


## PERSPECTIVE OPEN ACCESS

# Supporting Wildlife Restoration in Eastern States via State Wildlife Action Plans

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## ABSTRACT

The biodiversity crisis is driven by extinction at two scales: the global extinction of species and the local extirpation of populations (i.e., range contraction). Local extirpations are especially acute in the eastern United States, which has lost a substantial portion of its native mammalian fauna. Species restoration in the U.S., therefore, should be utilised more to revitalise and restore degraded systems. State wildlife agencies can elevate discussions about species restoration and facilitate internal capacity to conduct restoration projects by including locally extirpated species in State Wildlife Action Plans, which are currently under revision, and will guide state conservation programs for the next 10 years.

## 1 | Introduction

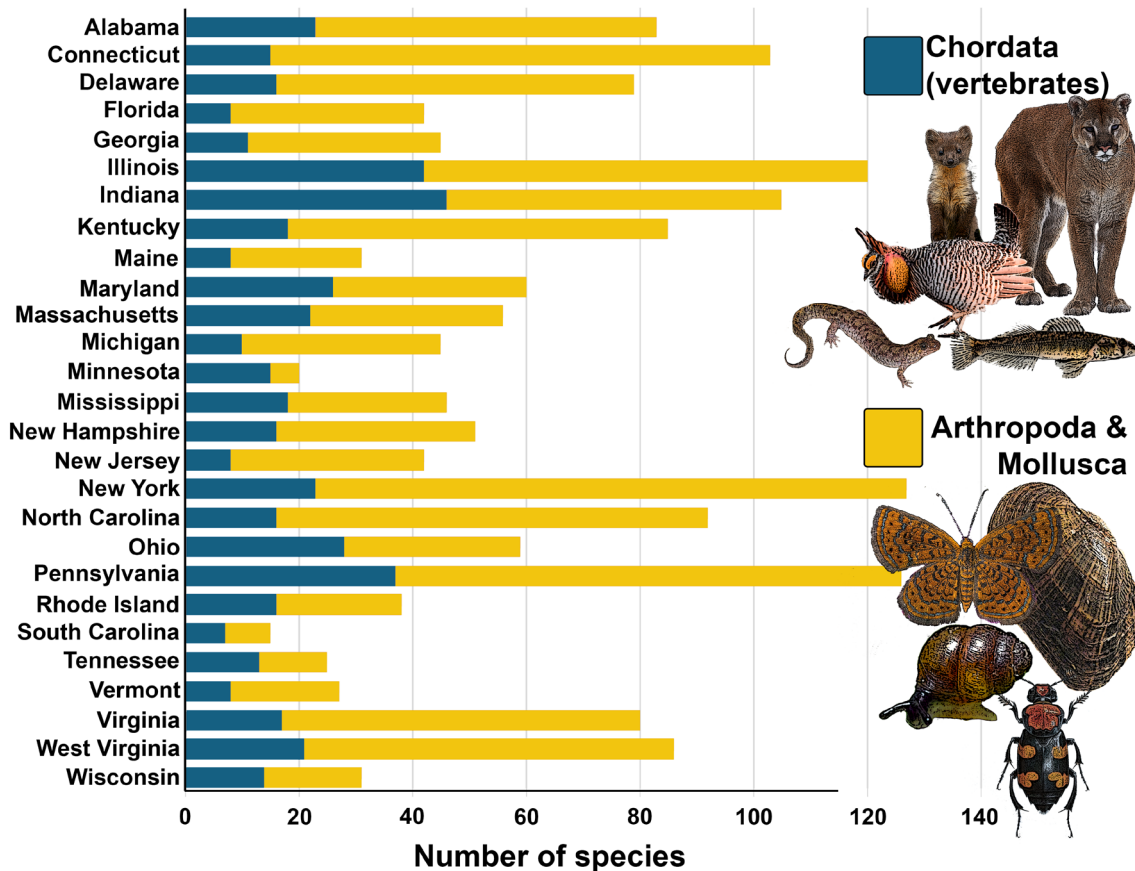
The biodiversity crisis is driven by extinction at two scales: the global extinction of species and the local extirpation of populations (i.e., range contraction; Pacifici et al. 2020). Most terrestrial vertebrates in decline for which we have adequate information have been extirpated from > 50% of their geographic ranges (Ceballos and Ehrlich 2002). This problem of local extirpations is especially acute in the eastern United States, which has lost a substantial portion of its native mammalian fauna (Ceballos and Ehrlich 2002). Among large terrestrial vertebrates, at least 10 species have experienced significant range contractions in the eastern U.S. (Laliberte and Ripple 2004): American black bear (*Ursus americanus*), grey wolf (*Canis lupus*), cougar (*Puma concolor*), Canada lynx (*Lynx canadensis*), northern river otter (*Lontra canadensis*), American marten (*Martes americana*), fisher (*Pekania pennanti*), wolverine (*Gulo gulo*), elk (*Cervus canadensis*) and boreal woodland caribou (*Rangifer tarandus*

*caribou*). For these species and habitat generalists, habitat persists in the East.

We collated additional evidence for the extent of local extirpations in the eastern U.S. by querying state-historic species (SH, 'Possibly Extirpated', defined as species only recorded historically in a state but that may be rediscovered) and state-extirpated species (SX, 'Presumed Extirpated', defined as those believed to be extinct within a state, but not globally) on the NatureServe Explorer database (<https://explorer.natureserve.org/>) Then we cross-referenced these results with information kept by state wildlife agencies and natural heritage programs (Supporting Information Tables S1–S27). We defined the eastern U.S. as states east of the Mississippi River, including Minnesota where the river originates. On average, these 27 eastern states each reported 64 (range 15–127) extirpated animal species, of which on average, 19 (range 7–46) were vertebrates in the phylum Chordata (Figure 1). The true number of

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**FIGURE 1** | Extirpated species in 27 eastern states. Total numbers are split into vertebrate species in the phylum Chordata (illustrated are American marten, *Martes americana*, cougar, *Puma concolor*, greater prairie chicken, *Tympanuchus cupido*, seal salamander, *Desmognathus monticola* and river darter, *Percina shumardi*) and invertebrate species in the phyla Mollusca and Arthropoda (illustrated are American burying beetle, *Nicrophorus americanus*, cupped vertigo snail, *Vertigo clappi*, little metalmark, *Calephelis virginiensis*, and brook floater, *Alasmidonta varicose*), which are generally more difficult to monitor, and more variably monitored.

extirpated species is likely greater given the commencement of state Natural Heritage Programs in 1974 (Groves, Klein, and Breden 1995), the uncertainty as to whether individual programs already tracked species occurrence in their jurisdictions, and the variable monitoring of species by state and federal agencies, especially invertebrates.

## 2 | State Wildlife Action Plans

In the U.S., the primary instrument for arresting extinctions is the Federal Endangered Species Act of 1973. However, the federal government appears to be delegating increasing responsibility for mitigating the biodiversity crisis to state governments (Vucetich et al. 2023). Specifically, the federal government provides funding through the State and Tribal Wildlife Grants (SWG) program for states to conserve species identified as ‘species of greatest conservation need’ in State Wildlife Action Plans (SWAPs). Generally, the intent of such efforts is to arrest localised extinctions before species become too rare or costly to restore. However, we believe that the cumulative loss of fauna, especially in the East, highlights the need for states to consider restoring lost species as well. Indeed, recent research indicates that the public prioritises efforts to restore extirpated species over other types of management activities (Carlson et al. 2023).

At this time, the Association of Fish and Wildlife Agencies’ ‘voluntary guidance’ for SWAPs emphasises *prioritisation* [emphasis added] when listing species of greatest conservation need, based on the conservation status of a species, the costs of management and the likelihood of management success (Association of Fish and Wildlife Agencies 2012). Effectively, this encourages a triage approach to listing species in SWAPs and discourages the pursuit of restoring species, some of which may in fact be cheaper and hold greater potential for success than maintaining others that require significant conservation support. Triage conservation strategies are not embraced by all (e.g., Vucetich, Nelson, and Bruskotter 2017; Wiedenfeld et al. 2021; Brann, Lee, and Hale 2024), and they carry their own costs, such as the exclusion of diverse viewpoints and ethical beliefs of many people impacted by decision-making (Wilson and Law 2016). Further, some believe that it is an untested assumption that conservation is limited by potential funding and that creative approaches to philanthropy could resolve funding limitations (Vucetich, Nelson, and Bruskotter 2017).

Although there is precedent for the inclusion of locally extirpated species in SWAPs, we believe this tool is sorely underutilised. Cougars, for example, were once present throughout the eastern U.S. but were extirpated from all eastern states except Florida. Cougars were included in six eastern 2015 SWAPs (AL,

FL, GA, MN, MS and VT). Similarly, red wolves (*C. rufus*) were once present throughout much of the eastern U.S. and are now extinct from 99% of their historical range. Red wolves were included in the SWAPs of just two states in 2015: North Carolina and Alabama. Fisher and Canada lynx have been extirpated from ~47% to 39% of their historical ranges—much of it in the eastern U.S. (Laliberte and Ripple 2004). Those species were included in the 2015 SWAPs of a few states each (fisher: NJ, TN, VA, with NC listing in 2005; Canada lynx: ME, MN, NH, VT, with MI and NY listing in 2005).

### 3 | Conclusion

Human domination of terrestrial ecosystems is so complete that only an estimated 4% of the Earth's mammalian biomass is wild animals (Bar-On, Phillips, and Milo 2018). More than half of the 'global deterioration in the conservation status of birds, mammals and amphibians' is concentrated in just 8 of 195 countries—one of which is the U.S. (Rodrigues et al. 2014). Species restoration in the U.S., therefore, should be utilised more as we attempt to revitalise and restore degraded systems.

We recognise that the restoration of wildlife will be challenging, especially for species that have narrow habitat requirements—especially if their habitat type is now absent or degraded. For other species, such as habitat generalists that were extirpated due to over-hunting, restoration is likely more feasible because appropriate habitat still exists in former range to support an introduced population. Regardless, we have the opportunity to elevate restoration as a conservation strategy via SWAPs right now.

SWAPs are revised every 10 years, and the next iteration will guide state wildlife agendas for the next decade, beginning in 2025. We encourage state wildlife agencies to elevate discussions of species restoration by including locally extirpated species in SWAPs, and we encourage all people to contact their state wildlife agencies to request that they include extirpated species as Species of Greatest Conservation Need. Such inclusion will not only elevate awareness of historic species assemblages, it will better set the stage for state wildlife institutions to engage in restoration projects.

#### Author Contributions

The authors conceived the idea together. C.R. collected the data on species extirpations. L.M.E., J.A.V. and J.T.B. drafted the initial version of the paper, and all authors contributed to its refinement and submission. L.M.E. created the figure.

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#### Conflicts of Interest

The authors declare no conflicts of interest.

#### Data Availability Statement

All underlying data are found in the Supporting Information S1.

#### Peer Review

The peer review history for this article is available at <https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/ddi.13971>.

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#### Supporting Information

Additional supporting information can be found online in the Supporting Information section.