Bryant University

HONORS THESIS

Assessing Contingent Valuation as a Decision Making Tool for the Endangered Species Act

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Table of Contents

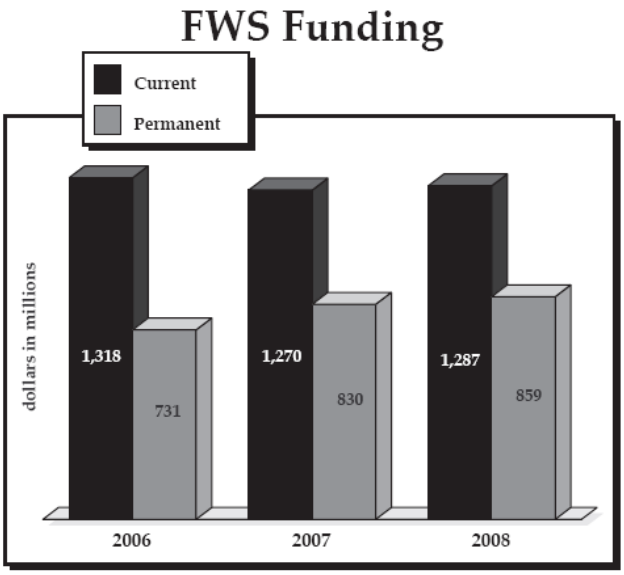
ABSTRACT

The purpose of this project is to examine how utilizing the contingent valuation method could help or hinder the decision making process for the Endangered Species Act (ESA). Contingent valuation is a technique which uses surveys to measure people's willingness to pay for a specific good or service. The ESA has been in effect since 1973 and its objective is to provide for the protection of endangered and threatened species and to aid in their recovery. The ESA has been criticized since there have not been many species who have recovered and been delisted. The argument has been made that the ESA should incorporate economics and a cost/benefit analysis when determining whether species should be listed as endangered. The contingent valuation method is designed to address the issue of valuing a non-use benefit or cost; a challenge made difficult when applying economic considerations to protecting the environment. I conducted a contingent valuation survey at Bryant University to determine whether the contingent valuation method would be helpful to the Fish and Wildlife Service (FWS) when deciding whether to list a species. After analyzing the survey results, I determined there are many potential problems with the use of the contingent valuation method. I came to the conclusion the FWS would be unlikely to derive any benefits from the utilization of the contingent valuation method in the decision making process for the ESA.

INTRODUCTION

The Endangered Species Act (ESA) was passed in 1973 with the goal of protecting and increasing the populations of threatened and endangered species in the United States. The ESA is also focused on preventing the extinction of these species and allowing the populations to grow to a size where protection under the ESA is no longer necessary. The Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are the government agencies responsible for implementing the ESA. These agencies decide whether a species should be listed or not and develop the recovery plans for listed species. The FWS and NMFS have to decide whether a nominated species should be added to the endangered species list, and if so, what type of recovery plan should be developed. Recovery plans include information about specific actions to assist in a species' recovery so that it may be delisted. When a species is delisted, it is officially removed from the endangered species list. A critical habitat is designated for listed species, which is based on the area needed to conserve the species. The FWS is led by an overall director and a deputy director. There are ten assistant directors under their authority. Each of those assistant directors has a deputy or deputy chief under them. The assistant directors are responsible for managing certain divisions that fall under their control. The FWS is comprised of eight regions throughout the U.S., each with their own regional director and offices. Figure 1 shows the funding for the FWS for the current and previous two years. The amount of permanent funding for the FWS is increasing each year, which correlates with the increasing number of species needing assistance.

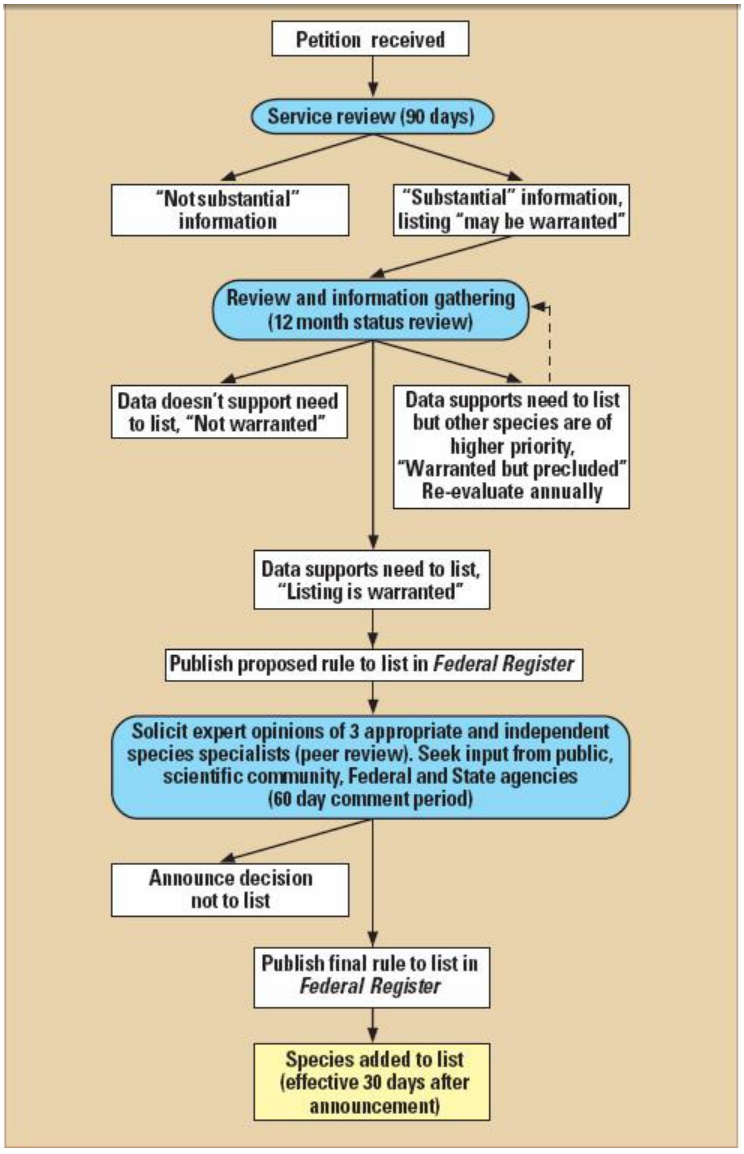
Figure 1 – FWS Funding 2006 - 2008



How a Species is Listed

For a species to be added to the endangered species list, it must be nominated through a petition. A petition is a formal request for a species to be listed under the ESA as endangered or threatened. Anyone can submit a petition; however they are usually generated internally by the FWS or NMFS. Once a petition is received, the FWS or NMFS must make a finding within 90 days. This 90 day period is called a service review. If the FWS finds there is "substantial information" that the petitioned listing is warranted, then the finding is positive. (FWS website) Figure 2 shows a flow chart explaining the listing process.

Figure 2 - Species Listing Process



The listing then goes through a 12 month status review period, which includes gathering more information about the potential listing. During this time, it is determined whether or not the listing is warranted. If the FWS or NMFS determines there is not enough data to support the need to list, the listing is deemed "not warranted". Another possible result is "warranted but precluded," which means there are other species of higher priority to be listed. The species will be re-evaluated in another 12 months. Priority is determined by the degree of threat to the species, how immediate the threat is, and then the taxonomic

distinctiveness of the species. Taxonomic distinctiveness has to do with whether the species is part of a subspecies or not. (FWS website) When data supporting the need to list is found, the listing is deemed to be warranted. This results in publishing the proposed rule to list in the *Federal Register*, which is a daily Federal Government publication. After a 60 day comment period, which includes gathering the opinions of three independent species specialists and reviewing contributions by the public, the scientific community, and federal and state agencies, the announcement of whether or not a species will be listed is made. If the species will be listed, the announcement is published in the *Federal Register*. Thirty days after this announcement, the species is added to the list.

A species may be added to the endangered species list for a variety of reasons. Some of the possible reasons are disease, predation, over utilization for commercial, educational, or recreational purposes, the present habitat of the species is being destroyed or modified, and any other factor negatively effecting the species' survival. When a species is listed, it is designated as endangered or threatened. Endangered means the species is at a high risk of extinction throughout all or a major part of its range. A species is threatened when it is probable to become endangered in the near future. (FWS website)

Recovery Plan

Once a species is listed, it may benefit from the protective measures allowed by the ESA. The listed species will be protected under recovery plans and it will be illegal to "take" the species, which includes killing, transporting, or selling. (FWS website) Also, the FWS will be permitted to purchase habitat area for the species to live. Conservation efforts may be established even before a species is listed as part of Candidate Conservation Agreements. These are partnerships with the FWS and states, agencies, and the public. They promote activities to decrease or eliminate threats to species.

Amendments to the ESA

The ESA has been amended three times since it was enacted. Changes to the act were made in 1978, 1982, and 1988. The 1978 amendment was brought about after the Tennessee Valley Authority v. Hill case involving the snail darter. The TVA had begun construction on a dam before the ESA was passed and threatened the survival of the snail darter in the surrounding

region. The most significant part of the 1978 amendment was the exemption process, which allowed for a weighing of economics. For instance, Federal agencies could take action where a listed species would be jeopardized if the action was exempted by a cabinet-level committee. There must be no reasonable alternatives for the exemption to take place. It is very uncommon for an exemption to take place; only one exemption took place during 1978 to 1990. There are three other parts to the 1978 Amendment. A critical habitat had to be assigned at the same time as the listing of a species. The Secretaries of the Interior and Agriculture departments were now responsible for creating a program to conserve fish, wildlife and plants. The authority to obtain land was added to these species, which included those already listed. Additionally, the definition of species in regards to populations was changed to be restricted to vertebrates. Any other species, subspecies, or variety of a plant or animal was still able to be listed under the ESA.

The 1982 Amendment was signed by Ronald Reagan and had four different components to it. The first part was prohibiting any economic considerations in the listing process. The status of the species would be determined by using only biological and trade information. Economics would only be factored in when determining what actions to take. This is important because it emphasizes how vital it is to treat all species similarly and initially avoid factoring in costs. This was done to clarify how a species was determined to be endangered or threatened. It also created the use of time-tables in the petition process. Specifically, a final ruling in the status of a species must be determined within one year of its proposal. It also established procedures for decreasing the amount of time for the consultation process. The last part to the 1982 Amendment was adding a prohibition against removing listed plants from the land.

The ESA was amended in 1988 to make the recovery plan implementation process easier and to report the costs of recovery. The 1988 Amendment also contains four primary parts. The first change was the new requirement of monitoring all candidate and recovered species. This also allowed for emergency listings when the data shows significant risk. Another requirement was providing a report including all reasonably identifiable expenditures on a species-by-species basis. Environmental economists are particularly interested in this information to weigh the costs and benefits of a species' recovery. This information would

also be useful if the contingent valuation method were used in the listing process. The protection of endangered plants was expanded to incorporate destruction on Federal land and other takings violating State law. This meant it would be illegal to destroy Federal land inhabiting an endangered species. The 1988 Amendment also dealt with the recovery plans. They were changed by requiring five years of monitoring recovered species. Biennial reports are published and include information about the creation and execution of recovery plans and the status of all species with plans. Recovery plans now undergo public notice and review.

Relationship between Federal, State, and Local Governments

When the ESA was enacted, it transferred wildlife management resources from state governments to the federal government. Congress made it illegal to kill any endangered species in the United States, regardless of whether the species was migrating through the area or lived there permanently. Also, since species were protected based on their habitat, land management issues arose between the federal and state governments. The federal government now had more power over the states to regulate hunting, fishing, recreational land use, and the use of natural resources. Due to these changes in control, the states have begun to associate the ESA as putting them in a bad situation concerning their own interests in their state. The states want to see the interests of local governments and private property landowners under more consideration. The states believe the ESA would provide more protection and effective plans if they were more involved. In order for a species to recover, it is very beneficial to have the state, federal, and private entities involved in the area to work together. These entities engage in activities such as habitat management, reintroductions into the wild, law enforcement, research, and other activities specific to the species. While the FWS and NMFS are responsible for implementing the ESA, Congress is responsible for setting goals for the ESA and providing resources to reach those goals. However, Congress has been criticized for not providing the necessary resources.

The listing of endangered species can cause conflict among governments and politicians. There is the perception that saving a species can only happen if something else is sacrificed. If the contingent valuation method, which is discussed in a later section, were to be utilized in the listing process, it could potentially show the public's willingness to pay for a species'

recovery and nothing would need to be sacrificed. In order to change this perception, the FWS must show they are flexible and innovative in developing recovery plans. The George W. Bush administration is criticized as attempting to hinder any progress made by the ESA. They are said to be trying to weaken the act by encouraging amendments to make it more difficult to list threatened species. ("Science Regarding Endangered Species Act Manipulated") Also, they are said to be trying to reduce the use of population modeling, which hurts the ESA since the population modeling technique is a very credible way to determine how likely a small species population will stay alive in their current habitat. The Bush administration has also been accused of changing the scientific findings of their agencies to support their political agenda. These alterations are usually changed to show a species should not be listed. ("Science Regarding Endangered Species Act Manipulated") There are many other politicians who do not support the ESA due to their belief that it hinders economic growth. Don Young, R-Alaska, believes that ESA restrictions on development "smash the dreams of millions of Americans". He also says, "This act has become a powerful weapon to stop development in this country" (Democrats Say Science Will Guide Endangered Species Act).

How other Regulations affect the ESA

The ban on DDT in 1972 is considered to have helped in the recovery of certain species of birds located at the top of the food chain. High concentrations of DDT were responsible for thinning the egg shells of many predatory birds, thus reducing the number of new hatchlings. By disallowing the use of DDT, the populations of the birds were able to grow. Many critics of the ESA believe the recovery of certain birds, such as the brown pelican and the Arctic peregrine falcon should be attributed to the DDT ban, rather than the ESA. (Protecting the ESA)

The two types of Safe Harbor agreements are individual and umbrella. An individual agreement occurs between a landowner and either the FWS or NMFS. The landowner does something helpful for an endangered species in exchange for being guaranteed no extra regulatory restrictions will be imposed upon them in regards to the newly improved or developed habitat. An umbrella agreement is different from an individual agreement in that it involves an intermediary, such as a state fish, game, or agricultural agency or a private

conservation organization. The intermediary is responsible for developing the Safe Harbor program for the area, which is normally a county or group of counties. When a program is approved by the FWS or NMFS, the intermediary generates agreements with individual landowners, which are covered under the intermediary's umbrella agreement. Landowners are then able to restore habitats without worrying about new regulations.

Some of the common actions taken by landowners considered to be beneficial to certain endangered species are the organized burning of forests, regulated grazing, and controlled harvesting of timber. In both North and South Carolina for example, many forest landowners have agreed not to cut down certain trees and allow them to grow tall for species that depend on older forests. Safe Harbor agreements have also helped to limit the occurrence of "panic cutting", which is when landowners cut their trees before they normally would have to avoid harvest restrictions being imposed on them if an endangered species were discovered on their land.

Criticisms of the Endangered Species Act

The ESA is criticized for being ineffective for a variety of reasons. The two primary reasons are a lack of financial incentives for private landowners who may be harboring an endangered species and the extreme length of the listing process. Other criticisms, such as the lack of funds and resources for the agencies administering the ESA, the lack of political support, and the public's skewed expectations of the act, make it appear ineffective. Scientists believe the ESA could be more effective by protecting more species if agencies received adequate resources and political support. (Endangered Species Act under fire from two directions) Additionally, when the ESA was first enacted, the public had the idea its purpose was to protect charismatic animals, such as bears and the bald eagle. Since the ESA also protects species the public views as unlikable, such as snakes and spiders, their expectations were not met. Therefore, they view the act as ineffective. Also, both politicians and the general public expect faster recovery of species. However, as seen in the bald eagle's recovery, it took over 30 years to be removed from the endangered and threatened species lists. Species can take a long time to recover for a variety of reasons. The FWS has to determine what the recovery strategy is and how they are going to implement recovery measures. Species must reach a

certain age before they are able to reproduce and may only give birth to one offspring. Since the population is starting off small, it can take decades for the population to increase enough to be downlisted.

As previously mentioned, in order for a species to be listed, it must go through the lengthy listing process. It is argued that by the time most of the species are added to the list, they are already getting close to extinction. (The Endangered Species Act: To Be or to Be Reformed) By waiting to list the species until the population is very low, the strictest restrictions on land use are often enforced. There are currently 1,237 animals and 747 plants listed as endangered or threatened. A total of 47 species have been removed from the list for three different reasons: 21 of those species recovered, 9 species went extinct, and 17 were removed due to original errors in their data. (FWS website) Some examples of data errors are recording the wrong population numbers, classifying a species as new when it is genetically the same as another species, or discovering a new population of the species which render the species no longer endangered. (FWS website) Critics of the act believe this number of recovered species is too small. Also, they believe the recovery of some large predatory birds should be attributed to the ban on DDT, instead of the ESA.

When a species is listed, a critical habitat is designated for that species' recovery. This critical habitat area can include any type of land, including privately owned land. Land that is part of the critical habitat has restrictions placed on it to aid in the recovery of the species living there. For example, a landowner would not be allowed to cut down their trees if an endangered species that needed trees to survive lived there. This is especially evident when a large area of Oregon was designated as the critical habitat for the Northern Spotted Owl in 1992, restrictions were placed on logging and 10,000 jobs were lost. (The Overcrowded Ark) Property rights advocates argue private landowners are harmed by the ESA. They believe the act should offer more financial incentives to property owners and involve the state and local governments more when determining whether to list a species. (Endangered Species Act under fire from two directions) Also, there aren't any real incentives in place now for private landowners who may be tempted to remove the endangered species themselves before it is discovered by the FWS.

Furthermore, some landowners who earn their money by farming or harvesting lumber on their land may be hurt economically if an endangered species is discovered on their land. Therefore they have more incentive to destroy the species than help in the recovery of the species. One example of this situation took place in 2001 in the Klamath River Basin. About 200,000 acres of farmland were denied water rights since it would harm the endangered salmon living there. (The Problem with the ESA) This resulted in 1,400 farmers losing $200 million since the land wasn't farmable. In summary, private landowners believe the act unfairly places the burden of the species recovery on them, when it was society in general who caused the species to become endangered.

Some of the listed species, such as the cave crayfish, have a limited amount of information on their population status. This means their recovery plan includes the phrase, "sufficient data to estimate the population size or trends is lacking." This implies the FWS is not sure about how many cave crayfish exist and do not have a way to find the true population. Critics believe species such as this are listed too quickly before any hard evidence, including population amount, can be determined. (The Problem with the ESA) Also, some endangered species are believed to be the same genetically as some populated animals. For example, some critics say the endangered Colombia white-tail deer is the same as a common white-tail deer. This argument is also made about the California spotted owl and the endangered northern spotted owl. (ESA: Flawed Law) Critics of the ESA believe the act has not been effective when measuring the number of species recovered to the number of species listed. This results in the apparent success rate of 0.01%. However, this approach includes species that have been recently listed and could not have recovered in a short amount of time. (ESA: Success or Failure)

By looking at two examples of where listed species have not yet recovered after being listed since 1967, one can see how the ESA is easily criticized. The populations of both the whooping crane and California condor have greatly increased in numbers since being listed. However, neither has reached the target population size for recovery and sustainability of the species. The following two sections detail their recovery effort.

Whooping Crane

The whooping crane, pictured on the left, has experienced a drastic population decrease and then subsequent recovery which has been attributed to the ESA. FWS website) The

population of whooping cranes was estimated to be between 500 and 1,400 in 1870, however this number plummeted to only 21 birds in 1952. (Whooping Crane Recovery Plan page 12) The cranes used to live throughout the Eastern half of the U.S. and in Canada (Appendix A). Whooping cranes suffered a population decrease due to illegal shooting, loss of breeding habitat, habitat modification, disease, lead poisoning, chemical spills, collisions with power lines, and other human disturbances. The whooping crane came under protection in 1967 under the Endangered Species Preservation Act. At the time the ESA was enacted, the population of whooping cranes had grown to 49 birds. (Whooping Crane Recovery Plan page 12) While this growth was good, it was only at a rate of about one bird per year. The chart below shows how the population of whooping crane remained relatively steady until being listed under the ESA. As of October 2007, this number has grown to 503. (WCEP website – www.bringbackthecranes.org)

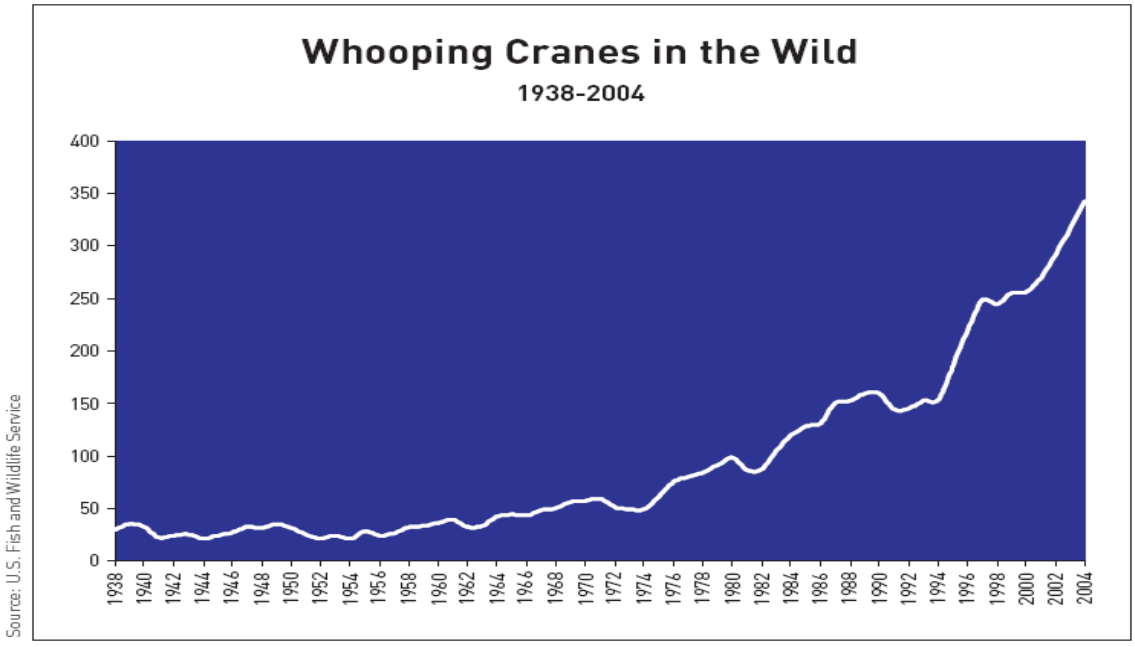


Figure 3 - Whooping Crane Population Graph

The recovery of the whooping crane has been slow, but it has been increasing in population numbers. The International Whooping Crane Recovery Team was established between the FWS and the Canadian Wildlife Service in 1985. In 1998, the Whooping Crane Eastern Partnership (WCEP) was founded to establish a migratory group of cranes in that region. It is likely the establishment of these groups has aided in the crane's recovery. The FWS is part of the WCEP with many other public and private organizations. The WCEP teaches the cranes a migration route from Wisconsin to Florida. Migration is a learned habit and humans have taken on the role of teaching the young birds a migration route and how to forage for food. The current migration path for wild whooping cranes is from Canada to Texas.

Another reason why the population growth has been slow are various factors adversely affecting the crane's reproduction rates. These include predation of eggs and chicks, food scarcity among chicks, loss of genetic diversity due to the small population used to breed, and red tide toxin in clams. The recovery plan for the crane places a large emphasis on removing these threats in order for the crane to recovery. It is unlikely the crane would be able to have a successful recovery if these threats are not eliminated. Without the current threats, the offspring of the crane would be more likely to survive, thus increasing the whooping crane population.

There are two objectives the plan lists to allow for the downlisting of the crane. The first objective is to "establish and maintain self-sustaining populations of whooping cranes in the wild that are genetically stable and resilient to stochastic environmental events" (Whooping Crane Recovery Plan). The criterion for this objective is to maintain at least 40 productive pairs in the Aransas Wood Buffalo population (AWBP) for at least ten years. Also, two other populations containing at least 25 productive pairs each for ten years must be maintained. These populations must be at discrete locations and can be either migratory or non-migratory. The FWS is hoping for the population levels to be 160 in the AWBP and 100 in the other two populations. The recovery plan does not say when these population targets are expected to be met. The two other populations will most likely be the non-migratory Florida population and the eastern migratory population. The second objective is to "maintain a genetically stable captive population to ensure against extinction of the species" (Whooping Crane Recovery

Plan). The criterion for this objective is to have a population of 153 cranes in captivity, including 21 productive pairs. The FWS also recommends at least 15 captive breeder pairs spread throughout various locations. A breeder pair is a pair that is expected to breed in the future, while a productive pair is currently breeding.

The FWS was unable to determine specific delisting criteria in May of 2007, at the time the most recent recovery plan was put in place. This is because they want to decrease the threats to the crane first and eliminate any other threats that may come up. Also, they realize the recovery will take a long time and believe they will be able to establish delisting criteria as the whooping crane moves closer to recovery. (Whooping Crane Recovery Plan) While there are no specific downlisting criteria in the recovery plan, the FWS still outlines five actions that need to occur in order for the crane to recover. (Whooping Crane Recovery Plan)

1. Continue to build the AWBP and protect and manage its habitat to minimize the probability that a catastrophic event will eradicate this population.
2. Attain breeder pair and productivity goals at 4 captive facilities in the United States and 1 in Canada to produce the birds required for reintroductions.
3. Establish 2 additional self-sustaining wild populations. Continue research to identify appropriate reintroduction sites and improve reintroduction techniques. Protect and manage habitat of reintroduced populations.
4. Continue to use genetic information and advances in conservation biology to conserve flock genetics, and determine the optimal population for recovery, and revise criteria as warranted.
5. Maintain an outreach program.

The FWS has estimated downlisting of the crane to occur in 2035. It could take over ten years to establish a population of over 100 birds since they must be at least three years old to breed. The FWS has estimated how much money is to be spent on each of these actions per year until 2035. They estimate $6.1 million will be spent annually until 2016, when the amount spent is to drop to $3.22 million until 2035. The estimated combined costs for the recovery are estimated at $125.8 (Appendix B).

The recovery of the whooping crane includes protecting their habitat, captive breeding, and reintroduction into their historical range. The FWS also focuses on reducing any threats that

could harm the whooping crane populations or limit their chances of survival. Another concern is to keep the populations of cranes separate from each other to avoid spread of disease. Fortunately, the whooping crane has a few characteristics that may have assisted in its recovery. Since it is a migratory bird, there are more habitat options for the crane. However, this also means more habitat area must be maintained and protected. Also, the availability of a food source for the crane has generally not been a problem. Even though the whooping crane is still listed as endangered, it has proven to have begun to recover under the ESA.

California Condor

The California condor, pictured to the left, was first listed as endangered in 1967 under the Endangered Species Preservation Act. (www.britannica.com) The population of condors at the time was estimated to be between 50 and 60 birds. Condors used to live throughout the Pacific coast region, from British Columbia, Canada to Baja California Norte, Mexico. They disappeared from the northern region in the 1800s and from the southern region in the 1930s. The condor currently inhabits California, Nevada, Utah, and Arizona. Even after the condor was listed as endangered, the population had declined to 25 to 30 birds in 1978. This number continued to decline during the early 1980s until all wild condors were captured and brought into captivity. After April of 1987, there were no known condors living in the wild. Figure 4 shows how the number

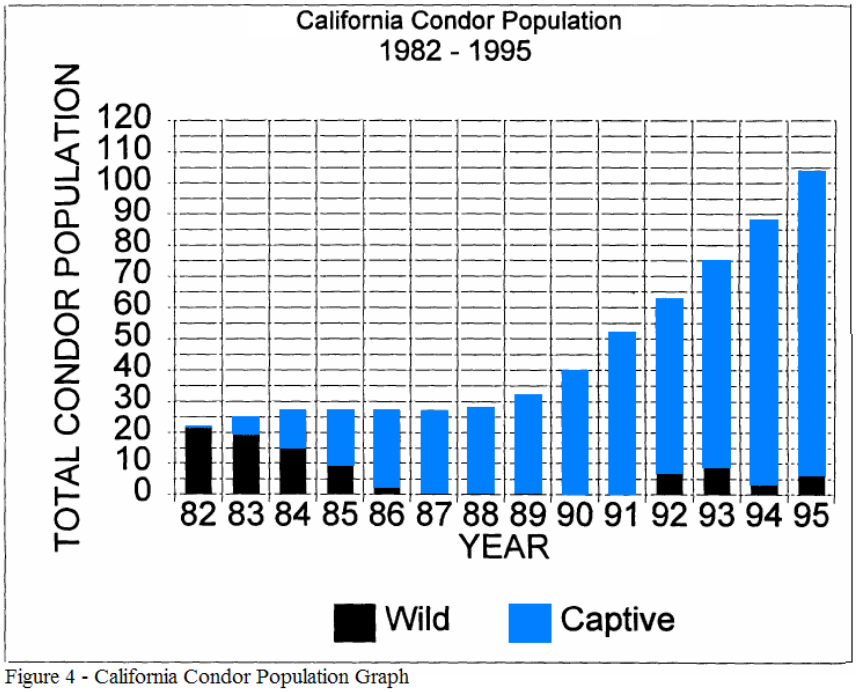


Figure 4 - California Condor Population Graph

of condors has increased since being brought into captivity. (California Condor Recovery Plan) According to the San Diego Zoo's website, the known population of condors is 297, including 146 condors living in the wild.

The population of condors had been declining for many reasons. The two primary causes were lead poisoning and shooting. Condor shootings have decreased since the recovery program includes an extensive awareness campaign and a heavy fine for shooting them. Lead poisoning is a continuing problem for condors released back into the wild since their food source may have been shot by lead bullets. This is believed to be the major factor that led to the severe population decline in the 1980s. Population decline in the 1960s and 50s is attributed to the use of DDT, which thinned the condor eggshells. Many condors that have been released back into the wild are killed by colliding with manmade objects, such as power lines. The condor recovery plan suggests future releases to be done in rural areas, to avoid human interactions with condors. There are also cases where condor eggs were destroyed by ravens, golden eagles, and black bears. Some other factors which contributed to the condor's decline, which are no longer considered to be a threat are drowning in oil sumps, Native American ceremonial use, and capturing birds or their eggs for sport or display. The public is more informed now of the condor's importance and therefore these threats no longer exist as they once did.

The California condor is currently under the protection of three different habitat conservation plans (HCPs). HCPs are developed to prevent incidental takings of listed species. The Kern Water Bank plan is a 75 year plan in Southern California. The two other plans are Nuevo Torch and Seneca & Enron Oil & Gas. Both of these plans are 30 year plans in the town of Bakersfield, CA. There are a variety of other species protected under these plans.

The recovery plan for the condor was last updated in 1996. The recovery objective on the plan is to downlist the condor from endangered to threatened. The FWS outlines specific criteria for this objective to be achieved. To be reclassified as threatened, at least two non-captive and one captive population must be maintained, each of those populations having at least 150 birds and at least 15 breeding pairs. They must also have members that have descended from

each of the 14 founders. The reasoning for this is to maintain genetic diversity. The populations must also have a positive rate of population growth and be reproductively self sustaining. The populations living in the wild must be "spatially disjunct and non-interacting", meaning the populations are completely separated from each other and have no chance of interaction (California Condor Recovery Plan). Five actions are listed in the recovery plan that need to happen in order for the recovery criteria to be met.

1. Establish a captive breeding program to preserve the gene pool.
2. Reintroduce California condors to the wild.
3. Minimize mortality factors in the natural environment.
4. Maintain habitat for condor recovery.
5. Implement condor information and education programs.

Figure 5 - California Condor Estimated Recovery Costs

Total Estimated Cost of Recovery

Costs ($1,000's):

Year	Need 1	Need 2	Need 3	Need 4	Need 5
1995	658.0	582.0	83.0	128.0	37.0
1996	643.0	590.0	83.0	193.0	37.0
1997	643.0	895.0	83.0	218.0	237.0
1998	643.0	890.0	83.0	218.0	237.0
1999	643.0	870.0	83.0	148.0	237.0
2000	650.0	850.0	85.0	150.0	50.0
2001	650.0	850.0	85.0	150.0	50.0
2002	650.0	850.0	85.0	150.0	50.0
2003	650.0	850.0	85.0	150.0	50.0
2004	650.0	850.0	85.0	150.0	50.0
2005	650.0	850.0	85.0	150.0	50.0
2006	650.0	850.0	85.0	150.0	50.0
2007	650.0	850.0	85.0	150.0	50.0
2008	650.0	850.0	85.0	150.0	50.0
2009	650.0	850.0	85.0	150.0	50.0
2010	650.0	850.0	85.0	150.0	50.0
Total Costs	10,380.0	13,177.0	1,350.0	2,555.0	1,335.0

The FWS also estimates how much each of these actions will cost in Figure 5. In 1996, it was estimated downlisting could be initiated in 2010, however that seems extremely unlikely now. The total annual costs for all five needed actions for the years between 2000 and 2010, is estimated to be $1,785,000. The FWS states current annual operating costs of the three condor breeding facilities and four condor release organizations to be $2,000,000. (FWS website) The condor recovery plan implementation schedule for 1995 to 1999 is provided in Appendix C.

The recovery plans are extremely well thought out and detailed as to what needs to be done to assist in the recovery of the California condor. Each of those five criteria is elaborated upon in the Recovery Strategy section of the recovery plan. Specific details are given for each action and how the FWS intends to satisfy the requirements. The births and deaths of the captive condors are also detailed in the plan.

The condor has failed to recover in the expected amount of time for a variety of reasons. The primary reasons are human causes. This includes collisions with power lines and ingesting carcasses that have been shot with lead bullets. It has been difficult to reintroduce condors into areas with little human contact. Condors are prone to perching on power lines, which usually results in them being returned to captivity and released elsewhere. Also, since the condor does not migrate, its food source may decline in its habitat. Currently, reintroduced condors are given food by the release organizations, which also ensure those condors are less likely to ingest lead tainted food. Efforts have been made to have hunters use non-lead bullets and informing them of the environmental harm lead bullets cause. Condors do not reproduce until they are six years old; therefore the population is slow growing if condors die before reaching this age. The condor recovery plan will most likely be revised in the near future since the original projected downlisting is to take place in 2010.

Some people believe it may be helpful to consider what the public's view is on whether a species should be saved and how much should be spent on it when developing the recovery plan. However, generally the public is not fully informed or educated on all the factors that go into creating a recovery plan and the environmental value of each species to the ecosystem.

CONTINGENT VALUATION METHOD

Introduction

Contingent valuation is a technique used to measure people's willingness to pay for a specific good or service. The purpose of this study is to examine how utilizing the contingent valuation method could help or hinder the listing process for endangered species. Since many environmental goods do not typically have a definite value associated with them, this method could be used to determine a value for these species. By incorporating economics into the decision making process for the Endangered Species Act, the FWS and NMFS could have access to more defined values when performing a cost/benefit analysis. However, this assumes the values gathered from the contingent valuation surveys are accurate.

The contingent valuation method can be used to make policy decisions. Since contingent valuation is often used to place a value on something that otherwise is difficult to measure, it could be used under the ESA to assign a value to species' protection programs. Ecosystem and environmental services are commonly measured by this method since it can be used to estimate non-use values. A non-use value is something that is not connected to an actual use that can have an accurate cost attached to it. An example of a non-use value is being able to enjoy a landscape or seeing animals in the wild. Non-use values can also be called passive-use values.

The results of contingent valuation surveys are used to compare the costs of something to the benefits derived from it. In a contingent valuation survey, respondents are asked what they would be willing to pay for an environmental good or service, or what they would be willing to accept in compensation to give up a certain environmental good or service. Since their response is contingent on a certain scenario in the survey, the method is called contingent valuation. It is also known as the stated preference method since respondents directly answer what they would be willing to pay.

An alternative method is the revealed preference method where researchers would have to infer values based on survey responses. Revealed preference surveys do not directly ask respondents their willingness to pay. Instead, they ask a series of questions and then the

survey analysts determine the respondents' preferences. While the survey responses of the contingent valuation method may give researchers a definite value to assign to environmental services, the responses are based on hypothetical scenarios or situations and therefore are subject to controversy.

Applying Contingent Valuation to ESA Decision Making

In the case of the Endangered Species Act, some people have suggested incorporating contingent valuation into the listing process for species. It is argued that by surveying the public, the FWS would be able to determine how the public values a species and whether the benefits of protecting the species will outweigh what it is estimated to cost. If the survey results show the public is willing to pay for the recovery of a species, it would back up the FWS's argument to list the species. It would also show the public places a high value on species recovery.

Contingent Valuation Survey Development

Developing a contingent valuation survey is a time consuming process. Many variables must be considered when designing the questions and deciding who to send the survey to. The first task is determining what needs to be valued. In most cases, this would be what the public would be willing to pay to save an endangered species. The second step in survey development would be to decide how to conduct the survey. The options are by mail, by phone, or in person. The sample size would have to be considered for this decision. Many people are unlikely to partake in surveys over the phone, while mail surveys may be thrown out. While surveying people in person may allow respondents to better understand the questions being asked of them, they are the most expensive. Step three of survey development is designing the survey, which is the most time consuming process. In order for the FWS to incorporate this kind of survey into the listing process, they would first have to conduct focus groups with future survey respondents to determine how much they already know about a species. By assessing the public's knowledge, the FWS would be able to design a better survey to match the level of information already known. Subsequent focus groups would be needed to determine the detail of the survey questions and what specific background information should be included on the survey. Informing the survey respondents of the issues such as, how species extinction would affect the ecosystem or how biodiversity is important,

would help lower any lack of knowledge bias in the results. However, this assumes that all survey respondents read the provided information. Once a rough draft of the survey is developed, a survey pretest is conducted to determine if any questions are confusing. More than one pretest may be conducted to finalize the survey. Implementing the survey is step four. The survey respondents should be randomly selected and represent the relevant population. In the case of mail and phone surveys, respondents may be repeatedly contacted in order to increase response rates. The last step of the contingent valuation method is to compile the data and analyze the results.

While interpreting the results, researchers would have to determine if the responses included any outliers and how to assess non-response surveys. The survey questions would also have to be designed to prevent unintended associations with other environmental factors. For example, in the case of the killer whale, some respondents may believe the ocean will be cleaned up to provide a cleaner habitat for the whale. They may respond to the survey that they are willing to pay for the protection of the killer whale, when in fact they want the ocean to be cleaned up. It is important to include in the survey background what the money will be used for. How respondents would pay should also be included. In my survey, the money is said to come from increased taxes. Many contingent valuation surveys are designed this way, since it is easy to calculate the willingness to pay by using the number of taxpayers in the U.S. as opposed to having the money come from paychecks that may be paid weekly, biweekly, or monthly. This would add to the complexity of analyzing the survey results. Overall, survey development plays a critical role in the application of contingent valuation to the listing decisions of endangered species.

Contingent Valuation Survey Implementation

For my survey, I decided to find the values Bryant University students place on the protection of the California condor and the orca whale. The California condor was chosen because it is a species that has been listed as endangered since the ESA's inception. Also, the argument could be made that the condor is an uncharismatic species. I chose the orca whale since it was recently listed as endangered in 2006. The orca whale could be considered a charismatic species. By having two different species on the survey with opposite outlooks, I could

determine whether these outlooks affect the results. A copy of the survey is included in Appendix D.

The survey was given to 54 students at Bryant University currently enrolled in an environmental science class focused on the impact humans have on land and life. I chose to implement the survey this way because this class consists primarily of upperclassmen, which are likely to be more informed about environmental and economic issues. Also it is the fastest way to get responses and guarantees a low non-response rate since every student was given a survey and time was allotted for the survey to be answered. The survey was given both at the beginning of the semester and at the end of the semester to determine if additional knowledge obtained from the course would influence the results.

Applying Contingent Valuation for Protection Decisions

There were two types of questions on the survey. The first question gave background information about the species and then asked how much they would be willing to pay in increased taxes to provide protection for the species. The respondents just had to write in a specific amount. The other question asked whether they would vote in favor of a proposal to establish more condor breeding facilities and pay for it through increased taxes. If students responded "yes", they were asked to circle a range of what they would be willing to pay. By asking a similar question in two different ways, it shows how responses can vary based on the wording of the question.

Applying Contingent Valuation to Listing Decisions

If the contingent valuation method were to be used in the listing process, surveys would be administered during the review and information gathering stage. This would allow the FWS 12 months to develop, implement, and analyze the surveys and use them to make listing decisions.

For this analysis, I chose what I assume to be a familiar species, the orca whale, also called the killer whale. The recovery plan for Southern Resident killer whales was recently finalized on January 17, 2008. Annual estimated costs for recovery of the killer whale are about $1,500,000. The delisting is estimated to take place in 28 years, with more money estimated to be spent in the first five years of recovery. This means approximately $49,540,000 is

planned to be spent on the recovery of the killer whale, disregarding inflation. (South Resident Killer Whale Recovery Plan) The information and question given to the survey respondents regarding the killer whale was as follows,

> The killer whale, also known as an orca whale, was recently listed as endangered in 2006. The killer whale occupies the top position in the food chain, making it vital to the ecosystem. If there were no killer whales, the food chain would be radically altered. The commercial value of the killer whale may be higher than other endangered species due to its popularity at parks such as Sea World and for whale watching in the Northern Pacific. The number of killer whales has decreased due to a decline in their food source and habitat pollution.
>
> With this information about the killer whale, how much money would you be willing to pay annually through increased taxes to provide for protection of the killer whale?

Compiling and Interpretation of the Results – First Survey – Orca Whale Question

The amounts respondents would be willing to pay ranged from $0 to $1,000,000. (Appendix E) Two students did not indicate an amount, and therefore were assigned a $0 value. Four students wrote dollar ranges, in which I used the average. Two responses were drastically higher than the rest and therefore, I am considering those to be outliers. If the outliers were included, the average based on 54 survey respondents would be $20,476. By eliminating the outliers, the average based on 52 survey respondents was $111.76.

Since the survey asked how much they would be willing to pay through increased taxes, the average was multiplied by the number of taxpayers in the U.S. The IRS states on their website that 136.1 million tax returns were filed in 2006. However, many of these returns have zero tax liability. It has been estimated that 32% of filed tax returns in 2006 will not owe any taxes, which results in not counting 43.5 million returns. (Tax Foundation website) Using 92,548,000 returns should yield the most accurate results. When $111.76 is multiplied by the number of taxpaying returns, it results in a willingness to pay of approximately $10.1 billion. This number is much higher than the $1.5 million the FWS has estimated for the annual cost of recovery for the killer whale. The results of the survey have two implications. First, people

highly value the killer whale and want it to be protected under the ESA. In other words, they are willing to pay a large amount for its protection. Secondly, the survey respondents did not realize a small amount of money would amount to such a high total. When the $1.5 million annual estimated recovery costs of the killer whale is divided by 92,548,000 taxpayers, it results in 1.62¢ per taxpayer. Only one of the survey respondents seemed to realize this based on their comments and willingness to pay of 25¢ for both the condor and the killer whale.

Compiling and Interpretation of the Results – Second Survey – Orca Whale Question

The same survey was given again to the same students, however this time there were 64 respondents. The willingness to pay for the protection of the orca whale increased when the survey was given a second time. The average this time was $116.33, which is a $6.63 increase in average from the first time the survey was given. (Appendix F) Since this increase is relatively small, it suggests many of the students were already educated about the orca whale. There were no responses I considered to be outliers. Multiplying $116.33 by the number of taxpayers yields approximately $10.76 billion. This is an increase of about $600 million. Since the willingness to pay only slightly increased, it reinforces the belief that the orca whale is a popular species.

Applying Contingent Valuation to Continued Protection Decisions

The contingent valuation method could potentially be used to determine whether to continue protecting a species. The California condor has been listed under the ESA since its inception in 1973 and is not close to meeting its delisting criteria. If contingent valuation surveys were used for the condor, they should include information on the condor's recovery efforts thus far and why the FWS believes they should continue to be protected. The first question on the survey about the condor was as follows:

> The California condor has been on the endangered species list since 1967. The condor plays an important role in the ecosystem since it is at the top of the food chain and is responsible for disposing of dead or rotting carcasses. They are said to be part of "nature's cleanup crew" and without them, carcasses would be left to biodegrade themselves. Over two million people visit the San Diego Wild Animal Park annually, where one of the condor's breeding facilities is located. The factors leading to the

> condor's population decline include lead poisoning, collision with man made objects, poaching, and habitat loss.
>
> With this information about the condor, how much money would you be willing to pay annually through increased taxes to provide for increased/continued protection of the California condor?

Compiling and Interpreting the Results – First Survey – California Condor Questions

The responses to this question ranged from $0 to $100,000. (Appendix E) One respondent left the answer line blank, therefore I included it as a zero when calculating the average. Two respondents answered with a range of $0 to $200, in which I used the average of $100. I am also considering the $100,000 response to be an outlier. It is much higher than any of the other responses for this question. This particular survey respondent was also the one who answered $1 million for the listing question about the orca whale. This implies the respondent did not take the survey seriously and the response should not be included in the results. If the outlier was included, the average based on 54 survey respondents would be $1,915.07. By eliminating the outlier, the average based on 53 survey respondents was $64.41. When this value is multiplied by the number of taxpayers in the U.S., 92,548,000, it results in a willingness to pay approximately $6 billion. This value is much higher than what is currently being spent on the condor's recovery. If surveys implemented by the FWS yielded these kinds of results, they could be interpreted in two ways. The first is that the public supports the protection of the condor and even more money could be spent on its recovery. The other interpretation is that the public does not know how to value a species and does not realize how much money their responses add up to.

The second question asked about the condor was as follows:

> Suppose a proposal to establish more California condor breeding facilities was on the ballot in the next nationwide election. How would you vote on this proposal? Would you vote in favor of this proposal if it increased your property taxes every year?
>
> Please circle: YES NO
>
> If your answer is yes, circle the amount you would be willing to pay in increased annual taxes:

0-$200	$800-1000	$1600-1800
$200-400	$1000-1200	$1800-2000
$400-600	$1200-1400	> $2000
$600-800	$1400-1600	

Twelve of the 54 survey respondents answered “no” to this question, which amounts to about 22% of respondents. Of the remaining respondents who answered “yes”, about 81% selected the 0-$200 range. Four respondents selected the $200-$400 range. For the $400-$600, $600-$800, $800-$1000, and $1800-$2000 answer choices, there was one respondent who chose that range. Figure 6 shows these results.

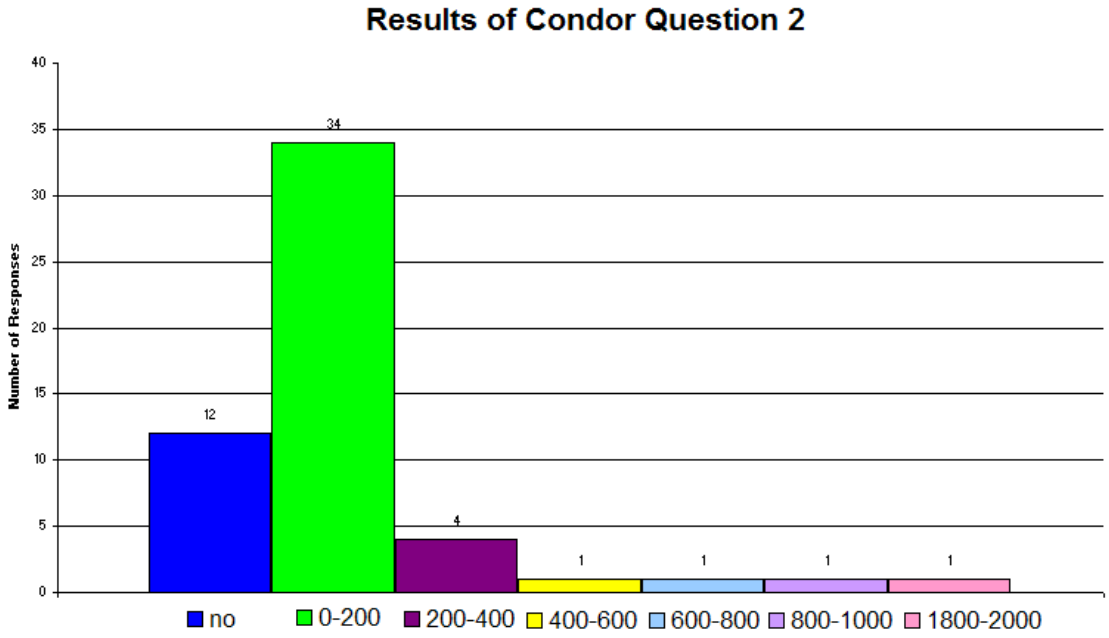


Figure 6 - Results of Second Condor Question

In the survey, there was a 100% response rate and since the respondents had to answer “yes” or “no”, there was no in-between area that could result due to biases such as inflating answers due to the hypothetical nature of the question. However, some respondents may have answered “yes” if they believed that is the answer I wanted, as the survey administrator. They may also have answered “yes” to feel as though they were doing a good thing. It would be impossible to eliminate all biases in any survey. The primary bias in contingent valuation

surveys is that people may not answer truthfully since the questions are hypothetical and they know they will not actually have to pay their responded amount.

Compiling and Interpreting the Results – Second Survey – California Condor Questions

The average willingness to pay increased for the condor as well when the same survey was given a second time. This time, the average was $99.20, which is $34.79 higher than the first survey average. There were no responses I considered to be outliers. This suggests the students may have taken the survey more seriously the second time. When $99.20 is multiplied by the number of taxpayers, it results in approximately $9.2 billion that would be paid for the protection of the California condor. This number is about $3.2 billion higher than the number from the first time the survey was given. Since the condor's number increased much more than the orca's did, it suggests educating the public on species they may not know of has a greater effect. Also, the percentage of respondents who answered "yes" when asked if they would vote in favor of continued protection of the condor increased from 78% to 83%. This also shows how education could have a positive impact on the way people perceive endangered species. (Appendix F)

Discussion – General Survey Results

The administration of this survey brought to light a variety of flaws inherent in the contingent valuation method. The following discussion analyzes its flaws and its application to ESA decision making.

The drawbacks of this method begin in the survey development phase. When designing the survey, the FWS would have to make sure the survey questions were objective and not biased to achieve certain responses. To have an objective survey, it would have to include information about why protecting a species is important and include any negative consequences that may occur if a species were to be added to the endangered species list. Even if the survey includes a lot of background information about a species, it still might not be enough for some respondents to fully understand the situation. Their lack of knowledge could lead to misinformed responses. Many respondents may be more familiar with charismatic species such as bears, wolves, and whales. Therefore, they may respond with a higher willingness to pay, wanting to have them protected. This would result in such species

coming from plant, insect, and reptile groups to be valued less. I believe this is shown in my survey about the condor and killer whale. It is probable that many of the students surveyed associate killer whales with the movie "Free Willy" and "Shamu" from SeaWorld. The California condor is considered uncharismatic since many of the respondents probably did not know what a California condor looks like and probably associated it with a vulture or another large scavenging bird. The survey results show the students had a larger willingness to pay for the protection of the killer whale by about $45.

The surveys used by the FWS would be very time consuming to develop and pretest, costing a lot to design and implement. Also, the FWS would have to make sure they selected a sample population that is statistically the right size and is representative of the relevant population. It can be inferred by the description of the five survey development steps that the contingent valuation method is very time consuming, costly, and produces results that may be useless or not meaningful. If this were done for every species, the FWS would be spending too much time developing surveys and less time of developing recovery plans and conducting species research.

When interpreting the survey results, the FWS would have to make several judgments. They would have to determine what numbers should be considered outliers and how to treat non-responses. They would also have to figure out if their results are skewed based on the hypothetical nature of the survey. Responses may be higher if respondents do not believe they will actually have to pay. They could also be lower if respondents believe they will have to pay. Those two sides could potentially balance each other out, but there is really no way to tell how truthful the responses are. When responses include small amounts of money as their willingness to pay, it could be because people do not care that much about the protection of a species, or because they realize a small amount adds up to a lot of money when applied to all U.S. taxpayers. Again, there is no way to tell. Many people are not familiar with placing a monetary value on environmental goods. Therefore their responses could be completely misleading.

With regard to the survey in this study, the students may not have been able to reliably respond with their willingness to pay since many of them are not currently paying taxes. This implies the results would not adequately measure their true willingness to pay. Also, it could mean that some people either did not take the survey seriously because the questions are hypothetical or they may have misunderstood the question. Either way it shows how contingent valuation surveys can result in extreme responses that should not be used.

Also, since the students are enrolled in an environmental science class, one would think they would be more concerned about the protection of endangered species. However, the survey results show some of them are not willing to pay for the protection of the California condor or killer whale.

The survey results from the killer whale question suggest that the contingent valuation method would not be helpful in the listing process. The FWS would have to decide which responses are outliers and how to value non-responses or range responses. There would be too much time spent on a method that would not yield helpful results. The only potential benefit I believe that could come out of using contingent valuation is to show politicians how the public values the protection of endangered species. However, they would most likely argue the public did not realize their high responses would add up to so much money.

Finally, the results from the second question about the condor shows 12 respondents would vote against a proposal to establish more condor breeding facilities, while only five respondents said they would not be willing to pay any money for the continued protection of the condor. Even though the two condor questions were not asking the same thing, they have the same basic idea behind them, which is whether people would be willing to pay for the continued protection of the condor. This shows how the wording of a survey question is important.

Conclusion

While there are some potential benefits of utilizing the contingent valuation method in the listing process, the negatives of using this method far outnumber any possible benefits. I also believe the costs of developing and conducting a contingent valuation survey to determine

how much the public believes should be spent on a species would drastically outweigh any benefit derived from it.

Since there are so many biases and potential problems associated with survey data as part of the contingent valuation method, many people do not believe the results. I do not believe survey results would provide the FWS with useful information and would most likely be disadvantageous, in terms of time and money spent on survey development, implementation, and analysis. The only benefits of using this method compared to other valuation methods are that it is flexible, it can be used to place a monetary value on almost any environmental good, and the results typically are not difficult to analyze. However, as shown in my survey, there are some atypical results that can be interpreted in various ways.

Although the contingent valuation survey showed respondents were in favor of protecting and listing the selected species, the variability of the survey development and the survey responses strongly suggest that the contingent valuation method cannot be used for ESA decision making. This is in line with the intent of the ESA to rise above all economic considerations.

Consequently, it seems as though the contingent valuation method has too many variables causing the results to be highly erratic or unreliable. Therefore, I would not recommend the use of the contingent valuation method as an aid to making decisions regarding the ESA. However, the effort to apply a method to determine non-use values should be continued. An accurate and reliable method could prove to be a useful tool to make decisions about the environment.

APPENDICES

Appendix A – Whooping Crane Historical Range

Appendix B – Whooping Crane Total Estimated Cost of Recovery

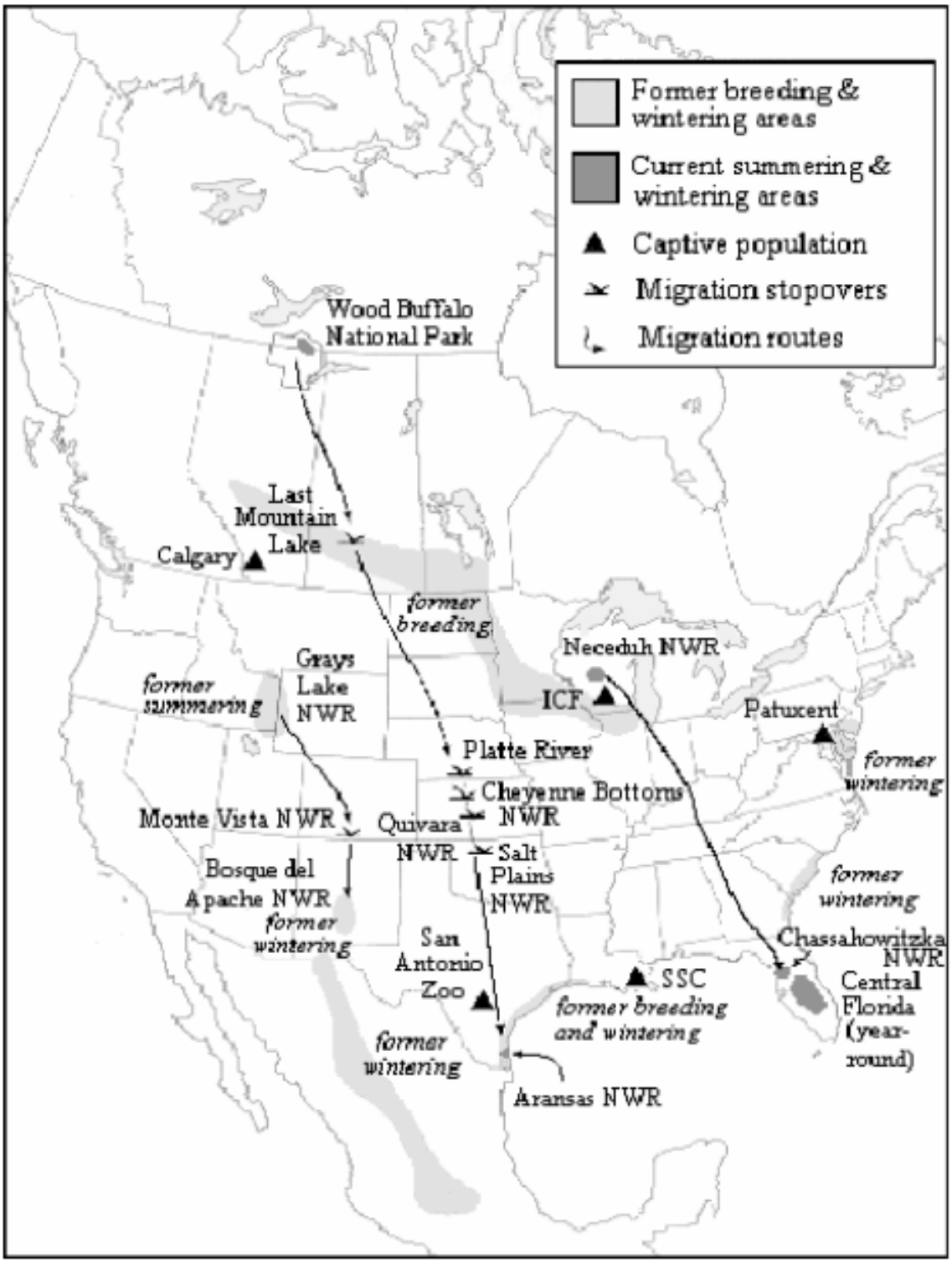
Appendix C – Recovery Plan Implementation Schedule for the California Condor

Appendix D – Contingent Valuation Survey

Appendix E – Survey Results – First Survey

Appendix F – Survey Results – Second Survey

Appendix A – Whooping Crane Historical Range



Appendix B – Whooping Crane Total Estimated Cost of Recovery

Year	Action 1	Action 2	Action 3	Action 4	Action 5	Total $ (000's)
2006	1394	1705	3030	0	15	6144
2007	1388.25	1705	3042.5	30	15	6180.75
2008	1388.25	1705	3042.5	0	15	6150.75
2009	1388.25	1705	3042.5	0	15	6150.75
2010	1388.25	1705	3042.5	0	15	6150.75
2011	1419.8	1609	3045	0	15	6088.8
2012	1419.8	1609	3045	5	15	6093.8
2013	1419.8	1609	3045	0	15	6088.8
2014	1419.8	1609	3045	0	15	6088.8
2015	1419.8	1609	3045	5	15	6093.8
2016	1009	188	2025	0	6	3228
2017	1009	188	2025	0	6	3228
2018	1009	188	2025	0	6	3228
2019	1009	188	2025	0	6	3228
2020	1009	188	2025	0	6	3228
2021	1009	188	2025	0	6	3228
2022	1009	188	2025	5	6	3233
2023	1009	188	2025	0	6	3228
2024	1009	188	2025	0	6	3228
2025	1009	188	2025	0	6	3228
2026	1009	188	2025	0	6	3228
2027	1009	188	2025	0	6	3228
2028	1009	188	2025	0	6	3228
2029	1009	188	2025	0	6	3228
2030	1009	188	2025	0	6	3228
2031	1009	188	2025	0	6	3228
2032	1009	188	2025	5	6	3233
2033	1009	188	2025	0	6	3228
2034	1009	188	2025	0	6	3228
2035	1009	188	2025	0	6	3228
Total	34,226	20,330	70,925	50	270	125,801

Appendix C – Recovery Plan Implementation Schedule for the California Condor

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
			1: Captive Breeding								
1	1	111	Management Protocol	1	LAZ* SDWAP* USFWS-PF	5	5				
1	1	112	Operate Facilities	Ongoing	LAZ-SDWAP PF	1500	300	300	300	300	300
1	2	113	New Captive Breeding Facilities	Ongoing	CCRT USFWS	10	10				
1	1	12	Manage Captive Flock	Ongoing	LAZ-SDWAP PF	1250	250	250	250	250	250
1	1	121	Maintain: Genetic, Age & Sex Balance	Ongoing	LAZ-SDWAP PF	5	1	1	1	1	1
1	2	122	Offspring & Eggs Exchange	Ongoing	LAZ-SDWAP PF	10	2	2	2	2	2
1	1	123	Determine Genetic Balance	Ongoing	LAZ-SDWAP PF	10	2	2	2	2	2
1	2	124	Develop & Implement Pair Strategies	Ongoing	LAZ-SDWAP PF	10	2	2	2	2	2
1	1	13	Manage Selected Condors for Release	Ongoing	LAZ-SDWAP PF	15	3	3	3	3	3
1	3	14	Behavioral Data	Ongoing	LAZ-SDWAP PF	150	30	30	30	30	30
			1: Subtotal Needs			2965	605	590	590	590	590

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
5	2	54	Establish Points of Observations & Educational Facilities	Ongoing	USFS USFWS-CDFG USBLM	25	5	5	5	5	5
5	3	55	Videos	Ongoing	USFWS CDFG- USBLM USFS	50	10	10	10	10	10
5	3	56	Training Sessions	Ongoing	USFWS CDFG- USBLM LAZ-SDWAP-PF USFS	10	2	2	2	2	2
5	3	571	Zoo Kiosks	Ongoing	LAZ-SDWAP PF	30	6	6	6	6	6
5	3	572	Zoo Condor Exhibit	3	LAZ-SDWAP PF	600			200	200	200
5	3	573	Provide Photos & Videos	Ongoing	LAZ-SDWAP PF	25	5	5	5	5	5
5	3	58	Maintain Centralized Information Center	Ongoing	USFWS	5	1	1	1	1	1
			5: Subtotal Needs			785	37	37	237	237	237
			TOTAL COSTS			9558	1793	1741	1968	1978	2078

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
			2: Reintro-ductions								
2	1	21	Develop Release Protocols	1	USFWS CCRT	10	10				
2	2	211	Release Criteria	1	CCRT USFWS	1	1				
2	1	212	Annual Release Plan Release Criteria	Ongoing	USFWS	50	10	10	10	10	10
2	2	221	Release Site Selection Criteria	1	CCRT USFWS	1	1				
2	1	222	Select Release Sites	3	CCRT USFWS	30		10	10	10	
2	1	223	Prepare Release Sites	3	USFWS	30		10	10	10	
2	1	23	Conduct Releases	5	USFWS	2250	450	450	450	450	450
2	1	231	Develop California Release Plan	1	USFWS	5	5				
2	1	232	Release Condors	5	USFWS	50	10	10	10	10	10
2	1	233	Monitor Condors at Site	5	USFWS	250	50	50	50	50	50
2	1	234	Monitor Free-Flying Condors	Ongoing	USFWS	250	50	50	50	50	50
2	1	235	Protect Released Condors	5	USFWS-CDFG USFS	250	50	50	50	50	50

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
2	1	241	Northern Arizona Release	3	USFWS-PF AGFD	1050	250	200	200	200	200
2	2	242	New Mexico Release	3	USFWS PF	210				10	200
2	1	25	Wild Rearing Facilities	1	USFWS	50	50				
			2: Subtotal Needs			4487	937	840	840	850	1020
			3: Habitat								
3	1	31	Protect Nest Sites	Ongoing	USFWS USBLM-CDFG BIA-USFS	10	2	2	2	2	2
3	1	32	Protect Roost Sites	Ongoing	USFWS USBLM-CDFG BIA-USFS	10	2	2	2	2	2
3	2	331	Manage Condor Foraging Habitat	Ongoing	USFWS USBLM-CDFG BIA-USFS	10	2	2	2	2	2
3	3	3311	Dead Livestock on Rangelands	Ongoing	USFWS USBLM-CDFG USFS-AGFD	26	4	4	6	6	6
3	2	3312	Reestablish Native Ungulates	Ongoing	CDFG USFS-USFWS USBLM	20	4	4	4	4	4

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
3	1	3321	S.W. Kern Co.	Ongoing	CDFG-CO. USBLM	5	1	1	1	1	1
3	1	3322	Carrizo & Elkhorn Plains	Ongoing	USBLM TNC-CDFG	100	20	20	20	20	20
3	3	3323	Tulare County Grasslands	Ongoing	CDFG-CO.	5	1	1	1	1	1
3	2	3324	Glenville Woody Area	Ongoing	CDFG-CO.	5	1	1	1	1	1
3	1	3325	Tejon Ranch	Ongoing	CDFG-CO.	5	1	1	1	1	1
3	3	3326	Hopper Mtn.	Ongoing	USFWS USBLM-CDFG USFS	100	20	20	20	20	20
3	1	3327	Bitter Creek	Ongoing	USFWS	50	10	10	10	10	10
3	2	3328	San Juan Creek	Ongoing	CDFG-CO.	5	1	1	1	1	1
3	1	3329	Elkhorn Hill & Caliente Range	Ongoing	CDFG-CO.	25	5	5	5	5	5
3	3	341	Land Use Planning	Ongoing	USFWS USFS-CDFG BIA-USBLM	15	3	3	3	3	3
3	3	342	General Plan Review	Ongoing	CDFG USFWS	20	4	4	4	4	4
			3: Subtotal Needs			411	81	81	83	83	83

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
			4: Mortality								
4	3	41	Assess Historical Findings	Ongoing	USFWS	10	2	2	2	2	2
4	3	42	Law Enforcement	Ongoing	CDFG USBLM-USFS USFWS	25	5	5	5	5	5
4	1	43	Minimize Contaminant Related Mortality	Ongoing	USFWS USBLM-CDFG USFS	25	5	5	5	5	5
4	2	43	Monitor Contaminants	Ongoing	USFWS	10	10				
4	1	441	Determine Effects of Contaminants	3	USFWS	165		55	55	55	
4	3	451	Sample Food for Contaminant Loads	3	USFWS	75			25	25	25
4	3	452	Blood Samples Contaminant Loads	Ongoing	USFWS CDFG	25	5	5	5	5	5
4	1	461	Avian Mortality due to Collisions with Human-made Structures	Ongoing	CEC-USFWS Private Sector	500	100	100	100	100	100

Recovery Plan Implementation Schedule for the California Condor

Need #	Priority #	Task #	Task Description	Task Duration (Yrs)	Responsible Party	Total Cost	Cost Estimates ($1,000)				
							FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
4	2	462	Advise Planning Agencies on Location & Mitigation to Avoid Collisions with Human-made Structures	Ongoing	USFWS CDFG	25	5	5	5	5	5
4	3	47	Control Predators	3	USFWS	45		15	15	15	15
4	3	48	Restrict Aircraft in Key Areas	Ongoing	USFWS-FAA	5	1	1	1	1	1
			4: Subtotal Needs			910	133	193	218	218	148
			5: Information & Education								
5	1	51	Distribute Educational Material	Ongoing	USFWS CDFG USBLM LAZ-SDWAP-PF USFS	25	5	5	5	5	5
5	1	52	Provide Information to Land Managers	Ongoing	USFWS CDFG-USBLM USFS	10	2	2	2	2	2
5	1	53	Provide Information to Private Landowners	Ongoing	USFWS CDFG-USBLM USFS	5	1	1	1	1	1

Appendix D – Contingent Valuation Survey

Endangered Species Act Survey

A. The California condor has been on the endangered species list since 1967. The condor plays an important role in the ecosystem since it is at the top of the food chain and is responsible for disposing of dead or rotting carcasses. They are said to be part of "nature's cleanup crew" and without them, carcasses would be left to biodegrade themselves. Over two million people visit the San Diego Wild Animal Park annually, where one of the condor's breeding facilities is located. The factors leading to the condor's population decline include lead poisoning, collision with man made objects, poaching, and habitat loss.

1. With this information about the condor, how much money would you be willing to pay annually through increased taxes to provide for increased/continued protection of the California condor?

$_____

2. Suppose a proposal to establish more California condor breeding facilities was on the ballot in the next nationwide election. How would you vote on this proposal? Would you vote in favor of this proposal if it increased your property taxes every year?

Please circle: YES NO

If your answer is yes, circle the amount you would be willing to pay in increased annual taxes:

0-$200	$800-1000	$1600-1800
$200-400	$1000-1200	$1800-2000
$400-600	$1200-1400	> $2000
$600-800	$1400-1600	

B. The killer whale, also known as an orca whale, was recently listed as endangered in 2006. The killer whale occupies the top position in the food chain, making it vital to the ecosystem. If there were no killer whales, the food chain would be radically altered. The commercial value of the killer whale may be higher than other endangered species due to its popularity at parks such as Sea World and for whale watching in the Northern Pacific. The number of killer whales has decreased due to a decline in their food source and habitat pollution.

3. With this information about the killer whale, how much money would you be willing to pay annually through increased taxes to provide for protection of the killer whale?

$_____

C. Additional Comments:

Appendix E – Survey Results – First Survey

Survey Respondent #	Condor $	Yes/No	Range	Orca $
1	25	no	-	30
2	1000	yes	800-1000	500
3	20	yes	0-200	150
4	100	yes	0-200	25
5	0	no	-	100
6	40	yes	0-200	60
7	15	yes	0-200	15
8	30	yes	0-200	100
9	25	yes	0-200	25
10	50	yes	0-200	300
11	25	yes	0-200	25
12	1	no	-	900
13	0.25	yes	0-200	0.25
14	0	no	-	0
15	50	yes	0-200	200
16	2	yes	0-200	3
17	1	yes	0-200	1
18	50	no	-	50
19	10	yes	0-200	20
20	20	yes	0-200	20
21	0	no	-	0
22	25	yes	0-200	25
23	15	no	-	5
24	0	yes	1800-2000	0
25	50	yes	0-200	50
26	25	yes	0-200	25
27	100	yes	200-400	100
28	1	yes	0-200	10
29	1	yes	0-200	10
30	10	yes	0-200	20
31	200	yes	200-400	200
32	5	yes	0-200	20
33	10.5	yes	0-200	100000
34	100	yes	200-400	200
35	10	yes	0-200	10
36	100	yes	0-200	100
37	20	yes	0-200	20
38	100000	yes	400-600	1000000
39	20	yes	0-200	20
40	25	yes	0-200	10
41	50	yes	0-200	50

Survey Respondent #	Condor $	Yes/No	Range	Orca $
42	20	yes	0-200	20
43	5	yes	0-200	5
44	100	yes	0-200	100
45	100	yes	0-200	100
46	50	no	-	50
47	2	yes	600-800	700
48	350	yes	0-200	750
49	25	no	-	50
50	10	no	-	10
51	20	yes	0-200	20
52	0	no	-	0
53	300	no	-	300
54	200	yes	200-400	200

Appendix F – Survey Results – Second Survey

Survey Respondent #	Condor $	Yes/No	Range	Orca $
1	4	yes	0-200	4
2	100	yes	0-200	100
3	200	yes	200-400	200
4	5	yes	0-200	5
5	300	yes	200-400	500
6	5	yes	0-200	5
7	2	yes	0-200	2
8	50	yes	0-200	50
9	10	no	-	11
10	200	no	-	300
11	10	yes	0-200	15
12	25	yes	0-200	75
13	300	yes	200-400	300
14	0.1	yes	0-200	0.1
15	1000	yes	800-1000	1500
16	7.5	no	-	7.5
17	500	yes	400-600	500
18	10	no	-	100
19	5	yes	0-200	5
20	100	yes	0-200	100
21	20	yes	0-200	20
22	100	yes	200-400	50
23	3	yes	0-200	3
24	37.5	no	-	37.5
25	50	yes	0-200	50
26	250	yes	200-400	250
27	100	yes	0-200	200
28	200	yes	0-200	100
29	50	yes	0-200	50
30	50	yes	0-200	100
31	50	yes	0-200	50
32	25	yes	0-200	10
33	100	yes	0-200	100
34	5	yes	0-200	5
35	50	yes	0-200	50
36	10	yes	0-200	10
37	50	yes	200-400	50
38	50	yes	400-600	0
39	10	yes	0-200	10
40	20	yes	0-200	35
41	250	yes	600-800	600

Survey Respondent #	Condor $	Yes/No	Range	Orca $
42	10	yes	0-200	600
43	1000	yes	800-1000	0
44	15	yes	0-200	20
45	10	yes	0-200	10
46	50	yes	0-200	50
47	20	yes	0-200	20
48	100	yes	0-200	100
49	100	yes	0-200	200
50	50	no	-	100
51	25	yes	0-200	50
52	5	yes	0-200	15
53	25	yes	600-800	40
54	5	no	-	10
55	100	no	-	100
56	100	yes	0-200	100
57	50	yes	0-200	50
58	25	no	-	25
59	50	yes	0-200	50
60	100	yes	200-400	100
61	15	yes	0-200	15
62	50	no	-	50
63	30	no	-	30
64	100	yes	0-200	150

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