Bullets and Numbering
5. Protects scientific and cultural resources and associated values.	Formatted: Bullets and Numbering
6. Protects and guarantees a wilderness experience—solitude, remoteness from the ordinary activities and work of humans, isolation, and self-sufficiency.	Formatted: Bullets and Numbering
7. Recognizes the existence of caves that can provide a wilderness experience and use that is not dependent on a specific site.	Formatted: Bullets and Numbering
8. Recognizes the need to protect for future generations.	Formatted: Bullets and Numbering
9. Recognizes the educational value of cave resources and research.	Formatted: Bullets and Numbering
10. Recognizes that historic use, which does not intrude upon the cave's wilderness and the wilderness experience, may be considered acceptable.	Formatted: Bullets and Numbering

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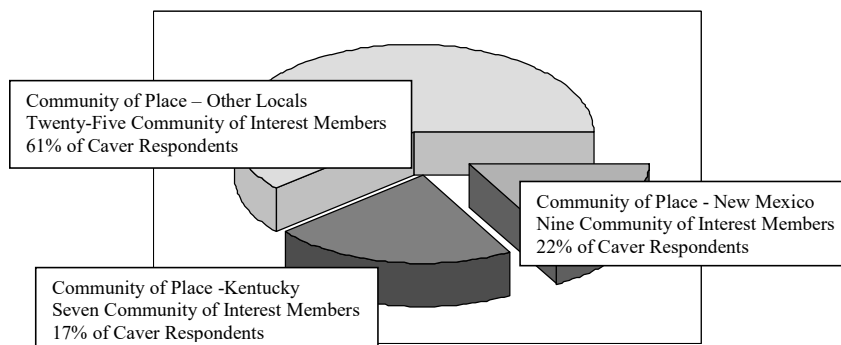
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Criteria Important in Defining the Idea of Wilderness as Established by Focus Groups
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<u>Designation must protect caves based on today's knowledge and values and preserve caves and cave resources for future generations' needs and values</u>
<u>Scientific Values</u>
<u>Designation must provide protection of the cave's scientific values and resources, for study now and in the future, including preservation of future discovery opportunities.</u>
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<u>Education</u>
<u>Specially designated caves can serve as educational resources (with or without requiring physical visitation); generating public awareness of the significance of caves</u>
<u>Management</u>
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Defining the Elusive Cave Wilderness Designation Values & Definition
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Figure 1. Overlap of Community of Interest and Community of Place.



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