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A Fish Tale: A Small Fish, the ESA, and Our Shared Future

Dale Goble
University of Idaho, College of Law, gobled@uidaho.edu

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ESSAY

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BY

DALE D. GOBLE*

The objective of the Endangered Species Act is to "recover" imperiled species and thus to render the Act's conservation tools unnecessary. To achieve this goal, the drafters of the Act crafted a linear process that begins with an assessment of the threats facing the species and moves through the elimination of those threats to the recovery and delisting of the species.

It has become increasingly apparent over the past decade that few species fit this model: most species face threats—altered habitats and competition with invasive species—that cannot be eliminated. These species are "conservation reliant" because they will require ongoing conservation management. Conservation-reliant species can be recovered biologically through management actions at the relevant scale, but delisting such species is problematic because to do so will deprive the species of the management required to maintain its numbers and distribution. To date, a handful of conservation-reliant species have been delisted as recovered pursuant to management agreements that obligate a manager—a federal or state agency, a conservation organization, or a specially created management entity—to provide ongoing conservation management activities.

These developments are examined in part by using the Borax Lake chub—a small fish endemic to a highly alkaline lake in eastern

* 2008–2009 Distinguished Environmental Law Scholar, Lewis and Clark School of Law; Margaret Wilson Schimke Distinguished Professor of Law, University of Idaho. My thanks to Lewis and Clark for a congenial environment within which to write, and to J. Michael Scott, Susan Kilgore, and Carmen Thomas-Morse for their close reading of the manuscript. This Essay was partially funded by a University of Idaho College of Law summer research stipend.

Oregon—as a continuing example of both how the Act was intended to operate and how it might be re-envisioned to achieve its recovery goals in a rapidly changing conservation landscape.

I.

The Borax Lake chub (*Gila boraxobius*) is a small fish (typically 1.3 to two inches in length) that is dark olive-green above and mostly silver below with a hint of purple iridescence.[1] It is an opportunistic omnivore, feeding on whatever comes its way: aquatic and terrestrial insects, spiders, mollusks and their eggs, aquatic worms, algae, and seeds.[2] The species reaches reproductive maturity within a single year.[3] Although it spawns primarily in the spring, breeding can occur throughout the year.[4]

The chub takes its name from the environment that created it: Borax Lake, a small (10.2-acre), shallow (less than three feet), highly mineralized, alkaline lake in the Alvord Basin of eastern Oregon's high desert.[5] Borax Lake, which is fed by subterranean hot springs, is an unusual ecosystem, in part because it is a "perched" lake: Precipitation of minerals from the water over the millennia has raised the lake's shoreline approximately thirty feet above the salt crust that covers the adjacent desert playa.[6] Water overflowing the lake's southwest rim has created an extensive marsh that ends in the small, intermittent Lower Borax Lake.[7]

The springs flowing into the lake have temperatures between 95 and 104 degrees Fahrenheit (°F).[8] The chub prefers water of 84°F to 86°F, and temperatures above 93°F are potentially lethal.[9] The chubs therefore live around the shallow perimeter of the lake and in the wetlands at the lake's

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1 The discussion of the biology of the species and the physical description of its habitat are based on JACK E. WILLIAMS, U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, RECOVERY PLAN FOR THE BORAX LAKE CHUB, *GILA BORAXOBIUS* 4 (1987), *available at* http://ecos.fws.gov/docs/recovery_plan/060619.pdf; Endangered Status and Critical Habitat for Borax Lake Chub (*Gila boraxobius*), 47 Fed. Reg. 43,957, 43,957 (Oct. 5, 1982) (codified at 50 C.F.R. pt. 17); Proposed Endangered Status and Critical Habitat for Borax Lake Chub (*Gila boraxobius*), 45 Fed. Reg. 68,886, 68,886 (proposed Oct. 16, 1980) (to be codified at 50 C.F.R. pt. 17); Emergency Determination of Endangered Status and Critical Habitat for the Borax Lake Chub, 45 Fed. Reg. 35,821, 35,821 (May 28, 1980); U.S. Fish & Wildlife Serv., U.S. Dep't of the Interior, Borax Lake Chub: *Gila boraxobius*, http://ecos.fws.gov/docs/life_histories/E027.html (last visited April 18, 2010); U.S. Geological Survey, U.S. Dep't of the Interior, Status of Listed Species and Recovery Plan Development: Borax Lake Chub: *Gila boraxobius*—Endangered, http://www.npwrc.usgs.gov/resource/wildlife/recoprog/states/species/gilabora.htm (last visited April 18, 2010).

2 U.S. Fish & Wildlife Serv., *supra* note 1.

3 *Id.*

4 *Id.*

5 WILLIAMS, *supra* note 1, at 6, 9; U.S. Fish & Wildlife Serv., *supra* note 1.

6 47 Fed. Reg. at 43,957; 45 Fed. Reg. at 68,886; 45 Fed. Reg. at 35,821; WILLIAMS, *supra* note 1, at 8; U.S. Fish & Wildlife Serv., *supra* note 1.

7 47 Fed. Reg. at 43,958; 45 Fed. Reg. at 68,886; 45 Fed. Reg. at 35,822; WILLIAMS, *supra* note 1, at 9.

8 WILLIAMS, *supra* note 1, at 8–9; U.S. Fish & Wildlife Serv., *supra* note 1.

9 WILLIAMS, *supra* note 1, at 17; U.S. Fish & Wildlife Serv., *supra* note 1.

outflow where the temperature is within their preferred range.[10] This further reduces the available habitat to only a fraction of the lake's area and makes the species particularly vulnerable to decreases in water level.[11]

During the Pleistocene, the floor of the Alvord Basin was covered by Lake Alvord, a large pluvial lake that was the ancestral home of the chub.[12] The level of Lake Alvord has fluctuated greatly over at least the past 40,000 years.[13] Within the last 10,000 years it largely dried up, leaving only two intermittent remnants: Alvord Lake in Oregon and Continental Lake in Nevada.[14] The retreat of Lake Alvord restricted the lake's fish to scattered populations in the few permanent springs and creeks that remained.[15]

Prior to 1980, the Borax Lake chub had been considered a dwarfed population of the Alvord chub (*Gila alvordensis*), the species found elsewhere in the Alvord Basin.[16] Isolation from other populations of the Alvord chub, plus a combination of extreme environmental conditions, short generation times in the warm water, and the small number of founding individuals, led to a rapid differentiation of the population into what is now acknowledged to be a distinct, endemic species—the Borax Lake chub.[17]

II.

The purpose of the Endangered Species Act (ESA)[18] is to "conserve" species at risk of extinction and the ecosystems upon which these species depend.[19] This is more than a requirement simply to prevent extinction. "Conserve" is defined as the affirmative mandate to "use . . . all methods and procedures which are necessary to bring any [listed] species . . . to the point at which the measures provided pursuant to this [Act] are no longer necessary."[20] Conservation, in other words, requires the recovery of listed species. To achieve this goal, the Act's drafters crafted what they envisioned to be an orderly progression that moves from assessing the threats facing a species, through the elimination of those threats, to recovery and delisting.[21]

The threshold to this progression is a *risk assessment*. The federal agencies responsible for implementing the Act are required to determine whether a species is either endangered or threatened based on a set of

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10 U.S. Fish & Wildlife Serv., *supra* note 1.

11 *Id.*

12 WILLIAMS, *supra* note 1, at 5–6.

13 *Id.*

14 *Id.* at 6.

15 *Id.*

16 *Id.* at 1, 3.

17 *Id.* at 1, 6–8.

18 Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2006).

19 *Id.* § 1531(b). For a more extended discussion of the ESA, see Dale D. Goble, *The Endangered Species Act: What We Talk About When We Talk About Recovery*, 49 NAT. RESOURCES J. (forthcoming 2010) (on file with author).

20 16 U.S.C. § 1532(3) (2006).

21 *See* J. Michael Scott et al., *Introduction* to 1 THE ENDANGERED SPECIES ACT AT THIRTY: RENEWING THE CONSERVATION PROMISE 11 (Dale D. Goble et al. eds., 2006).

enumerated threats.[22] The Act defines "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range."[23] The definition of "threatened species" differs only through the addition of an explicit temporal component: 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."[24] These standards are none too precise: The statutory definitions require the decision maker to determine whether a species is to be listed given its risk of extinction (i.e., "in danger of extinction, or likely to become so"[25]) over a temporal scale (i.e., now or "within the foreseeable future"[26]).

The species's status as endangered, threatened, or insufficiently at risk to warrant listing is determined by assessing five threat factors: 1) habitat destruction or range curtailment, 2) overutilization, 3) disease or predation, 4) inadequate regulatory mechanisms, and 5) any "other natural or manmade factors."[27] If the agency concludes that a species is either threatened or endangered, it is required to list the species.[28]

Listing triggers the ESA's risk-management provisions.[29] These can be divided in to two functional groups. The first is *extinction prevention*, a group of tools—primarily restrictions on actions such as the prohibition on taking an endangered species—intended to protect a listed species from activities that threaten its continued existence.[30] The second group of risk-management provisions are *recovery actions*. These are a far more varied group of affirmative statutory tools intended to address the threats facing a species;

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22 The two agencies are the United States Fish and Wildlife Service (FWS) in the United States Department of the Interior, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) in the United States Department of Commerce. *See* 16 U.S.C. § 1532(15) (2006) (delegating implementation power to the Departments of Interior and Commerce); *see also* CRAIG N. JOHNSTON ET AL., LEGAL PROTECTION OF THE ENVIRONMENT 602 (2d ed. 2007) (discussing implementation of the ESA by FWS and NOAA Fisheries). FWS is the agency responsible for managing the chub. *See* 50 C.F.R. § 17.11 (2008). *See generally id.* § 17.2 (explaining relationship over management of listed species between the two agencies).

23 16 U.S.C. § 1532(6) (2006).

24 *Id.* § 1532(20) (emphasis added).

25 *Id.* § 1533(b)(1)(B)(ii).

26 *Id.*; *see* Goble, *supra* note 19 (manuscript at 2). In developing guidance for listing and delisting species, the United States Fish and Wildlife Service has labeled these two components of risk as "magnitude" (either high or moderate to low) and "immediacy" (either imminent or nonimminent). Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 Fed. Reg. 43,098, 43,102–03 (Sept. 21, 1983). For a discussion on the vagueness in such standards, see generally Helen M. Regan et al., *A Taxonomy and Treatment of Uncertainty for Ecology and Conservation Biology*, 12 ECOLOGICAL APPLICATIONS 618, 621–22 (2002).

27 16 U.S.C. § 1533(a)(1)(A)–(E) (2006).

28 *Id.* § 1533(c)(1).

29 *See, e.g.*, *id.* § 1536 ("All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 1533 of this title."); *id.* § 1533(f)(1) ("The Secretary shall develop and implement plans . . . for the conservation and survival of endangered species and threatened species listed pursuant to this section . . . .").

30 There are two primary extinction prevention tools: the consultation requirements of section 7 of the ESA, *id.* § 1536(a)–(d), and the take prohibition of section 9, *id.* § 1538(a)(1)–(2).

they include mechanisms such as the authority to transplant populations or restore habitat.[31]

The drafters of the ESA appear to have assumed that recovery actions would eliminate the threats facing the species and that its population would rebound. When this occurred, the listing agency would initiate delisting, employing the same risk-assessment standards and procedures used in the decision to list the species.[32] The Act's drafters also appear to have assumed that after delisting the species would thrive with only existing management, such as state fish and game laws.

Implementing the Act has proved more complex—as the tale of the Borax Lake chub demonstrates.

III.

In 1980, as the paper characterizing the chub as a new species was in the editorial process,[33] two activities around Borax Lake were imperiling the species's continued existence. First, the rancher who owned the lake and the surrounding 160 acres cut channels into its perimeter to irrigate forage on his land.[34] In addition to lowering the lake level, the channels redirected the flow of water from the lake's natural outflow, drying up the wetlands and Lower Borax Lake.[35] Second, the agency that managed the federal land adjacent to the lake, the Bureau of Land Management (BLM), began the

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31 Recovery actions are a much more heterogonous collection of tools than extinction prevention tools. Recovery actions include 1) recovery planning requirements, *id.* § 1533(f), 2) the broad delegation of power contained in the definition of "conservation," which authorizes the use of "all activities associated with scientific resources management," *id.* § 1532(3), 3) the authority to acquire lands and waters "by purchase, donation, or otherwise," *id.* § 1534(a)(2), 4) the (under-enforced) affirmative obligation imposed on all federal agencies, *id.* § 1536(a)(1), 5) the authority to issue recovery permits, *id.* § 1539(a)(1)(A), 6) the experimental populations provision, *id.* § 1539(j), and 7) the obligation to designate critical habitat, *id.* § 1533(a)(3). The consultation mandate also has a recovery element because a proposed action's impact on a species's recovery is a basis for a jeopardy or adverse effect determination. *See* Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv., 378 F.3d 1059, 1069–70 (9th Cir. 2004) ("The agency's controlling regulation on [destruction or adverse modification of] critical habitat thus offends the ESA because the ESA was enacted not merely to forestall the extinction of species (i.e., promote a species survival), but to allow a species to recover to the point where it may be delisted.").

32 As several courts have noted, "'Since the same five statutory factors must be considered in delisting as in listing, the Court necessarily concludes that the FWS . . . must address each of the five statutory delisting factors and measure whether threats to the [species] have been ameliorated.'" Defenders of Wildlife v. Babbitt, 130 F. Supp. 2d 121, 133 (D.D.C. 2001) (quoting Fund for Animals v. Babbitt, 903 F. Supp. 96, 111 (D.D.C. 1995)); *see also* Nat'l Wildlife Fed'n v. Norton, 386 F. Supp. 2d 553, 558 (D. Vt. 2005).

33 *See* Jack E. Williams & Carl E. Bond, Gila boraxobius, *A New Species of Cyprinid Fish from Southeastern Oregon with a Comparison to* G. alvordensis *Hubbs and Miller*, 93 PROC. BIOLOGICAL SOC'Y WASH. 291 (1980).

34 Proposed Endangered Status and Critical Habitat for Borax Lake Chub (*Gila boraxobius*), 45 Fed. Reg. 68,886, 68,886 (proposed Oct. 16, 1980) (to be codified at 50 C.F.R. pt. 17); Williams, *supra* note 1, at 18.

35 45 Fed. Reg. at 68,886.

process of issuing leases to permit the geothermal development of the Alvord Basin.[36]

In response to BLM's proposal to lease 6789 acres surrounding Borax Lake for geothermal exploration and testing, the United States Fish and Wildlife Service (FWS) promulgated an emergency regulation listing the chub as an endangered species on May 28, 1980.[37] The agency's rationale for listing the species focused on the threats to its habitat. The lake's "position above the valley floor," FWS noted, made it vulnerable to the irrigation diversions that both lowered the level of the lake and diverted water away from the natural outflow.[38] Geothermal exploration also threatened the species given the potential changes to the subsurface flow of water in the aquifer that fed the lake.[39] The listing was necessary, the agency concluded, to ensure that BLM considered "the welfare of this species during its deliberations" on both the leasing decision and the stipulations that would be included in any leases that it might eventually issue.[40]

With the listing of the species, the Act's extinction prevention and recovery action provisions became applicable. The extinction prevention requirements came into play first given their prohibitory orientation.[41] The Act requires any federal agency whose actions are likely to affect a listed species to consult with the appropriate federal wildlife agency—in the case of the chub, FWS—to "insure" that the action "is not likely to jeopardize the continued existence of [the species] . . . or result in the destruction or adverse modification" of the species's critical habitat.[42] Because the exploration activities permitted by proposed geothermal exploration leases could affect the chub, BLM requested formal consultation with FWS on July 3, 1980.[43] Following several exchanges of documents and a meeting in September that was attended by FWS, the United States Geological Survey, BLM, Anadarko Production Company, Getty Oil, several state agencies, two private utilities, "and various environmental and engineering consulting firms,"[44] FWS issued a biological opinion (BiOp) evaluating the risk the leasing action posed to the chub.[45] The BiOp concluded that

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36 Emergency Determination of Endangered Status and Critical Habitat for the Borax Lake Chub, 45 Fed. Reg. 35,821, 35,822 (May 28, 1980) (codified at 50 C.F.R. pt. 17).

37 *Id.* at 35,821. On the Secretary's authority to make emergency listings, see Endangered Species Act of 1973, 16 U.S.C. § 1533(b)(7) (2006).

38 45 Fed. Reg. at 35,822.

39 *Id.*

40 *Id.* Geothermal exploration threatened to adversely modify the designated habitat through subsidence (from removing water from the aquifer) and alteration of the thermal springs' flows. *Id.* at 35,822–23. Geothermal resource development—if it were to follow exploration—threatened additional adverse impacts. *Id.* Finally, the agency also designated 3840 acres of critical habitat surrounding the lake. *Id.* at 35,822.

41 *See supra* note 30 and accompanying text.

42 16 U.S.C. § 1536(a)(2)–(3) (2006).

43 Memorandum from L.A. Mehrhoff, Area Manager, U.S. Fish & Wildlife Serv., to State Dir., Bureau of Land Mgmt. 22 (Oct. 10, 1980) (regarding Formal Section 7 Consultation for BLM Geothermal Leasing Units 28, 33, and 34 near Borax Lake, Oregon).

44 *Id.* at 22–23.

45 *Id.* at 22.

granting "geothermal exploration leases, with present stipulations, for BLM Leasing Units 28, 33 and 34 is likely to jeopardize the continued existence of the Borax Lake chub and/or adversely modify its critical habitat."[46] "[T]he key issue of concern," the BiOp noted, "is the likelihood that drilling activity might impact th[e] fault system" beneath the basin floor that is the source of both the thermal springs that feed the lake and the cold water aquifer that reduces the temperature of the springs to a range that the chub can withstand.[47]

When FWS issues a "jeopardy" opinion, the ESA requires the agency to provide "reasonable and prudent alternatives" to the action that would permit it to proceed without jeopardizing the species.[48] At the September meeting, the participants agreed that a half-mile buffer around the lake and the associated hot springs "would probably provide adequate protection to the aquifers."[49] FWS therefore recommended that any leases include a half-mile buffer.[50] In addition, the agency proposed at least weekly monitoring of the quantity and quality of the water issuing from the springs within the buffer zone and a mandatory shutdown if any changes to either quality or quantity were detected.[51] BLM adopted these recommendations as stipulations on the leases it subsequently issued to Anadarko.[52]

An emergency listing is effective for only 240 days.[53] In mid-October 1980, FWS therefore initiated procedures to list the chub as endangered.[54] That listing was finalized nearly two years later on October 5, 1982.[55] In its decision, the agency concluded that irrigation diversions and potential geothermal development continued to be the most significant threats to the species.[56] Although no new diversions had been made since 1980, the original diversions remained a threat because there were no legal prohibitions on diverting water from the lake.[57] Similarly, the threat from drilling had been reduced by the stipulations but not eliminated.[58] Finally, the agency noted that the existing regulatory mechanisms were also inadequate: Although the

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46 *Id.* at 23.

47 *Id.* at 27.

48 Endangered Species Act of 1973, 16 U.S.C. § 1536(b)(3)(A) (2006).

49 Memorandum from L.A. Mehrhoff to State Dir., *supra* note 43, at 27.

50 *Id.* at 28.

51 *Id.* at 28–29.

52 FWS relied upon inclusion of the stipulations in subsequently adjusting the boundaries of critical habitat to reduce the area from the 3840 acres designated in the emergency listing to 640 acres. Endangered Status and Critical Habitat for Borax Lake Chub (*Gila boraxobius*), 47 Fed. Reg. 43,957, 43,957–59 (Oct. 5, 1982) (codified at 50 C.F.R. pt. 17).

53 16 U.S.C. § 1533(b)(7) (2006).

54 Proposed Endangered Status and Critical Habitat for Borax Lake Chub (*Gila boraxobius*), 45 Fed. Reg. 68,886, 68,886 (proposed Oct. 16, 1980) (to be codified at 50 C.F.R. pt. 17).

55 47 Fed. Reg. at 43,957. The listing came after Anadarko Production Company, the lessee of the BLM lease units, filed a plan of operation—the document that initiates the post-leasing, exploratory phase—for one of the leases in March 1982. *See* WILLIAMS, *supra* note 1, at 21.

56 47 Fed. Reg. at 43,958.

57 *See id.*

58 *Id.*

species was on the Oregon endangered species list, the state had taken no steps either to protect its habitat or the water in the lake.[59]

With the listing of the chub, designation of its critical habitat, and the corralling of the immediate threats associated with geothermal leasing, conservation of the species entered a new phase.

IV.

As noted, the ESA seeks to do more than prevent extinction. The Act also requires all federal agencies to use their authorities to recover listed species.[60] To guide these conservation actions, the responsible federal wildlife agency is required to develop and implement a plan to recover the species.[61] Unlike the Act's extinction-prevention provisions, recovery actions are intended to increase the viability of the species; recovery planning and implementation, in other words, is the element of the statutory scheme that details the types of actions necessary to accomplish the Act's ultimate objective of conserving listed species and their ecosystems. As the FWS guidelines for recovery planning state, "Recovery is the process by which the decline of [a listed] species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured."[62]

The recovery planning guidelines suggest that the plans be drafted by scientists who are familiar with the species.[63] Plans are required to analyze the threats facing the species and determine the actions necessary to remove or mitigate those threats to the point at which the risk to the species has been reduced to an acceptable level.[64] The development of a recovery plan thus requires an analysis of the species, its life history, and the threats it faces, and a determination of the actions necessary to mitigate those threats to the point at which the risk to the species has been diminished to an acceptable level.[65]

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59 *Id.*

60 Endangered Species Act of 1973, 16 U.S.C. § 1536(a)(1) (2006).

61 *Id.* § 1533(f). On recovery plans, see generally Dale D. Goble, *Recovery*, *in* ENDANGERED SPECIES ACT: LAW, POLICY, AND PERSPECTIVES 70, 79–85 (Donald C. Baur & Wm. Robert Irvin eds., 2d ed. 2010) (evaluating the statutory and case law on recovery planning).

62 U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, POLICY AND GUIDELINES FOR PLANNING AND COORDINATING RECOVERY OF ENDANGERED AND THREATENED SPECIES 1 (1990), *available at* http://www.fws.gov/endangered/pdfs/recovery/90guide.pdf.

63 *Id.* at 6, app. II, at II-1 to -2.

64 The plan itself must contain three types of information. The first is a summary of what is known about the species, including its distribution, habitat, and life history, and the threat factors that prompted its listing. *Id.* app. I, at I-9 to -10. The second section contains the criteria for determining when the species is recovered. *Id.* app. I, at I-11 to -13. Finally, the plan details the actions required to address the threats to the species and an implementation schedule for the actions needed to meet the plan's objectives. *Id.* app. I, at I-14 to -20.

65 Recovery planning has been widely criticized. *See generally* Theodore C. Foin et al., *Improving Recovery Planning for Threatened and Endangered Species: Comparative Analysis of Recovery Plans Can Contribute to More Effective Recovery Planning*, 48 BIOSCI. 177, 177 (1998); Peter M. Kareiva, *Applying Ecological Science to Recovery Planning*, 12 ECOLOGICAL APPLICATIONS 629, 629 (2002); Douglas W. Schemske et al., *Evaluating Approaches to the*

V.

It was a nongovernmental organization (NGO), The Nature Conservancy (TNC), that took the first steps to conserve the chub. In 1983, it acquired a ten-year lease of the 160 acres of private land that bounded the lake; the lease included a right of first refusal for the purchase of the property.[66] TNC, however, agreed to allow continued water diversions from the lake and cattle grazing on the surrounding land.[67] Shortly after acquiring the lease, the organization began steps to return the outflow of Borax Lake into its former, natural channel in order to rehydrate the wetlands and increase available habitat for the species.[68] This proved far more difficult than expected; work continued through 1985 before flows approximating the pre-1980 conditions were restored and the wetlands were again wet.[69]

Also in 1983, BLM designated the 520 acres of federal land around Borax Lake an Area of Critical Environmental Concern (ACEC).[70] An ACEC is the most restrictive land-use category under the Federal Land Policy and Management Act[71] short of wilderness designation. ACECs are parcels "where special management attention is required . . . to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes."[72] The management standards incorporated into the Borax Lake ACEC when it was designated are designed to control vehicular access to the lake.[73]

FWS did not finalize a recovery plan for the species until 1987.[74] As required by the guidelines, the plan described the chub, its habitat, and

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Conservation of Rare and Endangered Plants, 75 ECOLOGY 584, 584 (1994); Timothy H. Tear et al., *Status and Prospects for Success of the Endangered Species Act: A Look at Recovery Plans*, 262 SCI. 976, 976–77 (1993). Most critics agree, however, that "[r]ecovery teams usually work under the constraints of little money, conflicting interest groups, and little time in which to produce a recovery plan. . . . These problems are exacerbated by the limited information available for most listed species." Foin et al., *supra*, at 178. See Julie K. Miller et al., *The Endangered Species Act: Dollars and Sense*, 52 BIOSCI. 163, 167–68 (2002), for a discussion on funding.

66 WILLIAMS, *supra* note 1, at 22.

67 *Id.*

68 *Id.* at 23–25.

69 *Id.*

70 Burns District, Oregon; Areas of Critical Environmental Concern, 48 Fed. Reg. 30,202, 30,202 (June 30, 1983) (designating 520 acres as the Borax Lake ACEC).

71 Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701–1784 (2006).

72 *Id.* § 1702(a). As the BLM *Manual* notes, the designation thus "serves as a reminder that significant value(s) or resource(s) exist which must be accommodated when future management actions and land use proposals are considered near or within an ACEC." BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MANAGEMENT MANUAL TRANSMITTAL SHEET: 1613 – AREAS OF CRITICAL ENVIRONMENTAL CONCERN § 1613.02 (1988) (on file with author).

73 48 Fed. Reg. at 30,202–03; BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, ANDREWS MANAGEMENT UNIT RECORD OF DECISION AND RESOURCE MANAGEMENT PLAN 70–71 (2005) (describing management standards); *see also* Oregon; Off-Highway Vehicle Designation, 52 Fed. Reg. 5348, 5349 (Feb. 20, 1987) (designating the Alvord Desert ACEC as "limited to motorized vehicle use on designated, existing roads and trails").

74 WILLIAMS, *supra* note 1.

the threats it and its habitat faced.[75] The plan focused on three threats: the modification of the lake and its natural outflow as a result of irrigation diversions, the risk of altering subsurface water flows that would impact the lake as a result of geothermal development, and the negative impacts of off-highway vehicle (OHV) use.[76] Since the threats facing the chub had not caused its population to decline, "maintenance of a certain number of individuals is not as relevant to the survival of the Borax Lake chub as is protection of the integrity of the aquifer and shoreline."[77] The plan thus emphasized securing habitat protection: acquiring land and water rights,[78] restoring Lower Borax Lake and the intervening marshes, protecting the lake's ecosystem (primarily through restriction of access), monitoring the status of that ecosystem, encouraging public support through education, and utilizing laws and regulations to protect the chub and its habitat.[79]

Completion of the recovery plan framed the tasks facing the entities acting to conserve the species. The federal land-management agency took steps both to ameliorate the immediate threats to the species from geothermal exploration and to ensure that the lands surrounding the lake would receive special attention.[80] In addition, a national conservation NGO took steps to acquire the lake and the private lands around it.[81] FWS concluded, however, that these actions were insufficient to justify either downlisting the species to threatened or delisting it.[82]

VI.

In 2003, FWS contracted with Southern Oregon University for a review of the progress being made to meet the chub's recovery goals.[83] The resulting report noted, "Numerous recovery measures have been implemented during the past two decades that have improved the conservation status of the

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75 *Id.* at 1–19.

76 *Id.* at 18–19.

77 *Id.* at 14.

78 The plan called for permanent protection for both the 160-acre parcel surrounding Borax Lake and another 160-acre parcel north of the lake "by The Nature Conservancy or other appropriate Public Resource Agency," and withdrawal of the Lake's waters from appropriation under state water law. *Id.* at 27–28; *see also id.* at 33–34.

79 *Id.* at 35–45.

80 *Id.* at 19–22.

81 *Id.* at 22.

82 *Id.* at 30.

83 The ESA requires that the Secretary of Interior review the status of all listed species "at least once every five years." Endangered Species Act of 1973, 16 U.S.C. § 1533(c)(2)(A) (2006). The chub's status had been reviewed in 1987 and 1991. *See* Review of Species Listed in 1976, 1977, 1981, and 1982, 52 Fed. Reg. 25,523, 25,527 (July 7, 1987) (1987 review); 5-Year Review of Listed Species, 56 Fed. Reg. 56,882, 56,887 (Nov. 6, 1991) (1991 review). The 2003 independent review was in preparation for the next five-year review. Initiation of 5-Year Reviews of 70 Species in Idaho, Oregon, Washington, and Hawaii, and Guam, 71 Fed. Reg. 18,345, 18,346 (Apr. 11, 2006) (2006 review).

Borax Lake chub and protection of its habitat."[84] These included the designation of critical habitat; BLM's designation of the federal lands around Borax Lake as an ACEC; the TNC lease and subsequent purchase in 1993 of both the private parcel surrounding the lake and another, adjacent parcel; and the adoption of the Steens Mountain Cooperative Management and Protection Act of 2000.[85] The Steens Mountain Act withdrew the public lands (including the Alvord Basin Known Geothermal Resource Area) from mineral and geothermal development.[86] The report also noted, however, that all was not well: Gates on the access road to the lake were unlocked, and there was evidence of "significant recreational use," including motorcycle and OHV damage to the salt crusts within the ACEC west of the lake[87] and disturbance to the lake bed from people wading in it.[88]

Table 1: Numerical Scores for Recovery Goals[89]

1. Securing Land and Water Rights	3.7
2. Restoring Lower Borax Lake and the Intervening Marshes	4.0
3. Protecting the Lake's Ecosystem	2.7
4. Monitoring the Status of the Ecosystem	2.3
5. Encouraging Public Support Through Public Awareness	3.5
6. Using Laws and Regulation to Protect the Chub and Its Habitat	2.5
Overall Average:	3.1

Key:
0 = no implementation
1 = minor implementation
2 = approximately half implemented
3 = mostly implemented
4 = fully implemented

The report's authors evaluated the status of the chub against two standards. First, they assigned a numerical value to reflect the degree of implementation of each of the 1987 recovery plan's six goals (see Table 1).[90] In addition to the numerical evaluation, the report's authors evaluated the chub's status in relation to the ESA's list of threat factors. The report noted that, although the original threats of diversions of water from the lake for

84 JACK E. WILLIAMS & CATHERINE A. MACDONALD, A REVIEW OF THE CONSERVATION STATUS OF THE BORAX LAKE CHUB, AN ENDANGERED SPECIES 2 (2003).

85 Steens Mountain Cooperative Management and Protection Act of 2000, 16 U.S.C. §§ 460nnn-1 to -122 (2006).

86 *Id.* § 460nnn-81(a)(2).

87 WILLIAMS & MACDONALD, *supra* note 84, at 7.

88 *Id.* at 9.

89 *Id.* at 10–12.

90 *Id.*; *see also id.* at 27–32.

irrigation and the geothermal development had been removed,[91] OHV and recreational use posed new threats, including "damage to soils, wetlands, and lake shoreline from off-highway vehicles, and impacts to water quality, lake substrates, and lake shorelines [from] wading, camping, and boating."[92] Similarly, although disease and predation had not been a threat to the species in 1982, by 2003 "increased vehicle access and visitation [made] the introduction of non-native species an increasing concern."[93] Finally, the report's authors noted that the chub's restricted range meant that it was "vulnerable to loss from a single disturbance," which "could take the form of vandalism, introduction of non-native species, or collapse of the lake shoreline."[94] Nonetheless, the report was broadly optimistic: "With acquisition of private lands including Borax Lake by The Nature Conservancy, careful management of the rest of the critical habitat by the BLM, and passage of the Steens Mountain legislation, the Borax Lake chub appears to be nearing recovery."[95]

FWS convened an expert panel of eight scientists to evaluate the report.[96] The panel agreed that, despite the "[s]ubstantial" progress that had been made, "threats to the species and ecosystem remain."[97] Given these threats—increased recreational use and the potential for the introduction of nonnative species—the panel concluded that the chub remained endangered and no change in listing status was warranted.[98] Echoing the report's authors, the panel concluded, "Because of the restricted range of the Borax Lake chub to a single area, the species is vulnerable to catastrophic loss despite existing protection."[99]

The recommendations of both the report's authors and the expert panel neither to delist nor to reclassify the species raises a crucial issue: What *is* recovery?

VII.

The Act's linear structure—a procedure that leads from listing through risk management (i.e., the extinction prevention and recovery action provisions) to delisting as a "secure, self-sustaining wild population[] of

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91 TNC's acquisition of the land, establishment of an instream water right by the state, and the withdrawal of the basin from geothermal development in the Steens Mountain Cooperative Management and Protection Act removed the threats cited in 1982. *Id.* at 10, 12–13.

92 *Id.* at 13.

93 *Id.*

94 *Id.* at 14.

95 *Id.* at 3.

96 *See id.* app. B, at 33.

97 *Id.* at 14.

98 *Id.* at 14–15. Goldfish (*Carassius auratus*) have been introduced into another lake north of Borax Lake. Jack E. Williams et al., *Prospects for Recovering Endemic Fishes Pursuant to the U.S. Endangered Species Act*, FISHERIES, June 2005, at 24, 26.

99 WILLIAMS & MACDONALD, *supra* note 84, at 15; *see also id.* at 19–21 (discussing the vulnerability of the chub).

species"[100]—suggests that its drafters assumed that the threats facing a species could be eliminated and, with the elimination of those threats, the species's population would rebound so that it could be delisted and thrive without species-specific conservation management.[101] These assumptions have proved accurate for some species.

The Aleutian cackling goose (*Branta hutchinsii leucopareia*), for example, was listed as a result of population declines primarily caused by the introduction of foxes onto its nesting islands.[102] Removal of the foxes from these islands and hunting closures on the species's wintering grounds in Oregon and California allowed the species's population to climb from 790 individuals in 1975 to 36,978 in 2000.[103] This population increase met the species's demographic recovery goals.[104] Indeed, the species is something of a poster child for recovery; its population has increased to the point that it has become an agricultural pest with its own depredation program.[105]

Other species have followed the same path to recovery. The American peregrine falcon (*Falco peregrinus anatum*), for example, was imperiled by exposure to organochlorine pesticides such as dichlorodiphenyltrichloroethane (DDT).[106] Following listing, the banning of DDT, and the implementation of an intensive reintroduction program, the

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100 U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, POLICY AND GUIDELINES FOR PLANNING AND COORDINATING RECOVERY OF ENDANGERED AND THREATENED SPECIES 1 (1990), *available at* http://www.fws.gov/endangered/pdfs/Recovery/90guide.pdf.

101 It was not until 1988—the last time the Act was amended—that even a modest provision for monitoring the status of delisted species was added. Endangered Species Act Amendments of 1988, Pub. L. No. 100-478, tit. I, § 1004, 102 Stat. 2306, 2307 (1988) (codified at 16 U.S.C. § 1533(g) (2006)).

102 *See* Native Fish and Wildlife: Endangered Species, 32 Fed. Reg. 4001, 4001 (Mar. 11, 1967); Proposed Reclassification of the Aleutian Canada Goose from Endangered to Threatened, 54 Fed. Reg. 40,142, 40,142 (proposed Sept. 29, 1989). The species has recently been reclassified from the Aleutian Canada goose (*Branta canadensis leucopareia*) to the Aleutian cackling goose. *See, e.g.*, U.S. Fish & Wildlife Serv., U.S. Dep't of the Interior, Alaska Maritime National Wildlife Refuge: Area History: 1945 to Present, http://alaskamaritime.fws.gov/historyculture/1945-Present.htm (last visited Apr. 18, 2010).

103 Final Rule to Remove the Aleutian Canada Goose from the Federal List of Endangered and Threatened Wildlife, 66 Fed. Reg. 15,643, 15,645 (Mar. 20, 2001).

104 The recovery goals called for "at least 7,500 geese" and 50 nesting pairs in three geographic parts of its historic range. ALEUTIAN CANADA GOOSE RECOVERY TEAM, ALEUTIAN CANADA GOOSE *BRANTA CANADENSIS LEUCOPAREIA* RECOVERY PLAN 22 (2d rev. 1991). In addition to the nearly 4680% population increase, the breeding range expanded from one to at least six islands. 66 Fed. Reg. at 15,645.

105 *See* ANNE MINI & RON LEVALLEY, MAD RIVER BIOLOGISTS, ALEUTIAN CACKLING GOOSE AGRICULTURAL DEPREDATION MANAGEMENT PLAN: DEL NORTE COUNTY 2005–2006, at 63 (2006), *available at* http://www.pcjv.org/california/pdfs/Del%20Norte%20Aleutian%20Plan%20_Final%209-2006.pdf.

106 *See* Final Rule to Remove the American Peregrine Falcon from the Federal List of Endangered and Threatened Wildlife, 64 Fed. Reg. 46,542, 46,554–55 (Aug. 25, 1999). In addition to eggshell thinning, organochlorine pesticides are directly toxic to pelicans. *See* Removal of the Brown Pelican in the Southeastern United States from the List of Endangered and Threatened Wildlife, 50 Fed. Reg. 4938, 4938 (Feb. 4, 1985) (codified at 50 C.F.R. pt. 17).

species was reestablished in areas from which it had been extirpated.[107] Similarly, the gray whale (*Eschrichtius robustus*) and the American alligator (*Alligator mississippiensis*) had been hunted nearly to extinction;[108] following listing and prohibitions on taking the species, their populations recovered.[109]

But recovery is not exclusively a question of numbers. The demographic targets in recovery plans are in fact surrogates, a handy way to indirectly measure the actual goal.[110] Under the ESA, that goal is the amelioration or elimination of the threats that led to the species's listing.[111] As FWS and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service have noted, "[R]ecovery is not attained until the threats to the species as analyzed under section 4(a)(1) of the Act have been removed."[112] The goose's dramatic population increase (nearly 4700%) is a handy measure of the elimination of the threat facing the species, but it is the elimination of the threat—predation by a nonnative species—rather than the population increase itself that is the actual legal requirement.

This raises a further point. The statutory list of threat factors contains two different types of threats. The first are those that directly drive a species's demographics: habitat loss, overutilization, and disease or predation.[113] Ameliorating these threats on a scale that is biologically relevant to a species will generally lead to increased—or at least stabilized—population. This was the case with the goose: Foxes were removed from the islands on which it bred and the species's population increased.[114] The second type of threat, on the other hand, focuses not on the drivers of extinction, but on the law that is available to ameliorate or

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107 The falcon had been "essentially extirpated" east of the Mississippi River and in the Great Plains states east of the Rocky Mountains; west of the 100th meridian, nesting had been reduced by at least two-thirds. 64 Fed. Reg. at 46,542–43. Four regional recovery plans, developed between 1982 and 1991, called for a minimum of 631 breeding pairs with specified distribution by states and regions. *Id.* at 46,543–48. When the species was delisted in 1999, there were at least 1650 breeding pairs broadly distributed across North America. *Id.* at 46,544–49. On the species's recovery, see generally RETURN OF THE PEREGRINE: A NORTH AMERICAN SAGA OF TENACITY AND TEAMWORK (Tom J. Cade & William Burnham eds., 2003) (describing the decline of the peregrine, legislation in response to that decline, and subsequent recovery).

108 Endangered Fish and Wildlife; Gray Whale, 58 Fed. Reg. 3121, 3122, 3125 (Jan. 7, 1993); Reclassification of the American Alligator to Threatened Due to Similarity of Appearance Throughout the Remainder of Its Range, 52 Fed. Reg. 21,059, 21,059–61 (June 4, 1987) (codified at 50 C.F.R. pt. 17).

109 *See* 52 Fed. Reg. at 21,061 tbl.1; Endangered Fish and Wildlife; Gray Whale, 56 Fed. Reg. 58,869, 58,870 (proposed Nov. 22, 1991) (to be codified at 50 C.F.R. pt. 222).

110 *See* Dale D. Goble, *What* Are *Slugs Good for? Ecosystem Services and the Conservation of Biodiversity*, 22 J. LAND USE & ENVTL. L. 411, 413 (2007).

111 Endangered Species Act of 1973, 16 U.S.C. § 1533(f) (2006).

112 Interagency Cooperation—Endangered Species Act of 1973, as Amended; Final Rule, 51 Fed. Reg. 19,926, 19,935 (June 3, 1986) (codified at 50 C.F.R. pt. 402).

113 16 U.S.C. § 1533(a)(1)(A)–(C) (2006).

114 Arctic Goose Joint Venture, Cackling Goose, http://www.agjv.ca/index.php?option=com_content&task=view&id=16&itemid=56 (last visited Apr. 18, 2010) (outlining the current status and management of Aleutian cackling geese).

eliminate those drivers: Are there adequate "existing regulatory mechanisms" to address the biological threats to the species?[115]

Although decisions to delist a species are governed by the same substantive, evidentiary, and procedural requirements as listing decisions,[116] the fact that delisting a species removes the ESA's protections is significant. At delisting, the question of the adequacy of existing regulatory mechanisms focuses on whether the change in the species's legal status from listed to delisted will place it at risk of extinction.[117] To delist a species, in other words, requires reasonable assurances that the delisting itself will not deprive the species of the species-specific protection it requires.

As noted, the goose is a weedy species that has become an agricultural nuisance.[118] To the extent that the species requires post-delisting protection, it is provided by a preexisting monitoring and management structure under the Migratory Bird Treaty Act (MBTA).[119] Falcons also thrive in anthropogenic landscapes, having taken up residence in most major U.S. cities where tall buildings substitute for traditional cliffs and pigeons are an abundant prey species.[120] The peregrine is also subject to a comprehensive monitoring and management system under the MBTA's

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115 16 U.S.C. § 1533(a)(1)(D) (2006).

116 *See id.* § 1533(a)(1); *see also supra* note 32.

117 *See* 16 U.S.C. § 1533(b)(1)(B)(ii) (2006) (stating that the Secretary must consider whether a species is "in danger of extinction" during the delisting process).

118 *See supra* note 105 and accompanying text.

119 16 U.S.C. §§ 703–711 (2006). The MBTA federalized the conservation of migratory birds: It begins, for example, with a broad declaration that "it shall be unlawful . . . to take, . . . kill, possess, . . . sell, . . . ship, [or] export . . . any migratory bird." *Id.* § 703(a). Federal protection extends to "any product . . . which . . . is composed in whole or part, of any such bird or any part, nest or egg thereof." *Id.* The species's status is monitored, and take is managed by the federal and state governments through the Pacific Flyway Council established under the MBTA. *See id.* § 704 (authorizing the Secretary of Interior to allow takes when appropriate and to issue regulations governing the same); *id.* § 708 (recognizing that states may impose stricter regulations for protection of migratory birds); Pac. Flyway Council, Coordinated Management, http://pacificflyway.gov/Index.asp (last visited Apr. 18, 2010). The Council represents the fish and game commissions of the western states and provinces. *Id.* It has prepared a management plan for the Aleutian Canada goose. *See* SUBCOMM. ON THE CACKLING CANADA GOOSE, PAC. FLYWAY STUDY COMM., PAC. FLYWAY COUNCIL, U.S. FISH & WILDLIFE SERV., PACIFIC FLYWAY MANAGEMENT PLAN FOR THE CACKLING CANADA GOOSE (1999), *available at* http://pacificflyway.gov/Documents/Ccg_plan.pdf.

In addition, since the species nests on islands that are included within the Alaska Maritime National Wildlife Refuge, see U.S. Fish & Wildlife Serv., U.S. Dep't of the Interior, Alaska Maritime National Wildlife Refuge, http://alaska.fws.gov/nwr/akmar/index.htm (last visited Apr. 18, 2010), FWS has the authority not only to remove foxes from additional islands in the Aleutian chain but also to take whatever additional management actions might be necessary. *See* National Wildlife Refuge System Administration Act of 1966, 16 U.S.C. §§ 668dd–668ee (2006); *see also* U.S. Fish & Wildlife Serv., U.S. Dep't of the Interior, Wildlife: Alien/Invasive Species, http://alaska.fws.gov/nwr/akmar/wildlife-wildlands/wildlife/nonnative/alien.htm (last visited Apr. 18, 2010).

120 On November 20, 2009, a Google search for "peregrine falcon camera" produced several thousand hits, the first ten of which were for cameras in an unidentified city in Pennsylvania; Jersey City, New Jersey; Buffalo, New York; Rochester, New York; Salt Lake City, Utah; Columbus, Ohio; Rochester, New York (a second pair); and Wall Street in New York City.

falconry provisions.[121] Similarly, the overharvesting that led to listing the gray whale and the American alligator is a threat that is being managed after delisting through traditional federal and state take prohibitions under existing monitoring and enforcement mechanisms.[122]

These species share at least three crucial characteristics: their decline was primarily a result of a specific, eliminable threat;[123] the risk management necessary to delist the species after its population recovered is provided by existing regulatory mechanisms that provides species-specific monitoring and management, often because the species is charismatic;[124] and—the factor that may have trumped the rest—the species are habitat generalists that can flourish in human-impacted environments.[125]

VIII.

Most species do not fit this pattern. They have not been pushed to the edge of extinction by an eliminable threat. Instead, the most common threats facing at-risk species are habitat degradation and the predation or competition of invasive species.[126] One study, for example, found that sixty

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121 *See* Migratory Bird Permits; Changes in the Regulations Governing Falconry, 73 Fed. Reg. 59,448 (Oct. 8, 2008) (to be codified at 50 C.F.R. pts. 21–22).

122 Gray whales are subject to monitoring by the International Whaling Commission under the Protocol to the International Convention for the Regulation of Whaling, Dec. 2, 1946, 62 Stat. 1716, 161 U.N.T.S. 72. Domestically, the species is protected under the Marine Mammal Protection Act of 1972, 16 U.S.C. §§ 1361–1421h (2006). In addition to state fish and game regulations, the alligator continues to be managed pursuant to three federal regulatory mechanisms: the Lacey Act of 1900, 16 U.S.C. § 701 (2006), and the Lacey Act Amendments of 1981, 16 U.S.C. §§ 3371–3378 (2006), which prohibit interstate shipment of wildlife taken contrary to state or federal law, *id.* §§ 701, 3371–3378; a special rule promulgated under the ESA's similarity of appearance provisions (since the alligator is similar to other crocodilians, which still are listed), 50 C.F.R. § 17.42 (2004); and listing under Appendix I of Convention on International Trade in Endangered Species of Wild Fauna and Flora, app. I, Mar. 3, 1973, 27 U.S.T. 1087, 1118, 993 U.N.T.S. 243, 257, which prohibits international commerce in the species, *id.*

123 *See supra* notes 102–09 and accompanying text.

124 *See supra* notes 119, 121–22 and accompanying text.

125 *See, e.g.*, U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, PEREGRINE FALCON (*FALCO PEREGRINUS*) (2006), *available at* http://myfwc.com/conservation/conservationyou_living_w_wildlife_alligators.htm (stating that peregrine falcons "readily nest on manmade structures" in urban environments); U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, THREATENED AND ENDANGERED SPECIES: ALEUTIAN CANADA GOOSE (*BRANTA CANADENSIS LEUCOPAREIA*) (1999), *available at* http://alaska.fws.gov/media/acg/fact.pdf (stating that the Aleutian Canada goose frequents agricultural pastures and grainfields during its migration); Fla. Fish & Wildlife Conservation Comm'n, American Alligator, http://www.fwc.state.fl.us/Learning/Learn_AdultsFamilies_alligator.htm (last visited Apr. 18, 2010) (highlighting the encroachment of humans into the natural habitat of the American alligator); NatureServe Explorer, Comprehensive Report Species—*Eschrichtius robustus*, http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Eschrichtius+robustus (last visited Apr. 18, 2010) (stating that the gray whales' habitat consists of coastal and shallow shelf waters).

126 *See* David S. Wilcove et al., *Leading Threats to Biodiversity: What's Imperiling U.S. Species*, *in* PRECIOUS HERITAGE: THE STATUS OF BIODIVERSITY IN THE UNITED STATES 239, 240 (Bruce A. Stein et al. eds., 2000); David S. Wilcove et al., *Quantifying Threats to Imperiled Species in the*

percent of the listed species in the United States are imperiled by either disruption of natural fire disturbance regimes or the spread of nonnative species.[127] Such threats generally cannot be eliminated. A natural fire regime, for example, cannot be reintroduced into the scattered jack pine (*Pinus banksiana*) stands of the Midwest.[128] As a general rule, such threats can only be *managed*—rather than *eliminated*—because they require ongoing human intervention.[129]

Robbins' cinquefoil (*Potentilla robbinsiana*), for example, is a long-lived, dwarf member of the rose family.[130] Although never abundant, the species had been reduced to a single site—Monroe Flats—in New Hampshire when it was listed in 1967.[131] This population was at risk of extinction because the Appalachian Trail crossed Monroe Flats and the species was literally being trampled into extinction by hikers.[132] Following listing, FWS prepared a recovery plan to address the threats the species faced by protecting the existing colony on Monroe Flats[133] and by establishing additional self-sustaining populations.[134] By 2002, FWS concluded that the species had met its demographic targets: The Monroe Flats colony's population had increased more than 800% and there were three separate, additional populations.[135]

United States: Assessing the Relative Importance of Habitat Destruction, Alien Species, Pollution, Overexploitation, and Disease, 48 BIOSCI. 607, 607–09 (1998).

127 David S. Wilcove & Linus Y. Chen, *Management Costs for Endangered Species*, 12 CONSERVATION BIOLOGY 1405, 1406 (1998).

128 Carol I. Bocetti, Dale D. Goble & J. Michael Scott, *Using Conservation-Management Agreements to Secure Post-Recovery Perpetuation of Conservation-Reliant Species: The Kirtland's Warbler as a Case Study*, BIOSCI. (forthcoming) (manuscript at 5) (explaining that one recovery strategy for Kirtland's warbler (*Dendroica kirtlandii*) is habitat management that harvests and replants jack pines in a pattern that attempts to replicate their natural regeneration distribution after wildfires).

129 J. Michael Scott et al., *Conservation-Reliant Species and the Future of Conservation*, CONSERVATION LETTERS (forthcoming 2010) (manuscript at 10), *available at* http://www3.interscience.wiley.com/cgi-bin/fulltext/123263877/PDFSTART (reporting that 84% of the species listed under the ESA will require continuing conservation management even after the biological requirements for delisting have been achieved).

130 Press Release, U.S. Fish & Wildlife Serv., Rare White Mountains Plant Recovers: Endangered Species Success Story (Aug. 28, 2002), http://www.fws.gov/news/newsreleases/r5/C3314775-90A8-4608-9A5159013020D017.html (last visited Apr. 18, 2010).

131 Determination of *Potententilla robbinsiana* to Be an Endangered Species, with Critical Habitat, 45 Fed. Reg. 61,944, 61,945 (Sept. 17, 1980) (codified at 50 C.F.R. pt. 17).

132 Press Release, U.S. Fish & Wildlife Serv., *supra* note 130.

133 Proposed Rule to Remove *Potentilla robbinsiana* (Robbins' cinquefoil) from the Endangered and Threatened Plant List, 66 Fed. Reg. 30,860, 30,861 (proposed June 8, 2001) (to be codified at 50 C.F.R. pt. 17). To address this objective, the trail was rerouted away from the population, and a screen wall was constructed between the trail and the population and posted with "closed entry" signs. *Id.* at 30,861, 30,863. The plan also sought to expand the population into formerly occupied habitat that had been degraded by hikers. *Id.* at 30,861. Plants were also transplanted back into these areas after the trail had been rerouted. Removal of *Potentilla robbinsiana* (Robbins' cinquefoil) from the Federal List of Endangered and Threatened Plants, 67 Fed. Reg. 54,968, 54,970 (Aug. 27, 2002) (codified at 50 C.F.R. pt. 17).

134 66 Fed. Reg. at 30,861. The plan originally called for four additional populations but was scaled back when it became apparent that there was not sufficient habitat. 67 Fed. Reg. at 54,969–70.

135 67 Fed. Reg. at 54,968–73. The four populations totaled nearly 15,000 individuals. *Id.*

Although the cinquefoil's population and distribution had achieved the point at which it was no longer demographically at risk in the foreseeable future, the threats it faced from trampling could not be eliminated short of closing a section of the Appalachian Trail. Ameliorating the threat of trampling thus differs from removing relatively large predators (foxes) from relatively small islands, or removing DDT from the market. Hikers will require continuing monitoring and management to keep them on the path.[136] FWS responded to this problem by creating a conservation management structure to provide ongoing risk management after the cinquefoil was delisted.[137]

Both the landowner (the United States Forest Service (USFS)) and a recreational organization (the Appalachian Mountain Club (AMC)) actively participated in recovering the species by providing "stewardship, enforcement, and educational resources on site."[138] In preparation for delisting, FWS secured agreements with both entities to continue their monitoring and management activities.[139] AMC agreed to station a naturalist at the Lake of the Clouds Hut near Monroe Flats during the summer.[140] The naturalist provides educational outreach and, along with other staff at the hut, monitors the cinquefoil population for human impacts.[141]

FWS and USFS entered into a formal memorandum of understanding (MOU) that memorialized the agencies' "long-term commitment to conservation of this important plant species."[142] The short document (less than 2.5 pages) did four important things. First, FWS agreed to maintain the Monroe Flats habitat, "vigorously protect[]" the species from take through human disturbance, train personnel, and provide educational and interpretational information to visitors to the forest.[143] Second, the MOU established an "Oversight Committee" composed of FWS and USFS representatives.[144] Third, the MOU directed the Committee to initiate a long-term monitoring program to assess the species's stability and recruitment.[145] Finally, the MOU established a process under which the Committee "render[s] opinions and recommendations" on any proposed activity that may affect the species or its habitat; these opinions and

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136 *Id.* at 54,972–73. For example, despite continuing monitoring and the presence of the Appalachian Mountain Club botanist during the summer of 1985, 86 of the 4286 hikers who hiked the section of the Trail at Monroe Flats trespassed into the walled-off critical habitat. *Id.* at 54;972. This two percent trespass rate was less than the five percent noncompliance standard established by the recovery plan. *Id.*

137 *Id.* at 54,974.

138 *Id.* at 54,970; *see also id.* at 54,968, 54,971–73.

139 66 Fed. Reg. at 30,861.

140 67 Fed. Reg. at 54,972–73.

141 *Id.* at 54,973.

142 Memorandum of Understanding Between U.S. Forest Serv. and U.S. Fish & Wildlife Serv. for the Conservation of the Robbins' Cinquefoil (*Potentilla robbinsiana*) 2 (Dec. 2, 1994) (on file with author).

143 *Id.* at 3.

144 *Id.* at 1.

145 *Id.*

recommendations must be "considered" by USFS in making decisions on whether to proceed with the proposed activity.[146]

A second example is the Columbian white-tailed deer (*Odocoileus virginianus leucurus*). Originally common in the bottomlands of the Willamette, Umpqua, and lower Columbia River basins in western Oregon and southwestern Washington, by the early 1900s the species had been reduced to two disjunct populations: one along the lower Columbia River and the other in Douglas County in southern Oregon.[147] Like the goose, the species was listed as endangered in 1967.[148] By 2002, the Douglas County population had grown from an estimated 500 animals in 1970 to about 6070 animals.[149] Since the Columbia River population had not recovered, FWS designated the two populations "distinct population segments" (DPSs)[150] and delisted the Douglas County DPS as recovered.[151]

Post-delisting risk management is more complicated for the deer. Like many species at risk of extinction, the deer occurs in a fragmented matrix of public and private lands that are owned by multiple landowners.[152] Such landscapes present complex management problems that will often require a variety of regulatory mechanisms. Managing habitat in such landscapes is significantly different than removing a predator or a poison; even if lands are set aside *permanently*, addressing habitat loss requires ongoing monitoring and management if the land is to continue to meet the species's needs. More importantly, there were no existing regulatory mechanisms (such as the MBTA[153]) that could be used to manage habitat for the deer.

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146 *Id.* at 1–2.

147 Final Rule to Remove the Douglas County Distinct Population Segment of Columbian White-Tailed Deer from the Federal List of Endangered and Threatened Wildlife, 68 Fed. Reg. 43,647, 43,647 (July 24, 2003) (codified at 50 C.F.R. pt. 17).

148 Native Fish and Wildlife; Endangered Species, 32 Fed. Reg. 4001, 4001 (Mar. 11, 1967).

149 68 Fed. Reg. at 43,647–48.

150 One listable unit under the ESA's definition of "species" is "any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." Endangered Species Act of 1973, 16 U.S.C. § 1532(16) (2006). In 1996, the federal wildlife agencies issued a joint policy on the interpretation of DPS. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4722 (Feb. 7, 1996). For the application of the policy to the deer, see Proposed Rule to Delist the Douglas County Population of Columbian White-Tailed Deer, 64 Fed. Reg. 25,263, 25,265 (proposed May 11, 1999) (to be codified at 50 C.F.R. pt. 17); *see also* Supplemental Proposed Rule to Remove the Douglas County Population of Columbian White-Tailed Deer from the Federal List of Endangered and Threatened Species; Notice of a Public Hearing, 67 Fed. Reg. 42,217, 42,220 (proposed June 1, 2002) (to be codified at 50 C.F.R. pt. 17).

151 68 Fed. Reg. at 43,647.

152 *Id.* at 43,652.

153 *Compare* SUBCOMM. ON THE CACKLING CANADA GOOSE, *supra* note 119 (discussing the monitoring and management of the goose by the Pacific Flyway Council pursuant to the Migratory Bird Treaty Act, 16 U.S.C. §§ 703–711 (2006)), *with* 68 Fed. Reg. at 43,656–58 (discussing a management plan, developed by FWS for the Douglas County DPS, designed to detect changes in the status of the population).

FWS addressed this need for additional protection by requiring at least 5000 acres of "secure habitat" as a recovery goal.[154] The agency defined this requirement as "areas that are protected from adverse human activities . . . in the foreseeable future, and that are relatively safe from natural phenomena that would destroy their value to the subspecies."[155] This standard has both a legal and a biological component: The habitat must be legally protected against adverse human actions, and it must continue to provide the biological requirements of the species.

The requisite legal security can be obtained, the agency concluded, through a variety of regulatory mechanisms that ranged from ownership to land-use controls.[156] At one end of the continuum is obtaining interests in land such as "easements, leases, acquisitions, donations, or trusts" by public entities or conservation NGOs.[157] At the other end of the continuum are use restrictions on privately-owned land imposed through instruments such as "zoning ordinances, land-use planning, parks and greenbelts, agreements, memoranda of understanding, and other mechanisms available to local jurisdictions."[158]

The most significant recovery action was BLM's acquisition of a 6581-acre ranch as habitat for the deer.[159] Following the acquisition of the North Bank Habitat Management Area (NBHMA), BLM designated ninety-five percent of the land as an ACEC.[160] In addition, Douglas County received a bequest of 1100 acres of ranch land that was to be managed "as a wildlife refuge and working ranch."[161]

Simply setting aside habitat, however, is insufficient; there must also be legal assurances that that habitat will be managed so that it continues to meet the biological needs of the species. The management plan BLM adopted for the NBHMA "provides for the protection and enhancement of habitat for the Columbian white-tailed deer";[162] it emphasizes "active management to maintain or enhance habitat [through] the use of prescribed

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154 *See* 68 Fed. Reg. at 43,651.

155 *Id.*

156 *See id.*

157 *Id.*

158 *Id.* The security of these various tools may vary widely. Federal acquisition of land is probably the most secure; acquisition by private conservation organizations is also likely to be relatively secure (depending upon funding). Local politics, on the other hand, may be hostile to the conservation needs of the species or unwilling to expend the necessary funds. *See generally* Gregory M. Parkhurst & Jason F. Shogren, *Evaluating Incentive Mechanisms for Conserving Habitat*, 43 NAT. RESOURCES J. 1093 (2003) (comparing tools utilized for habitat conservation plans across the federal, local, and private sectors).

159 ROSEBURG DIST. OFFICE, BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, NORTH BANK HABITAT MANAGEMENT AREA AND AREA OF CRITICAL ENVIRONMENTAL CONCERN: RECORD OF DECISION: HABITAT MANAGEMENT PLAN AND MONITORING PLAN 23 (2001), *available at* http://www.blm.gov/or/districts/roseburg/plans/files/NBnkACEC.pdf.

160 *Id.*

161 68 Fed. Reg. at 43,654. The county also adopted a Columbian White-Tailed Deer Habitat Protection Program that imposed land-use controls, including minimum lot sizes and set-back requirements designed to protect brushy riparian corridors. *Id.* at 43,654–55.

162 ROSEBURG DIST. OFFICE, *supra* note 159, at 9.

fire, grazing, fertilization, seeding, planting forage plots and mowing."[163] The plan includes both a monitoring and research program to ensure that the area continues to meet the species's biological needs.[164] Both FWS and the Oregon Department of Fish and Wildlife are cooperating agencies on the management plan.[165]

The examples of post-delisting management agreements can be expanded. Eggert's sunflower (*Helianthus eggertii*) is found on rolling to flat uplands in Alabama, Kentucky, and Tennessee, a barren habitat that "is disappearing from the south-central United States at a rapid rate."[166] Given the threats the species faces—encroachment both by other plants and by commercial, residential, or industrial development—"[a]ctive management is required to ensure that Eggert's sunflower continues to survive at all sites."[167] Reasonable assurances that the necessary management was available came from a variety of management agreements: Two federal entities—Arnold Air Force Base and the National Park Service—signed Cooperative management agreements with FWS,[168] and two state agencies—the Kentucky Transportation Cabinet and the Tennessee Wildlife Resources Agency—signed management agreements to enhance and monitor populations on state lands that they manage.[169] The Nature Conservancy also entered into a management agreement.[170]

Hoover's woolly-star (*Eriastrum hooveri*) is an annual herb in the phlox family that grows in the San Joaquin and Cuyama Valleys in California, an area that has undergone intense land conversion and urbanization; oil, gas, and agricultural development presented significant risks to the species when it was listed as threatened in 1990.[171] In response to the listing, approximately 286,000 acres containing four metapopulations were included in a variety of protected statuses: two BLM ACECs, the Carrizo Plain National Monument, four California Department of Fish and Game Ecological Reserves, and four privately owned mitigation sites.[172] Ongoing conservation management was secured through BLM designation of the plant as a "sensitive species,"[173]

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163 *Id.* at 10.

164 *Id.* at 37–38, 59–65. The Douglas County Parks Department also manages the bequest lands to provide habitat for the species consistent with the other objectives of the bequest. 68 Fed. Reg. at 43,654.

165 ROSEBURG DIST. OFFICE, *supra* note 159, at 1, 17.

166 Determination of Threatened Status for *Helianthus eggertii* (Eggert's Sunflower), 62 Fed. Reg. 27,973, 27,976 (May 22, 1997) (codified at 50 C.F.R. pt. 17).

167 *Id.* at 27,975–76.

168 Proposed Removal of *Helianthus eggertii* (Eggert's Sunflower) from the Federal List of Endangered and Threatened Species and Determination that Designation of Critical Habitat is Not Prudent, 69 Fed. Reg. 17,627, 17,629, 17,633 (proposed Apr. 5, 2004) (to be codified at 50 C.F.R. pt. 17).

169 *Id.* at 17,633.

170 *Id.* at 17,629.

171 Determination of Endangered or Threatened Status for Five Plants from the Southern San Joaquin Valley, 55 Fed. Reg. 29,361, 29,361–62 (July 19, 1990) (codified at 50 C.F.R. pt. 17).

172 Removing *Eriastrum hooveri* (Hoover's Woolly-Star) from the Federal List of Endangered and Threatened Species, 68 Fed. Reg. 57,829, 57,832 (Oct. 7, 2003) (codified at 50 C.F.R. pt. 17).

173 *Id.* at 57,829.

which requires that it be addressed in all National Environmental Policy Act[174] documents.[175] BLM also agreed to "ensure that actions they authorize, fund, or carry out do not contribute to the need to relist the species."[176] The combination of conservation management agreements led FWS to conclude that "management practices of, and commitments by, the U.S. Bureau of Land Management . . . , on whose land a substantial number of new populations have been found, will afford adequate protection to the species upon delisting."[177]

As the cinquefoil, the deer, and the woolly-star demonstrate, there is no specifically targeted legal protection for most species other than the ESA.[178] Conserving such species requires the creation of specific management protocols. This is the irony of the ESA. It is a powerful statute that can bring species back from the brink of extinction—but its power often makes the Act irreplaceable. Other than the ESA itself, neither federal nor state law provides similar species-specific protection against threats that most species face—habitat degradation from human activities and competition from nonnative species.[179] For example, rats, mongooses, feral cats, and dogs cannot be removed from the Hawaiian Islands where they have endangered species such as the Hawaiian moorhen (*Gallinula chloropus sandvicensis*).[180] Unlike the recovery of the goose—which involved a relatively large predator (foxes) on relatively small and barren islands[181]—removal of the moorhen's predators is impossible given the size of the Hawai'ian Islands. Conservation

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174 National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4347 (2006).

175 68 Fed. Reg. at 57,832.

176 *Id.*; *see id.* at 57,835–36. The quoted language mirrors the consultation standard in section 7 of the Act. *See* National Environmental Policy Act of 1969, 42 U.S.C. § 4321(2)(a) (2006). There is, however, no actual consultation and thus no independent evaluation of the potential impact of any proposed action on the species.

177 68 Fed. Reg. at 57,829.

178 Holly Doremus, *Delisting Endangered Species: An Aspirational Goal, Not a Realistic Expectation*, 30 Envtl. L. Rep. (Envtl. Law Inst.) 10,434, 10,454 (2000); Holly Doremus & Joel E. Pagel, *Why Listing May Be Forever: Perspectives on Delisting Under the U.S. Endangered Species Act*, 15 CONSERVATION BIOLOGY 1258, 1261 (2001); Williams et al., *supra* note 98, at 24. This is particularly true for plants and invertebrates, which are often entirely without legal protection. Doremus, *supra*, at 10,447–48.

179 Although there are other, more broadly applicable statutes that protect habitat (e.g., the Federal Water Pollution Control Act, 33 U.S.C. §§ 1251–1387 (2006), state fish and game laws, and local zoning regulations), such statutes are unlikely to be sufficient to protect most listed species because such statutes only protect habitat in the process of advancing other objectives (such as assuring clean water) and thus do not provide assurances of ongoing management in the absence of the other objectives. Similarly, existing statutes on nonnative species (e.g., the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, 16 U.S.C. §§ 4701–4751 (2006), and state noxious weed control programs) are insufficiently tailored to be of much assistance to individual conservation-reliant species.

180 U.S. FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, DRAFT REVISED RECOVERY PLAN FOR HAWAIIAN WATERBIRDS, SECOND DRAFT OF SECOND REVISION 44, 46–47 (2005), *available at* http://ecos.fws.gov/docs/recovery_plan/061213.pdf.

181 Dale D. Goble, *Recovery in a Cynical Time—With Apologies to Eric Arthur Blair*, 82 WASH. L. REV. 581, 587 (2007).

of species such as the moorhen requires continuing monitoring and management. Such species are conservation reliant.[182]

The cinquefoil, the deer, and the woolly-star are examples of conservation-reliant species that have been recovered and delisted despite their need for continuing conservation management. To date, however, such delistings have been ad hoc, the result of crafting individualized conservation management agreements.

IX.

The Borax Lake chub is an example of a conservation-reliant species and of the management issues such species present. The chub is neither at risk of extinction due to a threat that can be eliminated, nor is there an existing regulatory mechanism to monitor and manage the species if it were delisted. Instead, the chub remains at risk of extinction from habitat degradation caused by increased human recreational use and the potential for the introduction of nonnative species.[183] What might a conservation management agreement (CMA) for the chub look like?

In its consensus findings on the conservation status of the Borax Lake chub, the expert panel convened by FWS provided a detailed discussion of both the threats facing the species and the steps necessary to manage those threats.[184] The discussion offers a description of the components that would be required for a CMA for the species.

The panel focused on the four threats facing the species: recreation, nonnative species, groundwater withdrawals, and the species's restricted range.[185] Its mitigation proposals take on a repetitive cadence: monitoring, access restrictions, and education.[186] Field visits to the lake had found gates unlocked, off-highway vehicle use within the critical habitat (with a resulting degradation of the area), and a lack of signs explaining the area's sensitivity.[187] To determine the timing of use, types of visitors, and their impacts on the ecosystem, the panel proposed an extensive monitoring program that included quarterly site visits to monitor the physical integrity of the site; annual fish, invertebrate, and water quality monitoring; visitor use monitoring; and annual evaluation of the collected data.[188] The panel also recommended research to determine the risk to the lake's ecosystem from potential groundwater development in the basin.[189] It advocated eliminating vehicle use of the area around the lake and boat access to the lake.[190] The panel also proposed an educational program to inform visitors of

182 *See* J. Michael Scott et al., *Recovery of Imperiled Species Under the Endangered Species Act: The Need for a New Approach*, 3 FRONTIERS ECOLOGY & ENV'T 383, 386 (2005).

183 WILLIAMS & MACDONALD, *supra* note 84, at 14–15; Williams et al., *supra* note 98, at 26.

184 WILLIAMS & MACDONALD, *supra* note 84, at 14–24.

185 *Id.*

186 *Id.*

187 *Id.* at 16–17.

188 *Id.* at 17, 22.

189 *Id.* at 19.

190 *Id.* at 18.

"the unique and fragile features of the ecosystem" and minimize the threat of nonnative species.[191]

The panel's discussion outlines what would be required for post-delisting management: restrictions on vehicular access, an educational campaign to inform visitors of the site's fragility, and a monitoring program sufficient to alert managers to any changes in the biotic or abiotic environment.[192] These actions are not dependent upon the ESA; as the land-managing agency and the landowner, BLM and The Nature Conservancy (TNC) have the ability to control vehicular and individual access to the lake and its surroundings.[193] The agencies can also provide interpretative signage at the site. Finally, TNC and BLM have the expertise necessary to develop and implement a monitoring program.[194] A CMA could be drafted that would ensure that these actions were implemented, and that FWS would be kept apprised of the results of the monitoring program.

But, as the panel noted, although frequent monitoring can reduce the threats, the chub's vulnerability "cannot be eliminated"[195]—a statement that could be made about most species which face threats that can at best be managed rather than eliminated.

X.

The Borax Lake chub is a window to the future. A recent conservative estimate placed the actual number of at-risk species in the United States at between 14,000 and 30,000 species—approximately seven to eighteen percent of the nation's animals, plants, and fungi.[196] Given our species's increasing numbers and appetites—which are reflected in and compounded by global climate change—even now-common species are likely to become endangered within the foreseeable future. If there is any hope to avoid a calamitous loss of biodiversity, it is no longer possible to simply let nature take its course. Conservation reliance and the need for ongoing conservation management is the new norm.

We have become nature and must accept the responsibilities that come with the role.

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191 *Id.*

192 *Id.* at 16–22.

193 There is a potential for some conflict between competing TNC objectives. On the one hand, the organization has a lengthy record of successful conservation management. RICHARD BREWER, CONSERVANCY: THE LAND TRUST MOVEMENT IN AMERICA 186 (2003). On the other hand, the need to raise funds can lead it to advertising fragile areas such as Borax Lake. The TNC website, for example, has a stunning picture of mist rising from Borax Lake with a snow-capped Steens Mountain in the background; the lead paragraph is a discussion of "[w]hy [y]ou [s]hould [v]isit." The Nature Conservancy, Borax Lake, http://nature.org/wherewework/northamerica/states/oregon/preserves/art6794.html (last visited Apr. 18, 2010).

194 *See, e.g.*, BREWER, *supra* note 193, at 186, 204; BUREAU OF LAND MGMT., *supra* note 72, § 1613.02.

195 WILLIAMS & MACDONALD, *supra* note 84, at 20.

196 David S. Wilcove & Lawrence L. Master, *How Many Endangered Species Are There in the United States?*, 3 FRONTIERS ECOLOGY & ENV'T 414, 416 (2005).