

Improving Implementation of the Endangered Species Act: Finding Common Ground Through Common Sense

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The Endangered Species Act of 1973 continues to be the subject of intense political acrimony. Opponents believe the law is a failure and call for significant changes, whereas proponents resist changes and argue for more funding to implement the statute. We suggest the law has been successful in meeting its core mission of preventing human-caused extinctions, but there are significant challenges with how the law is applied that limit its success. We recommend improvements in implementation that could lessen political controversy while making the act a more effective tool for conservation.

Keywords: Endangered Species Act, critical habitat, listing, environmental regulation

The Endangered Species Act of 1973 (ESA) has been the subject of heated debate. The act is considered by many to be the signature environmental law of the United States (Bean 2009), but this status also amplifies the acrimony over the act's ongoing implementation. These arguments for and against the ESA often align along familiar perspectives (Male and Bean 2005, Evans et al. 2016). Critics call it a failure because it has not led to the recovery (i.e., formal delisting) of very many listed species. Proponents claim the opposite, noting that the ESA has helped prevent the extinction of the vast majority of listed species.

Our view is squarely in the middle and is based on many decades of implementing the ESA as field biologists and wildlife managers in both the private and public sectors throughout the American West. The act continues to enable some of the most important and positive conservation outcomes in the United States, but its effectiveness could be significantly improved to accomplish even more conservation with fewer unintended consequences.

Reflecting on this experience, the purpose of the present article is threefold: to affirm the obvious success of the ESA in meeting its core mission of preventing human-caused extinctions, to acknowledge that the ESA sometimes has unintended negative consequences and that current and future implementation of the act has significant challenges

and unrealized potential, and to provide a field perspective with some practical recommendations for future improvement in implementation. It is our hope that this discussion finds common ground and leads to improved implementation of the act for the wide variety of stakeholders in both rural and urban America.

Success of the ESA

The ESA is a resounding conservation success story. It stops extinctions and recovers species (Schwartz 2008, Donlan and Rothacker 2015), and it provides valuable oversight of relevant federal activities (Malcom and Li 2015). The act also educates the public on the vulnerability of species and ecosystems as it puts many species on a steady path to recovery (Luther et al. 2016). Although the pace of recovering and delisting species was slow for the first few decades of the act's implementation, it has picked up significantly in recent years (figure 1; Neel et al. 2012). But for the act, it is doubtful that we would be able to observe in the wild some of the magnificent wildlife species that we now take for granted, such as peregrine falcons (*Falco peregrinus*), brown pelicans (*Pelecanus occidentalis*), southern sea otters (*Enhydra lutris nereis*), humpback whales (*Megaptera novaeangliae*), American alligators (*Alligator mississippiensis*) and many others. This success has been well documented by other authors

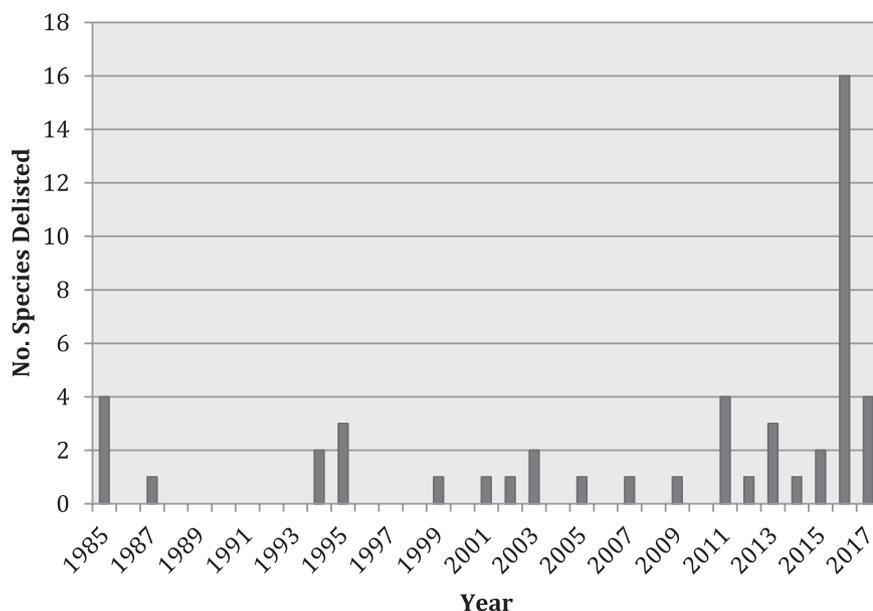


Figure 1. The number of species delisted per year under the ESA because of recovery. Source: USFWS 2018.

and will not be further detailed here (e.g., Evans et al. 2016, Luther et al. 2016). Instead, we focus on challenges with the ESA and how its implementation might be improved.

Shortcomings of ESA implementation

The above success notwithstanding, there are significant areas in which the ESA falls short of its potential and in which its effectiveness could be improved (Donlan and Rothacker 2015, Evans et al. 2016). This is a difficult topic for some conservationists to discuss. They are reluctant to admit that the ESA can have flaws or room for improvement, perhaps concerned that doing so will unravel political support for the act or enable weakening of various provisions of the law. However, our observations and some recent research reach different conclusions about challenges with the ESA (Baur et al. 2009, Benson 2012), and it is important to face these concerns squarely to make the act work better.

Perhaps the most significant overall concern is that application of the ESA does not always result in net positive conservation outcomes (Langpap and Wu 2004, Sorice and Abel 2015). How could this be? The act's clear intent is to conserve biodiversity, not harm it. Unfortunately, the act can create perverse disincentives for the conservation of many species and for important segments of the American public (Langpap et al. 2018). It sometimes alienates or antagonizes key constituencies who would otherwise support its goals and intent, such as many family farmers and ranchers (Mir and Dick 2012, Knapp et al. 2015). And its implementation often consumes scarce conservation resources because of bureaucratic and administrative requirements, especially when ambiguities in the law invite litigation (Rylander 2012). Proponents of the ESA need to recognize and address

these problems if the act is to be supported more broadly in both rural and urban America (Fankhauser 2015).

Many of these shortcomings are a consequence of the highly variable legal, ecological, and social environment within which the act is applied, as well as a vastly different political and economic environment today from those when the act was first passed 45 years ago (Evans et al. 2016). Some of the specific areas in which implementation of the act faces challenges and could be improved are the process for listing species and the need to encourage proactive conservation prior to a final listing decision, distinguishing between conservation opportunities on public lands versus private lands, distinguishing between conservation challenges that require regulatory action versus those that need proactive or voluntary intervention, reducing the negative conservation consequences of critical habitat designation, reconciling single species conservation with ecosystem conservation, and the process for delisting species and the need to transition recovering species from the ESA to other forms of management.

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The listing process: Encouraging conservation prior to a final listing decision

It is often said that if you have reached the point that you need to list a species under the ESA, you are probably too late. This statement is true in two simple ways. First, the more a species is allowed to decline before taking affirmative action, the more expensive and technically challenging it will be to prevent extinction and reach recovery. And second, once a species is formally listed, the opportunities for collaboration with many state and local governments and private landowners are usually reduced, and the acrimony surrounding actions to conserve the species is usually heightened (Benson 2012).

Quite often, the most opportune time for species conservation to occur is that moment when a species is seriously being considered for a listing but well before a final listing decision has been made. Once a listing decision is imminent, people start paying attention, information is collected, and stakeholders are jolted into action. Unfortunately, this moment can be short-lived and fleeting, even for species for which declines have long been recognized. There is no effective incremental or iterative process under the ESA

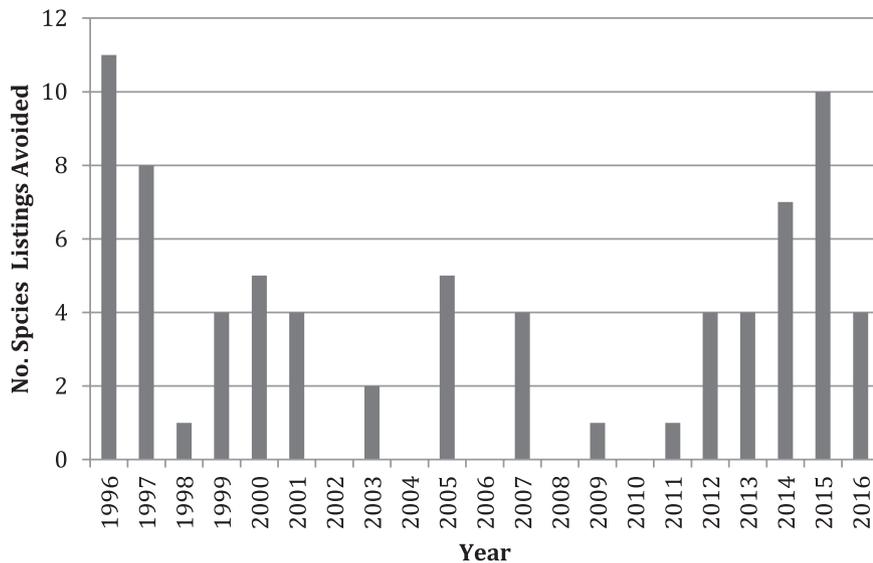


Figure 2. The number of species for which the need for ESA listing has been avoided per year because of preemptive implementation of conservation measures or plan. Source: USFWS 2018.

for initiating conservation prior to a species being formally considered for listing (Bean 2015). The listing process, once formally initiated, is mostly a linear and deadline-driven regulatory process, especially when operating under a court-ordered schedule because of litigation. This process does not accommodate or encourage the development of relationships, partnerships, and trust, all of which are essential ingredients in the creation of voluntary and proactive conservation plans.

Historically, the process also redirects most discretionary agency staff resources to the actual development of the listing finding and away from participating in conservation activities that might benefit the species and forestall the need to list. This dynamic may be changing: A pending listing can be a powerful incentive that brings stakeholders to the table, and once there, the process could allow for time and flexibility to enable different interests to find common ground, as was done for the 2015 greater sage grouse (*Centrocercus urophasianus*) not warranted listing decision (USFWS 2015a). In recent years, interest in prelisting conservation plans seems to be increasing for species being considered for listing (figure 2) or that have been granted candidate status, such as the greater sage grouse, fisher (*Pekania pennant*; USFWS 2016a), or lesser prairie chicken (*Tympanuchus pallidicinctus*; BenDor et al. 2017). There can sometimes be local efforts and public notoriety surrounding species that are in decline but not yet federally listed.

Can meaningful and collaborative conservation efforts be started upstream of the Endangered Species Act (Donlan and Rothacker 2015)? We believe so, and we offer the following recommendations to encourage collaborative conservation efforts prior to a final listing decision:

Unless a species is faced with imminent extinction and aggressive intervention is immediately necessary, make it standard procedure prior to a listing to develop collaborative conservation strategies with states and private stakeholders (Rissman and Sayre 2012, Raymond and Schneider 2014).

Encourage stakeholders, especially private landowners or permit holders using federal lands, to participate in the design of prelisting conservation programs with an explicit goal of obviating the need to list. The US Fish and Wildlife Service (USFWS) and state agencies can provide staff support for these efforts. This would increase buy-in, reduce acrimony and mistrust, distribute the workload, and lead to better conservation on private lands (Sorice and Abel 2015).

Consistent with the authorities described in the act, actively engage willing states in certain ESA-related

activities through section 6 cooperative agreements, such as preparation of prelisting conservation agreements, recovery outlines, and so on. This will help spread the workload, bring needed expertise from state agencies, and help invest states in final listing decisions. However, a process will need to be enumerated in the agreement to resolve situations in which a state and the USFWS might disagree on decisions or recommendations, in which multiple states are involved, and in which resources to staff these efforts are limited.

For wide-ranging species, encourage and monitor different approaches in different states to assess the pros and cons of various plans and to encourage creativity and adaptive management. Recent examples of proactive, multistate efforts that obviated the need for a listing include the greater sage grouse (USFWS 2015a), fisher (2016a), and Washington ground squirrel (*Urocitellus washingtoni*; USFWS 2016b).

Public lands versus private lands

Once species are on the Threatened and Endangered list, some of the biggest challenges to achieving positive ESA outcomes are the complex trade-offs between how to manage species that occur on public lands compared with those located on private lands (Langpap et al. 2018). Regulatory authorities, positive and negative incentives, and social mores vary widely on the different land ownership types (James 2002). This difference also plays out at a national political level because public lands compose a disproportionately large portion of the western United States.

The ESA is well suited for reconciling many federal activities with species conservation, especially actions occurring on federal lands. Examples include the conservation of old growth trees on national forests, the management of public waters, and the building of federal highways. The

vast majority of federal actions that are subjected to ESA oversight proceed, sometimes but not always with adjustment to minimize their impacts to listed species (Malcom and Li 2015). Federal action and regulatory agencies have learned to work more collaboratively and proactively with one another to carry out their missions and efficiently comply with the act. Improvements in the process occur regularly, and in our view it is more efficient than some critics of the act suggest.

Nevertheless, a regulatory approach that may be efficient for conserving species on federal lands may actually lead to negative conservation on private lands (Knapp et al. 2015). Over two-thirds of at-risk species occur on private lands (Evans et al. 2016), and many of these private lands—and the species that occupy them—are interspersed with public lands. Unfortunately, ESA-listed species are often viewed as a fiscal or legal burden by private landowners (Ciuizio et al. 2013, Sorice et al. 2011, 2013), which, in turn, discourages many of these landowners from participating in conservation efforts (James 2002, Baur et al. 2009). Many ranchers and farmers have a strong land stewardship ethic that inclines them to a conservation perspective (Jackson-Smith et al. 2005, Knight 2007, Raymond and Schneider 2014), but concerns posed by environmental regulation usually overwhelm positive conservation values (Olive and Raymond 2010, Miller et al. 2011, Sorice and Abel 2015). Therefore, many landowners oppose maintaining or improving habitat for endangered species on their property to protect their long-term commercial or legal interests and their property rights (Mir and Dick 2012, Rissman and Sayre 2012).

This ESA dynamic works against conservation in many places (Fischer and Bliss 2008, Groce et al. 2012). For example, throughout the American West livestock ranches, family farms, and small woodlots provide important and relatively undeveloped habitat conditions for many species of wildlife (Knight 2007, Talbert et al. 2007, Davies et al. 2011). Many agricultural producers operate close to financial margins and are very sensitive to real or perceived economic uncertainties, including unpredictable regulation (Olive and McCune 2017). Struggling ranches, farms, and working forests are often subdivided or converted to other uses (Liffman et al. 2000, Brunson and Huntsinger 2008). Also, stable rural communities provide the capability and infrastructure to help address important conservation challenges, such as responding to wildfire, managing invasive species, and monitoring local ecological trends (Murphy et al. 2013). Loss or decline of these working landscapes and the economic and social communities that support them can be counterproductive to conservation (Haversustad et al. 2007).

In our view, keeping people working their farms and ranches is a better overall conservation outcome than contributing to conditions that force them off the land. This outcome may seem counterintuitive to some conservationists, especially for those seeking to restrict local economic activities on private natural areas or on nearby public lands. But in

many parts of the West, and especially with working ranches and forests, the relationship between private and public lands management is inextricably linked economically, socially, and ecologically. Implementation of the ESA—and conservation efforts in general—needs to explicitly prioritize avoiding unintended negative economic consequences to local communities that support open, semiwild landscapes if broader and durable conservation goals are to be reached.

Implementation of the ESA has slowly improved to address this need during the last several decades (Evans et al. 2016). For example, in 1982 section 10 of the act was modified to allow for habitat conservation plans (HCPs), and in the 1990s, policies were developed to enable safe harbor agreements (SHAs) and candidate conservation agreements with assurances (CCAAs; Baur et al. 2009). Langpap and Kerkvliet (2012) found that HCPs, on average, are having a positive effect on species recovery, and results from SHAs are positive but could be improved and expanded (Bean 2017). Most recently, development of CCAAs on private lands figured prominently in the decision to not list the greater sage grouse as Threatened or Endangered in eleven states in 2015 (USFWS 2015a). Likewise, the USFWS did not list the fisher in Washington, Oregon, and California partly because of proactive conservation efforts associated with CCAAs with states and private timber companies (USFWS 2016a). Although these decisions remain controversial for environmentalists who would have preferred the species to be listed (Kass 2015), these decisions clearly demonstrate the potential for the act to be applied proactively prior to a listing decision and with positive conservation outcomes that may outweigh the net conservation benefits of listing these species.

Increased use of these agreements is a significant positive development in ESA implementation, but the process for preparing and completing them is lengthy, costly, and labor intensive and needs to be further streamlined and simplified (Donlan and Rothacker 2015, Bean 2017). These tools are also viewed with suspicion by many private landowners and environmental groups, although for different reasons. Private landowners sometimes see them as a type of extortion: They must enroll in this plan or else be regulated. They are also concerned about the potential for revealing proprietary information regarding their property or business. In contrast, environmentalists often view these agreements as if the landowners are “getting off easy” by avoiding regulation. Environmentalists often oppose these agreements publically and sometimes litigate, which makes private landowners reluctant to participate, which, in turn, perpetuates a cycle of conservation avoidance on private lands.

There has also been increased use of sections 4(d) and 10(j) of the act to reduce unnecessary regulation, soften opposition to listed species' conservation, increase management flexibility, and encourage collaboration among a wider segment of the public. Section 10(j) allows the USFWS to establish experimental populations with increased flexibility on the management of those populations, thereby helping overcome local resistance to reintroductions. Section 4(d)

allows the USFWS to establish certain rules in a listing determination that may relax take restrictions and reduce conflict with certain segments of the public, such as farmers or ranchers, as long as the actions the rules permit are compatible with the species' conservation. Currently, approximately 25% of species listed as Threatened have an associated 4(d) rule exempting certain activities from the take prohibition, and as of this writing the USFWS is considering a proposed regulation change to remove the blanket take prohibition on Threatened species (It would remain in effect for endangered species.).

During the last several years in Oregon, the USFWS has used 4(d) rules and 10(j) designations to advance the conservation of bull trout (*Salvelinus confluentus*) (Dunham et al. 2016), streaked horned lark (*Eremophila alpestris strigata*), Columbian white-tailed deer (*Odocoileus virginianus leucurus*), and Oregon silverspot butterfly (*Speyeria zerene hippolyta*), often with the enthusiastic support of local land managers. Similar provisions have been applied to many listed species elsewhere in the United States, such as the southern sea otter (*Enhydra lutris nereis*), California condor (*Gymnogyps californianus*), black-footed ferret (*Mustela nigripes*), and California tiger salamander (*Ambystoma californiense*). Although some in the environmental community oppose these efforts (Sanerib et al. 2016), it is clear these approaches have had a significant net positive impact on conservation of these species and on public perceptions of the act, especially with private landowners (Sand County Foundation 2015, Dunham et al. 2016). These tools enable reintroductions of new populations, and they reduce conflicts that might otherwise lead to habitat loss. More detailed information on how these ESA tools improve the status of these species can be readily accessed at www.fws.gov/endangered.

Regulatory versus voluntary conservation actions (reactive versus proactive)

As was discussed above, there is a tension between the carrot and the stick with the ESA. The act can be effective at modifying harmful federal activities but falls short at encouraging proactive, restorative actions on private lands (Ryan et al. 2013). Worse, the ESA sometimes unintentionally encourages people to passively avoid positive engagement (Brook et al. 2003) or to take negative, preemptive actions that discourage species occurring on their property because of fear of regulation or adverse economic impacts (Langpap and Wu 2004, Langpap 2006, Groce et al. 2012).

Many of the early successes of the act were because of its ability to modify and improve federal actions that were directly harming highly vulnerable species. Section 9 of the ESA prohibits unpermitted take of a species, and section 7 requires federal action agencies to consult with the regulatory agencies when their actions may affect listed species; both of these regulatory conventions have helped improve the status of many species (Malcom and Li 2015). However,

rather than regulatory prohibitions, many of the most serious conservation challenges today necessitate proactive, interventionist action: restoring natural ecological processes such as fire and flood cycles to large landscapes (Ryan et al. 2013), reintroducing extirpated species and assisting colonization in rapidly changing environments (Seddon et al. 2014, Dunham et al. 2016), and aggressively managing undesirable invasive species (Simberloff et al. 2013), to name a few. These and many other interventions also require acceptance of potential short-term impacts and risk as we manage lands for long-term resiliency in the face of an uncertain future (Gunderson 2013, Henson et al. 2013). Unfortunately, many land managers let important recovery opportunities slip by because of concern of self-inflicted regulatory encumbrance: Why let a listed species thrive and recover on their property if it might bring them risk of economic harm (Langpap 2006)? We have had dozens of conversations with private landowners and public land managers who acknowledge resisting the implementation of positive conservation measures on their lands. They fear that by taking these actions they will self-impose uncontrollable ESA burdens on their future land management with associated economic and legal costs (Henderson et al. 2014), a fear that SHAs were supposed to alleviate, but they have not been fully successful (Bean 2017).

A second concern is that the process of implementing restoration or beneficial actions is often heavily regulated by the ESA, and the costs and headaches of the process discourage action and risk taking. Even small scale conservation and restoration actions that have short-term impacts (e.g., prescribed fire and forest fuels management, in-stream restoration work, invasive species removal) are often regulated as *adverse actions* under the ESA, adding bureaucratic process costs and introducing an additional layer of oversight that sometimes discourages project implementation or consumes limited project resources (Baur et al. 2009). From a permitting perspective, it is often as difficult to implement a simple restoration action as it is to implement a habitat-altering commercial development. In the meantime, invasive species continue to spread into Endangered species' habitat, the risk of unnatural catastrophic wildfire increases, and unoccupied historic habitat remains unoccupied because of opposition to reintroductions of native species. Unfortunately, for many land managers, these outcomes are preferable to the economic or legal uncertainty associated with helping species recover. Implementation of the ESA needs to be improved and streamlined to change this dynamic.

The following recommendations to land managers and regulators will reduce the conflicts that occur when trying to conserve species on private lands, and they should encourage proactive conservation actions on all landownerships:

Use the flexibility of section 4(d) of the ESA when listing or reclassifying a species. For species not facing imminent extinction risk or severe population constraints, consider the Threatened listing classification with limited or no take

prohibitions. This will lessen the fear of economic and legal liability of having listed species on one's private lands.

Expand the effort to streamline and simplify the regulatory oversight of permitting management and restoration actions with nonfederal parties. Make section 10 documents (HCPs, SHAs, and CCAAs) less complicated legal instruments that do not intimidate private landowners, especially landowners that do not have easy access to legal advice (Male and Donlan 2015, Bean 2017).

To expedite implementation of positive conservation actions, encourage use of the discretion afforded under recent section 7 guidance meant to streamline approval of restoration and recovery projects (USFWS 2016c). Use programmatic section 7 approaches wherever feasible, and continue to use more collaborative and streamlined section 7 processes with federal action agencies (e.g., NOAA 2012, USFWS 2015b).

Critical habitat

The designation of critical habitat provides the clearest example of the difference in positive conservation outcomes when applying the ESA on public versus private lands and when evaluating trade-offs between regulatory and voluntary actions. All listed species are required to have critical habitat designated, which is defined as the specific geographic areas that contain features essential to the conservation of an Endangered or Threatened species and that may require special management and protection. Designating critical habitat is often more controversial than the actual listing of a species as Threatened or Endangered (Groce et al. 2012). Although it is a fundamental tenet of conservation biology that all species need habitat within which to exist—and it was reasonable and prescient for Congress to include a provision for habitat conservation in the ESA—designating critical habitat as currently practiced is often not an effective mechanism to provide or encourage these habitat-related conservation measures on private lands. Therefore, it is important to manage the critical habitat designation process to maximize positive conservation outcomes and minimize unintended negative consequences.

The positive and negative impacts of a critical habitat designation are highly variable and usually depend on very specific and unique circumstances. One cannot generalize across taxa and geography. Critical habitat may have some conservation benefit in one set of circumstances, such as with the northern spotted owl (*Strix occidentalis caurina*) on high-quality federal lands, but its designation is often counterproductive in other circumstances, such as with listed species on private lands. Although it is difficult to assess quantitatively, one needs to predict and weigh the relative positive and negative conservation consequences of critical habitat designations on a case-by-case basis. This is a challenging exercise (Kalen 2014), although there may be some general rules or questions that could be applied to evaluate this trade-off.

Critical habitat designation has always been controversial, but for several reasons, the acrimony is greatest when private

lands are designated. First, drawing a clear legal demarcation on privately owned lands is perceived by many as a federal taking of private land, and it has a profound psychological (if not economic) impact on landowners and local communities (Turner and McGrath 2013). Second, there do not seem to be many obvious regulatory benefits from such designations on private lands, and there are often direct negative conservation impacts. Third, designating critical habitat prior to having important scientific and economic information is controversial, often leading to intense public acrimony and a lack of public confidence in the law or the agencies implementing it (Kalen 2014).

The USFWS has long recognized these issues and commented on the limited conservation value of the existing critical habitat process (Clark 1999, Hagen and Hodges 2006). Although Taylor and colleagues (2005) concluded that critical habitat provides significant positive conservation benefits, other researchers have found little quantitative evidence for net positive conservation outcomes associated with critical habitat designations (Male and Bean 2005, Kerkvliet and Langpap 2007, Gibbs and Currie 2012, Camaclang et al. 2014, Nelson et al. 2014). We have observed private landowners purposefully remove rare and critically endangered plants on their property after their lands were proposed as critical habitat. In other cases, private landowners who were at first willing to restore listed species on their property changed their minds when their lands were proposed for critical habitat. Clearly the designation of critical habitat can have unintended adverse impacts on the conservation of species regardless of the good intentions of the act.

Policy guiding critical habitat designation was recently clarified to address this concern (USFWS and NOAA 2016). This policy update makes clear the USFWS's discretion to weigh the specific positive benefits of a critical habitat designation against the potential negative impacts and then decide whether there is a net conservation benefit to the designation. For example, if a landowner who has entered into an SHA is disinclined to implement positive conservation measures on their private land because he is worried that a pending critical habitat designation on his property might adversely affect his property rights or value, the USFWS can factor this potential into a final decision of whether or not to exclude these lands from a final critical habitat designation.

The listing agencies can reduce these conflicts by considering the following guidelines as they complete critical habitat designations: Critical habitat designations should clearly be expected to result in net positive conservation outcomes, especially on private lands. Encourage the use of updated policy discretion to determine whether designations are advisable, especially on private lands. The USFWS has used this discretion as long ago as 2003 in the state of Hawaii (USFWS 2003), but we recommend it be applied more widely. Identify "recovery habitat" in recovery plans to provide nonregulatory guidance to private landowners on what geographic areas are important to the recovery of the species. But do not formally designate these areas as

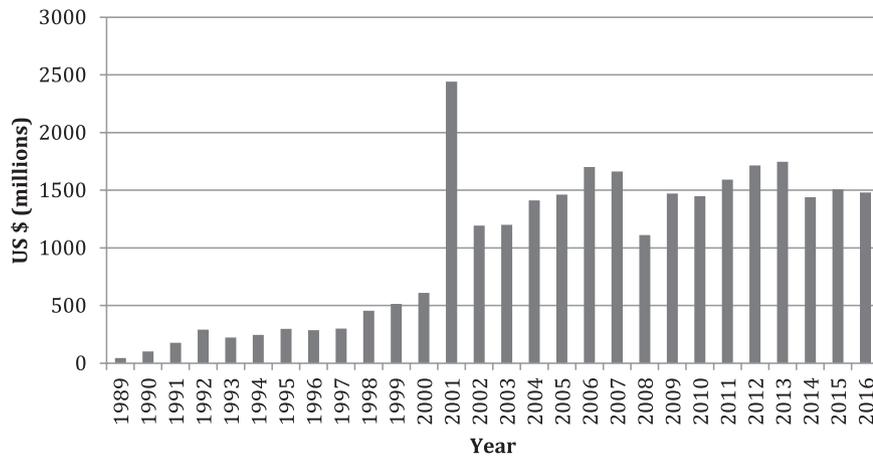


Figure 3. Annual expenditures of Federal and State agencies implementing the ESA. Source: USFWS 2018.

critical habitat if it would negatively affect the likelihood of conservation on those lands. Whenever possible, conduct section 7 consultation with action agencies on designated critical habitat at a programmatic, landscape plan level. If consultation determines that the overarching landscape plan will not adversely modify critical habitat, then subsequent site-specific actions conducted under such a plan will also not adversely modify.

Managing for single species versus ecosystems

The dilemma with critical habitat also raises another challenge to ESA implementation: the focus on single species versus ecosystems and landscapes (Benson 2012). The stated purpose of the ESA is “to provide a means whereby the ecosystems on which endangered species and threatened species depend may be conserved” (ESA, §2(b)). Likewise, the principles of conservation biology encourage us to focus on the conservation of landscapes and large areas of habitat and not just single species (Soule and Wilcox 1980).

As more and more species are listed, the capacity of the USFWS to manage and recover these individual species is increasingly strained (Gerber 2016). Federal ESA budgets remain flat even as more species are listed (figure 3). There are currently about 1600 listed species in the United States, with hundreds more petitioned for listing. Once a species is listed, the USFWS usually must dedicate individual staff exclusively to managing the legal and technical processes associated with complying with the ESA requirements for those species (e.g., critical habitat designation, recovery plan development, section 7 consultation, HCP development, lawsuits). USFWS field operations simply do not have the resources to implement all of the necessary administrative or conservation actions to recover these species. In addition, biologists are often required to focus first on those actions that are legally required by statute or court order (e.g., designate critical habitat) rather than actions that might have greater net conservation value (e.g., curtail an invasive species or work collaboratively with local landowners).

In addition to the exponentially increasing single-species workload, a single-species focus often creates obstacles to implementation of broader ecosystem restoration strategies on large landscapes (Hobbs et al. 2011, Casazza et al. 2016). Conflicts sometimes occur when ecosystem restoration goals do not fully align with the more narrow or short-term conservation needs of individual species (Lampert et al. 2014). For example, even in situations in which there is a general scientific consensus that some degree of active intervention is necessary to restore fire-prone, ecologically departed forests in the West to a more natural and resilient state (Prather et al. 2008, Haugo et al. 2015),

there is still reluctance to take action if such actions might harm listed species in the short term. Although avoiding action may minimize short-term impacts to these species, it often leads to a deferral of needed restoration actions. Ironically, this deferral may put those same listed species at greater risk in the long term (Prather et al. 2008). These conflicts play out for a variety of listed species across ecosystem types, including forests, marshes, deserts, and riparian systems (Lampert et al. 2014).

To reconcile this conflict for northern spotted owls, the USFWS developed an overarching vision in the owl recovery plan (USFWS 2011) that can best be summarized as *If it's good for the ecosystem, it's good for the owl*. The plan explicitly encourages active management for maintenance or restoration of forest ecological processes (e.g., uncharacteristic wildfire, managing invasive species) even if there are short-term impacts to spotted owls. Of course, this vision depends on a robust scientific understanding of the ecological processes and the relative risks and rewards of taking action (Hobbs et al. 2011, Henson et al. 2013). But it was appropriate to make these recommendations explicit in the recovery plan to overcome a tendency for risk-averse land managers to forego taking actions that may be controversial, even though they are scientifically and ecologically justified.

We recognize that we cannot abandon single-species management in landscapes in which natural processes have been significantly altered. But an approach that focuses on restoring and conserving the natural processes of ecosystems (e.g., Ricklefs et al. 1984) is likely to provide the highest probability of net conservation success, rather than attempting to manage and regulate all actions that affect single species and their associated critical habitats. Such conflicts are likely to increase in frequency and scale as landscape-level conservation challenges associated with climate change, invasive species, and human population growth overwhelm our remaining capacity to manage single species recovery.

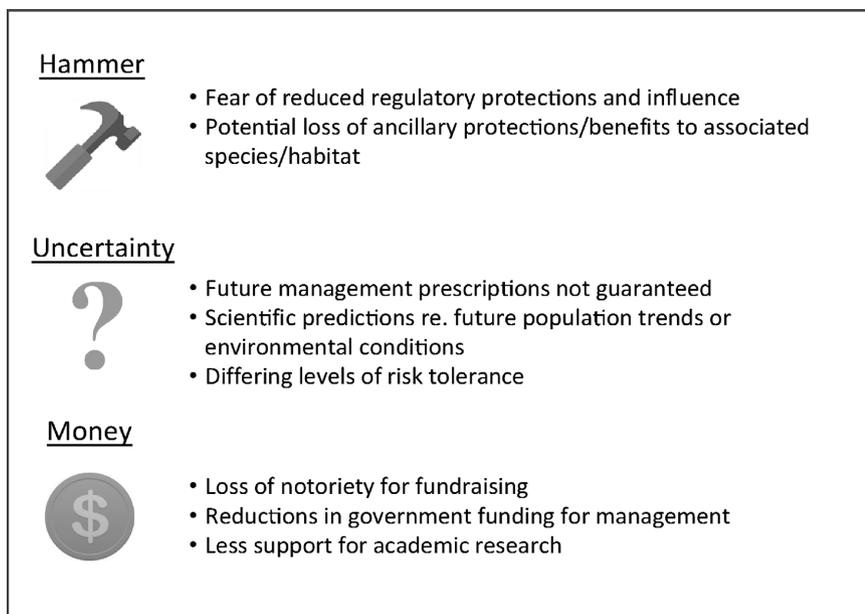


Figure 4. A summary of institutional challenges to delisting of species under the ESA, divided into three categories: hammer, uncertainty, and money.

Delisting recovered species

The final area of ESA implementation that bears review is the process for determining recovery and formally removing species from the ESA list of Threatened or Endangered species. The number of species delisted is not the only measure of the ESA’s success (Langpap et al. 2018); this tally is relatively short compared with the number of species currently listed and those awaiting consideration for listing. As was mentioned in the introduction to the present article, this metric misses the broader goals of the ESA, which is to prevent extinctions, conserve the species and the ecosystems on which they depend, and to bring these species to the point at which the protections provided by the act are no longer necessary. The pace of recovering and delisting species has increased significantly during the last decade (figure 1), but it is still relatively slow and remains a legitimate concern.

Although many authors have called for increased funding for ESA implementation as more species are listed, recent federal funding for listed species has remained flat or declined (figure 3; Gerber 2016). In other words, the total funding pie for the ESA has not increased in size recently, and that pie is being divided up into smaller and smaller pieces as more species are listed. Given political and economic trends, it is simply not reasonable to expect federal funding levels to increase in any significant way in the near future (Rylander 2012). Therefore, we need to find more efficient ways to conserve species before they make it on the Endangered species list, and promptly remove from the list those species that no longer require the protections of the act even though they may still require direct management through other mechanisms.

To optimize conservation, it is imperative to target limited ESA funds to species with the greatest need or the highest likelihood of success (Gerber 2016) or to situations in which conservation of umbrella species can provide benefits to associated species in a larger landscape. The act is clearly improving the status of hundreds of listed species. Why, then, is it difficult to delist species that have reached recovery targets or whose threats have been significantly reduced, and to reallocate these resources to species in greater need?

The challenges to delisting can usually be allocated to one or more of the following three factors: hammer, uncertainty, and money (figure 4). It is possible that the delisting of a species, even if the species is doing relatively well and the main threats have been ameliorated, will unravel the regulatory protections that are helping it recover (or protecting other species within the ecosystem). In

other words, the hammer will go away. Therefore, a delisting is sometimes resisted because of concern that the regulatory conditions that helped recover the species will dissipate, and these conditions are necessary to maintain the species’ recovered status or provide other conservation benefits for associated species.

Similarly, uncertainty in either the future management prescriptions or in the science underlying the predictions for the species’ status can discourage delisting (e.g., Doremus and Pagel 2001). Unfortunately, absolute certainty is usually not achievable in either science or policy. Various what-if scenarios are cited as reasons to not delist, even though the probability of such scenarios occurring might be relatively low if not completely discountable. This discussion of uncertainty usually bogs down on debates of ideal population size, threat management, and disagreements on risk tolerance (Wolf et al. 2015).

A listing under the ESA historically brought notoriety and public recognition that helped direct limited money and resources to the species’ conservation. Bringing resources and attention to a declining species is a very important and positive function of the ESA. But what happens when the conservation crisis has abated or when there are species and issues for which the need is greater? Whether one is an academic researcher, an environmental organization that is fundraising, or a government office implementing species recovery, it can be hard to voluntarily let go of these resources by supporting a delisting. As was discussed earlier, it is clear that ESA resources are not always distributed efficiently, and it is unlikely that increased ESA resources will be appropriated by Congress in the near future (Gerber 2016). As a result, there needs to be more discretion at the

field and regional levels of the federal and state agencies to efficiently prioritize scarce ESA resources and determine where limited ESA funds are applied (Kerkvliet and Langpap 2007).

One way to proactively address this hammer–uncertainty–money phenomenon, use resources more efficiently, and advance the fundamental intent of the ESA is to refine and apply the conservation-reliant species management model advanced by Scott and colleagues (2005), Goble and colleagues (2012), and Bocetti and colleagues (2012). In short, this approach views species recovery as a continuum along which varying levels of management intervention are necessary to reduce threats and hold them at acceptable levels. As long as the management is assured and is being applied, and monitoring is in place to confirm its effectiveness, a conservation-reliant species can be considered recovered and removed from the ESA list. If the management is not applied as anticipated, or unforeseen changes occur in a delisted species' status, the species could be added back to the Endangered or Threatened list in a timely manner.

The practical utility of the Scott and colleagues (2005) conservation-reliant approach is becoming more and more apparent. For example, the Oregon chub was recently delisted as recovered, the first fish to reach this status under the ESA. The persistence of this species is completely dependent on a reliable series of federal, state, and private management actions occurring on a mix of natural and man-made water features (Dunham et al. 2016). Historically, the chub evolved and persisted within the highly dynamic floodplain of Oregon's Willamette River, a system that is now intensively regulated by integrated systems of flood control, irrigation, and rural and municipal land management (Hughes 2015). A diverse partnership of federal, state and local managers cobbled together a reliable network of ponds, creeks, and riverine backwaters that crudely mimics the original natural system, and chub were maintained or reintroduced to these areas. As a result, there is now a metapopulation of over 100 chub populations in the Willamette Valley. Assuming this system is adequately maintained by this partnership for the foreseeable future—a reasonable assumption—it was appropriate to delist this species and redeploy limited ESA regulation and resources to other species in greater need.

Some authors urge caution applying the conservation-reliant approach (e.g., Carroll et al. 2014, Rohlf et al. 2014), but there are multiple examples throughout the United States in which the approach has been or should be applied, such as with the black-capped vireo (*Vireo atricapilla*; Wilsey et al. 2013), Kirtland's warbler (*Setophaga kirtlandii*; Bocetti et al. 2012), and various listed Hawaiian birds (Reed et al. 2012). In our opinion, there are many other examples of conservation-reliant listed and sensitive species that can probably be conserved more efficiently outside the ESA under a reliable management plan. Some of these species have management strategies that already obviated the need for an ESA listing, such as the fisher (USFWS 2016a), greater sage grouse

(USFWS 2015a), and Washington ground squirrel (USFWS 2016b). Other species, such as the endangered Fender's blue butterfly (*Icaricia icarioides fenderi*), has a growing network of SHAs, HCPs, and other conservation efforts that can continue to provide reliable management into the future to justify a conservation-reliant delisting (Dunham et al. 2016).

Of course, it often takes the threat of an ESA listing (e.g., greater sage grouse)—or the strong desire for a delisting (e.g., Oregon chub)—to get skeptical or cautious stakeholders to clearly commit to the necessary management measures. Can the ESA and associated funding be proactively applied to get these commitments upstream in the process before species have declined to such a degree that their conservation is more expensive or more challenging?

We offer the following recommendations to increase the likelihood that recovered species will be delisted in a timely manner, in turn allowing for the act's resources to be applied to species in greater need:

Apply the conservation-reliant model to recovery and delisting scenarios. Use recovery management agreements as defined by Scott and colleagues (2005) to get commitments from other entities (states, other federal agencies, tribes, private landowners) to manage threats to support delisting. Downlist and delist promptly if a suitable management plan is in place with a reasonable expectation of implementation (Bean 2009).

Affirm that recovery plans are guidelines, and population goals in such plans are not regulatory targets, per se. The main consideration for delisting should be threat management (which can include consideration of low population numbers, population trends, or population distribution). Population data and models often provide useful insight into whether threat management measures are successful or are likely to be successful under different plausible scenarios.

Use or build on existing plans from other efforts (e.g., state plans) that may substitute for a recovery plan as long as they meet all of the substantive requirements of a recovery plan (e.g., site specific management actions, measurable criteria regarding threats, time and cost estimates). These should also provide for public review and comment.

Delisted species should be able to be promptly considered for relisting if promised management measures are not implemented or if the species' status changes because of unforeseen circumstances.

Conclusions

Although the ESA enjoys broad support among the American public, over the years, its implementation has alienated key segments of that public. The act is a flexible statute, and it can be implemented with more common sense to find common ground across the majority of the American public. Applying the above recommendations should increase the likelihood that some listings will become unnecessary, or, for species that are listed, unintended negative outcomes will be minimized by reducing opposition to the act among private landowners. It is our belief that acknowledging the

shortcomings of historic ESA practices and implementing the recommendations above will translate to increased conservation and broader support for the ESA in both rural and urban parts of the country.

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