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THE ENDANGERED SPECIES ACT — ECONOMIC IMPACTS: THE PERCEPTION AND THE NUMBERS

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The Endangered Species Act — Economic Impacts: The Perception and The Numbers

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From its very beginning, the Endangered Species Act (ESA) has generated debate about the costs of preserving endangered species versus the benefits received as a result of their protection. This debate was foreseen, if generally understated, in the original legislation, and has been overstated in subsequent attempts to overrule it. Unfortunately, these debates have frequently emphasized antithetical positions without a detailed examination of the costs of protecting endangered and threatened species within a larger governmental regulation framework. Also, unfortunately, discussion of economics in relation to endangered species has been polarized in both public discussions and in the literature. There are two schools of thought. One side says that the existence of any particular species is beyond value (Bishop 1982). The other says that the extinction of species is an ongoing process, and that if a particular species cannot adapt to changing conditions, particularly if it has no commercial value, then efforts to conserve the species should not come at extravagant cost (Sansonetti 1991). This line of reasoning postulates that species, and their associated habitats, that have commercial value will be protected by private industry. This fundamental question of the value of an endangered species colors debate over the role of economics in the ESA.

Primary focus in my discussion will be placed on the costs of endangered species protection. The Act, and its legislative history, will be discussed when it relates to economic analyses or balancing. Specifically, the costs that result from protecting endangered species will be differentiated according to where they are likely to occur. The emphases in this differentiation will emphasize overlapping legal protections for the species (which I will call "screening"), the spatial scale of an economic analysis, and economic efficiency versus equity considerations in ascribing benefits and costs. Discrimination among these various effects is crucial because it determines the distribution of economic effects, both those resulting from the ESA law itself as well as how these costs are distributed throughout society.

Economic Effects in the E.S.A. Two sections of the Endangered Species Act have the potential to cause economic effects, while another two sections incorporate economics as a balancing mechanism. Section 7 of the Act requires that Federal agencies consult with the Secretary to "insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or

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[1] Portions of this essay first appeared in Souder (1993).

result in the destruction or adverse modification of habitat of such species which is determined by the Secretary ... to be critical..." (16 U.S.C. §1536(a)(2)). Section 9 of the Act regulates the "taking", or harm, to individual endangered species or actions that may cause harm to their habitat. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. §1532(19)). The provisions of Section 9 affect all persons, irrespective of whether Federal actions are involved.

Congress made it clear that economic criteria are not to be considered in either the listing or the designation of proposed critical habitat (H.R. Rep. No. 567, 97th Cong., 2d Sess. 20, *reprinted* in 1982 U.S. Code Cong. & Admin. News 2,820). Economic considerations may be used to balance the Act 's provisions in only two places. The first place is when critical habitat is designated under Section 4 (16 U.S.C. §1533(a)(3)). The second occurs during Section 7 consultations, including the deliberations of the Endangered Species Committee when exemptions to Section 7 (and Section 9) are requested (16 U.S.C. §1536(g)).

When designating critical habitat under Section 4 of the Act for a threatened or endangered species, the Secretary may

> "tak[e] into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned" (16 U.S.C. §1533(b)(2))

The economic and social analyses for critical habitat are required under Section 4 of the ESA (16 U.S.C. §1533(b)(2)), however, the Fish and Wildlife Service has not specified through rule making relevant economic criteria to use in excluding areas from critical habitat (50 C.F.R. Ch. IV §424.19).

The second area where economics plays a role is in the implementation of Section 7 interagency consultations (16 U.S.C. §1536(a)). When the Service issues a jeopardy or adverse modification of critical habitat biological opinion, it must provide the applicant with reasonable and prudent alternatives—if they exist—to the applicant's proposal (50 C.F.R. §402.4(g)(8), (h)). "Reasonable and prudent" alternatives are defined as "alternative actions ... that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is [sic] economically and technologically feasible" (50 C.F.R. §402.02). The criteria to determine what is economically feasible is left to the Secretary's discretion (50 C.F.R. Ch. IV §402.14(h)).

Economics also plays a critical role in the ESA exemption process(16 U.S.C. §1536(g)(1)). Should the Service issue a jeopardy opinion or find that the action will adversely modify critical habitat, and if either there are no reasonable and prudent alternatives or the Service and the project proponent cannot agree on them, then an appeal to exempt the action from ESA protections may be made to the Endangered Species Committee (16 U.S.C.A. §1536(g)(1)). To grant an exemption, the Committee must conclude that: (1) the proposed action has no reasonable and prudent alternatives; (2) that the benefits clearly outweigh alternative courses of action and that the project is in the "best public interest"; (3) that the action is of "national or regional significance"; and (4) that the applicant has made no irreversible or irretrievable commitments of resources (16 U.S.C. §1536(h)(1)(A); 50 C.F.R. §453.03(1)). Economics are clearly involved in the second and third criteria. "Benefits" identified in the second criterion are defined as "both tangible and intangible, including but not limited to economic, environmental and cultural benefits" (50 C.F.R. §450.01). What is of national or regional significance will be discussed *infra*.

Economics is incorporated less explicitly in developing recovery plans for the species (16 U.S.C. §1533(f)(1). First, Congress prescribed a system that gives priority in preparation of recovery plans to species that have the potential to conflict with economic or development plans (16 U.S.C. §1533(f)(1)(A) citing P.L. 100-478 §1003, 102 Stat 2306 (1986)). Recovery plans are also required to contain cost and time estimates (16 U.S.C. §1533(f)(1)(B). Additionally, for those plans considered "major Federal actions," an environmental impact statement must be prepared under N.E.P.A. that identifies the economic and social costs of various alternative processes to facilitate species recovery (P.L. 91-190 §120(C)).

Protection of biological resources under the Endangered Species Act (ESA) is frequently considered to be encumbered by the requirement that the U.S. Fish and Wildlife Service (Service) conduct economic analyses prior to critical habitat designation and implementation of certain recovery plans. The requirement for these analyses are both procedural and substantive; and in both cases their underlying purpose is to require the Service to take a hard look at the effects of its proposed actions by documenting that it has considered alternatives, that the benefits of the proposed actions outweigh their social and economic costs, and that its decisions are not "arbitrary and capricious" as defined under the Administrative Procedures Act (5 U.S.C. §706(2)(A)). While these analyses are frequently viewed as roadblocks to implementation of the ESA, they have the potential—if properly conducted and used by the Service—to build public support for endangered species protection.

Approaches for Economic Evaluations. Traditional economic analyses conducted under §4 of the ESA have focused on single species. However, packages of species listings are increasingly

being proposed because (1) either the proposed critical habitat overlaps or is adjacent from one species to the next, and/or (2) because threats to the species are similar. This was the case with the big river fishes in the Colorado River Basin (U.S.F.W.S. 1993). The major parameters defining the type of economic analysis are determined by how wide-ranging the species' proposed critical habitat is, and by the sorts of deleterious effects on the species whose economic effects require analysis. A typology of social and economic analyses, shown in Table 1, can be constructed based on these two criteria.

Table 1. Typology of social and economic analyses with species examples.

		Potential Effects	
		Concentrated	Diffuse
Species' Geographic	Dispersed	I. Desert tortoise	II. Mexican spotted owl
Distribution	Discrete	III. Socorro isopod	IV. SW willow flycatcher

Potential deleterious effects on species can be roughly divided into two types: those that are concentrated and those that are diffuse. Examples of concentrated effects are water impoundments, urban developments such as highways and housing, and collecting of the species. Diffuse deleterious effects take into account things like the cumulative effects of timber harvest and grazing, stream and groundwater hydrological modifications, pesticides and herbicides, exotic species introductions, and climatic changes. Determining cause-and-effect relationships between the activity and its impacts, both biological and economic, on the species is more straightforward with concentrated effects than with diffuse effects. Consequently, the types of economic analyses required differ between these two types of effects.

The second key determinant for economic analyses is the extent of the target species' distribution. Basically two different possibilities exist: the species can be located in a discrete, single or multiple, site(s); or the species can be widely distributed. The geographic extent of the species' distribution sets the bounds for at least the first level of determining the region of economic effects from designation of critical habitat and recovery of the species. And, in many cases, the geographic distribution will determine the amount of effort required—and the complexity—of coordination with affected interests.

Answers to questions in four specific areas will be required to conduct the economic and social effect analyses required under the ESA for geographic regions (within a state), ecosystems (within a region), and site-specific localities proposed for designation of critical habitat for one or more species. These questions relate to (1) the types of economic effects encountered in protecting

endangered species, (2) how to discriminate between those economic effects that occur solely as a result of the ESA versus those resulting from other legal protections, (3) the appropriate scale to use to analyze social and economic effects, and (4) the geographic bounds for effects determination.

Specific questions within each of these four areas that need to be answered are:

- Determination of Economic Costs and Benefits. Three types of economic effects typically result from endangered species protection. These can be broadly categorized into either economic efficiency (prevention of waste), or distributional equity (who wins, who loses). Generally the economic efficiency criterion prevails—at least in critical habitat designations—while distributional equity considerations are commonly overlooked until political pressures are applied.
- Screening of Effects. How detailed should the economic and social effects of other Federal and state laws that come into play with ESA listing be examined? Similarly, how should the effects of listing, compared to critical habitat, compared to recovery be delineated?
- Scale of Analyses. What is the appropriate level of effects to analyze? This would seem to ultimately flip between viewing the effects from a broader perspective versus identifying the effects that result from smaller, chronic problems of the type usually addressed through adverse modification of critical habitat.
- Geographic Boundaries. How do you determine the geographic boundaries for estimation of social and economic effects for assemblages of listed species? How do these boundaries correspond to ecosystem boundaries, and how do these correspond to the specific locations for proposed critical habitats?

Determination of Costs and Benefits. Three types of economic impacts are used to characterize economic efficiency and distributional effects in the designation of critical habitat. These are only descriptions of economic impacts — similar to what would be used in a NEPA analysis — and not the criteria used to exclude potential critical habitat areas. The economic effect are characterized as (1) national economic costs, termed "efficiency"; (2) regional, or distributive, economic impacts; and (3) other costs that are not national or regional (for the northern spotted owl, see 57 Fed. Reg. 1796, 1812 (1992)). Efficiency effects are measured as the change in economic rents and consumer surpluses attributable to the designated areas (57 Fed. Reg. 1812 (1992), with and without critical habitat; and the change in capital asset values (Ibid.) and wages lost by displaced workers who remain unemployed or are re-employed at lower wages (Ibid.). Regional, or distributional, impacts are reductions in county revenue sharing from Federal timber sales (Ibid.), the social costs to individuals and communities caused by a slowdown in timber dependent economies (Ibid.), and changes in state and county property and severance tax revenue (Ibid.).

Two other effects that the Service identified but chose not to include in their analysis are the increases in profits that producers (including the federal government) would receive from higher prices for timber, and the effects of a decrease in real estate values that would be expected as a result of high unemployment.

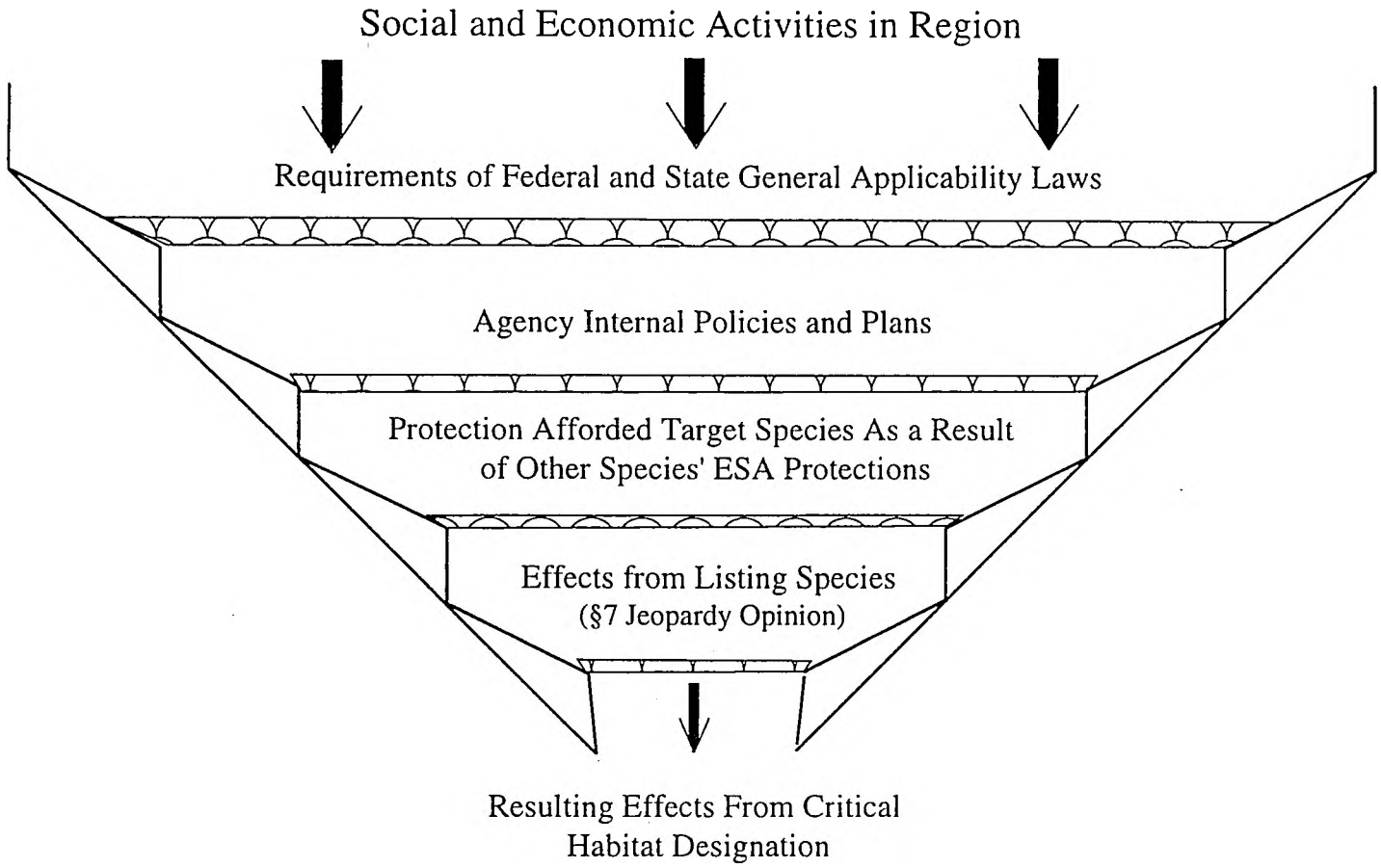
The costs associated with species and ecosystem protection are commonly balanced by public benefits. Economic theory identifies three types of benefits from endangered species protection: existence value, option value, and human-use values (Norton 1986). Traditionally, the determination of these values for any given species is beyond the scope of the economic analyses for critical habitat designation. Benefits are mentioned, but then largely not incorporated into the analysis of the benefits versus the costs of designating specific critical habitat areas (U.S.F.W.S. 1987). Usually, the only economic benefits considered in typical analyses are those resulting from the prevention of wasteful government expenditures (Souder 1986a, 1986b).

Screening of Effects. The analysis scale is inextricably linked with the comparative protections offered by other laws in relations to those uniquely provided by the Endangered Species Act. Additionally, as previously mentioned, economic effects that result from listing generally differ from those that result from designation of critical habitat . The determination of the economic and social effects from designating critical habitat for a single species can be envisioned as a funnel containing a series of finer and finer screens that sieve out the effects that do not result from critical habitat. This series of effect filters is shown in Figure 1.

Species are protected by a broad range of Federal laws and rules of general applicability such as NEPA, Section 404 of the Clean Water Act, and the National Forest and Federal Lands Planning and Management Acts (NFMA and FLPMA). Agency internal policies and plans (i.e., Forest Plans, Allotment Management Plans (AMP), etc.) provide the second screening of economic and social effects resulting from endangered species protection. For example, most forest plans and AMPs mandate protection of riparian areas, and since these areas are frequently critical to protection of the target ESA species, economic and social effects under the ESA are subsumed by the effects of the agencies policies and plans. Protection may also be afforded the target species through other species' ESA protections. This occurs when another listed species occurs in the same location as the target species, and this species' protective measures also protect the target species. For example, riparian and stream protection measures required to prevent a jeopardy opinion for the listed Apache trout may prevent jeopardy, and possibly adverse modification of critical habitat, for proposed Arizona willow (Souder 1994). If this is the case, there is no additional social or economic effect from listing or critical habitat for the Arizona willow in areas of

overlay as long as any effects on the Apache trout are sufficient to trigger a Section 7 jeopardy opinion (Ibid.). However, added costs may result if actions that would not jeopardize the trout adversely modify critical habitat for the willow, or if the two species' ranges do not overlap. Similar situations exist where other species' critical habitat overlaps the target species'. The final, and typically primary, screen for social and economic effects is the relationship between protections offered the target species as a result of Section 7 prohibitions on jeopardizing the continued existence of the species compared to the effects resulting from adverse modification of critical habitat.

Figure 1. Process for determining social and economic effects from critical habitat designation.



Once social and economic effects are sieved through these screens, the effects remaining at the end represent those due to critical habitat designation. These procedures work well to determine the incremental effects of a single species in a single area, and thus provide invaluable information for the exclusion report. However, they work less well in determining the cumulative effects of all listings in a region. The regional cumulative effects analysis will start out at the third screen (in Figure 1) after economic effects are filtered through the first two screens—other Federal laws and agency policies and plans. From this level, detailed analyses of both the cumulative and marginal effects of individual species' protection and recovery measures can then be determined.

Scale of Analyses. The scale question can be answered by applying the idea of "tiering" analyses, such as those used in the NEPA process. The framework would look something like this:

- At the regional level, employment statistics, demographic projections, and economic multipliers provide the bases for the analyses. Basic economic revenue flows would be traced to determine regional effects.
- The county level would provide the basic first level for impact assessments. This scale overcomes a common problem with existing, single-species, analyses where detailed economic effects are "washed out" by focusing on too large an area, for example a single or multiple states (for example, see the Colorado River big fishes analysis (U.S.F.W.S. 1993)).
- Localized impacts for specific species or assemblages of species at the sub-county level where appropriate.
- Critical habitat area site-specific economic and social analyses required for the exclusion report. This level of analysis focuses on each individual critical habitat area to weigh the benefits of designation compared to their costs.

However, under the regional– or ecosystem–based analysis approach, there is the potential to incorporate a higher degree of economic and social benefits in the analyses. Generally, the benefits of protection are considered to occur first as nationwide (or international under treaty), then multi-state region, then state, then sub-state region, down to local areas. Once benefits are identified, procedures are required to trade off between these benefits and the level at which economic and social effects occur so that the net result can be displayed in the Exclusion Report. But since benefits tend to flow up from the local area to the nation, while costs of protection tend to flow down from the nation to the local area, there are issues of national versus local equity that need to be considered. We need a process to both identify these benefits and costs, as well as determine their significance, which is not done very well at present (U.S.F.W.S. 1992a).

Geographic Boundaries. The definition of region determines the context for incremental and cumulative analyses of endangered species protection costs. The differentiation between national and regional significance is used both in the economic analysis for determination of critical habitat, as well as by the Endangered Species Committee in determining whether an exemption to Section 7 is justified (U.S.F.W.S. 1992). Significance in determining whether the benefits resulting from critical habitat designation override the social and economic costs associated with this protection turn on whether they are of regional or national significance. The definition of "region" was extremely important and controversial in the Committee's hearing on the Bureau of Land Management's request for an exemption for its timber sales in Oregon.

However, region is nowhere defined in the Act or consistently in the legislative history. There is no regulatory definition of "region" (50 CFR §450.01). There is also no hard and fast definition of "region" for the purposes of analysis and exemption by the Endangered Species Committee (Comm. on Env. & Pub. Works 1982). Variously, region as been defined in terms of (1) multi-state effects; (2) single-state effects; (3) multi-county effects; and (4) county effects. The question of whether a regional impact can result from effects in a single county (or even a single timber sale) were compared to whether effects had to be "regional" in a multi-state context in debates during the 1978 ESA Amendments (H.R. Rep. No. 1625, 95th Cong., 1st Sess. 23 (1978); H.R. Conf. Rep. No. 1804, 95th Cong., 1st Sess. 20 (1978)). Yet the issue of region, similarly to the issue of the scale, ultimately determines not only what types of costs and benefits are included in the economic analysis, but also their relative significance both to the "region" as well as to local affected interests.

Critical Economic Issues. Three issues affect the Service's ability to effectively incorporate economic analyses in the ESA's implementation. They are directly related, and complimentary to, the screens used filter economic effects in the critical habitat analyses. First, to start estimating economic effects a determination of baseline conditions is needed. At issue is what can be reasonably certain to occur in the future, with and without consideration of the endangered species. Second, how any one specific potential action is compared to the cumulative effects of many previously existing or potential actions must be determined. Third, distinguishing the economic effects of listing compared to critical habitat designation effects is difficult, but required by statute and regulation. These three areas largely determine the which economic effects, and their magnitude that are affected by implementation of the Act.

Biological opinions issued by the Service in Section 7 consultations require a determination of the "effects of the action" (50 CFR §402.14(h)(2) and 51 Fed. Reg. 19932 (June 3, 1986)). A similar "reasonably certain to occur" criteria is used in the economic analysis to estimate the direct and indirect impacts resulting from critical habitat (U.S.F.W.S. n.d.). When the Service proposed regulations after the 1982 ESA Amendments there was extensive discussion of what "reasonably certain to occur" means (51 Fed. Reg. 19,932 (1986)). The resulting definition is that "reasonably certain to occur" means those "actions that are likely to occur, bearing in mind the economic, administrative, or legal hurdles which remain to be cleared" (51 Fed. Reg. 19,933 (1986)).

The "reasonably certain to occur" criteria is crucial to resolving the second critical issue: the determination of the cumulative effects of the proposed action. This is because the criteria at least partially delineates activities that are required to be analyzed in determining the "cumulative effects" of a specific Section 7 consultation in relation to other activities that may affect the species or its

critical habitat (50 CFR §402.02, §402.14(h)). The limitation on how far to go in determining "cumulative impacts" is defined by regulation: consider non-Federal projects or activities that are unrelated to the one under consultation (51 Fed. Reg. 19,932-33 (1986)).

Standards for distinguishing between "jeopardy" and "destruction or adverse modification of critical habitat" are important because they divide the apportionment of impacts in the economic analyses for critical habitat determinations. The Service, in a since-withdrawn National Policy Issuance, described the differentiation as "one of the scope of analysis." Adverse modification of critical habitat is determined by an activity's effects on the constituent elements identified as essential for the conservation of the species that are listed in the critical habitat rule (U.S.F.W.S. 1992). In contrast, jeopardizing the continued existence of a species requires a comparatively greater degree of effect, except when critical habitat occupies the entire range of the species and all constituent elements are identified (U.S.F.W.S. 1992).

Conclusions. While some critics may lambaste the whittling away of economic effects suggested by my analysis, I believe that it is important to clearly identify economic and social effects specific to the ESA from those which could occur in the absence of its protections. This is the only meaningful way to evaluate alternatives to the existing Act. The glaring light that focuses on the ESA typically results from the Act's clear standards—as delineated in an almost twenty year string of Supreme Court cases running from *Tennessee Valley Authority* v. *Hill* (437 U.S. 153 (1978)) to the recently decided *Babbitt* v. *Sweet Home* (No. 94-859-Opinion (1995))—in combination with the easy access that the public has to courts to enforce its provisions (16 U.S.C. §1540(g)). Because of the conjunction of these two features, the ESA incurs more suits, and faces greater challenge, than would otherwise occur. But it is noteworthy that in the almost twenty years since the 1978 amendment that established exemptions to the ESA, the Endangered Species Committee has not once lawfully found sufficient economic or social grounds to override Section 7 protections (the Committee's 1994 decision exempting 13 sales was stayed and subsequently withdrawn as a result of *ex parte* communications between the Committee and White House staff, *Portland Audubon Soc'y.* v. *Endangered Species Comm.*, 984 F.2d 1550 (1993)).

Notwithstanding the above, economic costs are incurred as a result of the Act. While the Federal governments costs for its own actions under Section 7 can be rationalized as the cost of doing business, economic effects suffered by private individuals and states under either Section 9, or through the Federal permitting process under Section 7, need to be taken into account. But the most reasonable way to do this is to first determine the true economic effects resulting from the Act. This is difficult, as I have shown, because not only do other laws protect endangered species, but protective measures afforded to other endangered species provide protection to the target

species. Overlapping species' protections exacerbates the difficulty in determining single-species economic effects, but along with this difficulty it also provides an opportunity to conduct cumulative and ecosystem-based analyses.

A broader array of conservation measures could expand our horizons beyond just focusing on economic effects. Especially needed are measures that work from an ecosystem framework, that attempt to prevent the listing of species by protecting them and their habitat (see for instance the Forest Service's proposed revisions of the National Forest Management Act rules in 60 Fed. Reg. 18885 (April 13, 1995)), and that encourage private individuals to incorporate protection of endangered species in their own private actions (Keystone Institute 1995). Together these measures are more likely to positively affect species—both currently listed as well as those at risk—than all the grenade lobbing from each side about the costs and benefits of the ESA. That said, economics can play a positive role in species protection by highlighting who pays and who benefits, by allowing the evaluation of alternative methods to reach the same point, and by educating society on the costs and benefits that biodiversity protection provides.

General References

Bishop, Richard C. "Option Value: An Exposition and Extension." 51 Land Economics 1 (1982).

Comm. on Env't. & Pub. Works, 97th Cong., 2d Sess. A Legislative History of the Endangered Species Act of 1973, As Amended in 1976, 1977, 1978, and 1980. (Comm. Print 1982).

Ekstrand, Earl, Dirk Draper, John McKean, and Richard Johnson. "Economic Analysis of Critical Habitat Designation for the Mexican Spotted Owl, Draft Report." U.S. Fish and Wildlife Service, Albuquerque, NM. 1995.

Keystone Institute. "The Keystone Dialogue on Incentives for Private Landowners to Protect Endangered Species, Final Report." (1995).

Kohm, Kathryn A. (ed.). Balancing on the Brink of Extinction: The Endangered Species Act and Lessons for the Future. (1991).

National Research Council. Science and the Endangered Species Act. 1995.

Norton, Bryan G. (ed.). The Preservation of Species: The Value of Biological Diversity. (1986).

Rohlf, Daniel J. The Endangered Species Act: A Guide to Its Protections and Implementation (1989).

Sansonetti, Thomas. "Economic Impacts of the Endangered Species Act". Mineral Law Series (Public Land Law Institute) 10-1 to 10-5 (1992).

Secretary of the Interior. "Report of the Secretary of the Interior to the Endangered Species Committee Related to the Application by the Bureau of Land Management for Exemption from the Requirements of Section 7(a)(2) of the Endangered Species Act In Order to Hold

Timber Sales on 44 Tracts Remaining in the Bureau's 1991 Program in Oregon." (April 29, 1992)

Souder, Jon A. "Analysis of the Economic Impacts of Designating Critical Habitat for *Salix arizonica* (Arizona willow) Under the Endangered Species Act of 1973, As Amended 1982." U.S. Fish and Wildlife Service, Albuquerque, NM. (1994).

Souder, Jon A. "Chasing Armadillos Down Yellow Lines: Economics in the Endangered Species Act." 33 Natural Resources Journal 1095 (1993).

Souder, Jon A. "Analysis of the Economic Impacts of Designating Critical Habitat for *Meda fulgida* (Spikedace) Under the Endangered Species Act of 1973, As Amended 1982." U.S. Fish and Wildlife Service, Albuquerque, NM. (1986a).

Souder, Jon A. "Analysis of the Economic Impacts of Designating Critical Habitat for *Tiaroga cobitis* (Loach minnow) Under the Endangered Species Act of 1973, As Amended 1982." U.S. Fish and Wildlife Service, Albuquerque, NM. (1986b).

U.S. Environmental Protection Agency. "Guidelines for Performing Regulatory Impact Analysis." E.P.A. 230-01-84-003. (Revised and reprinted, 1991).

U.S. Fish and Wildlife Service. "Draft Economic Analysis of Proposed Critical Habitat Designation in the Colorado River Basin For the Razorback Sucker, Humpback Chub, Colorado Squawfish, and Bonytail." (1993).

U.S. Fish and Wildlife Service. "Exclusion Process: Critical Habitat and the Northern Spotted Owl." Portland, OR. (1992a)

U.S. Fish and Wildlife Service. "Interim Endangered Species Act Section 7 Policy and Guidance. National Policy Guidance Issuance 90-[blank]." Memorandum from Richard N. Smith, Deputy Director to Regional Directors (Mar. 11, 1992b).

U.S. Fish and Wildlife Service. "Economic Handbook for Critical Habitat Designations Under the Endangered Species Act of 1973, As Amended (1982)." (Revised Ed., 1987).

U.S. Fish and Wildlife Service. "Draft Interim Report Format and Guidance for Economic Analysis of Proposed Critical Habitat." n.d.