

METHODS

Deriving values for the ecological support function of wildlife: An indirect valuation approach

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Received 25 July 2005; accepted 18 September 2005

Abstract

We describe a method that combines economic willingness-to-pay estimates for higher trophic-level species with basic information available about ecosystem relationships to derive estimates of partial willingness-to-pay for lower level species that might be of direct policy interest. This method is intended as a quasi-benefit transfer method for use in benefit–cost analysis. Our method makes it possible to establish partial willingness-to-pay estimates for the large number of species of immediate or potential policy interest using only data available in non-market valuation and biology and ecology literature. We provide a partial estimation of indirect values for the predator–prey relationships that support golden eagles in the Snake River Bird of Prey area as an example of how to operationalize our approach.

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Keywords: Valuation; Eagles; Ecosystem services; Predator–prey

1. Introduction

Valuation of wildlife—particularly estimation of non-use and non-consumptive use values for wildlife—is an important input into various policy decisions. Willingness-to-pay estimates for wildlife form inputs to many policy analyses in areas such as National Park and Forest planning, waterway projects and recreation policy. In these areas and others, understanding societal willingness-to-pay for wildlife

is essential to fully understanding the benefits and costs of policy options under consideration.

In addition to the areas in which wildlife valuation currently plays a role, there has been recent interest in expanding the use of information regarding willingness-to-pay for wildlife to other areas. The [U.S. EPA \(2003\)](#) recently announced its interest in better understanding the benefits of its environmental protection policies on ecosystems. One component of this understanding, and an important but rarely quantified element of the benefits of environmental regulations, is an understanding of willingness-to-pay for wildlife preservation. When linked to an understanding of how reductions in emissions to air, land and water

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will help reduce damage to wildlife, this valuation information will allow direct consideration of benefits in terms of wildlife preservation in the benefit–cost analysis of environmental regulations.

Another area in which willingness-to-pay estimates for wildlife could be important is direct protection of endangered species. Although current listings and species recovery plans under the Endangered Species Act (ESA) rarely contain direct consideration of benefits and costs, some proposals for reauthorization of the ESA have included provisions calling for some examination of benefits and costs in future ESA decision making. In addition, decisions regarding the extent of designation of critical habitat currently allow for balancing of benefits of cost—an opportunity that could be used more often were willingness-to-pay estimates available for more species of policy interest. Given these considerations, willingness-to-pay for wildlife may become increasingly relevant to endangered species policy.

While we provide several reasons above for desiring willingness-to-pay estimates as policy-making inputs, there are important limitations that make it difficult to use common methods for estimating such values to produce all of the estimates needed. In general, the contingent valuation method (CVM) is used to estimate non-market values for recreational use and direct use as well as non-use values, while the travel-cost method can also be employed to estimate recreation use values. Contingent valuation is generally the method used to estimate willingness-to-pay for protection of well-known wildlife species. The contingent valuation method requires a significant expenditure of both time and money in order to estimate willingness-to-pay for a single species of wildlife. There are approximately 22,000 species of plants and animals currently in the U.S. (Heinz Center, 2002), each is of potential policy interest, and 1265 species are currently considered endangered or threatened (USFWS, 2004) and thus of identified policy interest. Arrayed to estimate values for this large number of species is a handful of contingent valuation practitioners and a limited pool of time and financial resources.

CVM may allow us to estimate these values for the ecosystem support function of wildlife along with other direct use and non-use values. In some cases, particularly where the relationships in the ecosystem are well understood by the general public, the will-

ingness-to-pay estimate yielded by CVM research would include such support functions. Where the relationships are relatively simple, the CVM survey could include discussion of the relationships as part of the description of the good being valued. However, many of these support relationships are not widely understood and are often too complex to describe to survey respondents. In these cases, it cannot be assumed that the CVM-derived willingness-to-pay will include such values. At the same time, adding sufficient information to the CVM survey to allow for the inclusion of these values in the willingness-to-pay estimate would, in many cases, make the instrument so long and difficult to understand that it would significantly increase non-response to the survey.

Given these resource constraints and the large number of species of potential or immediate policy interest, it is useful to devise a method to utilize currently available information to estimate at least partial willingness-to-pay for a large number of wildlife species. One approach to doing this was proposed by Goulder and Kennedy (1997), who argued that we can use ecological models to map changes in lower trophic level species to effects in terms of change in populations of higher trophic-level species for which we have willingness-to-pay estimates. In this way, we might analyze all effects on ecosystems in terms of species for which we have already established willingness-to-pay estimates. This approach is probably the best way to assess ecosystem benefits and costs.

Unfortunately, we do not presently have sufficient understanding of most ecosystems in which we might be interested to allow for directly modeling changes in prey species in terms of effects on predator species. The costs in time and money of gaining a full understanding of a particular ecosystem and the constraints on both of these resources that usually face a policy maker trying to assess a particular decision make it necessary to investigate alternative approaches that use information currently available to estimate willingness-to-pay for the support roles of wildlife. As we show below, however, we do have enough information to reverse this process and derive values for the lower level species from knowledge about the top-level species for which willingness-to-pay estimates already exist.

In this paper, we describe a method that combines economic willingness-to-pay estimates for higher level species with basic information available about

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