

# Acceptability of Brucellosis Management Tools for Elk Among Montana Stakeholder Groups



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## Brucellosis and Elk

Elk populations in southwest Montana near Yellowstone National Park (YNP) are infected with brucellosis, a bacterial disease introduced to these elk and bison (*Bison bison*) populations in the 1930s via European livestock. Acceptability among different stakeholder groups for elk (*Cervus canadensis*) management actions designed to reduce the risk of elk-livestock brucellosis transmission is not fully understood. Brucellosis is transmitted from elk to cattle through exposure to reproductive and birth tissues; the disease can cause cattle to abort their calves. Treatment of the disease in cattle populations has been largely successful, but eradication in wildlife populations has proven elusive. The area of highest concern for brucellosis in Montana is known as the Designated Surveillance Area (DSA; Figure 1) encompassing several elk management units north and west of YNP.

## Stakeholder Input & Survey Overview

To develop elk and brucellosis management tools acceptable to a broad range of stakeholders, Montana Fish, Wildlife, and Parks (FWP) convened a statewide **Elk Management Guidelines in Areas with Brucellosis Working Group**. Deliberations of the working group produced several suggested management actions within the DSA and in more targeted geographic locations (i.e., specific valleys within the DSA). These actions included: limited fencing to prevent comingling of cattle and elk, hazing elk off private property, kill permits issued to landowners, disease management hunts (e.g., public hunting outside normal seasons), and others.

Input from hunters, landowners, cattle producers, and wildlife enthusiasts regarding the acceptability of these actions is essential to successful implementation of the working group recommendations. In addition, FWP seeks to understand the values, attitudes, and perspectives held by members of these constituent groups unable to participate in the working group or the subsequent public decision processes; both those who live within the DSA and more generally across Montana.

To this end, FWP and the University of Montana (UM) conducted a survey of stakeholders. The survey was developed during the summer of 2014 from working group input, previous scientific literature, and management tools proposed to the FWP Commission for adoption. The survey was finalized and administered in late summer and early fall of 2014. Response rate was 44% — a telephone non-response bias check was conducted after the survey and found no significant differences across key variables.

Ideally, brucellosis risk management tools will be acceptable to four specific

groups of stakeholders: hunters, landowners, cattle producers, and wildlife enthusiasts. The survey was stratified to sample each of these groups both inside and outside the DSA. Hunters (n = 591) were respondents who reported frequently hunting elk over the past 5 years. Landowners (n = 316) were respondents who owned at least 40 acres in Mont., but did not produce cattle. Cattle producers (n = 281) were landowners who indicated an active cattle operation on their property. Wildlife enthusiasts (n = 274) were respondents who reported frequently participating in a variety of wildlife viewing activities, but were not landowners, cattle producers, or hunters.



Figure 1: Designated Surveillance Area for brucellosis in Montana

## Scenarios

Throughout the elk and brucellosis discussions it has been clear that acceptability of management tools often depends on the context. To tease apart some of these contextual variables, we developed six scenarios and asked stakeholders to rate the acceptability of several tools given each different context (Figure 2). All scenarios took place on a hypothetical ranch in an area where elk were known to have brucellosis. In some scenarios, the hypothetical ranch owner allowed public access for hunting – in other scenarios, public access was prohibited. In some scenarios, the elk population in the area was above the FWP management objective while in other scenarios, the elk population was below objective. Finally, in two scenarios, cattle on the ranch had been infected with brucellosis. These scenarios allowed us to understand how acceptability of various tools changed for some stakeholders in different situations.

## Acceptability of Management Tools

Acceptability of different management tools was measured on a 7-point scale where 1 was “highly unacceptable” and 7 was “highly acceptable.” Acceptability varied across scenarios and among stakeholder groups. (Figure 3) The option to “take no action” was unacceptable for most people in most scenarios, although cattle producers were significantly more likely than other stakeholders to rate this option unacceptable across all scenarios. There was general agreement that monitoring the situation was an acceptable action, although cattle producers again were the most likely to rate this as unacceptable.

Figure 2: Scenarios

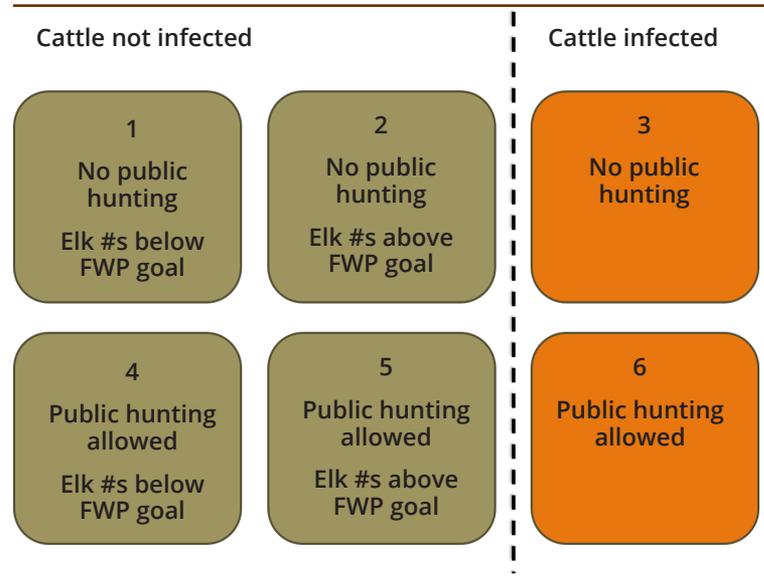
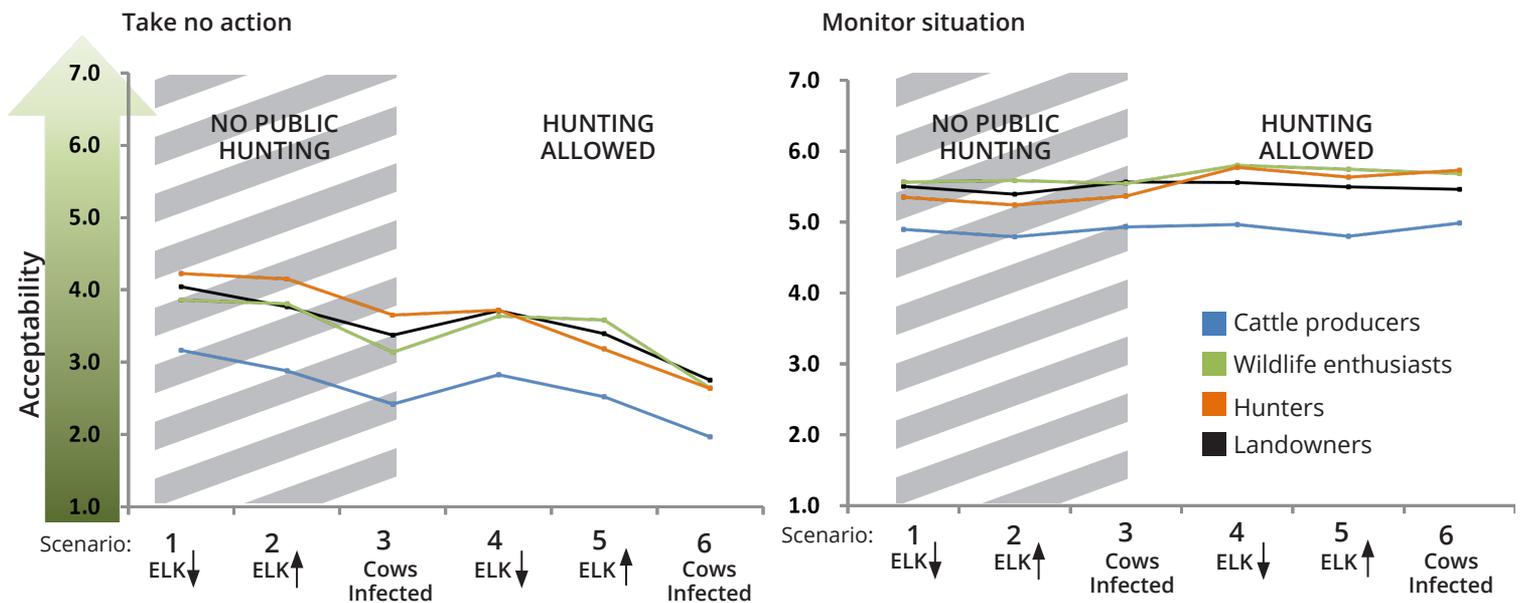


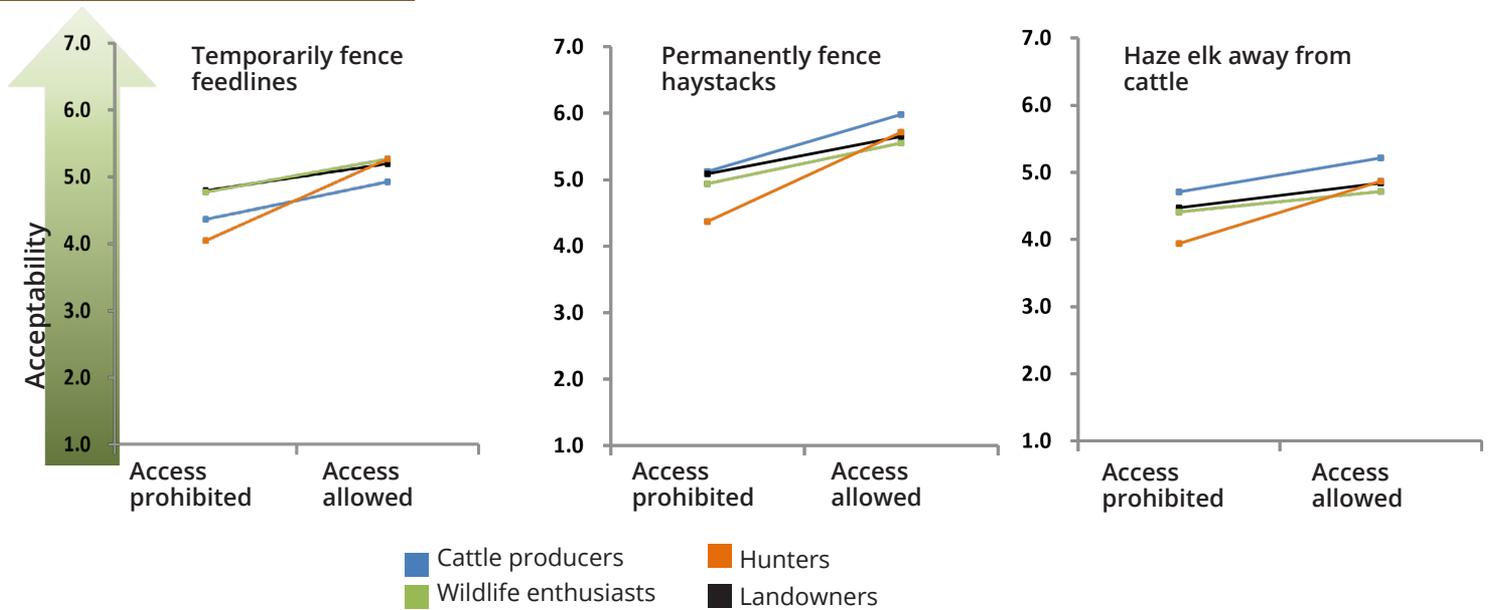
Figure 3: Acceptability of Management Tools



## Impact of Hunting Access

Across stakeholder groups, people found brucellosis management tools substantially more acceptable when public access for hunting was provided. (Figure 4) This was true for most proposed management tools, including: permanently fencing haystacks and temporarily fencing feed lines or pastures to prevent elk from co-mingling with cattle; allowing a limited number of hunters to harvest some elk to move elk away from cattle (during the traditional late hunting period of Jan. 15 to Feb. 15 and after Feb. 15, during the brucellosis risk period); hazing elk; and providing a small number of kill permits to the ranch owner to harvest and move some elk away from cattle (again, during the traditional late hunting period of Jan. 15 to Feb. 15 and after Feb. 15, during the brucellosis risk period).

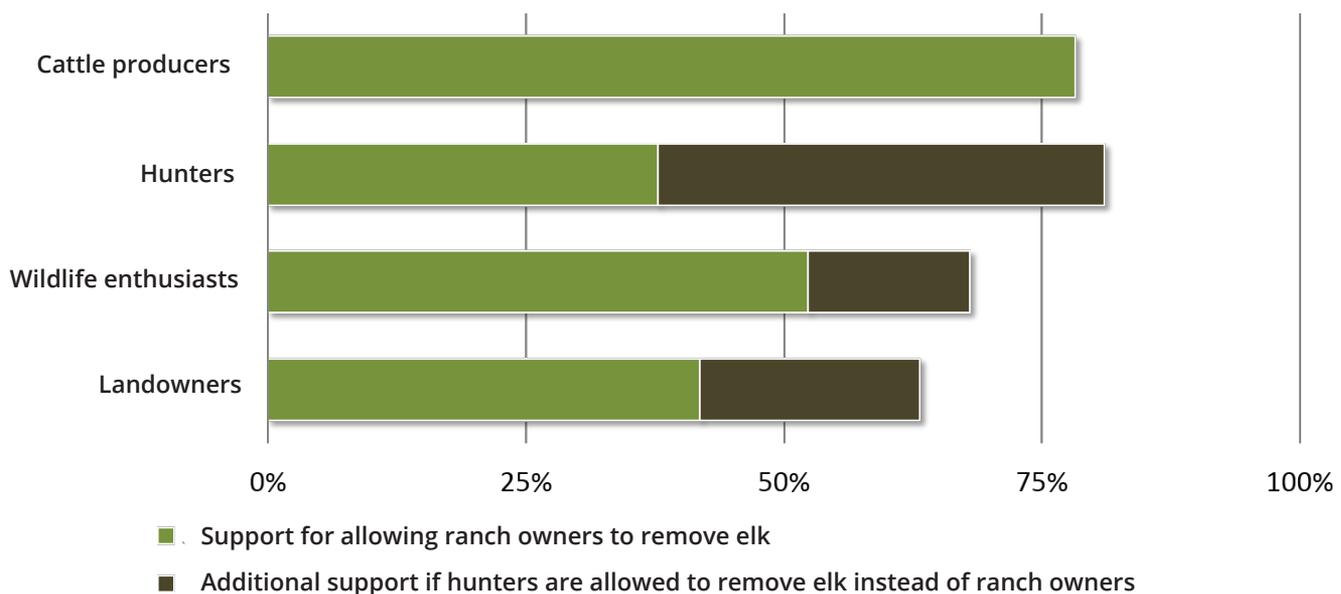
Figure 4: Impact of Hunting Access



## Who should pull the trigger?

Stakeholder opinion about the lethal removal was influenced by who harvested elk. (Figure 5) For hunters and wildlife enthusiasts, allowing hunters to harvest elk was significantly more acceptable than providing kill permits to ranch owners. This was true across all scenarios and regardless of season. In most scenarios, landowners also found it significantly more acceptable for hunters to harvest elk than for ranch owners to be provided kill permits. This effect was more pronounced in the later season (Feb. 15 to June 15). Only cattle producers saw little difference between hunters harvesting elk and ranch owners harvesting elk.

Figure 5: Hunter or Landowner Harvest



## Does Timing (Season) Matter?

Most respondents believed that lethal removal of elk was acceptable; only 18% of all stakeholders agreed or strongly agreed that elk should never be killed to protect cattle from brucellosis. (Figure 6) However, the season during which elk are killed mattered to many stakeholders. For example, about a third of all stakeholders agreed or strongly agreed that it is never ok to hunt elk after bulls have dropped their antlers. Similarly, over half of all stakeholders agreed or strongly agreed that it is never ok to hunt cow elk in the late winter or spring during the late stages of pregnancy.

Still, we found little change in acceptability of the lethal management tools when comparing the traditional late hunting season (Jan. 15 to Feb. 15) to the remainder

of the brucellosis risk period (Feb. 15 to June. 15). The two lethal tools proposed were (1) provide a small number of kill permits to the ranch owner to harvest and move some elk away from cattle, and (2) allow a limited number of hunters to harvest some elk to move elk away from cattle. Acceptability was not significantly related to seasonal timing. (Figure 7) This may indicate that the public who are against killing elk remained opposed to lethal tools regardless of season, and the public who are supportive of lethal removal remain so regardless of season. The slight decline in acceptability of lethal tools after Feb. 15 indicates that a minority of stakeholders are supportive of lethal means from Jan. 15 – Feb. 15 and then opposed after Feb. 15.

Figure 6: Timing of Management Action

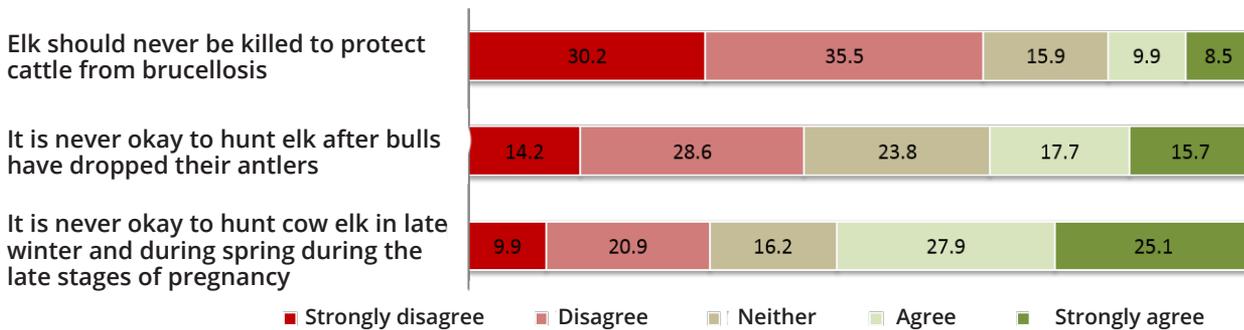
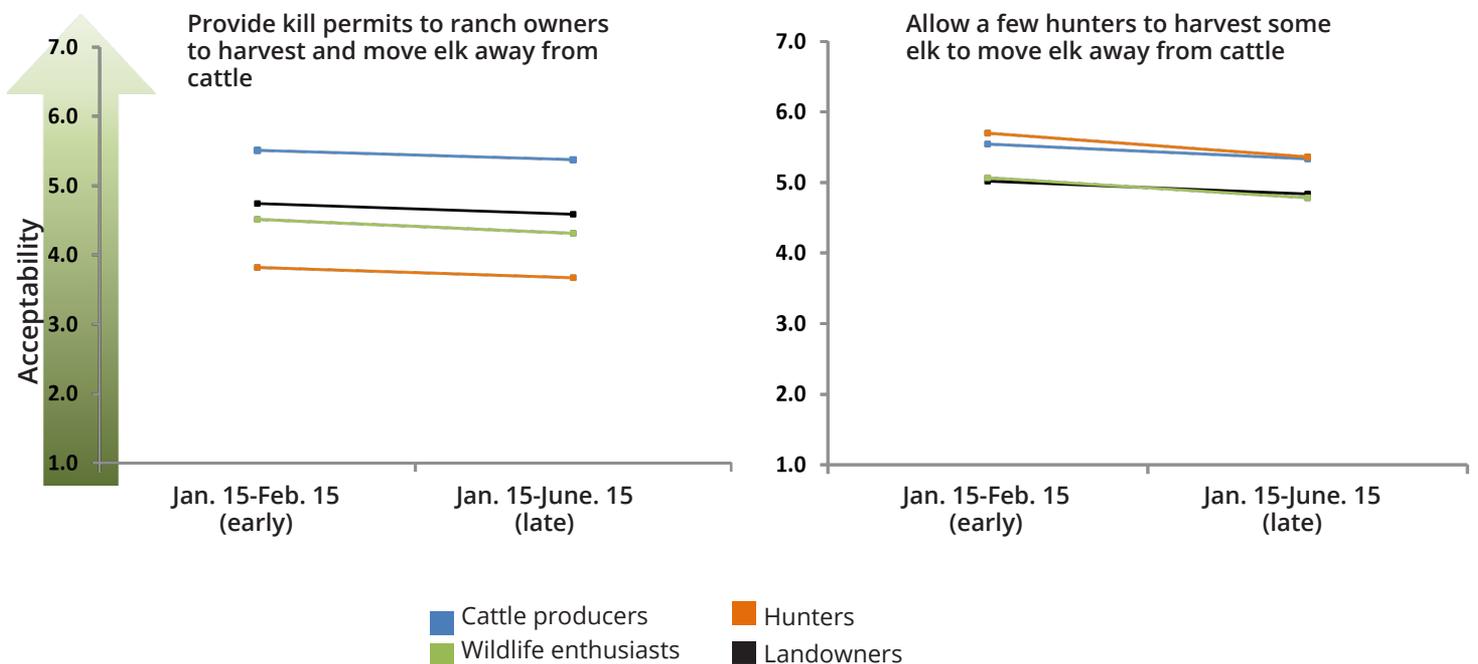


Figure 7: Timing of Management Action Related to Season



## Population Objective

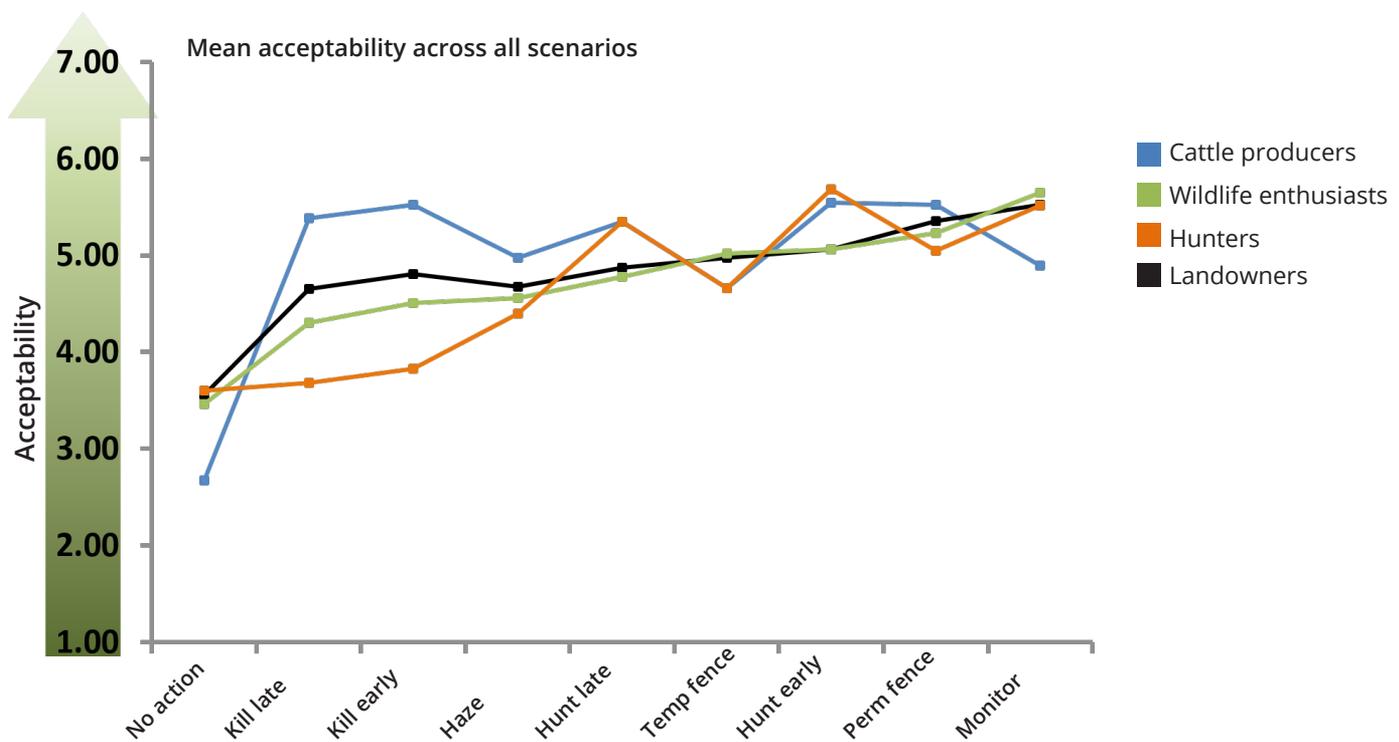
The size of the elk population affected acceptability only when public access for hunting was allowed. In scenarios where public access for hunting was prohibited, elk population status (i.e., above or below objective) had no significant effect on acceptability of management tools. Only in scenarios where public access for hunting was allowed did population status matter to stakeholders. When public access for hunting was allowed, acceptability was significantly higher for all stakeholder groups when elk populations were above objective than when elk populations were below objective. This was true for many tools included: providing kill permits (after Feb. 15) and for allowing hunters to harvest elk (during the traditional game damage season of Jan. 15 – Feb. 15, and after Feb. 15). Overall, population size relative to management objective had much less effect on acceptability than public access for hunting.

## Similarities across groups

Generally, all stakeholders agreed that taking no action was unacceptable (Figure 8). Early season (Jan. 15 – Feb. 15) remedies were favored over late season tools (after Feb. 15). Hunting was much preferred over kill permits, except for cattle producers and some landowners. Permanent fencing of haystacks was preferred over temporary fencing of feedlines. Monitoring was seen as one of the most worthwhile actions by all except cattle producers.

Hunters and cattle producers disagreed in many places, however, both groups found hunting-based solutions acceptable. Acceptability is likely to be highest when public access for hunting is provided, elk populations are above objectives, hunting is used for lethal removal (instead of ranch owner kill permits), fencing dollars are spent on permanent solutions like haystacks (instead of temporary fencing of feedlines), and investments are made in monitoring. Conflict is more likely when kill permits are issued (especially after Feb. 15), hazing is conducted, or nothing is done to address the problem.

Figure 8: How Stakeholders Agree

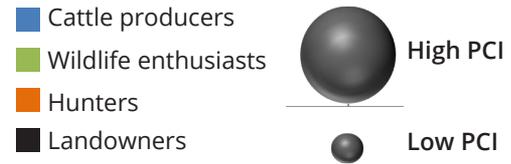
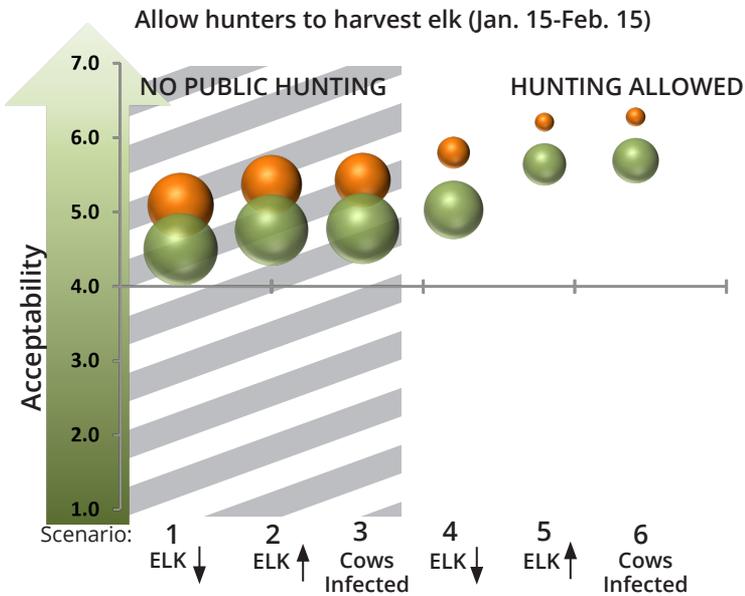


## Differences within groups

Not everyone within each stakeholder group was always in agreement. We used a tool called the Potential for Conflict Index (PCI) to analyze levels of agreement within each stakeholder group. In the graphs below, the vertical location of the bubble shows the average acceptability within a stakeholder group (the higher the bubble, the more acceptable the action); the size of the

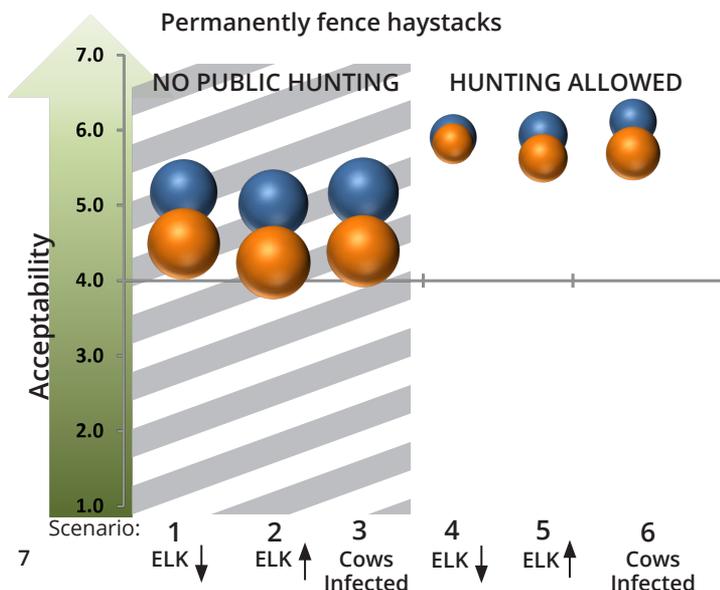
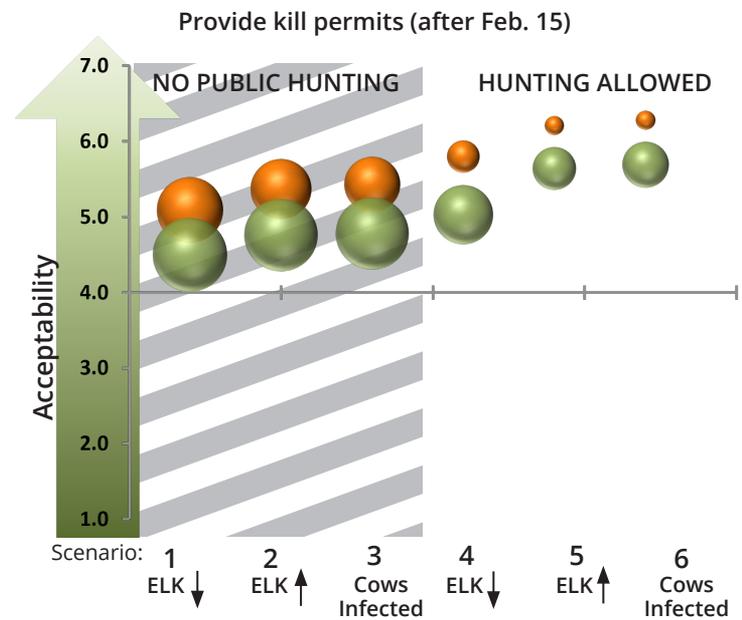
bubble represents the amount of disagreement within the stakeholder group (the larger the bubble, the more disagreement within the stakeholder group). PCI values can range from 0.0 (total agreement) to 1.0 (complete disagreement). Even when mean acceptability was high, PCI values often showed substantial disagreement.

Figure 10: How Stakeholders Disagree



In some scenarios, acceptability of tools was high and conflict was low. For example, allowing hunters to harvest some elk from Jan. 15 to Feb. 15 was at its highest acceptability and potential for conflict was at its lowest when public access for hunting was provided and elk populations were above objective.

Hunters found kill permits somewhat acceptable in two scenarios where public hunting access was provided (i.e., when elk populations were also above objective and when cattle were infected with brucellosis); however, PCI was high for hunters in these scenarios, suggesting that some hunters found kill permits unacceptable no matter the situation.



PCI also revealed that public access for hunting can reduce conflict among cattle producers. For example, cattle producers found it acceptable for FWP to fund permanent fencing for haystacks; however there was significantly less conflict among cattle producers when public access was provided.

## Acceptability of Brucellosis Management Tools for Elk Among Montana Landowners

Private landowners are important partners in the effort to manage brucellosis in Montana. Much of the land in the DSA is privately owned. To be successful, plans to manage brucellosis must consider private landowners concerns and perspectives. Earlier results from this study have shown that landowners' acceptability of brucellosis management tools is significantly related to public access – acceptability for implementing many tools on private lands increases substantially when public access for hunting is allowed (See Figure 2 on page 3).

Landowners also tend to be more accepting of lethal tools (i.e., issuing kill permits to ranch owners or allowing a limited number of hunters to harvest some elk to move elk away from cattle). However, potential for conflict (PCI) measures also show that some disagreement among landowners exists with regard to which tools should be used in what scenarios (see Figure 10 on page 7). This research summary takes a closer look at the perspectives held by landowners toward brucellosis management tools.

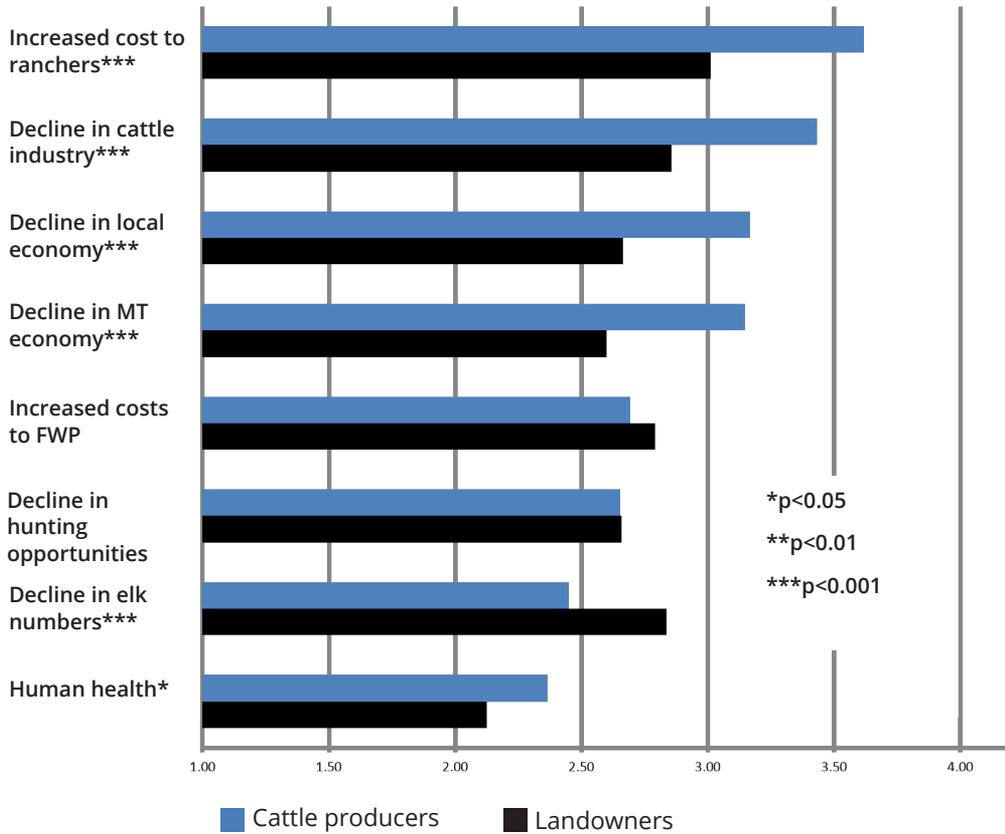
## Cattle producers and other landowners

Previous research has suggested that cattle producers tend to be more concerned about brucellosis risk than other stakeholders, including other landowners.

We found that cattle producers were significantly more concerned than other non-producer landowners that brucellosis might lead to things such as: increased costs for ranchers; a decline in the cattle industry; a decline in the local economy; a decline in Montana’s overall economy; a decline in elk numbers; or health impacts to humans.

Cattle producers and non-cattle producer landowners did not differ in their concerns over increased costs to FWP or a decline in hunting opportunities.

Figure 11: Landowner and Cattle Producer Differences



Landowners as a whole found “take no action” to be unacceptable in all scenarios, but cattle producers were significantly more likely than non-producer landowners to find “take no action” unacceptable (Figure 12). Non-producer landowners were significantly more likely than cattle producers to find “monitor the situation” acceptable (Figure 13). There was some disagreement among cattle producers — some felt this response was unacceptable, especially in scenarios where cattle had been infected. Non-producer landowners were in more agreement that monitoring was acceptable.

Figure 12: No action

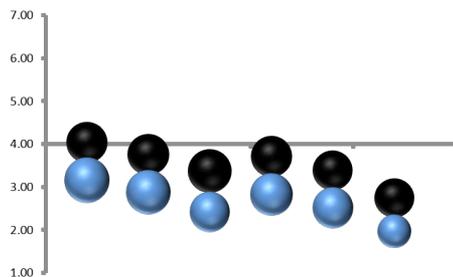
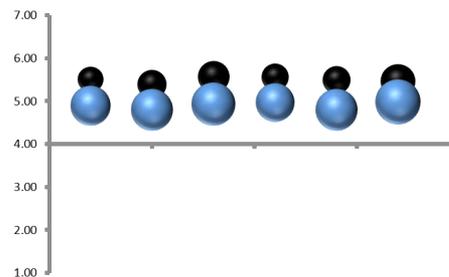
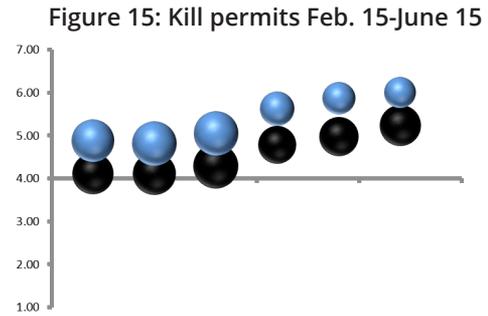
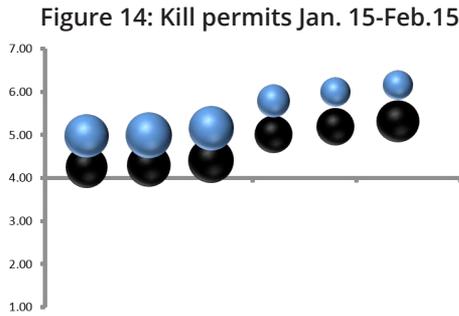


Figure 13: Monitor



Cattle producers also differed significantly from non-producer landowners when it came to providing a small number of kill permits to ranch owners to harvest and move some elk away from cattle, both in the traditional game damage season (Jan. 15 – Feb. 15) (Figure 14) and later during the remainder of the brucellosis risk period (Feb. 15 – Jun. 15) (Figure 15). This tool, regardless of timing, was significantly more acceptable to cattle producers than to non-producer landowners. For both groups, however, this tool was more acceptable in scenarios where public access for hunting was allowed by the ranch owner. Public access increased acceptability and decreased conflict for all landowners and cattle producers.



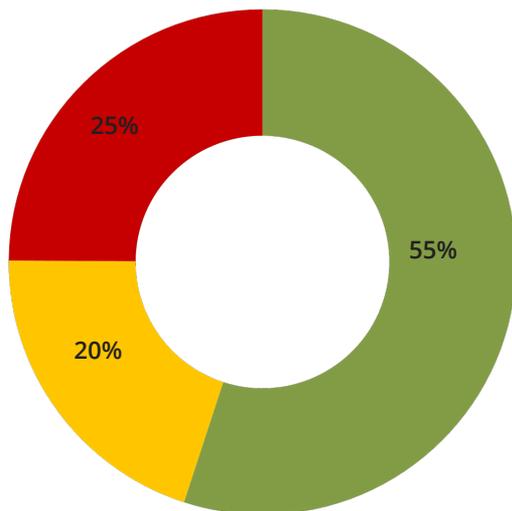
■ Cattle producers ■ Landowners

### Presence of elk

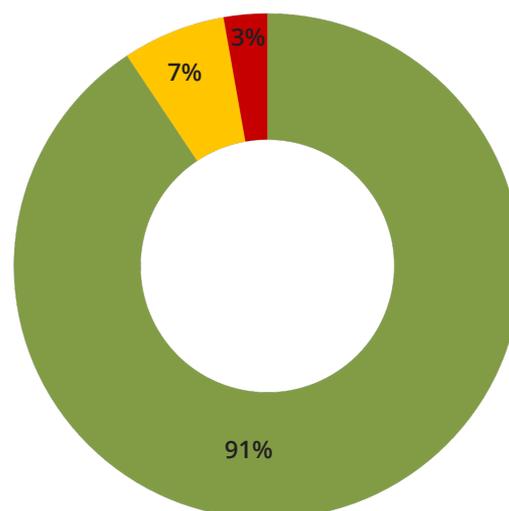
For all landowners, the presence of elk on their properties during the brucellosis risk period significantly affected the acceptability of some management tools, especially lethal removal. For example, among landowners who said there were “too few” or “far too few” elk on their property during the brucellosis risk period, 55 percent found it acceptable to provide a small number of kill permits to the ranch owner to harvest and move some elk away from cattle in the traditional game damage season (Jan. 15 – Feb. 15). Among landowners who said there were “too many” or “far too many” elk on their property during the brucellosis risk period, the number of landowners finding this tool acceptable rose to 91 percent.

Figure 16: Acceptability of Kill Permits (Jan.15-Feb.15) to landowners with “too few” elk on property during risk period

Figure 17: Acceptability of Kill Permits (Jan.15-Feb.15) to landowners with “too many” elk on property during risk period



■ % acceptable  
 ■ % neither  
 ■ % unacceptable



■ % acceptable  
 ■ % neither  
 ■ % unacceptable

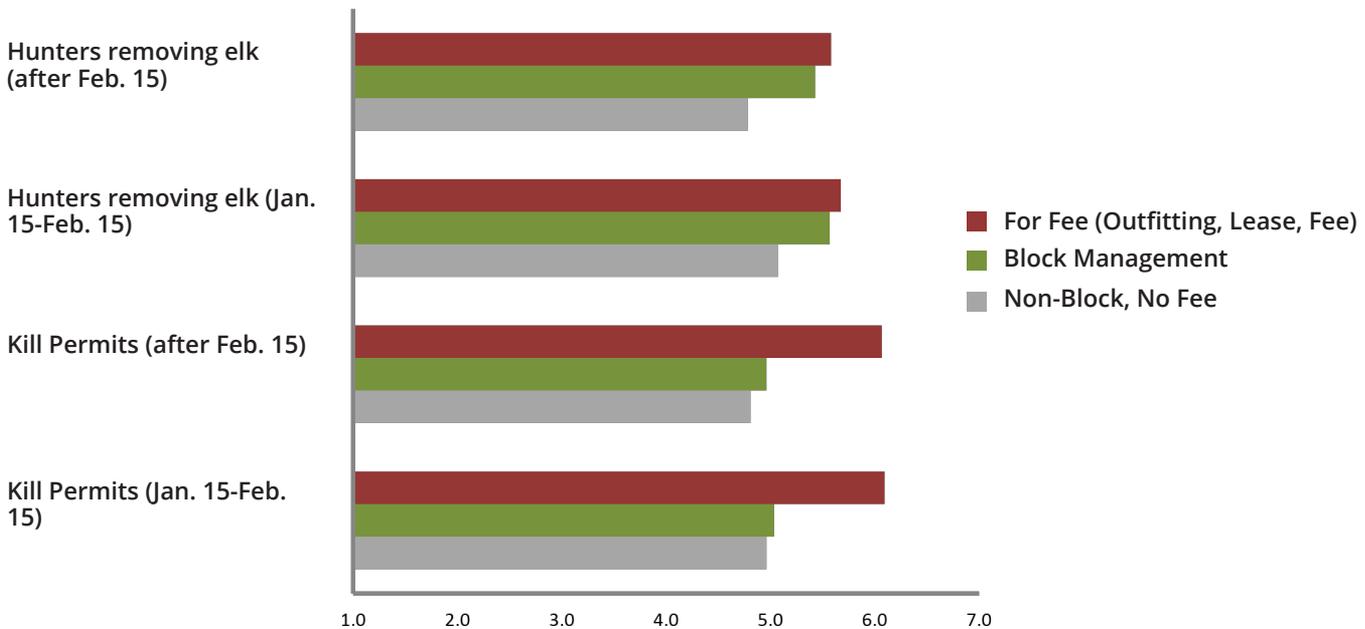
## Elk Hunting Management System

Landowners can use a variety of systems to manage hunting on their lands. These include:

- Block management hunting access program
- Non-block management hunting without a fee involving mostly hunters who are family/friends
- Non-block management hunting without a fee involving mostly hunters who are **not** family/friends
- Outfitting by the landowner
- Outfitting by a licensed outfitter other than the landowner
- Lease agreement with a non-outfitting business that markets hunting opportunities
- Lease agreement with a hunter or group of hunters
- Access fees (non-lease) charged per hunter or group of hunters

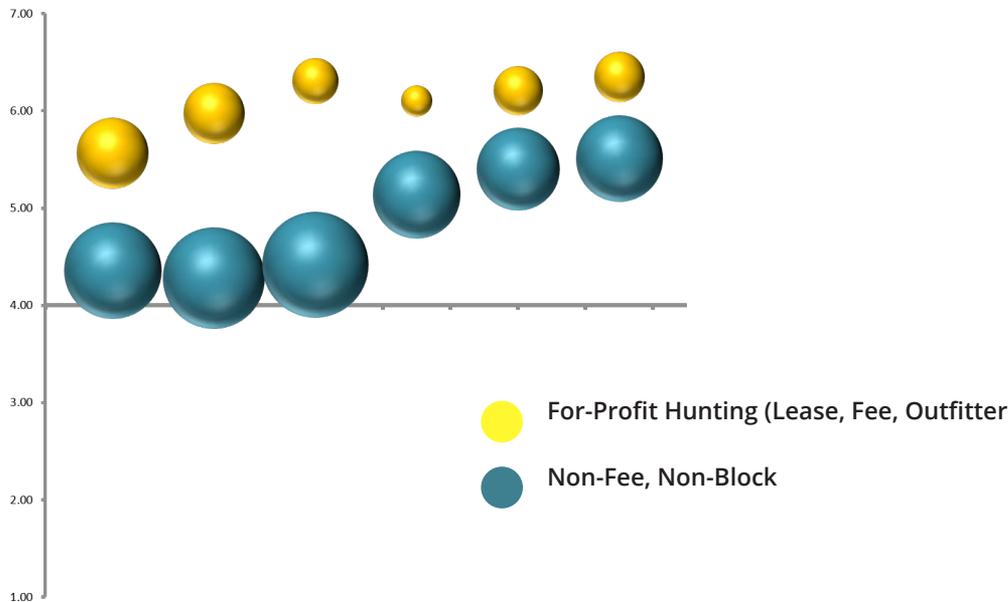
We asked landowners which system best represents how most of the elk hunting is managed on their land. Responses were grouped into three categories: Block management, for-profit hunting (lease, fee, outfitting). Acceptability of brucellosis management tools varied significantly among these groups. For example, allowing a limited number of hunters to harvest some elk to move elk away from cattle was significantly more acceptable to landowners using block management and for-profit hunting than it was for landowners using no-fee, no-block management systems. This was true for both the traditional game management season (Jan. 15 – Feb. 15) and for the remainder of the brucellosis risk period (Feb. 15 – Jun. 15). Landowners using for-profit hunting systems were significantly more likely than landowners using block management or no-fee, no-block management systems to find it acceptable to provide a small number of kill permits to ranch owners to harvest and move some elk away from cattle. Again this was true for both the traditional game management season (Jan. 15 – Feb. 15) and for the remainder of the brucellosis risk period (Feb. 15 – Jun. 15).

Figure 18: Managing hunting on landowners' property



Landowners using for-profit hunting systems were in more agreement (i.e., less conflict) than landowners using other systems (See bubble sizes in Figure 19). Also, for landowners using block management and no-fee, no-block management acceptability for using lethal management tools was significantly higher when public access for hunting was allowed; for landowners using for-profit hunting systems, public access had little impact on acceptability, but elk population and cattle infection status had more effect on acceptability. For example, slide 9 shows the acceptability and PCI scores for providing a small number of kill permits to ranch owner for landowners using for-profit and landowners using no-fee, no-block management hunting systems.

Figure 19: Provide a small number of kill permits to ranch owners to harvest and move some elk away from cattle (Jan. 15 – Feb. 15)



Cattle producers and non-producer landowners also differed when it came to who should be responsible and share the costs of managing brucellosis. Non-producing landowners agreed everyone should share the costs including FWP, entire MT public, hunters, ranchers, and the federal government. Cattle producers were significantly more likely to agree that FWP, the entire MT public, hunters, and the federal government should be responsible and share costs. Cattle producers were significantly less likely to agree that ranchers should share the cost of brucellosis management.

Figure 20: Who Should Pay?

