



Mountain Pine Beetles and Invasive Plant Species

Findings from a Survey of Colorado Community Residents



Dr. Courtney Flint, Hua Qin, and Michael Daab



University of Illinois at Urbana-Champaign
Department of Natural Resources and Environmental Sciences
(217) 244-1840 Hcflint@uiuc.edu

Ecosystem disturbance by Mountain Pine Beetle is spreading rapidly across Colorado. To better understand how local communities and residents have reacted to this problem as well as the issue of invasive plants, the Community and Natural Resources Research Team at the University of Illinois at Urbana-Champaign administered a mail survey to residents in nine communities in North Central Colorado. This report summarizes preliminary findings of this survey. Please don't hesitate to contact us for further information about this and other similar studies. We can be reached at Hcflint@illinois.edu.

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Survey Introduction

The US Forest Service, Pacific Northwest Research Station funded research to assess community responses to forest disturbance by mountain pine beetles (*Dendroctonus ponderosae*) and public reaction to invasive plants in north central Colorado.

In the Spring of 2007, 4,027 16-page questionnaires were mailed to randomly selected households with addresses in Breckenridge, Dillon, Frisco, Granby, Kremmling, Silverthorne, Springs Steamboat, Vail, and Walden, Colorado (see map below).

After adjusting for 589 undelivered surveys due to incorrect addresses, the 1348 completed surveys yielded an aggregate response rate of 39.2%.

All the nine communities were reasonably well represented in the survey. Table 1 shows number of surveys completed and response rates by communities. Walden had the highest proportion (15.7%) of the surveys received. Walden also had the highest response rate among study communities (49.8%). The lowest response rate was from Kremmling (33.1%).

Throughout this report, figures showing community variations are oriented from left to right according to a gradient of an amenity index from lower to higher amenity indicators. Thus, Walden has lower scores on indicators of amenity orientation and Frisco has the highest. Details on this amenity index can be obtained from the authors of this report.

**Current Bark Beetle Outbreaks in Colorado
From 2006 Aerial Detection Survey**

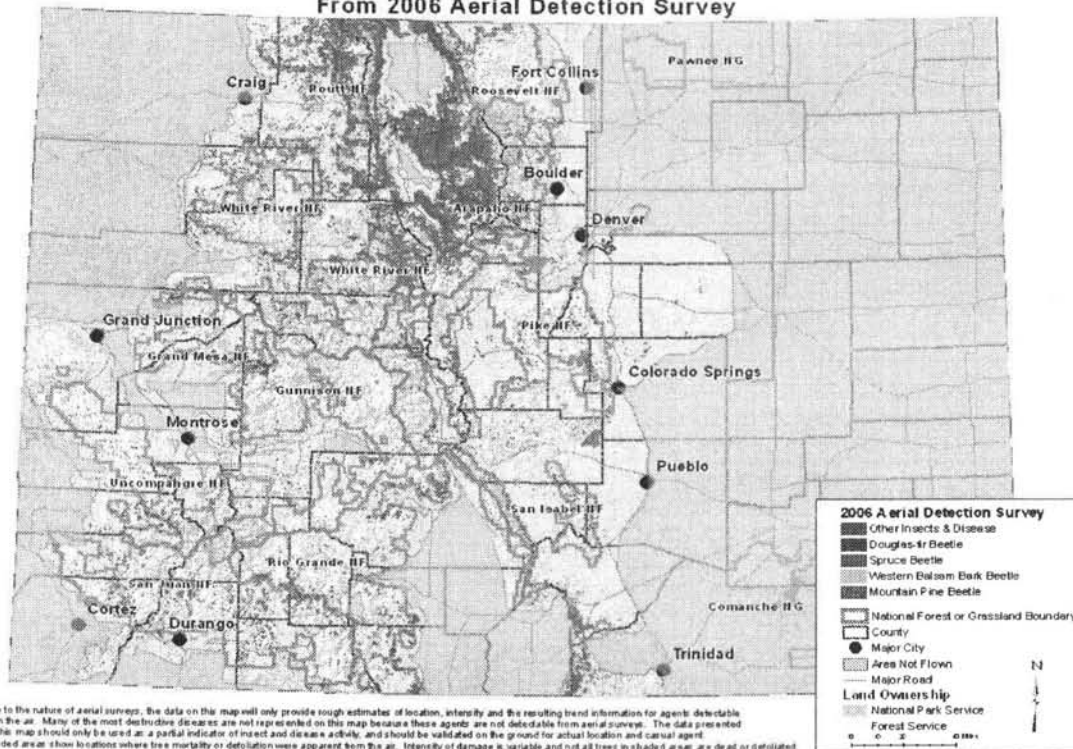


Table 1: Number of Surveys Received and Response Rates by Communities

Counties	No. of Surveys Sent	No. of Surveys Completed	Response Rate	% of the Total
Breckenridge	390	153	39.2%	11.4%
Dillon	343	131	38.2%	9.7%
Frisco	389	160	41.1%	11.9%
Granby	380	158	41.6%	11.7%
Kremmling	362	120	33.1%	8.9%
Silverthorne	395	150	38.0%	11.1%
Steamboat	392	139	35.5%	10.3%
Vail	363	126	34.7%	9.3%
Walden	424	211	49.8%	15.7%
Total	3438	1348	39.2%	100.0%

Characteristics of Respondents

A number of socio-demographic variables were included in the survey to describe the characteristics of mail survey respondents. The socio-demographic variables used in the analysis were age, gender, years lived in community, ethnicity, household income, educational attainment, employment, and political views. Socio-demographic characteristics for the aggregate dataset and individual communities are shown in Table 2.

The average age of all respondents was about 52. Female and male respondents accounted for 55.7% and 44.3% respectively in the total sample. A vast majority of the respondents (95.6%) were white. The average household income level of surveyed households was around \$75,000 ~ \$99,999. 27.9% of the surveyed households earned less than \$50,000 and 29.4% earned more than \$100,000 in 2006. The educational level of respondents was quite high. About 59% of all respondents attained four year college degrees or more.

Most respondents (75.3%) were either employed for pay by a company/business or self-employed. About 20% were retired.

Almost 17% of respondents had previous employment in occupations related to forest management, forest products, or timber harvesting. 25% of respondents had previous involvement in agricultural production.

Survey respondents reported living in their communities for an average of 19 years. Nearly 90% of all respondents were home owners. A large majority of respondents (91.9%) had primary residences in study communities, and 8.1% were second home owners. About half of the respondents (49.8%) lived within town or city limits, 32.4% lived in unincorporated area within 5 miles of city limits, and the others (17.8%) lived more than 5 miles away from cities. For the aggregate data, 70.3% of respondents lived on properties less than one acre.

The survey sample as a whole holds balanced political views. Nearly 35% of respondents described their views as liberal or moderate-liberal, 23.7% as moderate, and 37% as moderate-conservative or conservative.

Table 2: Socio-demographic Characteristics of Respondents for the Aggregate Dataset

Socio-demographic characteristics	Mean	Survey %	Standard deviation	Range
Age (n=1308)	52.04		13.06	13 – 89
Gender (n=1315)				
Female		44.3		
Male		55.7		
Ethnicity (n=1294)				
White		96.6		
Non-white		3.4		
Years in community (n=1324)	18.97		15.09	1 – 82
Home ownership (n=1331)				
Yes		89.6		
No		10.4		
Total household income (n=1127)				
Less than \$35,000		14.1		
\$35,000 to \$74,999		39.1		
\$75,000 to \$149,999		33.0		
\$150,000 or more		13.8		
Education (n=1320)				
High school degree or lower		10.9		
Some college or technical/associate degree		30.1		
Bachelor's degree or higher		58.9		
Employment situation (n=1322)				
Employed for pay by a company/business		43.9		
Self-employed		31.4		
Unemployed		1.4		
Retired		20.3		
Homemaker		2.9		
Employment in forest management/industry (n=1318)				
Yes		16.8		
No		83.2		
Involvement in agricultural production (n=1315)				
Yes		25.0		
No		75.0		
Political views (n=1280)				
Liberal or moderate-liberal		34.8		
Moderate		23.7		
Moderate-conservative or conservative		37.0		
Other		4.5		

Variations in respondent characteristics across study communities were common. Community differences regarding respondents' socio-demographic characteristics were significant for age, length of residence, household income, education, employment, and political views. Respondents were oldest in Walden and youngest in Breckenridge (see Figure 1).

Years in community were highest for Walden respondents and lowest for Dillon (see Figure 2). Respondents in Walden had significantly longer years in residence than those from all other communities. Kremmling respondents reported the second longest length of residence.

The highest average household income was found among Vail respondents and the lowest was among Walden respondents (see Figure 3). Walden respondents also reported significantly lower educational attainment than respondents from all other communities except Kremmling (see Figure 4). Average education levels for respondents from

Walden, Kremmling, and Granby were the lowest and differed significantly from the higher education levels found among respondents from other communities.

Differences in respondents' employment status across all the study communities were moderate with Walden respondents more likely to be retired than in other communities. Regarding employment in forest management/industry and agricultural production, Walden, Kremmling, and Granby had much higher proportions of respondents involved in these two areas than other communities (see Figure 5).

Community differences in respondents' political views showed similar patterns with those regarding household income, education, and employment. Walden, Kremmling, and Granby stand out again in this aspect. On average, respondents from these three communities indicated a more conservative political perspective than respondents from other communities (see Figure 6).

Figure 1: Community Differences in Respondents' Average Age

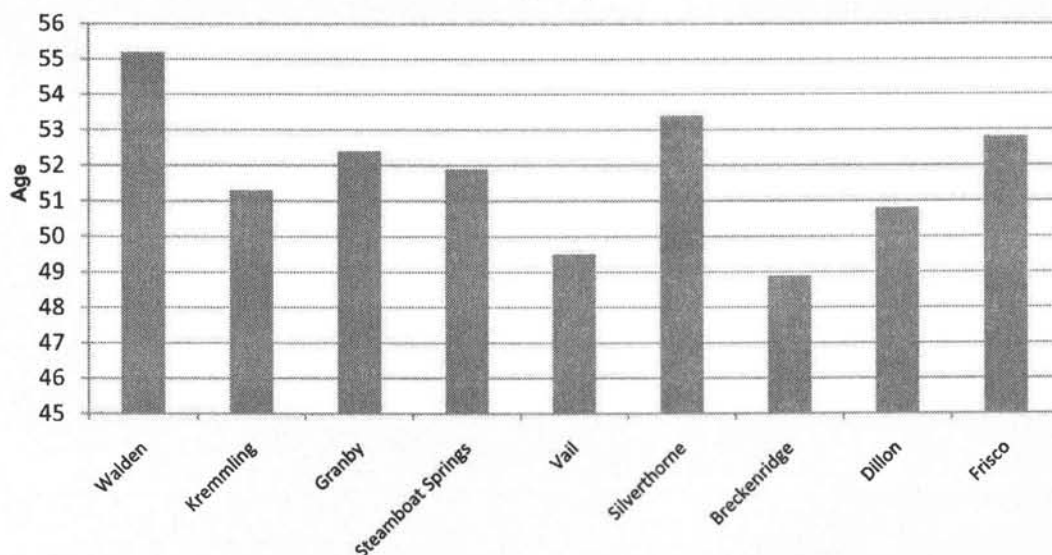


Figure 2: Community Differences in Respondents' Length of Residence

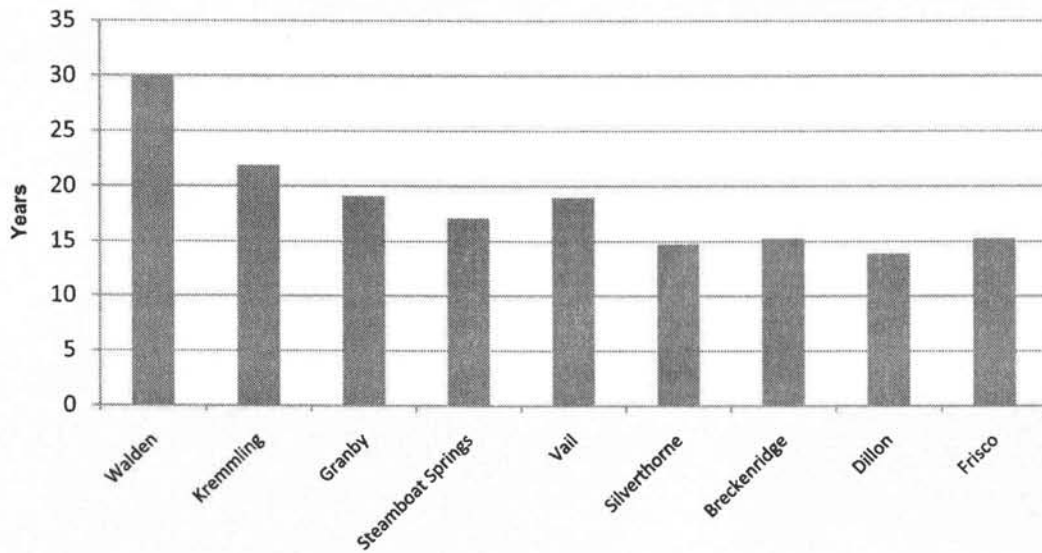


Figure 3: Community Differences in Respondents' Household Income

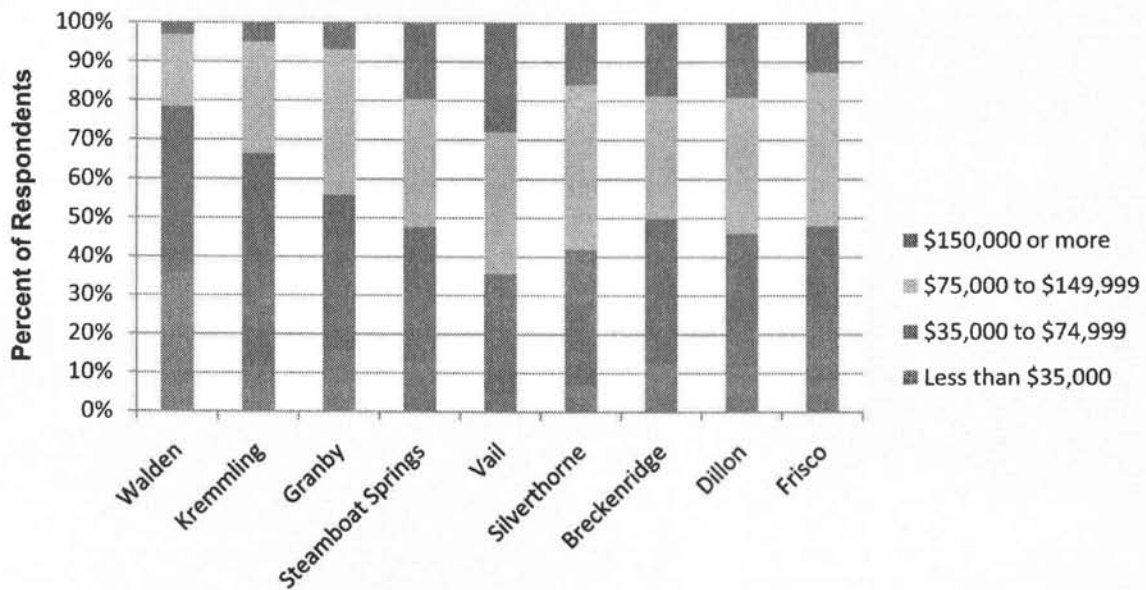


Figure 4: Community Differences in Respondents' Educational Attainment

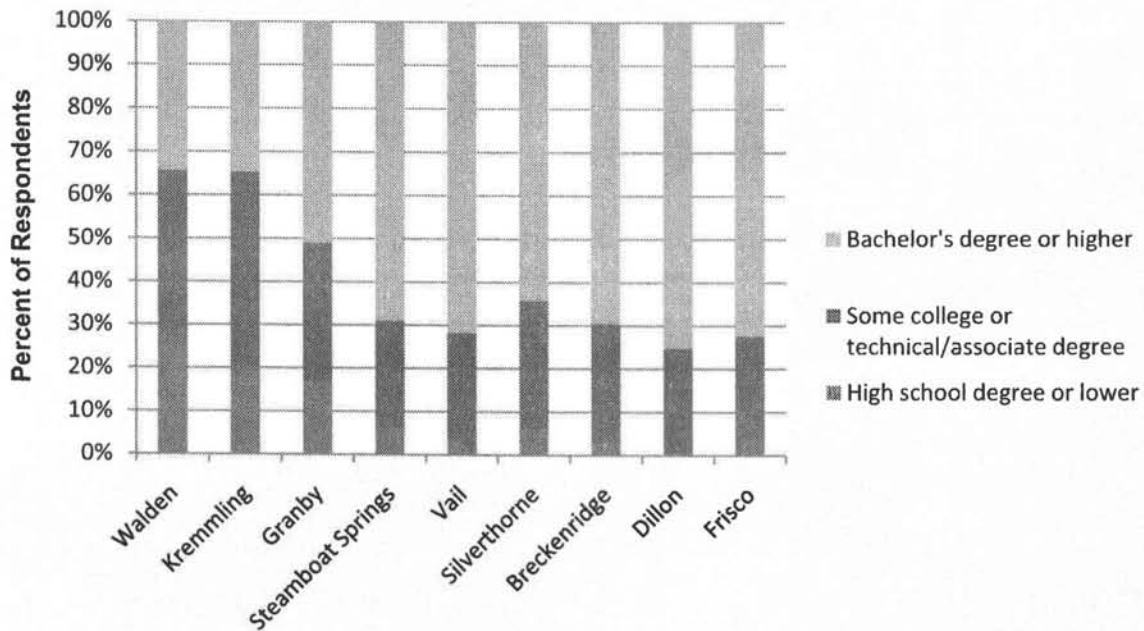


Figure 5: Community Differences in Respondents' Employment in Forest Management/Industry and Agriculture

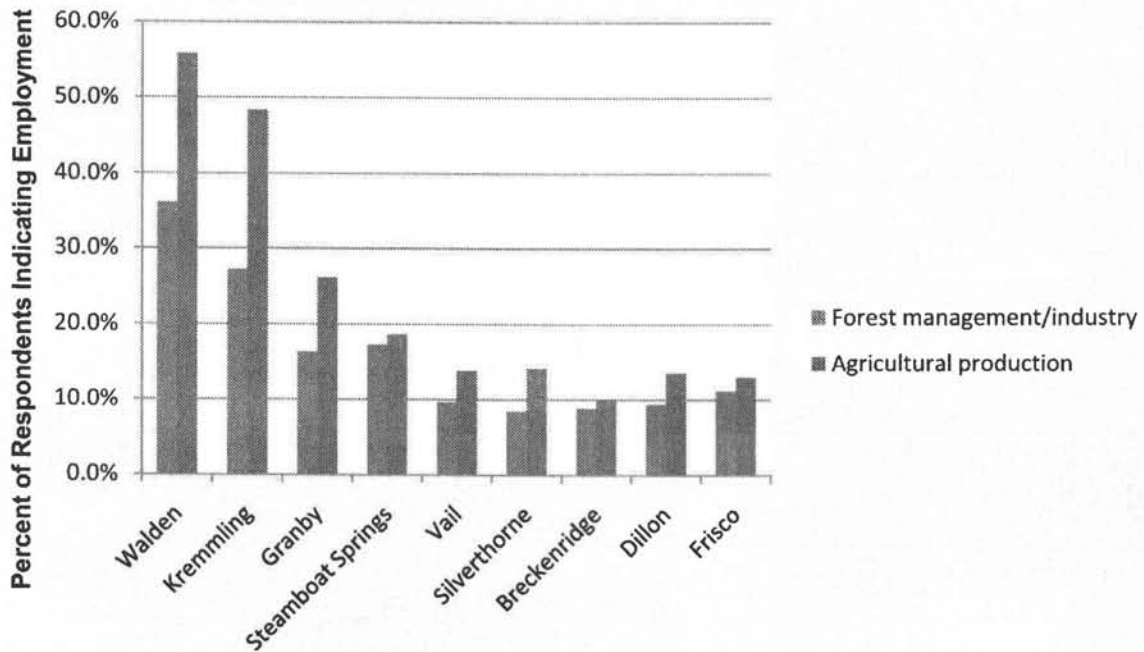
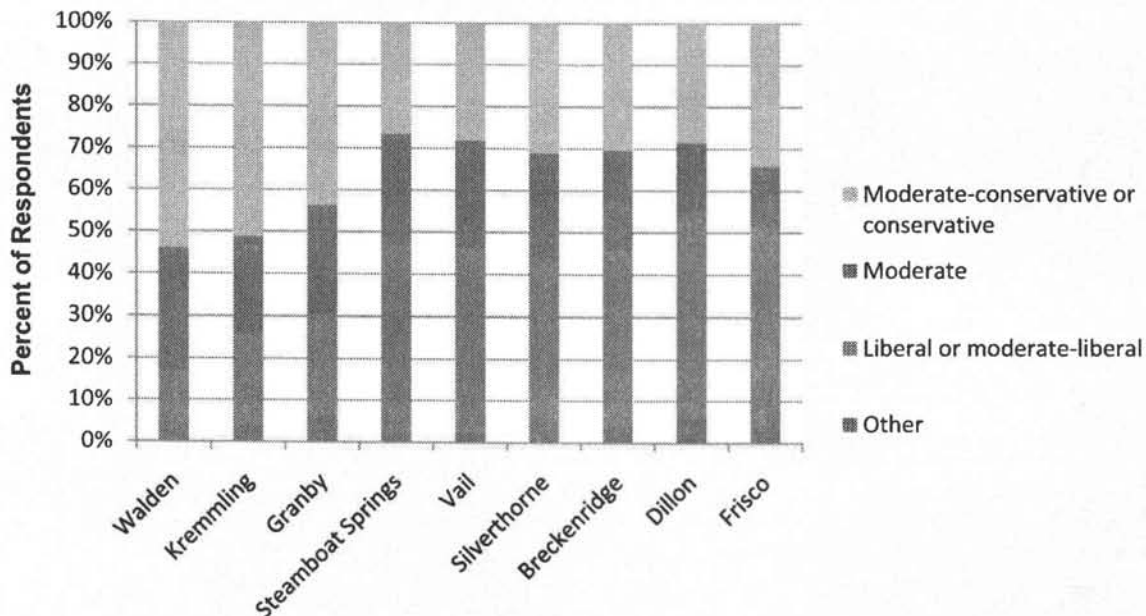


Figure 6: Community Differences in Respondents' Political Views



Perceptions of Beetle Impacts

Across the study communities, the perceived magnitude of pine mortality was highly variable while the perceived amount of tree re-growth was more consistently low.

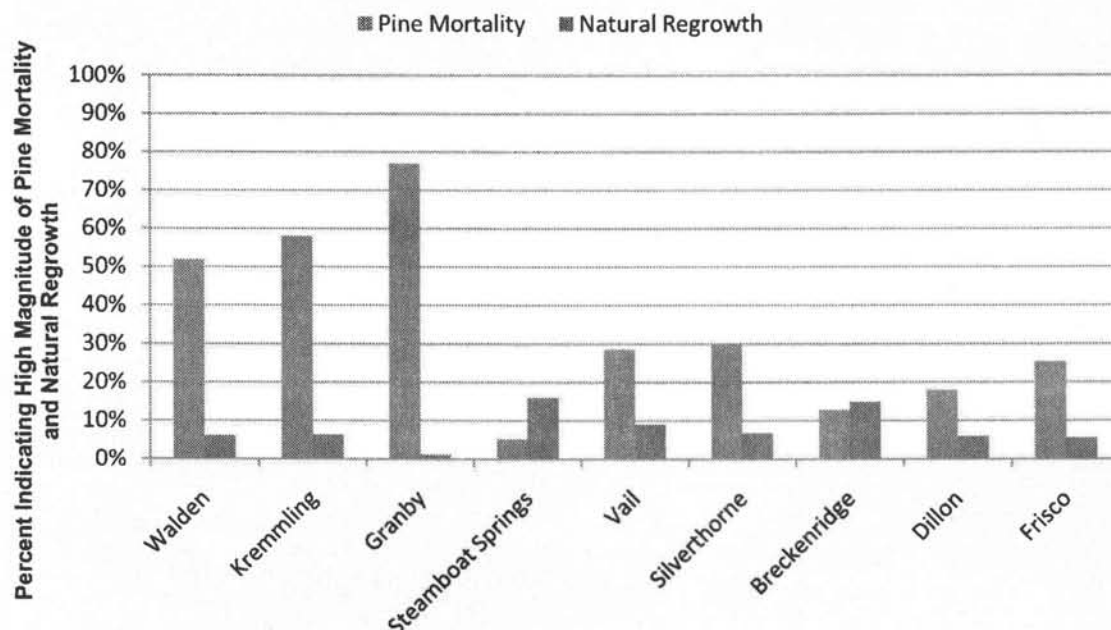
The figure below (Figure 7) shows the perceived magnitude of tree mortality and amount natural re-growth of respondents from each study community. The blue bars refer to the percentage of survey respondents who identified over half or almost all pines around their communities having been killed by beetles. The red bars refer to the percentage of survey respondents who indicated some or much natural re-growth around their communities.

As shown in Figure 7, community variations in the perceived magnitude of pine mortality

are large. More than 50% of survey respondents from Granby, Kremmling or Walden said over half or almost all pines around their communities were dead. By comparison, a moderate proportion (30% or less) of respondents from Breckenridge, Dillon, Frisco, Silverthorne and Vail, and only 5% of respondents from Steamboats Springs, indicated a high level of pine mortality.

The differences across communities in the perceived amount of natural re-growth are much smaller than those in the perceived magnitude of pine mortality. Only Steamboats Springs and Breckenridge had about 15% of respondents indicating some or much natural forest re-growth.

Figure 7: Perceptions of Pine Mortality and Natural Re-growth



For the entire study area, over 50% of survey respondents identified all of the listed impacts as having occurred (see Figure 8 below). Aesthetic loss, fire hazard, and tree clearing cost were indicated as the most common impacts (more than 90% of respondents reported these impacts).

There exist large community variations with respect to specific perceived impacts, especially “job creation”, “logging”, “privacy loss”, and “tree clearing”. Figure 9 shows that respondents from Steamboat Springs and Vail were much less likely to identify these impacts as having occurred than respondents living in other communities.

Survey respondents were asked to rate the impacts from the mountain pine beetles on a graduated scale from 1 (very negative) to 5 (very positive). The bars in Figure 10 refer to the mean values for each impact according to the answers of respondents.

Overall, only “availability of firewood” and “increased ecological awareness” were viewed to be positive impacts from mountain pine beetles (with means larger than 3). Survey respondents had largely neutral opinions on the impacts on “forest rejuvenation”, “logging”, “timber industry”, and “job creation” (with means around 3). All other impacts were considered to be negative (with mean less than 3). The two most indicated impacts (aesthetic loss and fire hazard) were also considered the most negative.

The rating of impacts in the economic domain, such as those on “job creation”, “logging”, and “timber industry”, show the greatest community variations. These impacts were indicated as more positive by respondents from Granby and Kremmling than by those from other study communities (see Figure 11).

Figure 8: Mountain Pine Beetle Impacts

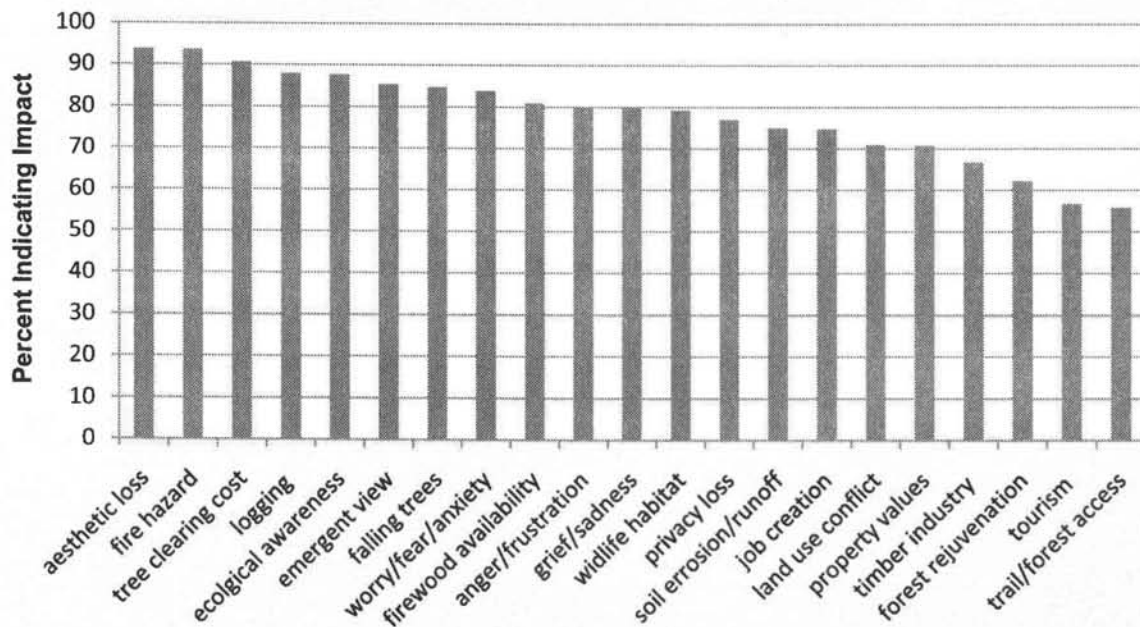


Figure 9: Community Variations in Perceived Mountain Pine Beetle Impacts

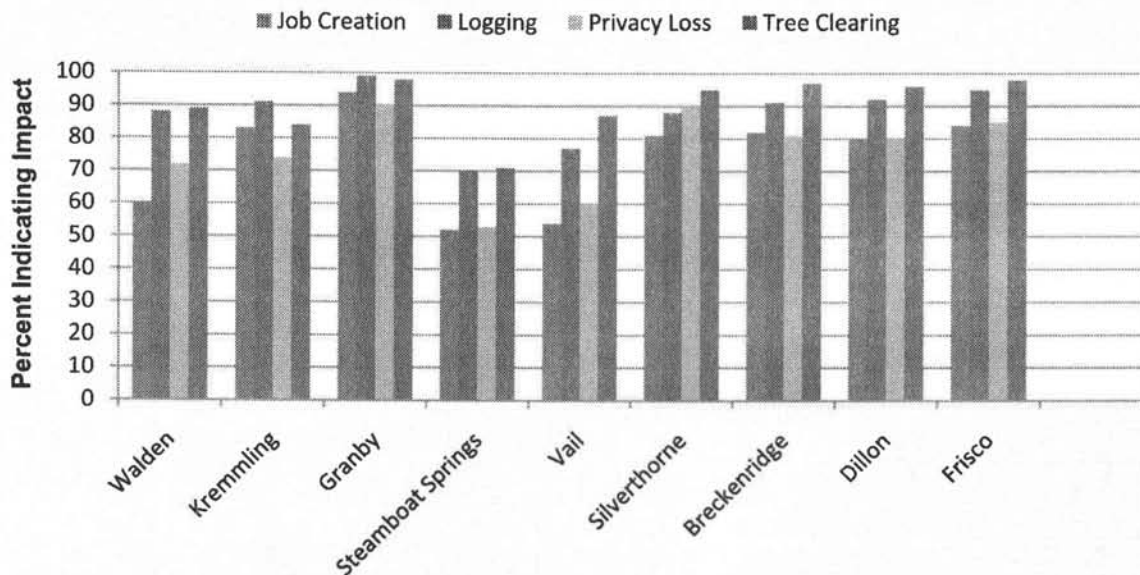


Figure 10: Rating of Mountain Pine Beetle Impacts

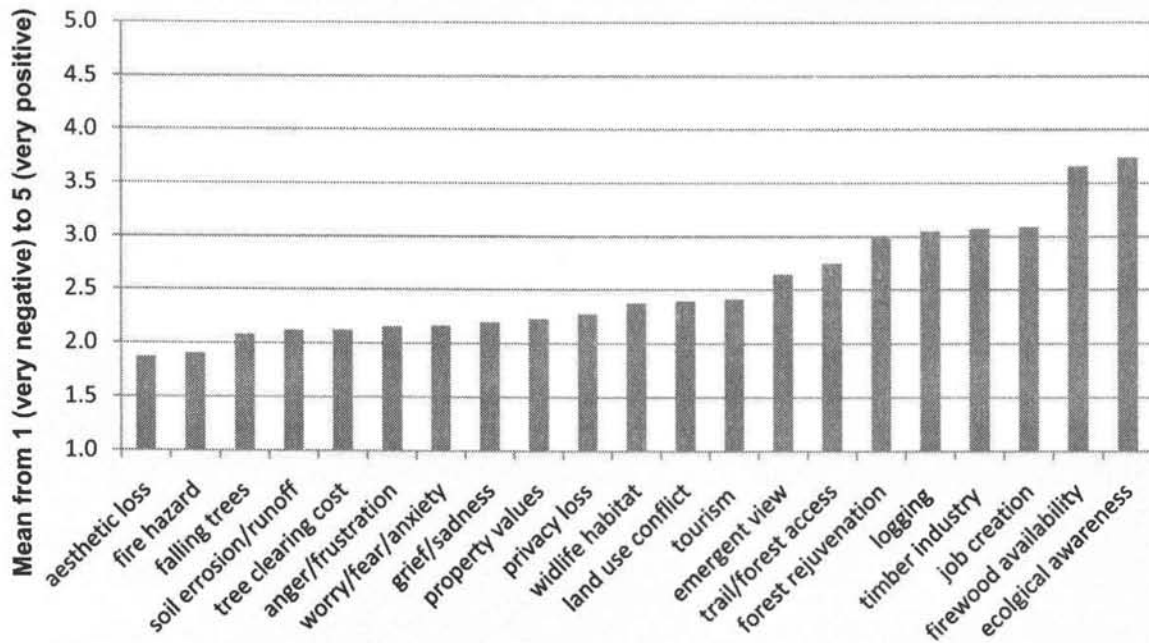
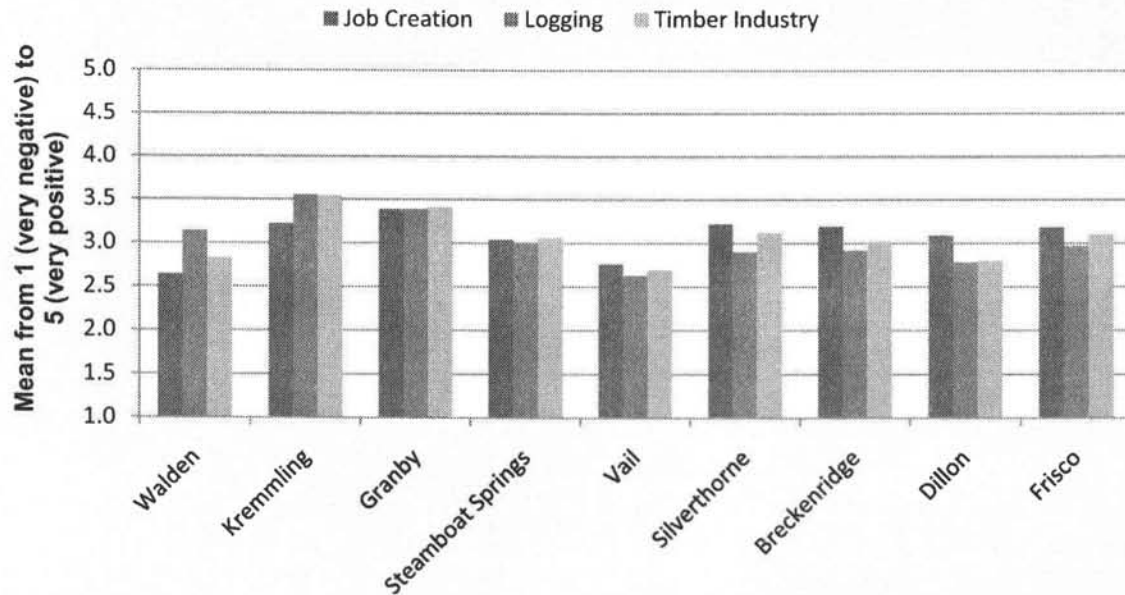


Figure 11: Community Variations in the Rating of Mountain Pine Beetle Impacts



Forest Risk Concerns

Survey results indicated that most respondents were concerned about forest risks caused by the beetle outbreak and changes in forest health. Forest risk concerns were measured with a scale from 1 (not concerned) to 5 (extremely concerned). Figure 12 shows the percentage of respondents indicating high to extreme risk perception about forest related risks (values 4 and 5). On average, survey respondents indicated a high level of concern for all forest risks listed on the survey except “impact on livestock grazing”. “Forest fire” and “loss of scenic/aesthetic quality” were the risks with highest concerns (89% and 83% indicated high or extreme concerns on these two risks respectively).

Concerns about forest related risks were quite different across communities.

Significant community variations regarding all listed risks were found except “invasive plant species” and “loss of scenic/aesthetic quality”. Concerns on the “impact on livestock grazing” and the “loss of forests as an economic resource” demonstrated the largest community difference (see Figure 13). On average, respondents from Walden, Kremmling and Granby indicated higher concerns on these two risks than respondents from other communities.

Respondents’ concern about wildfire hazard has also changed with the mountain pine beetle outbreak. For the aggregate dataset, 86.5% of respondents indicated that concern about wildfire had increased with the pine beetle outbreak (Figure 14). At the community level, at least 80% of respondents from each community reported increased fire concern.

Figure 12: Percent of Respondents Indicating High to Extreme Risk Concerns

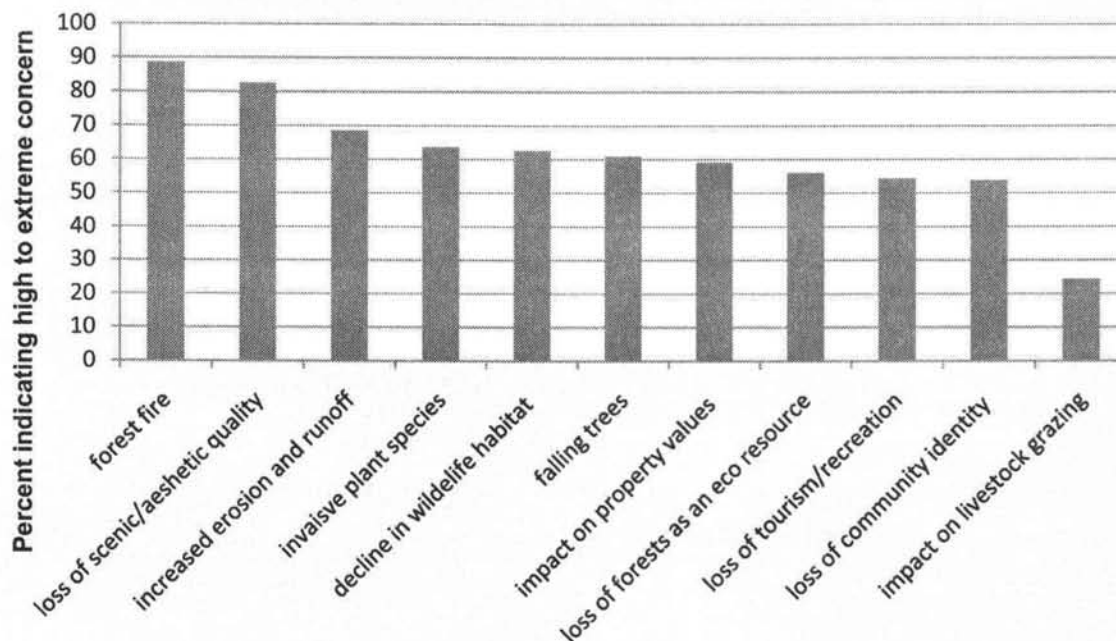


Figure 13: Community Variations in Forest Risk Concerns

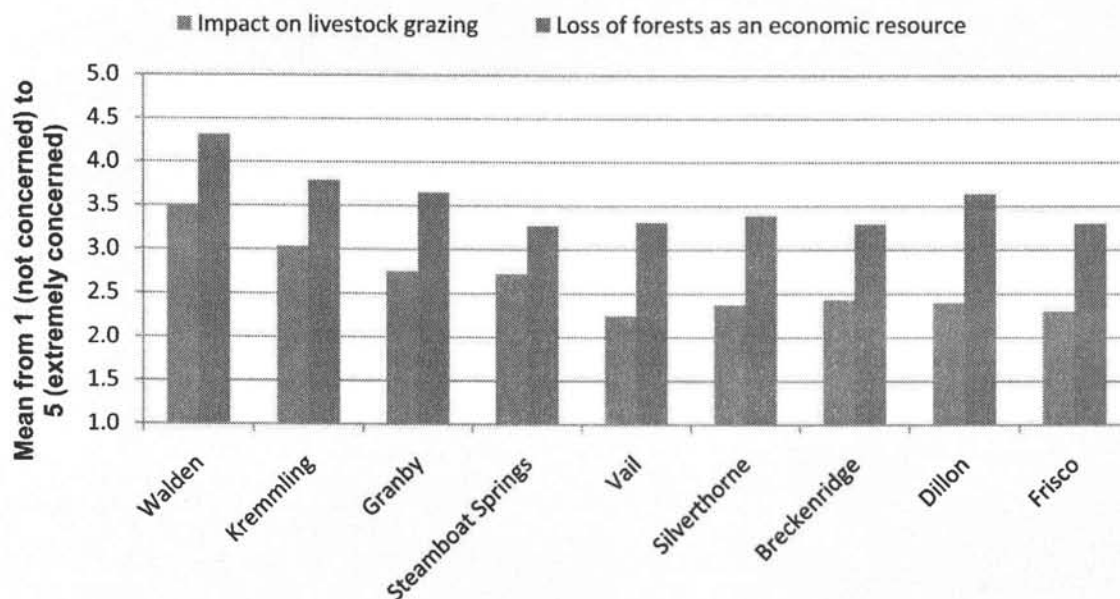
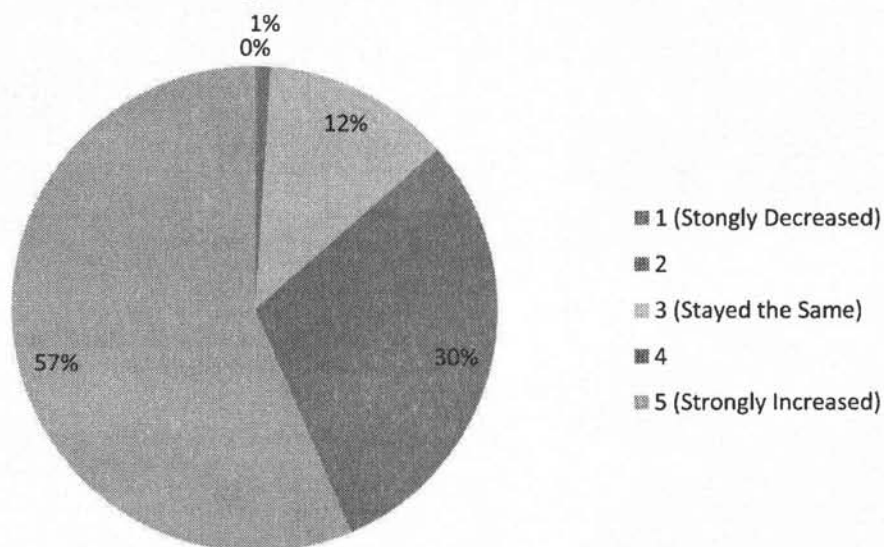


Figure 14: Changes in Concern about Wildfire Hazard

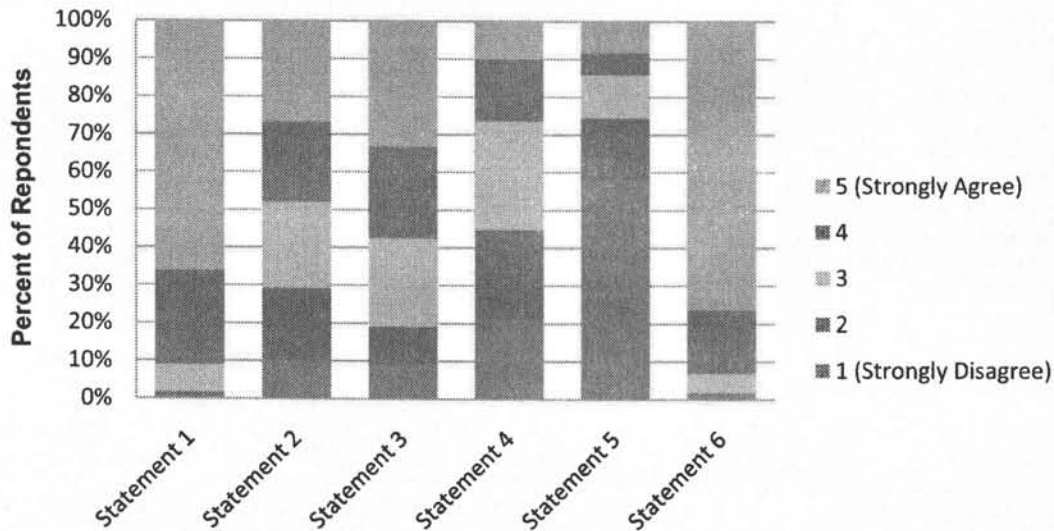


Opinions on Forest Management

We asked respondents' opinions on a series of statements on forests in Colorado and forest management in the survey. The level of agreement or disagreement with the

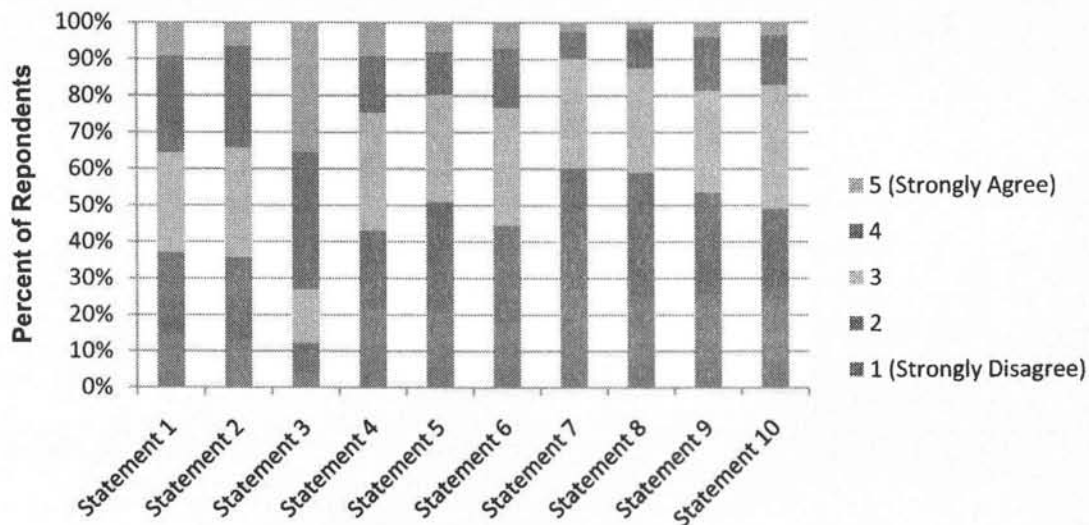
statements were measured on a scale from 1 (strongly disagree) to 5 (strongly agree). The results are summarized in the following charts (Figures 16 and 17).

Figure 16: Agreement or Disagreement with Statements about Forests in Colorado



- **Statement 1:** 91.1% of all respondents agreed that **forests give them a sense of peace and well-being** (1.7% disagreed, 7.2% neutral).
- **Statement 2:** 48.1% of all respondents agreed that **forests should be managed to meet as many human needs as possible** (29.2% disagreed, 22.7% neutral).
- **Statement 3:** 57.5% of all respondents agreed that **forests should have the right to exist for their own sake, regardless of human concerns and uses** (19.1% disagreed, 23.4% neutral).
- **Statement 4:** 26.3% of all respondents agreed that **forests should be left to grow, develop, and succumb to natural forces without being managed by humans** (44.8% disagreed, 28.9% neutral).
- **Statement 5:** 14.1% of all respondents agreed that **forests that are not used for the benefits of humans are a waste of our natural resources** (74.6% disagreed, 11.3% neutral).
- **Statement 6:** 93.1% of all respondents agreed that **it is important to maintain the forests for future generations** (1.8% disagreed, 5.1% neutral).

Figure 17: Agreement or Disagreement with Statements about Local Forest Management



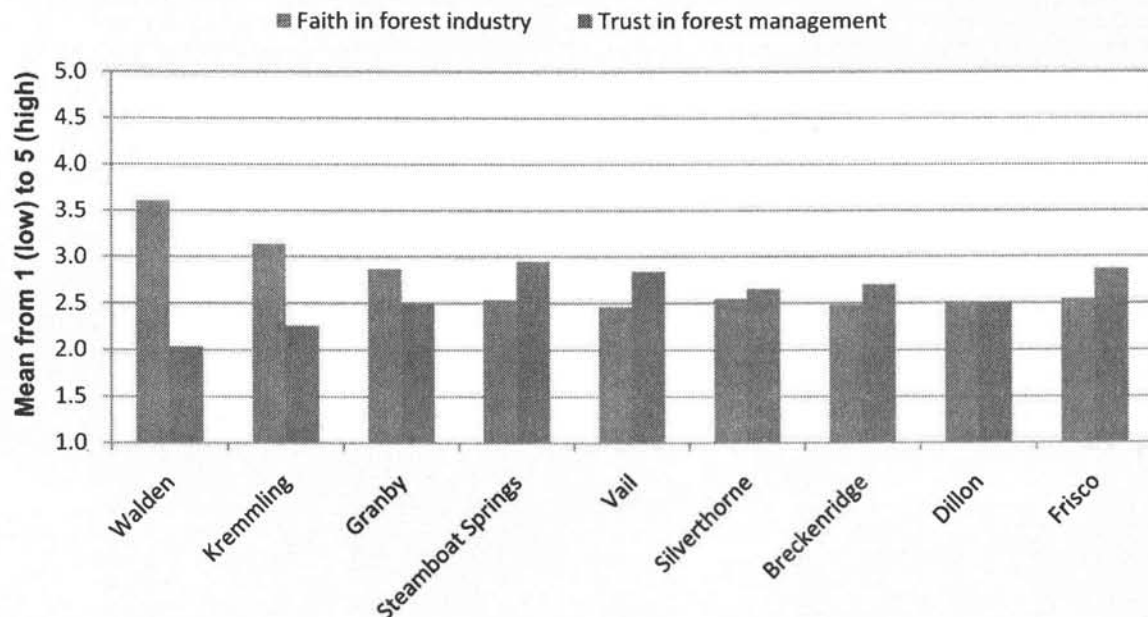
- **Statement 1:** 35.6% of all respondents agreed that **forests are being managed successfully for a wide range of uses and values, not just timber** (37.2% disagreed, 27.2% neutral).
- **Statement 2:** 34.3% of all respondents agreed that **forest management does a good job of including environmental concerns** (35.9% disagreed, 29.9% neutral).
- **Statement 3:** 73% of all respondents agreed that **when making forest decisions the concerns of people in communities close to the forest should be given higher priority than people in distant communities** (12.3% disagreed, 14.7% neutral).
- **Statement 4:** 24.6% of all respondents agreed that **the present rate of logging is too great to sustain our forest in the future** (43.2% disagreed, 32.2% neutral).
- **Statement 5:** 19.8% of all respondents agreed that **the economic benefits from logging usually outweigh any negative consequences** (50.8% disagreed, 29.4% neutral).
- **Statement 6:** 23.2% of all respondents agreed that **forestry practices generally produce few long-term negative effects on the environment** (44.7% disagreed, 32.1% neutral).
- **Statement 7:** 9.9% of all respondents agreed that **citizens in Colorado communities have enough say in forest management** (60.2% disagreed, 29.9% neutral).
- **Statement 8:** 12.4% of all respondents agreed that **forests are being managed successfully for the benefit of future generations** (59.1% disagreed, 28.6% neutral).
- **Statement 9:** 18.5% of all respondents said they **have confidence in the US Forest Service to manage forest in Colorado** (53.7% disagreed, 27.8% neutral).
- **Statement 10:** 16.9% of all respondents agreed that **the US Forest Service shares their values about how Colorado forests should be managed** (49.2% disagreed, 33.8% neutral).

Respondents from different communities indicated distinct opinions on all the statements about Colorado forests and forest management except for the one on maintaining forests for future generations where there was widespread agreement. These statements fell into two distinct categories (based on factor analysis of findings). These two categories were *faith in forest industry* and *trust in forest management*.

There were significant community variations regarding views on forest industry and the reported level of trust in forest management.

Figure 18 shows that higher faith in forest industry was associated with lower trust in forest management across communities. Respondents from Walden indicated the highest level of faith in forest industry, followed by respondents from Kremmling and Granby, while respondents from other communities showed a less enthusiastic attitude toward human utilization of forest resources. On the other hand, although respondents from Walden, Kremmling and Granby demonstrated higher faith in forest industry, they indicated less trust in the present forest management.

Figure 18: Community Variations in Opinions on Forest Management



Respondents' perspectives on forest values and forest management were expected to be closely related to their views on the future forest industry options. The survey used a scale from 1 (strongly oppose) to 5 (strongly support) to represent different levels of

support for forest industry options. The chart below (Figure 19) shows the proportion of respondents supporting or opposing each forest industry option.

- 58.4% of all respondents supported **biomass/biofuels power generation** (13.9% opposing, 27.7% neutral).
- 30.1% of all respondents supported **large scale timber processing** (45.3% opposing, 24.6% neutral).
- 60.3% of all respondents supported **small scale timber processing** (15.5% opposing, 24.2% neutral).
- 64.4% of all respondents supported **niche marketing/production of wood products** (8.9% opposing, 26.7% neutral).

Respondents from different study communities showed different levels of support for each forest industry option, especially those related to logging and timber processing (see Figure 20). Only respondents from the three forest industry involved communities (Walden, Kemmling, and Granby) generally supported large scale sawmills or processing plants. Respondents from these communities also indicated higher levels of support for the other three forest industry options than respondents from other communities. Overall, respondents from Walden indicated strongest support for all options.

Figure 19: Support for Forest Industry Options

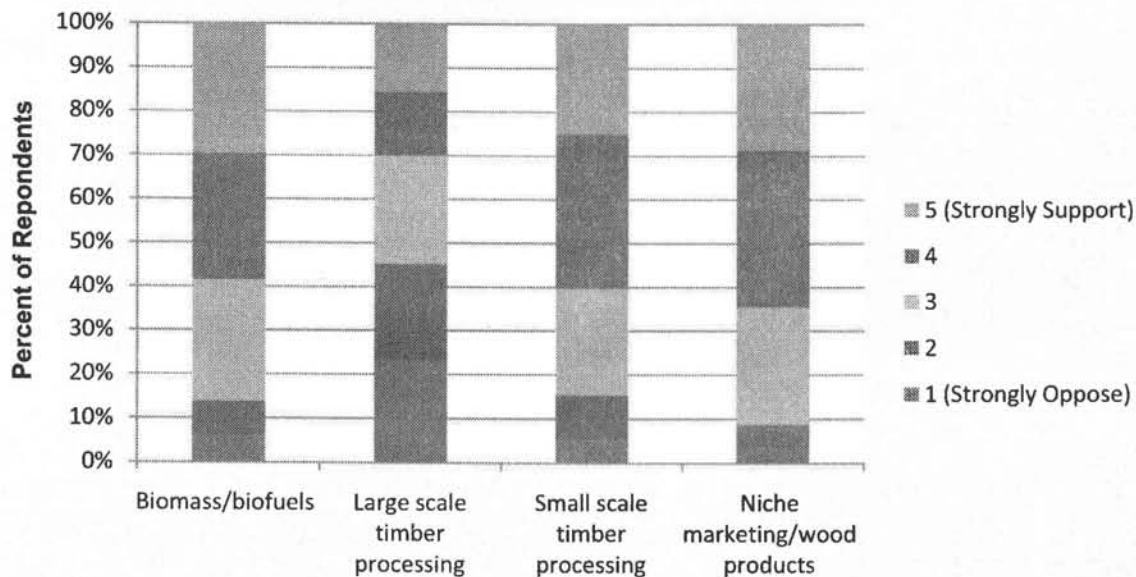
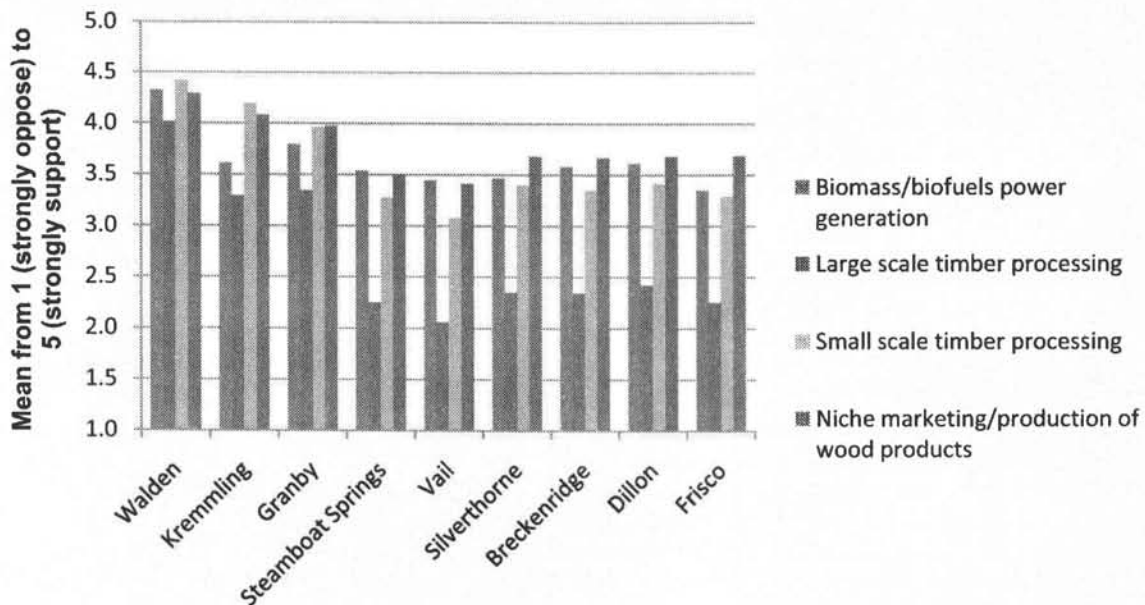


Figure 20: Community Variations in Support for Forest Industry Options



Sources of Information about Forests

The top five sources of information about forest issues and risks reported by respondents were newspaper, own observations, word of mouth, US Forest Service, and radio (see Figure 21). These five sources of information were also indicated as the most important in all communities except the three which are

more dependent on forest industry: Walden, Kremmling, and Granby. As compared with other communities, a much higher proportion of respondents in these three communities relied on local loggers for information (see Figure 22). Also, only in these three communities did own observations replace newspaper as the most commonly used information source.

Figure 21: Top Sources of Information about Forest Issues and Risks

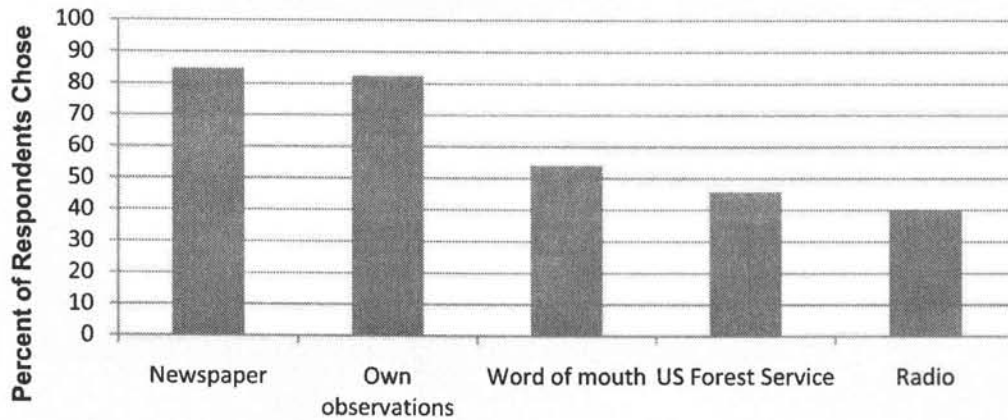
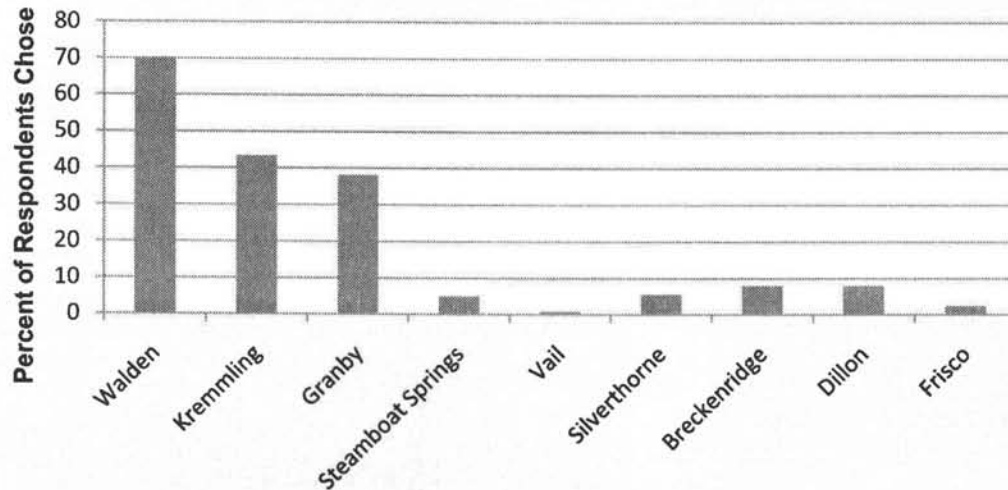


Figure 22: Community Variations in Relying on Local Loggers for Information about Forests



The top five trusted sources of accurate and reliable information according to the answers of all respondents were own observation, newspaper, US Forest Service, local loggers, and environmental

organizations (see Figure 23), while the top five least trusted ones were word of mouth, US Forest Service, environmental organizations, newspaper, and local loggers (see Figure 24).

Figure 23: Most Trusted Information Sources

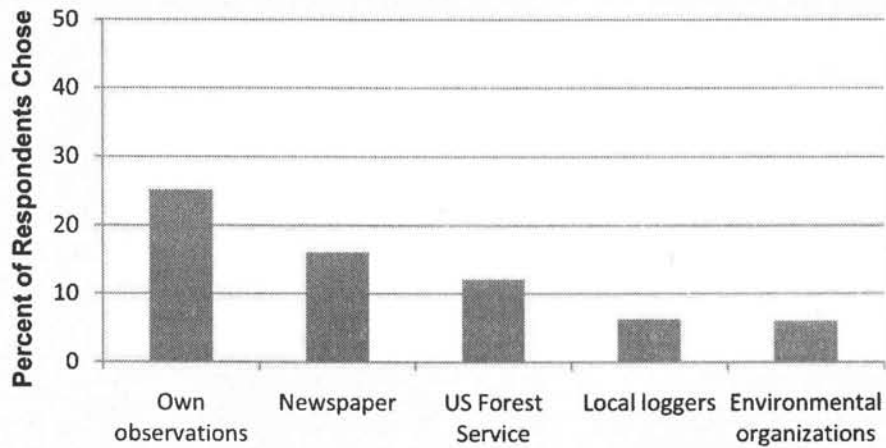
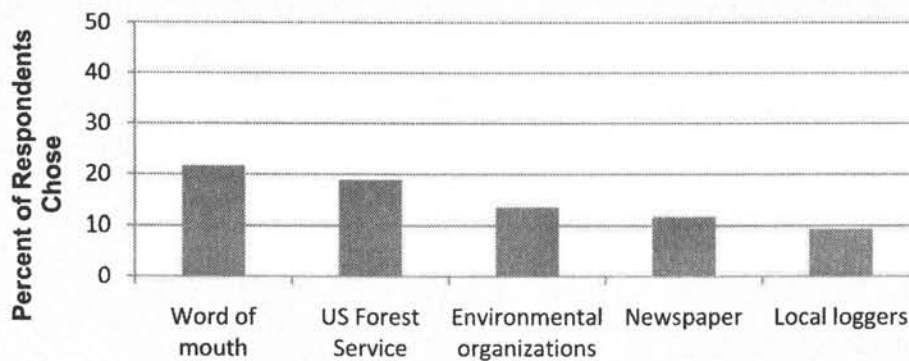


Figure 24: Least Trusted Information Sources



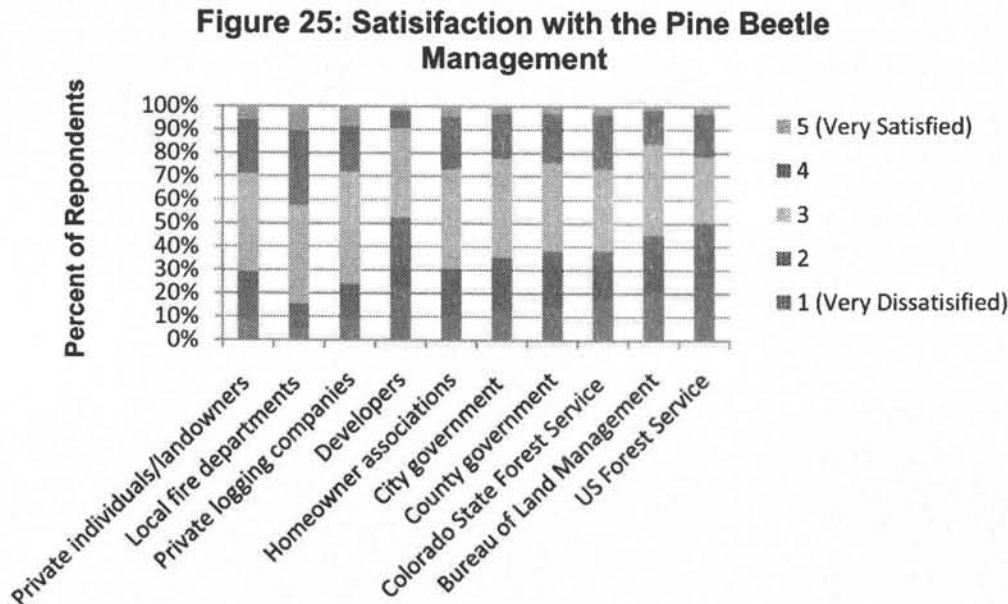
It was interesting to find that newspaper, US Forest Service, local loggers, and environmental organizations were ranked among both the most trusted *and* the least trusted information sources. The same sources were also viewed quite differently by respondents across communities.

In the three communities involved with forest industry (Walden, Kemmling, and Granby), local loggers were trusted as one of the most reliable information sources. However, they were indicated as one of the least trusted information sources by respondents from all other communities.

As a source of information, environmental organizations were less trusted by respondents from Walden, Kemmling, and Granby than in the other communities. Also worth noting is that 40.7% of respondents from Walden chose US Forest Service as the least trusted information source.

Satisfaction with Beetle Management

Survey respondents were also asked to indicate their level of satisfaction with entities involved with the management of the pine beetle issue on a scale from 1 (very dissatisfied) to 5 (very satisfied). The results are summarized in Figure 25.

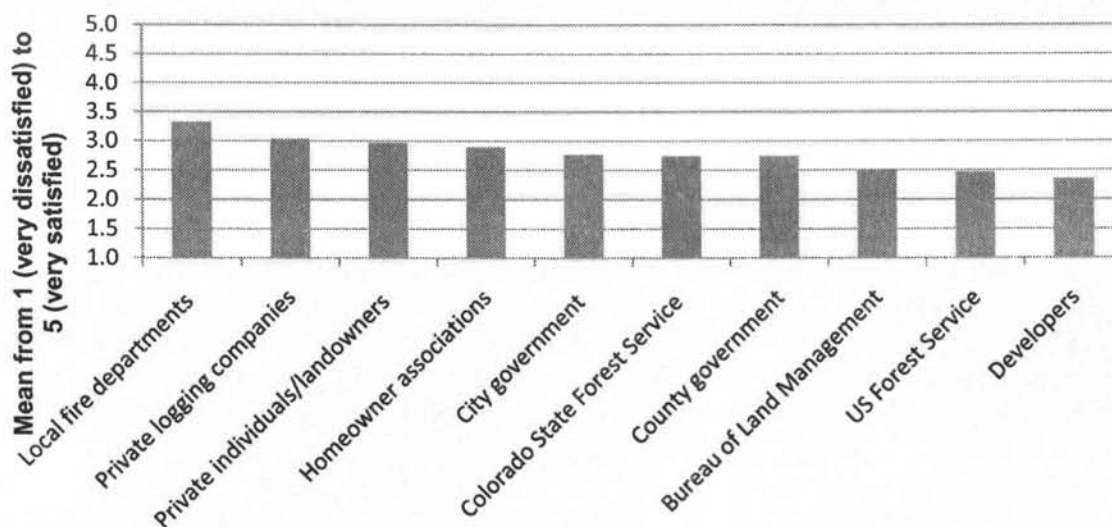


- 42.4% of all respondents were satisfied with **local fire departments** (15.5% dissatisfied, 42.2% neutral).
- 27.9% of all respondents were satisfied with **private logging companies** (24% dissatisfied, 48.1% neutral).
- 9.4% of all respondents were satisfied with **developers** (52.5% dissatisfied, 38.1% neutral).
- 27.1% of all respondents were satisfied with **homeowner associations** (30.9% dissatisfied, 42% neutral).
- 22.1% of all respondents were satisfied with **city government** (35.5% dissatisfied, 42.4% neutral).
- 23.8% of all respondents were satisfied with **county government** (38.5% dissatisfied, 37.6% neutral).
- 26.7% of all respondents were satisfied with the **Colorado State Forest Service** (38.5% dissatisfied, 34.8% neutral).
- 16.2% of all respondents were satisfied with the **Bureau of Land Management** (45.2% dissatisfied, 38.6% neutral).
- 21.3% of all respondents were satisfied with the **US Forest Service** (50.4% dissatisfied, 28.3% neutral).

The bars in the Figure 26 below refer to the mean values of satisfaction with different entities according to the answers of all respondents. On average, respondents were only slightly satisfied with the management of the pine beetle issues by local fire department (mean=3.3). The results show largely neutral opinion on the management

by private individuals and landowners, private logging companies, and homeowner associations. Overall, respondents were dissatisfied with governmental entities, and least satisfied with developers in terms of pine beetle management.

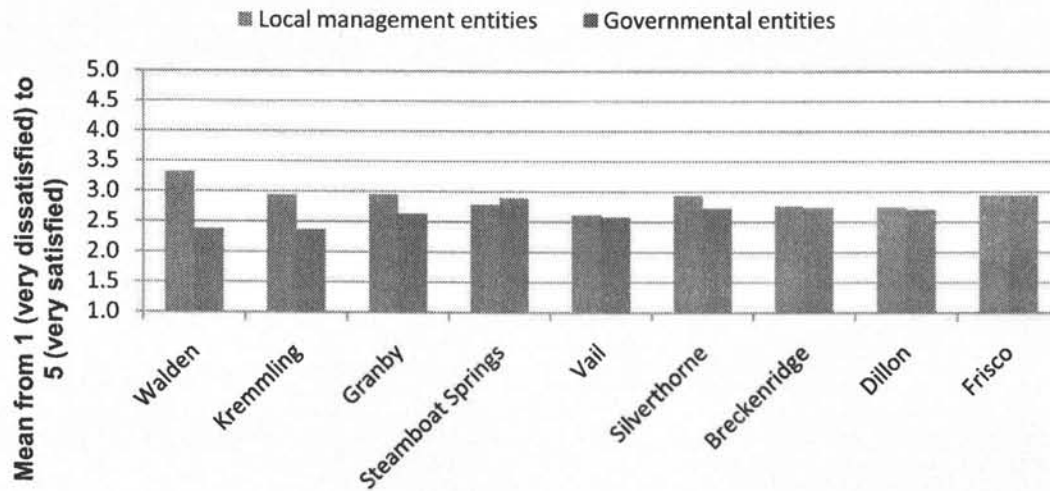
Figure 26: Satisfaction with the Pine Beetle Management



Two distinct categories of entities were found (based on factor analysis of the indicated levels of satisfaction with different entities by respondents). These categories were *satisfaction with local management entities* and *satisfaction with governmental entities*. In general, results show general dissatisfaction with the management of pine

beetles by both groups (means 2.92 and 2.65 respectively). The differences among communities in these two aggregate satisfaction levels are not very large, but still statistically significant. Only respondents from Walden indicated slightly more satisfaction with the pine beetle management by local entities (see Figure 27).

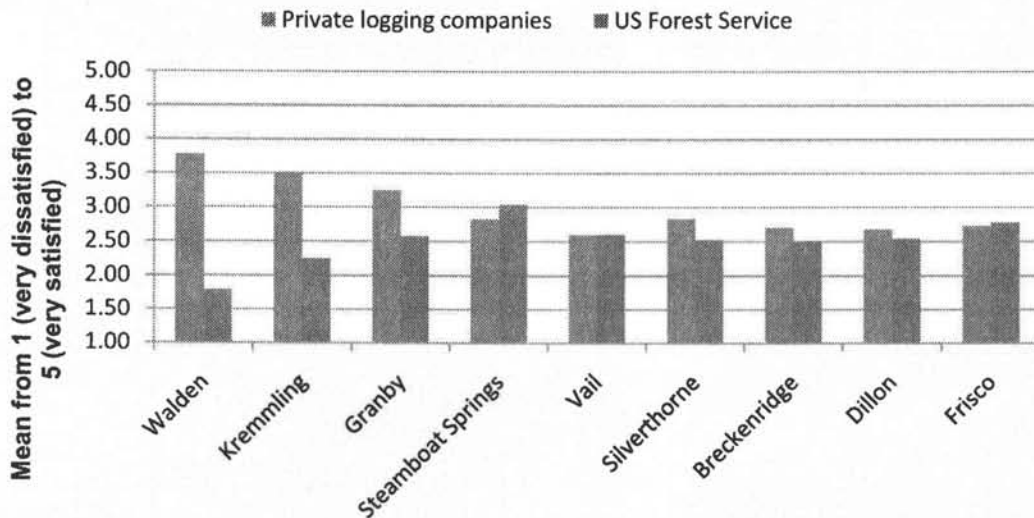
Figure 27: Community Variations in Aggregate Satisfaction Levels



Community variations were found regarding the levels of satisfaction for all entities especially private logging companies and US Forest Service. Only respondents from Walden, Kremmling, and Granby indicated a

moderate level of satisfaction with private logging companies. Satisfaction levels for the US Forest Service were low in almost all study communities, and particularly in Walden (Figure 28).

Figure 28: Community Variations in Satisfaction with the Pine Beetle Management



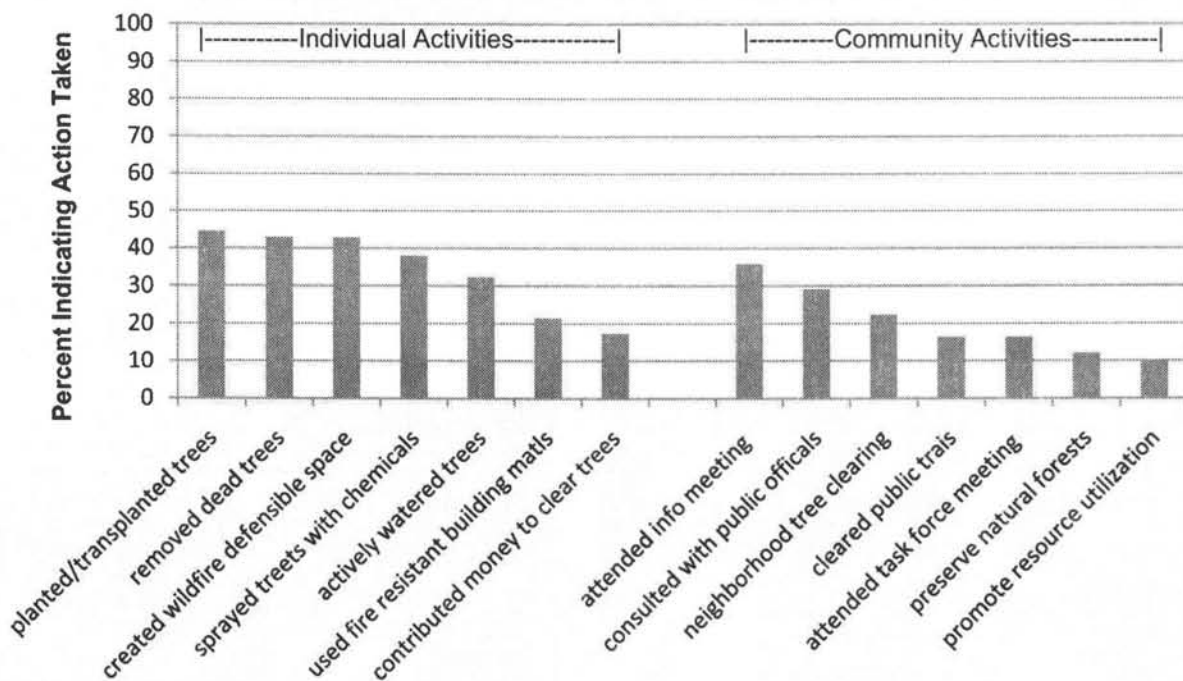
Response to the Beetle Outbreak

Respondents were asked if they had participated in any of a list of actions in response to the mountain pine beetle. Figure 29 shows the percent of all respondents who undertook various activities (both as individuals and as part of community efforts). Overall, the proportions of respondents indicating participation in individual/household activities (on the left

side) were higher than the proportions of those indicating participation in community related activities (on the right side).

For the aggregate data, the average numbers of individual/household and community related actions are 2.9 and 2.5 respectively. Community variations regarding individual/household and community actions are only moderate.

Figure 29: Actions Taken in Response to the Beetle Outbreak



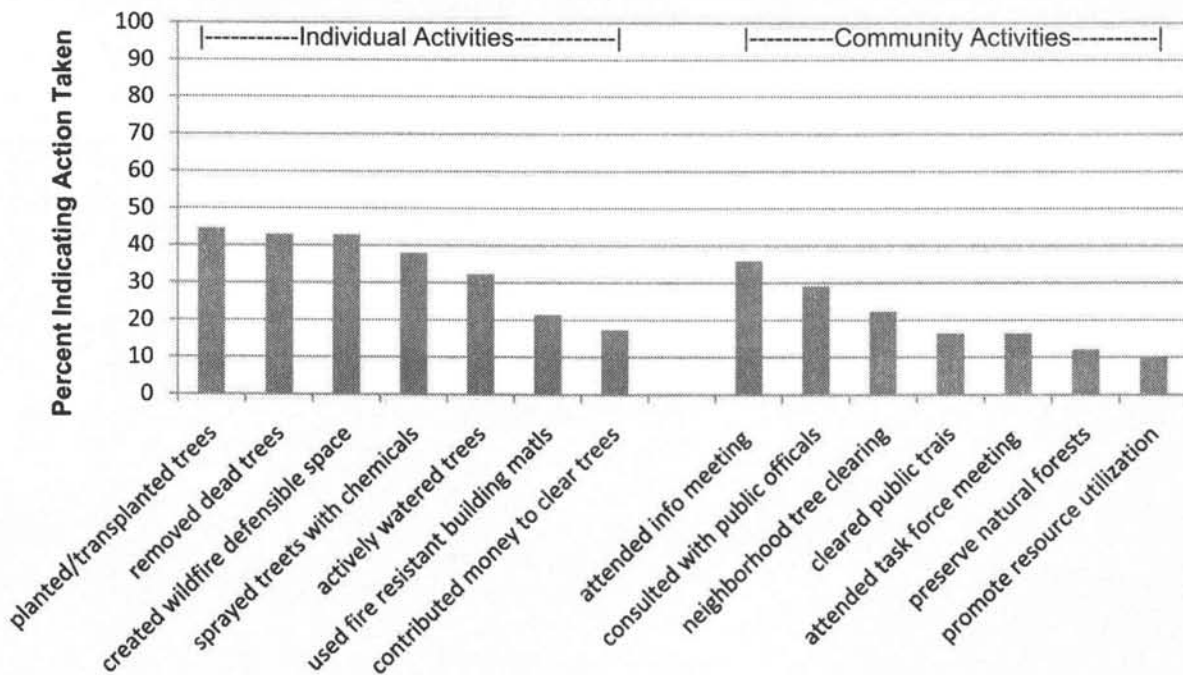
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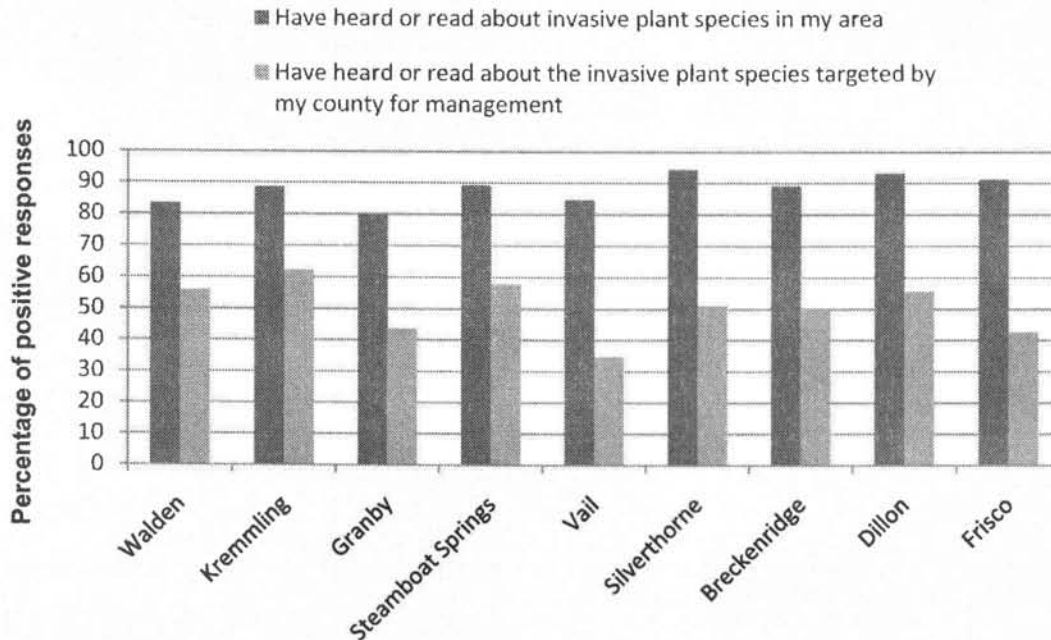
Invasive Plant Species Awareness

Previous studies of public awareness of invasive plant species indicated relatively low levels of engagement on this issue. In our study, we found a much higher level of awareness of invasive plants and problems. A total of 88% of all respondents had heard or read about invasive plant species in their area, from a high of 94.4% in Silverthorne to a low, but still relatively high awareness, of 80.0% in Granby. We also asked whether the public had heard or read about invasive plants that were targeted for management by their county weed boards. Fewer

respondents had heard or read about county-targeted plant species than had heard or read about invasive plants in general.

Kremmling respondents had the highest calculated score of awareness of county-targeted plant species, while Vail respondents had the lowest. Figure 30 shows differences between awareness in general and of county-targeted plants, as well as differences across communities. Respondents with past employment in occupations related to forestry or timber harvesting or agricultural production were more likely to have heard or read about county-targeted invasive plants.

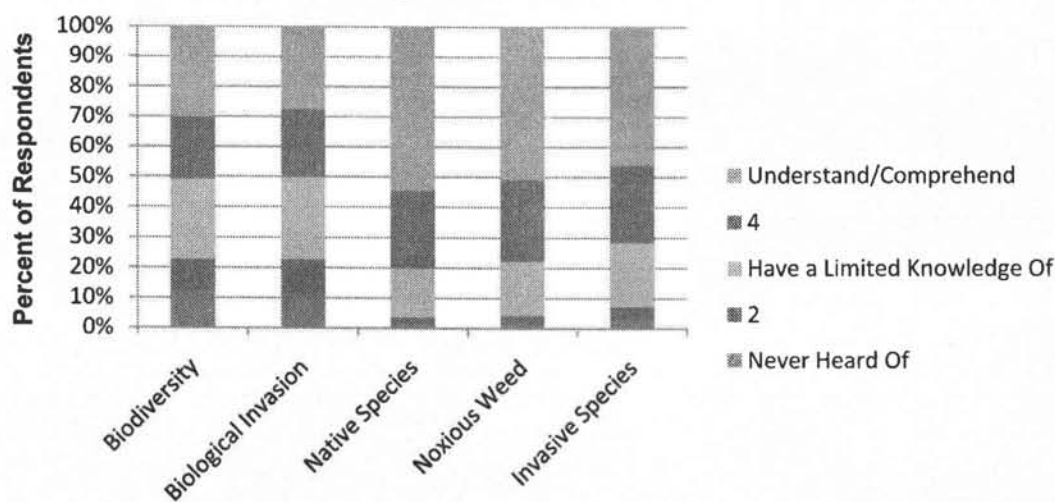
Figure 30: Awareness of Invasive Plant Species



Respondents reported their knowledge of terms that are important to the issue of invasive plants. These results are shown in Figure 31. Overall, most respondents reported at least a limited knowledge of all terms. Respondents reported less

knowledge of biodiversity (mean = 3.56) and biological invasions (mean = 3.43) than native species (mean = 4.30), noxious weed (mean = 4.23), and invasive species (mean = 4.07).

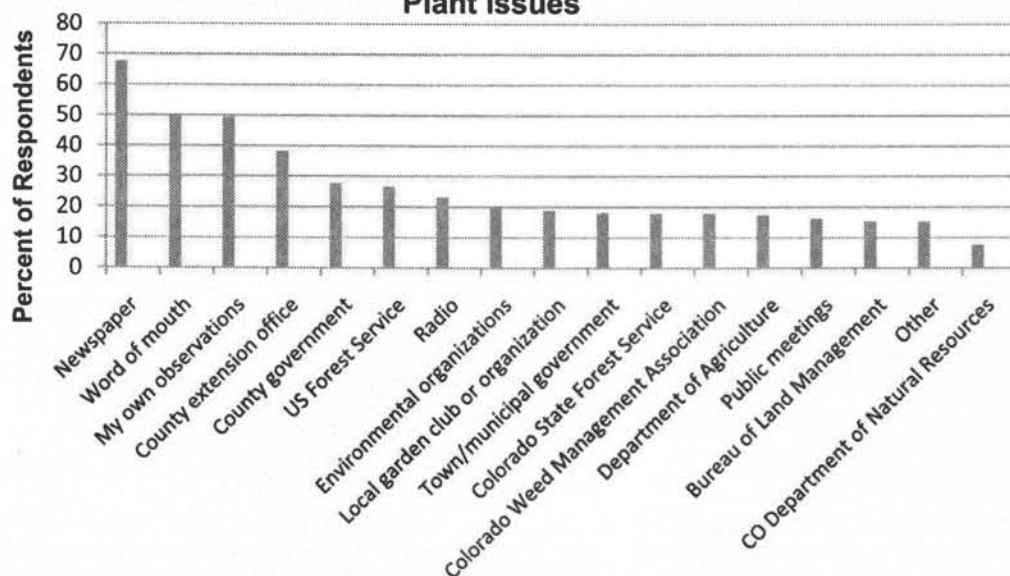
Figure 31: Knowledge of Terms Related to Invasive Plants



Survey respondents were asked which sources they utilized for information about plant issues or plant-related concerns. The results are shown below in Figure 32. The top three sources utilized were the newspaper, word of mouth, and my own observations. Respondents who utilized the County Extension office, the Colorado

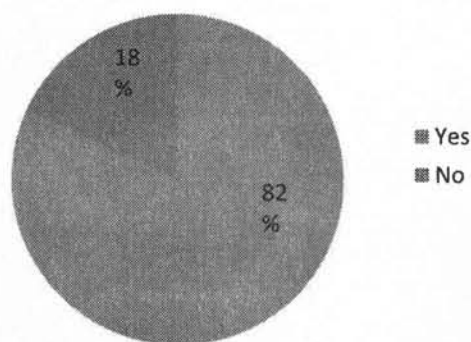
Weed Management Association, or the Department of Agriculture were most likely to have heard or read about plant species targeted for management in their counties. Use of any governmental organization other than town/municipal as a source of plant information resulted in significantly more awareness of county-targeted species.

Figure 32: Sources Used for Information about Plant Issues



Many respondents (82%) had come into contact with plants they found weedy or undesirable (see Figure 33 below).

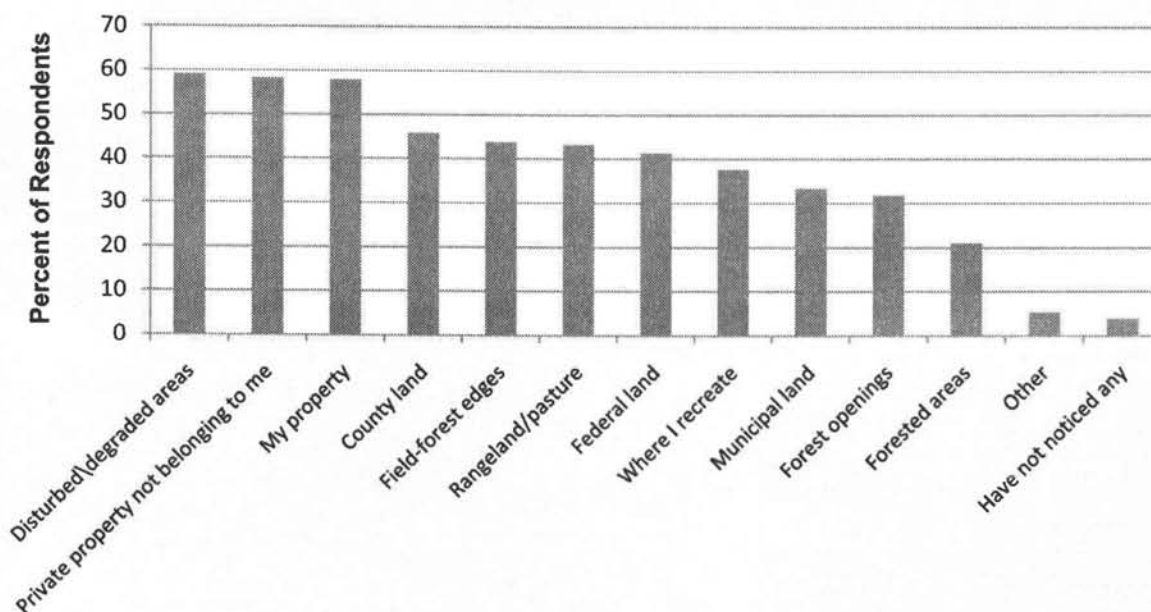
Figure 33: Contact with Weedy or Undesirable Plants



Respondents were asked where they found invasive plant species. The results are shown in Figure 34. Respondents encountered invasive plants in a variety of settings. The setting most reported was disturbed/degraded areas (roadsides,

abandoned lots, etc.) (59.2%), followed by private property belonging to someone else (58.4%), and on respondents' own property (58.1%). Very few respondents had not noticed any invasive plants (3.9%).

Figure 34: Sites Where Invasive Plants Have Been Found

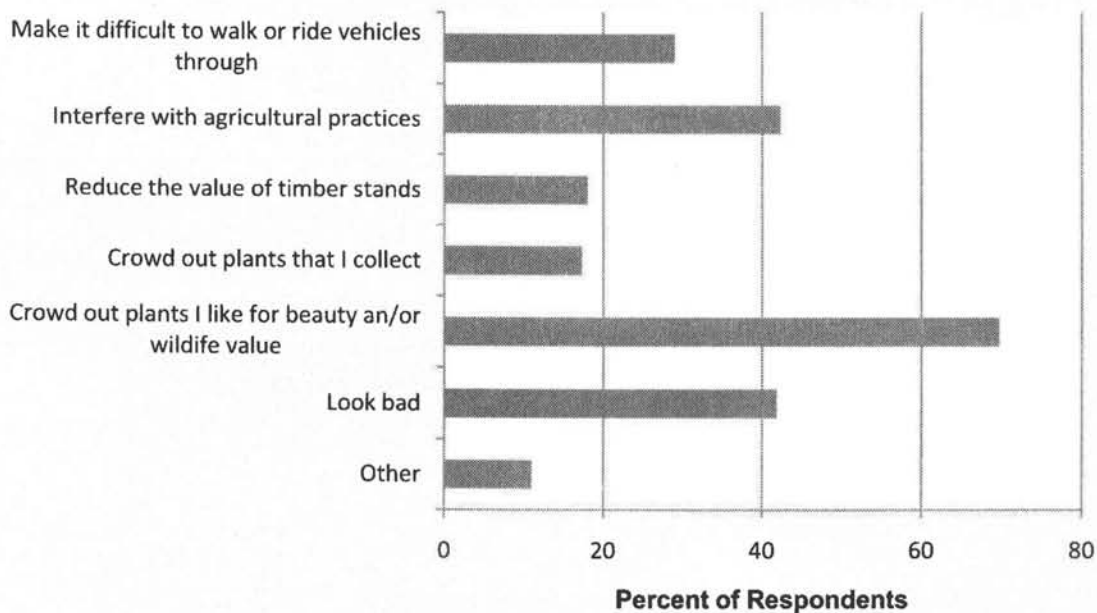


Respondents reported several reasons why they considered some of the plants they had encountered to be weedy or undesirable. The results are shown below in Figure 35.

These results indicate that respondents are most concerned about how invasive plants affect wildlife, aesthetics, and agriculture.

Respondents who specified “Other” indicated they were concerned about invasive qualities such as aggressive propagation and harm done to native plants, hoarding of water resources, negative impacts on grazing and other agriculture, and impacts on humans such as allergies or being stuck by a spiny species.

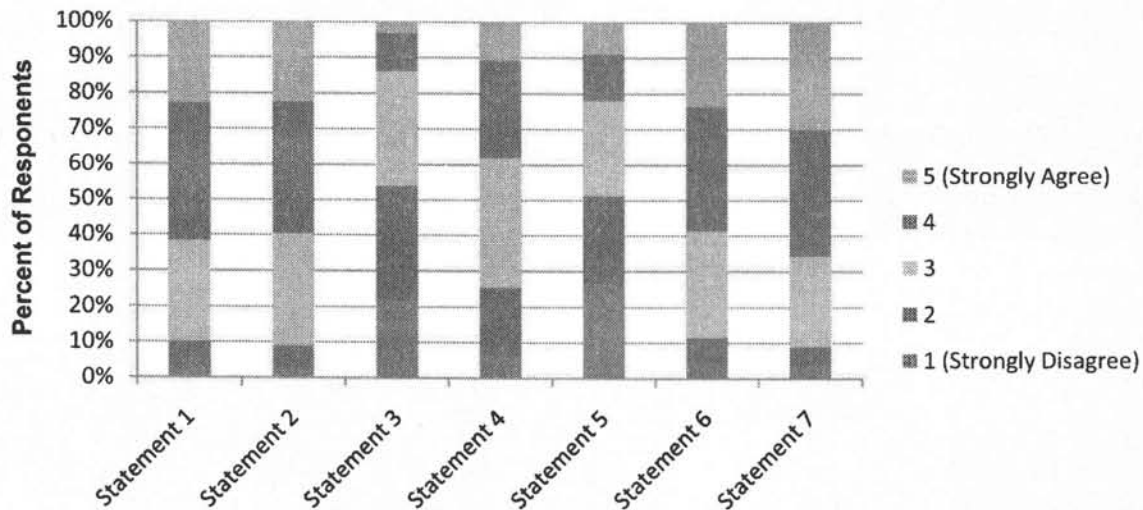
Figure 35: Why are plants considered undesirable



We asked for respondent opinions on a series of statements on invasive plants in Colorado. The level of agreement or disagreement with the statements were measured on a scale from 1 (strongly disagree) to 5 (strongly agree). The results are summarized in the Figure 36 and they indicate that most respondents were aware of the consequences of invasive plants and

they felt personally responsible for protecting the environment from those consequences. Respondents indicated concern about the time and expense of managing invasive plants, but did not indicate concern about losing personal freedoms due to laws aimed at requiring the removal of invasive plants.

Figure 36: Agreement or Disagreement with Statements about Invasive Plants in Colorado



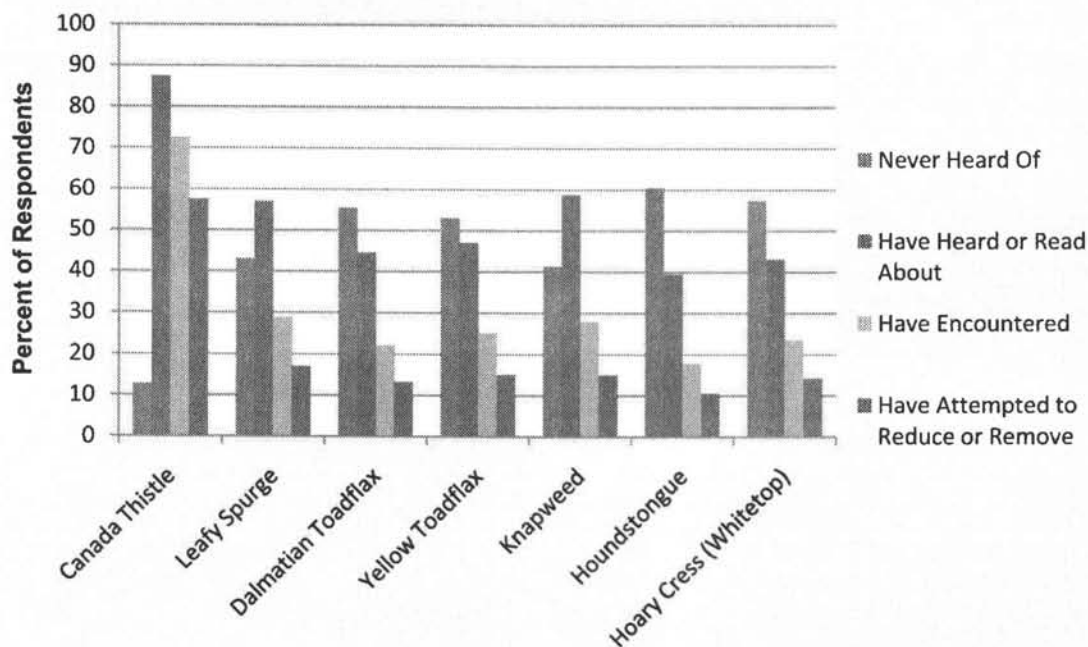
- **Statement 1:** 61.5% of all respondents agreed that **over the next several decades the spread of invasive plants will result in the loss of many of Colorado's native plant species** (10.3% disagreed, 28.2% neutral).
- **Statement 2:** 59.6% of all respondents agreed that **the effects of invasive plant species on ecosystems are worse than we realize** (9.1% disagreed, 31.3% neutral).
- **Statement 3:** 13.7% of all respondents agreed that **claims that invasive plant species are severely degrading the environment are exaggerated** (53.9% disagreed, 32.3% neutral).
- **Statement 4:** 38.0% of all respondents agreed that **attempting to remove or reduce invasive plants will be expensive and/or time consuming for me** (25.5% disagreed, 36.5% neutral).
- **Statement 5:** 21.9% of all respondents agreed that **laws aimed at requiring the removal of invasive plants limit my personal freedom** (51.3% disagreed, 26.8% neutral).
- **Statement 6:** 58.7% of all respondents agreed that **it is my responsibility to protect against the spread of invasive plants even if other people seem to be unconcerned** (11.6% disagreed, 29.7% neutral).
- **Statement 7:** 65.7% of all respondents agreed that **it is my responsibility to help protect environmental quality for everyone in Colorado** (9.1% disagreed, 25.3% neutral).

Prevention is the first step in management of invasive plants. Many invasive plants are introduced for horticultural purposes. The majority of survey respondents (58%) indicated they had checked a plant for potential invasiveness before purchase or planting.

Many invasive plants are established in North Central Colorado. Figure 37 below

shows the level of interaction between respondents and invasive plants targeted for management by the five counties in the study area. Respondents had heard of and had the most interaction with Canada thistle (*Cirsium arvense*), including most attempts at reduction or removal. Few respondents attempted to manage population of other invasive plants and many respondents had not heard or read about several of them.

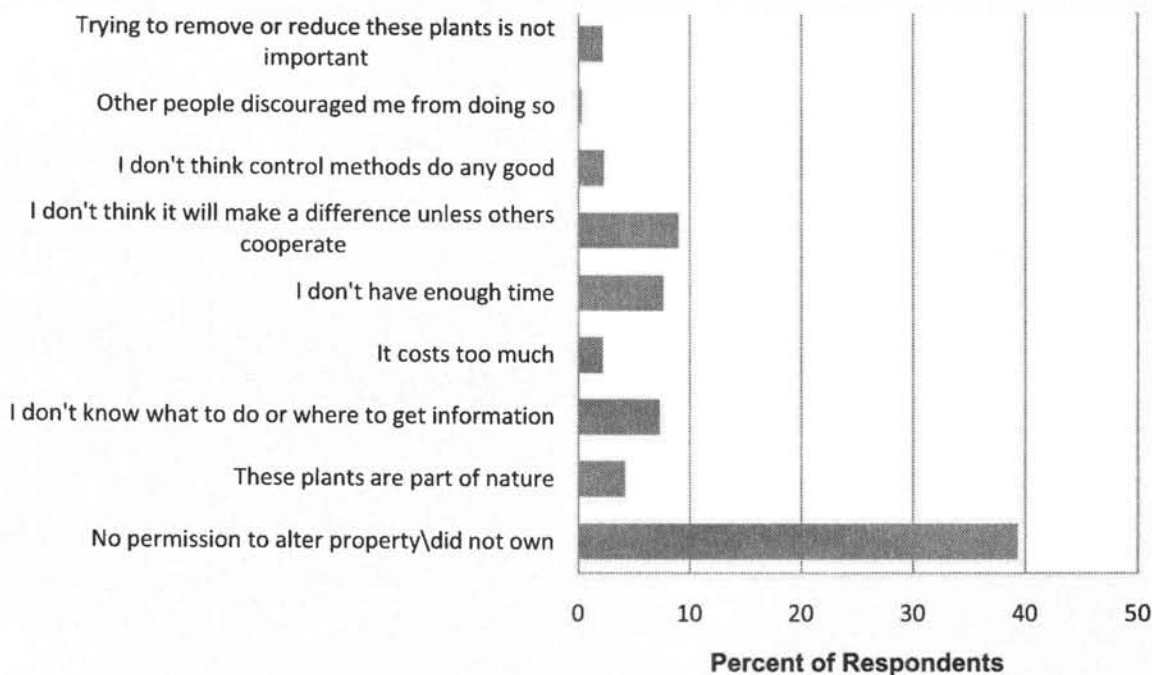
Figure 37: Public Interaction with Invasive Plants Targeted by County Weed Boards



Respondents were asked why they had not attempted to reduce or remove invasive plants that they had encountered. As shown in Figure 38, most respondents did not have

permission to alter the property on which they had found invasive plants. Very few respondents had been discouraged by others from taking action to manage invasive plants.

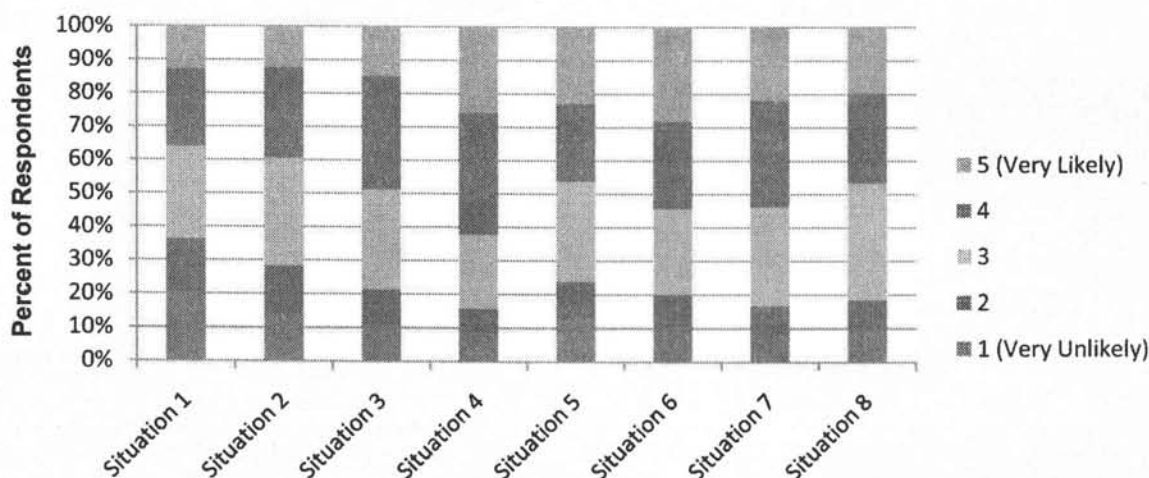
Figure 38: Reasons for Not Attempting to Remove or Reduce Encountered Invasive Plants



Respondents were asked how likely they would be to look into controlling invasive plants in a variety of situations. As shown in Figure 39, more respondents were likely to look into controlling invasive plants if they could obtain simple, written

instructions of control techniques. Fewer respondents were interested in controlling invasive plants as part of a volunteer team on public lands, although many still would be likely to look into this option.

Figure 39: Likelihood of Looking into Controlling Invasive Plant Species



- **Situation 1:** 35.9% of all respondents were likely to look into controlling invasive plants if I was given the option to remove invasive plants on public lands as part of a trained volunteer team (36.6% were unlikely, 27.5% neutral).
- **Situation 2:** 39.5% of all respondents were likely to look into controlling invasive plants if I could observe a site where control practices had been applied (28.4% were unlikely, 32.1% neutral).
- **Situation 3:** 48.7% of all respondents were likely to look into controlling invasive plants if I could observe a demonstration of control techniques (21.5% were unlikely, 29.8% neutral).
- **Situation 4:** 62.0% of all respondents were likely to look into controlling invasive plants if I could obtain simple written instructions of control techniques (16.0% were unlikely, 22.0% neutral).
- **Situation 5:** 46.1% of all respondents were likely to look into controlling invasive plants if I could obtain cost-share assistance (24.1% were unlikely, 29.8% neutral).
- **Situation 6:** 54.4% of all respondents were likely to look into controlling invasive plants if there were effective means to control them without herbicides (20.2% were unlikely, 25.5% neutral).
- **Situation 7:** 53.8% of all respondents were likely to look into controlling invasive plants if other people got involved in controlling invasive plant species (16.9% were unlikely, 29.3% neutral).
- **Situation 8:** 46.6% of all respondents were likely to look into controlling invasive plants if desirable species alternatives were more accessible (18.4% were unlikely, 34.9% neutral).