



A Vision for Rangeland
and Pasture Research



The 2007 Southeast Oregon Weed Management Survey: Ranchers' Perceptions of Weeds in Sagebrush Steppe Rangeland*

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The 2007 Southeast Oregon Rangeland Weed Management Survey

I. Purposes of the Project

The 2007 Southeast Oregon Rangeland Weed Management Survey was conducted as a collaborative effort between the Oregon State University Extension Service, the USDA – Agricultural Research Service, the Harney County Cooperative Weed Management Area (CWMA), the Lake County CWMA, and the Malheur County CWMA to fulfill two roles:

1. A primary purpose of this work was to understand how the Oregon State University Cooperative Extension Service and its partners can better provide applicable rangeland weed management information to ranchers in southeast Oregon. The survey provided data for needs assessment. These data have helped to identify rangeland weeds the ranching community considers most problematic for grazing operations, types of rangeland weed management information that inspires the most need and interest, preferred forms of information delivery, important sources of weed management information, and opportunities and constraints for implementing measures to prevent and/or control rangeland weeds in southeast Oregon.
2. Another fundamental purpose of this work was to determine the ranching community's opinions, perceptions and management of invasive annual grasses and other rangeland weeds in southeast Oregon. These data will serve to identify opportunities and challenges for developing large scale rangeland weed management programs in southeast Oregon. Specifically, these data will illuminate what issues are viewed by the ranching community as being most important for sustaining ranching operations, how the ranching community currently manages invasive annual grasses and other rangeland weeds, which prevention and control measures are currently being used, the perceived effectiveness and economics of common weed control measures, and where issues with rangeland weeds rank among other ranching concerns.

Thus, the joint goal among collaborators on this project was to collect data that would form a valuable resource for research, enhancing both the knowledge base and the effectiveness and efficiency of outreach. Indeed, at the time that this report is written, data analysis has

already resulted in three presentations at various venues and a working manuscript. The purpose of this report is to document the questionnaire development, sampling scheme, implementation, response rates and summary statistics of the data. It does not include more in-depth analysis, as this will appear in stand-alone papers.

II. Organization of this Report

The purpose of this report is to document the methods used and data collected for this project. Section III describes the Needs Assessment process and outlines the ecological, economic and societal situation that makes it important to inquire into ranchers' attitudes, values, and goals concerning rangeland weed management.

Section IV details the questionnaire development process and final questionnaire. Appendix B contains a copy of the final questionnaire as it was distributed to recipients.

Section V provides frequency distributions of responses to each question. While further analysis is beyond the scope of this document, Section VI includes comments that add context to selected results.

III. Needs Assessment

This survey was conducted to obtain the ranching community's input regarding weed management of southeast Oregon's rangelands. Southeast Oregon is characterized by highly diverse landownership patterns. For example, only 27.5% of the 5.83 million acres in Harney County zoned exclusively for farm or range use is privately owned; however land ownership is highly intermingled (Figure 1) and diverse (2,435 land owners). In addition, nearly 94% of the privately held land in Harney County is zoned exclusively for farm or range use, consequently the vast majority of private lands are controlled and managed by ranchers and farmers. Despite diverse land ownership patterns and the obvious importance of the ranching community as a partner in effective weed management, little is known about ranchers' perspectives, values, and goals concerning rangeland weed management in southeast Oregon. Ranchers and other managers of rangelands in southeast Oregon face many challenges, including appropriate application of science, multiple use management, and cooperation among diverse, sometimes conflicting, user groups, all within the context of economic and ecological sustainability. Major threats to the sustainability of southeast Oregon rangelands resulting from broad scale vegetation

change include: 1) shifts in plant species composition toward shrubs and trees that accumulate woody fuels; 2) shifts toward annual or perennial invasive non-native weeds; and 3) shifts toward plant communities that do not allow native plant communities to return.

Vegetation management to address invasive species is becoming increasingly necessary. The health of rangeland ecosystems, sustained agricultural production, wildlife habitat and diversity, and continued use of natural resources are at stake. A better understanding of the needs and perceptions of southeast Oregon ranchers is foundational to effective rangeland weed management.

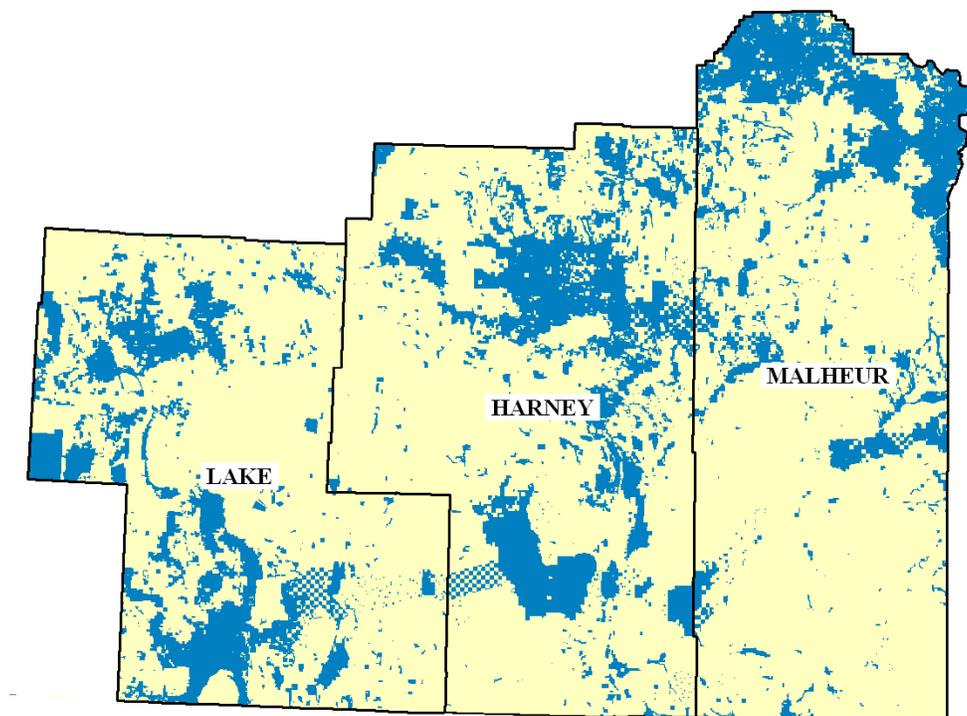


Figure 1. Map of southeast Oregon (i.e., Lake, Harney, and Malheur Counties) showing landownership patterns. Private and public lands are denoted in blue and yellow, respectively.

IV. Methods

A written public opinion questionnaire (Appendix A) about weed management with particular focus on invasive annual grasses was sent to ranchers operating on sagebrush steppe rangelands in southeast Oregon in counties of Harney, Malheur, and Lake (Figure 1). Mailing addresses of 600 ranchers were obtained from databases maintained by each County Extension Office for the purpose of disseminating newsletters and other sources of information. A random sample of 200 ranchers was selected from each county. The sole criterion for subject selection was that the rancher must have entirely or partially operated on sagebrush steppe rangeland.



Figure 2. Study counties in southeast Oregon, USA.

The individuals on the list were mailed the questionnaire and cover letter (Appendix B) in August 2008. The overall response rate was 18 percent (105 completed surveys). Response rates for counties were 15, 17, and 21 percent for Lake County, Malheur County, and Harney County, respectively. It was not possible to determine the number of questionnaires which were not returned due to incomplete or erroneous addresses compared to those who declined participation. Results describing the opinions, perspectives, management, and information needs of ranchers concerning rangeland weed management in southeast Oregon were summarized and will be reported by county in this report.

V. Results

Characteristics of Respondents

Respondents were relatively evenly distributed among the three counties (Table 1). The largest share of respondents was from Harney County, Oregon (39%) and the smallest from Lake County, Oregon (29%). Average age was 58 with over 70% of the respondents being older than 50 years. The average total acreage operated (calculated as total owned acreage plus total rented acreage, including public grazing lands, minus acreage rented to others) was 45,518.

Approximately 28% of the respondents indicated that they operated on more than 50,000 acres (estimate includes public grazing land). For those 98 respondents (93%) who indicated that they grazed cattle on their ranch, the average number of cattle grazed was 593 cow/calf pairs. On average, respondents derived 74% of their gross income from grazing animals, with nearly 60% obtaining more than 90 percent of their gross income from livestock grazing. Nearly 70% indicated using public grazing lands. Approximately 81% of respondents indicated they had some college and nearly 51% had achieved an undergraduate or graduate degree. Approximately 28% of respondents indicated they had worked an off-ranch job in 2007.

Table 1. Characteristics of ranchers responding to weed management survey.

	Characteristic	Value
	County:	
	Harney	39.0%
	Lake	28.6%
	Malheur	32.4%
	Respondent Age:	
	Mean	58.0 yrs.
	Distribution:	
	less than 40	9.5%
	41 to 50	17.1%
	51 to 60	29.5%
	61 to 70	26.7%
	over 70	17.1%
	Total Acreage Operated:	
	Mean	45,518 acres
	Distribution:	
	less than 2,001 acres	19.0%
	2,001 to 10,000 acres	22.9%
	10,001 to 30,000 acres	18.1%
	30,001 to 50,000 acres	12.4%
	more than 50,000 acres	27.6%

- Continued -

Table 1. Continued.

Characteristic	Value
Livestock grazed:	
Cows and calves (mean)	593 head
Distribution:	
1 to 100 head	18.1%
101 to 250 head	20.0%
251 to 500 head	24.8%
501 to 1,000 head	18.1%
more than 1,000 head	19.0%
Horses (mean)	12 head
Distribution:	
1 to 5 head	31.7%
6 to 10 head	30.7%
11 to 20 head	16.8%
more than 20 head	20.8%
Education - highest level completed:	
Some high school	4.8%
High school graduate	14.3%
Some college	30.5%
Associate degree	7.6%
Bachelor's degree	32.4%
Graduate degree	10.5%
Proportion of Gross Income from Grazing Livestock	
Mean	74.4%
Distribution:	
50% or less	21.2%
51 to 75%	7.1%
76 to 90%	12.1%
More than 90%	59.6%
Proportion of Ranches with Public Grazing Lands	69.5%
Net Income (2007):	
Negative	16.3%
0 to \$5,000	11.2%
\$5,001 to \$10,000	12.2%
\$10,001 to \$20,000	15.3%
\$20,001 to \$30,000	9.2%
\$30,001 to \$40,000	6.1%
\$40,001 to \$50,000	11.2%
More than \$50,000	18.4%
Percentage of Respondents Who Worked Off-Farm in 2007:	27.6%

Problems Faced by Livestock Producers

Respondents were asked to rate a series of ranching issues as a major problem, not a problem, or a minor problem. Of the issues presented, 79% and 83% of ranchers in southeast Oregon thought that feed costs and other operating costs (e.g., fuel, labor, etc.), respectively, were major problems in 2007 (Table 2). Noxious and invasive weeds rated much lower with only about 51% of respondents ranking weeds as a major problem for grazing operations in their areas.

When asked to identify which of the issues listed was the single most important (i.e., most serious problem), operating costs emerged as the most important problem (24%). Livestock producers felt operating costs, adverse weather (17%), feed costs (16%), and public land regulations (14%) were all more serious problems for livestock producers than noxious and invasive weeds (11%). The majority of ranchers also felt feed and other operating costs, public land regulations, and noxious and invasive weeds had become more problematic over the 5 years previous to 2007.

Table 2. Problems faced by ranchers and changes in problems in past five years.

Problems/Issues	County:			
	Harney	Lake	Malheur	Overall
	---% indicated a major problem---			
Other costs (Fuel, Labor, Land, etc.)	80.5	73.3	94.1	82.9
Feed costs	78.0	66.7	91.2	79.0
Public land regulations	56.1	60.0	58.8	58.1
Noxious or invasive weeds	48.8	46.7	55.9	50.5
Adverse weather	51.2	50.0	44.1	48.6
Livestock prices	51.2	33.3	55.9	47.6
Grazing land availability	43.9	40.0	47.1	43.8
Private land regulations	22.0	30.0	29.4	26.7
Predators	19.5	20.0	23.5	21.0
	---% indicated most important problem---			
Other costs (Fuel, Labor, Land, etc.)	22.0	30.0	20.6	23.8
Adverse weather	19.5	16.7	14.7	17.1
Feed costs	12.2	16.7	20.6	16.2
Public land regulations	7.3	20.0	17.6	14.3
Noxious or invasive weeds	14.6	3.3	14.7	11.4
Other issues	4.9	6.7	5.9	7.6
Grazing land availability	12.2	3.3	5.9	5.7
Livestock prices	7.3	0.0	0.0	2.9
Private land regulations	0.0	3.3	0.0	1.0
Predators	0.0	0.0	0.0	0.0

- Continued -

Table 2. Continued

Problems/Issues	County:			
	Harney	Lake	Malheur	Overall
	---% indicated problem worsened in past 5 years---			
Other costs (Fuel, Labor, Land, etc.)	97.6	90.0	94.1	94.3
Feed costs	95.1	86.7	94.1	92.4
Noxious or invasive weeds	58.5	56.7	61.8	59.0
Public land regulations	53.7	53.3	47.1	51.4
Livestock prices	56.1	30.0	44.1	44.8
Grazing land availability	36.6	30.0	44.1	37.1
Private land regulations	26.8	36.7	26.5	29.5
Adverse weather	17.1	23.3	17.6	19.0
Predators	29.3	13.3	5.9	17.1

Weed Species and Management Problems

Ranchers most often identified western juniper (55%) as a major problem for grazing operations in southeast Oregon, followed by thistles (46%) and medusahead rye (45%) (Table 3). Not surprisingly, there were large differences across counties in the perceived importance of individual weed species. The majority of ranchers from Harney County thought western juniper (56%), medusahead (54%), and perennial pepperweed (51%) were major problems for grazing operations. The majority of respondents felt western juniper (87%) and thistles (60%) were major problems in Lake County, while the majority of those from Malheur County indicated that whitetop (71%) and perennial pepperweed (56%) were major problems. When asked to identify the most problematic weed species for grazing operations, nearly 30% of all respondents in southeast Oregon indicated medusahead, followed by western juniper (19%). However, again there were large differences in opinions concerning the most important weed across counties. Medusahead was identified as the most significant weed in Harney County, whereas western juniper and whitetop were most recognized as the most important weeds species in Lake and Malheur Counties, respectively.

Table 4 shows the respondents' estimates of the proportion of southeast Oregon rangelands infested by noxious and invasive weeds. Cheatgrass comprised the greatest proportion of land infested with an average of approximately 21% of rangeland in southeast Oregon. On average, western juniper infested nearly 17% and medusahead rye infested approximately 7% of rangelands in southeast Oregon. All other weed species have infested approximately 3% or less of rangelands in southeast Oregon.

Respondents were asked to rate how strongly they agreed or disagreed with a variety of statements about weed management, public land management, regulations, and invasive annual grass issues and management options. The statement with which the respondents most strongly agreed (average score closest to 5 – strongly agree) was “I am concerned about controlling weeds on rangeland” (average score of 4.4) (Table 5). In general, ranchers also felt strongly (average scores over 4) that state and federal agencies are not doing enough to control weeds on public land, herbicides are not harmful to the environment if used properly, and annual grasses are a long term management problem. Overall, respondents most strongly disagreed with the two statements, “weed infestations have no effect on the market value of rangeland” and “public land managers are doing a good job of controlling weeds on public land.”

Respondents were asked to indicate their perceptions of the effectiveness and economics of five methods for controlling invasive annual grasses including (1) herbicide treatments, (2) prescribed fire treatments, (3) grazing treatments, (4) mechanical treatments (i.e., mowing, tillage/disking), and (5) revegetation treatments. There was strong agreement among ranchers that mechanical treatments would mostly likely be ineffective at controlling invasive annual grasses; less than 10% of respondents thought mowing and/or tillage/disking would be very effective at controlling annual grasses (Table 6). Similarly, less than 20 percent of ranchers thought prescribed fire would be very effective at controlling invasive annual grasses. Herbicide and grazing treatments ranked at the top of the listed control methods, with an average of 31% and 30% of respondents indicating the methods would be very effective at controlling invasive annual grasses, respectively.

Ranchers were asked to indicate the reasons for not using herbicides, prescribed fire, grazing, mechanical, and revegetation treatments for controlling invasive annual grasses. The most common reasons for not using herbicides to treat invasive annual grasses included “the acreage of infestations is so large that the cost of using herbicides would be prohibitively expensive,” and respondents felt they “lacked the equipment or expertise to apply herbicides.” Over 35% of respondents also felt that herbicides are not economical, environmental restrictions/concerns prevent them from properly applying herbicides, and they don’t have time to treat annual grass infestations with herbicides (Table 7). Fewer than 30% of respondents cited reasons related to inaccessibility, ineffectiveness, inadequate cost-share programs, and difficulties with reseeding desirable vegetation after herbicide treatment. The majority of

respondents felt they didn't have enough labor and there is too much of a liability risk to use prescribed fire to successfully control invasive annual grasses. Less than a quarter of respondents thought prescribed fires were ineffective for controlling annual grasses. A majority of ranchers (65%) indicated they had used grazing treatments to control invasive annual grasses in the past (Table 8). Therefore, few producers indicated reasons for not using grazing treatments show in Table 7. Fewer than 20% of the respondents identified any one of the reasons for not using grazing treatments. Most producers (average of 62%) felt that annual grass infestations occur on land that is not suitable for mechanical treatments. Difficulties associated with getting reseeded vegetation to grow and the reality that infestations often occur on land that is not suitable for revegetation treatments were cited most often as reasons for not using revegetation treatments to control annual grasses.

The most accepted factors causing invasive weed problems were the weed was not recognized as a threat until too late and the weed typically spreads from adjoining, already infested rangeland land (Table 8). Ranchers were asked whether or not they used a variety of preventive measures to limit the infestation or expansion of weeds on their property. Those respondents indicating they purchase only weed-free hay, insist local governments control weeds along roadways, and change grazing management to avoid known infestations when weeds seeds can be dispersed were in the minority; only 25%, 48%, and 32%, respectively, indicated they used these preventive measures (Table 9). Whereas, a majority of producers indicated that they keep machinery/trucks clean, aggressively destroy weeds when found, spot spray near fringe or boundary areas, and routinely monitor rangeland for weeds; an average of 64%, 84%, 81%, and 73%, respectively, indicated they used these practices (Table 9).

Table 3. Weeds posing the greatest problems to ranchers in southeast Oregon.

Weed Species	County:			Overall
	Harney	Lake	Malheur	
	---% indicated a major problem---			
juniper	56.1	86.7	26.5	55.2
thistles	34.1	60.0	47.1	45.7
medusahead rye	53.7	30.0	47.1	44.8
perennial pepperweed	51.2	16.7	55.9	42.9
whitetop	14.6	13.3	70.6	32.4
knapweeds	22.0	10.0	20.6	18.1
cheatgrass	17.1	16.7	8.8	14.3
Dalmatian toadflax	12.2	0.0	0.0	4.8
ventanata	2.4	0.0	11.8	4.8
leafy spurge	0.0	0.0	5.9	1.9
	---% indicated most important weed---			
medusahead rye	34.1	20.0	29.4	29.5
juniper	17.1	33.3	8.8	19.0
whitetop	2.4	0.0	35.3	13.3
perennial pepperweed	19.5	6.7	8.8	12.4
thistles	4.9	23.3	5.9	10.5
other ¹	9.8	10.0	11.8	7.6
knapweeds	4.9	3.3	0.0	3.8
cheatgrass	4.9	3.3	0.0	2.9
Dalmatian toadflax	2.4	0.0	0.0	1.0
leafy spurge	0.0	0.0	0.0	0.0
ventanata	0.0	0.0	0.0	0.0

¹Other weeds listed included the following: larkspur, bulbous bluegrass, Mediterranean sage, Dyer's woad, and tumble mustard.

Table 4. Respondents' estimates of the proportion of grazing land acres infested by weeds in each county.

Weed Species	County:			Overall
	Harney	Lake	Malheur	
	---% of grazing land infested---			
cheatgrass	16.3	5.8	32.7	21.1
juniper	20.0	18.5	12.3	16.6
medusahead	3.2	2.0	12.9	7.0
whitetop	0.5	0.1	6.8	3.1
thistles	1.1	1.4	4.7	2.7
knapweeds	0.2	0.2	1.5	0.7
perennial pepperweed	0.7	0.8	0.6	0.7
Dalmatian toadflax	0.6	0.3	0.0	0.3
leafy spurge	0.0	0.0	0.0	0.0

Table 5. Ranchers' opinions and perceptions about weed management in general, invasive annual grass infestations, and methods of invasive annual grass control.

Statement	County:			Overall
	Harney	Lake	Malheur	
	---average score ¹ ---			
Weed problems on rangeland are generally the result of poor management	2.9	2.7	3.4	3.0
I am concerned about controlling weeds in rangeland	4.1	4.4	4.8	4.4
State and Federal agencies are not doing enough to control weeds on public land	4.3	4.2	4.3	4.3
State and Federal agencies are not doing enough to control weeds on private land	3.6	3.5	3.6	3.6
Local governments are not effective in controlling problem weeds	3.7	3.7	3.7	3.7
It seldom makes economic sense to control weeds on rangeland	2.0	1.8	2.0	2.0
Rangeland weeds represent a problem to all ranchers	4.0	4.0	4.4	4.2
It doesn't pay to control weeds on my land when my neighbor doesn't on his weeds	3.3	2.7	3.1	3.1
There needs to be more research on controlling weeds on rangelands	4.0	3.7	4.0	3.9
Restrictions governing the use of herbicides on rangeland are too strict	4.2	3.9	4.0	4.0
Herbicides, if used properly, are not harmful to the environment	4.2	4.0	4.3	4.2
Weed infestations have no effect on the market value of rangeland	1.7	1.5	1.6	1.6
Public land managers are doing a good job of controlling weeds on public land	1.9	1.9	1.7	1.8
Annual grasses are nearly impossible to control with current control methods	3.1	2.9	3.2	3.1
Annual grasses are a threat to rangeland productivity	3.9	3.7	4.1	3.9
Annual grasses can be controlled but it is too costly to do on an effective scale	2.8	3.3	3.6	3.2
Annual grasses can be controlled but it is too difficult to get reseeded vegetation to grow	3.1	3.0	3.0	3.0
Annual grasses are a long term management problem	4.3	4.1	4.3	4.2
Governments should help pay part of the cost to control annual grasses, even if it means an increase in taxes	2.7	2.9	2.6	2.7

¹Based on a score of 1 to 5, where 1 indicates strong disagreement and 5 indicates strong agreement.

Table 6. Ranchers' perceptions of effectiveness of methods to control invasive annual grasses.

Control Method	County:			
	Harney	Lake	Malheur	Overall
	---% indicated method was very effective---			
herbicides	39.0	33.3	23.5	30.5
grazing	39.0	53.3	26.5	29.5
reseeding with competing vegetation	31.7	50.0	29.4	28.6
prescribed fire	14.6	30.0	17.6	16.2
mowing	17.1	33.3	5.9	9.5
disking/tillage	4.9	40.0	8.8	4.8
	---% indicated method pays---			
reseeding with competing vegetation	51.2	43.3	41.2	45.7
grazing	39.0	40.0	38.2	39.0
herbicides	29.3	43.3	35.3	35.2
prescribed fire	19.5	26.7	14.7	20.0
mechanical	14.6	20.0	26.5	20.0

Table 7. Ranchers' indications of why the following controls are not used on invasive annual grasses.

Control Method	County:			
	Harney	Lake	Malheur	Overall
	---% indicated reason for not using---			
Reasons for not using herbicides				
Acreage of infestations is so large that the cost of using herbicides would be prohibitively expensive	53.7	33.3	58.8	49.5
Lack the equipment or expertise to apply herbicides	41.5	40.0	41.2	41.0
Environmental restrictions/concerns prevent me from applying herbicides	41.5	26.7	47.1	39.0
Do not have the time to treat annual grass infestations	41.5	33.3	38.2	38.1
Herbicides are not economical	51.2	23.3	32.4	37.1
Cost-share programs for herbicides are no longer available or have been reduced	29.3	23.3	35.3	29.5
Annual grass infestations are inaccessible to sprayers	26.8	16.7	26.5	23.8
Herbicides provide only temporary control and it's too difficult to reestablish reseeded vegetation to prevent reinvasion of annual grasses	19.5	20.0	32.4	23.8
Herbicides are ineffective for controlling annual grasses	12.2	13.3	14.7	13.3

- Continued -

Table 7. Continued.

Control Method	County:			
	Harney	Lake	Malheur	Overall
Reasons for not using fire treatments				
There is too much of a liability risk	63.4	80.0	67.6	69.5
Do not have enough labor/personnel	61.0	46.7	52.9	54.3
Lack the proper equipment for prescribed fire	48.8	40.0	41.2	43.8
Fire is too difficult to use at the proper time	39.0	43.3	35.3	39.0
Lack expertise/knowledge to apply prescribed fire	39.0	30.0	44.1	38.1
Fire is ineffective for controlling annual grasses	26.8	16.7	26.5	23.8
I do not like fire	4.9	10.0	8.8	7.6
Not economical to use prescribed fire	4.9	10.0	5.9	6.7
Reasons for not using grazing treatments				
Lack the expertise/knowledge	19.5	10.0	23.5	18.1
Grazing is ineffective at controlling annual grasses	14.6	16.7	20.6	17.1
Lack the proper equipment	9.8	13.3	11.8	11.4
Grazing treatments are too time-consuming to use	12.2	3.3	5.9	7.6
Not economical to use grazing treatments	4.9	6.7	8.8	6.7
Grazing treatments are too costly to manage	4.9	6.7	5.9	5.7
Reasons for not using mechanical treatments				
Infestations occur on unsuitable land	65.9	56.7	61.8	61.9
Not economical to use mechanical treatments	39.0	43.3	41.2	41.0
Lack the time to work with these methods	36.6	30.0	29.4	32.4
Lack the proper equipment	29.3	23.3	38.2	30.5
These methods are ineffective	24.4	30.0	26.5	26.7
Lack expertise/knowledge	9.8	3.3	11.8	8.6
Reasons for not using revegetation treatments				
Infestations occur on unsuitable land	41.5	40.0	41.2	41.0
Too difficult to get reseeded vegetation to grow	41.5	43.3	35.3	40.0
Lack the time to work with these methods	31.7	20.0	29.4	27.6
Lack the proper equipment	24.4	13.3	35.3	24.8
Lack the expertise/knowledge	19.5	10.0	29.4	20.0
Not economical to use revegetation treatments	12.2	16.7	26.5	18.1
These methods are ineffective	2.4	10.0	0.0	3.8

Table 8. Percentage of ranchers indicating the manner in which weed infestations expanded.

Method of Dispersal	County:			
	Harney	Lake	Malheur	Overall
	-% indicated as the most important reason-			
not recognized until too late	43.9	43.3	52.9	46.7
spread from adjoining land	43.9	53.3	32.4	42.9
lack of cost effective controls	36.6	36.7	32.4	35.2
spread by man's actions	34.1	23.3	44.1	34.3
lack of native plant competition	17.1	16.7	11.8	15.2
overgrazing	2.4	3.3	2.9	2.9

Table 9. Ranchers' use of measures to prevent and control weed infestations.

Preventive/Control Method	County:			
	Harney	Lake	Malheur	Overall
	---% indicated using preventive measure---			
aggressively destroy weeds when found	82.9	83.3	85.3	83.8
spot spraying near fringe or boundary areas	73.2	86.7	85.3	81.0
routinely monitor rangeland for weeds	70.7	83.3	67.6	73.3
keep machinery/trucks clean	78.0	56.7	52.9	63.8
insist that local governments control weeds along roadways	51.2	33.3	55.9	47.6
change grazing management to avoid known infestations when weed seeds can be dispersed	39.0	30.0	26.5	32.4
purchase only weed-free hay	39.0	13.3	17.6	24.8
	---% indicated using method in past---			
grazing	73.2	53.3	64.7	64.8
herbicides	46.3	46.7	50.0	47.6
mowing	43.9	30.0	44.1	40.0
reseeding with competing vegetation	34.1	43.3	23.5	33.3
burning	29.3	16.7	29.4	25.7
disking/tillage	17.1	30.0	26.5	23.8
	--% indicated plans to use method in future--			
grazing	70.7	50.0	64.7	62.9
herbicides	53.7	56.7	50.0	53.3
reseeding with competing vegetation	43.9	46.7	38.2	42.9
mowing	31.7	30.0	38.2	33.3
burning	26.8	26.7	20.6	24.8
disking/tillage	14.6	30.0	17.6	20.0

Sources and Types of Weed Management Information

The County Weed Board, the Extension Service, and private companies/consultants are the major sources of weed management information in southeast Oregon. More than 31%, 27%, and 25% of all respondents indicated they frequently used the county weed board, the Extension Service, and private companies/consultants, respectively, to obtain information about weed management (Table 10).

Types of information requested by the majority of respondents were effectiveness of various herbicide treatment programs (71%), economics of herbicide treatments (60%), techniques and effectiveness of control with grazing animals (59%), economics of using grazing treatments (54%), effectiveness of various revegetation treatments (57%), and economics of revegetation treatments (55%) (Table 11). Most respondents wanted information in a pamphlet or bulletin available through the Extension Service (55%) or through personal visits and on-site help by range specialists (51%). Area demonstration plots and testimonials from fellow ranchers and other land managers were also identified as informational delivery forms of choice by 41% and 40% of respondents, respectively.

Table 10. Sources of weed management information most often used by ranchers.

Source	County:			
	Harney	Lake	Malheur	Overall
	-% indicated source is used frequently-			
county weed board coordinator	41.5	20.0	29.4	31.4
extension service/county agent/universities	24.4	33.3	26.5	27.6
private companies/consultants	19.5	40.0	17.6	24.8
farm/ranch/trade magazines	12.2	20.0	17.6	16.2
agricultural experiment stations	29.3	6.7	5.9	15.2
public land managers	14.6	3.3	8.8	9.5
Internet/on-line computer services	2.4	6.7	11.8	6.7
grazing associations	4.9	0.0	0.0	1.9
	---% indicated most important source---			
county weed board coordinator	26.8	6.7	52.9	29.5
extension service/county agent/universities	12.2	40.0	11.8	20.0
private companies/consultants	9.8	30.0	8.8	15.2
agricultural experiment stations	31.7	0.0	0.0	12.4
Other ¹	7.3	16.7	8.8	10.5
farm/ranch/trade magazines	2.4	0.0	14.7	5.7
public land managers	9.8	3.3	2.9	5.7
grazing associations	0.0	3.3	0.0	1.0
Internet/on-line computer services	0.0	0.0	0.0	0.0

¹Other sources indicated were: Natural Resources Conservation Service, Oregon Department of Agriculture, and neighboring ranches.

Table 11. Types and forms of weed management information most requested by ranchers.

	County:			
	Harney	Lake	Malheur	Overall
	---% indicated very interested---			
Type of Information				
Effectiveness of various herbicide treatment programs	68.3	63.3	79.4	70.5
Economics of herbicide treatments	65.9	53.3	58.8	60.0
Techniques and effectiveness of control with grazing treatments	61.0	50.0	64.7	59.0
Effectiveness of various revegetation treatment programs	58.5	50.0	61.8	57.1
Economics of revegetation treatments	58.5	43.3	61.8	55.2
Economics of using grazing treatments	56.1	50.0	55.9	54.3
Economics of prescribed fire treatments	53.7	46.7	32.4	44.8
Effectiveness of various prescribed fire treatment programs	48.8	43.3	38.2	43.8
Effectiveness of mechanical treatments	31.7	33.3	32.4	32.4
Economics of mechanical treatments	34.1	30.0	32.4	32.4
Form of Information				
Pamphlet of bulletin available through the Extension Service or County Agent	43.9	53.3	70.6	55.2
Personal visits and on-site help by range specialists	48.8	46.7	58.8	51.4
Area demonstration plots showing the effectiveness of various control methods	43.9	36.7	41.2	41.0
Testimonials from fellow ranchers and other land managers	31.7	43.3	47.1	40.0
Videos demonstrating the various control methods	19.5	26.7	29.4	24.8
Internet/computer based decision aids and information	9.8	23.3	26.5	19.0

VI. CONCLUSIONS

The responses to various statements on weed and range management indicated that ranchers, as a group, are generally very concerned about weeds in rangeland. Respondents commonly felt it makes economic sense to control weeds in rangeland, and felt very strongly that not enough was being done to control weeds on public land. The majority of ranchers indicated a need for more research on controlling weeds on rangelands.

Ranchers depend heavily on their county extension agents and local weed control officers for information on weed control. Over 50% of respondents identified their county extension agents or local weed control officers as their primary sources of information on weed control. Information on the effectiveness and economics of herbicides, grazing treatments, and revegetation techniques was most requested by the majority of ranchers; and they would like to receive the information in a pamphlet/bulletin or via personal visits by range/weed management specialists. Demonstration of weed control techniques and testimonials from fellow ranchers and land managers were also popular information delivery methods. Internet-based decision aids and online information delivery were less popular among southeast Oregon ranchers. In fact, the vast majority of ranchers indicated they would not be interested in internet provided forms of information. This is somewhat surprising considering that nearly 67% of ranchers in southeast Oregon indicated owning a computer with access to the internet. However, most of rural southeast Oregon is limited to dial-up internet access over a 56k modem and largely lacks access to broadband internet services. Thus, web-based information usage by ranchers may be constrained by relatively unreliable and slow download transfer rates.

Cheatgrass, despite comprising the greatest proportion of infested rangeland, was not considered most the problematic weed for ranchers in southeast Oregon. In fact, many weeds that currently occupy a relatively small proportion of rangeland relative to cheatgrass were identified as being more problematic for grazing operations. Medusahead rye, whitetop, perennial pepperweed, thistles, and knapweeds, despite comprising a much smaller proportion of infested rangeland, were all considered more problematic for grazing operations than cheatgrass. We speculate the reason for the apparent contradiction is cheatgrass, grazed at the right time of year, offers moderate to superior forage quality and palatability; whereas, the other weed species are generally of limited to no use to grazing livestock because of innate anti-quality factors that limit their palatability and utilization.

The majority of ranchers felt that using herbicides, prescribed fire, grazing animals, mechanical methods, and revegetation treatments to control invasive annual grasses provided a marginal to positive return on their investment; however, on average, less than 30 percent of ranchers with annual grasses thought those controls were ‘very effective.’ Despite the general feeling that invasive annual grass control methods are only marginally effective, a majority of ranchers indicated plans to treat their infestations with herbicides, grazing animals, and revegetation treatments in the future.

The reasons for not using various annual grass controls generally fell into environmental, educational, and financial categories. In many cases, little can be done to remove environmental constraints; particularly those related to topography, water, and other circumstances. However, the financial constraints can be addressed through cost-share programs either offered locally or through state or federal agencies. Educational or knowledge-based constraints to adopting and using weed controls and preventive measures could be abated through university and governmental educational and research programs.

APPENDIX A

MANAGEMENT SURVEY

Ranch/Farm Operators

The following questions pertain to management issues in **your region or county**.

1. Please rate each of the following problems/issues that may affect livestock grazing operations in your area: (circle the appropriate number)

	Not a Problem	Minor Problem	Major Problem	Don't Know
a. adverse weather conditions	1	2	3	4
b. availability of grazing land	1	2	3	4
c. cost of feed	1	2	3	4
d. other operating costs (fuel, supplies)	1	2	3	4
e. livestock prices	1	2	3	4
f. noxious or invasive weeds	1	2	3	4
g. predators	1	2	3	4
h. regulations affecting use of public lands	1	2	3	4
i. regulations affecting use of private lands	1	2	3	4
j. others (please specify)	1	2	3	4

2. Which problem/issue listed in Question 1 do you feel is the **most serious** problem affecting grazing operations in your area? (**Circle** the appropriate letter)

3. Have these problems/issues in your area improved, remained the same, or become worse over the past five years?

	Improved	Remained the Same	Become Worse	Don't Know
a. adverse weather conditions	1	2	3	4
b. availability of grazing land	1	2	3	4
c. cost of feed and supplies	1	2	3	4
d. other operating costs (fuel, supplies)	1	2	3	4
e. livestock prices	1	2	3	4
f. noxious or invasive weeds	1	2	3	4
g. predators	1	2	3	4
h. regulations affecting use of public lands	1	2	3	4
i. regulations affecting use of private lands	1	2	3	4
j. others (please specify)	1	2	3	4

4. Which weeds pose problems for livestock grazing operations in your area? (please rate each of following weeds)

	Not a Problem	Minor Problem	Major Problem	Don't Know
a. cheatgrass	1	2	3	4
b. Dalmatian toadflax	1	2	3	4
c. juniper	1	2	3	4
d. knapweeds	1	2	3	4
e. leafy spurge	1	2	3	4
f. medusahead rye	1	2	3	4
g. perennial pepperweed (tall whitetop)	1	2	3	4
h. ventanata	1	2	3	4
i. thistles	1	2	3	4
j. whitetop	1	2	3	4
k. others (please specify _____)	1	2	3	4

5. Which weed listed above currently poses the **most serious** problem for grazing operations in your area? (**Circle** the appropriate letter)

6. What do you think are the two most important causes of weed infestations in your area? (circle the two most important)

- a. infestation spread from adjoining land
- b. not recognized as a problem/threat until it's too late
- c. spread by man's actions (e.g., vehicles, contaminated hay, recreation)
- d. overgrazing of rangeland
- e. lack of competition from native plants/grasses
- f. lack of cost effective controls
- g. other (please specify _____)

7. How serious is the weed problem on your farm or ranch? (please circle)

not a problem minor problem major problem

Please estimate how many **acres** of the following weeds are on your farm/ranch?

	Grazing Lands	Hay Land
a. cheatgrass	_____	_____
b. Dalmatian toadflax	_____	_____
c. juniper	_____	_____
d. knapweeds	_____	_____
e. leafy spurge	_____	_____
f. medusahead rye	_____	_____
g. perennial pepperweed (tall whitetop)	_____	_____
h. sagebrush	_____	_____
i. thistles	_____	_____
j. whitetop	_____	_____
k. others (please specify _____)	_____	_____

8. What measures have you taken to prevent weeds from establishing and spreading on your farm/ranch?

- | | | |
|---|-----|----|
| a. purchase only weed-free hay | Yes | No |
| b. keep machinery/trucks clean | Yes | No |
| c. aggressively destroy weeds when found | Yes | No |
| d. spot spraying near fringe or boundary areas | Yes | No |
| e. routinely monitor rangeland for weeds | Yes | No |
| f. insist that local governments control weeds along road ways | Yes | No |
| g. change grazing management to avoid known infestations when weed seeds can be dispersed | Yes | No |
| h. other measures (please specify _____) | Yes | No |

9. Do you currently have invasive annual grasses (i.e. cheatgrass, medusahead, ventanata) on your farm or ranch?

____ No (if **No**, please go to Question 10)

____ If **Yes**, please indicate if you have used or plan to use any of the following general practices to control annual grasses: (check all that apply)

	Have Used in the Past	Plan to Use
a. herbicides	Yes / No (# of years _____)	Yes / No
b. burning	Yes / No (# of years _____)	Yes / No
c. grazing	Yes / No (# of years _____)	Yes / No
d. mowing	Yes / No (# of years _____)	Yes / No
e. disking/tillage	Yes / No (# of years _____)	Yes / No
f. reseeding with competing vegetation	Yes / No (# of years _____)	Yes / No
g. other controls (please specify _____)	Yes / No (# of years _____)	Yes / No

10. Which annual grass causes the most economical losses in your region (circle one)?

A. cheatgrass, B. medusahead, C. ventanata , or D. other annual grass (please specify)

11. Which annual grass has the potential to cause the most economical losses in your county (circle one)?

A. cheatgrass, B. medusahead, C. ventanata , or D. other annual grass (please specify)

12. Which annual grass causes the greatest ecological harm in your county (circle one)?

A. cheatgrass, B. medusahead, C. ventanata , or D. other annual grass (please specify)

13. Which annual grass has the potential to cause the greatest ecological harm in your county (circle one)?

A. cheatgrass, B. medusahead, C. ventanata , or D. other annual grass (please specify)

14. Even if you currently have no annual grasses, how would you rate the **effectiveness** of the following practices in controlling annual grasses?

	Not Effective	Partially Effective	Very Effective	Don't Know
a. spraying with herbicides	1	2	3	4
b. control with prescribed fire	1	2	3	4
c. control with grazing animals	1	2	3	4
d. control with mowing	1	2	3	4
e. control with disking or tillage	1	2	3	4
f. reseeding with competing vegetation	1	2	3	4
g. other controls (please specify _____)	1	2	3	4

15. Even if you currently have no annual grasses (i.e., cheatgrass, medusahead, ventanata), do you think it pays to use the following annual grass control practices?

	Yes, It Pays	Marginal	Does Not Pay	Don't Know
a. spraying with herbicides	1	2	3	4
b. control with prescribed fire	1	2	3	4
c. control with grazing animals	1	2	3	4
d. mechanical control with mowing, tillage, disking	1	2	3	4
e. reseeding with competing vegetation	1	2	3	4
f. other controls (please specify _____)	1	2	3	4

16. Based on what you have experienced, believe, or have been told, please indicate the reasons for **not** using the following control methods on annual grasses.

Reasons for not using herbicide treatments: (please check all that apply)

- Annual grass infestations are inaccessible to sprayers
- Herbicides are not economical
- Herbicides are ineffective for controlling annual grasses
- Environmental restrictions/concerns prevent me from applying herbicides (such as, spraying near water, trees, sensitive crops, etc.)
- Do not have the time to treat annual grass infestations
- Acreage of infestations is so large that the cost of using herbicides would be prohibitively expensive
- Herbicides provide only temporary control and it's too difficult to reestablish reseeded vegetation to prevent reinvasion of annual grasses
- Lack the equipment or expertise to apply herbicides (such as restricted use permits)
- Cost-share programs for herbicides are no longer available or have been reduced
- Other reasons (please specify _____)

Reasons for not using prescribed fire treatments: (please check all that apply)

- Do not have the expertise/knowledge to apply prescribed fire
- Not economical to use prescribed fire
- Lack the proper equipment for prescribed fire
- Do not have enough labor/personnel for prescribed fire
- Prescribed fire is ineffective for controlling annual grasses
- There is too much of a liability risk with using prescribed fire to control annual grasses
- Prescribed fire is too difficult to use at the proper time
- I do not like prescribed fire
- Other reasons (please specify _____)

Reasons for not using grazing treatments: (please check all that apply)

- Do not have the expertise/knowledge to use grazing treatments to control annual grasses
- Not economical to use grazing treatments
- Lack the proper equipment for using grazing treatments to control annual grasses (fences, water, etc)
- Grazing treatments are too time-consuming to use/take too long to work
- Grazing treatments are ineffective for controlling annual grasses
- Grazing treatments are too costly to manage/not economical to use
- Other reasons (please specify _____)

Reasons for not using mechanical treatments (mowing, disking, tillage): (please check all that apply)

- Do not have the expertise/knowledge to use mechanical treatments to control annual grasses
- Not economical to use mechanical treatments
- Lack the proper equipment
- These methods are ineffective
- Do not have enough time to work with these methods
- Infestations occur on land that is not suitable for mechanical treatments (inaccessible, incompatible terrain, too rocky, etc.)
- Other reasons (please specify _____)

Reasons for not using revegetation treatments (reseeding competing vegetation): (please check all that apply)

- Do not have the expertise/knowledge to use revegetation treatments
- Lack the proper equipment
- Not economical to use revegetation treatments
- These methods are ineffective
- Too difficult to get reseeded vegetation to grow
- Do not have enough time to work with these methods
- Infestations occur on land that is not suitable for revegetation treatments (inaccessible, incompatible terrain, too rocky, etc.)
- Other reasons (please specify _____)

17. When you need information about **weed management on grazing land**, which of the following sources do you use?

	Seldom	Sometimes	Frequently	Never
a. Extension Service/county agent/universities	1	2	3	4
b. agricultural experiment station(s)	1	2	3	4
c. private companies/consultants	1	2	3	4
d. farm/ranch/trade magazines	1	2	3	4
e. grazing associations	1	2	3	4
f. public land managers (BLM, Forest Service)	1	2	3	4
g. Internet/On-line computer services	1	2	3	4
h. county weed board coordinator/officers	1	2	3	4
f. other controls (please specify _____)	1	2	3	4

18. Which one has been the **most valuable** source of information for weed management on grazing land? (Please **circle** the appropriate letter above)

19. What type of information would you like to obtain concerning weed management on grazing and hay land?

	Not Interested	Somewhat Interested	Very Interested
a. effectiveness of various herbicide treatment programs	1	2	3
b. economics of herbicide treatments	1	2	3
c. techniques and effectiveness of control with grazing treatments	1	2	3
d. economics of using grazing treatments	1	2	3
e. effectiveness of various prescribe fire treatment programs	1	2	3
f. economics of prescribe fire treatments	1	2	3
g. effectiveness of various mechanical treatment programs	1	2	3
h. economics of mechanical treatments	1	2	3
i. effectiveness of various revegetation treatment programs	1	2	3
j. economics of revegetation treatments	1	2	3
f. others (please specify _____)	1	2	3

20. In what form would you like to receive the information?

	Not Interested	Somewhat Interested	Very Interested
a. pamphlet or bulletin available through Extension office or county agent	1	2	3
b. videos (VHS, DVD) demonstrating the various control methods	1	2	3
c. area demonstration plots showing effectiveness of various control methods	1	2	3
d. testimonials from fellow ranchers and other land managers	1	2	3
e. computer based decision aids (programs) that can be used to evaluate the effectiveness or economics of various controls	1	2	3
f. personal visits and on-site help by range management specialists	1	2	3
g. others (please specify _____)	1	2	3

The next set of questions asks what you think about general weed management issues and concerns dealing with annual grasses.

21. Please indicate whether you agree or disagree with the following statements:

<u>Weed Management Issue</u>	Strongly Disagree (1)	Somewhat Disagree (2)	Neither Agree or Disagree (3)	Somewhat Agree (4)	Strongly Agree (5)	Don't Know (0)
Weed problems on rangelands are generally the result of poor range management	1	2	3	4	5	0
I am concerned about controlling weeds in rangeland	1	2	3	4	5	0
State and Federal government agencies are not doing enough to control problem weeds on <u>public</u> grazing land	1	2	3	4	5	0
State and Federal government agencies are not doing enough to help control problem weeds on <u>private</u> grazing land	1	2	3	4	5	0
Local governments are not effective in controlling problem weeds	1	2	3	4	5	0
It seldom makes economic sense to control weeds on rangeland	1	2	3	4	5	0
Rangeland weeds represent a problem to all ranchers	1	2	3	4	5	0
It doesn't pay to control weeds on my land when my neighbor doesn't control his weeds	1	2	3	4	5	0
There needs to be more research on controlling weeds on rangelands	1	2	3	4	5	0

<u>Weed Management Issue</u> (continued...)	Strongly Disagree (1)	Somewhat Disagree (2)	Neither Agree or Disagree (3)	Somewhat Agree (4)	Strongly Agree (5)	Don't Know (0)
Restrictions governing the use of herbicides on rangeland are too strict	1	2	3	4	5	0
Herbicides, if used properly, are not harmful to the environment	1	2	3	4	5	0
Weeds infestations have no effect on the market (sale) value of rangeland	1	2	3	4	5	0
Public land managers are doing a good job of controlling weeds on public land	1	2	3	4	5	0
Annual grasses are nearly impossible to control with current control methods and techniques	1	2	3	4	5	0
Annual grasses are a threat to rangeland productivity	1	2	3	4	5	0
Annual grasses can be controlled but it is just too costly to do on an effective scale	1	2	3	4	5	0
Annual grasses can be controlled but it is too difficult to get reseeded competing vegetation to grow	1	2	3	4	5	0
Annual grasses are a long-term management problem	1	2	3	4	5	0
Governments should help pay part of the cost to control annual grasses, even if it means an increase in taxes	1	2	3	4	5	0

We would now like to ask a few general questions about your ranch. These responses will help us to compare ranch characteristics. Also included in this section are financial questions about your ranching activities in 2007. If you are in a partnership or corporation, please answer for the entity and not just for you share. PLEASE BE ASSURED THAT RESPONSES WILL BE AVERAGED OVER SEVERAL COUNTIES AND YOUR INDIVIDUAL RESPONSES WILL BE KEPT STRICTLY CONFIDENTIAL.

22. In 2007, how many acres did you:

	Hay Land/ Cropland	Grazing Land	Total
a. Own	_____	_____	_____
b. Rent or lease from others	_____	_____	_____
c. Rent or lease to others	_____	_____	_____

23. How many head of livestock did you graze in 2007?

	Estimated Number of Head
a. Cattle and calves	_____
b. Sheep and lambs	_____
d. Horses	_____
c. Others (specify _____)	_____

24. Did you use any public (federal and/or state) land for grazing in 2007? Yes / No

If **Yes**, how many acres _____ or number of permitted AUMs _____?

25. What best describes your ranch/farm organization? (please circle)

- a. single proprietor
- b. partnership
- c. family corporation
- d. other (please clarify _____)

26. Do you use a computer to assist you in the operation of your farm or ranch? Yes / No

If **yes**, do you have access to the Internet? Yes / No

27. Which of the following categories best describes your **gross farm income** in 2007?

- a. \$50,000 or less
- b. \$50,001 to \$100,000
- c. \$100,001 to \$150,000
- d. \$150,001 to \$200,000
- e. \$200,001 to \$250,000
- f. \$250,001 to \$300,000
- g. \$300,001 to \$350,000
- h. Over \$350,000

28. Which of the following categories best describes your **net farm income** (gross cash farm income less gross cash farm expenses) in 2007?

- a. negative
- b. \$0 to \$5,000
- c. \$5,001 to \$10,000
- d. \$10,001 to \$20,000
- e. \$20,001 to \$30,000
- f. \$30,001 to \$40,000
- g. \$40,001 to \$50,000
- h. Over \$50,000

29. Approximately what percentage of your gross farm income in 2007 came from grazing livestock?

_____ %

30. About what percentage of your total family income in 2007 came from farming/ranching?

_____ %

We would now like to ask a few questions about you for statistical purposes. Information will not be disclosed on an individual basis.

31. In what county and state do you live? _____ County _____ State

32. How long have you lived in this county? _____ Years

33. What is your age? _____ Years

34. How many years have you been farming/ranching? _____ Years

35. Highest level of education received?

- Some high school _____
- High School diploma _____
- Some college _____
- Associate degree _____
- Four year university degree _____
- Graduate degree _____

36. In 2007, did you work an off-ranch job?

_____ No

_____ Yes, about how many days did you work at least 4 hours per day off you ranch? _____ Days

Thank you for completing this survey. Your cooperation is sincerely appreciated. If you would like a report summarizing the findings of this study, please contact the Harney County Extension Office 541-573-2506.

ATTACHMENT 2

Dear Respondent,

We are asking you to participate in a research project to study management of sagebrush steppe rangelands. This research project is funded jointly by Oregon State University and the USDA-Agricultural Research Service. Along with this letter is a questionnaire that asks a variety of questions about management of sagebrush steppe rangeland in your region. We are asking you to look over the questionnaire and, if you choose to do so, complete it and send it back to us in the self-addressed, post paid envelope.

The results of this project will be used to better understand the ranching community's views on current challenges, practices and resource needs (e.g., information, tools and technology, etc.) for management of sagebrush steppe rangelands. We hope the results of the survey will be useful for identifying extension/educational and research programs that are better tailored to meet your management needs. We hope to share our results by publishing them in a scientific journal and University publication and presenting them at professional meetings and rangeland management workshops.

We do not know of any risks to you if you decide to participate in this survey and we guarantee that your responses will not be identified with you personally. Individual questionnaires will not be shared with anyone outside of our research group. Please do not put your name or any other information that could be used to identify you on the questionnaire.

The survey should take you about 30 minutes to complete. We hope you will take the time to complete this questionnaire and return it. Your participation is voluntary and there is no penalty if you do not participate. Regardless of whether you choose to participate, please let us know if you would like a summary of our findings. To receive a summary, please call the Harney County Extension Office at 541-573-2506.

If you have any questions or concerns about completing the questionnaire or about being in this study, you may contact the Harney County Extension Office at 541-573-2506. The Institutional Review Board (IRB) at Oregon State University has approved this study. If you have any concerns about your rights as a participant in this study you may contact the Office of Sponsored Programs and Research Compliance via email (irb@oregonstate.edu) or by telephone (541-737-4933).

Sincerely,

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