Economics of Red Wolf Reintroduction

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Abstract

In any animal reintroduction, one main component that is heavily evaluated is the economics of the reintroduction process of introducing an endangered animal to a specific area. Red wolves in specific, have a strong economic correlation between ecotourism and economics, as red wolves are an almost extinct species. In this analysis, I examined the economics of ecotourism as a benefit for red wolf reintroduction into the Delmarva. Additionally, I further examined how ecosystem services are an additional benefit to the economics in Delmarva. I used two case studies in my analysis to determine if the Delmarva Peninsula would enhance economically if it were to reintroduce red wolves: Yellowstone (Gray Wolf) and North Carolina (Red Wolf). Yellowstone and North Carolina case studies are two areas that are highly successful for wolf reintroduction. We can model behavior from these two case studies to determine if the introduction of wolves to Delmarva would be successful. Since Yellowstone and North Carolina both showed great promises of raised revenue from the introduction of wolves, then we can conclude that if the Delmarva would introduce, they could see economic benefit. The reintroduction process would financially benefit the local economy as well as financial benefit the ecosystem through ecosystem services.

Introduction

Red wolves bring in a variety of benefits to the environment and local communities. Due to the rarity of red wolves' existence, they can be used as a tool for ecological tourism and conservation. According to the North Carolina Wildlife Federation, there are only a few hundred left in captive breeding programs and fewer than 25 in their natural habitat, which is why it is crucial that we continue to reintroduce red wolves into different coastal wetlands. The National Wildlife Federation stated that red wolves are the most endangered canids in the world. However, due to hunting and habitat loss, this species was almost extinct in the 1970s. Luckily in 2007, North Carolina reintroduced the species to the Albemarle Peninsula. The U.S Fish and Wildlife Services started a Red Wolf Recovery Plan In North Carolina due to the status of the red wolf being “threatened with extinction.” Research suggests that red wolves historically occupied moist, densely vegetated habitats, including virgin pine and lowland hardwood forests, coastal prairies, and marshes (Phillips et al., 2003). Due to the Delmarva being a coastal wetland, I conclude that the Delmarva would be a sufficient location in Virginia for the introduction of red wolves.

There are current processes for the reintroduction of gray wolves throughout the Mountain division of the United States to help keep the wolf population in high volumes. We are starting to recognize the importance of wolves and the part they play in our ecosystem as a keystone species. Colorado Parks and Wildlife have been in communication with the U.S. Fish and Wildlife Services regarding gray wolf management from the outset of this restoration and

management planning effort. Colorado Parks and Wildlife Commission developed a plan to introduce gray wolves in Colorado and passed on November 3rd, 2020. However, since this is a new reintroduction, there is not an exact statistic on the number of wolves Colorado currently has. The northwestern wolf currently occupies California, Oregon, Washington, Idaho, Montana, and Wyoming. The California Wolf Center stated that California and Oregon are the only states that have the northwestern wolf under federal Protection to keep the population thriving in these areas. Montana and Wyoming are under state management meaning that these states have the legal control of wildlife, as recognized under the state ownership doctrine, which is based on the fundamental premise that the state government has the power to control the taking (by capturing or killing) of all wild animals found within their jurisdiction (Favre, 2003). Even though Montana and Wyoming are under state management, there is still an increased wolf population since there is no hunting for these animals. Lastly, Idaho has a year-round hunting season for the northwestern wolf due to the un-wanting presence of wolves by humans.

In my analysis, I am examining the existing ecotourism on the Delmarva and how wolves would bring additional revenue to the community. I am also examining the ecosystem services provided by wolves and how that would help stabilize the environment on the Delmarva Peninsula. Even though the size of Yellowstone and Amberle Peninsula are different dimensions (size), having the rare species of red wolves being in only one other location (North Carolina), we can still assume that the Delmarva would receive an influx of economic benefits.

Economics of Ecotourism

Ecotourism is an amalgam of interests arising out of the environment, economic, and social concerns (Western, 1993). Ecotourism is a helpful tool to attract economic revenue with the practice of conserving the environment. In having an attractive environment with a species that is native to a specific area, as ecotourists we learn to have a certain appreciation for the environment when we are visiting. When traveling, we want to have a philosophical approach to ecotourism to create a more sustainable tourism industry in every country (Wearing et al., 2009). By having a philosophical approach toward ecotourism, we have an appreciation for the beauty and do not want to destroy the land we walk on or the animals we encounter.

North Carolina

The US Fish and Wildlife Service noted that the Red Wolf Center is located in Columbia, NC on Pocosin Lakes National Wildlife Refuge with 241 wolves in captivity, which is a big improvement towards conservation. It was constructed in 2007 to exhibit red wolves as a conservation effort for the wolf species that almost led to extinction. One study found that the proportion of mortality attributable to anthropogenic causes, specifically mortality caused by gunshot during fall and winter hunting seasons (Oct–Dec), increased significantly since 2000 and became the leading cause of red wolf death (Hinton et al., 2016). Since there is a drastic increase

in hunting wolves in their natural habitat, the Red Wolf Center is an advocate for the long-term protection of the red wolf population by teaching conservation efforts. The number of tourists (98%) came from 26 states in the United States, and 2% from three other countries – Australia, England, and Italy. North Carolina had the most interviewees at 34%, Virginia at 12%, Pennsylvania at 10%, Tennessee at 6%, and Florida at 5%. Over 70% of interviewees were from states in the Eastern Time Zone (Lash et al., 2005). This variability of visitors is significant because people will travel from all over the world to see the rare wolf species and bring economic revenue to eastern North Carolina. It promotes conservation by educating visitors about the importance of this animal. By promoting conservation, we could further help protect the habitat of red wolves by bringing awareness to the animal and the environment red wolves live in. Additionally, by having all these visitors, we bring in economic revenue to the North Carolinas local community and economic revenue to the sanctuary to fund more red wolf research. Not only does revenue help the sanctuary keep running, but it also benefits the species by having enough resources for the wolves to thrive.

Yellowstone National Park

This national park is 3,471mi2 and creates a home for thousands of animals that are federally protected. Yellowstone is located in three states: Montana, Idaho, and Wyoming. Along with the ecotourist fascination of seeing animals in their natural habitat, Yellowstone is also known for its natural beauty with geysers, hot springs, and creeks. The restoration of wolves to Yellowstone National Park has become one of the most successful wildlife conservation programs in the history of endangered species conservation (Duffield et al., 2008). Yellowstone receives over 3 million ecotourists annually, providing professional and qualitative services, as well as possibilities to practice various ecotourism activities (Simoni et al., 2013). After the eradication of the wolf species in the United States in the 1920s, Yellowstone started a reintroduction program for wolves in the 1990s to provide ecotourists with another species to glance at in a natural environment. Wolf restoration to the GYA began in 1995, when 14 wolves were brought to the park from Alberta, Canada, held in acclimation pens for 10 weeks, and then released. At the end of 2004, at least 171 wolves and 16 packs occupied Yellowstone National Park. (Smith et al., 2005). The Yellowstone Wolf Project plan provided the funding for GPS collaring of the wolves to track movement and analyze patterns of migration between Montana, Idaho, and Wyoming. The project also provided funds for population counts and behavioral studies to keep the wolf population up so that the park can attract ecotourists who specifically see wolves.

Current Ecotourism in the Delmarva

During the fall migration season, the Delmarva is the place to visit songbirds and other bird species. These natural areas of coastland provide the necessary habitat for songbirds following migration patterns. Kester-McCabe stated that birders spent an estimated $15 billion on their trips and $26 billion on equipment in 2011. For trip expenditures, 52 percent was food and lodging, 34 percent was transportation, and 14 percent was other costs such as guide fees, park

fees, and equipment rental. Breaking down the statistic of bird migration ecotourism, 52% of food and lodging brings economic revenue to the Delmarva Peninsula by contributing to local companies. Because of the economic value of songbird migration, there is an effort to protect the coastal habitat in Delmarva. These concentration areas may have tremendous conservation significance to bird populations that depend on them for rest, refueling, and protection from predators (Watts et al., 1994). Although there is a significant amount of money being brought in through bird migration to Delmarva, more potential revenue could be brought in and potential protection for songbirds. If wolves were to be brought into the Delmarva there is an economic incentive to market ecotourism and provide additional services for bird watchers along the North Carolina Bird Trail (Flood et al., 2006).

Results

North Carolina

There is a great potential for red wolves to generate revenue for North Carolina because of the support for red wolf recovery and reintroduction. The Red Wolf Center has wolf-specific activities for ecotourists, like howling trips, that could provide additional revenue to the center (Lash et al., 2005). If only 10% of visitors from the Outer Banks would visit the Center, it could bring over one million dollars within the first year running. With the center also being on a major highway, we can account for the number of tourists traveling and stopping at the center.

Row	Formula	X = 33%	X = 10%	X = 5%	X = 2%
A	Visitors coming to the Outer Banks in summer	200,000 per week	200,000 per week	200,000 per week	200,000 per week
B	76% of visitors want to visit the Red Wolf Center	152,000 per week	152,000 per week	152,000 per week	152,000 per week
C	X percentage of Row B visitors who actually come	50,160 per week	15,200 per week	7,600 per week	3,040 per week
D	At $5.00 admission charge, weekly revenue is	$250,800 per week	$76,000 per week	$38,000 per week	$15,200 per week
E	Number of visitors over a 12-week summer	601,920	182,400	91,200	36,480
F	Admissions revenue over a 12-week summer	$3,009,600	$912,000	$456,000	$182,400

Figure 1. A Calculation of Potential Revenue for the Red Wolf Center (Lash et al., 2005)

Yellowstone National Park

Since the reintroduction of gray wolves to Yellowstone, the national park has seen an influx of revenue because of this species. Regarding changes in visitor spending in the local economy due to wolf presence, the current estimate of +$35.5 million (confidence interval of $22.4 to $48.6 million) is consistent with the 1994 Environmental Impact Statement estimate of +$27.7 million

(Duffield et al., 2008). In addition to ecotourist from all over the world, there was an evaluation that found that $22.5 million in direct non-resident spending within the Greater Yellowstone Area is directly attributable to the presence of wolves in the park. Based on the estimated variability in the estimates used, the 95% confidence interval associated with estimated wolf-related visitor spending ranges from $14.5 to $30.6 million annually (Duffield et al., 2008). In total, it is estimated that visitors coming from outside the three-state region (Idaho, Montana, Wyoming), who are coming specifically to see or hear wolves in the park, spend $35.5 million annually (Duffield et al., 2008).

Statistic	Spring	Summer	Fall	Winter
Total recreational visitation to Yellowstone	382,598	1,819,798	547,777	85,478
% of visitors from outside the three-state area	70.5%	83.68%	67.59%	82.2%
(A) Recreational visitors from out of the three states	269,770	1,522,807	370,242	70,289
(B) % of visitors who would not have visited without the presence of wolves	1.93%	4.78%	3.45%	3.66%
(C) Average spending per visitor within the three states by visitors from outside the area	$361.89	$369.12	$425.50	$510.84
(A) * (B) * (C) Total estimated annual three-state visitor spending attributable to wolves	$1,885,178	$26,889,668	$5,431,916	$1,314,167
Total estimated annual visitor spending in the three states attributable to wolves		$35,520,929		
95% Confidence interval		$22,404,274 to $48,637,585		

Figure 2. Total Estimate of Annual Visitor Spending in Yellowstone from the Greater Yellowstone Area Due to Wolf Presence (Duffield et al., 2008)

Discussion

We see potential revenue from wolf ecotourism through the case studies of Yellowstone and North Carolina. However, there are other factors that help the economics of the Delmarva besides the tourism industry. Ecosystem services are conditions and processes through which natural ecosystems, and the species that make them up, sustain, and fulfill human life (Daily, 1997). Through the ecosystem services that wolves provide, we can have a natural and sustainable process of restoration of the Delmarva coastal wetlands. These ecosystem services also serve as another reason why Delmarva should introduce the species as well as it will save money on eradication efforts towards Nutria.

The Fish and Wildlife Service stated that although the exact diet of red wolves varies depending on available prey, it usually consists of a combination of white-tailed deer, raccoons, and smaller mammals such as rabbits, rodents, and nutria. In Delmarva, they have the invasive species of nutria that has devastated the coastal wetland by feeding on native vegetation. When nutria excavates roots, they expose the sediment to tidal erosion and brackish wetlands to saltwater intrusion (Kendrot, 2011). Nutria destroys the environment by not only feeding on native vegetation, yet when feeding, but they are also eroding the coastal wetland. Efforts to eradicate this invasive species were trapping and hunting. Although these methods had positive effects on the removal of nutria species, there are still signs of them today. United States Department of Agriculture stated that as of 2020, all known nutria populations have been removed from over a quarter-million acres of the Delmarva Peninsula, and the Chesapeake Bay Nutria Eradication Project is currently implementing efforts to verify total eradication. Another way to help the eradication of invasive nutria, besides human hunting efforts, is the introduction of red wolves to this area would help tremendously since they are one of the main food sources. Red wolves can help protect coastal land. To protect and preserve unique wetland habitat types and associated wildlife species; we need to provide habitat and protection for endangered species such as red wolves, red-cockaded woodpeckers, and American alligators; provide habitat for black bears; provide habitat and management for waterfowl and other migratory birds (Villamagna et al., 2014). Wolves can be placed in these coastal wetlands to protect the habitat from invasive species such as nutria to help other species such as the songbird migration in the Delmarva. In addition, the California Wolf Center stated that wolves are a “keystone species,” which is any species that other plants and animals within an ecosystem largely depend on. If a keystone species is removed, the ecosystem would drastically change, and in some cases, collapse.

There is great potential for Virginia to reintroduce wolves as multiple states across the country are planning reintroduction processes for this beautiful species of red and gray wolves. From the Yellowstone and North Carolina Case study, I support the introduction of red wolves in the Delmarva Peninsula to bring forth potential revenue through the ecotourism industry. Even though Songbird migration shows great economic revenue, the studies from Yellowstone and North Carolina provide additional insight into potential income for Delmarva. We also can conclude that the introduction could benefit the ecosystem as it could provide a natural way of hunting nutria, which will help the songbirds by conserving the ecosystem. From the results being estimators of potential income, we are unable to obtain actual results of revenue for ecotourism. However, based on the tourism industry, there will be potential revenue for Delmarva.

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