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The Endangered Species Act is hailed as the "gold standard" of species conservation legislation both in the U.S. and globally. There are scarce conservation funds that we as a society can spend on the recovery of endangered species, so it is important to understand how the parties involved with this legislation choose which species to prioritize. There is literature that shows the government allocates funds to individual species mainly based on visceral characteristics such as body length, and allocates funds in response to short term political pressure. However, there is little literature on the motivations behind why private organizations target specific species in lawsuits against the Fish and Wildlife Service (FWS). In this paper, I conducted an empirical study to find evidence for these motivations. I find that body length and the taxonomic classification of the species (mammal, fish, etc.) is significant to how environmental non-profits make these decisions, and economic conflict is significant to how corporate groups decide which species to target.

Why Wolves? An Analysis of Private Organization Decision Making in Filing Citizen Suits Under the Endangered Species Act

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Matthew Lundgren, Author

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Section I: Introduction

As a society, we are in a critical time regarding the health of the natural world, and the extinction of species is one of the dangers caused by anthropogenic interactions with the environment. To combat this, the Endangered Species Act was passed by the U.S Congress in 1973 with the goal of protecting endangered species, both domestic and international, and helping their populations recover to healthy levels.

Private organizations, such as advocacy environmental groups (e.g. Sierra Club, The Center for Biological Diversity) and corporate interest groups (e.g. home building associations, private property right groups) play a pivotal role in how the Endangered Species Act (ESA) is carried out. These groups can sue the Fish and Wildlife Service (FWS), to attempt to have a species listed or delisted, to designate habitat deemed critical (and protected) or increase the amount of habitat designated, or to remove critical habitat designation or reduce the amount of habitat designated. There is a provision in the ESA that allows for citizens and private organizations to petition the FWS or National Marine Fisheries Service (NMFS) to act for a species (one of the actions previously described). If the petition is not acted upon by the government agency within given deadlines, then the group can sue the agency to require action through the citizen suit provision of the ESA.

Private petitions and citizen suits are a controversial aspect of the ESA. Critics believe that these private lawsuits interfere with how the FWS follows their priority ranking system and how they allocate the scarce conservation funds and resources such as staff time (Brosi and Biber, 2012). The purpose of the ESA is to help the recovery of endangered and threatened species; however, if the motivations behind these private lawsuits are not based on the endangerment of species, this could undermine the effectiveness of the ESA, especially if these

lawsuits are numerous. The conservation funding given by Congress for these species' recovery is limited as it is, and if these lawsuits are not motivated by gaining protection for high priority species, then they are forcing the FWS to spend more funds on low-priority species that could be used for species that are more endangered (Restani and Marzluff, 2001, 2002). Therefore, it is imperative to understand how these private organizations make these lawsuit decisions, so that we can determine if the citizen suit provision enables better species recovery, or if it may make the ESA less effective.

There are a number of papers that deal with how the Fish and Wildlife Service allocates funding across the species under the ESA (Dawson and Shogren, 2001; Simon et al., 2007; Metrick and Wetizman, 1996). This literature attempts to decipher the motivations for how the FWS and other government agencies allocate their funding across the hundreds of listed endangered species. These papers generally find that allocation of funds is not connected with FWS priority ranking, and seems to be more closely related to species characteristics. However, the FWS isn't the only party influencing the implementation of the Endangered Species Act. Private organizations such as corporate interest groups and environmental NGOs also place a vital role through citizen suits. While there is literature on how the government allocates conservation funds under the ESA, there is little literature to explain how or why private organizations make their decisions on which species to target in citizen suits. This paper attempts to fill the gap in the ESA literature and attempts to estimate what factors determine how private organizations make these decisions.

In this paper, I use a panel data set of species characteristics of vertebrate species listed under the ESA and data on if they were targeted in a citizen suit. I use a linear probability model with random effects to analyze the motivations behind citizen suits from environmental

nonprofits and corporate interest groups. From this analysis, there is evidence that environmental nonprofits are influenced by charisma and the taxonomy of the species when they file citizen suits, while corporate interest groups are motivated by if a species exists in conflict with economic activity.

The rest of this paper will be organized as follows. Section II is an overview of the Endangered Species Act, including the history of the legislation, and how private organizations can participate. Section III consists of a literature review analyzing papers on the FWS's allocation of funds under the ESA, papers discussing how non-profits make decisions, an overview of literature that analyzes the effectiveness of the ESA, and papers that look at the effect of private organization participation on the implementation of the ESA. Section IV is an overview of the data used in this paper. Section V is a discussion and presentation of the empirical model used to estimate the factors that affect the private organizations' litigation decisions. Section VI presents the empirical results and discusses their robustness. Section VII is a discussion of the results and what these results mean for the ESA and how this information can be used in other areas. Section VIII concludes the paper and offers future research suggestions and policy implications.

Section II: Overview of the Endangered Species Act

History of The Legislation

The ESA has been a gold standard for global conservation legislation for the past 40 years. It started out as the Endangered Species Preservation Act, which Congress passed in 1966 with the goals of designating certain species as endangered and giving them certain federal protections ("A History of The Endangered Species Act," n.d.). Leading up to this, it was becoming apparent that many bird species in the United States, such as the passenger pigeon and the whooping crane, were either going extinct or their populations were decreasing significantly; the passenger pigeon went extinct in 1914, and in 1944, there were only 21 whooping cranes left ("A History of The Endangered Species Act | Timeline," n.d.). Thus, the Endangered Species Preservation Act was born. However, in the beginning it was quite limited, only empowering the Departments of Interior, Agriculture, and Defense to preserve habitat within their normal operations, and the U.S. Fish and Wildlife Service to set aside and purchase land to preserve the habitat of the imperiled species. In 1969, Congress amended the act and created a list of species considered to be endangered worldwide and prohibited importation of these species without specific permits.

Then, in 1973, Congress passed the Endangered Species Act, which replaced the prior Endangered Species Preservation Act, and added many more regulations to the toolbox for protecting endangered species in the US. These added regulations included requiring federal agencies to make sure their actions would not damage a listed species or its habitat and prohibiting landowners from harming listed species on their land. This new act also defined what was meant by "endangered" and "threatened", made plants and invertebrates eligible for federal protection, and implemented the Convention on International Trade in Endangered Species of

Wild Fauna and Flora (CITES) protection within the United States, which is an international agreement to help prevent the global trade in endangered species and their body parts.

Since 1973, the Endangered Species Act has provided protection for various endangered plants and animals within the United States, with 1,447 animal species and 944 plant species being listed under the act as of April, 2017 ("Listing and Critical Habitat," n.d.).

The Listing Process

There are two ways that a species can be listed for protection under the ESA. The first is through the candidate assessment process, in which FWS biologists assess a species and decide if it meets the criteria for listing: 1) There is a present or threatened destruction of the species or their habitat, 2) The species has been overutilized for commercial, educational, or recreational purposes, 3) High levels of disease or predation, 4) The existing regulatory scheme is deemed unsatisfactory, and 5) There are other natural or anthropogenic dangers to the species' existence ("The Candidate Conservation Process," n.d.). To determine if a species meets these criteria, the FWS seeks biological data, and does not give extra attention to popular species or those species considered "higher life forms." ("Listing a Species as Threatened," n.d.). If a species satisfies those conditions, it is moved onto the candidate species list. The species will then be officially listed unless there is higher priority work for species already listed. If it stays on the candidate species list, the FWS will re-evaluate the status of the species to determine if their priority should be raised and put on the official endangered species list, taken off the candidate list if the situation has improved, or if they should remain on the candidate list.

The other way a species can be listed under the ESA is for the public to petition the FWS to list a certain species. Additionally, the public can also petition to designate critical habitat for

an already listed species. Any member of the public can petition the FWS, including individual citizens, non-governmental organizations, and corporations. A petition is a formal request for the Fish and Wildlife Service to review the status of a species or habitat, and decide whether that species warrants listing under the ESA, or if critical habitat should be increased or reduced. The FWS, or the National Marine Fisheries Services (which deals with marine species), then has 90 days to complete a review of the species to see if there is "substantial information" that would warrant the species or habitat being protected. Within one year of receiving the petition, the agency must make a finding of whether or not the species or habitat should be listed or not ("Listing and Critical Habitat | Petition Process," n.d.). If they do not find the species or habitat eligible of being protected under the Endangered Species Act, or they miss the statutory deadlines, the private organization can then sue the FWS or the National Marine Fisheries Services to force them to either further review the species or to list the species.

With current literature, it is unclear whether private litigation under the ESA actually helps to conserve more endangered species, or causes the FWS to spend scarce resources on supporting the lawsuits, conserving less endangered species, and thus causing the ESA to be less effective. This is a major aspect of how the ESA is implemented, as there have been 736 private petitions since 1983 ("Endangered Species Act Petitions," n.d.).

Section III: Literature Review

The study of economics fundamentally tries to tackle the question of how society makes decisions when faced with scarce resources. To be an efficient society, we must make sure that we are making these decisions in a way that promotes the greatest good; extracting the highest net benefit out of the resources. When looking at how private organizations make the decisions on which species to advocate for under the Endangered Species Act, one must look at four major questions. 1) How do nonprofits make decisions in general? This can give valuable insight into how these organizations behave and how they would select which species they want to target in lawsuits. 2) How do federal agencies allocate funding for the conservation of endangered species under the ESA? If federal agencies are allocating funds in an efficient way, perhaps it is less important how private organizations choose which species to sue for. 3) Is the ESA effective? If the legislation itself isn't effective and isn't promoting the recovery of endangered species, the regulation may be a broken system, and these private lawsuits would be moot all together. 4) What role do private organizations play in how the ESA is implemented? Private organizations may be serving to point out flaws in the FWS's listing process and be promoting greater ecological effectiveness, or they may be bogging down the federal agency with countless petitions and lawsuits that could in fact drive the listing decisions away from efficiency.

To answer these questions, I review literature, both from the field of economics and from other fields, to give a clearer picture of why this topic is important and how it is currently perceived.

How do Non-Profits Make Decisions?

Most are familiar with how for-profit organizations make their decisions, as we normally assume they are profit-maximizing decision makers. However, by their definition, nonprofits are *not* profit-maximizers. They are also usually not cost-minimizers, as donations and gifts allow their costs to exceed their revenues (Newhouse, 1970). Therefore, there must be another goal that nonprofits are attempting to maximize. This subsection will review papers that attempt to understand what drives nonprofit decision making and what their operating goals are.

Since nonprofits are not profit-maximizers and not necessarily cost-minimizers, some papers have attempted to create a new framework to think about their decision making. Newhouse (1970) took on this problem and developed a theoretical framework for nonprofit institutions by looking at how a nonprofit hospital would make decisions. Newhouse envisioned a nonprofit hospital where there is a board of directors, and they give control of the hospital operations to an administrator. The main decision that this administrator had to make was the tradeoff between quantity and quality of care. The hospital could give exceptional care to a fewer number of patients, or subpar care to many patients.

In this way, one can think of the hospital administrator as having a utility function, with two inputs: quality of healthcare, and quantity of patients served. As Newhouse points out, people have come to expect a high level of quality in their healthcare, so the administrator is biased against providing a low-quality service. This is different from a for-profit firm, which would produce a low-quality good or service for those who would be willing to pay for it and could not afford the higher quality products, as well as producing high-quality goods or services for those who are willing to pay for them. Newhouse also discusses that since the hospital is receiving donations and gifts, they need not equalize their costs and revenues, which again biases the decision maker towards providing high quality service. This would be inefficient for a

regular firm, but demonstrates that nonprofits, instead of trying to maximize profit, attempt to maximize quality of their service, which can be extended outside of the hospital realm and into nonprofits in general.

This bias towards providing strictly a high quality of service is relevant to environmental nonprofits as well. Beneficiaries who donate to these nonprofits expect their dollars to be spent in the most effective ways to conserve the environment and endangered species, and if this high quality isn't maintained, beneficiaries would donate their money elsewhere. There would be no demand for low quality conservation efforts. For environmental nonprofits that focus on litigating for the protection of the environment, this high quality of service would indicate high probabilities of winning lawsuits and filing lawsuits that would preserve the maximum biodiversity.

Analyzing the tradeoffs that nonprofit decision makers must consider, Krug and Weinberg (2004) developed a three-dimensional model for nonprofit administrators to evaluate their actions and visually see the tradeoffs they are making. The three dimensions of the model were: 1) Do our programs advance our mission (are we doing the right thing)? 2) How much do these programs cost, and how much do they bring in (are we doing things right financially)? 3) Are we good at doing these programs (are we doing things at the right quality)? The authors took this model to the administrators of museums and had them rank their programs (core exhibits, special exhibits, and space rental) in terms of each of these three dimensions.

Even though this paper is mainly about developing this infield model to be used by the administrators, it illuminates some of the main goals that nonprofit decision makers try to achieve. First, they try to maximize a program's contribution to their overall mission. For most nonprofits, and especially environmental nonprofits, the decision makers ultimately answer to

the beneficiaries, the ones who donate the money to the organization; if the decision makers take actions that aren't aligned with the values of the beneficiaries, then the money will stop flowing in. Second, they attempt to balance their costs and revenues, even though we know that the donations can make this goal less essential and cause costs to exceed revenues (Newhouse, 1970). For environmental nonprofits, their "revenue" comes in the form of donations, or through winning lawsuits against the government (Equal Access to Justice Act, 1980), so they must try to balance their costs with the inflow of donations. Finally, they strive to maximize the quality of the programs they conduct. This goal can be easily tied to the goal of maximizing a program's contribution to their overall mission, as a low-quality program may not contribute to the mission as much as a high-quality program would.

From these papers, a general framework of how nonprofits make their decisions can be formed. Nonprofits focus on maximizing the quality of the services they provide, and conduct programs that they believe maximize the advancement of their mission. The balance of costs and revenues does play a part in their strategic decision making, but the priority of this goal is diluted by the intake of donations and gifts.

How do federal agencies allocate funds under the ESA?

The Fish and Wildlife Service and other federal agencies, such as the National Marine Fisheries Service, are tasked with spending federal funds for the protection and recovery of species listed under the Endangered Species Act. Since the creation of the act, there have been many criticisms that the FWS and the other agencies had been allocating funds not based on the best science, but rather short-term political pressure and public opinion. Congress has made formal requests that the FWS determines their priority score for species solely on the basis of biological need, and in 1988, the General Accounting Office made a formal critique, saying the

agency allocated their funds mainly based on public appeal, without regards to the priority rankings (Restani and Marzluff, 2001). Therefore, it is important to determine how these federal agencies allocate the conservation funds, and if these allocations are truly efficient.

To investigate this question, Restani and Marzluff (2002), looked at the FWS's allocation of funds under the ESA in 1993, 1995, 1997, and 1998. They wanted to see whether expenditures really followed the priority ranking system as the FWS claimed. The priority ranking system was developed by the FWS in order to help decide which candidate species should be on the official endangered species list ("Listing a Species as Threatened," n.d.). However, they found that recovery expenditures were poorly correlated with the priority ranks (Restani and Marzluff, 2002). The priority rankings only explained approximately 4% of the variation in conservation expenditures across all the federal agencies, and approximately 5% of the variation if only the FWS expenditures are analyzed. The authors found that the level of threat the species was facing was relatively unimportant, as was the taxonomic distinctness of the species. The conservation funds were instead allocated primarily to species that were in economic conflict and had a wide range, which are species who exist on land that would otherwise be developed for economic activity, and species whose habitat is widely dispersed. Mammals and birds also received more funds per species than amphibians or reptiles, even with similar average priority rankings and population trends.

These correlations show a weak connection between priority ranking and the amount of funds a species will receive, and the FWS has even publicly admitted to allocating based on different criteria. In response to the GAO critique, the FWS said that they allocate funds to these low-ranking species in order to garner public and political support, as this favor is gained through delistings (Restani and Marzluff, 2002).

Czech et. al., (1998), also found similar results when applying the social construction-political power public policy framework to ESA expenditures. Social construction is the attitude of the general public towards a group of people. For example, mothers have a positive social construction as most people view them in a positive light, deserving of help. Political power is how much weight does a particular group have in the political arena. For example, corporations have strong political power because they can spend large amounts of money lobbying for their interests. This framework gives a way to divide the subjects of policy into four categories: advantaged, contenders, dependents, and deviants. The advantaged group are those with positive social construction and strong political power, contenders have a negative/mixed social construction and strong political power, dependents have positive social construction but weak political power, and deviants have negative social construction and weak political power.

The authors apply this policy framework to analyze the underlying mechanism for allocation of funds under the ESA. They sent out surveys and asked people to rank eight groups of species: Amphibians, birds, fish, invertebrates, mammals, microorganisms, plants, and reptiles. This was their measure of social construction. For political power, they used the number of environmental NGOs, out of the 632 conservation NGOs considered, that were focused around that specific type of species, such as Ducks Unlimited being focused on birds.

They then assigned the eight species types to one of the four categories in this framework, either advantaged, contenders, dependents, or deviants. Birds, mammals, and fish were found to be advantaged species, plants were found to be dependent species, contenders had a mix of species, but most of them were mammals, and amphibians, microorganisms, invertebrates, and reptiles, not including testudines (turtles, tortoises, and terrapins), were found to be deviant species. The authors found that, once you separate testudines from the rest of the

reptiles, then only mammals were found to not receive expenditures consistent with this social construction-political power framework. They hypothesized that this discrepancy among mammals was due to the fact that many endangered mammals are predators and rodents, so they have mixed social construction and political power.

Plants had a high social construction, but were only represented by 13% of the NGOs devoted to mammals, fish, plants, and birds. This carried over to their allocation of funds, which was disproportionately less than their public value (Czech et. al., 1998). Birds received almost double the amount of funds compared to their public valuation, and were represented by 54 NGOs. During 1993, there were $23,605,900 spent on recovering 32 reptile species, however 98% of those funds went to 13 species of turtles and tortoises, which matches up well with the fact that these species (testudines) have disproportionately more political power than the rest of the reptiles.

These authors demonstrated that the FWS was not necessarily allocating funds based on biological need or their own priority system, but instead, directing most of the funds towards the advantaged species. This would imply that the allocation of conservation funds is swayed by political pressure and public opinion.

Restani and Marzluff (2001), analyzed federal conservation expenditures on endangered and threatened avian species and whether these expenditures aligned with the priority rankings of the species. They gathered federal agency expenditures from 1992 to 1995, as well as FWS priority ranking, endangerment status, and population trends for each species. The authors wanted to test whether there was a linear relationship between priority ranking and annual recovery expenditures. If federal agencies were following the priority ranking system, then those species that are highly ranked should receive the most funding. They looked at how range size,

distribution (mainland species or an island species), and migratory status correlated with variations in expenditures. The authors also analyzed the expenditures to determine which of the three components of the FWS priority rankings: 1) degree of threat, 2) recovery potential, 3) taxonomic distinctness, contributes the most to the relationship between the expenditures and priority ranking.

They concluded that the mean annual spending on a species was weakly correlated with the priority ranking, and once they adjusted the spending for range size (mean annual spending/range size), the relationship weakened even more. When they analyzed just FWS spending (excluding spending done by state agencies and other federal agencies), the relationship improved, however only slightly. Based on these findings, they couldn't reject the null hypothesis that annual expenditures are independent of priority ranking.

Restani and Marzluff (2001) also found that threatened species received more funding per species than endangered species, even though endangered species had higher priority rankings. Species with larger range sizes received more funding, as did mainland species compared to island species. Out of the three components of the FWS ranking system, only recovery potential was found to contribute significantly to the relationship, with species that had higher recovery potential receiving more funds. These findings reinforce previous evidence that the FWS and other government agencies do not allocate funding based on the priority ranking system, or that perhaps they are just attempting to get species off the list, and not necessarily focusing on the most endangered ones.

This conclusion was supported again by a study done by Dawson and Shogren in 2001, where they analyzed federal expenditures allocated to 241 endangered species from 1993 to 1996. They conducted a regression of this panel data and controlled for time invariant species

characteristics, including the size, cultural value, historic game use, etc. Their model includes three explanatory variables, distinctiveness, survivability, and opportunity cost. Distinctiveness was proxied by the component of the FWS priority score that measures taxonomic distinctness, which the authors hypothesized to have a positive effect on expenditures. Survivability was proxied by the endangerment ranks from the Nature Conservancy, and is expected to have a negative effect. Opportunity cost is proxied by the FWS's economic conflict code, and expected to have a positive effect on spending.

Dawson and Shogren found that endangerment ranking and economic conflict had no significant effect on the conservation expenditures. They instead find that there is evidence for a mix of time invariant variables that are controlling expenditures. Since the FWS was allocating funds to a select number of species for their full recovery based on these time invariant variables, such as size or historic game use, it suggests that the managers are either taking a long-term view on trying to restore the underlying health of the ecosystems, or responding to short term political and public pressures.

Another paper that looks at the decisions of the government on which species to protect and provide conservation funding to was done by Metrick and Weitzman (1996). The authors looked at what might be the motivations behind which species the FWS lists, and then how much conservation funding is allocated to each listed species. There are crucial questions to answer, as the listing of a species can cause great economic disruption, and conservation funds are limited already, so allocating funds to species that don't necessarily need them can cause inefficiencies.

Metrick and Weitzman observed that just 10 listed species received over half of the recovery funds spent from 1989 to 1991, and all of these species were birds or mammals, and mainly relatively large birds or mammals, such as the Grizzly Bear or the American Peregrine

Falcon. These observations match with what other papers have found, that the government allocates funds to more "charismatic" species (Dawson and Shogren, 2001).

They then run two empirical models to answer the questions of how the FWS chooses which species to list, and then how to allocate funding among the listed species. They first run a logit model on a dataset of listed and unlisted species, with the dependent variable being whether or not the species was listed as of March, 1993. They include both physical and taxonomic explanatory variables, as well as a measure of endangerment in the form of the Nature Conservancy's endangerment ranking for that species. The results show that body length, the taxonomic classification (mammal, bird, amphibian, reptile, fish), endangerment ranking, and whether the species is monotypic, meaning it is the only member of its genus, are all statistically significant to the listing decision. These results agree with the general idea that a species is listed when there is enough credible scientific evidence to show that it is endangered. However, there is also evidence that visceral characteristics, such as body length, do play a significant role in the listing decision.

Metrick and Weitzman then run a tobit model with the log of total spending from 1989 to 1991 as the dependent variable to estimate the motivations behind spending decisions. The authors noted however that the data is generally understood to be less than perfect, and comes from multiple agencies, both at the federal and state level. Therefore, they take their results to be less than comprehensive. They used the same explanatory variables as their previous regression, and add an additional dummy variable to measure whether a species was a subspecies or not. The authors found that body length was again statistically significant and large, showing a 1% increase in spending for a 1% increase in body length. The dummy variable for mammal was found to be statistically significant and positive, while the variable for reptile was found to be

statistically significant and negative. The surprising result from this regression was that the variable for the Nature Conservancy's ranking, which took a lower value for a more endangered species, was found to be positive and statistically significant. This means that there is evidence that the less endangered a species is, the more conservation funding is allocated to that species. However, this model omits a variable that directly measures charisma, as this is not a feasible thing to measure, so the interpretation of this phenomenon that less endangered species get more funding depends on the size of this bias. Through this regression, the authors conclude that spending decisions are more influenced by visceral characteristics than scientific ones.

This question of what motivates government conservation spending under the ESA is tackled again in Metrick and Weitzman (1998). In this paper, the authors propose a theoretical model for biodiversity conservation, named the "Noah's Ark Problem." In this problem, Noah must find an ordinal ranking system to easily decide which species to bring on his ark (which is the same as investing in a conservation plan for that species) in order to increase their probability of survival and maximize biodiversity. Metrick and Weitzman argue there are four main criteria that make up this decision: 1) Utility of a species, 2) Distinctiveness of a species, 3) The increase in survivability of the species from investing in the conservation plan, and 4) Cost of enhancing the survivability.

The authors then create proxies for both Noah's ranking itself, and the four components listed above. They proxy the ranking with three variables: 1) The log of the number of favorable public comments made during the proposal stage, 2) A dummy variable for whether the species is listed, and 3) The amount of public money spent on the recovery of the species from 1989 to 1993. They then create proxies for the four decision variables. Utility is proxied by the taxonomic classification of a species (mammal, bird, amphibian, reptile, fish), and the log body

length of the species, in an attempt to capture the charisma of megafauna. Distinctiveness is then proxied by two dummy variables, whether a species is the only species in its genus, and whether it is a subspecies. To proxy for the survivability of the species, they use the Nature Conservancy's endangerment ranking. To proxy for the cost of enhancing survivability, they use the conflict indicator from the FWS to indicate if a species exists in conflict with economic activity. The authors then run regression models for the three proxies of Noah's ranking, the log of number of public comments, the listing decision, and the spending decision.

The results are similar to Metrick and Weitzman (1996). They find visceral characteristics such as body length and taxonomic classification, as well as endangerment to be statistically significant for the listing decision, and the visceral characteristics are significant for the spending decision, while endangerment is significant but positive (implying a perverse effect of endangerment on spending).

All of these studies come to a similar conclusion, the FWS and other government agencies are not allocating conservation funds based on their priority ranking system. The papers demonstrate that there is evidence that funds are spent based on political pressure and charisma. This could leave a potential gap in the implementation of the ESA for private organizations to fill, if they do indeed sue for species based on biological need.

How Effective is the ESA?

It is important to understand how agencies allocate these ESA funds amongst species, as it can give insight into whether the programs are being run efficiently and if they are promoting the common good. However, this insight is less helpful if the Endangered Species Act itself is an

inefficient piece of legislation. The following papers examine different aspects of the ESA and whether they have a positive effect on endangered species recovery.

One of the most controversial aspects of the ESA is the takings section, which prohibits private landowners from performing a "taking" of an endangered species, which is defined as any damage, annoyance, or harassment to the species or its habitat. Due to this section, if a private landowner knows that they have potential habitat for a listed species on their land, they may be incentivized to destroy that habitat preemptively to prevent being subject to the strict regulations of the ESA. Many critics say that this causes the ESA to actually harm species, as potential habitat is destroyed.

Lueck and Michael (2003) analyzed this problem of preemptive habitat destruction with private forest owners in North Carolina and the endangered Red-Cockaded Woodpecker. This species of woodpecker requires a specific type of habitat, mature stands of southern pine, and require large habitat areas (Lueck and Michael, 2003). The authors surveyed 1,199 plots of private land in North Carolina that had suitable stands of mature southern pine. They analyzed both the probability that the plot would be harvested, and the harvest rotation of the land to see if either of these were affected by a proximity to populations of Red-Cockaded Woodpecker. If preemptive habitat destruction was happening, the authors expected plots that were closer to populations of the endangered woodpecker to have a higher probability of being harvested, and harvested at a younger age.

To estimate this relationship, Lueck and Michael first ran a regression for the probability that a stand of trees would be harvested, with a binary dependent variable that took the value 1 if the plot was harvested between 1984 to 1990. Their main variable of interest was *ESA*, which represents a probability that the Red-Cockaded Woodpecker would inhabit the plot, and the

probability that the FWS would discover the bird on that plot. Since these probabilities are not known and not easily estimated, the authors used three variables to measure the proximity of Red-Cockaded Woodpecker colonies to represent whether a woodpecker colony was within a 5, 10, or 15 mile radius of the plot of land. They found that the variables for 10-mile and 15-mile radii had a positive statistically significant effect on the probability that the plot of land would be harvested, which supports the hypothesis that proximity to a woodpecker colony would increase the probability of the plot being harvested. The variable for a 5-mile radius wasn't statistically significant, which the authors explained could be because land that is that close to a population could already be under ESA regulations. They run similar models for a dependent variable of the age that the plot is harvested at. From these models, Lueck and Michael discover that the same variables for a 10-mile and 15-mile radius had negative statistically significant effects on the age a plot was harvested at, providing evidence that if these woodpeckers are close to the plot of land, the landowner will harvest that timber stand on shorter rotations.

From these regressions, the authors concluded that there was evidence of preemptive habitat destruction, or "Scorched Earth" techniques, being used on these plots in North Carolina. The timber stands that the Red-Cockaded Woodpecker inhabits are very valuable, ranging from $30,000 to $200,000 of foregone timber earnings for each plot (200 acres) of timber (Lueck and Michael, 2003). Therefore, there are often large economic incentives for private landowners to alter or destroy the potential habitat on their land before the endangered species inhabits it. The authors also didn't take into account other ways that private landowners can hurt the endangered species, either through direct killing of the endangered species, which is illegal, or through passive habitat destruction, where the private landowner doesn't manage their land properly and the habitat is altered and destroyed. Many critics believe this makes the ESA ineffective and

possibly damaging to listed species, however the authors noted that they can't tell if the positive effects of the populations being protected is outweighed by the preemptive habitat destruction or not.

To combat the risk of preemptive habitat destruction, habitat conservation plans, or HCPs, were developed. These are negotiations made between a private landowner and the FWS to allow for some taking of the endangered species (as long as it doesn't appreciably damage the species), in exchange for action done by the landowner to help the recovery of the species (Langpap and Kerkvliet, 2012). The landowners are also promised that they will be spared any future changes or restrictions that the ESA would impose on their land, which is referred to as the "no surprises" rule. Because of this, it eliminates much of the risk that landowners see with the ESA. With these plans, the landowner can still conduct some economic activity on their land, while also promoting the overall recovery of the endangered species that exist on their land.

Langpap and Kerkvliet (2012), conducted a study of vertebrates listed under the ESA from 1990 to 2004 to estimate the effect that an HCP has on a species' recovery. The authors use probit models along with matching methods and average treatment effect (ATE) models with the recovery status, measured by the FWS status score, as the dependent variable. The main variable of interest in these models was *HCP*, which was a binary variable that took the value 1 if the species had an HCP, and 0 if otherwise. The expectation was that the species with an HCP would have better recovery than a species without an HCP.

In the probit regression model, there were concerns about the HCP variable and conservation expenditures being determined simultaneously, so the authors used two instrumental variables for HCP, the number of previously approved habitat conservation plans in a species' lead FWS administrative region, and a dummy variable for whether the "no surprises"

rule was in effect during the period. They also used an instrumental variable for cumulative spending, which was the League of Conservation Voters (LCV) score for U.S. Congress Interior Subcommittee members from the species' home state(s). This is the League of Conservation Votes score, which measures, "the percentage of pro-environmental votes by members of Congress on a set of key legislative votes selected by experts from environmental organizations." (Langpap and Kerkvliet, 2012). They used this instrument as it is generally believed that politics will affect the allocation of funds.

The ordered probit model showed that species who had an HCP were less likely to be classified as extinct or declining and more likely to be classified as stable or improving. For the average species, a one point increase in the probability of having an HCP lowered the probability of being classified as extinct by 5.7 percentage points, and lowered the probability of being classified as declining by 43.5 percentage points. They also found that for the average species, a one point increase in the probability of having an HCP increased the probability of being classified as stable by 16.5 percentage points, and increased the probability of being classified as improving by 32.6 percentage points. The matching methods and average treatment effects (ATE) models showed similar results.

There have also been proposals that HCPs that cover large areas of land, and HCPs that involve multiple species, will be more effective in recovery efforts. Langpap and Kerkvliet found evidence that larger HCPs had a more positive effect on species recovery than small HCPs, however failed to find strong evidence that multi-species plans were more effective. The evidence from this paper provides support that the Endangered Species Act is indeed effective in helping endangered species recover, and it shows that there is a potential solution to preemptive habitat destruction.

Another study that used matching methods to estimate the effectiveness of the ESA was done by Ferraro, McIntosh, and Ospina in 2007. These authors tackled one of the major problems that had been present in previous studies of the effectiveness of the ESA, the construction of an appropriate counterfactual group. It is difficult to judge the effectiveness of a policy without being able to compare the treated group with a control group that is similar, especially when it is the Endangered Species Act, where selection into the treated group (listed species) isn't random.

To solve this problem, the authors used matching methods to create an appropriate counterfactual group, and then analyze the effectiveness of the ESA, and used four different matching methods models. The authors split the species into three different treatment groups: 1) being listed, 2) being listed and not receiving substantial recovery funds, 3) being listed and receiving substantial recovery funds.

Ferraro, McIntosh, and Ospina (2007) found different effects for each of the three treatment groups. For the treatment of just being listed, there was no significant effect on the species recovery. The treatment of being listed and *not* receiving substantial conservation funding from government agencies had a negative statistically significant effect on species recovery. Finally, being listed and receiving substantial conservation funding had a positive statistically significant effect on recovery. This is an interesting result that suggests that for the ESA to help the recovery of an endangered species, there must be substantial funds allocated to that species after they are listed. The negative effect of being listed without receiving substantial funds is possibly due to the preemptive habitat destruction phenomenon.

How do Citizen Suits Affect the Implementation of the ESA?

There is evidence that the FWS and other federal agencies don't allocate conservation funds based on their own priority ranking, and the other group that can affect how these agencies make these decisions are private organizations. These groups play a large role in how the ESA is implemented. Restani and Marzluff (2002) proposed that these private organizations are filing large amounts of lawsuits for low priority species, which is causing the FWS to deviate from their priority ranking system. Restani and Marzluff (2001) made similar comments, saying that these lawsuits are causing the FWS and Congress to spend scarce resources on these lawsuits where they could instead be using those funds to help high-priority species recover.

Non-Economic Papers on Motivations Behind Citizen Suits

While there are no economic papers that study the motivations behind these citizen suits, and how the private organizations decide which species to target in the lawsuits, there are a couple of papers outside of the economics discipline that seek to answer this question. Brosi and Biber (2012) look at this issue with a database of terrestrial and freshwater species found in the U.S. that are listed as either endangered or threatened under the ESA, and then analyze the differences between species who were listed by the FWS, or listed through the public petition process or citizen suits. The authors found that species that were listed by private citizen involvement (petition or citizen suit) faced higher levels of biological threat, and are more likely to exist in conflict with economic activity. This paper finds evidence that private organizations target species based on biological threat to the species, as well as direct anthropogenic threats from economic activity such as land development. However, the authors note that private organizations petitioning and targeting species in lawsuits that exist in conflict with economic activity is consistent with previous critiques that these petitions and suits are politically motivated, aimed at slowing down and preventing land development.

From the literature reviewed above, nonprofits have a general utility function that contains a tradeoff between quality and quantity of programs they conduct, and they are maximizers of quality and donations. The FWS and other government agencies are meant to allocate funds to listed species based on the FWS priority ranking system, which would give higher priority species more funds than lower priority species. However, there is strong evidence that these agencies do not follow this system, and tend to allocate fund based on public support and short term political pressure. The allocation of funds wouldn't be important if the ESA itself wasn't effective in achieving its goals. Many critics claim that the ESA actually harms listed species, mainly through the conflict with private landowners and preemptive habitat destruction. While there is evidence that this habitat destruction does occur, there is strong evidence that the ESA does have a positive effect on species recovery, through both conservation funding and HCPs. Based on the evidence that the FWS doesn't follow their own priority ranking system, one could expect private organizations to step in and use the petition process to conserve species who have a biological need. However, as Restani and Marzluff (2001), and Restani and Marzluff (2002), noted, private organization lawsuits may cause the FWS to deviate away from their priority system, and spend scarce resources on the lawsuits instead of using those funds to conserve high priority species.

There are multiple papers that examine the relationship between the FWS priority ranks and conservation fund allocation to estimate what truly motivates government agencies when funding different species. However, there is little literature on the motivations that private organizations have when deciding which species to petition and sue for. With this paper, I seek to contribute to the literature on how private organizations make these decisions, how they interact with the ESA, and how nonprofits in general make their decisions.

Section IV: Review of Data

How the Data was Gathered

The data used in this study is comprised of two separate datasets. The first dataset was constructed using lawsuits filed against the FWS or the Department of the Interior during the years 2000 - 2010, including information about the purpose of the lawsuit: listing, delisting, designation of critical habitat, no designation of critical habitat, an increase or decrease in critical habitat, the establishment of a recovery plan, or other, and the type of plaintiff: an environmental group, an individual, a corporate group, or a state/county office. It also included the year and district court the lawsuit was filed in. The data were obtained through a Freedom of Information Act request. The second dataset (Langpap and Kerkvliet, 2007), is panel data on species characteristics for all the listed vertebrates ranging from 2000 to 2010. This dataset contained time variant variables such as the FWS recovery score, total spending and cumulative spending on a species, and whether the species had critical habitat designated for it. It also included time invariant variables such as body length, and dummy variables for the diet, phenology, habitat, and migratory status of each species (Langpap and Kerkvliet, 2007). These two datasets were combined into a single panel dataset which was then used for the regression analysis.

Noteworthy Variables in the Dataset

The important variables in this dataset are the dummies for the type of species (*mammal, bird, amphibian, reptile, fish*), *bodyl* which measures the average body length in inches of the species, *conf*, which is a dummy variable that takes the value of 1 if the species was found to exist in conflict with economic activity, *tsp*, which was the total conservation spending allocated to that species over those two years (as the data was biennial), and *rvote*, which measures the

percentage of vote for the Republican candidate in the previous presidential election in the state(s) where the species has habitat. *Distinct* is a binary variable that takes the value of 1 if a species is monotypic (the only one in its genus) or is in a small genus (2-5 species). There is also *fws* which represents the Fish and Wildlife Service's recovery score for the species, and the FWS assigns one of seven categories to describe a species' recovery: Extinct (E), Declining (D), Stable (S), Improving (I), Recovered (R), only found in captivity (C), and Uncertain (U). The *fws* variable takes on a value of 0 if a species is extinct, a value of 1 if a species is declining, a value of 2 if a species is stable, and a value of 3 if a species is improving or recovered. Species only found in captivity were excluded because there were only two species in this category, which makes the estimation difficult. The I and R categories are combined because there are only nine species in the R category. Species categorized as Uncertain are excluded due to the difficulties of ordering uncertainty among the other categories in a meaningful way (Langpap and Kerkvliet, 2007).

Summary Statistics

Table 4.1: Number of species targeted in a lawsuit by petitioner.

Petitioner	Environmental Group	Individual	Corporate Group	State/County	Total
Count	75	12	25	5	77
Percentage	97.40%	15.58%	32.47%	6.49%	

Table 4.1 shows a breakdown of how many species were targeted in a lawsuit by each type of petitioner. There were 77 species targeted by at least one lawsuit. Most targeted species (97.40%) were named at least once by an environmental group, and 32.47% of the species were targeted by a corporate group. Because the unit of observation was a species, a single species could receive multiple lawsuits, and multiple lawsuits from different types of petitioners, thus the total number of lawsuits is greater than 77.

Table 4.2: Number of species targeted in a lawsuit by purpose.

Purpose of Lawsuit	Listing	Delisting	Designation of Critical Habitat	Reduction of Critical Habitat	Recovery Plan	Other	Total
Count	29	10	42	16	5	23	77
Percentage	37.66%	12.99%	54.55%	20.78%	6.49%	29.87%	

Table 4.2 shows a breakdown of how many species received a lawsuit on their behalf for each different purpose. 54.55% of the species that were targeted in lawsuits, were targeted in at least one lawsuit for the designation of critical habitat, 37.66% were targeted in at least one lawsuit for listing, and 20.78% were targeted in at least one lawsuit for reduced critical habitat.

Table 4.3: Species breakdown by species type.

Type of Species	Mammal	Bird	Reptile	Amphibian	Fish	Total
	69	79	29	21	110	308
	22.40%	25.65%	9.42%	6.82%	35.71%	100%

Table 4.3 shows the diversity of species within the dataset. There are 308 species used for this study. Notably, 35.71% of the species are fish, 25.65% are birds, and 22.40% are mammals.

Table 4.4: Summary of FWS priority scores by year.

Year	2000	2002	2004	2006	2008	2010
FWS						
0	8	13	15	5	5	5
	3.56%	5.60%	6.64%	2.28%	2.18%	2.17%
1	86	83	75	62	62	52
	38.22%	35.78%	33.19%	28.31%	27.07%	22.61%
2	87	96	103	111	125	135
	38.67%	41.38%	45.58%	50.68%	54.59%	58.70%
3	44	40	33	41	37	38
	19.56%	17.24%	14.60%	18.72%	16.16%	16.52%
Total	225	232	226	219	229	230
	100%	100%	100%	100%	100%	100%

Table 4.4 above describes the breakdown of species with each FWS recovery score by each year in the panel data. Notably, the number of species who had a ranking of 2 increased

from 2000 to 2010, increasing from 38.67% to 58.70%. Species who had a ranking of 3 decreased from 19.56% to 16.52%.

Table 4.5: Means of select time variant variables by year.

Year	2000	2002	2004	2006	2008	2010
Time Variant Variable						
habit	0.296	0.341	0.364	0.385	0.391	0.42
Somep	0.481	0.287	0.313	0.304	0.311	0.339
Finalp	0.481	0.672	0.586	0.595	0.589	0.565
Conf	0.428	0.452	0.453	0.453	0.475	0.475

Table 4.5 above shows the mean value of variables in the dataset that can help to describe the endangerment and recovery of the species. Since these variables are binary, the mean represents the percentage of species who had a 1 for that variable in that time period. The table shows that the number of species with critical habitat designated for them increases by about 13% from 2000-2010. The number of species with some recovery plan filed by the FWS decreases by about 15%, where the number of species with a final recovery plan filed by the FWS increases by about 8%. The number of species that are found by the FWS to exist in economic conflict remains relatively constant from 2000 to 2010.

Section V: Empirical Model

Presentation of Empirical Model

In this paper, I attempt to determine which factors affect the private organizations' choice of which species to target in a lawsuit. Metrick and Weitzman (1996) and Dawson and Shogren (2007), among other papers, have attempted to uncover the motivations behind how the government allocates funds to listed species, and have used similar variables (taxonomic classification, distinctiveness, body length). I seek to uncover whether these variables, among others, also influence how private organizations target species in lawsuits against the FWS. I used a linear probability model with random effects to answer this question. Since the motivations behind environmental nonprofit and corporate group behavior in terms of endangered species are likely to differ, I estimated two different models, one for environmental groups, and one for corporate groups. I detail the specification of each model below.

$$envgroup2_i = \beta_0 + \beta_1 mammal_i + \beta_2 bird_i + \beta_3 amphibian_i + \beta_4 fish_i + \beta_5 bodyl_i + \beta_6 distinct_i + \beta_7 fws_{it} + \beta_8 tsp_{it} + \beta_9 habit_{it} + \beta_{10} somep_{it} + \beta_{11} finalp_{it} + \beta_{12} conf_{it} + \beta_{13} rvote_{it} + \beta_{14} region_i + \beta_{15} year_{it} + \epsilon_i$$

$$corpgroup2_i = \beta_0 + \beta_1 mammal_i + \beta_2 bird_i + \beta_3 amphibian_i + \beta_4 fish_i + \beta_5 bodyl_i + \beta_6 disctinct_i + \beta_7 fws_{it} + \beta_8 tsp_{it} + \beta_9 habit_{it} + \beta_{10} somep_{it} + \beta_{11} finalp_{it} + \beta_{12} conf_{it} + \beta_{13} rvote_{it} + \beta_{14} region_i + \beta_{15} year_{it} + \epsilon_i$$

Review of Variables in the Models

Each of the above models contains the same variables, only with differing dependent variables. For the environmental group model, *envgroup2*, is a binary variable that took the value 1 if the species had ever had a lawsuit filed on their behalf by an environmental group. Similarly

for the corporate group model, *corpgroup2,* is a binary variable that takes the value 1 if the species had ever been targeted in a lawsuit by a corporate group (such as a firm, or industry interest group). These binary variables do not measure the number of lawsuits a species was targeted by, just whether the species has been targeted in at least one lawsuit by the respective private organization type.

Some of the important explanatory variables in the models include *fws*, *somep, finalp, conf, distinct,* and *rvote*. The variables *somep* and *finalp* were dummy variables that took the value of 1 if the FWS had partially completed or completed the species' recovery plan, respectively. *Conf* is unity if FWS determined the species' recovery was in conflict with economic activity, and zero otherwise. The variable *region* is a vector of binary region variables for each FWS region, and *year* is a vector of binary year variables, including 2000, 2002, 2004, 2006, 2008, and 2010.

Rationale for Variables

The taxonomic variables *mammal, bird, amphibian,* and *fish* were included in the model because I predicted that the type of animal, which is linked to the public opinion of the species (Czech et. al., 1998), would influence whether a private organization would sue for that species' protection. Because environmental groups get much of their funding from public donations, it would make sense that they would sue for species that had higher public appeal. For corporate groups, there are certain types of species that could be more likely to pose a threat to economic activity, such as birds on land planned for timber harvest, or fish in a stream that a firm wants to divert water from. The variable *bodyl* was included for a similar reason, as bigger species generally have higher public appeal (think polar bears, grizzly bears, etc.). Environmental groups would get more positive public attention when targeting a larger species, and corporate groups

may get more bad publicity for suing against a species with high public appeal. There has also been an established U-shaped relationship between body size and extinction risk (Johst and Brandl, 1997), where species on both extremes of the body length range (very small and very large species) have the highest extinction risk. If environmental groups are targeting species that are at greater risks of extinction, then they should be more likely to target species with low or high body sizes, and less likely to target species with medium-range body sizes. For corporate groups, they are more likely to win a lawsuit if the species has less extinction risk, so they would be more likely to target species with medium-range body sizes.

Distinct was included because if this was found to be statistically significant, it would provide evidence that private groups were suing for biological reasons and following the FWS priority ranking (Restani and Marzluff, 2001). *FWS* was included in the models for the same reasoning, if it was statistically significant, there would be evidence that private groups were suing for scientific reasoning. If this variable is significant and negative, it would provide evidence that private organizations are suing based on the recovery status of the species, and are more likely to target more endangered species.

Habit, which was a binary variable that took the value of 1 if the species had critical habitat designated for it, was included as those species that had critical habitat would, I predicted, be more likely to be sued for reduced protections by corporate groups. For the corporate group model, *habit* was included because a corporate group suing for the delisting of a species may be more likely to win if that species doesn't have critical habitat, as the government may not see that species as threatened as other species with critical habitat designated. The variable *tsp* was included because it would give insight into whether environmental groups were suing for species that were being relatively neglected by the government in terms of conservation

funds. It was included in the corporate model because if a species has more funding, they most likely have greater public appeal and political support (Czech et. al., 1998), and thus it could be more difficult for the corporate group to win the case. *Somep* and *finalp* were included because I predicted that species with more recovery planning would be less likely to be sued by environmental groups, as their recovery would more likely be progressing. These variables are included in the corporate model as if a species had an incomplete or complete recovery plan filed by the FWS, they would be less likely to win the case, compared to if a species had no recovery plan filed. *Conf* was included because I predicted this to be a significant factor in which species had lawsuits by corporate groups. Since endangered species would disrupt economic activity on private land, firms have an incentive to fight for reduced protection and delisting of the species that conflicted with their activity. For environmental groups, it has been thought that one of the motivations behind their lawsuits is to sue to disrupt economic development (Brosi and Biber, 2012).

The variable *rvote* was included as I predicted that states that were more Republican would favor the interest of businesses rather than conservation, and corporate groups would have more success, and thus sue more in these states, for reducing the protection of species. For the environmental group, the higher the percentage of Republican voters in the state, the more difficult it would be for them to win the lawsuit. The variables for the FWS regions and the year were included to provide fixed effects and control for any differences between the regions or the years.

Rationale for Estimation Method

In this study, I used a linear probability model with random effects and robust standard errors to estimate the regression models. Due to my interest in the time invariant variables, a

fixed effects model was not possible. A linear probability model was used rather than other binary dependent variable methods as it is simpler with panel data. I ran multiple robustness checks for different specifications and with correlated random effects (CRE) models, which are discussed in section VI. CRE models were used as a robustness check as this specification allows for fixed effects from the time varying variables, but doesn't eliminate the time invariant variables, which are the main variables of interest in this study.

Section VI: Results

Regression Results

From these two regression models, I find strong evidence that environmental nonprofits choose to sue for species based on charisma and public opinion of the species, while corporate groups sue for species that come into conflict with economic activity. Table 4 below outlines the results from these two regression models.

Table 6.1: Regression model results.

Variable	*Envgroup2* Model	*Corpgroup2* Model
mammal	0.048** (0.024)	0.015 (0.009)
bird	0.015 (0.021)	0.026*** (0.010)
amphibian	0.119** (0.050)	0.012 (0.015)
fish	0.025 (0.023)	0.020* (0.010)
bodyl	0.0005*** (0.0002)	0.00009 (0.0001)
distinct	0.005 (0.013)	-0.0004 (0.009)
fws	-0.010 (0.007)	-0.005 (0.004)
tsp	0.0006 (0.002)	-0.0003 (0.001)
habit	-0.0002* (0.00009)	0.00003 (0.00009)
somep	-0.031 (0.032)	-0.036* (0.213)
finalp	-0.021 (0.033)	-0.024 (0.019)
conf	0.009 (0.013)	0.026*** (0.010)
rvote	-0.065 (0.078)	0.013 (0.069)
constant	0.058 (0.049)	0.007 (0.021)
Observations	1361	1361
R-Squared (Between)	0.1522	0.0616

* represents significantly different from zero at $\alpha \leq 0.10$.

** represents significantly different from zero at $\alpha \leq 0.05$.

*** represents significantly different from zero at $\alpha \leq 0.01$.

Environmental groups are more likely to sue on the behalf of species that have a greater body length (P = 0.004), and are more likely to sue for mammals (P = 0.043) and amphibians (P = 0.027). The presence of designated critical habitat for the species decreases the probability that

an environmental group will sue for the species (P = 0.082). Corporate groups are more likely to sue for bird species (P = 0.007) and fish (P = 0.059). They are more likely to sue for species that are in conflict with economic activity (P = 0.007), but less likely to sue for species that have some recovery plan in place (P = 0.093). For environmental groups, whether a species is an amphibian has the largest statistically significant effect, increasing the probability that they will file a suit for the species by 11.88 percentage points, as compared to a reptile. Corporate group decision making is mostly influenced by economic conflict, which will increase the likelihood a species is targeted in a lawsuit by a corporate group by 2.62 percentage points, and if the species has some recovery plan filed, which decreases the likelihood by 3.59 percentage points.

It is also intriguing that the variables *fws* and *distinct* were not statistically significant in the environmental group model, suggesting that they do not consider the endangerment of a species when targeting species in these lawsuits. Also, *somep* and *finalp* are not statistically significant in the environmental group model, suggesting how far the FWS has progressed in a recovery plan for the species doesn't enter the decision-making formula for the environmental groups.

Robustness Checks

I ran multiple robustness checks with these two models. I ran a version that included cumulative conservation spending on a species (*cumsp*), instead of total spending (*tsp*), and the results described above remained the same for both models. The results for the environmental group model were also robust to using an interaction term of the region and dummy variables, although *fws, somep,* and *finalp* became statistically significant. For the corporate group model, the results were robust to the interaction term version. I also ran CRE versions of both models to be able to get the fixed effects of the time variant variables, and the results for both models were

robust, although *somep* is no longer statistically significant in the corporate group model. Additionally, I ran a version of the two models with *fws* lagged by one period (two years). Since these lawsuits take place after a petition has already been filed and rejected, and since this process can take some time, it is possible that the FWS priority ranking two years before the lawsuit is filed is more significant than the priority ranking in the same year as the filing. I found that the results from the environmental group model are mostly robust, except *mammal* ceases to be statistically significant. In the corporate model, the results are somewhat robust, however *mammal* and *fws* (lagged) are statistically significant, *habit* becomes significant, and *somep* ceases to be statistically significant. The results of the robustness checks are shown in Table 6.2 below for the environmental group model, and below in Table 6.3 for the corporate group model.

Table 6.2: Robustness checks results for environmental group model.

Model	Main Model (1)	Model with *cumsp* (2)	Model with region and year interaction (3)	CRE Model (4)	Model with lagged variables (5)
Variable					
mammal	0.048** (0.024)	0.051** (0.022)	0.049** (0.024)	0.046** (0.022)	0.044 (0.028)
bird	0.015 (0.021)	0.010 (0.019)	0.016 (0.021)	0.007 (0.018)	0.013 (0.025)
amphibian	0.119** (0.050)	0.114** (0.049)	0.112** (0.051)	0.107** (0.047)	0.114** (0.052)
fish	0.025 (0.023)	0.025 (0.243)	0.025 (0.024)	0.019 (0.021)	0.030 (0.027)
bodyl	0.0005*** (0.0002)	0.0004*** (0.0002)	0.0005*** (0.0002)	0.0004** (0.0002)	0.0005*** (0.0002)
distinct	0.005 (0.013)	0.003 (0.013)	0.004 (0.013)	0.003 (0.013)	0.005 (0.013)
fws	-0.010 (0.007)	-0.011 (0.007)	-0.014** (0.007)	-0.017 (0.011)	-
fws (lagged)	-	-	-	-	-0.005 (0.008)
tsp	0.0006 (0.002)	-	0.001 (0.002)	-0.003 (0.002)	0.0003 (0.002)
cumsp	-	0.0007 (0.0004)	-	-	-
habit	-0.0002* (0.00009)	-0.0001 (0.00009)	-0.00009 (0.0002)	-0.045 (0.044)	-0.005 (0.015)
somep	-0.031 (0.032)	-0.034 (0.032)	-0.028 (0.032)	-0.02 (0.073)	-0.050 (0.038)
finalp	-0.021 (0.033)	-0.022 (0.033)	-0.020 (0.032)	-0.007 (0.083)	-0.045 (0.035)
conf	0.009 (0.013)	0.005 (0.013)	0.001 (0.014)	0.004 (0.013)	0.014 (0.016)
rvote	-0.065 (0.078)	-0.085 (0.076)	-0.056 (0.089)	-0.031 (0.149)	-0.043 (0.088)
Constant	0.058 (0.049)	0.066 (0.049)	0.025 (0.047)	0.085 (0.051)	0.059 (0.052)
Observations	1361	1361	1358	1361	1124
R-Squared (Between)	0.1522	0.1650	0.1360	0.1775	0.2009

* represents significantly different from zero at $\alpha \leq 0.10$.

** represents significantly different from zero at $\alpha \leq 0.05$.

*** represents significantly different from zero at $\alpha \leq 0.01$.

Table 6.3: Robustness checks for corporate group model.

Model	Main Model (1)	Model with *cumsp* (2)	Model with region and year interaction (3)	CRE Model (4)	Model with lagged variables (5)
Variable					
mammal	0.015 (0.009)	0.017* (0.009)	0.014 (0.009)	0.012 (0.008)	0.020** (0.010)
bird	0.026*** (0.010)	0.023** (0.009)	0.027*** (0.010)	0.021** (0.009)	0.025** (0.010)
amphibian	0.012 (0.015)	0.012 (0.015)	0.009 (0.014)	0.003 (0.015)	-0.008 (0.013)
fish	0.020* (0.010)	0.020* (0.010)	0.019* (0.011)	0.015 (0.010)	0.014 (0.013)
bodyl	0.00009 (0.0001)	0.00006 (0.0001)	0.00008 (0.0001)	0.00007 (0.0001)	-0.00003 (0.00007)
distinct	-0.0004 (0.009)	-0.001 (0.009)	-0.0010 (0.009)	-0.002 (0.009)	-0.0007 (0.011)
fws	-0.005 (0.004)	-0.006 (0.004)	-0.005 (0.004)	-0.007 (0.005)	-
fws (lagged)	-	-	-	-	-0.010** (0.004)
tsp	-0.0003 (0.001)	-	-0.00007 (0.001)	-0.002 (0.002)	0.0007 (0.001)
cumsp	-	0.0004 (0.0005)	-	-	-
habit	0.00003 (0.00009)	0.00005 (0.00008)	-0.00002 (0.0001)	0.026 (0.018)	0.026*** (0.009)
somep	-0.036* (0.213)	-0.038* (0.021)	-0.041** (0.020)	0.025 (0.044)	-0.029 (0.018)
finalp	-0.024 (0.019)	-0.024 (0.020)	-0.028 (0.018)	0.047 (0.044)	-0.018 (0.017)
conf	0.026*** (0.010)	0.026*** (0.009)	0.027*** (0.010)	0.024** (0.009)	0.029*** (0.008)
rvote	0.013 (0.069)	-0.001 (0.072)	0.042 (0.075)	-0.181 (0.099)	-0.045 (0.052)
constant	0.007 (0.021)	0.014 (0.022)	-0.009 (0.028)	0.003 (0.030)	0.019 (0.024)
Observations	1361	1361	1358	1361	1124
R-Squared (Between)	0.0616	0.0634	0.0663	0.0876	0.1384

* represents significantly different from zero at $\alpha \leq 0.10$.

** represents significantly different from zero at $\alpha \leq 0.05$.

*** represents significantly different from zero at $\alpha \leq 0.01$.

Section VII: Discussion

The Endangered Species Act has come under much criticism in the 40 years since its inception, and one of the criticisms is that the FWS doesn't allocate conservation funds based on their own priority ranking. Rather, there is strong evidence that the FWS allocates funding based on political pressure and the charisma of the species (Restani and Marzluff, 2001; Czech et. al., 1998). From the results of this paper, there is strong evidence that environmental nonprofits also sue for species that have higher charisma and public support, through the statistical significance of the *bodyl* and *mammal* variables. Mammals have high public appeal (Czech et. al., 1998), and larger species tend to have more public support and charisma as well. Nonprofits, while they may try to balance their revenues and costs, can have their costs exceed their revenues because they receive donations and gifts (Newhouse, 1970). Nonprofits are also quality maximizers (Newhouse, 1970; Krug and Weinberg, 2004), and to maximize the quality of their programs, they must have sufficient funds. For environmental nonprofits, this means they must maximize their donations to maximize their quality, because they don't have traditional sources of revenue, so they depend almost solely on donations and gifts. To achieve this goal, environmental nonprofits use these FWS lawsuits as a way of "marketing" to increase their fundraising. If they sue on the behalf of species that have high public appeal, more of the public will be in favor of their actions, and therefore more people will donate to the organization.

Under the Equal Access to Justice Act (Equal Access to Justice Act, 1980), parties that take civil action against the United States government and are found to be the prevailing party (win the case), are awarded with compensation for the expenses and fees of expert witnesses, research, and attorneys that were necessary for the case. This compensation is based on the market rate for these consultants and lawyers, which means this can often provide an opportunity

for an environmental non-profit to make a profit from the lawsuit, if they receive these consulting services at a discounted rate below the market rate (reasonable assumption for non-profits). Therefore, this could be another motivation for environmental non-profits to sue for a species protection under the ESA, and could strengthen the argument that they sue for more popular species. While public appeal of a species doesn't necessarily mean they are more likely to win a case for that species, they could be more likely to gain support from other organizations, and perhaps find more scientific evidence for that species (Metrick and Weitzman, 1996).

I also find strong evidence that corporate groups sue for species that conflict with economic activity, which is consistent with general economic theory that firms are profit-maximizers. If a plot of land is restricted economically due to the presence of an endangered species, a firm cannot generally use the land for an economic activity. Unless the firm could sell the land to a party that wanted it for a non-use reason, the land would become similar to a sunk cost in that it could not easily be recovered. Therefore, to be able to utilize the land and avoid the sunk cost, they may sue the FWS to get the species delisted or reduce their critical habitat designation. There is also evidence that corporate groups are more likely to sue for bird and fish species, relative to reptile species. This could be because much private land development that would come into conflict with an endangered species would be timber harvest or the development of forested land, which would cause conflict with endangered birds. There is also much economic activity that would alter and damage streams and rivers, such as pollution and agriculture, that would cause firms to encounter endangered fish species.

These conclusions about the environmental nonprofits could be applied to the general literature of nonprofit decision making through empirical evidence that supports the idea that nonprofits, along with being quality maximizers, are also donation maximizers. This goal can

lead nonprofits to choosing programs that would bring in more donations, even if it didn't support the mission of the organization as well as other programs. These results could also add an additional dimension to the field model developed by Krug and Weinberg (2004). Along with contribution to mission, fiscal balance, and quality level, nonprofit administrators could also evaluate their programs through the amount of donations and gifts that the program generates.

Since the goal of the ESA is to protect and list the species that have the most biological threat, then these private lawsuits, and especially the ones done by environmental nonprofits, may cause a disruption to this goal. Others have also noted that private lawsuits can cause distortions in how the FWS allocates funds and makes it more difficult for them to follow their priority system (Restani and Marzluff, 2001; Restani and Marzluff, 2002). These private lawsuits can take away time and resources from the federal government that could be spent on the recovery of listed species, but is instead spent on litigation for increased protections of charismatic, but not necessarily highly endangered, species. However, there is not strong evidence that the federal government itself follows the priority ranking system (Dawson and Shogren, 2001; Restani and Marzluff, 2001; Metrick and Weitzman, 1996). Therefore, the evidence suggests that as the legislation stands now, more charismatic and popular species will continue to receive the bulk of conservation funding, while more low-profile, but possibly more threatened, species will receive less. There are multiple solutions to this problem. Congress could amend the ESA and require stricter scientific reasoning for species to get listed, and require more scientific standards for a species to get more funding. Alternatively, Congress could also increase the budget for conserving endangered species. This way, the favoring of high-profile species would detract less from recovery efforts for more highly endangered, but less publicly liked, species. Finally, as suggested in Restani and Marzluff (2002), a "favored" list could be created

that included the low-priority but high-profile species, and this list could have its own separate funding.

These suggestions would allow for the ESA to be more effective in conserving species who are in great danger of going extinct. I think it unlikely that we can change the behavior of environmental nonprofits in a way to have them only sue for those species that are higher priority, and thus the above solutions would allow this behavior to continue, and also correct the funding allocation issue.

Section VIII: Conclusion

The Endangered Species Act is hailed as the gold standard of environmental legislation in both the U.S. and worldwide. One aspect of the ESA allows for private parties to petition and sue the FWS or NMFS to get a species listed or delisted, or to designate critical habitat or reduce critical habitat for already listed species. This part of the legislation has been used extensively, with 736 petitions being sent to the FWS since 1983 ("Endangered Species Act Petitions," n.d.). There has been much research into how federal agencies, namely the FWS, allocates conservation funds among endangered species, but little literature into how these private organizations determine which species they file lawsuits for. This paper seeks to fill this void.

Based on the results from this paper, there is strong evidence that environmental nonprofits are more likely to sue for species that are larger (more charismatic) and are more likely to sue for mammals and amphibians. There is also evidence that corporate groups are more likely to sue for species that come into conflict with economic activity, and are more likely to sue for birds and fish.

For future research into how private organizations choose which species to sue for under the Endangered Species Act, one could look at what characteristics of a private organization makes it more likely to file one of these lawsuits. For the corporate groups, are they mainly in a certain industry, such as timber or agriculture? And for environmental nonprofits, are they mainly nonprofits focused around litigation, or ones that also engage in "on the ground" conservation work? There could also be an interesting link made between characteristics of the environmental organization, and the perceived motivation behind the lawsuit. Are larger nonprofits more likely to sue for public appeal reasons, whereas smaller ones conduct more litigation based on biological need? Future research involving the models used in this paper, with

additional variable(s) to capture the perceived probability an environmental non-profit has to win a case for the particular species would also provide valuable insights.

Given these new insights into private organization behavior, if the ESA remains as it is today, the conservation of endangered species will likely continue to over-fund charismatic species, and under-fund species that are on the brink of extinction. Moving forward, I would suggest that Congress either mandates more rigorous scientific reasoning for funding allocation, or create a separate listing and funding source for these species that have high public appeal. In order to protect the environment, we must work to conserve all endangered species, and this focus on "popular" species can cause great harm to the underlying threads of many ecosystems by ignoring the many endangered, smaller species (such as microorganisms or reptiles), that play a large role as well.

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