



The urban impacts of the Endangered Species Act: A general equilibrium analysis[☆]

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Abstract

We consider the general equilibrium implications of environmental regulations which result in a reduction of otherwise profitable residential development. Critical habitat designation under the Endangered Species Act is an important example. If the regulations affect a significant amount of land, they may have important effects on the rest of the regional economy—increasing rents and densities on lands not subject to the regulation, causing the conversion of lands from alternative uses, increasing the net developed area in the region, and decreasing consumer welfare. We develop a flexible general equilibrium simulation of the economic effects of critical habitat designation, explicitly considering the distributional effects upon owners of different types of land and upon housing consumers. The results of our simulation show that the most significant economic effects of critical habitat occur outside of the designated area. The prices and rents of non-critical habitat lands increase significantly. Incomes are redistributed across landlords, and the well being of housing consumers is further affected through these linkages.

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1. Introduction

Under the Endangered Species Act, the US Fish and Wildlife Service (USFWS) is charged with designating “Critical Habitat,” lands which may require special management to protect an endangered plant or animal species. This protection often restricts development of private land causing the price of land and the pattern of land usage throughout the region to adjust to reflect the scarcity of developable land. Critical habitat designations have the potential to create large economic impacts and affect significant numbers of people. First, critical habitat designations can be large.¹ Secondly, critical habitat lands often occur near urban areas.²

Lands may be excluded from the critical habitat designation if the economic costs of designation outweigh the benefits, unless the failure to designate such area will result in the extinction of the species [16 USC §1533(b)(2)]. Whereas the benefits of critical habitat designation and species preservation accrue to citizens in the nation as a whole (or perhaps all world citizens) the costs of critical habitat are borne by the local economy. Given the nature of land markets in an urban economy, the costs of providing similar critical habitat benefits can vary markedly depending on the location and scope of designated lands.

This paper uses a spatially explicit model of the economic interrelationships of housing consumers and producers to analyze the economic impacts of designating as critical habitat raw land that would otherwise have been used to produce housing in the region. We consider a closed region whose economic base is given, where relocation within the region is costless, but mobility to other regions is prohibitively expensive.³ Changes arise because some significant amount of land cannot be used as intensively to produce housing after critical habitat designation.

In a stylized model of the regional economy, we evaluate the impacts of these regulations on the spatial allocation of capital, on the density of housing development, and on housing and land prices throughout the region. We also analyze the net effect of the land designation on the well-being of households and the distribution of rents among the region’s landowners. Our results show the importance of using a general equilibrium framework for evaluating the impacts of land use regulations like critical habitat designation; a partial equilibrium analysis tends to underestimate the impacts and ignores large wealth transfers from consumers to owners of non-regulated lands.

Section 2 below surveys the surprisingly incomplete literature on this issue and summarizes prior work by economists studying environmental regulation of land uses. A model of the regional economy is sketched out in Section 3, and Section 4 traces out the qualitative impacts of critical habitat designation using this model. In Section 5 we use the model to estimate the economic impacts of critical habitat designation using stylized but reasonable parameters reflecting a regional economy.

¹ For example, the USFWS designated 4,140,440 acres in California as critical habitat for the red-legged frog in 2001, 1,184,513 acres in California and Oregon as critical habitat for vernal pool species in 2003, and 8,600,000 acres in Arizona, Colorado, Utah, and New Mexico as critical habitat for the Mexican spotted owl in 2004.

² In a recent analysis of critical habitat in California, Zabel and Paterson [25] sampled almost 400 FIPS-designated places (cities), with sizes ranging between 209 and 303,000 acres, finding an average of 1.62 percent of land area designated as critical habitat. However, among those 118 sampled FIPS places in which some land had been set aside for critical habitat, the median (mean) set aside was 6.9 percent (15.3 percent) of land area.

³ In the alternative, “open region” formulation, where mobility between regions is costless, the well being of the region’s residents is determined exogenously. Thus, the competitive equilibrium must yield the same level of utility for residents regardless of critical habitat designation in the region. This implies that the entire cost of critical habitat designation is reflected in the change in market value of the regulated lands.

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