

# Quantifying Factors that Impact Federally Listed Threatened and Endangered Species

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## Introduction

The recovery of federally listed (i.e., threatened or endangered invertebrates, vertebrates, and plants) species is dependent on the mitigation of factors that inhibit the existence of those species (Lawler et al., 2002). From the time of the Endangered Species Act, 1973, until 1995, Wilcove et al. (1998) found that habitat degradation and loss, invasive species and pollution had the largest impact on the existence of federally listed species. A similar study, conducted by Evans et al. (2016), involved a review of recovery plans from 1973 to 2010 and identified these same top threats. Evans et al. (2016) also made it evident that climate change was a growing threat to threatened and endangered species.

The objectives of this study are:

- Compare the largest threats impacting federally listed species at their time of listing during the last 40 years.
- Determine the most pervasive threats to federally listed species and how they have changed over time.
- Identify newly emerging threats to federally listed species.

## Methods

- We created a database containing entries for all listed plant and animal species using the Environmental Conservation Online System ([ecos.fws.gov](http://ecos.fws.gov)).
- Federal Register listing documents for 1,362 listed species were reviewed and associated threats to these species were recorded.
- Following data collection, analyses of the database was carried out to identify the magnitude to which each listed threat was affecting all federally listed species.
- We compared threats impacting threatened and endangered species at time of their listing from 1973-2015.

## Results

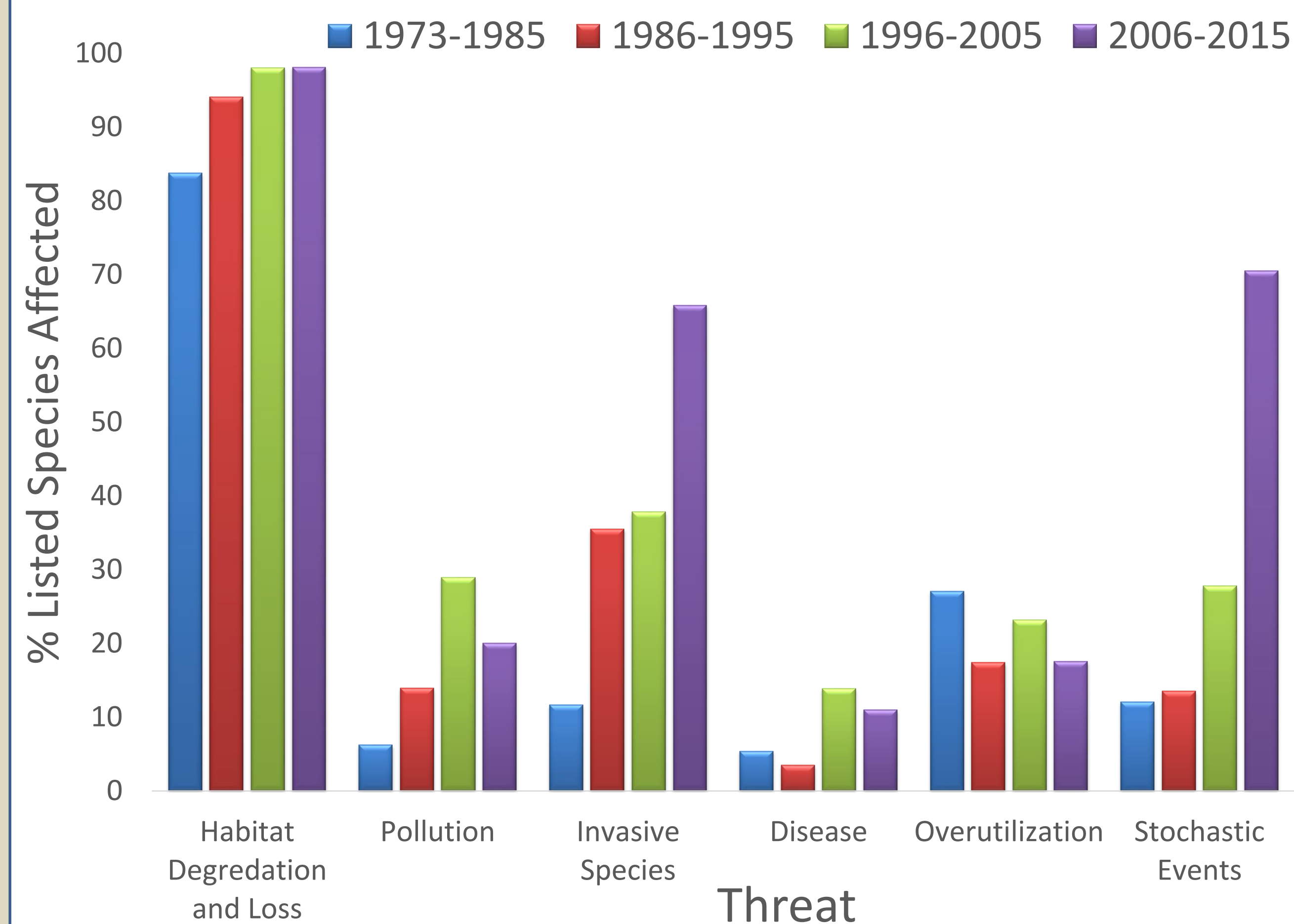


Figure 1. Percentage of federally listed species affected by specific threats at their time of listing during the last 40 years.

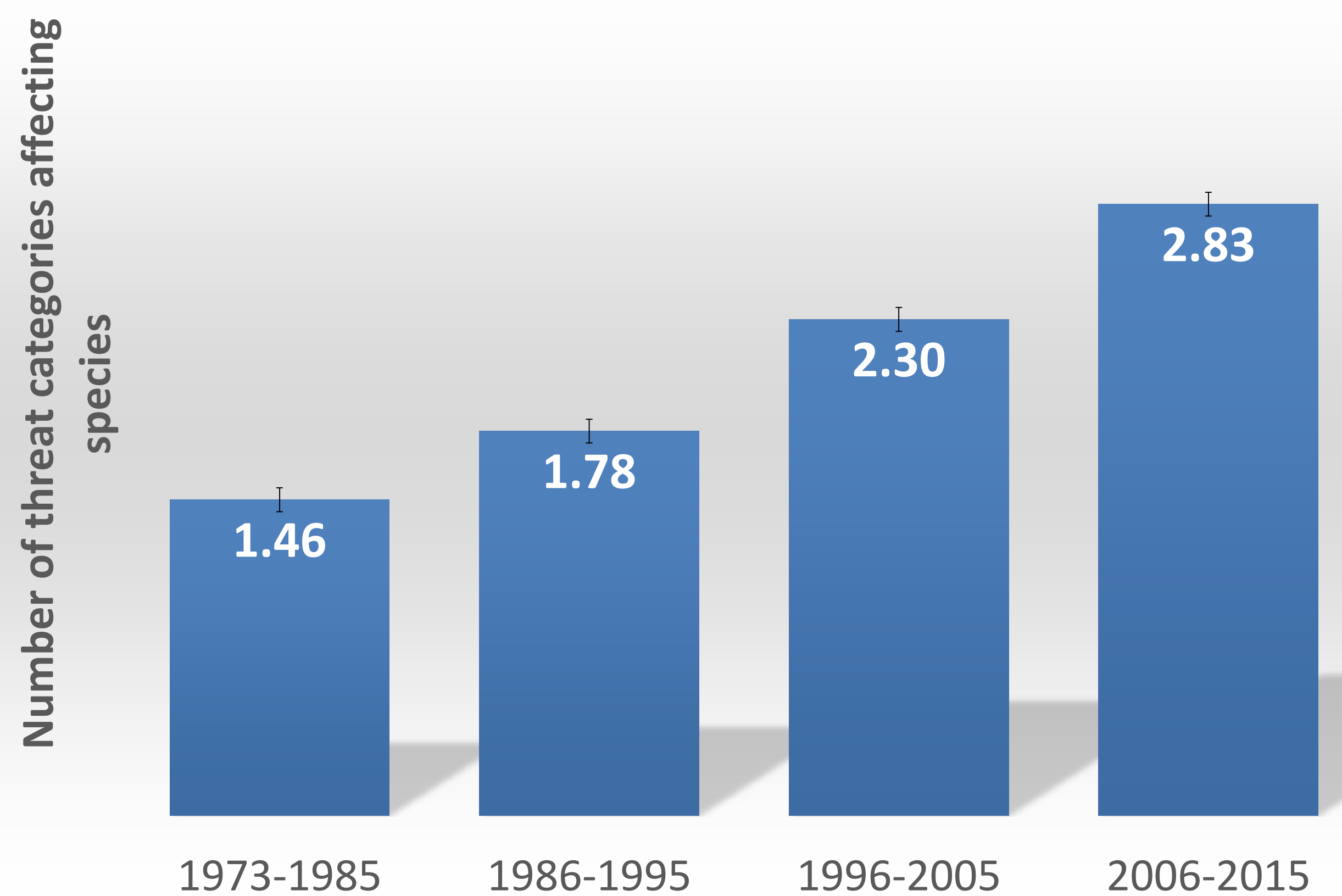


Figure 2. Average number of specific threats (± standard error) affecting federally listed species at time of listing during the last 40 years.

## Discussion

While habitat degradation has historically had a great impact on threatened and endangered species, alien species, and more recently stochastic events, have also become top threats to species. The increase in the impact of stochastic events to listed species is directly related to environmental stochasticity associated with climate change. There may be a relationship between an increase in stochastic events and the increase in invasive species threats. Environmental stochasticity may make regions less habitable to native species, thus increasing the spread of invasive species.

We also found that overtime, the listing of species has become more conservative. Species are now being listed when facing multiple threats as compared to in the past when species were listed with just one or two threats.

## Management Implications

Results from our analysis can help state and federal wildlife agencies better identify which current pervasive threats are causing species to become federally listed and what new management strategies may be required to recover threatened and endangered species. For example, future restoration, translocation and reintroduction efforts for federally listed species must now consider the stochastic events of climate change (Thomas 2011) and focus conservation efforts in areas that have recently become more suitable for listed species based on current climate conditions.

## References

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