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Mr. Chairman and members of the committee, it is a pleasure to provide you with information on the economic costs of critical habitat designation. In these remarks, I will focus on the housing industry since it is the sector of the economy most impacted by designation of critical habitat. It should be borne in mind, however, that critical habitat designation affects other industries including commercial development, transportation, mining, agriculture and utilities, as well as the activities of state and local governments.

Section 4 of the Endangered Species Act authorizes the Secretary of the Interior to take economic impacts into account when designating critical habitat. I have authored a series of studies describing how the economic impacts of critical habitat designation should be measured and identifying the groups who are most likely to be impacted. I will summarize my findings to date in this written statement.

Regulatory Baseline

A crucial step in any present calculation of the impacts of CHD is a definition of the regulatory baseline. When defining the regulatory baseline, it one must confront the admonition of the Tenth Circuit in its widely cited *New Mexico Cattlegrowers* decision.[1] Plaintiffs in the case challenged the Fish & Wildlife Service's designation of critical habitat for the southwestern willow flycatcher arguing, *inter alia*, that the Service's "baseline" approach to measuring the economic impacts of critical habitat designation was an erroneous construction of the ESA. Under this approach, the Service would consider the initial listing of the species to be part of the baseline and thus would not analyze the economic impacts of listing, but only the economic impacts attributable directly to the critical habitat designation. Applying this baseline approach to the critical habitat designation for the flycatcher, the Service relied on its Section 7 regulations to conclude that no economic impacts would have occurred "but for" the critical habitat designation, and that the impacts of critical habitat designation and listing of the flycatcher were co-extensive.

The Tenth Circuit rejected this "baseline" approach, holding that the Service is required to analyze *all* impacts of critical habitat designation, regardless of whether those impacts

[1] New Mexico Cattlegrowers Assn. v. U.S. Fish and Wildlife Service, 248 F.3d 1277 (10th Cir. 2001).

are co-extensive with those of listing. The court acknowledged that the ESA "clearly bars economic considerations when the listing determination is being made." However, the court stated, the ESA also plainly requires "some kind of consideration of economic impact" at the critical habitat designation phase. The Service's regulatory "definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless." Thus, the court concluded, the baseline approach failed to give effect to the congressional directive that economic impacts be considered at the time of critical habitat designation and was not in accord with the language or intent of the ESA. Accordingly, the costs of CHD are properly defined as all of the costs that flow from the listing of the gnatcatcher as threatened.

Project-Level Impacts of CHD

In the context of housing, the most obvious effects of CHD are to increase the cost of development and to reduce the size of individual projects as a result of land set-asides. However, there are other, more subtle economic effects of CHD. The process of land development is complex and conditioned by numerous factors. If land is set aside or if the scale of projects is reduced by CHD, there may well be market and regional effects from this designation. Other land cannot always be brought into production to make up for losses due to designation, and even if it can, it may be in a suboptimal location. CHD also delays the development process, which imposes additional costs on developers, consumers and others in the affected region.

This process of site selection is often exhaustive since a large number of factors are relevant to the site selection process. In fact, the National Association of Home Builders has developed a list of over 1,000 factors that should be considered before acquiring land for development. Among the factors that make a site suitable for development are the following:

- Location and neighborhood
- Size and shape
- Accessibility and visibility
- Environmental conditions
- Legal constraints
- Utilities
- Zoning and regulation

The cumulative effect of these factors is that while an area may appear to have a large amount of vacant land available for development, in reality there can be little land actually or realistically available for development. Imposing additional regulation through CHD may effectively reduce the amount of land available for development in a region, reduce the regional stock of housing and create unintended consequences on other resources (such as agriculture) and local planning processes.

Other factors constrain the development process. Local governments often impose density restrictions that work to limit the number of housing units that can be constructed in a particular location. "Leapfrog" development is increasingly problematic since local governments often seek to confine development within defined boundaries. Further, non-sequential development requires utilities, roads and other infrastructure to be extended longer distances, thereby increasing project costs. Thus, land away from the urban boundary may be at best an imperfect substitute for land on the boundary that is set aside for habitat protection.

It is also important to note that CHD can significantly delay completion of a project, imposing potentially large costs on the developer, consumers and others affected by project completion. Delay reduces the supply of housing by reducing the present value of the developer's return on investment. In extreme cases, delay can lead to bankruptcy if the developer is highly leveraged. Delay also imposes costs on consumers who must live in a suboptimal location for some period of time.

Market Implications

The economic impacts of CHD depend as well on the nature of the regional housing market. There are two basic theories of housing market equilibrium. The most common approach is to assume that the price of housing reflects the marginal cost of construction and development. Accordingly, in this approach, housing is expensive because, say, land (an input to housing) is expensive. In this view, commonly called the neoclassical approach to housing market equilibrium and taught to every graduate student in urban economics, density will adjust to equate the price of land with its marginal value to consumers. This view also holds that developers do not earn excess profits from their activities.

An alternative approach stresses the importance of regulation such a zoning and density controls that limit the supply of housing. In this approach, the marginal cost of construction and development can be far below the market price of a house since houses are rationed among a number of consumers and their price is bid up accordingly. Thus, in the regulation-focused approach, housing prices reflect scarcity more than costs of production. In this view, the value of land with a house on it can be far above the willingness of consumers to pay for an additional unit of lot size.

This distinction between the neoclassical and regulation-focused explanations of the price of housing is important to the impact of CHD on the housing industry. As discussed earlier, CHD perturbs the housing market in three basic ways: it increases the cost of development, it reduces the output of the project, and it delays completion and delivery of the housing units. In markets where housing prices reflect marginal costs, the impact of CHD on costs of construction and development and on completion time will be of most importance; the marginal welfare costs of output restrictions are negligible since marginal cost equals marginal utility in the pre-regulation equilibrium.

When housing supply is limited and houses are rationed as a result, the supply-reducing effect of environmental regulation takes on major significance. By further restricting supply, environmental regulation imposes costs on consumers and results in losses to landowners and developers undertaking projects on conserved land.

Recently, UC Berkeley graduate student Aaron Swoboda and I implemented a statistical test to identify regulation-constrained housing markets. The approach exploits the fact that in regulation-constrained markets the price of housing is above the costs of construction and development. In such situations, the value of land with a house on it (called the "extensive margin" value) will exceed the marginal willingness of consumers to pay for an additional unit of land (the "intensive margin" value). This line of reasoning suggests a statistical test of price formation: if the intensive and extensive margin values of land are equal, then the neoclassical model best describes the housing market. If, however, the extensive margin value exceeds the intensive margin value, then the market is constrained by prior regulation and these distortions must be accounted for when calculating the cost of additional regulations.

The main difficulty in executing the test to categorize housing markets is how to measure consumers' willingness to pay for land. Mr. Swoboda and I collected information on over 18,000 new home sales in the "Inland Empire" region of Southern California, one of the nation's fastest-growing areas. The study area was divided into 14 subregions along lines used by the regional metropolitan planning agencies. Controlling for other factors, they estimated the contribution of a unit of lot size to the sales price of a home separately for each subregion. In 11 of the 14 areas considered, the extensive margin value of land was above the intensive margin value at a high level of statistical significance. The neoclassical model held only in the most remote, least politically organized areas. Thus, in the study area, housing is rationed by prior regulation and imposition of further regulation can cause large increases in the price of housing.

Nationwide, the work of other economists suggests that housing is rationed by regulation in a number of regions. In a less formal study than my work with Mr. Swoboda, researchers at Harvard University and the University of Pennsylvania have found that around 20 percent of the nation's housing is sold in markets where supply is artificially limited by regulation and other non-market factors. It is in these markets (largely on the West and East Coasts) where setting aside land for habitat is likely to have the largest economic impact

Who Bears the Costs of CHD?

In previous work, I have developed simulation models to measure the total economic effects of CHD, as well as its impact on particular groups. A typical simulation scenario envisions a 1,000-unit housing project that is reduced to 800 units as a result of CHD. The demand for the project's units has an implied elasticity of –1.67 evaluated at the initial price and quantity. The pre-regulation cost of development and construction is

$200,000 per unit, and CHD adds $10,000 to the price of each unit. The rate of interest is 10 percent, and CHD is assumed to delay completion of the project by 1 year.

Before designation of critical habitat, the equilibrium price of each house in the development is $250,000 and 1,000 units are sold. CHD increases the price of a house to $280,000, and decreases output by 200 units. The increase in price and the reduction in the number of homes built cause a loss to consumers with a present value of $27 million. The effects on producers are subtler. While producers lose from the reduction in quantity and the increase in development and construction costs, they also gain from the increase in selling price.

This surplus loss is a present-value loss from a *permanent* reduction in consumption and production. The effects of delay are *temporary*. While social surplus loss stems largely from a reduction in output, delay cost stems from postponing construction of the units that *do* get built plus regional and indirect costs. Thus, delay costs are equal to post-construction consumer and producer surplus plus external costs multiplied by the interest rate for each period of delay.

Taking short- and long-run effects together, the total economic impact of CHD is $33 million for this hypothetical project. As a group, consumers lose the most from CHD in this scenario. This finding is quite robust to permutations of market conditions.

An important lesson from the simulation analysis is that permitting costs and land price decreases are a poor guide to the total impacts of CHD. These indicators underestimate true costs and give a biased impression with respect to the incidence of CHD costs. In cases where land is scarce and where housing is rationed by prior regulation, it is important to consider the market effects; in all cases it is important to recognize the costs of delay.