

Comments

On the Draft Economic Analysis of Critical Habitat Designation for the California Red-legged Frog

Prepared for

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by

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I. BACKGROUND

In November 2005, the U.S. Fish and Wildlife Service (Service) released a revised proposed rule to designate critical habitat for the California Red-legged Frog (RLF), *Rana aurora draytonii*, which was listed under the Endangered Species Act (ESA) on May 23, 1996. On November 3, 2005, the Service issued its draft analysis of the potential economic impacts of the proposed designation.¹

Pacific Rivers Council asked ECONorthwest to determine if the draft analysis by the Service fully and accurately describes the potential economic impacts of the proposed designation in a manner consistent with the professional and analytical standards commonly applied to the underlying economic issues. Ernie Niemi and Cleo Neculae prepared this report in response to that request. Our findings constitute comments on the Service's draft economic analysis, and we anticipate the agency will consider them as it reviews the proposed designation and prepares its final rule for the designation of critical habitat.

We have prepared this report based on our general knowledge of the relationship between natural resources and the economy of the western U.S., the housing industry, urban development, as well as on information derived from government agencies, private statistical services, the reports of others, interviews of individuals, or other sources believed to be reliable. This report summarizes the results of our analysis to date. As we review additional information we may revise our opinions, add opinions, or both.

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¹ CRA International. 2005. *Economic Effects of Critical Habitat Designation for the Red-legged Frog in 23 California Counties*. Oakland, CA. Division of Economics, U.S. Fish and Wildlife. October 19. Hereafter, *Draft Report*.

II. FINDINGS AND COMMENTS

Economic considerations play a limited role as the ESA is implemented to conserve the California RLF. Economic issues are not to be considered as the Service determines if a species is sufficiently at risk of extinction that it warrants listing as a threatened or an endangered species under the provisions of the ESA. Instead, these determinations are to be based solely on biological factors. Economics comes into play only when the Director of the Service designates critical habitat for the species, an action that restricts federal agencies from taking actions that would destroy or adversely modify habitat essential to recovering the species. Before making this determination, the Director must consider all economic impacts, in addition to others, such as impacts on national security. Following this accounting, the Director may exclude an individual area from the designation only if the benefits of exclusion for that area outweigh the benefits of designation.

On November 3, 2005, the Service issued a draft report on the potential economic impacts of its proposal to designate critical habitat for the California RLF. Based, in part, on the report's findings, the Service is proposing to exclude from the designation numerous areas the agency's biologists have deemed biologically essential to the recovery of the California RLF. After reviewing public comments, it may amend this proposal to increase or decrease the areas included in the designation.

Our review shows the draft economic report contains several overlapping, fatal flaws that distort its findings and render them unsuitable as the foundation for decisions to exclude areas from the designation. These flaws stem from key assumptions and decisions embedded in the draft report:

- The Service unreasonably decided to ignore the economic benefits of designating critical habitat for the California RLF.
- The Service unreasonably inflated its estimates of the economic benefits of excluding areas from the designation of critical habitat.
- The Service has improperly structured its analysis so that its findings are biased and irrelevant to the Director's task. The findings cannot be relied on to yield a fair evaluation of the economic benefits of exclusion against the economic benefits of designation for individual habitat areas.

In sum, the report is neither comprehensive in the scope of impacts it describes nor accurate in its analysis of the impacts it does describe. Without major revisions, the analysis cannot provide a reasonable basis for any decision to exclude an area from the critical habitat designation.

A. The Service Improperly Failed to Measure the Economic Benefits of Designating Critical Habitat

The Service did not even attempt to calculate the potential economic benefits that would materialize from designating critical habitat for the California RLF. Thus, it asks those who review its analysis to keep one eye closed as they consider the economic effects of the agency's decisions, to pretend that designating critical habitat will only impose costs on the economy and generate no economic benefits. By ignoring the economic benefits of protecting habitat essential to achieving conservation goals for the RLF, the Service blithely ignores both common sense and a large body of research that confirms the existence of such benefits.

In the following sections we demonstrate that the Service wobbled between acknowledging and disregarding the benefits of habitat designation, and chose to ignore the already existing norms of economic analysis of the costs and benefits provided by the environment. Moreover, we show that the Service slighted a mount of economic literature proving that critical-habitat protection can yield economic benefits. A thorough analysis may indeed establish that the benefits of habitat designation are significant enough to yield an overall positive economic impact.

The Service's Statements Regarding Economic Benefits Are Misleading and Inconsistent

In an attempt to validate its decision to ignore economic benefits, the Service, on pages 10-11 of the *Draft Report*, offered a disjointed, erroneous line of reasoning. It first acknowledged that the designation would yield economic benefits, some directly related to the California RLF and others related indirectly. It even recognized the existence of economic literature that "has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species." Then, in an aside, it observed that the Office of Management and Budget (OMB) acknowledges that sometimes it may not be feasible to monetize or quantify the benefits of environmental regulations. Without any feasibility analysis of monetizing or quantifying the economic benefits of designation, the *Draft Report* then merely dismissed them as irrelevant to the economic analysis: "*Rather than rely on economic measures, the Service believes that the benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*" (Italics emphasis in original.)

As an afterthought, the *Draft Report* acknowledged that the designation of critical habitat may generate "ancillary" economic benefits, such as increased recreational opportunities associated with healthy frog habitat. It also stated that these ancillary benefits may yield increases in employment and output that "may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its

habitat.” With recognition of these economic benefits in hand, the *Draft Report* then asserted that the Service incorporated economic benefits into its evaluation of the designation: “To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, *they are factored into the overall economic impact assessment in this report.*” (Italics emphasis added.)

There is no air in this balloon, however. Subsequent pages of the *Draft Report* offered no accounting—none—of any economic benefits, direct or ancillary. Nowhere else in the *Draft Report* did the Service even mention any attempt to collect data or seek studies regarding the economic benefits of designating critical habitat for the California RLF.

The Service’s Failure to Evaluate the Economic Benefits Is Inconsistent with Administrative Guidance and Widely Accepted Professional Standards

Economic analyses of environmental rules and regulations, such as those associated with the designation of critical habitat for the California RLF, typically take a much broader view than that of the *Draft Report*. They provide a full accounting of both benefits and costs, including those that cannot be measured in monetary terms and those that lie outside recognizable markets. The *Draft Report*, though, fails to rise to these standards of economic analysis. It doesn’t treat the benefits and costs of designation fairly and it doesn’t provide any information about their distribution.

Guidance toward a sound evaluation of rulemaking has been prepared by the Environmental Protection Agency (EPA), in its *Guidelines for Preparing Economic Analyses*. It recommends that economic analyses should consider both benefits and costs. Furthermore, it observes that, unless an analysis is broad in scope and embraces even impacts for which there are no monetary data, it cannot provide the public and decision-makers with all relevant economic information:

For most practical applications, therefore, a complete economic analysis comprises a benefit-cost analysis, an economic impacts analysis, and an equity assessment. Benefit-cost analysis evaluates the favorable effects of policy actions and the associated opportunity costs of those actions. The favorable effects are defined as benefits and the opportunities foregone define economic costs. [...]

Economic analyses should present and highlight non-monetized effects when these are important for policy decisions. Reasons why these consequences cannot be valued in monetary terms are important to communicate as well. Unquantified, but potentially significant, consequences of a policy also should be highlighted, especially when these could be important enough in magnitude to affect the broad conclusions of an economic analysis of different policy options and alternatives.²

² U.S. Environmental Protection Agency. 2000. *Guidelines for Preparing Economic Analyses*. September, pp. 20 and 176.

The federal Office of Management and Budget offers similar guidance. It clearly directs the heads of executive agencies to describe both benefits and costs—and to take a broad perspective when doing so—when evaluating the economic consequences of rules and regulations:

Key Elements of a Regulatory Analysis

A good regulatory analysis should include [...] an evaluation of the benefits and costs—quantitative and qualitative—of the proposed action and the main alternatives identified by the analysis. [...]

If you are not able to quantify the effects, you should present any relevant quantitative information along with a description of the unquantified effects, such as ecological gains, improvements in quality of life, and aesthetic beauty. You should provide a discussion of the strengths and limitations of the qualitative information. This should include information on the key reason(s) why they cannot be quantified. In one instance, you may know with certainty the magnitude of a risk to which a substantial, but unknown, number of individuals are exposed. In another instance, the existence of a risk may be based on highly speculative assumptions, and the magnitude of the risk may be unknown.

For cases in which the unquantified benefits or costs affect a policy choice, you should provide a clear explanation of the rationale behind the choice. Such an explanation could include detailed information on the nature, timing, likelihood, location, and distribution of the unquantified benefits and costs. Also, please include a summary table that lists all the unquantified benefits and costs, and use your professional judgment to highlight (e.g., with categories or rank ordering) those that you believe are most important (e.g., by considering factors such as the degree of certainty, expected magnitude, and reversibility of effects).³

Executive Order 12866 of September 30, 1993—“Regulatory Planning and Review” also requires federal agencies to assess the costs and benefits of all significant regulatory actions:

Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.⁴

The guidance offered by these documents represents analytical standards widely accepted by professional economists. The Service’s *Draft Report* sits well outside the boundaries of these standards, ignoring them. The economic analysis in the *Draft Report* does not:

- Describe the benefits as well as the costs of the Service’s proposed rule;
- Describe the rule’s non-monetized effects and their significance;
- Describe the rule’s unquantified effects, such as ecological gains, improvements in quality of life, and aesthetic beauty; or

³ Office of Management and Budget. 2003. *Circular A-4 to the Heads of Executive Agencies and Establishments Regarding Regulatory Analysis*. September 17, pp. 2 and 27. Bold emphasis in the original.

⁴ U.S. Environmental Protection Agency. 1993. “Executive Order 12866 Regulatory Planning and Review.” *Federal Register* (58). September 30. <http://www.epa.gov/fedrgstr/eo/eo12866.htm> (accessed May 11, 2005).

- Provide detailed information on the nature, timing, likelihood, location, and distribution of the rule’s benefits and costs, including those that are unmonetized or unquantified.

Because of these failings, the proposed rule, and specifically its exclusion of areas from the designation, is not based upon a reasoned determination that its benefits justify its costs.

Moreover, the Service disregarded some fundamental elements of the relationship between natural resources and the economy. Current understanding of this relationship recognizes that ecosystems, including those upon which the California RLF depends for its existence, produce a broad set of economically valuable goods and services. These are described in a report by the National Research Council, which found that the range of goods and services extends far beyond those associated with the direct use of an ecosystem:

Ecosystems provide a wide variety of marketable goods, fish and lumber being two familiar examples. However, society is increasingly recognizing the myriad functions—the observable manifestations of ecosystem processes such as nutrient recycling, regulation of climate, and maintenance of biodiversity—that they provide, without which human civilizations could not thrive. Derived from the physical, biological, and chemical processes at work in natural ecosystems, these functions are seldom experienced directly by users of the resource. Rather, it is the services provided by ecosystems, such as flood risk reduction and water supply, together with ecosystem goods, that create value for human users.⁵

Table 1 provides an illustrative list of ecosystem processes, as well as a list of goods and services these processes generate. This list illustrates the range of goods and services that might be positively or adversely affected by designating critical habitat for the California RLF. Thus, to provide a full representation of the economic consequences of designating critical habitat for the California RLF, the Service must examine the economic values associated with a set of goods and services similar to those listed in Table 1. Moreover, to comply with the professional standards represented in guidance from the EPA, the OMB, and Executive Order 12866, the Service must consider all the goods and services and all the economic values, not just those that “may be captured by a market through an identifiable shift in resource allocation” as the Service asserts in the *Draft Report*.

⁵ National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*. National Academies Press, p. 1.

Table 1: Functions, Goods, and Services of Natural and Seminal Ecosystems⁶

Functions	Ecosystem Processes and Components	Goods and Services
Regulation	Maintenance of essential ecological processes and life support systems	
Gas regulation	Role of ecosystems in biogeochemical cycles	Ultraviolet-B protection Maintenance of air quality Influence on climate
Climate regulation	Influence of land cover and biologically mediated processes	Maintenance of temperature, precipitation
Disturbance prevention	Influence of system structure on dampening environmental disturbance	Storm protection Flood dampening
Water regulation	Role of land cover in regulating runoff and river discharge	Drainage and natural irrigation Medium for transport
Water supply	Filtering, retention, and storage of fresh water (e.g., in aquifers)	Provision of water for consumptive use
Soil retention	Role of vegetation root matrix and soil biota in soil retention	Maintenance of arable land Prevention of damage from erosion and siltation
Soil formation	Weathering of rock, accumulation of organic matter	Maintenance of productivity on arable land
Nutrient regulation	Role of biota in storage and recycling of nutrients	Maintenance of productive ecosystems
Waste treatment	Role of vegetation and biota in removal or breakdown of xenic nutrients and compounds	Pollution control and detoxification
Pollination	Role of biota in movement of floral gametes	Pollination of wild plants species
Biological control	Population control through trophic-dynamic relations	Control of pests and diseases

⁶ National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*. National Academies Press, pp. 81-83.

Table 1: Functions, Goods, and Services of Natural and Seminal Ecosystems, cont.

Functions	Ecosystem Processes and Components	Goods and Services
Habitat	Providing habitat (suitable living space) for wild plant and animal species	
Refugium	Suitable living space for wild plants and animals	Maintenance of biological and genetic diversity Maintenance of commercially Harvested species
Nursery	Suitable reproductive habitat	Hunting; gathering of fish, game, fruit, etc. Aquaculture
Production	Provision of natural resources	
Food	Conversion of solar energy into edible plants and animals	Building and manufacturing Fuel and energy Fodder and fertilizer
Raw materials	Conversion of solar energy into biomass for human construction and other uses	Improve crop resistance to pathogens and pests
Genetic resources	Genetic material and evolution in wild plants and animals	Drugs and pharmaceuticals Chemical models and tools Test and assay organisms
Medicinal resources	Variety of (bio)chemical substances in, and other medicinal uses of, natural biota	
Ornamental resources	Variety of biota in natural ecosystems with (potential) ornamental use	Resources for fashion, handicraft, worship, decoration, etc.
Information	Providing opportunities for cognitive development	
Aesthetic	Attractive landscape features	Enjoyment of scenery
Recreation	Variety in landscapes with (potential) recreational uses	Ecotourism
Cultural and artistic	Variety in natural features with cultural and artistic value	Inspiration for creative activities
Spiritual and historic	Variety in natural features with spiritual and historic value	Use of nature for religious or historic purposes
Science and education	Variety in nature with scientific and educational value	Use of nature for education and research

Nowhere in its *Draft Report* did the Service describe the broad set of goods and services that would be affected, positively or negatively, by designating critical habitat for the California RLF. Nowhere did it comply with the guidance we describe above. Instead, the Service asserted that it “believes that the direct [economic] benefits of the proposed rule are best expressed in biological terms...” It offered no justification for this belief and no evaluation of the potential consequences if this belief should prove incorrect. Reason, responsibility, and past research notwithstanding, the Service has declared biology to be the best discipline for measuring the impacts of its decisions on the economy.

A study conducted in Portland, Oregon illustrates the importance of looking at the economic benefits of protecting a species’ habitat rather than using, as a surrogate, the biological benefits to the species.⁷ The study estimated the value of some of the ecosystem services that would be generated from restoring healthy vegetation along two miles of an urban stream that contains salmon listed under the Endangered Species Act. The study found that only 13 percent of the overall economic benefits from the program related to the biological impacts of improved habitat on the salmon themselves. The total economic value of all benefits would be more than seven times the value of the salmon-related benefits, alone. While this ratio between economic and biological benefits of protecting salmon may change for the protection of the California RLF, the qualitative results remain valid: increasing the supply of habitat may yield economic benefits in addition to those directly related to its impact on the species.

By comparing the economic costs of designating an area as critical habitat with its biological benefits, the Service, without justification, improperly assumed that the relationship between the economic and biological dimensions of a change in the species’ population is linear. That is, it assumed the economic benefit of each incremental increase in the population of the California RLF resulting from the habitat protections would mirror the biological benefit. This is inconsistent with expectations of economic theory, supported by empirical evidence, that the economic value of each additional increment in population would decline, all else equal, in most situations. The flip side of this expectation also is important: that the economic value of each incremental loss of population would rise.

There is an important distinction between the designation’s impact on the biological risk of the extinction for the California RLF and the economic value of that risk. The California RLF faces a high risk of extinction, in part, because healthy habitat is scarce.⁸ If, by excluding an area from the

⁷ David Evans and Associates, Inc. and ECONorthwest. 2004. *Comparative Valuation of Ecosystem Services: Lents Project Case Study*. City of Portland Watershed Management Program. June. <http://www.portlandonline.com/bes/index.cfm?&a=64845>.

⁸ Wildlife Diversity Project, Wildlife Health Center, University of California, Davis. 2005. *California Wildlife: Conservation Challenges (Comprehensive Wildlife Conservation Strategy)*. California Department of Fish and Game; and U.S. Fish and Wildlife Service. 2002. *Recovery Plan for the California Red-legged Frog (Rana aurora draytonii)*.

designation, the supply of healthy habitat diminished further and the risk of extinction increased, the economic values associated with the remaining frog population and related habitat conceivably would increase even faster. Indeed, any increase in the risk of extinction would involve values that Congress recognized to be “incalculable.”⁹ Designating an area as critical habitat, hence, would not just increase the supply of habitat for the California RLF, it also would prevent the loss of habitat, prevent an increase in the risk of the frog’s extinction, and prevent an even faster increase in economic losses. The Service did not include in its analysis these economic benefits that would materialize from the designation’s impacts on risk.

As a result of its method, the Service ignored any ancillary benefits that may ensue from the designation, failed to make any effort to identify, describe, and evaluate these benefits, assigning them a zero value. Unless and until the Service demonstrates otherwise, the evidence from the Oregon study suggests this action is unreasonable and misleading. Employing economics rather than biology to account for the benefits of designation would, all else equal, support using greater caution before excluding areas from the designation.

There Is No Valid Analytical Excuse for Not Describing the Economic Benefits of Designating Critical Habitat

The Service offers no explanation for why it disregarded the economic benefits of designating critical habitat for the California RLF. Some insight is offered by its sister agency, NOAA Fisheries, which attempted to justify a similar decision to disregard the economic benefits of designating critical habitat for Pacific salmon, by asserting that the analysis of benefits is more difficult, costly, and time-consuming than the analysis of the costs.¹⁰ On the surface, this argument might have some merit. Analyzing the benefits of environmental regulations can be more difficult, especially when the costs entail goods and services for which there are ample data on jobs, prices, and so forth, but the benefits do not. This difficulty should not be regarded, though, as prohibitive to complete a fair study of both benefits and costs.

In its discussion of economic values derived from ecosystems, a committee of the National Research Council clearly stated that there is widespread agreement among economists that the natural environment, in and of itself, has economic value. It does not have to first be converted into

⁹ House of Representatives. 1973. Report No. 93-4112, pp. 4-5.

¹⁰ U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NOAA Fisheries, Northwest Fisheries Science Center. 2004. *Draft Economic Analysis of Critical Habitat Designation for 13 Pacific Salmon and O. mykiss ESUs*. Seattle, WA. November 15. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2004. *Draft Economic Analysis of Critical Habitat Designation for Seven Pacific Salmon and O. mykiss ESUs*. Long Beach, CA. November 15.

something else—forests into lumber, rivers into shipping canals, etc.—to have economic value. Consider this statement from the report:

Given the crucial role that ecosystems and their services play in supporting human, animal, plant, and microbial populations, there is now widespread agreement that ecosystems are ‘valuable’ and that decision-makers ranging from individuals to governments should consider the ‘value’ of these ecosystems and the services they provide to society [...].¹¹

In conclusion, the difference in difficulty of measuring the benefits vs. the costs is illusory. This statement, from a leading reference book on environmental and natural-resource economics, explains why:

It is a commonly held view both within and outside the economics profession that the costs of environmental regulations are relatively easy to measure, at least in comparison with the task of measuring environmental benefits. This optimistic view is consistent with what I would call a naïve theory of cost . [...] The naïve theory fails to recognize the fundamental symmetry between benefits and costs as changes in the utilities of individuals. It also neglects several important realities concerning the ways that government regulations can affect people’s welfare. [...] Because of this fundamental symmetry, proper measurement of costs involves the same kinds of problems as, and is likely to be as difficult as, the measurement of the benefits of environmental improvement.¹²

The economic reasoning supporting this statement lies beyond the focus of this report and, if the Service is serious about reviewing and responding to our comments, we recommend it spend some time with the original text. For our purposes it is sufficient to observe that, although the estimation of benefits and costs may entail different data and methods, they should be seen not as different animals but as different images of the same animal. Moreover, to estimate either benefits or costs, one must work with imperfect data, make assumptions, and explain not just the results of calculations but also the uncertainties associated with them. That the two estimates have different data, assumptions, and underlying uncertainties is not reason enough for setting either of them aside.¹³

Another recent book, which focuses on methods for valuing different uses of water resources, reinforces this point. It observes that the analytical methods used to estimate the economic benefits of environmental protection generally have been subjected to greater scrutiny and testing than methods commonly used to estimate the costs.

[A]lthough many of the resource valuation methods, particularly on the topic of environmental quality, have been subject to critical scrutiny and testing, some areas of water valuation have received less attention. Especially for the

¹¹ National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Resources: Toward Better Environmental Decision-Making*. National Academies Press, p. 35.

¹² Freeman, A.M., III. 2003. *The Measurement of Environmental and Resource Values: Theory and Methods*, Second Edition. Washington, D.C.: Resources for the Future, p. 37.

¹³ For more information regarding appropriate approaches for describing the benefits of environmental protection, see U.S. Environmental Protection Agency. 2002. *A Framework for the Economic Assessment of Ecological Benefits*. February 1.

intermediate or producers' goods derived from water—such as crop irrigation, hydroelectric power and industrial water use—procedures for empirical application of valuation methods appear to be less well developed and have received less application and critical testing.¹⁴

Together, the authors of these two books make it clear that, in general, there is no scientific excuse for downplaying or ignoring the benefits of environmental protection. The methods available for estimating the benefits of environmental protection are not inherently more difficult or less reliable than those available for estimating the costs. For both the benefits and the costs, the available methods typically entail considerable uncertainty and require making significant assumptions.¹⁵ Against this backdrop, it is apparent that the Service bears the burden of giving equal consideration to both the benefits and the costs, unless it has demonstrated there is a valid analytical reason to do otherwise. It did not meet this obligation by merely asserting that it “believes that the direct benefits of the proposed rule are best expressed in biological terms” or by failing to provide a comprehensive description of the designation’s economic ancillary benefits.

We are not saying the Service’s analysis of the economic benefits of designating critical habitat for the California RLF should be symmetrical to its analysis of the economic costs. The two analyses probably will use different data and methods. Each will require interpretation. It generally would be unreasonable, though, for the Service to assume that the data and methods associated with the analysis of the benefits are less reliable than those associated with the analysis of the costs.

A recent report prepared for NOAA Fisheries illustrates an appropriate response to the task of analyzing both benefits and costs of environmental protection and demonstrates that asking the Service to take a similar approach is not unreasonable.¹⁶ The authors looked at the impacts of alternative proposals to proscribe activities harmful to species and habitats within the Channel Islands Marine Sanctuary and gave this candid assessment of both the challenge and their response to it:

We simply are not capable of forecasting all the human responses as well as the ecological-biological responses, and the interaction of these systems that will result from the network of marine reserves. All the benefits and costs of marine reserves cannot be quantified, and so a formal benefit-cost analysis is not

¹⁴ Young, R.A. 2005. *Determining the Economic Value of Water*. Washington, D.C.: Resources for the Future, p. 16.

¹⁵ Even a casual review of the *Draft Report* reveals that the Service’s cost estimations do not rest on comprehensive, accurate data, but rather on limited data plus numerous, powerful assumptions that the Service employs without explaining the reason for them or the method of their employment. On pages 34-36, for example, the Service discusses generally its calculations of market effects of the designation, but fails to reveal the specific assumptions it made to yield the calculations it reports in the accompanying “Table IV-2: Market Impacts of Designation.”

¹⁶ Leeworthy, V. and P. Wiley. 2002. *Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Special Projects. April 29.

conducted. Instead, we use the benefit-cost framework and list all the potential benefits and costs, and quantify them where we can. Where we can't quantify benefits or costs, we discuss them qualitatively and in what direction we believe benefits or costs will move (under various conditions) [...].

In short, the authors of that study provided as much information, both quantitative and qualitative, as they could, giving equal consideration to the analysis of benefits and the analysis of costs. They were candid about disparities in the availability of data and the uncertainties underlying their findings. If they could do it—provide a complete, quantitative and qualitative description of economic benefits as well as costs—so too could the Service.

In sum, this discussion demonstrates there is no valid excuse for the Service's failure to describe fully both the benefits and the costs of the proposed designation or of decisions to exclude areas from the designation. Whatever the Service's rationale to justify disregarding the economic benefits of designating critical habitat, it has no basis in the theoretical or empirical literature or in the standards widely accepted by professional economists. The only approach that fully meets widely accepted professional standards is to describe both the benefits and the costs as fully as possible, in quantitative and qualitative terms, using available information.

Insofar as the Service's *Draft Report* fails to give equal consideration to the benefits and the costs, readers, including the Director, should recognize that it fails to meet these standards in fundamental ways and discount it accordingly. From the *Draft Report* neither the Director nor anyone else can know if the net economic benefits (gross benefits minus gross costs) of designating a specific area as critical habitat would be greater than, equal to, or less than zero. Also, from reading the *Draft Report*, neither the Director nor anyone else can know if the economic benefits of designating one area would be greater than, less than, or equal to the economic benefits of designating another area.

The Economic Benefits of Environmental Protection Are Too Substantial to Ignore or Downplay without Showing Cause

In this section we describe evidence indicating there is a high likelihood that protecting critical habitat for the California RLF will yield economic benefits. Moreover, these benefits probably are sufficiently large that, if the Director were to exclude areas from the designation based on the analysis in the *Draft Report*, which ignores them, the overall impact on the economy would be negative.

Both economic reasoning and evidence indicate that the economic benefits from protecting critical habitat for the California RLF probably outweigh the costs. Consider first some basic economic reasoning. In many, if not most, instances, the landowners, developers, and others who have made decisions to degrade the frog's habitat have not borne the full costs to society, because some of the costs, such as increased risk of extinction, accrue not to the decision-maker but to society as a whole. Insofar as they

don't bear the full costs, they probably have overdone it i.e., degraded some habitat where the costs to society exceeded the benefits. Under such conditions, there is a considerable probability that further degradation of habitat will yield even more net costs to the overall economy. Conversely, the benefits of an incremental increase in the amount of habitat protected likely will exceed the costs. This conclusion is reinforced insofar as the activities, such as farming and urban development, that degrade habitat are subsidized.

Consider next some evidence supporting such a conclusion. As Table 1 shows, the natural environment provides myriad goods and services, many of which have not been fully taken into account in resource-management decisions.^{17, 18} Many of these goods and services, by their nature, provide benefits to groups outside the direct concern of decision-makers. For example, when the owner of a wetland decides to fill it in, s/he has no direct economic incentive to account for the costs imposed on others by degrading habitat for migrating birds, increasing the sediment in runoff delivered to downstream streams, or converting an aesthetically pleasing vista into a parking lot. Thus, there are widespread, fundamental reasons for concluding that native habitat has been degraded to the point where protection against further degradation and/or incremental restoration to correct past degradation is likely to yield economic benefits greater than the costs.

Many studies have documented this conclusion. For example, an analysis of restrictions on logging to protect habitat for northern spotted owls in the Pacific Northwest found that the benefits outweighed the costs.¹⁹ A study of the potential recreational benefits associated with increased salmon production in the Klamath River Basin found that the benefits would outweigh the costs nine-to-one.²⁰ Another study predicted that the recreational and intrinsic benefits that would be produced by leaving water in a portion of Colorado's South Platte River would be 25-60 times the value of the water if it instead were diverted for irrigation.²¹ A

¹⁷ See, for example, Daily, G.C. (editor). 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington, D.C.: Island Press.

¹⁸ One attempt to quantify the value of goods and services derived globally from the environment found the annual value exceeds the quantified value of the annual output of the world's economies and, even though the effort generated considerable debate regarding the methods used, the study shows that the benefits derived from the environment are huge. Costanza, R., R. d'Arge, R. De Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R.V. O'Neill, J. Paruello, R.G. Raskin, and P. Sutton. 1997. "The Value of the World's Ecosystem Services and Natural Capital." *Nature* 387 (May 15): 253-260.

¹⁹ Hagen, D.A., J.W. Vincent, and P.G. Welle. 1992. "Benefits of Preserving Old-Growth Forests and the Spotted Owl." *Contemporary Policy Issues* 10 (April): 13-26.

²⁰ Douglas, A.J. and A. Sleeper. 2002. *Estimating Recreation Trip Related Benefits for the Klamath River Basin with TCM and Contingent Use Data*. Midcontinent Ecological Science Center, U.S. Geological Survey.

²¹ Loomis, J., P. Kent, L. Strange, K. Fausch, and A. Covich. 2000. "Measuring the Total Economic Value of Restoring Ecosystem Services in an Impaired River Basin: Results from a Contingent Valuation Method Survey." *Ecological Economics* 33: 103-117.

comparison of the net benefits of developing healthy habitat versus protecting it concluded that, at the margin, the latter probably exceed the former.²² A broad economic analysis of the environmental impacts of agricultural practices in the U.S. found that many common practices generate extensive negative externalities.²³

Studies of the economic impacts of environmental regulations have found that their benefits often offset their costs. One report, by the Office of Management and Budget, compared the benefits and costs of major regulations of three agencies—the Departments of Energy and Transportation and the EPA—in FY 2001-2002.²⁴ It found that, for the three agencies as a whole, the regulations generated benefits of \$2.4 – \$6.5 billion, substantially greater than the costs of \$1.6 – \$2.0 billion. For EPA, the ratio was even greater, with benefits of \$1.2 – \$4.8 billion and costs of only \$0.2 billion.

Other studies, using changes in employment and other indicators of economic activity, have also concluded that, whatever the costs of regulations that protect the environment, these are offset, more or less by the benefits. One study representative of this literature looked at the net impacts of regulations associated with the federal Endangered Species Act on employment in 333 non-metropolitan counties in 11 western states, and found “the hypothesis that endangered species listing has had a negative effect on the non-metropolitan county economies of the U.S. West is not supported by the data.”²⁵ Another study found that “States with better environmental conditions had significantly higher income growth rates [and] stricter environmental policies did not significantly depress income growth.”²⁶ A third study looked at the impacts of state environmental regulations and found that “interstate differences in environmental regulations do not systematically affect the location of most manufacturing plants.”²⁷ And numerous other studies have found

²² Balmford, A., A. Bruner, P. Cooper, R. Costanza, S. Farber, R.E. Green, M. Jenkins, P. Jefferiss, V. Jessamy, J. Madden, K. Munro, N. Myers, S. Naeem, J. Paavola, M. Rayment, S. Rosendo, J. Roughgarden, K. Trumper, and R.K. Turner. 2002. “Economic Reasons for Conserving Wild Nature.” *Science* 297: 950-953.

²³ U.S. Department of Agriculture, Economic Research Service. 2003. *Agricultural Resource and Economic Indicators*. October. <http://www.ers.usda.gov/publications/areil/>.

²⁴ Office of Management and Budget, Office of Information and Regulatory Affairs. 2003. *Informing Regulatory Decisions: 2003 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities*. Executive Office of the President of the United States.

²⁵ Duffy-Deno, K.T. 1997. “Economic Effect of Endangered Species Preservation in the Non-Metropolitan West.” *Growth and Change* 28 (Summer): 263-388.

²⁶ Goetz, S.J., R.C. Ready, and B. Stone. 1996. “U.S. Economic Growth vs. Environmental Conditions.” *Growth and Change* 27 (Winter): 97-110.

²⁷ Levinson, A. 1996. “Environmental Regulations and Manufacturers' Location Choices: Evidence from the Census of Manufactures.” *Journal of Public Economics* 62: 5-29.

that open space and related amenities increase the value of nearby housing.²⁸

These studies, plus a much broader body of research findings, have convinced many economists that the benefits of environmental protection outweigh the costs in many settings and for many environmental resources. One important example of the broad support for this conclusion is provided by a recent letter, signed by more than 100 economists, regarding the economic importance of the western states' natural environment. It states that "[t]he West's natural environment is, arguably, its greatest, long-run economic strength." Based on this assessment, it asks President Bush and the governors of the western eleven contiguous states to recognize that the positive impacts on jobs and prosperity of actions that protect or enhance the region's environment generally will far outweigh the negative impacts. The letter concludes:

... [N]early all communities in the West will find they cannot have a healthy economy without a healthy environment. Moreover, there exist many opportunities in the West to improve both the environment and the economy, for example, the elimination of inefficient subsidies would make more money available for other public services or to reduce debt. The longer these opportunities languish, the fewer will be the West's jobs, the lower its incomes, and the poorer its communities. Conversely, the sooner we seize these opportunities, the sooner the West will enjoy more jobs, higher incomes, and greater prosperity.²⁹

In stark contrast, the economic analysis in the *Draft Report* overlooked entirely the likelihood, even the possibility, that protecting critical habitat for the California RLF would have positive effects on the economies of nearby communities and on the national economy as a whole. Similarly, it failed to consider the likelihood that excluding areas from the designation would have negative effects.

Insofar as wetlands constitute much of the habitat the Service identified as essential for conservation of the California RLF, it is instructive to examine studies that have examined the economic value of wetlands. Tables 2 and 3 present some of the findings from a recent review of multiple studies that estimated the values of services provided by wetlands.³⁰ The studies examined wetlands in different locations that provided different types of services to local economies with different characteristics. Table 2 shows the techniques used in the underlying studies to estimate the economic value of goods and services produced by wetlands, as well as the ecosystem functions that produce the goods and services. These techniques are well-known and were available to the

²⁸ See, for example, Lutzenhiser, M. and N.R. Netusil. 2001. "The Effect of Open Spaces on a Home's Sale Price." *Contemporary Economic Policy* 19 (3): 291-298.

²⁹ Whitelaw, E. (editor). 2003. *A Letter from Economists to President Bush and the Governors of Eleven Western States Regarding the Economic Importance of the West's Natural Environment*. December 3. http://www.salmonandeconomy.org/econ_reports.html.

³⁰ Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270.

Table 2: Wetland Functions, Economically Valuable Goods and Services They Produce, and Techniques for Estimating Their Value

Function	Economically Valuable Good(s) or Service(s) ^a	Typical Valuative Techniques
Recharge of groundwater	Increased water quantity	Net factor income or replacement cost
Discharge of ground water	Increased productivity of downstream fisheries	Net factor income, replacement cost, or travel cost
Water quality control	Reduced costs of water purification	Net factor income or replacement cost
Retention, removal, and transformation of nutrients	Reduced costs of water purification	Net factor income or replacement cost
Habitat for aquatic species	Improvements in commercial and/or recreational fisheries either on or offsite. Nonuse	Net factor income, replacement cost, travel cost, or contingent valuation
Habitat for terrestrial and avian species	Recreational observation and hunting of wildlife. Nonuse	Travel cost or contingent valuation
Biomass production and export (both plant and animal)	Production of valuable food and fiber for harvest	Net factor income
Flood control and storm buffering	Reduced damage due to flooding and severe storms	Net factor income or replacement cost
Stabilization of sediment	Erosion reduction	Net factor income or replacement cost
Overall environment	Amenity values provided by proximity to the environment	Hedonic pricing

Source: Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270.

Service at the time it prepared its *Draft Report*.

From the underlying studies, the authors of the review concluded that actual wetlands produce such a complex set of services that it is difficult, if not impossible, to estimate their total value. Hence, they derived estimates of the values associated with hypothetical wetlands producing only one type of service.

The data in Table 3 show the mean values they derived from the underlying studies. The authors emphasize that the variation in value, from one wetland to another, is so great that the values in Table 3 cannot provide a reliable, quantitative estimate of the value of services provided by any specific wetland. Site-specific studies are required to determine the value of goods and services provided by specific wetlands. The data in Table 3 do, however, support some qualitative conclusions regarding

economic values associated with wetlands. The *Draft Report* did not describe the extent to which designating critical habitat for the California RLF would affect the supply of services, such as those listed in Table 3, produced by wetlands.

Table 3. Estimated Values per Acre of Single-Service Wetlands

Service	Value per Acre^a
Reduce flood damage	\$393
Improve water quality	417
Recharge groundwater	127
Improve recreational fishing	357
Improve bird hunting	70
Improve bird watching	1,212
Improve amenities for nearby homes	3
Provide fish and wildlife habitat	306
Stabilize sediment	237

Source: Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270.

^a Mean value of estimates in diverse studies. Values measured in the dollars of 1990.

Conclusions

The above-mentioned reports demonstrate that the Service, had it tried, could have provided a description of the economic benefits of designating critical habitat for the California RLF in accord with widely accepted professional standards and the analytical guidance from the Environmental Protection Agency, the Office of Management and Budget, and the President. These and many others relevant to the task were readily available to the Service, had it looked. Others have found them and used them, demonstrating the feasibility of describing the economic benefits of other environmental regulations in a manner that satisfies the professional standards and analytical guidance.

Against this backdrop, the Service stands out as an odd duck. Its assertion that biological measures of the benefits of designation adequately substitute for economic measures lacks theoretical foundation and ignores a room full of contrary empirical evidence. Its analytical results are nonsensical. Decisions based on them are likely to do more economic harm than good.

B. The Service Improperly Inflated the Economic Benefits of Excluding Habitat from the Designation

The economic benefits of exclusion are the designation-related costs that would be avoided if an area were excluded from the designation. On the surface, the Service estimated the economic benefits of excluding areas from the designation in an appropriate manner: by estimating the costs federal agencies and others would incur if each area were included in the designation and assuming that these costs would be avoided if the area were excluded. Look beneath the surface, however, and one finds something far different.

The Service inflated the benefits of exclusion (the costs of designation) by basing its estimates on extreme scenarios in which it has embedded unreasonable assumptions and data. Doing so produced estimates containing at least three fatal flaws. The Service measured the benefits of exclusion (costs of designation) in *gross*, not *net*, terms; it incorporated benefits of exclusion (costs of designation) that may not materialize, and it relied on unsubstantiated data, assumptions, and methods inconsistent with economic realities.

The Service Described the Gross, Not Net, Benefits of Excluding Habitat from the Designation

The Service, itself, acknowledged the importance of analyzing the net rather than the gross effects of critical habitat designation. (pp.10-11) Nonetheless, it turned its back on this analytical standard and focused its analysis on the gross benefits of excluding areas from the designation (the designation's gross costs). That is, it calculated the gross economic cost of designating each area of critical habitat, with no accounting for factors that might offset them. Doing so distorts the analysis in two ways. It misrepresents the true, net costs of designation within an area. It renders the comparison of opportunity costs among areas impossible, since each of them has different costs and different benefits. For example, the Service may show that one area of designation has higher gross costs compared to another area, but if benefits are taken into account for each, the results may reveal that the designation in the second area is more costly than in the first one. Thus, any evaluation of which area would incur higher costs due to the habitat designation becomes meaningless based on the Service's analysis.

The Service compounded these flaws by failing to define the obligations of landowners and developers to protect habitat for reasons independent of the designation, and by calculating the benefits of exclusion (costs of designation) looking solely at private landowners and developers within the proposed designation areas and ignoring the impacts on third parties located outside them.

Consider this example: Parcel A of developable raw land lies in the proposed designation area, Parcel B does not. They are otherwise identical, except that, absent the designation, A can be developed for \$100, and B for \$101. The supply of developable, raw land in the market exceeds demand so that only one parcel will be developed. Thus, absent the designation, a developer (to simplify things, assume there is only one) would purchase A and develop it and B would go undeveloped. With the designation, though, assume A could not be developed, so B would be. What are the designation's economic costs and benefits? The owner of A sees the value of the land decline to zero and, hence, incurs costs of \$100. The owner of B, however, sees the value of the land go from zero to \$101 and, hence, realizes benefits of \$101. For society as a whole, the cost of development rose from \$100 to \$101. The net cost of the designation, therefore is \$1.

This example illustrates an analytical choice the Service faced as it prepared the draft economic analysis: should it measure costs stemming from the designation as the reduction in the value of land inside the designation areas or as the net cost to society? To answer the question, the Service explained:

At the guidance of the Office and Management and Budget (OMB) and in compliance with Executive Order 12866 'Regulatory Planning and Review,' Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. For regulations specific to the conservation of the RLF, efficiency effects represent the opportunity cost of resources used, or benefits foregone, by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets. (p. 6)

In other words, the applicable administrative guidance requires the Service to examine economic impacts in terms of the overall impacts on "society, as a whole" rather than just some parties, and to consider the "affected markets" rather than just some participants in them. Applied to the example above, the guidance directs the Service to focus on the \$1 cost to society.

In stark contrast, however, the Service focused not on the net cost to society, but on the gross costs to individual parties, in other words on the \$101, rather than on the \$1. It did not describe the overall adjustment of the affected markets to the designation of critical habitat, but the impacts on some of the participants in these markets. In terms of the illustration above, the Service estimated the cost to the owner of Parcel A and the reduction in land value only within the proposed designation areas.³¹

We anticipate that the Director of the Service knows that, when businesses make decisions based on their gross, not net, costs, they greatly increase the probability of going bankrupt. The Service should heed this lesson and not provide the Director with an economic analysis

³¹ The Service summarizes its analytical approach and methodology regarding the impact on private land development on pages 34-36.

that would induce him to make decisions to exclude areas from the designation based on gross, not net, costs.

The Service Included in Its Estimates Benefits That May Not Materialize

The Service describes the benefits of excluding areas from the designation with an aura of certainty that the underlying data do not support. For example, it states on page 15: “an estimated 220,000 additional housing units will have to be constructed every year through 2020 in order to keep pace with the expanding population.” The Service extracted this statement from a report by the California Department of Housing and Community Development (CDHCD). Just a few lines below this statement, however, the CDHCD report qualified this estimate of future housing starts as “a stretch” since such a level of housing permits has not been exceeded since the late 1980s.³²

Moreover, the Service assumed that individual plots of land, absent the critical habitat designation, have a 100 percent probability of being developed. This assumption fails to recognize other factors, including market forces and regulatory restrictions, that reduce the probability of development below 100 percent. The CDHCD study illustrated some of these factors in its assessment comparing the demand for raw land, i.e., land that has not previously been developed, against the supply. Among the factors that could render land undevelopable, it identified steep slopes, remote location, and location in flood zones. To the extent there is ambiguity regarding the applicability of these factors to a given site, they reduce the probability that it will be developed.

After accounting for these potential physical limitations on development, the CDHCD study incorporated the potential effect of regulations “prohibiting development in special natural areas and in areas identified as endangered and threatened.”³³ After doing so, it concluded that the state’s supply of developable land “is far more than enough capacity to accommodate projected housing demand through 2020 and beyond.” It also stated, “California has more than enough raw land to accommodate projected populations and housing growth and still maintain current levels of agricultural production and environmental quality.”

Where the supply of developable land exceeds the demand, the probability that a given area will be developed is less than 100 percent. Thus, these findings indicate that the probability that development would occur, absent the designation, on each of the 737,793 acres in the critical-habitat units identified by the Service is less than 100 percent. The Service,

³² California Department of Housing and Community Development. 2000. *Raising the Roof- California Housing Development Projections and Constraints 1997-2020*. Retrieved from <http://www.hcd.ca.gov/hpd/hrc/rtr/index.html> on November 10, 2005

³³ *ibid.*

however, overlooks this uncertainty. Instead, it assumed that, absent designation as critical habitat, each of the different areas would be developed, and with the designation it would not. This assumption is inconsistent with the facts and it biases upward the Service's estimates of the benefits of excluding land from the designation (costs of including the land in the designation).

The Service Employed Unsubstantiated Assumptions and Analytical Methods Inconsistent with Economic Realities

The Service relied on different databases and econometric models to estimate the gross costs that the habitat designation would impose on the economies of the impacted counties. Its discussion of the assumptions and methods it employed in this process, however, is incomplete, making it impossible to check their validity. For example, the Service chose the census tract as the spatial unit within which the designation would affect consumer's surplus. It did not, however, explain what effect this choice has on its calculations. By focusing on census tracts, the Service assumed that each time it found the designation would keep land from being developed in a census tract, consumer's surplus for the overall economy would decline. Housing markets typically incorporate more than a single census tract, however, so it is possible that as the designation would depress development in one, the market would respond by increasing development in another.

Looking at the relevant housing market for each critical-habitat unit, not just segments identified by census tracts is essential if the Service is to provide reliable estimates of the designation's impacts on development. Moreover, the Service must examine all aspects of the designation's impacts on the individual relevant markets. These include the likelihood that protecting habitat might increase the value of nearby homes. Such increases might materialize in the same census tract or in an adjacent one. Numerous studies document the positive effects open space, including wetlands, has on nearby property values.³⁴ The Service's analysis, however, overlooked this relationship. Nor did it account for adaptability within California's housing markets, including the application in some communities of principles such as those associated with terms like smart growth and new urbanism.³⁵

³⁴ See, for example, Lutzenhiser, M. and N.R. Netusil. 2001. "The Effect of Open Spaces on a Home's Sale Price." *Contemporary Economic Policy* 19 (3): 291-298; Benson, E.D., J.L. Hansen, A.L. Schwartz, Jr., and G.T. Smersh. 1998. "Pricing Residential Amenities: The Value of a View." *Journal of Real Estate Finance and Economics* 16 (1): 55-73; Mahan, Brent, Stephen Polasky, and Richard Adams. 2000. "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76 (1): 100-113; and Tyrvaiven, L and A Miettinen. 2000. "Property Prices and Urban Forest Amenities." *Journal of Environmental Economics and Management* 39: 205-223.

³⁵ See, for example, descriptions of California communities in Sierra Club. 2005. *Building Better: A Guide to America's Best New Development Project*. November.

Equally disappointing is the fact that the Service did not include a study or even a brief assessment of the attitudes Californians usually exhibit toward protected species. A study published in 2005 shows that, for example, households in Orange County are willing to pay \$23—104 for the recovery of all local endangered species.³⁶

The Service also did not provide a clear explanation of the econometric models it used to test whether designation of critical habitat would constrain development. Specifically, the Service's explanation fell short of widely accepted professional practices in these areas:

- The Service did not support its choice of variables to include in the models by explaining how they lend significance to the model. Equally important, it failed to explain why it excluded other variables (i.e., income, proximity to schools, shopping, open space etc.) that usually appear in hedonic models of housing values.
- The Service did not make it clear what years the home-construction data cover. It mentions that all prices included in the dataset are in 2005 dollars, but it fails to account for the length of time the dataset covers.
- The Service failed to explain elements of the results from its models that seem to defy expectations. For example, the models indicate that housing values decrease as the number of bedrooms and stories increase. Together with the unexpectedly high t-values, these modeling results might signal econometric problems with the regression analysis. The Service, however, does not investigate this possibility, nor does it provide sufficient documentation for others to do so.
- The Service did not discuss the methods it used to estimate the projected population, projected number of households, and the number of homes that will not be built due to the designation. These are the variables on which the Service directly based its projections of lost consumer's surplus. Widely accepted professional standards require providing full documentation of the data and analytical results associated with these variables, and an assessment of the reliability of the results. The Service, however, provides none. In effect, the results come from a black box into which nobody can see.

Another puzzling aspect of the gross-cost estimation is the Service's unexplained decision to initiate its calculations of losses due to the designation in 2005, rather than in 2006, when the Director is expected to announce his final decision. If the Service assumed the market would anticipate the announcement and begin adjusting a year early, then it should explain the basis for this assumption. It also should expand the assumption to explain all the ways in which the market is likely to adjust

³⁶ Stanley, D.L. 2005. "Local Perception of Public Goods: Recent Assessments of Willingness-to-Pay for Endangered Species." *Contemporary Economic Policy* 23 (2):165-179.

to the designation. If it assumed that the market would not anticipate the final rule, then it initiated the calculations a year too soon. Either way, the Service's approach inflates the benefits of exclusion (costs of designation).

The Service also erred in its treatment of another aspect of the adaptation: mitigation costs. When it talked about the designation's effects in the context of the regional economy, the Service considered these mitigation costs to be transfers, from one group to another (p. 66). But, when it estimated the losses that the designation would impose on the economy, it took a different approach. It narrowed its focus to consider local segments of the regional economy in isolation, and considered mitigation costs as part of the total gross costs the designation would impose on developers in individual census tracts (p. 36). Using a local perspective to estimate the economic impact of a federal regulatory action, such as the designation of critical habitat, runs counter to widely accepted professional practice, as indicated by the guidance, described above, from the Environmental Protection Agency, as well as analytical requirements established by the U.S. Water Resources Council.³⁷

Conclusions

Even though, at a first glance, it may seem that the Service approached the estimation of habitat-designation costs appropriately, in reality the analysis is riddled with flaws. The Service did not try to compensate for the lack of benefit analysis with a solid study of the designation costs. Instead, it added a new level of distortion to its framework that was supposed to represent the impacts on the real world, should the designation be implemented.

³⁷ U.S. Environmental Protection Agency. 2000. *Guidelines for Preparing Economic Analyses*. September. p. 131; U.S. Water Resources Council. 1983. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. March 10.

C. In Conclusion, the Service Improperly Used Its Economic Estimates to Justify Excluding Habitat from the Designation

In preparing its *Draft Report*, the Service had a limited, straightforward objective: to provide the Director of the Service with sufficient information to weigh fairly, for each area, the benefits of designation against the benefits of exclusion. To have a fair weighing, the Director would have to consider the *net* benefits of each option, on an area-by-area basis.

The *Draft Report* fell far short of its objective. It failed to measure the economic benefits, direct and indirect, of designation in each area. Even though the Service committed to account for the stream of benefits of the designation (p. 10), it provided no documentation of any attempt to do so. In the beginning of the *Draft Report*, the Service created the expectation that the final estimations would reflect the net costs to society, but, in the end it estimated the gross costs to just a segment of society. The *Draft Report* also inflated the economic benefits of excluding areas from the designation. The estimates in the report represent the *gross*, not *net*, benefits of exclusion, and the Service has inflated the estimates of gross benefits in numerous ways. Hence, if the Director were to use the draft economic report to make decisions to exclude areas from the designation, these decisions would be biased.

In sum, the Service has selected the wrong things to measure and, having done so, it has measured them badly, using unsubstantiated and unreasonable assumptions. The findings presented in the *Draft Report* do not meet common professional standards applicable to this type of analysis. The findings do not and cannot provide an accurate, unbiased factual basis for determining if the economic benefits of excluding land from the final designation would exceed the economic benefits of including it.

Even if the Service's numbers were correct, the Service uses them in a manner irrelevant to the task that faces the Director. He must determine, for each area, if the economic and other impacts of designating it warrant excluding it from the designation. To make this determination, he must weigh the net benefits of designating the area against the net benefits of excluding it and he can justify excluding it on economic grounds only if he can demonstrate that the latter outweigh the former. The Service, however, does something different: it compares the gross benefits of excluding one area against the gross benefits of excluding others and proposes to exclude those that at the top of the list. Such comparisons cannot provide the Director with the information he needs. Area A might have the highest *gross* benefits, compared with Areas B, C, and D, but this says nothing about whether or not the *net* benefits of excluding it from the designation would outweigh the net benefits of including it in the designation. It also says nothing about how the different areas rank in terms of their *net* benefits.

The *Draft Report* remains fundamentally flawed, even if one accepted the Service's premise that weighing the benefits of excluding one area against the benefits of excluding others would satisfy the Director's obligation under the ESA. Assume for the moment that it would be appropriate for the Director to compare the benefits of excluding each area against the benefits of excluding others, and that the Service had provided accurate estimates of the *net* exclusionary benefits for each area. Even with these heroic assumptions, the most that the Secretary could discern is how the *incremental* benefits of excluding each area compare to one another. He could not determine if the *total* amount of habitat to be designated would be appropriate. Any analysis of the *incremental* effects of designating individual areas must be conducted in the context of and only after first completing an analysis that identifies the *total* amount of habitat that should be designated to satisfy the conservation objectives of the ESA.

In reaching these conclusions we have focused on the Service's analysis of the designation's impacts on private land, which it asserts constitute the bulk of the overall impacts. These same conclusions, however, also apply to the Service's description of the designation's potential impacts on public land development, insofar as the Service has provided an inaccurate, biased baseline, failed to measure the benefits of designation, made assumptions that exaggerate the costs, and failed to measure the extent to which the availability of substitutes would influence the designation's net impacts.

III. RECOMMENDATIONS

From the preceding discussion we draw several recommendations for the Service as it moves from its proposed designation rule and draft economic analysis to a final rule and final analysis. We recommend that the Director rely on nothing in the *Draft Report*. Beyond this, we offer these specific recommendations:

1. *Measure the designation's costs and benefits, from the perspective of its impacts on society as a whole.*

Major deficiencies in the *Draft Report* stem from its assertion that the impacts on one component of society, the developers and landowners within the designation areas, equal the net impacts on society as a whole. The Service must correct these deficiencies if the final economic analysis is to present an accurate, unbiased picture of the designation's economic impacts. In particular, the Service must correct its calculation of costs to private landowners and developers to take into account impacts on third parties located outside of the designation areas, to properly reflect the designation's *overall* economic impacts on society.

2. *Describe fully the dynamic character of the ecosystem and the economy, and the economy's ability to adapt to the designation.*

In the *Draft Report*, the Service describes a future in which both the ecosystem and the economy are essentially frozen over time. It describes the ecosystem as static, failing to show how the risk of extinction for the California RLF, and other ecological variables, might change from now through 2025. Consequently, the Service cannot assess whether or not economic values associated with protecting the California RLF or other elements of the ecosystem would increase or decrease over time. The analytical consequences could be considerable. All else equal, as the California RLF, open space, natural landscapes, and so forth become increasingly scarce, their per-unit values should increase, and the designation's benefits should increase relative to its costs to the extent that it retards this trend toward scarcity.

The Service also portrays the economy as static in its response to the designation. Instead of assessing the designation's impacts taking into account the economy's dynamic ability to respond to it in a manner that would decrease its costs and increase its benefits, the Service paints a picture that maximizes the costs and minimizes the benefits.

Adaptability, however, is perhaps the greatest strength of the American economy. Failing to account for it indicates incompetence. As it develops its final analysis of the designation's economic impacts, the Service should account for the adaptability of both the ecosystem and the economy. If the Service anticipates that the risk of the California RLF's extinction will change significantly during the study period, it should describe the change and how it will affect both the

status of the designation and the designation's economic impacts. In describing the economic impacts, the Service should explicitly describe the extent to which individuals, firms, and communities will seek to minimize their costs and maximize their benefits.

3. *Measure the net benefits of the designation.*

Major deficiencies in the *Draft Report* stem from its focus on the designation's costs and its failure to measure the designation's economic benefits. Before the Director can decide that the economic impacts warrant excluding land from the final designation, he must be able to see the full, positive impacts (that is, net benefits) of the designation and how they would change with exclusion. It is not sufficient for the Service, as it has done in the *Draft Report*, to measure only the designation's costs. The Service must correct these deficiencies if the final analysis is to give the Director information on which he can rely to weigh the benefits of including land in the designation against the benefits of excluding it.