The Normative Dimension and Legal Meaning of *Endangered* and *Recovery* in the U.S. Endangered Species Act

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Abstract: *The ethical, legal, and social significance of the U.S. Endangered Species Act of 1973 (ESA) is widely appreciated. Much of the significance of the act arises from the legal definitions that the act provides for the terms* threatened species *and* endangered species. *The meanings of these terms are important because they give legal meaning to the concept of a recovered species. Unfortunately, the meanings of these terms are often misapprehended and rarely subjected to formal analysis. We analyzed the legal meaning of* recovered species *and illustrate key points with details from "recovery" efforts for the gray wolf (*Canis lupus*). We focused on interpreting the phrase "significant portion of its range," which is part of the legal definition of endangered species. We argue that recovery and endangerment entail a fundamentally normative dimension (i.e., specifying conditions of endangerment) and a fundamentally scientific dimension (i.e., determining whether a species meets the conditions of endangerment). Specifying conditions for endangerment is largely normative because it judges risks of extinction to be either acceptable or unacceptable. Like many other laws that specify what is unacceptable, the ESA largely specifies the conditions that constitute unacceptable extinction risk. The ESA specifies unacceptable risks of extinction by defining endangered species in terms of the portion of a species' range over which a species is "in danger of extinction." Our analysis indicated that (1) legal recovery entails much more than the scientific notion of population viability, (2) most efforts to recover endangered species are grossly inadequate, and (3) many unlisted species meet the legal definition of an endangered or threatened species.*

Keywords: *Canis lupus*, delisting, endangered species, gray wolf

La Dimensión Normativa y el Significado Legal de *En Peligro* y *Recuperación* en el Acta de Especies en Peligro de E. U. A.

Resumen: *El trasfondo ético, legal y social del Acta de Especies en Peligro de E. U. A. de 1973 (AEP) es valorado ampliamente. Mucho del significado del acta se origina en la definición legal que proporciona a los términos* especies amenazadas *y* especies en peligro*. El significado de esos términos es importante porque proporcionan una acepción legal al concepto de especie recuperada. Desafortunadamente, el significado de esos términos es malentendido a menudo y raramente es sujeto de un análisis formal. Analizamos el significado legal de* especie recuperada *e ilustramos puntos clave con detalles de los esfuerzos de recuperación para el lobo gris (*Canis lupus*). Nos concentramos en interpretar la frase* porción significativa de su distribución*, que es parte de la definición legal de* especie en peligro*. Argumentamos que* recuperación y estar en peligro *implican una dimensión fundamentalmente normativa (i.e., especificación de las condiciones de estar en peligro) y una dimensión fundamentalmente científica (i.e., determinar si una especie reúne las condiciones de estar en peligro). La especificación de condiciones para estar en peligro es principalmente normativa porque*

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juzga que los riesgos de extinción son aceptables o inaceptables. Como muchas otras leyes que especifican lo que es inaceptable, el AEP especifica las condiciones que constituyen un riesgo de extinción inaceptable. El AEP especifica riesgos de extinción inaceptables al definir especies en peligro en términos de la porción de la distribución de una especie en la que la especie está en peligro de extinción. Nuestro análisis indicó que (1) la recuperación legal implica mucho más que la noción científica de viabilidad poblacional, (2) la mayoría de los esfuerzos para recuperar especies en peligro son burdamente inadecuados y (3) muchas especies que han sido retiradas de la lista cumplen con la definición legal de una especie amenazada o en peligro.

Palabras Clave: *Canis lupus*, especies en peligro, lobo gris, retirar de la lista

Introduction

Within conservation science, there are many meanings associated with the words *threatened* and *endangered.* Each is context dependent, and some are incommensurable. Population biologists use these two terms to refer to high probabilities of extinction within specified time frames (Vucetich & Waite 1998). The World Conservation Union (IUCN) defines these terms for the purpose of prioritizing and ranking species according to the risk of global extinction. According to the U.S. Endangered Species Act of 1973 (ESA), an "endangered species" is "any species which is "in danger of extinction" throughout all or a significant portion of its range . . . " (section 3.6) and a "threatened species" is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (section 3.21). The primary purpose of ESA's definitions is to identify which species require protection because their extinction risk is unacceptably high.

A "recovered species" is one that is not threatened or endangered. Many conservation workers seem to associate closely "recovery" with population viability. Because population viability analyses are considered a fundamentally scientific endeavor, many presume that scientists are exclusively responsible for determining the conditions that constitute endangerment and recovery. We explain why this view is inadequate and how the ESA, in its legal definition of endangered species, largely specifies the conditions that represent endangerment and recovery.

If the general conditions constituting endangerment are specified, then judging a particular species to be or not to be endangered or threatened is a fundamentally scientific determination. Accordingly, the ESA stipulates that endangerment is to be determined "solely on the basis of the best scientific and commercial data available" (section 4[b]).

Nevertheless, specifying the conditions representing endangerment is a fundamentally normative (not scientific) determination, although appropriate determination would be informed by relevant scientific facts. Philosophers sometimes distinguish empirical (or scientific) claims that are potentially falsifiable from normative (or value) claims that can be neither proved nor disproved (e.g., Hempel 1970; Putnam 2002). A predominately empirical claim is, for example, the risk of a fatal car collision increases with increasing speed. Whereas, a predominantly normative claim is, for example, it is unacceptable (i.e., wrong) to drive faster than 65 miles per hour on some roads. Most complex, real-world ideas entail both empirical and normative elements.

In the context of species endangerment, an empirical claim would be that a particular species has a <10% chance of extinction over the next 75 years throughout 60% of its range and a greater risk of extinction throughout the remainder of its range. The claim could be true or false, but the claim would generally be considered empirical because its truth or falsehood is (potentially or conceivably) determinable via scientific methods. In contrast, a normative claim would be that the species of the previous statement is (or is not) in danger of extinction throughout all or a "significant portion of its range." Although such a statement may appear to be, or may be offered as, a purely empirical claim, it possesses an irreducibly normative dimension. More specifically, a fundamental principle of population biology is that a species may be more or less at risk but not simply at risk or not at risk. The ESA's notion of endangered is fundamentally normative insomuch as it requires specifying acceptable and unacceptable levels of risk.

Judgments concerning the acceptably of any risk vary tremendously among individuals, even among individuals with similar levels of expertise. For example, a 66% chance of population decline may cause some to call for dramatic conservation action, others to merely pay closer attention, and others to be unconcerned. Such variation among individuals is attributable to variation in moral, political, psychological, and other normative characteristics.

Here, we provide an in-depth conceptual analysis of the normative dimension and legal meaning and normative dimension of endangered and recovery. In the legal context of species recovery, recovery plans (reviewed in Kareiva 2002) specify precisely the measurable conditions under which particular species would no longer be considered endangered or threatened (i.e., recovered). Our analysis focuses primarily on recovery-plan development.

The Meaning of *Recovery*

Although the ESA does not explicitly define recovery, its legal meaning is implied in the act because a recovered species is considered one that is no longer threatened or endangered. Consequently, a recovered species is not endangered or threatened when it "is not in danger of extinction throughout all or a significant portion of its range and not likely to become so in the foreseeable future." Thus, a recovered species is in danger of extinction throughout at most an "insignificant portion of its range," now or in the foreseeable future. The meaning of recovery (and endangerment) depends on an appropriate interpretation of the phrases significant portion of its range and insignificant portion of range.

To clarify the meaning of recovery, consider an example concerning a hypothetically imperiled species whose range is homogeneous (below, we consider species with heterogeneous ranges.). Suppose it is agreed that 25% is the smallest portion of the species' range that is considered a significant portion, portions <25% are insignificant, and portions equal to or larger are significant. Now suppose this species' status improves such that it is not in danger of extinction over 30% of its range. Has recovery been achieved? No. The species still fits the definition of an endangered species: it is in danger of extinction on a portion of its range (70%) that exceeds the smallest portion that was agreed to be significant (i.e., 25%). Only if the species were not in danger of extinction over 75% (=1 −25%) or more of its range could it be considered recovered. At this point the species would be considered not in danger of extinction throughout all or a significant portion of its range, or equivalently in danger of extinction throughout at most an insignificant portion of its range. For emphasis, an easily misapprehended definition of recovery is not being in danger of extinction throughout at least a significant portion of its range. The inappropriateness of this definition is confirmed by noting that if the species from our example above were not in danger of extinction throughout 30% of its range, the species would fit this misapprehended definition of recovery. Moreover, this species would fit the appropriate definition of an endangered species because it would be in danger of extinction throughout 70% of its range, an area that greatly exceeds the smallest portion of range that was agreed to be significant (i.e., 25%). For example, it seems untenable to consider the grizzly bear (*Ursus arctos*) or the gray wolf (*Canis lupus*) for delisting throughout the lower 48 states given that they occupy <2% and 5%, respectively, of their "historic range."

Why Focus on Significant Portion of Range?

Careful consideration of the phrase significant portion of its range is consistent with common sense and the U.S. Congress' intent for the ESA. The ESA of 1973 was preceded by two similar laws (Endangered Species Preservation Act of 1966 and Endangered Species Conservation Act of 1969) (Bean & Rowland 1997), which defined endangered species more narrowly, with the intention of merely preventing total (i.e., global) extinction. The ESA of 1973 is distinguished, in part, by its redefinition of an endangered species to include the concept of significant portion of its range. Moreover, a report from the U.S. House of Representatives, which was cited in a recent court decision (*Defenders of Wildlife v. Norton* 2005), indicates "The new definition's expansion to include species in danger of extinction 'in *any* portion of its range' represented a significant shift in the definition in existing law which considered a species to be endangered only when it is threatened with worldwide extinction." (Emphasis in the original report [HR Report 412, 93rd Congress, 1973]). The Congress clearly indicated its intent for a recovered species to be reasonably well distributed within its historic range, to the extent feasible.

The Congress' intended focus on significant portion of range is scientifically justified. Specifically, the geographic extent of a species is a general predictor of extinction risk (e.g., Gaston & Blackburn 1996; Purvis et al. 2000; Diniz-Filho & Tôrres 2002; Jones et al. 2003). Additionally, one of the IUCN's primary criteria for defining the endangerment of a species is range occupation (IUCN 2001).

On several occasions, federal judges have also confirmed the importance of considering this phrase (e.g., *Defenders of Wildlife v. Norton* 2001, 2002, 2005, *Southwest Center for Biological Diversity v. Norton* 2004). For example, the Ninth Circuit Court, in a decision concerning the threatened flat-tailed horned lizard (*Phrynosoma mcallii*), wrote (*Defenders of Wildlife v. Norton* 2001:9667): "[Because] it is on the record apparent that the area in which the lizard is expected to survive is much smaller that its historical range, the Secretary must at least explain her conclusion that the area in which the species can no longer live is not a significant portion of its range."

From scientific and nonscientific perspectives it is sensible to conceive of extinction from a local perspective. As a scientific concept, local extinction (i.e., extinction in a portion of a species' range) is central to the notion of metapopulation dynamics (Thomas & Hanksi 1997) and is used regularly throughout the scientific literature. The science citation index service (Institute for Scientific Information) has indexed more than 626 scientific articles written between 1994 and 2004 that contain the key phrase *locally extinct* or *local extinction*. Even from a nontechnical perspective most U.S. citizens appreciate that a species may be locally extinct or endangered. This broad appreciation is reflected in the fact that most U.S. states have lists of endangered species, many of which include taxa that are not at risk of extinction in other states and countries.

The Meaning of *Significant Portion*

Conceptual Considerations

The meaning of significant is context dependent and imprecise. For example, statisticians following the frequentist paradigm comfortably define probabilities >5% as representing a significant chance of experiencing a Type I error if the consequences of that error are grave. Nevertheless, picnickers would probably consider 5% an insignificant chance of rain. The meaning of significant portion in the context of species' ranges and ecological principles is not immediately obvious because prior to the ESA ecologists were not concerned with the concept of significant portion of range.Nevertheless, useful guidance is provided by consulting the dictionary definition of significant (i.e., "a noticeably or measurably large amount" and as "having or likely to have influence or effect," according to the *Merriam-Webster's Collegiate Dictionary* [2003]).

A useful meaning of significant is likely to vary among species. This case-by-case approach is supported by case law (*Defenders of Wildlife v. Norton* 2001) and appeals strongly to common sense. For example, for species whose historical range is small (e.g., Kirtland's Warbler [*Dendroica kirtlandii*]), even a small percentage could be a significant portion. For species with large (continent wide) distributions, perhaps 10% is the smallest portion that might be considered significant. It is difficult, however, to conceive of circumstances in which 33% or more of a species' range could be considered insignificant (see also *Southwest Center for Biological Diversity v. Norton* 2004). By defining endangerment in terms of significant portion of range, the ESA places substantial restriction on the range of acceptable normative views about what is an appropriate level of extinction risk (cf. *Defenders of Wildlife v. Norton* 2001).

Treating significant as described in the previous paragraph would be relatively straightforward for species whose ecology (e.g., vital rates, density, limiting factors, behavior) is homogenous throughout their range compared with species with more variable ecologies. Nevertheless, significant portion of range can also be treated for species whose ecology is not homogenous throughout its range. For example, consider a species' range that is comprised of two regions, each of which is distinct from the other and represents an ecologically significant type. Suppose population density for the species is proportional to prey availability, which varies greatly between the two regions because of precipitation. Recovery here could entail being in danger of extinction (now or in the foreseeable future) throughout at most an insignificant portion of each region, which comprises its range.

This treatment of significant implies that a portion of historic range cannot be considered insignificant simply because population density is (or is expected) to be lower than in other portions of range. This view is supported by qualitative and quantitative assessments of ecological and evolutionary processes (e.g., Caughley et al. 1988; Scudder 1989; Lawton 1993; Hoffmann & Blows 1994; Lomolino & Channel 1995; Lesica & Allendorf 1995; Channell & Lomolino 2000). For example, populations with low density and high variability may have the greatest potential to evolve quickly in response to a changing environment (Vucetich & Waite 2003). More generally, prejudging the ecological significance of some portion of range on the basis of population density may be inappropriate because local population density and fitness (or habitat quality) may not typically be well correlated (e.g., Brawn & Robinson 1996).

Recovery may require a species to occupy all but an insignificant proportion of each significant ecoregion in which the species formerly existed.

Application of Concepts

The purpose of this example is to demonstrate that our ideas can be applied to complex, real-world circumstances. Recently a habitat-suitability model has been developed for wolves in the southwestern portion of the United States (Carroll et al. 2006). This model indicates that suitable wolf habitat may be divided into two largely contiguous habitat types. One habitat type would support higher wolf densities, represents higher elevation terrain, where mesic forests are common, and is largely contained on public lands. The other habitat type would support lower densities of wolves and represents lower elevation terrain, where climate is hot and dry. In this lower density habitat cattle-stocking densities and private land ownership is higher. The natural dynamics of populations in this region may be metapopulation like insomuch as local extinction and recolonization are frequent. The historic range of wolves in the southwestern United States is likely to be reasonably close to that represented by this habitat-suitability model.

Public controversy surrounding wolf recovery in the southwest is substantial. Sociological analyses suggest that support and opposition for wolves appear to be rooted in personal character, more so than any specific or general economic concern (e.g., Naughton-Treves et al. 2003). Given these circumstances and a respect for minority opposition to wolf reintroduction, one could devise recovery criteria that are (1) as sensitive as possible to this minority, normative position and (2) meet normative criteria specified by the ESA, which we develop explicitly here. More specifically, we recommend that one-third is the largest portion that could, by any stretch of the imagination, be considered an insignificant portion of range. See the sections "The Meaning of *Recovery*" and "The Meaning of *Significant Portion*" for context and justification.

Thus, recovery for these wolves could entail removal of human threats (i.e., human-caused mortality) over 66%

(i.e., 1.00 – 0.33) of the high-density portion of the suitable habitat in the southwestern distinct population segment. From a practical standpoint, for wolves this would mean that human-caused mortality would be reduced so that it did not appreciably affect wolf density (see the section "The Meaning of *In Danger of Extinction*").

Recovery would also entail that human threats be effectively eliminated over 66% of the low-density portion of the suitable habitat. The effective removal of all threat is necessary because density is expected to be low (see the section "The Meaning of *In Danger of Extinction*"). We recognize that this high level of protection would be implemented in areas where livestock density is high. This concern is mitigated by recognizing that wolf density, and thus livestock losses, are expected to be low in these areas. If an area assigned as low-density habitat eventually were to support high densities of wolves, then such a region should be reclassified as high-density habitat and managed accordingly.

The Meaning of *Range*

According to a 2003 U.S. Fish and Wildlife Service (USFWS) ruling (USFWS 2003), the recovery of gray wolves is to be managed in three separate regions or distinct population segments (see www.fws.gov/midwest/wolf/edps/eastern-dps.htm for details and a map). In July 2004, wolves occupied approximately 10% of the area of the eastern distinct population segment (EDPS). Virtually all the EDPS is historic range, much suitable habitat exists, and substantial portions of it could be made suitable if human threats were removed. In July 2004, the USFWS proposed delisting wolves from the EDPS (Ragan et al. 2004). The proposal's rationale for delisting (Ragan et al. 2004) is problematic and reveals the need to understand what might count as reasonable and unreasonable interpretations of the term *range*.

This proposal equates range in the ESA definition of endangered species with "current range" (Ragan et al. 2004:43690):

> within its *current* range it must no longer be in danger of extinction or likely to become endangered in the foreseeable future . . . Similarly, when a threatened species has recovered to the point where it is not likely to become in danger of extinction throughout all or a significant portion of its *current* range in the foreseeable future, it is appropriate to delist the species even if a substantial amount of the historical range remains unoccupied if the population in its current range is secure [emphasis added].

Replacing range with current range is unjustified for several reasons. First, consider directly how replacing range with current range affects the ESA's definition of an endangered species: "any species which is in danger of extinction throughout all or a significant portion of its *current* range." Using current range in this way is functionally identical to striking the last phrase of the ESA's definition (i.e., throughout all or a significant portion of its range) or reducing the definition of endangered to "any species which is in danger of extinction."

In most cases, species are listed as endangered because current range has been reduced by the enterprises of humans (Czech & Krausman 1997). The ESA is intended to mitigate reductions in range, not merely describe them.

Perhaps the most sensible meaning for range in the ESA's definition is: historic range that is currently suitable or can be made suitable by removing or sufficiently mitigating threats to the species. In many cases, a more than adequate sense of this range would be provided by science's best understanding of a species' historic range (Egan & Howell 2001) and contemporary habitat suitability studies (Carroll et al. 2006). Framing recovery on the basis of historical range has also been recognized by some previous delisting actions (e.g., Brown Pelicans [*Pelecanus occidentalis*] and gray whales [*Eschrichtius robustus*]; USFWS 1985, 1994).

A satisfying demonstration that historic range is an adequate interpretation for range demonstrates that other senses of range (especially, "current suitable range" and "potentially suitable range") are less appropriate, and selecting a point in history on which to judge historic range is not overly arbitrary. One would likely avoid being overly arbitrary if historic range meant the range shortly before humans are thought to have caused significant range reduction. Moreover, range size, prior to human-caused reduction in range size, would represent a naturally selected (in the Darwinian sense) range size that would (by virtue of being naturally selected) be associated with a natural risk of extinction (e.g., Hoffman & Blows 1994). A natural risk of extinction would typically be low and would seem acceptably low. A more thorough analysis of the meaning of range would be valuable, and these considerations would be a useful starting point for such analysis.

Recovery and Population Viability

Population Viability (PV) is a contemporary scientific concept referring to a state of low extinction risk over a long period of time (e.g., Beissinger & Westphal 1998). Because PV may be characterized as an ecologically significant condition, could it be sensible to equate recovery with PV, insomuch as a viable population would occupy an "ecologically significant" or "demographically significant" portion of its range? If so, then interpreting significant portion in a strictly geographic or areal sense may be overly simplistic. Moreover, because PV analyses are a highly technical activity, equating recovery with PV would have the apparent virtue of making recovery into a highly scientific and objective concept.

At least four considerations discredit equating recovery with PV:

(1) The Congress is unlikely to have equated recovery with our modern, scientific notion of PV. This concept, as we know it today, did not exist in 1973, when the ESA was made law.
(2) If recovery were simply equated with PV, then the ESA would provide no guidance concerning what counts as "low" or "long" when considering recovery to be a low extinction risk for a long period of time. Extinction risk is associated with a species' geographic range, and by defining endangerment in terms of significant portion of its range the 1973 ESA clearly provides guidance about what constitutes an acceptably low risk of extinction.
(3) Equating recovery with PV would promote substantial misapprehension of recovery. First, PV analyses are highly technical, and that technicality would often be mistaken by many as objectivity, when PV in fact is highly normative. Second, few people (including conservation experts) can accurately compare extinction risks because they entail cognitive illusions, which are well documented (Ayton 1996) deficiencies in human ability to reason about risk and uncertainty. Consider, for example, which species is at greatest risk of extinction, one with a 30% chance of extinction within the next 500 years, one with a 75% chance of extinction with 100 years, or one with a 90% chance of surviving 50 years? It is not obvious to most people that these represent roughly equal risks of extinction (e.g., Vucetich & Waite 1998). Nevertheless, if certain assumptions about a species' population dynamics (i.e., the shape of the distribution of its times to extinction) cannot be verified (and they usually cannot be), then these risk statements are simply incomparable. If PV were the only effective conceptual means by which to judge recovery, then it would be necessary to do so. Nevertheless, the ESA provides an equally effective and substantially simpler means of judging recovery. Virtually everyone is able to discuss and understand different view points on what is and is not a significant portion of range.
(4) The ESA requires recovery plans to specify measurable recovery criteria, such as population size or vital rates. There is broad agreement that modern PV analyses cannot reliably convert specific levels of extinction risk into such measurable criteria (e.g., Mills et al. 1996; Ludwig 1996, 1999; Beissinger & Westphal 1998; Coulson et al. 2001). Attempting to use PV analyses for such a purpose would not represent the use of best-available science; it would represent a misuse of science.

The Meaning of *In Danger of Extinction*

Given an understanding of significant portion of range, what does it mean to be in danger of extinction on some portion of range? The previous section highlights some serious limitations of relying exclusively on PV analyses and estimated probabilities of extinction to judge the danger of extinction. The danger of extinction tends to increase with reduced population abundance (density) or reduced vital rates (e.g., survival and fecundity). The danger of extinction is also affected by interaction among vital rates and interaction between vital rates and abundance. Given these fundamentals of population biology, the danger of extinction might be usefully judged by considering general principles such as (1) an appreciable reduction in density may cause an unacceptably high danger of extinction for populations with naturally low density; (2) an appreciable reduction in a vital rate may cause an unacceptably high danger of extinction for populations with the ability to compensate a reduction in one vital rate by increasing another (Boyce et al. 1999); (3) an appreciable reduction in adult survival may cause an unacceptably high danger of extinction for populations characterized by high survival and low recruitment; and (4) an appreciable reduction in recruitment may cause an unacceptably high danger of extinction for populations characterized by high recruitment and low survival.

Although potentially useful, this list of principles is not intended to be exhaustive or a substitute for detailed consideration of case-specific circumstances. Application of such principles requires some empirical knowledge of the kind of population being considered; a general (i.e., reliable) theoretical understanding of the population dynamics associated with that kind of population; and being able to judge the normative dimension of "appreciably." In some cases a rational decision process would require accommodating substantial ignorance of the population's dynamics. The challenge of simultaneously working with scientific and normative dimensions is unavoidable. Virtues of this approach are that most people can discuss and understand the meaning of appreciably and it appropriately and generally translates a legal requirement (i.e., judging in danger of extinction) into recovery criteria that are measurable in most circumstances (i.e., abundance and vital rates). Although useful, more work is liable to yield better understanding of the meaning of in danger of extinction.

Conclusion

Specifying the conditions for endangerment (i.e., acceptable and unacceptable levels of extinction risk) is a fundamentally normative determination. Specifying whether a species meets such conditions is a fundamentally scientific determination. The ESA largely specifies the conditions for endangerment when it defines an endangered species and a threatened species in terms of significant portion of range. It is thus remarkable that only a small portion of recovery plans account for, in any way, the concept associated with significant portion of range.

Individual recovery plans are responsible for resolving, within the constraints of the ESA, the precise conditions for recovery that are not specified by the ESA. Each recovery plan has to judge, for example, whether 15% is a significant or insignificant portion of a species' range? What does it mean to be in danger of extinction across some portion of range? The only advice that we can offer is that answers to such questions are fundamentally normative, not exclusively scientific, and should be dealt with accordingly. Political scientists, ethicists, legal scholars, sociologists (especially insomuch as they can objectively represent public attitudes about normative issues), and ecologists would contribute valuably to such resolution. Hence such experts ought to be involved with the development of recovery criteria. Nevertheless, these perspectives are typically not considered when precise conditions for recovery are determined during recovery planning.

The ESA's requirement that endangerment be determined "solely on the basis of the best scientific and commercial data available" does not mean scientists have exclusive right to determine the normative dimensions of specifying the conditions of extinction. This mandate merely provides science the exclusive right to determine whether specified conditions for endangerment are met by particular species.

The legal meanings of endangerment and recovery indicate that most recovery plans are grossly inadequate, most threatened and endangered species are far from recovery, and many unlisted species, in fact, meet the legal definition of endangered or threatened. If the ESA accurately expresses the collective value that U.S. citizens place on nature, then these problems need to be rectified, and doing so would require substantially more effort than has been exerted toward species recovery. Failure to rectify such shortcomings would justify corrective litigation—a trend that seems to be underway (Suckling 2003).

Nevertheless, widespread recognition of the legal meaning of endangerment could precipitate a national debate that would reevaluate our collective valuation of nature. Such reevaluation would be as monumental as the original enactment of the 1973 ESA. Do U.S. citizens merely aim to prevent global extinction, recover species to all but an insignificant portion of their range, or something in between? An answer to these questions would clarify our collective commitment to nonhuman life.

Between the positions of living up to the ESA and revising the ESA may lie a third position. U.S. citizens could remain committed to the current ESA, in principle, but decide that recovery will often be infeasible and thus prioritize recovery efforts according to the degree of endangerment or likelihood of success. Such prioritization could be virtuous for being pragmatic or vicious for failing important commitments to nonhuman life and failing to admit such lack of commitment.

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