Editorial: Imperiled species recovery under the U.S. Endangered Species Act

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Editorial on the Research Topic
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In the United States (U.S.), managing imperiled species protection in the face of competing national priorities has proven more difficult than the U.S. Congress expected when it passed the Endangered Species Act (ESA) in 1973. The ESA has been incredibly successful in staving off extinction, with more than 95% of species listed under the Act still with us (Evans et al., 2016). The explicit purpose of the ESA is to "to provide a program for the conservation of such endangered species and threatened species," with "conservation" under the ESA being defined as recovering species to the point where they no longer need the protections of the Act. Sections 2(c) and 7(a)(1) of the Act clarify that conserving imperiled species is the responsibility of all federal agencies.

Although the rate or recovery has improved (Haines et al., 2021), recovery overall has lagged behind the ambitious goals set when the ESA was passed. This has been due to a variety of political, economic, ecological, and legal factors (Neel et al., 2012; Evans et al., 2016; Malcom and Li, 2018). For example, when species are eventually listed under the ESA, they suffer from complex and large-scale threats likely due to the prolonged listing process (Leu et al., 2019). In addition, many species do not obtain critical habitat designations and most only receive a fraction of the funding required for their recovery (Wilcove et al., 1993; Scott et al., 2005; Negrón-Ortiz, 2014; Gerber, 2016). Given these factors and the fact that species tend to have historically low abundance at the time of listing, many species require long periods of time to become delisted (Wilcove et al., 1993; Neel et al., 2012; Evans et al., 2016; Valdivia et al., 2019). As the U.S. celebrates the 50th anniversary of the passage of the ESA, it is a particularly opportune time to take stock of the status of recovery goals and explore what goes right – and wrong – for species recovery efforts.

"Recovery" under the ESA means a given listed species has recovered to the point where it no longer needs the law's protections– the species is neither at risk of extinction nor likely to be at risk of extinction in the "foreseeable future". Under the ESA, the Services (i.e.,

United States Fish & Wildlife Service [USFWS] and National Marine Fisheries Service [NMFS]) are required to develop recovery plans for species they list unless they find "such a plan will not promote the conservation of the species." Under the ESA, recovery plans are required to set forth specific criteria as to when the species at issue could be considered recovered. The USFWS currently evaluates species' biological status using their version of the "3Rs" – resilience, redundancy, and representation of the species at issue (FWS, 2016; Malcom and Carter, 2021). The NMFS evaluates abundance, productivity, spatial distribution/structure, and diversity (NMFS, 2020). Successful recovery according to both the Services, therefore, includes a complex analysis of the species' biological status and how it interacts with threats now and in the future.

The goal of this Research Topic is to gain a better understanding of the recovery processes and programs under the ESA and explore possible policy interventions that can improve those processes and programs. The scope of the papers included in this Research Topic encompasses work that investigates, analyzes, and evaluates species recovery programs and projects carried out under the ESA by federal agencies, academic institutions, state and local governments, non-governmental organizations, private landowners, and Indigenous or First Nations. These papers explore the past, present, and future of ESA recovery programs, identify barriers to effective recovery, and explore possible policy interventions to improve, enhance, and reform ESA recovery efforts.

In their Research Topic of publicly available data, Evans and Malcom evaluated the use and potential of "recovery units" under the ESA and unveiled the biases in designating recovery with recovery units, with fish more likely to have designated recovery units than plants. This can raise a flag to managers to pay more attention to certain taxonomic groups when implementing a full toolkit for recovery planning actions. Regarding, resource allocation and funding for the ESA, Iacona et al. reminds us of the important point that specific imagined "hurdles" based on perceptions and values of involved partners can often prevent action from occurring on behalf of endangered species, including the use of decision support tools. However, through processes like co-production, both decision makers and end users can work together on articulating what their values are in the hope of achieving the desired recovery outcome. Lombardi et al. showed the importance of place and landscape in determining what actions to take during the recovery planning process. Depending on where a species is found, especially if it is on private lands, it is important to work with landowners and interested parties who

have a vested interest in the place and the direct impacts any conservation will have on it.

Johnson and Molano-Flores offered a valuable perspective on the lessons we can learn from rare species, such as plants, and how important it is to acknowledge data gaps and attempt to fill them while still making progress towards recovery for extremely imperiled organisms. The lack of data on populations outside of protected areas highlights the need for more collaboration with private landowners to identify other potential areas of habitat. Greenwald evaluated the complex history of litigation surrounding the grizzly bear showing the often-overlooked importance of the legal system and how it impacts imperiled species conservation and management. While litigation is often seen as a hurdle to conservation management, it also serves to ignite conversation between the government and interested parties to better implement the ESA, and can enforce usage of best available science against potential politicization of conservation decisions.

In summary, managing endangered species recovery is a complex issue, involving the synergy and collaboration of experts across different fields, from science, to policy, to even businesses. This Research Topic highlights several important recent findings in the ESA recovery planning field overall.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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