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# Rangeland Fires and Cheatgrass: Values at Risk and Support for Preservation

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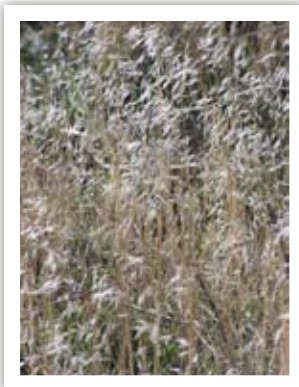

The high desert sagebrush ecosystems of the Great Basin evolved with fire. However, the introduction of cheatgrass (t. bromus), a highly flammable invasive annual grass, has contributed to the increased intensity and frequency of wildfires we have seen in recent years. Cheatgrass-fueled fires often kill native perennials, which creates openings for further cheatgrass expansion. Winters with more moisture than usual result in more cheatgrass and increased fire risk. Over time the result is ever larger areas dominated by cheatgrass and other invasive weeds that burn with greater frequency, and increasingly severe fire seasons.

A cheatgrass-dominated ecosystem can support neither native vegetation nor the animals and birds that require sagebrush habitat. Prior to the spread of cheatgrass, wildfires occurred in intervals of roughly 30 to 110 years, depending on the area in the Great Basin. Where cheatgrass dominates, fires now occur as often as every 3 to 5 years. Ecologists predict that the amount of cheatgrass in the Great Basin is enough that if nothing is done, eventual loss of the sagebrush ecosystem is unavoidable.

## What can be done?

After an area no longer can support native vegetation, restoration is the only available option. This requires reseeding and planting young native plants, which are often in short supply. Restoration is very expensive, and in the harsh conditions of the Great Basin, restoration efforts are effective less than half of the time.

An alternative is to preemptively manage vegetation to prevent loss of the sagebrush ecosystem. Pre-emptive vegetation management involves removal of accumulated fuels from the landscape and suppression of cheatgrass. These methods include use of prescribed burns, herbicides, mechanical removal of fuels, and planting of non-native, but non-invasive plants to compete with cheatgrass. Vegetation management is successful if the landscape's ability to support native vegetation is not diminished after the next fire.

Ecologists believe that as the amount of cheatgrass increases and perennial native grasses decrease, a threshold is reached where preemptive land management treatments to reduce cheatgrass are not effective. One goal of the SageSTEP project is to determine where this threshold is so that scarce resources available for land management can be allocated to where they will do the most good. Preemptive vegetation management strategies can be viewed as investments to preserve intact sagebrush ecosystems so that we can avoid the need for costly restoration.

To distribute available resources between restoration and preservation, we need to be able to estimate the values of these investments. One of the main purposes of the economics work on this project is to determine the value of efforts to prevent further losses. One way to think of the value of preservation is to measure the cost of inaction.

How much would people stand to lose if these ecosystems undergo irreversible changes from the traditional sagebrush dominated plant communities and their associated plants, animals, birds, reptiles and other species that are integral parts of this ecosystem?

What is the value to society of a natural sagebrush landscape versus the likely alternative if nothing is done: an invasive weed-infested fire prone landscape that can no longer support native plants and animals? There are many public policy goals important to the general public (highways, defense, education) which have unfortunately limited funds. When setting priorities on these funds, values that are not easily measured with dollar units tend to be difficult to compare to other important uses.

Accordingly, to be able to make relevant comparisons and bring to the table the notion of investing in preserving these areas, economists have developed methods to translate people's values for nature into dollar terms to facilitate comparison with other demands on the public purse.

## Methods

These methods are based on the following concept. If people state that they are willing to pay a given amount to achieve a specific goal, then we can assume that the value of achieving that goal is worth at least that much to them. We designed a set of questions that presented trade-offs in terms of annual dollar costs to their households to establish a program to implement preemptive vegetation management to prevent further losses to the sagebrush ecosystem. We tested these questions in a pilot survey of residents of the Great Basin, weighted toward rural residents. Results from this question together with demographic characteristics of the respondents give us insights about the value of preserving the sagebrush ecosystem to diverse social groups. We also wanted to know if providing people with information about the relationship between cheatgrass, wildfire and the sagebrush ecosystem would affect their willingness to pay. To find out, we provided extra information on half of the surveys. We also wanted to determine if people can distinguish between preservation and restoration, so half the surveys ask about willingness to pay for preservation, while the other half ask about restoration.

To take into account people's uncertainty, they were given five options to indicate their willingness to pay a variety of annual dollar amounts: "definitely yes," "probably yes," "probably no," definitely no," and "not sure."

## Results

Using the "definitely yes" answers alone, we find that people are willing to pay $71 per household annually for a land management program to protect the sagebrush ecosystem from losses to wildfire and invasive weeds. Including the "probably yes" responses increases this amount to $114.

People are willing to pay $26 more per household annually to preserve existing areas than to restore areas that have already lost their ability

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to support native vegetation. This implies that there is more value and likely more public support for preventing losses than for restoration after losses occur. This is contrary to current policy practices whereby there is less preventative funding available relative to funding for restoration after losses have already occurred. More effort on treatments before lands are degraded is likely a good investment, especially given the high costs and low success rates of restoration.

Demographic information from the survey can be used in estimating willingness to pay to understand differences among groups in society. For example, people who work in agriculture are more likely to support vegetation management efforts by a substantial margin: $38 more than the average respondent for those who say "definitely yes", and $61 per year when we add in the "probably yes" responses. However, people who say that forage for livestock is an important rangeland resource are willing to pay slightly less than other people who work in agriculture, by about $12 per year, but they are still ahead of the general public by about $26. In contrast, people who stated that "grazing is a threat to rangeland ecosystems" indicate that they are definitely willing to pay $29 more than the average of $71 per year, and adding in the "probably yes" responses, they are willing to pay $47 more per year than the average.

We find that more highly educated people are more likely to support vegetation management efforts, but that their increased likelihood to support these programs does not translate into being willing to pay more. In contrast to the effect of formal education, when we supplied additional information to survey recipients, this did not cause people to be more or less supportive of vegetation management efforts. However, people who received added information were willing to pay substantially more per year than those who did not receive it – a $99 increase in what people say they would seriously consider paying. The information effect on the amount that people are willing to pay increases with the length of time they have lived in the Great Basin, but decreased with age. It seems that the information does not change people's minds about whether they are willing to support the effort, but for those who already have a propensity to support the effort, the added information increases how much they value these programs.

### Conclusions and Future Work

Preemptive treatments are investments in preserving intact sagebrush ecosystems so that we can avoid the need for restoration. These are best done before fire and invasive weeds compromise the ecosystem. Unfortunately it is difficult to make a case for scarce resources needed to implement prevention measures when other competing uses for the same funds appear more immediate. The devastation of catastrophic wildfires attracts publicity and funds when it is often too late to invest in prevention, and more expensive and less reliable restoration is the only available option.

Expenditures on prevention are investments to preventing the high future cost of a complete conversion of Great Basin lands. Our results suggest that the value of preventing loss is higher than the perceived value gained by restoration after loss. Given this result, it would seem that a public policy that placed higher importance on prevention would not only be more consistent with public opinion and values, but it would be less costly and more likely to result in long term protection of the Great Basin sagebrush ecosystem than our current policy of reacting to losses after they occur.

Today's investments in prevention may be a small price to pay to avoid the costs of increasingly severe wildfire seasons and the loss of ecosystem benefits for the indefinite future. The values that we measured in this study would normally not be quantified by market-generated processes. By measuring them, we can bring them to the table when decisions are being made that affect the allocation of scarce resources to protecting the Great Basin and the livelihoods and quality of life of the people who care about this vast section of the Western American landscape.

We are currently extending this work to determine values for specific Great Basin ecosystem goods and services, including game and non-game wildlife, scenic beauty, recreation, air and water quality. Our methods require survey work for data collection, and we are surveying residents throughout the Great Basin. If you should receive one of our surveys, you are being asked to participate in our research. Please feel free to comment, ask questions, make suggestions, or ask for summaries of our results to date. More information about the pilot survey results that we describe here can be found in: "The 2005 Nevada Rangeland Vegetation Survey General Public Questionnaire and Survey of Responses," available for download at http://www.unce.unr.edu/publications/files/nr/2007/sp0711.pdf

### About the Authors

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**Kim Rollins** is a professor of Resource Economics at University of Nevada – Reno, where she studies the interaction between society and environment. She has studied environmental amenities, policy, and valuation of environmental amenities in Canada, Costa Rica, and the US. In addition to academic research, she is regularly involved with projects that allow research results to be transferred to practitioners in the public and private sectors. Her projects and research results use practical policy analysis to suggest resolution to current environmental problems.