Conservation Biology

Essay

Inadvertent Advocacy

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Abstract: *Policy advocacy is an issue regularly debated among conservation scientists. These debates have focused on intentional policy advocacy by scientists, but advocacy can also be unintentional. I define inadvertent policy advocacy as the act of unintentionally expressing personal policy preferences or ethical judgments in a way that is nearly indistinguishable from scientific judgments. A scientist may be well intentioned and intellectually honest but still inadvertently engage in policy advocacy. There are two ways to inadvertently engage in policy advocacy. First, a scientist expresses an opinion that she or he believes is a scientific judgment but it is actually an ethical judgment or personal policy preference. Second, a scientist expresses an opinion that he or she knows is an ethical judgment or personal policy preference but inadvertently fails to effectively communicate the nature of the opinion to policy makers or the public. I illustrate inadvertent advocacy with three examples: recovery criteria in recovery plans for species listed under the U.S. Endangered Species Act, a scientific peer review of a recovery plan for the Northern Spotted Owl (*Strix occidentalis caurina*), and the International Union for Conservation of Nature's definition of threatened. In each example, scientists expressed ethical judgments or policy preferences, but their value judgments were not identified as such, and, hence, their value judgments were opaque to policy makers and the public. Circumstances suggest their advocacy was inadvertent. I believe conservation scientists must become acutely aware of the line between science and policy and avoid inadvertent policy advocacy because it is professional negligence, erodes trust in scientists and science, and perpetuates an ethical vacuum that undermines the rational political discourse necessary for the evolution of society's values. The principal remedy for inadvertent advocacy is education of conservation scientists in an effort to help them understand how science and values interact to fulfill the mission of conservation science.*

Key words: conservation, endangered species, policy, values

Defensa Involuntaria

Resumen: *La defensa de políticas es un tema debatido regularmente por científicos de la conservación. Estos debates se han centrado en la defensa intencional de políticas por parte de científicos, pero la defensa también puede ser no intencional. Defino la defensa involuntaria como el acto de expresar involuntariamente preferencias políticas o juicios éticos en una manera que es casi indistinguible de juicios científicos. Aunque un científico sea bien intencionado e intelectualmente honesto puede involucrarse involuntariamente en la defensa de políticas. Hay dos formas de involucrarse involuntariamente en la defensa de políticas. Primera, un científico expresa una opinión que el o ella considera como un juicio científico, pero en realidad es un juicio ético o una preferencia política personal. Segunda, un científico expresa una opinión que el o ella sabe que es un juicio ético o una preferencia política personal pero involuntariamente falla en comunicar efectivamente la naturaleza de la opinión a los políticos o al público. Ilustro la defensa involuntaria con tres ejemplos: criterios de recuperación en planes de recuperación para especies enlistadas en el Acta de Especies en Peligro de E. U. A., una revisión por pares científicos de un plan de recuperación para el Búho Manchado Norteño (*Strix occidentalis caurina*), y la definición de* amenazado *de la Unión Internacional para la Conservación de la Naturaleza. En cada ejemplo, los científicos expresaron juicios* éticos *o preferencias políticas, pero sus juicios*

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de valor no fueron identificados como tales, y, por lo tanto, sus juicos de valor fueron opacos para los políticos y el público. Las circunstancias sugieren que su defensa fue involuntaria. Considero que los científicos de la conservación deben estar perfectamente conscientes de la línea entre la ciencia y la política y evitar la defensa política involuntaria porque refleja negligencia profesional, erosiona la confianza en los científicos y la ciencia y perpetúa un vacío ético que socava el discurso político racional necesario para la evolución de los valores de la sociedad. El principal remedio para la defensa involuntaria es la educar a los científicos de la conservación en un esfuerzo para ayudarles a comprender como interactúan la ciencia y los valores para cumplir la misión de la ciencia de la conservación.

Palabras Clave: conservación, especies en peligro, política, valores

Introduction

Conservation scientists have diverse views regarding professional conduct in the policy-making arena (Noss 1996; Meffe 2007). Some believe the discipline's mission demands advocacy for the preservation of biological diversity (Barry & Oelschlaeger 1996). Others believe policy advocacy diminishes the scientific credibility of conservation science (Scott et al. 2008). Many conservation scientists believe they should engage in policy advocacy but should be careful not to compromise their scientific credibility or professional reputation (Noss 2007). Regardless of their stance in the advocacy debate, I think all conservation scientists would agree with Rykiel (2001), Wilhere (2008), and Nelson and Vucetich (2009) that scientists should clearly distinguish their ethical judgments from their scientific judgments.

The debates over policy advocacy have focused on intentional policy advocacy, but advocacy can also be unintentional. *Inadvertent policy advocacy* is the act of unintentionally expressing ethical judgments or personal policy preferences in a way that is nearly indistinguishable from scientific judgments. Inadvertent policy advocacy is a form of "stealth policy advocacy" (Lackey 2004), which according to Lackey (2007) may be intentional or unintentional. In stealth advocacy the implied policy preference is opaque to policy makers and the public, and in inadvertent advocacy the unstated policy preference may be opaque even to the scientist responsible for the advocacy. Over the past decade, stealth advocacy has been identified as a disturbing trend in politics (Pielke 2002; Pielke 2007). Contemptuous accusations of stealth advocacy (although not labeled as such) have appeared in scientific journals (Aron et al. 2002; Martin 2006) and been followed by counter-accusations (Mott 2003; Crandall 2006) of the same behavior—misrepresenting advocacy as science. The term *stealth advocacy* has entered the popular literature (Pielke 2007), and even Newt Gingrich, former speaker of the U.S. House of Representatives, has warned policy makers to be on guard against scientists who engage in "stealth policy advocacy" (Gingrich & Maple 2007).

Regrettably there are scientists who intentionally cloak their advocacy in the guise of science (Pielke 2006). However, I contend that nearly all stealth advocacy engaged in by conservation scientists is inadvertent. A scientist may be well-intentioned, intellectually honest, and honorable but still inadvertently engage in policy advocacy. Furthermore, I believe that because *stealth* connotes furtive misbehavior, it is an unfair label for advocacy that is genuinely inadvertent.

Scientists may engage in inadvertent advocacy in one of two ways. First, they express opinions they believe are scientific judgments but the opinions are actually ethical judgments or personal policy preferences. Second, they express opinions they know are ethical judgments or personal policy preferences but inadvertently fail to effectively communicate the nature of their opinions to policy makers or the public. I illustrate inadvertent policy advocacy with three examples: recovery criteria in recovery plans for threatened and endangered species listed under the U.S. Endangered Species Act, a scientific peer review of a recovery plan for the Northern Spotted Owl (*Strix occidentalis caurina*), and the definition of *threatened* used by the International Union for Conservation of Nature (IUCN) in the IUCN Red List.

Recovery Criteria for Threatened and Endangered Species

Shaffer (1987), Rohlf (1991), Scott et al. (1995), Doremus (1997), DeMaster et al. (2004), and others have unequivocally established that the definitions of *recovery*, *endangered*, and *threatened* must be normative. These authors reiterate the fundamental principles that the basis for definitions of *recovery*, *endangered*, and *threatened* should be extinction risk; an acceptable level of extinction risk is a societal choice; and society's choice should be guided by science, but is ultimately determined by society's values.

The implicit, if not explicit, goal of every recovery plan is reducing a species' extinction risk to an acceptable level. The U.S. Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.) offers scant guidance regarding acceptable risk. Neither *recovery* nor *recovered* are defined in the act. The act's definitions of *endangered* and *threatened* suggest that an excessive risk (i.e., "in danger of extinction" or "likely to become endangered") is unacceptable, but the definitions are vague and open to subjective inter-

pretation. Similarly, the U.S. Code of Federal Regulations and official policies of the U.S. Fish and Wildlife Service or U.s. National Marine Fisheries Service provide no operational definition of *recovery*. Recovery-planning teams fill this policy void with their own ethical judgments regarding acceptable extinction risk. When these ethical judgments go unrecognized and are not forthrightly acknowledged, then inadvertent policy advocacy has occurred.

The recovery criteria in recovery plans are implicit statements of acceptable extinction risk, and a common criterion is population size. In a review of 17 recovery plans for bird species, Elphick et al. (2001) found that population targets for delisting range from 400 to 20,000; the first and third quartiles were 1600 and 7500, respectively. They and Tear et al. (2005) speculate about reasons for the inconsistency among plans, but they overlook the possibility that different recovery-planning teams hold different beliefs about acceptable extinction risk. I explored this possibility with a cursory review of recovery plans approved between 2000 and 2010.

Extinction risk is the probability (p) that a species will cease to exist within a specified period (T) (Master et al. 2009). When an acceptable extinction risk is specified as a recovery criterion, the species is not recovered until its extinction risk is estimated to be less than the acceptable risk. The recovery plans I examined seldom contained explicit statements of acceptable extinction risk, but among those that did the recovery criteria for acceptable risk (with $T = 100$ years) were 1 white abalone (*Haliotis sorenseni)* population with $p < 10\%$ (NMFS 2008), 1 Hawaiian Crow (*Corvus hawaiiensis*) population with $p < 5\%$ (USFWS 2009), 1 Steller's Eider (*Polysticta stelleri*) population with $p < 1\%$ (USFWS 2002), 3 Rio Grande silvery minnow (*Hybognathus amarus*) populations each with $p < 10\%$ (USFWS 2010*a*), and 3 Florida panther (*Puma concolor coryu*) populations each with $p < 5\%$ (USFWS 2008*a*). Assuming independent extinction probabilities for each population, the species-level extinction probabilities for Rio Grande silvery minnow and Florida panther are 0.1% and 0.0125%, respectively. The wide range of probabilities suggest that different beliefs about acceptable extinction risk are a plausible explanation for the inconsistency in population targets found by Elphick et al. (2001).

Why is the acceptable risk of extinction for the Hawaiian Crow nearly 400 times greater than the acceptable risk for the Florida panther? Policy makers and the public may never know because neither plan provides a justification for its acceptable risk of extinction. Among the plans cited above, only the white abalone plan (NMFS 2008) provides a justification, which consists of "per IUCN guidelines." The IUCN criterion chosen for the white abalone is the greatest acceptable risk of extinction relative to the other four plans—a risk nearly 800 times greater than the acceptable risk chosen for the Florida panther. None of the plans mention that the acceptable extinction risk is a policy decision. These omissions are consistent with the current recovery planning guidance of the National Marine Fisheries Service and Fish and Wildlife Service (2010). In this 110-page document the words *policy*, *normative*, *values* (in the normative sense), *subjective*, *judgment*, *risk*, and *ethical* are not mentioned in the discussion of recovery objectives or recovery criteria. In the recovery plans cited above, the recovery-planning teams did not explain or acknowledge the ethical judgments they made in developing their recovery criteria; hence, those judgments were opaque to policy makers and the public. Consequently, to policy makers and the public, the policy preferences expressed by the teams in the form of acceptable extinction risk may have been indistinguishable from scientific judgments.

Peer Review of the Northern Spotted Owl Recovery Plan

Conservation of the Northern Spotted Owl and its habitats has been one of the most contentious environmental issues in the United Stated over the past 30 years (Thomas et al. 1993; Marcot & Thomas 1997). The owl was listed as threatened in 1990, but a final recovery plan was not approved until 18 years later (USFWS 2008*b*). To ensure that the final recovery plan was based on the best available science, the Fish and Wildlife Service commissioned a joint independent peer review by the Society for Conservation Biology and the American Ornithologist's Union (SCB 2007). Their official charge was strictly an assessment of the science.

Most of the review (Reed 2008) was an unbiased, objective commentary on the science contained in the recovery plan; a model for the appropriate role of professional societies in controversial policy issues as espoused by Scott et al. (2008). For instance, the review states, "the methods and models of Lamberson et al. (1994) no longer represent the state of the art in spatial modeling," "the reserve modeling results focus on a single metric, occupancy, and do not analyze metrics relevant to evaluating persistence and extinction," and "relevant fire ecology references are misinterpreted in the Final Plan as supporting the new approach." The reviewers rightly criticized the plan for its various scientific shortcomings, but they engaged in inadvertent policy advocacy with the following declarations: "The primary reason the Final Plan fails is that it represents a reduction in the total area of federal land dedicated to the species recovery," " ... conservation measures should equal or exceed in effectiveness those in the Northwest Forest Plan," and "Given that the [spotted owl] has been experiencing about a 4% annual rate of population decline for the last 15 years, any

reductions from current levels of habitat protection cannot be justified."

The reviewers failed to recognize a legitimate justification for reducing the current levels of habitat protection—a different attitude toward risk—and tolerating a greater extinction risk allowed a reduction in habitat protection. The current plan for the protection of Northern Spotted Owl habitats, the Northwest Forest Plan (USDA & USDI 1994), was developed during the presidency of William Clinton, a Democrat, and the 2008 recovery plan was developed during the presidency of George Bush, a Republican, which could explain the difference in attitudes toward extinction risk. The reviewers believed the 2008 recovery plan would effect a greater risk than the 1994 Northwest Forest Plan. The Fish and Wildlife Service has no policy that operationally defines recovery; therefore, the reviewers had no standard with which to judge the amount of habitat protection necessary for recovery. Having no reference point, the reviewers mistakenly assumed the extinction risk of the 1994 plan should be the standard by which to judge the 2008 plan and consequently acted as inadvertent advocates for the 1994 plan.

The Associated Press distilled the 22-page review down to "still no scientific basis for allowing more logging of old growth forests where the [Spotted Owl] lives" (Barnard 2008). The reporter was unwittingly correct. There was no scientific basis for more or for less logging; the basis for less habitat protection was a change in values. The 2008 plan made this unusual admission, "this Plan's expression of risk, as embodied by the recovery strategy and actions, may not match the risk tolerance of every interested party." The statement makes plain that the recovery plan is in part a policy document, and the Fish and Wildlife Service surmises that the policy will conflict with the values of those citizens, including some scientists, who would prefer a lower extinction risk.

Whether implicit or explicit, the extinction risk specified by a recovery plan is a policy decision, but that decision is constrained by the purposes of the ESA, one of which is to provide a program for the recovery of endangered and threatened species. If the extinction risk imposed by the 2008 recovery plan was too high, then it was manifestly contrary to the ESA, and therefore, unlawful. The extinction risk may have been too high, but that was not for scientists acting as scientists to decide. A federal court must make that determination.

A federal court will never issue a ruling on the 2008 spotted owl recovery plan. The recovery plan was challenged in court (*Carpenters Industrial Council v. Salazar* 2010), but the Fish and Wildlife Service filed a motion for voluntary remand of the plan that the court granted. The motion was filed in response to an inspector general's investigation that concluded the integrity of the recovery plan's decision-making process was "potentially jeopardized" by improper political influence (USFWS 2010*b*). A revised recovery plan was recently issued by the Obama administration (USFWS 2011). With the change in administrations comes yet another change in values and a different attitude toward extinction risk. The new administration rejected the amount of habitat protected under the 2008 recovery plan and returned to the amount of habitat protected under the 1994 Northwest Forest Plan, and, in addition, the revised recovery plan encourages more habitat protection on nonfederal lands.

Another major finding of the inspector general's investigation (Devaney 2008) was the "enormous policy void" in the Fish and Wildlife Service's implementation of the ESA. According to Devaney (2008), the absence of policy constraints has been exploited and perpetuated by politicians or their appointees to promote the "agenda du jour," which has resulted in a fundamental lack of consistency and transparency when exercising agency discretion. I believe the policy void also encourages well-intentioned, intellectually honest scientists to inadvertently fill the void with their own ethical judgments or with the policies of past administrations.

IUCN Red List of Threatened Species

The IUCN Red List of Threatened Species periodically reports on the conservation status of plant and animal species. The list informs priorities, influences legislation, and guides conservation investment in countries throughout the world (Rodrigues et al. 2006; Hoffmann et al. 2008; Vié et al. 2008), and it affects national and international policies for the protection of species. For instance, the red-list categories and criteria are the basis for listing species as threatened or endangered under Canada's Species at Risk Act (COSEWIC 2010). Considerable effort was expended to make the red-list categorization system as objective, scientifically rigorous, and transparent as practicable (Mace & Lande 1991; Mace et al. 2008). However, the normative foundation of the red-list categories is never mentioned in explanations of the categorization system (Mace & Lande 1991; Rodrigues et al. 2006; Mace et al. 2008) or IUCN publications (IUCN 2001, 2010; Vié et al. 2008).

"Threatened with extinction" is a status that many societies find undesirable. Some nations (e.g., United States, Canada) believe it is intolerable for a species to be threatened with extinction, and, consequently, a threatened status triggers government actions to avert the species' extinction. Acceptable extinction risk is an ethical judgment. The acceptable extinction risk that defines "threatened" and represents a society's threshold for intolerable risk likely varies among cultures. Therefore, judgments regarding risk tolerance should consider a society's values and be made by policy makers through a political process (Shaffer 1987; Scott et al. 1995;

Doremus 1997). Under the IUCN system, a species is classified as threatened if its probability of extinction in the wild is at least 10% within 100 years (IUCN 2001). It is unclear whether the IUCN definition of threatened species reflects a society's values or which society's values they may represent. I presume the risk level was decided by groups of scientists, for no mention is made of policy makers, policies, or a political process for choosing an acceptable extinction risk (e.g., Mace & Lande 1991; Mace et al. 1992; IUCN 2001; Mace et al. 2008).

The scientists who developed the IUCN Red List categories and criteria engaged in inadvertent policy advocacy by not acknowledging and explaining their ethical judgments. I presume it was inadvertent because policy choices were apparently confused with scientific choices. Mace and Lande (1991), which is the scientific foundation for the red-list criteria and categories, describe the extinction risk threshold for categorizing a species as threatened to be "the highest level of risk that is *biologically* acceptable" (emphasis added). There is no such thing as biologically acceptable. Appropriate modifiers for acceptable would have been *socially*, *politically*, *economically*, *ethically*, or *culturally*, but these are words for politicians, policy makers, and policy advocates, not scientists acting as scientists.

Although the normative foundation of the red-list categories is not mentioned in IUCN publications, the IUCN openly acknowledges the normative judgment underlying the categorization process (IUCN 2001; Mace et al. 2008). Information used to determine a species' status is often uncertain. If the information is uncertain, then a species' categorization may also be uncertain. This uncertainty creates a risk that the red-list category assigned to a species is incorrect. The IUCN (2001, 2010) recommends that assessors adopt a precautionary but realistic attitude toward this risk (i.e., a low risk tolerance). A precautionary attitude encourages classifying a species as threatened unless there is strong evidence that it is not threatened. Precaution results in the probability of erroneously categorizing a species as threatened (false positives) being greater than the probability of erroneously categorizing a species as not threatened (false negatives). The IUCN contrasts a precautionary attitude with an evidentiary attitude, which results in a greater probability of false negatives than false positives. Adopting a particular attitude toward the risk of a categorization error was an unavoidable, necessary normative judgment, and the IUCN has been transparent regarding their choice of a precautionary attitude.

The risk of extinction is likely to be of greater concern to society than the risk of categorization error, but IUCN publications are silent on the normative foundations for its acceptable risk of extinction. The IUCN can undo its inadvertent advocacy by treating the categories with the same transparency as the categorization process.

Philosophical and Practical Realities

Conservation science, like all sciences, can never be purely objective. Science is a human enterprise that reflects the values of its practitioners and the social context in which it operates (Barry & Oelschlaeger 1996; Robertson & Hull 2001). Scientists cannot avoid value judgments. In particular, they cannot avoid contextual and methodological value judgments (Shrader-Frechette 1996). Ethical judgments fundamentally influence science, including what questions scientists ask and how they attempt to answer those questions (Roebuck & Phifer 1999). If value judgments, including ethical judgments, pervade all aspects of science, then must policy makers be involved in every step of scientific research? Shrader-Frechette (1996) believes policy makers must be involved only when value judgments can significantly affect the common good. As Shrader-Frechette put it, " . . . if the public ox is getting gored, then the public has a right to decide how safe is safe enough." Policy decisions concerning the conservation of species can significantly affect the common good, and when choosing an acceptable extinction risk (equivalent to deciding "how safe is safe enough") some public oxen are getting gored. Therefore, choosing the acceptable extinction risk is an ethical judgment for the public or policy makers, not scientists.

Real interactions between scientists and policy makers never conform to the ideal. Both policy makers and scientists may misunderstand their respective roles. Policy makers may provide inadequate guidance to scientists, be unavailable when needed, or allot insufficient attention to matters they do not fully appreciate. Scientists may not seek policy guidance when necessary or make decisions best left to policy makers. Policy voids may frustrate scientists and policy makers but in different ways. Both policy makers and scientists may confuse policy choices with scientific choices. Furthermore, the science-policy interface does not neatly divide scientists and policy makers. In small organizations, conservation scientists may play both roles. On recovery planning teams the proper roles of persons can become ambiguous. Many policy makers are former scientists who can contribute valuable scientific knowledge, and experienced scientists can offer insightful opinions on policy. A recovery-planning team may lack a policy maker, so a scientist may be compelled to assume that role. In short, the ideal in which the roles of scientist and policy maker are clearly defined, rigidly followed, and perfectly executed is far from reality. Real world, imperfect interactions between scientists and policy makers yield imperfect results. Mistakes may be made, including inadvertent policy advocacy. Nevertheless, scientists and policy makers should not only strive to achieve the ideal, but they should also gauge their practices by reference to the ideal.

Scientists who must fill the role of policy makers can avoid inadvertent advocacy by clearly identifying and documenting the ethical judgments and policy decisions they make and by stating the rationale for their policy preferences, including the ecological, economic, and social implications of those preferences, and discussing other policy alternatives and why they were rejected.

Reasons to Avoid Inadvertent Policy Advocacy

I believe inadvertent policy advocacy should be a concern among conservation scientists for three reasons. First, I believe inadvertent advocacy is professional negligence. Conservation science operates at the interface between science and policy. A scientist's conventional role in policy decisions is to provide policy makers with data, objective analyses, and unbiased interpretation of both. Those are the typical expectations of most policy makers and the public. If scientists unknowingly express policy preferences, develop quasi-scientific definitions of *recovery*, criticize a recovery plan because they do not understand its policy context, or do not acknowledge the values inherent to a definition of *threatened*, then they have stepped outside their role as scientists and engaged in inadvertent policy advocacy. Inadvertent advocacy results from ignorance of the values, ethical judgments, and policy decisions that should be confined to the other side of the science-policy interface. Some conservation scientists may regularly interact with policy makers, engage them in discussions of science and policy and, hence, directly influence policy decisions. Therefore, scientists have a responsibility to be acutely aware of the line between science and policy and to consciously make the choice either to cross or not to cross that line. When the line is crossed, scientists must effectively communicate that their opinions are ethical judgments or personal policy preferences (Scott et al. 2007; Wilhere 2008).

Second, inadvertent advocacy can erode trust in scientists and science. When inadvertent advocacy is detected, policy makers and the general public may have no reliable way of knowing whether the advocacy was unintentional or intentional and, hence, may assume advocacy was intentionally disguised as science. Polling results indicate that 4 in 10 people in the United States have little or no trust in what scientists have to say about the environment, and the trend suggests that distrust of scientists among citizens of the United States is growing (Cohen & Agiesta 2009). One cause of distrust is the increasing politicization of technical or scientific issues, which has sown confusion among the general public (Jackson 2005; Pielke 2006). The public cannot distinguish impartial interpretation of verifiable facts from politically biased distortion of facts. Inadvertent advocacy adds to the confusion.

Third, and most importantly, inadvertent advocacy perpetuates an ethical vacuum. Science has been called "the American faith" (Doremus 1997). In the United States, science is idealized as systematic, impartial, and objective. Consequently, science is used to trump the values of political adversaries (Pielke 2002). Politicians enlist science as the arbiter in environmental disputes, and special-interest groups appropriate whatever science supports their values (Doremus 1997; Pielke 2002). Such uses of science allow society to dodge profound and difficult questions: How much does society value biological diversity? What cost is society willing to bear to preserve it? What level of anthropogenic extinction risk is ethically intolerable? Inadvertent advocates facilitate amoral policy making by expressing their values or policy preferences in ways that are nearly indistinguishable from science. Successful conservation of biological diversity depends on sound science, but will ultimately be determined by society's values. Inadvertent policy advocacy undermines the rational political discourse necessary for the evolution of society's values.

The principal remedy for inadvertent advocacy is education. Scientists in a mission-driven discipline—a mission rooted in ethical values—should understand how science and values must interact to fulfill that mission. With education will come a fuller understanding and a professional commitment by conservation scientists to avoid undue influence over policy decisions through inadvertent advocacy.

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Literature Cited

Aron, W., W. Burke, and M. Freeman. 2002. Scientists versus whaling: science, advocacy, and errors of judgment. BioScience **52:**1137–1140.

Barnard, J. 2008. Scientists say spotted owl plan not good enough. Associated Press, New York. Available from http://www.komonews.com/news/local/26278724.html?partner=triggernews (accessed October 2011).

Barry, D., and M. Oelschlaeger. 1996. A science for survival: values and conservation biology. Conservation Biology **10:**905–911.

Carpenters Industrial Council v. Salazar. 2010. 734 F. Supp. 2d 126 (D.D.C., 1 September) (appeal dismissed 2011. WL 812391 [D.C. Cir., Feb 24, 2011]).

Cohen, J, and J. Agiesta. 2009. On environment, Obama and scientists take a hit in poll. Washington Post. Available from http://www.washingtonpost.com/wp-dyn/content/article/2009/12/18/AR2009121800002.html (accessed October 2011).

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2010. COSEWIC's assessment process and criteria. COSEWIC, Canadian Wildlife Service, Environment Canada, Gatineau, Québec.

Crandall, K. A. 2006. Advocacy dressed up as scientific critique. Animal Conservation **9:**250–251.

DeMaster, D., R. Angliss, J. Cochrane, P. Mace, R. Merrick, M. Miller, S. Rumsey, B. Taylor, G. Thompson, and R. Waples. 2004. Recommendations to NOAA fisheries: ESA listing criteria by the Quantitative Working Group. Technical memorandum NMFS-F/SPO-67. National Marine Fisheries Service, Seattle, Washington.

Devaney, E. E. 2008. Letter to Secretary of Interior Kempthorne. Report of investigation: the endangered species act and the conflict of science and policy. Office of the Inspector General, Department of Interior, Washington, D.C.

Doremus, H. 1997. Listing decisions under the Endangered Species Act: why better science isn't always better policy. Washington Law Quarterly **75:**1029–1153.

Elphick C. S., J. M. Reed, and J. M. Bonta. 2001. Correlates of population recovery goals in endangered birds. Conservation Biology **15**:1285–1291.

Gingrich, N., and T. L. Maple. 2007. A contract with the Earth. Johns Hopkins University Press, Baltimore, Maryland.

Hoffman, M., et al. 2008. Conservation planning and the IUCN Red List. Endangered Species Research **6:**113–125.

IUCN (International Union for the Conservation of Nature). 2001. IUCN Red List categories and criteria. Version 3.1. IUCN, Gland, Switzerland.

IUCN (International Union for the Conservation of Nature). 2010. Guidelines for using the IUCN Red List categories and criteria. Version 8.1. Standards and Petitions Subcommittee of the IUCN Species Survival Commission, IUCN, Gland, Switzerland.

Jackson, S. A. 2005. The nexus: where science meets society. Science **310:**1634–1639.

Lackey, R. T. 2004. Normative science. Fisheries **29:**38–39.

Lackey, R. T. 2007. Science, scientists, and policy advocacy. Conservation Biology **21:**12–17.

Lamberson, R. H., B. R. Noon, C. Voss, and R. McKelvey. 1994. Reserve design for territorial species: the effects of patch size and spacing on the viability of the northern spotted owl. Conservation Biology **8:**185–195.

Mace, G. M., N. J. Collar, K. J. Gaston, C. Hilton-Taylor, H. R. Akçakaya, N. Leader-Williams, E. J. Milner-Gulland, and S. N. Stuart. 2008. Quantification of extinction risk: IUCN's system for classifying threatened species. Conservation Biology **22:**1424–1442.

Mace, G., N. Collar, J. Cooke, K. Gaston, J. Ginsberg, N. Leader-Williams, M. Maunder, and E.J. Milner-Gulland. 1992. The development of new criteria for listing species on the IUCN Red List. Species **19**:16–22.

Mace, G. M., and R. Lande. 1991. Assessing extinction threats: toward a reevaluation of IUCN threatened species categories. Conservation Biology **5:**148–157.

Marcot, B. G., and J. W. Thomas. 1997. Of spotted owls, old growth, and new policies: a history since the Interagency Scientific Committee report. PNW-GTR-408. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Martin, A. 2006. Advocacy dressed up as science: response to Ramey et al. (2005). Animal Conservation **9:**248–249.

Master, L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, J. Nichols, L. Ramsay, and A. Tomaino. 2009. NatureServe conservation status assessments: factors for assessing extinction risk. NatureServe, Arlington, Virginia.

Meffe, G. K. 2007. Conservation focus: policy advocacy and conservation science. Conservation Biology **21:**11.

Mott, R. N. 2003. Neutral judges in a debate on scientific merits? BioScience **53:**204.

National Marine Fisheries Service and U.S. Fish and Wildlife Service (NMFS and USFWS). 2010. Interim endangered and threatened species recovery planning guidance. Version 1.3. NMFS, Silver Spring, Maryland, and USFWS, Arlington, Virginia.

Nelson, M. P., and J. A. Vucetich. 2009. On advocacy by environmental scientists: what, whether, why, and how. Conservation Biology **23:**1090–1101.

NMFS (National Marine Fisheries Service). 2008. Recovery plan for white abalone (*Haliotis sorenseni*). NMFS, Southwest Region, Long Beach, California.

Noss, R. F. 1996. Conservation biology, values and advocacy. Conservation Biology **10:**904.

Noss, R. F. 2007. Values are a good thing in conservation biology. Conservation Biology **21:**18–20.

Pielke, R. A. 2002. Policy, politics, and perspective. Nature **416:**367–368.

Pielke, R. A. 2006. When scientists politicize science. Regulation **29:**28–34.

Pielke, R.A. 2007. The honest broker: making sense of science in policy and politics. Cambridge University Press, Cambridge, United Kingdom.

Reed, J. M., compiler. 2008. Review of the Final Recovery Plan for the Northern Spotted Owl on behalf of the Society for Conservation Biology and the American Ornithologists Union. Society for Conservation Biology, Washington, D.C.

Robertson, D. P., and R. B. Hull. 2001. Beyond biology: toward a more public ecology for conservation. Conservation Biology **15:**970–979.

Rodrigues A. S. L., J. D. Pilgrim, J. L. Lamoreux, M. Hoffmann, and T. M. Brooks. 2006. The value of the Red List for conservation. Trends in Ecology & Evolution **21:**71–76.

Roebuck, P., and P. Phifer. 1999. The persistence of positivism in conservation biology. Conservation Biology **13:**444–446.

Rohlf, D. J. 1991. Six biological reasons why the Endangered Species Act doesn't work – and what to do about it. Conservation Biology **5:**273–282.

Rykiel, E. J. 2001. Scientific objectivity, value systems, and policymaking. BioScience **51:**433–436.

SCB (Society for Conservation Biology). 2007. Summary of peer review of draft Northern Spotted Owl recovery plan. SCB, Washington, D.C. Available from http://www.conbio.org/activities/policy/docs/SpottedOwlReviewSummarty.pdf (accessed April 2011).

Scott, J. M., J. L. Rachlow, and R. T. Lackey. 2008. The science-policy interface: What is an appropriate role for professional societies? BioScience **58:**865–869.

Scott, J. M., J. L. Rachlow, R. T. Lackey, A. B. Pidgorna, J. L. Aycrigg, G. R. Feldman, L. K. Svancara, D. A. Rupp, D. I. Stanish, and R. K. Steinhorst. 2007. Policy advocacy in science: prevalence, perspectives, and implications for conservation biologists. Conservation Biology **21:**29–35.

Scott, J. M., T. H. Tear, and L. S. Mills. 1995. Socioeconomics and the recovery of endangered species: biological assessment in a political world. Conservation Biology **9:**214–216.

Shaffer, M. L. 1987. Minimum viable populations: coping with uncertainty. Pages 69–86 in M.E. Soulé, editor. Viable populations for conservation. Cambridge University Press, New York, New York.

Shrader-Frechette, K. 1996. Throwing out the bathwater of positivism, keeping the baby of objectivism: relativism and advocacy in conservation biology. Conservation Biology **10:**912–914.

Tear, T. H., et al. 2005. How much is enough? The recurrent problem of setting measurable objectives in conservation. BioScience **55:**835–849.

Thomas, J. W., M. G. Raphael, R. G. Anthony, E. D. Forsman, A. G. Gunderson, R. S. Holthausen, B. G. Marcot, G. H. Reeves, J. R. Sedell, and D. M. Solis. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth

forests of the Pacific Northwest. U.S. Department of Agriculture, Forest Service, Portland, Oregon.

USDA and USDI (U.S. Department of Agriculture and U.S. Department of Interior). 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl. USDA Forest Service and USDI Bureau of Land Management, Washington, D.C.

USFWS (U.S. Fish and Wildlife Service). 2002. Steller's Eider recovery plan. USFWS, Region 7, Anchorage, Alaska.

USFWS (U.S. Fish and Wildlife Service). 2008*a*. Florida panther (*Puma concolor coryi*) recovery plan, third revision. USFWS, Southeast Region, Atlanta, Georgia.

USFWS (U.S. Fish and Wildlife Service). 2008*b*. Final recovery plan for the Northern Spotted Owl, *Strix occidentalis caurina*. USFWS, Region 1, Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 2009. Revised recovery plan for the Àlalā (*Corvus hawaiiensis*). USFWS, Region 1, Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 2010*a*. Rio Grande silvery minnow (*Hybognathus amarus*) recovery plan, first revision. USFWS, Southwest Region, Albuquerque, New Mexico.

USFWS (U.S. Fish and Wildlife Service). 2010*b*. Endangered and threatened wildlife and plants; draft revised recovery plan for the Northern Spotted Owl (*Strix occidentalis caurina*). Federal Register **75:**56131–56133.

USFWS (U.S. Fish and Wildlife Service). 2011. Revised recovery plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USFWS, Region 1, Portland, Oregon.

Vié, J. C., C. Hilton-Taylor, C. Pollock, J. Ragle, J. Smart, S. N. Stuart, and R. Tong. 2008. The IUCN Red List: a key conservation tool. Pages 1–14 in J. C. Vié, C. Hilton-Taylor, and S. N. Stuart, editors. Wildlife in a changing world: an analysis of the 2008 IUCN Red List of Threatened Species. International Union for the Conservation of Nature, Gland, Switzerland.

Wilhere, G. F. 2008. The how-much-is-enough myth. Conservation Biology **22:**514–517.