ECONOMICS OF THE US ENDANGERED SPECIES ACT – LESSONS LEARNED AND RESEARCH NEEDS

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Introduction

- The Endangered Species Act (ESA) was passed almost unanimously by the U.S. Congress forty five years ago.
- Implementation continues to be mired in controversy and gridlock.
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- For example, listing of the greater sage-grouse would have impacted ranching, mining, and energy development across 165 million acres in eleven Western states, potentially resulting in billions of dollars in annual costs

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- Listing decisions under the ESA remain combative and polarizing, with real conflicts between those promoting species preservation and those promoting economic activity.
- Debates over listing decisions has been fueled by controversy surrounding the effectiveness of the ESA.
  - *Opponents argue that only one percent of listed species have recovered to the point of delisting, while supporters contend that the ESA has prevented the extinction of 99% of listed species.*
- The issue of the effectiveness of the ESA is at the heart of legislative efforts to modify it and administrative efforts to soften its impacts on private landowners.

Introduction

- Economics has made important contributions to ESA debates:
  - *How government agencies make ESA listing and resource allocation decisions*
  - *The magnitude of the ESA's costs and impacts*
  - *The importance of incentives*
  - *How to measure the effectiveness of the ESA.*

Background: Key ESA Provisions

- Section 4:
  - *Establishes listing procedures*
  - *Requires designation of critical habitat*
  - *Requires preparation of a recovery plan.*
  - *Agencies are not allowed to consider the economic impact of listing decisions, but may consider economic impacts when designating critical habitat*

Background: Key ESA Provisions

- Section 7:
  - *Requires federal agencies to consult with Fish and Wildlife Service to ensure that actions authorized, funded, or carried out by the agency do not jeopardize listed species or adversely modify critical habitat.*

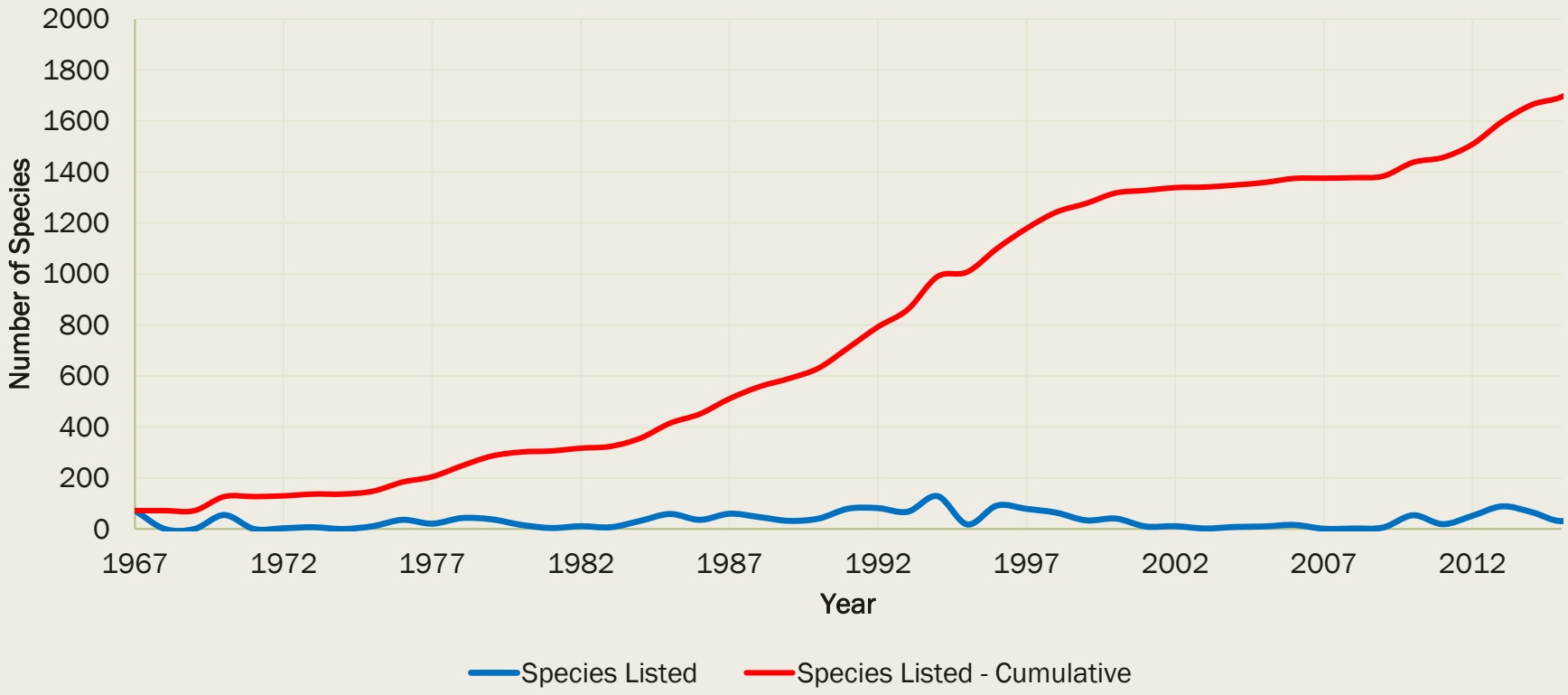
Background: Key ESA Provisions

- Section 9:
  - *Prohibits harming (taking) listed species, including indirect harm through habitat modification.*
    - Controversial because of a perceived conflict between species preservation and land development.

Background: Key ESA Provisions

- *Section 10:*
  - *Provides flexibility in implementation by granting exemptions from section 9 prohibitions.*

Background: Trends



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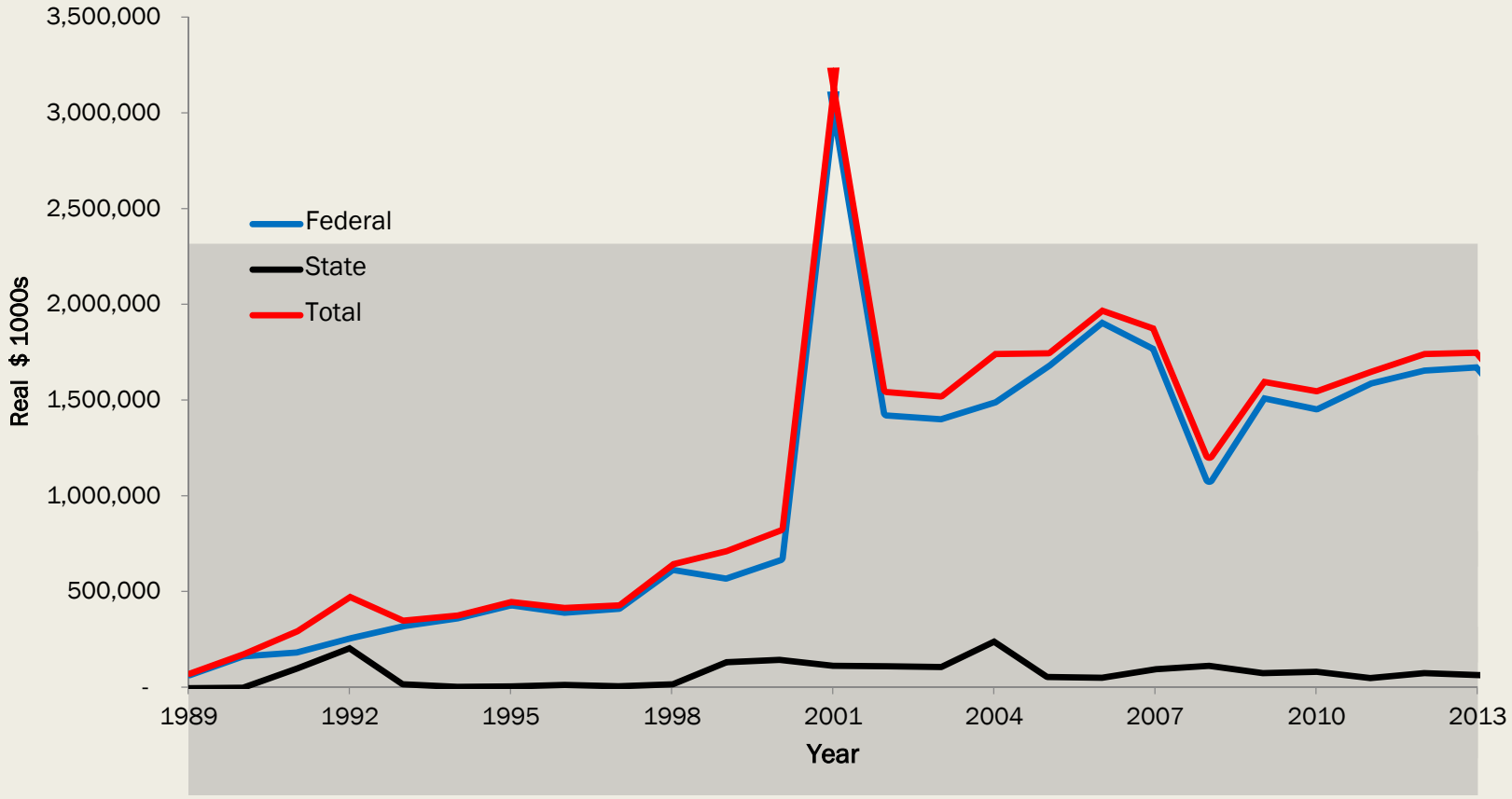

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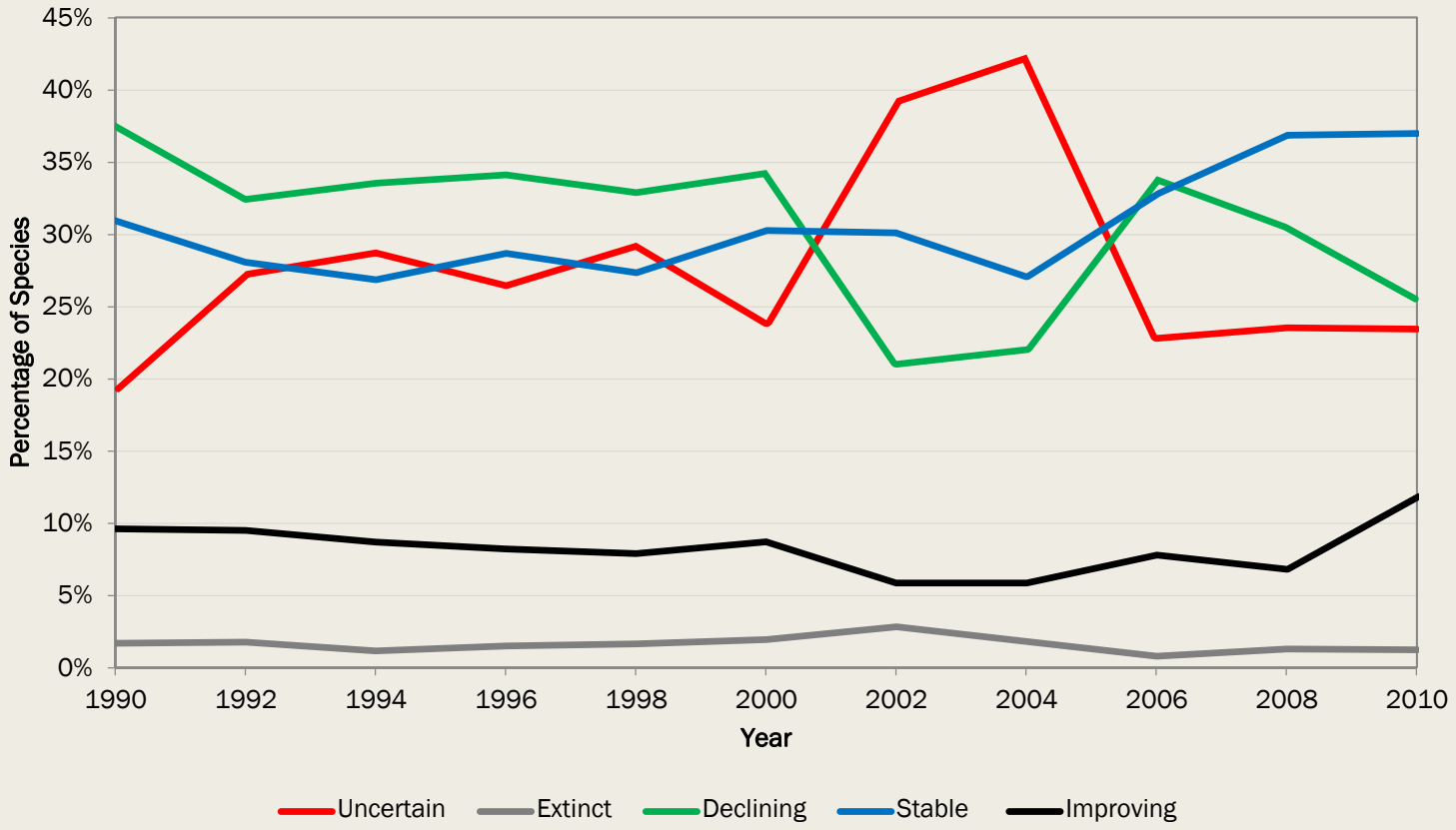

Listing Decisions and Spending Priorities

- There is evidence that non-scientific factors have played a substantive role in listing and expenditure decisions:
  - *Political influence*
  - *Species' "charisma" (size, taxonomic category)*
  - *Long-term cultural value*
  - *Costs*
  - *Value of habitat*
  - *Historical use of the species*

Listing Decisions and Spending Priorities

- A key development in ESA implementation is the growing influence of the private sector – mainly environmental groups -- on listing decisions and critical habitat designation through petitions and litigation.
  - *Since 2007 environmental organizations have petitioned to list over 1,230 species (nearly as many as were listed during the previous thirty years).*
  - *Settlements set deadlines for listing decisions for more than 250 species by 2016 and more than 700 species by 2018.*
  - *US Fish and Wildlife Service's priorities might be increasingly determined by litigants instead of agency personnel.*

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  - *Marginal cost of species conservation in terms of timber production may increase rapidly at high levels of conservation: welfare losses of $12 billion to increase probability of spotted owl survival from 82% to 91% and $13 billion to improve probability from 91% to 95% (Montgomery et al. 1994, Lichtenstein and Montgomery 2003)*
  - *Broader economic impacts (e.g. income, employment) of forest use restrictions are mixed due to factors such as in-migration and improved environmental amenities (Eichman et al. 2010, Chen et al. 2015).*

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- Critical Habitat designation may have impacted housing prices and welfare.
  - *Evidence of decrease in supply of housing permits (24%) and increase in housing prices (10%) in California (Zabel and Patterson 2006, 2011)*
  - *Potential welfare costs of up to $980 million for critical habitat for vernal pools in California (Sunding and Terhorst 2014)*
  - *Increases in rents and prices of land that would have been developed anyway are greater than decreases on land values for designated areas, leading to welfare redistribution (Quigley and Swoboda 2007).*
- No evidence of impacts on land use (Nelson et al. 2017).

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- No evidence that consultation requirements for federal agencies have stopped or substantially altered projects (Malcom and Li 2015).
  - *Perhaps federal agencies preemptively modify projects to avoid impacts or negotiate with Fish and Wildlife Service to ensure favorable findings.*
- However, some anecdotal evidence suggest significant project modifications and large economic impacts (Weiland et al. 2016).
- Literature is inconclusive on costs of consultations.

The Importance of Incentives

- In the US more than two-thirds of listed species occur on private land, and about one-third of listed species inhabit *only* private land.

The Importance of Incentives

- Landowners facing land use restrictions have little incentive to maintain or improve habitat, and may destroy it to preempt regulation.
- These perverse incentives generated by the ESA are well understood.
- There is some empirical evidence of such behavior

The Importance of Incentives

- In North Carolina the probability of harvest of southern pine increases and harvest age decreases with proximity to known colonies of red cockaded woodpecker (Lueck and Michael 2003).
  - *The acreage affected in the study area corresponded to 5% of the woodpecker's habitat, which could have provided habitat for up to 76 colonies.*
  - *This is significant relative to the 84 colonies that inhabited private land in the study region.*

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- In California vineyards reacted to potential water storage restrictions due to coho salmon and cutthroat trout listings by building fewer reservoirs and shifting to groundwater pumping or summer riparian diversions (Newburn et al. 2011) .
  - *These activities can negatively impact the survival of endangered fish.*

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- Data on Habitat Conservation Plans (HCPs) with regulatory assurances ("no surprises" policy) and listed species recovery status suggests these plans are effective in promoting recovery (Langpap and Kerkvliet 2012).
  - *1% increase in probability of having HCP decreases probability that species is classified as Declining by 43.5% and increases probability it is classified as Improving by 32.6%*

Effectiveness of the ESA

- The issue of whether the ESA has been effective remains controversial for two main reasons:
  - *The goals of the ESA are unclear and can seem like moving targets (What is recovery? What is the target baseline of species protection?), and there is no agreement on how to evaluate these targets*
  - *Empirical evaluation of effectiveness is difficult.*

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- Hard to argue that the ESA has been successful: of almost 2400 species listed, only forty-seven have recovered sufficiently to be delisted.

Effectiveness of the ESA

- Potential reasons for lack of species recovery:
  - *Vague legislative rulings*
  - *Interest group pressure*
  - *Perverse incentives*
  - *ESA's species-level rather than ecosystem-level focus*
  - *Perpetual underfunding*
  - *Allocations of recovery funds being driven by non-scientific factors*

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- ESA has been quite effective, as only ten species have become extinct while listed, and it is estimated that the law has prevented roughly 200 extinctions.
- Implementation of the ESA may improve species status even without achieving the threshold required for delisting.

Effectiveness of the ESA

- Potential reasons for success:
  - *Strong regulatory power*
  - *Availability of recovery funds*
  - *Partnerships with state and local governments and private landowners.*

Effectiveness of the ESA - Evidence

- Effectiveness of listing (Ferraro et al. 2007) :
  - *For the average species, listing does not have a significant impact on recovery.*
  - *Species that are listed but allocated little or no funding fare worse than species that are not listed, but listed species that receive substantial funding do experience improvements in recovery.*
  - *Funding recovery directly may be more effective than using scarce conservation funds in the listing process.*

Effectiveness of the ESA - Evidence

- Effectiveness of expenditures (Kerkvliet and Langpap 2007; Langpap and Kerkvliet 2010) :
  - *Species-specific expenditures promote recovery.*
  - *Alternative expenditure allocation criteria makes little difference for recovery.*
  - *Documented inconsistencies in FWS spending do not have substantive detrimental impacts on species recovery.*

Effectiveness of the ESA - Evidence

- Budget constraints lead to a tradeoff between promoting species recovery and preventing extinction (Langpap and Kerkvliet 2010).
  - *If more resources are directed to species that are at greater risk of extinction, then fewer resources can be allocated to species that are amenable to recovery.*
  - *On average, each extinction prevented implies two fewer species that are classified as Improving*

Effectiveness of the ESA - Evidence

- *Impact of other aspects of implementation (*Kerkvliet and Langpap 2007; Langpap and Kerkvliet 2010)
  - *Completion of recovery plans for listed species has a positive impact on recovery.*
  - *No consistent evidence that critical habitat designation affects recovery.*

Conclusions

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  3. *The effectiveness of the ESA should not be defined solely on the basis of full recovery, but also on improvements in status*

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  1. *Listing and expenditure decisions continue to be influenced by non-scientific factors*
  2. *Despite the influence of non-scientific factors, ESA implementation is effective when supported by substantial funding, but alternative funding allocation criteria (e.g., state Wildlife Action Plans) may not significantly improve outcomes*
  3. *The effectiveness of the ESA should not be defined solely on the basis of full recovery, but also on improvements in status*
  4. *Incentives such as cost sharing and compensation, particularly when complemented by regulatory assurances, can be effective*
  5. *Incentive programs can elicit conservation on private land and help overcome perverse incentives created by the ESA*

Directions For Future Research

- *Candidate Species*
  - *Candidate species are those considered sufficiently threatened to warrant ESA protection, but whose listing is precluded by higher priority activities*
  - *Little attention has been paid to candidate species and how incentives work when species are imperiled but not listed.*
  - *We need research that will help us to understand pre-listing decisions as well as listing and post-listing decisions.*

Directions For Future Research

- *The Role of the Nonprofit and Private Sectors*
  - *The role that environmental organizations play in species recovery through their expenditures, conservation efforts, and litigation is poorly understood.*
  - *Nonprofit environmental organizations can play a significant role in species recovery through advocacy, education, and habitat restoration or protection, and through litigation to force regulatory action from government agencies or to block actions perceived to be detrimental.*

Directions For Future Research

- *The Aftermath of Delisting*
  - *Delisting decisions are less common than listing decisions, but they can also be controversial.*
  - *While we understand how listing decisions are made, what happens after listing, and how effective the corresponding management tools are, we know much less about delisting.*
  - *Further research is needed on the delisting process and its aftermath.*