

Grizzly Bear Management in the Greater Yellowstone Ecosystem

2020 John Tschirhart Graduate Scholarship in Bioeconomics

Student:

Aaron J. Enriquez | PhD Candidate | Department of Economics, University of Wyoming
Email: enriquez.aaronj@gmail.com | Web: ajenriquez.com

Faculty Mentors:

Stephen C. Newbold | Assistant Professor | Department of Economics, University of Wyoming
David C. Finnoff | Professor | Department of Economics, University of Wyoming

Project Summary

The project entailed the pretesting, design, administration, and analysis of an online nonmarket valuation survey intended to elicit people's use and non-use values for grizzly bears in the Greater Yellowstone Ecosystem (GYE). The survey was completed by over 2,400 residents of Wyoming, Montana, and Idaho from December 2020 to January 2021. The sample consisted of both GYE locals and non-locals.

The survey included "stated preference" components: two separate choice experiments. The first was specific to the national parks of the GYE, and it included the following attributes: a park visitor's chance of seeing a grizzly bear, a park visitor's risk of being injured by a grizzly bear, and the national park entrance fee. The second was specific to areas of the GYE outside the parks, and it included the following attributes: the annual number of grizzly bear-human conflicts in the GYE, the 100-year extinction probability of GYE grizzly bears, and a vehicle registration fee. In the choice questions, respondents were tasked with choosing between status quo conditions (i.e., conditions as they are today) or improved conditions associated with a costly management change. Random utility models were used to capture people's decisions: respondents were assumed to choose the set of conditions that gave them higher utility. Logit regressions, with interactions between the attributes of interest and a person's local status, were used to parameterize the models. The framework lends itself to uncovering a person's willingness to pay (WTP) for changes in non-monetary attributes.

The survey also included "revealed preference" components: recall questions about people's trips to the national parks of the GYE, which were used to estimate people's recreation demand.

Findings

What are people's average use values for grizzly bears?

The use value attributes included in the survey were a park visitor's chance of seeing a grizzly bear and a park visitor's risk of being injured by a grizzly bear. The weighted WTP per additional percent chance of seeing a grizzly bear is \$0.29 (i.e., the average person would pay that amount to increase the chance of seeing a grizzly bear by one percent). The WTP is \$0.31 among non-locals and \$0.21 among locals, which implies that non-locals value park grizzly bear sightings more than locals. The weighted WTP to reduce the number of grizzly bear attacks per one million national park visitors by one is \$9.83. The WTP is \$9.75 among non-locals and \$10.23 among locals, which implies that locals value risk reduction more than non-locals.

What are people's average non-use values for grizzly bears?

The non-use value attributes included in the survey were the annual number of grizzly bear-human conflicts in the GYE and the 100-year extinction probability of GYE grizzly bears. The weighted WTP to reduce the number of conflicts in the GYE by one conflict is \$0.23. The WTP is \$0.25 among non-locals and \$0.15 among locals, which implies that non-locals are willing to pay more than locals to reduce the number of conflicts. This was a potentially surprising result that warrants further analysis. A preliminary hypothesis is that locals may have a better understanding of the nature of conflicts, including the breakdown by type and severity. They may also associate more of a link between their self-protective actions (e.g., carrying bear spray) and their chances of being involved in a conflict. The weighted WTP per percent decrease in the 100-year grizzly bear extinction probability is \$12.63. The WTP is \$10.86 among non-locals and \$20.55 among locals. Even if local support for grizzly bear conservation has eroded over time (as predicted in the literature), locals are still willing to pay more than non-locals to preserve the species in their backyard.

How would future management strategies influence people's average values for grizzly bears?

A person's WTP captures their marginal rate of substitution between monetary and non-monetary attributes. One of the key strengths of nonmarket valuation methods is that a diverse range of attributes can be quantified in terms of a common unit (e.g., dollars), which facilitates direct comparisons. Preliminary policy evaluation was conducted across a range of hypothetical grizzly bear policies, in which conditions across all policies improved or worsened by a constant percent change from the status quo (e.g., 25%). The policies included the following: a "best" policy (favorable changes in all grizzly bear-related conditions), a "population up" policy (changes in conditions resulting from an increase in the number of grizzly bears), a "population down" policy (changes in conditions resulting from a decrease in the number of grizzly bears), and a "hunting" policy (changes in conditions only outside of the parks). Per capita WTP was highest for the best policy (by design), second-highest for the hunting policy, third-highest for the population down policy, and lowest for the population up policy.

Future Research

Collaboration with grizzly bear experts (e.g., members of the Interagency Grizzly Bear Study Team) will aid the process of more accurately quantifying the links between changes in grizzly bear population sizes and corresponding changes in conditions. This will allow for better predictions of the public's response to future policies that could alter the number of grizzly bears in the wild. Future work will also analyze whether changes in grizzly bear conditions are expected to affect aggregate demand for recreation trips to the national parks of the GYE. The recreation demand (revealed preference) data will be combined with the choice experiment (stated preference) data in the parameterization of one underlying utility model.

Output

Enriquez, A. J. (2021). Bioeconomic Analysis and Nonmarket Valuation of Grizzly Bears in the Greater Yellowstone Ecosystem. Ph.D. Dissertation, Department of Economics, University of Wyoming. *ProQuest*.