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Case Study

The Estes Valley, Colorado: A Case Study of a Weed Management Area

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Weed Management Areas (WMAs) are an important approach for managing invasive plants. However, most WMAs are relatively recent, and little is known about how these active partnerships can be maintained over the long term. This case study of the Estes Valley WMA examined the early community support that led to the establishment of a WMA and reasons why the Estes Valley WMA did not continue as a collaborative process. The analysis uncovered four factors that were critical to the early success of the Estes Valley WMA group: community education/awareness, key participants, a community sense of responsibility, and economic/aesthetic values. The analysis also uncovered four factors explaining why the Estes Valley WMA did not continue: a lack of group structure, unclear boundary definitions, availability of funding, and decline in motivation. Residents of the Estes Valley now rely more on the county and private contractors to provide weed management services. While this approach is meeting basic weed management needs, some interviewees feel that community involvement has declined. Recommendations are given for the reestablishment of a collaborative weed management group in the Estes Valley.

Key words: Collaboration, community support.

Weed Management Areas (WMAs) or Cooperative Weed Management Areas (CWMAs) (herein referred to as WMA or WMAs) are the current and most commonly used terms to describe a cooperative partnership between government agencies, individuals, tribes, and interested groups working towards the management of noxious weeds and invasive plants in a defined, geographic area (Center for Invasive Plant Management 2006; VanBebber 2003).

While the concept of cooperative partnerships relating to weed control efforts has been in existence at least since the early 1980s (H. McNeel, personal communication), the first widely available document regarding the formation of WMAs was published in 1991 (Free et al. 1991a). Since then, the number of WMAs established in the western United States has grown to over 100, most of which have arisen only in the last 5 to 6 years (Center for Invasive Plant Management 2006). The benefits of WMAs are numerous and include bringing often-disparate groups together, pooling resources, and improving weed management efforts over larger areas. The establishment of WMAs is now critical to capturing funding for many weed management projects from important sources such as the National Fish and Wildlife Foundation (NFWF) Pulling Together Initiative (National Fish and Wildlife Federation 2007).

Given that weed management is a long-term process, sustaining coordinated efforts through WMAs may be critical to the future for success. However, there are still many knowledge gaps regarding the factors affecting the long-term success of implementing and sustaining the WMA concept. To better understand this issue, we examined the Estes Valley WMA, a broad based collaborative group that was established in 1997. WMAs are considered a type of collaborative process. Collaboration is defined as a process where stakeholders, from a broad spectrum of interested parties, work together to solve a problem (Gray 1989). Stakeholders can be individuals, groups, or organizations. Collaborative groups approach problems and solutions comprehensively, using joint decision-making (Dukes and Firehock 2001; Gray 1989). The Estes Valley is located approximately 96 km (60 miles) northwest of Denver with the town of Estes Park (population 5,812) as the center of activity. The community is known as a ''gateway community'' to Rocky Mountain National Park. A ''gateway community'' is

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a town or community that is next to or within close proximity of public lands (Howe et al. 1997). Gateway communities frequently present a challenge to weed managers because of the large influx of tourists (J. Connor, personal communication).

The Estes Valley includes multiple government jurisdictions, including portions of Rocky Mountain National Park, Arapahoe and Roosevelt National Forest, the town of Estes Park, and Larimer and Boulder counties. Multiple landowners can complicate weed management because of differing goals, understanding of weed issues, and management philosophies. However, the Estes Valley has a long history of cooperation among community members, federal, state, and local governments regarding land and weed management issues.

Our objective was to elucidate the factors that led to the establishment and continuation of the Estes Valley WMA. The Estes Valley group was successful in obtaining funding through NFWF's Pulling Together Initiative grant and matching funds from the Colorado Noxious Weed Management Fund. The support provided funding for the group's project, *Pulling Together: A Public/Private Initiative to Manage Invasive and Noxious Weeds*, implemented in 1998. However, it was revealed early in the study that the Estes Valley WMA as a coordinated or collaborative group did not continue after the final report for the Pulling Together project was released in 1999. Therefore, our focus shifted to include an exploration of why the Estes Valley WMA did not continue after completion of the grant. To accomplish this, we utilized a case study of the Estes Valley WMA.

Materials and Methods

A single case study methodology (Yin 2003) was used to examine the Estes Valley WMA. Case studies allow for an in-depth analysis of a situation over a specified period of time with lessons learned providing potentially valuable information for other communities and organizations. Multiple sources of data were utilized, with an emphasis on personal interviews, but also including document review, field notes, and field observations to increase the reliability of the findings (Denzin and Lincoln 1998).

Fourteen interviews were conducted between October 5, 2005 and July 20, 2006 with 15 individuals involved or familiar with the Estes Valley WMA, with one follow-up interview on October 31, 2006 (Gunderson-Izurieta 2007). Purposive or targeted sampling (Erlandson et al. 1993; Patton 2002) was used to select a wide range of relationships and affiliations with the Estes Valley WMA and to obtain a diversity of perspectives on what occurred in this case. Initial interviewees were identified from documents, and almost all of the long-term participants of the project were interviewed. The final number of interviews was determined using theoretical saturation, defined as the point when new interviews are producing little new information or understanding (Glaser and Strauss 1967).

Interviews followed a semistructured design with interview guides utilized in each interview (Rubin and Rubin 2005). All questions were open-ended and carefully worded to prevent leading the respondent in a particular direction. All interviews included the same core focal questions, but the interview guides evolved to build on pertinent information and topics brought up in previous interviews. Interview questions focused on participants' perceptions and understandings of the formation of the Estes Valley WMA and its outcome.

All interviews, except for one telephone interview, were recorded on a digital recorder and transcribed. Using qualitative analysis, transcriptions were reviewed and coded several times in a search of common themes and issues brought up in response to the open-ended questions about the WMA. Coding is a common first step of data analysis in qualitative research, whereby the researcher organizes interview and other data into categories (Bogdan and Biklen 2003; Denzin and Lincoln 1998). Additionally, field notes were taken throughout the interview process. The field notes were used to write two types of reflective journals, an interview journal for each interview and a personal journal. Interview journals are descriptive accounts of each interview with the intent to help interpret interviews and direct future interviews. Personal journals are used to record the researcher's subjective thoughts and responses to the interview process (Bogdan and Biklen 2003). Journals were also used to enhance the coding process and theme development. A brief follow-up interview was conducted when necessary to clarify interviewee responses from initial interviews.

Documents used in this case study include the final project report (O'Shea-Stone 1999), weed distribution maps generated during the project, jurisdictional boundary maps, printed material associated with the project, memorandums of understanding between participating groups, and the grant award letters. Documents were collected from interviewees and from the World Wide Web. The documents were not coded and were used as evidence to corroborate data collected throughout the interview process. Documents were also used to provide background on the Estes Valley WMA.

Results and Discussion

WMAs are now common in the western United States, but the Estes Valley WMA was one of the earlier groups formed. Guidelines providing direction to establishing WMAs were somewhat limited, especially in regards to sustaining a WMA on a long-term basis (Free et al. 1991b). Other manuals providing more comprehensive guidance on

the necessary components for a successful, sustained WMA are more recent (VanBebber 2003), and the Estes Valley group operated without the benefit of these newer guidelines. Some of their experiences highlight the value of the new guidelines, while others provide additional insights.

In the mid-1990s the town of Estes Park, Rocky Mountain National Park, and interested community members began meeting informally to create a unified approach to address the noxious weeds in the Estes Valley. The idea for the formation of the partnership was twofold: to protect Rocky Mountain National Park from invasive plants coming into the park and to prevent invasive plants already inside the park from spreading outside the park boundary into the Estes Valley. The partnership was also seen by the National Park Service as a way for the park to meet and communicate better with their neighbors bordering the park's boundary (J. Conner, personal communication).

By 1997, Rocky Mountain National Park, the town of Estes Park, the Estes Valley Improvement Association, Park School District, and several homeowner associations formed an informal partnership. Their efforts culminated in proposals submitted to the NFWF's Pulling Together Initiative and to the Colorado Noxious Weed Management Fund in 1998. The group referred to themselves in the proposals as the Estes Valley WMA and used the proposals to formalize the weed management partnership and create the Estes Valley WMA (Gunderson-Izurieta 2007). Funding was awarded by both grantors with additional grants from the National Park Services' Fee Demonstration Program and Larimer County Parks and Open Space (Connor and Waters 1999). Several other organizations in the Estes Valley also provided limited financial support (Connor and Waters 1999).

Group members prepared a management plan with goals, objectives, and guidelines as a part of the grant proposals. The plan identified 12 target species. Consultants were hired to implement the project, which included identifying and mapping infested areas, assessing the potential threat of exotic plant populations, considering management alternatives, implementing treatments, and evaluating the effects of the treatment. The consultants mapped and assessed 478 ha (1,182 acres) and 63 km (43 miles) of trails and roads. Weed control treatments were applied in several areas, and two baseline plots for future monitoring established. A consultant prepared the final report released in May 1999, and the report strongly recommended that a comprehensive weed management plan be followed using integrated pest management methods (O'Shea-Stone 1999).

Weed management efforts have continued in the Estes Valley since the Pulling Together project was completed. However, the Estes Valley WMA as a cooperative partnership has not continued. To better understand this outcome, early community support and commitment to weed management is examined. Next, ideas concerning longevity of the collaborative process and factors that led to this group's dissolution are explored in light of current guidelines for WMAs. Finally, the extent to which the objectives of the WMA continue to be met in the current activities in the Estes Valley are assessed along with suggestions provided by interviewees for future activity in the area.

Early Community Support. Current guidelines for successful cooperative WMAs (VanBebber 2003) and collaborative processes (Wondolleck and Yaffee 2000) generally highlight the importance of community education and awareness and key participants who serve as leaders. In this case study, participants indicated that these elements were present and important in the early success of the Estes Valley group. Participants also pointed to two other factors that contributed to the early formation of the group: a sense of community responsibility and economic/aesthetic values.

Interviewees identified education and awareness in the community as crucial to management efforts, because it produced a climate of support among partners and with the general community. Educational tools utilized in the Estes Valley included printed materials, media, person-to-person interactions, on-the-ground activities, and the sharing of ideas and expertise through seminars and guest speakers. These tools were described by interviewees as important components for creating "buy-in" and providing assistance to the weed management efforts. The person-to-person interactions were also vital because they allowed for visibility and communication between partners and members of the community. In their study of weed management programs, Hershdorfer et al. (2007) concluded that cooperative efforts utilizing education and outreach were more effective than single entity programs with regards to monitoring and creating support for group efforts.

Key participants were also identified by interviewees as critical to the early success of the Estes Valley partnership. Key people can be individuals or groups who are leaders and are enthusiastic (Selin and Chavez 1995; VanBebber 2003; Wondolleck and Yaffee 2000). Through their enthusiasm they are able to facilitate a climate of support within a community (VanBebber 2003). Two individuals working for Rocky Mountain National Park and the town of Estes Park, respectively, were identified during the interview process as playing key roles in promoting the WMA and writing the grant proposals for the group. In addition, the Estes Valley Improvement Association was also identified for its role as a liaison within the community and for its efforts to create support in the community through volunteer participation.

Interviewees also discussed the fact that buy-in to a WMA or any type of partnership involves creating a sense of responsibility and stewardship among community members (Gunderson-Izurieta 2007). One interviewee described how a WMA can facilitate stewardship by partners working for a ''common good'' (Gunderson-Izurieta 2007). This individual described a neighbor talking to him about the noxious weeds on his property and how this interaction helped him understand his responsibility to maintain his property within the larger community (Gunderson-Izurieta 2007). This idea is supported by Williams and Ellefson (1997) who found, in their study of 40 Forest Service partnerships, that involvement by private landowners occurs because they see cooperation as a responsible way to become better stewards of their own property.

Finally, recognition of the impact of invasive plants on economic and aesthetic values was an important factor in the Estes Valley that helped the community support the WMA concept. Economically, invading alien species contributed to a loss of almost $120 billion per year in the United States and had an impact on ''agriculture, forestry, and several other segments of the economy, in addition to harming the environment'' (Pimentel et al. 2005). Noxious weed infestations can also negatively impact land values when they harm the aesthetic quality of an area (K.G. Beck, personal communication). In gateway communities, the quality of life and tourist-based economy depend on the beauty of the area, and community members understand that with the decline of flora and fauna their property values could potentially decline (J. Connor, personal communication). Interviewees thus indicated that there was broad early support for a WMA in the Estes Valley.

Longevity and the Collaborative Process. The Estes Valley WMA group met at least once more after the Pulling Together report was completed in 1999. At that meeting, the group decided to work more closely with the Larimer County Weed District's Estes Park Program. The group did not consciously decide to dissolve, but because of the loss of key people, the group transitioned into the Larimer County program. According to interviewees, the completion of the project was a turning point for the group. The WMA as a collaborative entity was lost in the process, and much of the weed management activity in the Estes Valley was taken over by the Larimer County Weed District and private contractors. The county provided leadership, expertise, and services for the various entities involved in the WMA. Many entities contracted with the county on a fee-for-services basis or with private companies.

Factors that may have contributed to this dissolution of the WMA include a lack of group structure and identity, unclear boundary definition, funding issues, and the loss of a motivating sense of crisis. The Estes Valley WMA group did not create a formal structure, which is now recommended (VanBebber 2003). Two individuals played a strong leadership role initially, brought the group together, and helped it identify goals and acquire funding. However, formal leadership roles were not defined. When asked to describe what happened with the Estes Valley WMA after the final report was released, interviewees agreed that the group lost its key leaders when their job responsibilities changed (Gunderson-Izurieta 2007).

Formal group structure may also have provided a stronger group identity. Differences in perception regarding the Estes Valley WMA's identity became apparent during the interview process. When interviewees were asked to describe the Estes Valley WMA, their answers varied widely. Most of the interviewees directly involved with the group understood that the WMA was organized in the mid-1990s by the initial partnership. However, over one-fourth of the interviewees equated the Estes Valley WMA with the Estes Valley Improvement Association. These differences in perceptions suggest that no clear identity was created. Had the incipient WMA formalized in the traditional sense with by-laws, charter, and agreements, they may have been able to create a stronger identity. Group structural issues and lack of identity appear to be important factors influencing the eventual dissolution of the Estes Valley WMA.

Interviewees generally agreed that a boundary is needed for a WMA. However, it became apparent during the interview process that there was some confusion as to the actual boundaries of the Estes Valley WMA. Many interviewees were not aware of the original 1997 map of the proposed WMA or only had a vague idea of the boundary area. Several knew of the proposed map's existence, but did not have a clear understanding of the exact boundary location. One interviewee sketched the boundary on the author's USDA map of the Arapaho and Roosevelt National Forest. Subsequent interviewees that viewed the sketch had a similar understanding. However, late in the interview process the original proposed WMA map was located and the boundary encompassed a much larger area than most interviewees had estimated. The establishment of boundaries of the WMA is identified as an important early team-building step in WMA guidelines (Free et al. 1991a; VanBebber 2003), and establishment of clear boundaries probably would have helped forge a stronger group in Estes Valley.

Another significant factor in the dissolution of the Estes Valley WMA was a lack of sustained funding. The formation of the WMA was part of the proposal for funding, and the on-the-ground work was conducted in 1998 after funding was secured. However, once the money was spent and the work completed, the group was unable to

secure any additional funding. Several interviewees agreed that the lack of money and other resources, such as time and manpower, led to the transition of the WMA into the Larimer County Weed District. The Estes Valley WMA was still in its early development and had the Larimer County Weed District not provided an easy alternative, the group may have devised a way to create their own locally based weed management capabilities.

Funding is a recognized key factor in the development and longevity of WMAs and is considered to be a ''driving force'' behind WMAs (K.G. Beck, personal communication). Weed management can be expensive, and groups can sometimes pool funds or access new funds (K.G. Beck, personal communication). Hershdorfer et al. (2007) concluded in their study that adequately funded, locally adapted approaches are needed for successful weed management. The Estes Valley case study indicates that long-term group success may hinge on how a group utilizes its funding, with attention to sustaining funding for the future.

The Estes Valley group utilized most of the grant money to hire consultants to carry out weed management activities and write recommendations, thus distancing the group from collaborative engagement. It was learned that during the Pulling Together project, group members and volunteers tended to focus more on educational efforts and less on actual on the ground weed management. The limited role the group gave itself in its grant project may have contributed to the eventual decision to transition into the County Program.

The lack of a continuing action plan to follow up on the Pulling Together project was also likely a strong contributor to the group's demise. The group did not develop a new management plan, as recommended in the Pulling Together project's final report. According to several interviewees, the intention was to continue the weed management effort by continuing the group and following recommendations provided in the report. However, because group members contracted out the work for the Pulling Together project, most interviewees did not know where the plots were located and if monitoring had continued (Gunderson-Izurieta 2007). Without a framework in place to organize and assign tasks, group members may have lost a sense of ownership in the process; each assuming someone else was in charge or doing the work.

Finally, the loss of a sense of crisis may have decreased motivation to sustain the WMA. At the time of the group's formation, the rapid spread of Dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*) and diffuse knapweed (*Centaurea diffusa*) had been observed, and there was a sense of urgency about controlling invasive plants. Interviews suggested that with the creation of a group working on weeds, that the noxious weed crisis appeared to lessen, leading to a lack of motivation within the community. Believing that noxious weeds are under control can be a problem, because a motivating reason for the group to stay together may not be visible until the next noxious weed ''explosion'' occurs (Gunderson-Izurieta 2007).

Current Activities and Suggestions for the Future. The majority of interviewees are satisfied with current weed management activities in the Estes Valley. However, even those expressing satisfaction described concerns regarding the future of Estes Valley's weed management. Larimer County's Estes Park Program was described as providing structure, expertise, and manpower. The current program provides infrastructure making it easier for entities in the area to contract with the county. The county is also able to enforce the Colorado Noxious Weed Act (2003), described by several interviewees as an important tool in weed management (Gunderson-Izurieta 2007). Hershdorfer at al. (2007) found that enforcement authority was positively correlated with successful weed control. Additionally, interviewees described the senior weed specialist in Larimer County as a key person in the Estes Park Program in addition to the county's leadership and expertise. Larimer County also introduced several services—a weed roundup and weed district shop in the Estes Valley. The shop provides landowners the opportunity to purchase native seed mixes and herbicides. Sprayers are also on loan. The shop is staffed by volunteers in the Estes Valley who are also able to answer questions, offer advice, and identify plants.

Despite the satisfaction of most interviewees, several described the Estes Valley as becoming too reliant on the county program (Gunderson-Izurieta 2007) and felt that if the WMA group had stayed together that they would have been able to accomplish more working cooperatively with the county program. Another interviewee felt that relying on the county was dangerous, because if the person responsible for the Estes Park Program changes, there is a possibility that he/she may not be as approachable and enthusiastic (Gunderson-Izurieta 2007).

There was a feeling described by several interviewees that the Estes Valley community needs to be reenergized regarding invasive plants. Interviewees described a loss of community interest in weeds indicated by a decrease in the number of volunteers. One described the community as becoming apathetic and to have forgotten the effort and importance of continuing weed control. Finally, an interviewee described the Estes Valley Program as a cause of the waning interest, because the community seems to view the work being conducted by the county as keeping the problem under control.

Interviewees provided suggestions relating to the future structure of weed management efforts in the Estes Valley. Primarily, ideas were from the interviewees' own experiences and from lessons learned from the Estes Valley WMA, with several drawing from their experiences with

other WMAs in the western United States. Interviewees provided suggestions for creating a new formalized structure and reinvigorating community interest. These include re-forming the Estes Valley WMA, clearly defining a WMA boundary, making the formalization process easier, providing more opportunities for landowners to learn what is on their property through weed tours, providing more information on the biology of plant species and how to manage them, conducting urban interface meetings to create awareness in the community, and providing annual reports to the community so they can see the results and evidence of control efforts.

The suggestions provided by participants address the question, how does a WMA group facilitate education and outreach to influence and motivate community members to change their perceptions and actions? Facilitating education and outreach efforts will complement the current work being conducted in the Estes Valley. The Estes Valley WMA group, if reestablished, could increase public perception and understanding of weed problems, leading to changed behavior. A study conducted in California, for example, found that ranchers were more likely to implement changes to their range management practices if they attended short courses taught by the University of California Cooperative Extension that provided them with field research and technical and social tools (Richards and George 1996). The Estes Valley appears to be poised for a ''new'' collaborative group that would provide similar types of support to the Estes Valley community.

The Estes Valley WMA did not formalize as a collaborative group. On the basis of the lessons learned, it is suggested that a ''new'' Estes Valley WMA formalize to provide ongoing leadership and structure. In addition, formalizing will allow the group to pursue funding with more credibility to grantors, agencies, and the community. Formalizing will require effort and take time, but may be necessary for longevity.

Other elements also need to be incorporated into a new Estes Valley WMA. New stakeholders would need to be engaged, and community education again would be a key component. An action plan will be essential for the group to measure its own progress and demonstrate its effectiveness to the community. Recognizing the work of community members or partners in the Estes Valley WMA will also be important for long-term group success. Because the current structure has its advantages, particularly, enforcement authority (Gunderson-Izurieta 2007; Hershdorfer et al. 2007), a reorganized WMA may want to act as a complement to the county program.

As an outgrowth of the suggestions and lessons learned from the case study, interest in the Estes Valley WMA was revived. In 2007, after the case study was completed, individuals from Larimer County, the state of Colorado, the U.S. Forest Service, Estes Valley community members, and town of Estes Park officials began working towards the organization of a ''new'' WMA.

WMAs are an important tool for weed management efforts. Using the lessons learned from the Estes Valley WMA may improve new efforts in the Estes Valley and may also provide new and existing WMAs in other regions of the United States new ideas to apply to their own cooperative efforts. By understanding what factors can lead to the formation, sustainability, or dissolution of cooperative WMAs, it is hoped that they can be made more effective and successful in the future. A WMA can be considered successful as long as it is ongoing, can survive changes over time, and results in successful weed management.

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