Wildlife Innovation and Longevity Driver (WILD) Act

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Executive Summary

Human activities threaten the health and sustainability of biodiversity in the United States and around the world. In order to protect wildlife and their habitats, manage the growing threat of invasive species, and address the ongoing problem of human-wildlife conflict, Senator John Barrasso (R-Wyoming) introduced the Wildlife Innovation and Longevity Driver (WILD) Act in April of 2017.[1]

The WILD Act addresses three key problems that threaten wildlife and global biodiversity: (1) invasive species, (2) wildlife poaching and trafficking, and (3) habitat loss. Invasive species are non-native species that cause or would likely cause harm to the environment, economy, or human health. Invasive species can disrupt ecosystem balances and eradicate native species. Wildlife poaching — the illegal hunting, killing, or capturing of wildlife — and wildlife trafficking — the illegal transport, trade, or sale of wildlife or their parts — are closely related issues that contribute to the reduction of sensitive native species populations and to the spread of invasive species and pathogens. Habitat loss, caused or exacerbated by human activity in most cases, includes the destruction, degradation, and fragmentation of habitat, thereby seriously threatening wildlife populations, ecosystems, and biodiversity.

The WILD Act includes four provisions that offer solutions to one or more of the problems addressed in the bill. The first provision, the reauthorization of the Multinational Species Conservation Acts, allocates funds to promote research and protection of five target species groups. The second, an amendment to the Fish and Wildlife Coordination Act, expands the purview of the act to require federal invasive species management on federal land. The third, the reauthorization of the Partners for Fish and Wildlife Program, provides landowners with funding and technical expertise to implement habitat restoration projects on privately owned lands. The fourth, the establishment of the Theodore Roosevelt Genius Prizes, creates five cash prizes to incentivize development of innovative technologies to combat environmental problems.

The overall goal of the WILD Act is to protect and maintain Earth's biodiversity. The WILD Act has wide bipartisan support. However, there is some controversy associated with this bill. Certain conservation solutions have raised concerns regarding increased human-wildlife conflict and the loss of local livelihoods. While long-term, meaningful changes to global biodiversity are difficult to track and measure, the WILD Act can contribute incremental achievements through individual projects that accomplish smaller, significant milestones. Through establishing, amending, and reauthorizing key pieces of legislation, the WILD Act intends to mitigate threats to biodiversity and maintain the valuable services ecosystems provide for future generations.

[1] For references, please see the full Wildlife Innovation and Longevity Driver (WILD) Act Final Report.

Problems Addressed by the WILD Act

Invasive Species

Invasive species are non-native species that harm or can harm the economy, the environment, or human health (S. 826 - WILD Act, 2017). These invasive species, usually introduced by human activity, typically have few predators and can effectively utilize resources in their new habitats. As a result, their populations grow, as they outcompete native species, and thereby disrupt native ecosystems (Hill, 2014; Szyniszewska, 2007). This kind of disruption can decrease biodiversity, threaten human health, alter ecosystem conditions, and change food webs (Szyniszewska, 2007). Impacts caused by invasive species contribute to the classification of 42% of the species in the Endangered Species Act listings (Pimentel et al., 1999). An example of how this affects wildlife populations is the loss of endemic bird species in Guam because of the spread of the invasive Brown Tree Snake (see Appendix A). The annual cost to the U.S. — for invasive species management, infrastructure losses, and repairs to damage caused by invasive species — is estimated at more than $120 billion (Pimentel et al., 2012).

Wildlife Poaching and Trafficking

Wildlife poaching is defined as the illegal hunting, killing, capturing, or taking of wildlife in violation of conservation laws (U.S. Legal Inc., n.d.). Wildlife trafficking — the illegal transit, trade, and sale of wildlife — is tightly connected to poaching, but specifically refers to the movement of wildlife and their parts out of their place of origin, rather than the killing or taking of wildlife. Many species are targeted for their parts or skins, which are sold as high-priced animal products used as food, luxury goods, or medicines (Yi-Ming et al., 2000). Wildlife trafficking and poaching support an illegal international industry generating approximately $19 billion annually (McGrath, 2012).

Wildlife poaching and trafficking are global problems that disrupt ecosystems, threaten wildlife populations and spread disease. The overexploitation and loss of species is a major threat to biodiversity that can substantially alter the structure and function of entire ecosystems, even to the point of collapse (Cardinale et al., 2012). Wildlife poaching and trafficking are both domestic and international problems that can cause serious population decline and the extinction of threatened or endangered species, such as the Sumatran rhinoceros targeted for its horns (see Appendix B). Wildlife trafficking can also introduce pathogens through the sale of live animals which can lead to the spread of disease (Smith et al., 2009). Species loss and ecosystem instability, organized crime, government corruption, and economic loss in local communities are some of the many repercussions of wildlife trafficking and poaching.

Habitat Loss

Habitat loss is the loss of an organism's natural home or environment. Habitat loss detrimentally alters ecosystems and is considered the greatest global threat to biodiversity; it is the driver behind 85% of threatened and endangered species listed by the International Union for Conservation of Nature, or IUCN (Magiera et al., 2016). Although habitat loss may occur naturally, it increasingly results from anthropogenic activities such as land development, natural resource extraction, pollution, invasive plant or animal introduction, and climate change (World Wildlife Fund, 2017a). The destruction of habitat directly causes population decline and increases extinction rates by reducing the number of viable populations an area can support

(Sodhi, 2010).

The three categories of habitat loss are habitat destruction, fragmentation, and degradation. Habitat destruction is the complete removal of habitat on a large scale, such as the clearcutting of a forest for new agricultural lands. Habitat fragmentation occurs when habitat is divided into smaller, isolated patches, typically by roads and dams (Didham, 1997). Habitat degradation is the alteration of a habitat so that ecosystem processes are interrupted, often degrading an area to the point that it can no longer support native wildlife (World Wildlife Fund, 2017a). An example of this can be seen in the loss of longleaf pine forest habitats and its effects on the Gopher Tortoise (see Appendix C).

Reauthorization of the Multinational Species Conservation Acts

Legislative Summary

The Multinational Species Conservation Acts (MSCAs) aim to protect global biodiversity and to conserve wildlife by establishing Multinational Species Conservation Funds. These funds award grants for projects that help conserve certain species groups and their native habitats. The WILD Act reauthorizes the following acts for Fiscal Years 2018-2022: 1) African Elephant Conservation Act of 1988, 2) Rhinoceros and Tiger Conservation Act of 1994, 3) Asian Elephant Conservation Act of 1997, 4) Great Ape Conservation Act of 2000, and 5) Marine Turtle Conservation Act of 2004 (S. 826 - WILD Act, 2017).

Environmental Problems

The MSCAs address two threats to wildlife and global biodiversity: habitat loss and wildlife poaching and trafficking. Given the delicate balance of interactions within an ecosystem, these problems can substantially alter ecosystem function and health (Cardinale et al., 2012).

Proposed Solutions

The MSCAs authorize the U.S. Fish and Wildlife Service to award grants in support of wildlife conservation and research efforts. Funds are primarily allocated for international projects because the majority of species protected under the MSCAs are not found domestically. Approved projects combat habitat loss, trafficking, and poaching, by collaborating with diverse stakeholders such as park officials, scientists, and local communities. One such grant funded the Rhino Protection Unit (RPU) program in Indonesia to monitor Sumatran Rhinos and advance anti-poaching enforcement in protected areas (see Appendix B) (U.S. Fish and Wildlife Service, 2016a). The grants also support research that informs habitat protection and wildlife conservation decisions. A chimpanzee wildlife survey and forest corridor feasibility study was financed by the MSCAs in Virunga National Park in 2008 (U.S. Fish and Wildlife Service, 2007). The study utilized data on population size and habitat range to determine the best location for a forest corridor, which links fragmented or destructed habitat to provide a continuous pathway for wildlife between two forested areas (Bennett, 1999). Other approaches to promote wildlife conservation include the expansion of protected areas and local education programs.

The MSCAs specifically aim to protect vulnerable or endangered species and their habitats. The internationally accepted IUCN Red List criteria defines “vulnerable species” as those faced with a high risk of extinction in the wild and “endangered” as those faced with a very high risk of extinction (IUCN Species Survival Commission, 1994). The majority of species

groups targeted by the MSCAs are included in these criteria, such as marine turtles, of which six of the seven species are vulnerable or endangered (IUCN Red List of Threatened Species, 2008). The protection of the species included in the MSCAs is also important because they are considered "umbrella" species. Umbrella species are species whose conservation will indirectly protect many other species that occur within the same range (Lambeck, 1997). The protection of elephant, tiger, great ape, rhinoceros, and marine turtle species causes a trickledown effect to other species found in their habitat (see Appendices).

Controversies

Wildlife conservation can create a variety of controversies associated with economic loss and human-wildlife conflict, especially in developing countries. Anti-poaching efforts affect local livelihoods and impact individuals dependent on poaching as a primary source of income. Restrictions on wildlife poaching can also undermine cultural traditions and impact communities that rely on hunting for bushmeat (Barnett, 2000). The designation of protected areas is a controversial issue, because it often results in the displacement of economically marginal communities and loss of access to resources (Waweru & Oleleboo, 2013). Habitat protection and wildlife conservation efforts can also create revenue loss for large-scale industries, such as commercial logging.

Human-wildlife conflict is a central threat to the survival of many species worldwide and local communities. Wildlife-imposed damage to agricultural land and livestock is a frequent problem that drives farmers to kill wildlife to defend their crops and prevent economic loss (Barnett, 2000). The encroachment of wildlife into communities can also pose a direct threat to human safety in the event of confrontation with large animals or predators. In the Indian states of Jharkhand and Assam, confrontations with elephants caused 300 human deaths between 2000 and 2004 (see Appendix C) (Bulte and Rondeau, 2007). "Human-wildlife conflict is a serious obstacle to wildlife conservation worldwide and is becoming more prevalent as human populations continue to grow" (Waweru & Oleleboo, 2013).

Measuring Success

Measuring the success of the MSCAs can be challenging because of the distinct nature of individual projects and varied approaches to conserve certain species. Uniform metrics can be obtained across different conservation projects to help quantify and better measure the collective success of wildlife and habitat protection efforts. Examples of metrics include the number of poachers apprehended, the number of animals killed or the acreage of habitat protected. The Rhino Protection Unit program mentioned above recorded the number of rhinos poached annually to measure the success of anti-poaching efforts. This program measured the impacts of improved enforcement in two protected areas, Bukit Barisan Selatan and Way Kambas National Parks, where no Sumatran Rhinos have been poached since 2010 (see Appendix B)(International Rhino Foundation, 2017). Additional metrics and data, similar to the example above, from MSCA-funded projects can help track and measure success over time. It is important to note the complexities associated with wildlife and habitat protection, and consider that biodiversity protection on a global scale is a difficult goal to measure. Although worldwide wildlife conservation cannot be significantly impacted over a few years or decades, the creation of milestones can create small-scale goals and measure step by step progress toward the overall desired outcome of the MSCAs.

Amendment to the Fish and Wildlife Coordination Act

Legislative Summary

The WILD Act amends the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661) to protect water, oceans, coasts, and wildlife from invasive species. The Coordination Act authorizes the Secretary of the Interior to cooperate with federal, state, and private agencies in the protection, rearing, and stocking of all wildlife and their habitats, and to survey wildlife on federal lands. This proposed amendment adds a section to require specific federal agencies to plan and carry out invasive species control and management activities on the lands they manage (S. 826 - WILD Act, 2017).

Environmental Problems

The amendment to the FWCA addresses the invasive species problem, which has a dramatic impact on natural communities and ecological processes in the United States. Invasive species are likely to cause local or regional extinctions by altering ecological dynamics (Mack et al., 2000). This provision also addresses habitat loss, as many introduced species have invaded natural habitats to the detriment of one or more native species. The disruption of native communities by invasive species increases ecosystem vulnerability and can lead to the degradation and loss of viable habitat (Szyniszewska, 2007). Asian carp and Burmese pythons are two examples (see Appendix A) of invasive species prevalent in the U.S. that this amendment can help manage.

Proposed Solutions

The amendment to the FWCA proposes to protect native habitat and wildlife by funding federal agencies to improve invasive species control and management on federal lands. The WILD Act allows funding to be allocated for these agencies to create and implement strategic plans and work toward achieving annual invasive species reduction goals (S. 826 - WILD Act, 2017). Federal efforts can utilize several methods including control, eradication, and prevention to combat invasive species. Chemical controls include the use of herbicides or pesticides, and mechanical controls include cutting, mowing, and constructing barriers to prevent their spread (Gherardi et al., 2009). Biological control methods use other animals, fungi, or diseases to eliminate or curtail the growth of invasive populations (Wisconsin Department of Natural Resources, 2016). The use of biological control requires comprehensive analyses to ensure newly introduced species will not cause harm to the native community or become invasive themselves.

Invasive species eradication is the removal of every potentially reproducing individual of an invasive species from an area (Gherardi et al., 2009). One example of a successful federal invasive species management project was conducted by the U.S. Department of Agriculture in the the Saint Vincent Wildlife Refuge, where endangered Loggerhead Sea Turtles were threatened by invasive feral swine. The project successfully eradicated the swine population, which destroyed sea turtle nests and ate the eggs, using lethal methods (U.S. Fish and Wildlife Service, 2013). Prevention methods, such as improved habitat monitoring, public education, regulation of imports, and rapid response plans, can also aid in reducing the introduction of invasive species.

Controversies

Controversies occur when the management of invasive species benefits some stakeholders but hurts others. Some stakeholders, such as conservationists, ecologists, and waterway authorities that are interested in preserving native habitats and ecosystems favor management of invasive species. Because of this strong stance, these stakeholders are likely to advocate to manage invasive species that are harmful to the environment, rather than any non-native species that have minimal effects on the environment (Tuminello, 2012). However, stakeholders like consumers and hunters of invasive species strongly oppose the management of those animals and plants. For example, some Peruvian fishermen and consumers of trout, an invasive species in Peru, are against the removal and control. To eradicate the trout population would harm these stakeholders' incomes and/or food source (Soley, 2015).

Conservationists and scientists generally agree that the protection of endangered species and their habitats is beneficial. However, groups exist that would be negatively impacted by the protection of animals and lands. For instance, timber industries lost revenue from Spotted Owl habitat conservation, as they could only harvest 60% of the lumber from within about a mile of any spotted owl (Ketcham, 2017). Another example is Kanha Tiger Reserve. People living in Baiga tribe were displaced from their ancestral homes to assist tiger conservation in India (Survival International, 2015). This usually leads to three conflicts: revenue loss, exclusion from land use, and direct threats to human health or livelihood.

Measuring Success

The amendment to the FWCA aims to manage invasive species. The measurable outcomes are net annual reduction in population of invasive species, net annual reduction in area infested, and economic and ecological cost of management techniques. In practice, these components are difficult to quantify. The most measurable outcome is related to the economic cost of management options, like cost per invasive species removed. Additionally low-cost options can be favored given the expensive nature of invasive species management. However, as with other provisions of the WILD Act, outputs and milestones can be measured more accurately to serve as proxy to the overall outcomes of the amendment, such as the number of projects, amount of funding awarded, number of invasive species targeted, and total area worked in, while ensuring a high degree of project-level accountability.

Reauthorization of the Partners for Fish and Wildlife Program

Legislative Summary

The WILD Act reauthorizes the Partners for Fish and Wildlife Program (PFWP), which provides technical and financial assistance to private landowners for the restoration and enhancement of habitat on their private lands, in order to protect migratory birds, endangered species, and other wildlife. The WILD Act increases annual funding for the PFWP from $75 million to $100 million for fiscal years 2018 to 2022 (S. 826 - WILD Act, 2017).

Environmental Problems

This reauthorization will help to combat two major environmental issues that affect biodiversity and the health of wildlife populations – habitat loss and invasive species. The

Partners Program addresses these problems within the U.S., unlike the Multinational Species Conservation Acts, by targeting the estimated 73% of the country's privately-owned land (U.S. Fish and Wildlife Service, 2011).

Proposed Solutions

The PFWP aims to protect and expand wildlife habitat by incentivizing private landowners to implement habitat restoration projects on their lands. Partners can include, but are not limited to, farmers, non-profit organizations, and schools. Program goals are achieved by connecting community-based biologists with landowners to plan, implement, and monitor conservation projects that can maintain a self-sustaining system (U.S. Fish and Wildlife Service, 2011). The PFWP engages landowners to participate in conservation efforts on private land where federal programs cannot otherwise reach.

The PFWP restores native habitats through physical, ecological, and chemical methods (Partners for Fish and Wildlife Act, 2006). Physical methods may include rebuilding streambanks, replanting trees, and removing building structures. Ecological methods involve altering environmental conditions and resources to favor native species. Chemical methods involve the application of herbicides to remove invasive species and allow for regrowth of native plants (Gheradi et al., 2009).

Controversies

The PFWP aims to manage invasive species, provided they are harmful to their new environments. Engaged stakeholders are particularly interested in the management of invasive species that are harmful to the environments into which they are introduced, rather than the management of any non-native species, regardless of whether they are benign or even helpful to their new environments (Tuminello, 2012). However, there are consumers and hunters that oppose such management of invasive species out of concern that it will adversely impact personal benefits or livelihoods. Additionally, the protection and preservation of wildlife habitat allows existing ecosystems to maintain wildlife populations and sustain biodiversity. Yet, there is some opposition to the protection of wildlife habitats due to human-wildlife conflict or revenue loss — the protection of these areas may restrict use, access, and extraction of land-based resources. Private landowners may have views that could be in conflict with project design and implementation.

Measuring Success

The PFWP first went into effect in 1987, and in the last 30 years, the program has worked with thousands of voluntary partners in the U.S. to restore over 1 million acres of wetlands and 11,000 miles of streams (Banks, 2011). At the individual project level, measurable outcomes are dependent on particular project goals, but primarily consist of areas of habitat restored through activities such as removing stream barriers, treating invasive species, and improving existing landscape. Currently, the PFWP employs the Habitat Information and Tracking System (HabITS) platform to maintain consistency in the reporting of projects that can empower managers to conduct analysis using search, spatial, and predictive tools, aggregate data on project success, and carry out audits to ensure integrity of projects (U.S. Geological Survey, 2016). The collection and analysis of this information allows the PFWP to better quantify the success of programs on a macro scale.

Establishment of the Theodore Roosevelt Genius Prizes

Legislative Summary

Under the WILD Act, the Secretary of the Interior acting through the Director of the U.S. Fish and Wildlife Service will establish annual prize competitions known as the Theodore Roosevelt Genius Prizes. The Theodore Roosevelt Genius Prizes will award five or more monetary prizes of at least $100,000 for technological innovations in the following five categories: (1) the prevention of wildlife poaching and trafficking, (2) the promotion of wildlife conservation, (3) the management of invasive species, (4) the protection of endangered species, and (5) the management of human-wildlife conflicts (S. 826 - WILD Act, 2017).

Environmental Problems

The Genius Prizes support the development of technology that mitigates all three problems addressed in the WILD Act: habitat loss, wildlife poaching and trafficking, and invasive species. The prizes also address human-wildlife conflict, which is another global issue closely related to the aforementioned problems. Human-wildlife conflict occurs when interactions between humans and wildlife lead to negative impacts on one or both sides through the loss of property or livelihoods, injury, or death (Jayasinghe, 2015). In recent years, technology has been identified as one of the more promising tools to combat and prevent detrimental encounters between human and wildlife populations.

Proposed Solutions

The Genius Prizes create solutions that incentivize and fund the development of innovative technology to advance wildlife protection and global biodiversity. Innovation can help control invasive species, combat poaching and trafficking, reduce habitat loss, and mitigate human-wildlife conflict by developing new tools and improving existing techniques to address these challenges. Recent technological advancements have already aided in the protection of biodiversity by disseminating real-time information and enabling rapid response. For example, radar and Global Positioning Systems (GPS) have been used to estimate wildlife population densities and monitor wildlife movement patterns (Baratchi et al., 2013). UAVs (unmanned aerial vehicles), also known as drones, acquire high-resolution photographs and video footage 24 hours per day. Drones can help combat a variety of threats to wildlife and habitat, such as illegal logging, by improving monitoring and increasing the range of surveillance (Lan et al., 2017). Infrared cameras are being used as a form of anti-poaching technology in Kenya's Maasai Mara National Park to monitor wildlife and improve enforcement. The cameras automatically alert rangers if humans are detected and have already aided in the apprehension of twenty-eight poachers since 2015 (World Wildlife Fund, 2017b). The Genius Prizes allow for the continued development and further advancement of innovative technology to promote the future protection of wildlife worldwide.

Controversies

Although the WILD Act has not yet been implemented, it does have the potential to spark controversy by creating human-wildlife conflicts, as mentioned earlier. Innovative technologies that promote wildlife conservation and habitat protection can inhibit communities that rely on the land and wildlife resources for their livelihoods. However, by including a Genius Prize for the

non-lethal management of human-wildlife conflict, the WILD Act takes steps toward promoting management strategies that mitigate human-wildlife controversies, while conserving wild animals and plants. GPS collars are an example of an older form of animal-tracking technology that aided in the reduction of human wildlife conflict. A project in Kenya used GPS collars to monitor elephants and provide wildlife managers with real-time data on the location of the animals. Managers used this information to alert communities if an elephant moved close to farms, allowing enough time to divert the animal and avoid potentially fatal confrontations (Wall et al., 2014). The Genius Prizes now seek to fund new technology that further improves existing tools to reduce human wildlife conflict.

Measuring Success

The measurable outputs of the Genius Prizes are the total number of prizes awarded annually, and the nature of the technologies supported by the monetary award. Additionally, the measurable outputs of each technology will vary in response to the range of the technology's applicability and the environmental issue to be addressed. The outcomes of the Genius Prizes are dependent on the specific nature and goals of each technology. Consequently, new measuring techniques and environmental indicators of program success must be developed for each technological innovation. The common, general outcome of the five Genius Prizes will be the development of innovative technologies that help advance the protection of global biodiversity.

Conclusion

The WILD Act is a multifaceted bill that seeks to address several of today's pressing global environmental issues. This act proposes solutions to protect biodiversity and mitigate issues that threaten wildlife and habitat worldwide. Assessment of individual projects within each of the four provisions of the WILD Act is important in order to measure the overall success of the WILD Act. This assessment is a long-term process because global biodiversity improvement is a long-term process involving numerous variables. Measuring the incremental success of achievable milestones provides a feasible approach to illustrate progress toward the larger, long-term goals.

The WILD Act provides a number of contributions to long-term biodiversity goals favored by proponents of the bill, such an increase in populations of endangered species, a reduction in the spread of invasive species and increase preservation of wildlife habitat. However, the implementation of this bill has the potential to prevent individuals from utilizing land as well as plant and wildlife resources that sustain their livelihoods. This controversy can incite various human-wildlife conflicts such as the relocation and displacement of communities. Wildlife encroachment into villages and towns can also create direct threats to individuals including destruction of cropland and attacks on humans.

Policy makers must work closely with key stakeholders to accomplish the desired outcomes of the WILD Act. Collaboration among federal and state agencies, non-governmental organizations, private landowners, and local communities is needed to ensure the success and proper execution of the legislation. While there are challenges to implementing the WILD Act, the four provisions will take significant steps toward preserving wildlife and protecting global biodiversity.

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Appendices

Appendix A: Invasive Species Case Studies

Brown Tree Snake in Guam

The Brown Tree Snake, native to Australia, the Solomon Islands, and Papua New Guinea, was accidentally introduced to Guam in the late 1940's (Rodda et al., 1992). Native bird species in Guam had no defensive instincts because they did not evolve alongside predators such as snakes, resulting in the extinction of 10 out of the island's 12 bird species. The snakes also caused the extinction of several bat and lizard species, which resulted in the loss of vital ecosystem services such as pollination, seed dispersal, and insect management (Fritts and Leasman-Tanner, 2001). The introduction of Brown Tree Snakes has reduced farmer crop yields in Guam and increased the number of insect borne diseases.

Asian Carp

Asian carp are an invasive species that have been introduced into the U.S. through the aquaculture industry. Asian carp are voracious eaters that outcompete native fish species and negatively impact aquatic ecosystems. They are often extremely successful in the environments they invade. Asian carp comprise almost all of the biomass in the Illinois and Mississippi rivers, where they are not native (National Wildlife Federation, 2017). In 2010, the federal government committed $78.5 million (Davey, 2010) in investments to prevent the introduction of Asian carp to the Great Lakes, where they could threaten the $7 billion Great Lakes fisheries (DUJS, 2012).

Burmese Pythons

In Florida, non-native Burmese pythons have been discovered to prey on endangered native species including wood storks and Key Largo woodrats (Snow et al., 2007). For two decades government agencies have expended over a combined amount of $102.6 million dollars to protect and recover the loss of Key Largo woodrat and wood stork populations (U.S. Fish and Wildlife Service, 2012). Many large constrictor snakes can live in habitats and climates in our states and insular territories, and their introduction and spread could threaten other populations of endangered or threatened species (U.S. Fish and Wildlife Service, 2012)

Appendix B: Wildlife Poaching and Trafficking Case Studies

African Elephants

The removal of certain "keystone species," which perform vital functions that support entire ecosystems, can have widespread effects on prey behavior, plant growth, and the health of landscapes (Mills et al., 1993). African elephants, for example, play a critical role in maintaining grasslands in the savanna by curbing vegetation growth and consuming small trees (National Geographic, 2017). Elephants are one of the keystone species addressed in the MSCAs that suffer population decline due to the demand for ivory in the wildlife trafficking industry.

Asian Elephants

Human-wildlife conflict is an ongoing issue in India. The number of human deaths due elephant confrontations rose by 300 between 2000 and 2004 in the states of Jharkhand and Assam (Bulte and Rondeau, 2007). Elephant deaths have also occurred as a result of these animals destroying cropland and angering villagers. Elephants have been killed to provide villagers with bushmeat and valuable commodities, such as ivory, that provide additional income. To prevent this continued occurrence of human-wildlife conflict, local governments worked to provide compensation to villagers for their losses. As a result, the community was less likely to retaliate against elephants if they felt the compensation was adequate to total income loss.

Sumatran Rhinos

Sumatran rhinos are poached in Bukit Barisan Selatan and Way Kambas National Parks in Sumatra, Indonesia. Rhino horns are sold around the world for use in traditional medicines and as a symbol of wealth. Poaching of these rhinos has decimated their populations in the last 20 years as numbers have decreased by over 50 percent. Now, there are fewer than 100 of these rhinos left alive. To mitigate poaching, these parks currently receive funding through the Multinational Species Conservation Act to established Rhino Protection Units (RPUs). RPUs are highly trained patrol teams comprised of local community members and National Park guards that patrol parks to deactivate traps, apprehend poachers, and investigate crime scenes where poaching has occurred (U.S. Fish and Wildlife, 2016). These activities have been effective. According to the International Rhino Foundation, no Sumatran rhinos have been poached in these two parks in over seven years (International Rhino Foundation, 2017). While this metric is specific to this particular project, measuring project-specific outputs is an attainable way to examine the success of the WILD Act's provisions. Measuring the success of the overall program is more challenging, and requires aggregating metrics from across projects.

Appendix C: Habitat Loss Case Studies

Longleaf Pine and Gopher Tortoise

The Gopher Tortoise is an endangered species that found in longleaf pine forests in the southeastern United States (U.S. Fish and Wildlife Service, 2016b). Gopher tortoises are highly threatened by habitat loss because they require large parcels of intact forest that are not fragmented by roads, buildings or other infrastructure (U.S. Fish and Wildlife Service, 2016b). The Gopher Tortoise is a keystone species that creates burrows which provide refuge for about 360 other species throughout its range. The Partners for Fish and Wildlife Program has restored 34,000 acres of longleaf pine habitat through planting, prescribed burns, and invasive species management (U.S. Fish and Wildlife Service, 2016b).

Borneo Orangutan

The loss and fragmentation of orangutan habitat in Indonesia and Malaysia over the past two decades has resulted in an 80% decline of the primate population (Borneo Orangutan Survival Australia, 2017). This has been largely due to the increase in the agricultural farming of palm oil coupled with and expansion of the illegal logging in this region. Rapid deforestation has created fragmented forest islands that limit the number of animals it can support and are extremely susceptible to wildfires, leading to further degradation of these habitats (Borneo Orangutan Survival Australia, 2017).