

The Economics of the War on Weeds on Montana's Rocky Mountain Front

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Executive Summary

Weeds cost Montana economically by reducing farm and ranch productivity, degrading water quality, depressing wildlife numbers, and threatening outdoor recreation. Fighting the war on weeds on the Rocky Mountain Front (RMF) is also costly, but how costly, and are we spending enough to effectively manage the problem? To answer these questions, The Wilderness Society (TWS) contracted with Oregon State University to conduct a phone survey of RMF land managers. They responded to questions about expenditures, budget needs, and other priorities within a defined geographic area.¹ Public agencies and private organizations spent about \$1.1 million on RMF weed management in FY 2009. This figure does not include money or time spent by private landowners fighting noxious weeds on private property. At least 35 percent of this amount came from county funds obtained by taxation of property owners. Still, this is not enough to fulfill their agencies' missions. To do so, managers estimate they would need to nearly double their expenditures to \$1.9 million. The highest needs are tools for landscape mapping, tracking of weed infestations, and better understanding of effective treatments. In addition, land managers wish to promote public awareness of the threat of weeds, improve inter-agency cooperation, and develop better means of detecting weed outbreaks early.

Introduction

The Rocky Mountain Front (RMF) comprises over 2 million acres in north central Montana and encompasses the interface between the Rocky Mountains and the Great Plains.

¹ For the purposes of this survey, the boundaries of the Rocky Mountain Front were defined as follows: Northern Boundary: Canadian Border (including Glacier National Park); Southern Boundary: Roger's Pass; Western Boundary: Continental Divide; Eastern Boundary: Highways 89 and 287.

Land ownership is a mix of federal, state, local, tribal, and private lands and incorporates parts of four counties (Lewis and Clark, Teton, Pondera, Glacier), two National Forests (Lewis & Clark and Helena), Glacier National Park, and the Blackfeet Indian Reservation. The United States Fish and Wildlife Service (USFWS) recognizes the RMF as one of the nation's most significant wildlife areas (USFWS 2010) and identifies invasive weeds as one of three primary threats to the RMF's ecological integrity (USFWS Partners for Fish and Wildlife).

Of the 2 million acres on the RMF, noxious weeds infest an estimated 32,000 acres.² Weeds have negative economic impacts by reducing the productivity of farms and ranches, degrading water quality, reducing the quality and quantity of forage for elk, deer, antelope, and other wildlife (Montana Noxious Weed Summit Advisory Council Weed Management Task Force 2008), and adversely affecting outdoor recreation.

Residents concerned about the negative impacts of weeds have come together to form the RMF Weed Roundtable which brings together more than 230 landowners, agencies, Indian Nations, and volunteers in fighting weeds in eight of the Front's main watersheds.³ The effort includes mapping and monitoring noxious weeds, pulling and spraying them, using biological control insects and managing desirable plant communities (Rocky Mountain Front Weed Roundtable MOU 2007). Local people and land managers have banded together to promote volunteer activities to fight noxious weeds, for example, in 2009, over 300 volunteers provided

² It is difficult to determine an exact number of acres infested given the large area, multiple jurisdictions, and difficult terrain. To date, the Rocky Mountain Front Weed Roundtable has mapped 16,336 acres of weeds on the Front (Continental Divide to Highway 89/287; South Fork Dearborn to Birch Creek). Not every acre of weed infestation has been mapped so the 16,336 acre figure under-represents the total area of infestation (Dave Hanna, e-mail 2010). We have estimated that the total acreage infested is approximately 32,000 acres. TWS' phone survey shows 20,433 acres treated for noxious weed infestation on public lands. The Montana Weed Management Plan (2008) estimates that state-wide 8% of managed land is infested with weeds (Montana Noxious Weed Summit Advisory Council Weed Management Task Force (2008).

³ According to the Rocky Mountain Front Weed Roundtable, the area of interest encompasses approximately 2 million acres and runs from the South Fork of the Dearborn Watershed north along Continental Divide on the west to the Canadian border, east to a line east of Highways 464 and 89, south to Highway 89 at Birch Creek and Highway 89 south to US Highway 287 through the South fork of the Dearborn watershed.

an estimated 1,858 hours of donated labor in weed combat efforts (Casey Perkins, June 22, 2010).

Weeds have large, negative economic impacts. Recent, comprehensive studies are unavailable, but one 1996 study finds that just three species of knapweed infest over 2 million Montana acres and have a direct negative impact on Montana's economy of \$19.2 million (2009 dollars) (Hirsch and Leitch 1996).⁴ Direct and secondary impacts, estimated using an input-output model, are about \$57 million (2009 dollars), which could support over 500 jobs in the state's economy. The study finds that each acre of knapweed infested grazing land has a \$14.67 (2009 dollars) negative impact, while each acre of infested wildland has a \$5.45 (2009 dollars) impact.

Another study finds that each acre of grazing land infested with leafy spurge reduces grazing capacity by .37 animal unit months. For each acre, this translates into a direct \$18.69 (2009 dollars) negative impact on the state's economy from reduced livestock production (Bangsund and Leistritz 1991). The study estimates 21,189 acres of grazing land in Glacier, Lewis and Clark, Pondera, and Teton counties are infested with leafy spurge. The associated costs of reduced livestock production for these counties would be over \$415,000 (2009 dollars).⁵

Weeds degrade wildlife habitat. For example, a spotted knapweed management project in elk winter range on the Lolo national forest resulted in a 98 percent reduction in pounds-per-acre of weeds and a 714 percent increase grass production (Rocky Mountain Elk Foundation no date). Another study found that reducing spotted knapweed infestations on elk winter range increased elk foraging by an average of 266 percent (Thompson 1996). Other studies have

⁴ These figures are extrapolated from a 1996 study. Agricultural prices have declined since then, so grazing land losses may be lower in 2009. Conversely, other values such as those for hunting and water quality have probably increased, so the losses for wildland may be higher.

⁵ Bangsund and Leistritz (1991) contains estimates of total grazing land for each Montana county and leafy spurge infestation rates for these acres.

shown that leafy spurge reduces habitat utilization by bison, deer, and elk (Trammell and Butler 1995).

Weeds also impose costs by degrading water quality. One study in western Montana found that surface runoff was 56% higher and sediment yield was 192% higher on spotted knapweed sites, compared to native bunchgrass dominated sites (Lacey et al. 1989).

We are unaware of any studies that detail the economic impact of weeds on Montana's outdoor recreation industry, apparently because the data needed to conduct such studies are unavailable or incomplete (Eiswerth et al. 2005). It is likely that weeds negatively impact deer and elk herds and, by degrading water quality, affect Montana's trout streams.

The war against weeds is also costly. Statewide, an estimated \$21.2 million is spent on weeds in Montana (Montana Noxious Weed Summit Advisory Council Weed Management Task Force 2008). To obtain a sense of the costs of this war on the RMF, The Wilderness Society contracted with the Department of Agricultural and Resource Economics at Oregon State University to conduct a phone survey of RMF land managers. Respondents were asked about funding, funding needs, the use of funds, and tools needed for more effective management. The remainder of this report summarizes the results of this survey and lessons learned.

Survey Extent

The survey obtained responses from individuals who manage land on and near the RMF. On average, the responding agencies manage over 300,000 acres. Respondents represented the following entities: Montana Department of Natural Resources and Conservation, Pondera County, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Lewis and

Clark County, Glacier National Park, Teton County, Partners for Fish and Wildlife of the U.S. Fish and Wildlife Service, U.S. Forest Service, and Montana Fish Wildlife and Parks.

Weed Budgets, Sources, and Needs

Public agencies and private organizations spent at least \$1.1 million on RMF weed management in FY 2009. This estimate does not include the money and time spent by private landowners fighting noxious weeds on private land along the Front. The \$1.1 million figure includes \$0.84 million reported by survey respondents and an additional \$230,000 estimated by TWS from non-survey sources as likely spending on weed management.⁶ Respondents indicated that their FY2009 budgets were typical of past budgets, with small, one-time injections of \$10,000 in stimulus funds for one agency and a substantial reduction in wildfire-related funding for another.

Survey respondents reported that their agencies treated 20,433 acres of public land for weeds in FY 2009, as well as 2,438 acres of private land. Treatment costs for the respondents' agencies averaged \$61 per acre.⁷

For those agencies responding to the survey, 35 percent (\$294,000) of the reported budgets came from county funds obtained by taxation of landowners in the counties. State and federal funds contributed slightly less than 60 percent of funds, from various sources including appropriations, the Burned Area Emergency Response and Rehabilitation Program, Montana

⁶ The Blackfeet Reservation has a BIA-based weed management budget of \$55,000 in 2007 (Montana Noxious Weed Summit Advisory Council and Weed Management Task Force 2008). We assumed the FY 2009 budget remained the same. Bill Bandel (2010), Glacier County Weed District reported a \$150,000 budget for FY2009. David Hanna of The Nature Conservancy reports that TNC spent about \$16,000 treating 100 acres of the Pine Butte Preserve in 2009 (David Hanna 2010). Jay Winfield (2010) reported that the Helena National Forest spent \$4,500 on weeds on the RMF in 2009.

⁷ This compares to an estimated \$38 minimum weed management cost per acre used by Montana Noxious Weed Summit Advisory Council Weed Management Task Force (2008).

State Trust Lands, and Montana Department of Transportation. The remaining funds originated from Montana State Lands Trust, hunting license fees, and partnerships.⁸

Nine of the ten respondents reported that their agency's budget was insufficient to accomplish the agency's mission. Respondents reported the need for an additional \$821,000 annual budget to accomplish the agencies' missions. On average, respondents estimated that a 96 percent increase in budget is needed to accomplish the agency's mission.⁹ These estimates from the survey respondents are broadly consistent with the findings of the Montana Noxious Weed Summit Advisory Council Weed Management Task Force (2008), which finds that "a balanced [statewide] weed management program that stops spread and reduces weed infestations by 5% per year will require about \$55.8 million annually (p. 4-1)", an increase over the current budget of \$21.2 million.

Budget Uses

The respondents reported spending an average 60% of budget on combating spotted knapweed, 25% on leafy spurge, 7% on Canadian thistle, 3% on hounds tongue, and 5% on various other noxious weed species. Agencies spent an average 81% of their budgets on control/eradication, 12% on prevention, and 7% on education. Of the amount spent on control/eradication, on average, 16.82% was spent on mechanical control, 65.55% on chemical control, and 11.09% on biological control.

Additional Needs

⁸ The percentage of expenditures from county sources would probably be higher if we included agencies not responding to the survey, since it is likely that the \$150,000 reported budget of the Glacier County Weed Board was obtained largely from county funds.

⁹ The median increase in budget reported by respondents was 50 percent and this may be a more accurate measure since one respondent reported a need for a 500 percent increase.

When asked what additional information would be most helpful for managing noxious weeds respondents identified the following: landscape mapping information, spatial location of current infestations, a database of the effectiveness of treatments, sharing information, and collaborative monitoring efforts. Respondents acknowledged that while work is occurring in these areas more needs to be done.

When asked what the most urgent non-budgetary needs are respondents listed the following: increased awareness, education, political support, monitoring, personnel, participation from partners, control efforts of neighbors, landscape early detection network, and improved inter-agency communication. Many respondents suggested databases that distinguish between treated acres and surveyed/monitored acres.

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Appendix

Survey Results Summary and Protocol

Survey Responses

Entities

1. Department of Natural Resources and Conservation
2. Pondera County
3. U.S. Fish and Wildlife Service
4. Natural Resources Conservation Service
5. Lewis and Clark County
6. Glacier National Park
7. Teton County
8. USFWS, Partners for Fish and Wildlife
9. Lewis and Clark National Forest District Ranger
10. Montana Fish Wildlife and Parks Wildlife Area Manager

Additional information was gathered in subsequent phone interviews with Glacier County and Helena National Forest

Question 1: How long have you held your position within the agency?

Range- 2-30 years

Median- 10 years

Question 2: a) Acres managed b) Acres treated c) Private land managed/treated

Total acres managed: 3,581,019 acres

Private acres managed: thousands of acres

Private acres treated: 405 acres

- | | | |
|------------------|-----------------|----------------|
| a) Mean: 325,547 | Median: 112,000 | Stdev: 494,182 |
| b) Mean: 2,270 | Median: 315 | Stdev: 5,539 |
| c) Mean: 221.64 | Median: 0 | Stdev: 602.01 |

In some cases respondents' acres treated overlap

Question 3: What was the annual budget for 2009?

Total spending: \$1,388,413

Question 4: What were the most common species of weeds and the percentage of budget spent on each?

- 1) Spotted Knapweed- 60%
- 2) Leafy Spurge- 25%
- 3) Canadian Thistle- 7%
- 4) Hounds Tongue- 3%
- 5) Other (Russian Knapweed, Oxeye Daisy, Yellow Toadflax, Whitetop, Orange Hawkeye, Kosha, St. Johns Wart)- 5%

Question 5: What percent of the budget used for a) control/eradication, b) prevention, and c) education?

- a) Mean: 81% Stdev: 10.604
- b) Mean: 12% Stdev: 10.09
- c) Mean: 7% Stdev: 6.258

Question 6: What percent of the control budget was spent on a) mechanical control b) chemical control c) biological control?

- a) Mean: 16.82% Stdev: 28.66
- b) Mean: 65.55% Stdev: 34.50
- c) Mean: 11.09% Stdev: 11.82

Question 7: What are the top sources of funds and their percentage of total budget?

State/Federal: 2.96%

County: 48.9%

Appropriated funds: 2.98%

Other: 45.16%

ONPS- Operations of National Park Systems

FLREA- Federal Lands Recreation Enhancement Act

MDOT- Montana Department of Transportation

NWTF- Noxious Weed Trust Fund

Question 8: a) Is the budget adequate and b) recommended percentage increase?

a) Yes: 1 No: 9

b) Mean: 177.72% Stdev: 309.62

An approximate 99% increase in total budget is recommended to accomplish goals.

Question 9: What additional information would be most helpful?

1. Landscape mapping info
2. Spatial location of current infestation
3. Database of effectiveness of treatments
4. Sharing information
5. Collaborative monitoring effort

Question 10: What are the most urgent non-budgetary needs?

1. Increased awareness, education, political support, monitoring, personnel, participation from partners, and control efforts of neighbors
2. Landscape early detection network
3. Improved inter-agency communication

Question 11: Additional comments

1. Differentiate between treated acres and surveyed/monitored acres categories
2. Agencies should partner up together

Survey Procedure

1. Certification via CITI Course Completion- the educational training required for doing research involving human subjects.
2. Identifying specific information needed and writing the survey.
3. Determining the relevant target respondents for the survey by identifying who has the knowledge and background to accurately provide the required information.
4. A letter (or email if appropriate) was sent to target respondents explaining the research questions and requesting an appointment for a phone call to conduct the survey. A copy of the survey was included with the letter as reference for the recipients.
5. Phone calls to participants according to scheduled times to administer the survey. Responses were recorded as the survey was conducted.
6. Non-respondents were contacted by email to attempt to schedule an alternative time to conduct the survey. Several non-respondents were contacted repeatedly.
7. Responses were entered into a database and summarized.