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New Priorities as the Endangered Species Act Turns 40

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New priorities as the Endangered Species Act turns 40

Forty years ago this month, on December 28th 1973, US President Richard Nixon signed the Endangered Species Act (ESA) into law. Since then, the ESA has become one of the US's strongest safeguards for species at risk of extinction. The Act's protections have directly prevented the extinction of approximately 200 species and stabilized previously declining populations of several hundred more. And the benefits of ESA protections continue to accrue: the longer that at-risk species have been protected under the law, the more likely that their populations are increasing. By these measures, the ESA has been a remarkable success.

But the US and its ecosystems have changed dramatically since 1973, as has the country's understanding of nature, and ESA implementation has not kept pace with these changes. This 40th anniversary provides an opportunity to take stock and consider how ecologists can help catalyze innovations in the Act's implementation.

The purpose of the ESA is to conserve species and the ecosystems upon which they depend. The Act instructs federal agencies to promote the "recovery" of at-risk species, using "all methods and procedures which are necessary" to increase species' abundance and conserve their habitats until "the measures provided pursuant to this Act are no longer necessary". The drafters of the ESA envisioned species recovery as a linear process: (1) federal agencies would evaluate and list species that are endangered or threatened with extinction, and (2) the listing process would identify the threats the species face; (3) listed species would then be protected under the ESA from actions that imperil their existence, and (4) biologists would evaluate threats and implement remedial actions at conservation-relevant scales, permitting (5) the species' populations to rebound so that they could be delisted (ie removed from the federal listing).

Unfortunately, ensuring the complete recovery of endangered and threatened species has proven to be much more difficult. Since 1973, only 24 species in the US have been delisted as recovered; there are now more than 1400 US species on the endangered species list; and the number of at-risk species that warrant listing is likely an order of magnitude greater.

Society's failure to achieve the full conservation mandate of the ESA is a product of several obdurate and interacting problems. Clearly, federal funding for recovery-based planning and implementation has always been, and will likely continue to be, insufficient. In addition, the traditional conservation approach outlined in the ESA – focused on removing human-caused threats so that species can rebound in stable ecosystems – is inadequate for two reasons. First, ecosystems in the US are changing dramatically. Human population growth, economic activity, and land use have all rapidly increased over the past 40 years, and these trends will likely continue. Second, rather than being subject to discrete, readily eliminated risks, most listed species face diverse, persistent, and pervasive threats, especially habitat loss and degradation, invasive species, pollution, and climate change; consequently, monitoring and management will be required for the foreseeable future to promote species recovery.

We believe ecologists should help meet these challenges by serving as catalysts for innovation, in several ways: (1) Developing a transparent, biologically defensible way to efficiently allocate limited resources to promote species recovery. New scientific methods are needed that would allow conservation managers to assess extinction risk and calculate returns on conservation investments, clarifying costs and trade-offs. (2) Working with conservation managers to develop more user-friendly approaches to adaptive management for recovering species in a rapidly changing world. This will allow managers to treat conservation strategies as testable hypotheses, evaluate the results, and revise actions accordingly. (3) Creating stronger partnerships between researchers and managers to identify conservation-relevant research questions and communicate results to decision makers. (4) Promoting low-cost partnerships for species monitoring, such as citizen-science programs like the North American Breeding Bird Survey, to meet conservation information needs. As Lindenmayer *et al.* discuss later in this issue of *Frontiers*, biological monitoring of population trends is essential to managing endangered and threatened species, especially in an adaptive management framework. Regrettably, there is currently a near complete absence of data for most listed species. (5) Focusing research to facilitate ecological restoration and species resilience. Top research priorities should be to improve our understanding of the adaptive capacity of species and ecosystems and to develop novel techniques for mitigating invasive species, restoring more natural fire regimes in forests and grasslands, and increasing landscape connectivity.

The ESA is a flexible statute that permits considerable innovation in its implementation. Ecologists play an essential role in catalyzing this innovation to conserve endangered and threatened species.



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