

Rulemaking to List Four Constrictor Snake Species Under the Lacey Act

[Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), and Yellow Anaconda (*Eunectes notaeus*)]

Final Economic Analysis

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January 12, 2012**

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EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service is publishing a final rule to add four species of live constrictor snakes to the list of injurious wildlife under the Lacey Act. An injurious wildlife listing will prohibit the importation and interstate transport of all live listed constrictor snakes, hybrids, and their eggs, except as specifically permitted. This document analyzes the economic impacts of four alternatives: Alternative 1 (No Action Alternative); Alternative 2A– Add nine species of large constrictor snakes to the list of injurious wildlife; Alternative 2B – Add four species of large constrictor snakes to the list of injurious wildlife); Alternative 3 – Add seven species of large constrictor snakes to the list of injurious wildlife (excluding the Beni and DeSchauensee’s anacondas); and Alternative 4 – Add five species of large constrictor snakes to the list of injurious wildlife. Economic impacts are estimated on the biological impacts of constrictor snake populations. The report by the U.S. Geological Survey, **Giant Constrictors: Biological and Management Profiles and an Establishment Risk Assessment for Nine Large Species of Pythons, Anacondas, and the Boa Constrictor** by Reed and Rodda (2009) provided a qualitative assessment of the associated environmental and biological risk. These assessments were used in developing a comparison of the estimated economic costs and benefits associated with the alternatives (see Table ES-4 and Benefits of the Proposed Alternatives, p. 64).

Executive Orders 12866 Regulatory Planning and Review (U.S. Office of Management and Budget 1993) and 13563 Improving Regulation and Regulatory Review and the OMB Circular A-4 (U.S. Office of Management and Budget, September 17, 2003), identify guidelines or “best practices” for the economic analysis of Federal regulations. With respect to the regulation under consideration, an analysis that comports with Circular A-4 would include a full description and estimation of the economic benefits and costs associated with implementation of the regulation. These benefits and costs would be measured by the net change in consumer and producer surplus due to the regulation. Both producer and consumer surplus reflect opportunity cost as they measure what people would be willing to forego (pay) in order to obtain a particular good or service. “Producers’ surplus is the difference between the amount a producer is paid for a unit of a good or service and the minimum amount the producer would accept to supply that unit. Consumers’ surplus is the difference between what a consumer pays for a unit of a good or service and the maximum amount the consumer would be willing to pay for that unit (U.S. Office of Management and Budget p.19, 2003).”

In an ideal world, the economic effects to three groups would be assessed: (1) producers; (2) consumers; and (3) society. With the prohibition of imports and interstate shipping, producers, breeders and suppliers would be affected in several ways. Depending on the characteristics of a given business (such as what portion of their sales depends on out-of-state sales or imports), sales revenue would be reduced or eliminated, thus decreasing total producer surplus compared to the situation without the regulation. Consumers (pet owners or potential pet owners) would be affected by having a more limited choice of constrictor snakes or in some cases, no choice at all if out-of-state sales are prohibited. Consequently, total consumer surplus for pet owners or potential pet owners would decrease compared to the situation without the regulation. Taken together, the net decline in consumer and producer surplus would be the social cost of the rule. Certain segments of society may value knowing that the risk to natural areas and other potential impacts from constrictor snake populations is reduced by implementing one of the alternatives that were proposed. In this case, consumer surplus for these segments of society would increase compared to the situation without the regulation. Additionally, producer surplus may increase for certain businesses if consumers, who would have purchased constrictor snakes in the absence of the rule, now spend money on other goods and services. Table ES-1 summarizes the social benefits and costs.

Table ES-1. Description of Social Benefits and Costs.		
Economic Value measure	Social Benefits	Social Costs
Consumer Surplus	Decrease in probability of detrimental impacts of constrictor snake infestation	Consumers would have less choice or opportunities for constrictor snake ownership
Producer Surplus	Certain businesses would experience increased demand because of a transfer of consumer expenditures from constrictor snakes to other goods and services	Businesses selling, breeding, importing constrictor snakes or providing ancillary services would experience a decline in demand for associated goods and services

If comprehensive information were available on these different types of producer and consumer surplus, a comparison of social benefits and costs would be relatively straightforward. However, there is insufficient information available on these values, so a quantitative comparison of social benefits and costs in the context of producer and consumer surplus is not possible. In addition, this analysis relies on a limited quantitative assessment of the cost and qualitative assessment of benefits of the regulatory alternatives.

Due to data limitations, we are not able to provide quantitative estimates of the social benefits of the final rule. The section of this report titled Benefits of the Proposed Alternatives (p. 56) discusses qualitatively the various benefits associated with the final rule.

In lieu of using consumer and producer surplus estimates, we used estimates of retail value as a proxy for social costs. Under typical demand and supply characteristics, producer surplus would be some positive proportion of total retail value (*price times quantity*). We acknowledge that retail value is a second-best alternative to estimating producer surplus, however, in the interests of using all available information and identifying in a comprehensive manner the impacts to the constrictor snake industry, we believe the use of retail value provides a context to assist decision-makers and the public in evaluating the social costs of the final rule.

In addition to this approximation of social cost of the alternatives, we used an input-output model (Minnesota IMPLAN Group, see pp. 25-26, 2004) to estimate the secondary national multiplier - effects of this rulemaking due to reductions in retail sales – total economic output, job impacts, job income impacts and tax revenue impacts on ancillary and support industries (discussed below). As with retail value, these secondary multiplier effects are not measures of social benefits or costs of the regulatory alternatives as defined in Executive Orders 12866, 13563 and OMB Circular A-4 (U.S. Office of Management and Budget 2003).

Alternative 1

Alternative 1 (No Action Alternative) is the status quo (baseline). Under Alternative 1, the large constrictor snake market would not incur any additional economic impacts. Importation and breeding of large constrictor snakes would continue, and is assumed to be similar as in recent years. The potential threat to select ecosystems would continue.

Alternative 2A

Under Alternative 2A, the importation and interstate transport of nine species of large constrictor snakes [Burmese python (*Python molurus*), Reticulated Python (*Broghammerus reticulatus*, also referred to in this document as *Python reticulatus*), Northern African python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), DeSchaunsee's Anaconda (*Eunectes deschauenseei*), Green Anaconda (*Eunectes murinus*), and Beni Anaconda (*Eunectes beniensis*)] will be prohibited. As a result, any importation of these constrictor snakes will be eliminated, except as specifically permitted. Furthermore, any interstate transport by breeders in the United States will also be eliminated, except as specifically permitted. The annual retail value losses or social cost for Alternative 2A are estimated to range from \$14.7 million to \$30.1 million. This represents the loss of revenue to companies/individuals importing or breeding these large constrictor snakes. Under Alternative 2A, the probability of large constrictor snakes establishing a population outside southern Florida may decrease compared to Alternative 1. The change in probability is unknown.

Alternative 2B

Under Alternative 2B, the importation and interstate transport of four species of large constrictor snakes [Burmese python (*Python molurus*), Northern African python (*Python sebae*), Southern African Python (*Python natalensis*), Yellow Anaconda (*Eunectes notaeus*)] will be prohibited. As a result, any importation of these constrictor snakes will be eliminated, except as specifically permitted. Furthermore, any interstate transport by breeders in the United States will also be eliminated, except as specifically permitted. The annual retail value losses or social cost for Alternative 2B are estimated to range from \$3.7 million to \$7.6 million. This represents the loss of revenue to companies/individuals importing or breeding these large constrictor snakes. Under Alternative 2B, the probability of large constrictor snakes establishing a population outside southern Florida may decrease compared to Alternative 1. The change in probability is unknown.

Alternative 3

Under Alternative 3, the importation and interstate transport of seven species of large constrictor snakes [Burmese Python (*Python molurus*), Reticulated Python (*Broghammerus reticulatus* or *Python reticulatus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), and Green Anaconda (*Eunectes murinus*)] would be prohibited. The annual retail value losses for Alternative 3 are the same as Alternative 2A, because the two species not addressed in Alternative 3 are not currently in trade. Under Alternative 3, the probability of large constrictor snakes establishing a population outside southern Florida may decrease compared to Alternative 1. It is unknown what the new probability of establishment would be under Alternative 3. The estimated benefits associated with this alternative does not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems. The benefits from these additional factors are unknown, but are assumed to be non-zero.

Alternative 4

Under Alternative 4, the importation and interstate transport of five species of large constrictor snakes [Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), and the Yellow Anaconda (*Eunectes notaeus*)] would be prohibited. The annual retail value losses for Alternative 4 are estimated to range from \$12.8 million to \$26.2 million. The cost estimate represents the loss of revenue to companies/individuals importing or breeding these large constrictor snakes. Under Alternative 4, the probability of large constrictor snakes establishing a population outside southern Florida may decrease compared to

Alternative 1. It is unknown what the new probability of establishment would be under Alternative 4. The estimated benefits associated with this alternative does not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems. The benefits from these additional factors are unknown, but are assumed to be non-zero.

Summary

Tables ES-2 through ES-5 provide a summary of the estimated impacts of the regulatory alternatives considered for this rule on total retail value, benefits and associated secondary economic impacts for each alternative. Retail value is used here as a proxy for social costs and as a broad indicator of the overall impacts of the alternatives on the constrictor snake industry. Table ES-2 shows the annual range of impacts in retail value from baseline conditions (Alternative 1) for each of the alternatives.

Table ES-2. Decrease in Constrictor Snake Industry Retail Value from Baseline Condition (Alternative 1) as a Proxy Measure of Social Cost	
	Total Annual Decrease in Retail Value (Dollars in Millions)
Alternative 2A	\$14.7 – \$30.1
Alternative 2B	\$3.7 – \$7.6
Alternative 3	\$14.7 – \$30.1
Alternative 4	\$12.8 – \$26.2

Table ES-3 shows the relative (to the other alternatives) qualitative social benefits of Alternatives 2A, 2B, 3, and 4 for each species in the alternative. The high, medium, and low rankings are from the USGS Risk Assessment (Reed and Rodda, Table 10.7, p. 260; 2009) and are based on the overall Organism Risk Potential for each species. For example, if a species has a **high** Risk Potential ranking, then an alternative that would prohibit importation and interstate trade would have a high ranking for economic benefits (again, relative to the other alternatives, not necessarily in an absolute sense). Alternative 2A, since all nine species are included in this alternative, would have the highest potential benefits, other things equal. Alternative 3 has the same cost in retail value as Alternative 2A since *E. deschauenseei* and *E. beniensis* are not currently imported. However, Alternative 2A would have higher potential benefits than Alternative 3 since any future imports of these two species will be prohibited, while under Alternative 3, such imports would be allowed. Alternative 4 would have lower relative potential benefits compared with Alternatives 2A and 3 since only five species would be listed. Alternative 2B would have the lowest relative potential benefits because it omits the boa constrictor (a high-risk species that is first in terms of sale numbers of the nine species), the reticulated python (the most commonly traded medium-risk species evaluated), and three other species. However, Alternative 2B is likely to have the lowest costs of the four alternatives considered in this analysis. All social benefits are qualitative in nature.

Table ES-3 Relative Social Benefits of Alternatives 2, 3, and 4				
Species	Alternative 2A	Alternative 2B	Alternative 3	Alternative 4
<i>Python molurus</i>	High	High	High	High
<i>Python sebae</i>	High	High	High	High
<i>Python natalensis</i>	High	High	High	High
<i>Boa constrictor</i>	High		High	High
<i>Eunectes notaeus</i>	High	High	High	High
<i>Broghammerus (Python) reticulatus</i>	Medium		Medium	
<i>Eunectes murinus</i>	Medium		Medium	
<i>Eunectes deschauenseei</i> *	Medium			
<i>Eunectes beniensis</i> *	Medium			

Bold = Not currently imported

* = not currently bred domestically

We also provide summary of estimates of secondary economic effects in Tables ES-4 and ES-5. Table ES-4 estimates how the annual decrease (due to a decrease in retail value) in constrictor snake industry will affect economic output, jobs, job income and local, state and federal tax revenue (note: the impact categories cannot be added together since this would double-count the impacts). Both job income and tax revenue are derived from total change in economic output. For example, labor costs are paid out of total sales revenue for a company as are taxes. To add taxes and job income to output would double-count economic impacts.

These secondary economic impacts are assessed for the first year of implementation for a given alternative, but would not occur thereafter. **Jobs** and **job income** include direct, indirect and induced effects in a manner similar to economic output. Employment includes both full and part-time jobs, with a job defined as one person working for at least part of the calendar year, whether one day or the entire year. **Tax revenues**¹ are shown for business taxes, income taxes, and a variety of taxes at the local, state and national level. Like output, employment, and income, tax impacts include direct, indirect and induced tax effects of constrictor snake related expenditures. Once again, these secondary effects are not social benefits and costs associated with this listing.

¹ The overall tax rate is about 13.7 percent of economic output and includes direct, indirect and induced tax effects nationwide. The tax rate is calculated within the economic modeling software used to estimate economic impacts.

Table ES-4. Annual Decrease in Secondary Impacts from Baseline Condition (Alternative 1) (Dollars in Millions)				
	Economic Output	Jobs	Job Income	Tax Revenue
Alternative 2A	\$42.0 – \$86.2	372 - 763	\$15.0 - \$30.8	\$5.7 - \$11.8
Alternative 2B	\$10.7 - \$21.8	95 - 193	\$3.8 - \$7.8	\$1.4 - \$3.1
Alternative 3	\$42.0 - \$86.2	372 - 763	\$15.0 - \$30.8	\$5.7 - \$11.8
Alternative 4	\$36.6 - \$75.2	324 - 665	\$13.1 - \$26.9	\$5.0 - \$10.3

Table ES-5 shows an annual estimate of the impacts associated with a reduction of shipping expenditures associated with a decline in constrictor snake sales.

Table ES-5. Annual Reduction in Shipping Expenditures from Baseline Condition (Alternative 1) (Dollars in Millions)				
	Shipping Expenditures (Retail Value)	Economic Output	Employment	Employment Income
Alternative 2A	\$2.5 –\$5.1	\$6.5 – \$13.4	49 - 101	\$2.1 – \$4.3
Alternative 2B	\$0.7 - \$1.3	\$1.6 - \$3.3	12- 25	\$0.5 - \$1.1
Alternative 3	\$2.5 –\$5.1	\$6.5 – \$13.4	49 - 101	\$2.1 – \$4.3
Alternative 4	\$2.2 – \$4.5	\$5.7 – \$11.7	43 – 88	\$1.8 – \$3.8

The Fish and Wildlife Service is making final determination to list four of the nine originally proposed species. The following analysis was revised to include Alternative 2B as a subset of the original Alternative 2.

INTRODUCTION

Background

In June 2006, the U.S. Fish and Wildlife Service (Service) received a petition from the South Florida Water Management District to list Burmese pythons as an injurious species under the Lacey Act. At the time the petition was submitted, no scientific information had been compiled on Burmese pythons that would enable a rigorous assessment of risk and potential impacts to the Everglades and other ecosystems. As a result, the Service partnered with the National Park Service and jointly provided funds to U.S. Geological Survey in 2007 to complete this analysis. USGS finalized the assessment on October 13, 2009². This risk assessment included the Burmese python and eight other large constrictor snakes and considered what effects these species could have on the environment of the United States were such snakes to become established in the wild and the likelihood that they could become established. Information from the biological and management profiles was then incorporated into a formal risk assessment following guidelines published by the multi-agency Aquatic Nuisance Species Task Force in 1996. Species assessed include the Burmese Python; Northern African Python; Southern African Python; Reticulated Python; Green Anaconda; Yellow Anaconda; Beni (or Bolivian) Anaconda; DeSchaunsee's Anaconda; and Boa Constrictor.

The Service has the responsibility of prohibiting the importation and interstate movement of those species found to be injurious under the Lacey Act. The regulations contained in 50 CFR part 16 implement the Lacey Act (18 U.S.C. § 42) as amended. Under the terms of the law, the Secretary of the Interior is authorized to prescribe by regulation those wild mammals, wild birds, fish (including mollusks and crustaceans), amphibians, reptiles, and the offspring or eggs of any of the aforementioned, which are injurious to human beings, to the interests of agriculture, horticulture, or forestry, or to the wildlife or wildlife resources of the United States. Wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, and reptiles are the only organisms that can be added to the injurious wildlife list. The lists of injurious wildlife species are at 50 CFR 16.11-15.

If selected constrictor snakes are determined to be injurious, then as with all listed injurious animals, their importation into, or transportation between, States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States by any means whatsoever will be prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use, upon filing a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service Inspector at the port of entry. In addition, no live constrictor snakes, hybrids, or their eggs imported or transported under permit could be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the Director of the U.S. Fish and Wildlife Service. The interstate transportation of any of these live constrictor snakes, hybrids, and their eggs currently held in the United States for any purposes not permitted would be prohibited. The rule would not prohibit intrastate transport or possession of these constrictor snakes within States, where not prohibited by the State. Any regulation pertaining to the use of constrictor snakes within States would continue to be the responsibility of each State.

The Service published a Notice of Inquiry in the Federal Register on January 31, 2008, as the first step in the rulemaking process. The Service received 1,528 responses during the public comment period that closed April 30, 2008. A Proposed Rule to add nine constrictor snake species to the list of injurious

² Reed and Rodda 2009. Referred to in this report as USGS Risk Assessment.

wildlife under the Lacey Act was published in the *Federal Register* on March 12, 2010 (Volume 75, pages 11808-11829). In an effort to gather additional economic and ecological information, a notice was published in the Federal Register reopening the public comment period on July 1, 2010, and ending on August 2, 2010 (Volume 75, pages 38069-38070). The Service received approximately 56,500 comments during these two comment periods, of which few contained new, substantive economic information. This information along with the USGS Risk Assessment and environmental assessment is being used in the evaluation under the Lacey Act.

We attempted to obtain more economic information to supplement what we received from public comments (during a total of 180 days in three public comment periods) and from our own searches. On February 29, 2008, we participated in a panel discussion arranged by the pet industry; this meeting was within the public comment period for the Notice of Inquiry. The Service met with the Small Business Administration (SBA) on April 20, 2010, to discuss what information the SBA needed and what we needed; this meeting was within the public comment period for the proposed rule. The Service met with SBA on April 21, 2010, for a roundtable meeting with pet industry, zoo, and medical research representatives; this meeting was within the public comment period for the proposed rule. We also attempted to contact the Pet Industry Joint Advisory Council (PIJAC) and the United States Association of Reptile Keepers (USARK) to clarify their public comments.

Groups impacted by the listing would include: (1) companies importing live snakes, (2) companies (breeders and wholesalers) with interstate sales of live snakes, (3) companies selling reptile-related products and services, and (4) pet owners who own or would like to own snakes that may be listed under the rulemaking. Impacts to these groups depend on the amount of interstate sales within the constrictor snake market. All importation of snakes listed under the rulemaking would be eliminated. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts.

Structure of This Report

The remainder of this report is structured as follows:

- **Overview:** This section presents an overview of the constrictor snake industry, trends in desirable color-morphs or species, and State regulations pertaining to constrictor snakes.
- **Alternative 1 (Status Quo) – The No Action Alternative:** This section analyzes the current status of the constrictor snake market including importers, wholesalers, breeders, retailers, and pet owners. In addition, it summarizes cost avoidance measures if the No Action Alternative is implemented.
- **Alternative 2A – List as Injurious nine constrictor snakes including the Burmese Python (*Python molurus*), Reticulated Python (*Broghammerus reticulatus* or *Python reticulatus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), DeSchauensee’s Anaconda (*Eunectes deschauenseei*), Green Anaconda (*Eunectes murinus*), and Beni Anaconda (*Eunectes beniensis*):** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if these nine snake species are listed as injurious.
- **Alternative 2B - List as Injurious the Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), and Yellow Anaconda.** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if these four snake species are listed as injurious.

- **Alternative 3 - List as Injurious seven constrictor snakes including the Burmese Python (*Python molurus*), Reticulated Python (*Broghammerus reticulatus* or *Python reticulatus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), and Green Anaconda (*Eunectes murinus*).** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if these seven snake species are listed as injurious.

- **Alternative 4 – List as Injurious five constrictor snakes including the Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), and the Yellow Anaconda (*Eunectes notaeus*):** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if these five snake species are listed as injurious.

- **Benefits of the Proposed Alternatives**

- **Appendix – Retail Price Estimates by Genus and species: Pet Industry Joint Advisory Council (PIJAC)**

- **References**

OVERVIEW

Large Constrictor Snake Market

This section provides an overview of importation and breeding of large constrictor snakes in the United States. In this analysis, the term “large constrictor snakes” is a general category for all Boas, Pythons, and Eunectes (anacondas). While other genera may also be categorized as large constrictor snakes within the family Boidae, this term is used for the ease of describing these three genera in the analysis. We include all large constrictor snakes as the baseline for the constrictor snake trade industry to analyze the impact of the final rule. In this report, the “nine species” refers to the same nine large constrictor species that were analyzed in the proposed rule and the draft economic analysis.

Imported Large Constrictor Snakes

A number of data sources detailing live snake importation are available including the Service’s Division of Law Enforcement, the Service’s Division of Management Authority, World Conservation Monitoring Center, and public comments from the Notice of Inquiry. For the description and analysis of snake importation, we used data from the Service’s Division of Law Enforcement (2011) and public comments.

Because the constrictor snakes in the rule are not native to the United States, all of those species, if they are present in the United States, would likely have been imported at some point. In fact, various species of large constrictor snakes have been imported into the United States for the last 50 years (PIJAC 2008, 2010). From 1999 to 2010, almost 2 million live constrictor snakes, including 12 different species, were imported into the United States (**Table 1**). *Python regius* (ball python) comprised a significant percentage (78 percent) of these imports.

In general, it is difficult to describe long term trends for the importation or breeding of constrictor snakes. Trends are consumer-driven and typically change depending on the development of color-morphs (a variation in color or pattern). For example, imports could be important until U.S. breeders learn to captive breed particular morphs (Reaser 2009). However, if a desirable color morph is developed in the United States, then imports may decrease. Because it is difficult to estimate the long-term trends, this analysis uses a 3-year moving average when available. This overview section simply attempts to describe the past and current status of the importation and breeding of constrictor snakes in the United States. **Figure 1** shows that snake importation peaked in 2002 and 2005 but has since declined overall.

Importation of constrictor snakes is not distributed evenly across the United States (**Table 2**). Instead, imports were concentrated in three ports over the last three years: Miami, Los Angeles, and Dallas-Ft. Worth. These three ports have consistently represented about 98 percent of imported live constrictor snakes since 1999 (USFWS 2011). Approximately 354 companies or individuals imported live constrictor snakes during the last 12 years.

Table 1 shows total live constrictor snake imports from 1999 to 2010. *Python regius* accounts for 78.0 percent, and *Boa constrictor* accounts for 11.1 percent of total imports over this period.

Table 1

Total Live Constrictor Snake Imports: 1999-2010				
Genus	Species	Total Imports	Percent of Total Imports	Annual Average
<i>Python</i>	<i>regius</i>	1,556,601	78.0%	129,717
<i>Boa</i>	<i>constrictor</i>	220,493	11.1%	18,374
<i>Python</i>	<i>molurus bivittatus</i>	86,936	4.4%	7,245
<i>Python</i>	<i>reticulatus</i>	74,303	3.7%	6,192
<i>Python</i>	<i>curtus</i>	26,919	1.3%	2,243
<i>Python</i>	<i>brongersmai</i>	10,212	*	851
<i>Python</i>	<i>sebae</i>	8,940	*	745
<i>Eunectes</i>	<i>murinus</i>	7,542	*	629
<i>Eunectes</i>	<i>species</i>	864	*	72
<i>Python</i>	<i>species</i>	702	*	59
<i>Python</i>	<i>breitensteini</i>	557	*	46
<i>Eunectes</i>	<i>notaeus</i>	382	*	32
<i>Python</i>	<i>timoriensis</i>	31	*	3
<i>Python</i>	<i>anchietae</i>	1	*	0
<i>Python</i>	<i>natalensis</i>	0	0%	0
<i>Eunectes</i>	<i>deschauenseei</i>	0	0%	0
<i>Eunectes</i>	<i>beniensis</i>	0	0%	0
Total		1,994,483	100.0%	166,208

* = less than 1 %

Bold = One of the nine species affected by the final rule

Source: USFWS 2011

Table 2 shows total imports (all species) from 2008 to 2010. *Python regius* accounts for 78.6 percent and *Boa constrictor* accounts for 15.6 percent of all imports during this time period.

Table 2

Total Live Constrictor Snake Imports: 2008-2010				
Genus	Species	Total Imports	Annual Average	Percent of Total Imports
<i>Python</i>	<i>regius</i>	246,305	82,101	78.6 %
<i>Boa</i>	<i>constrictor</i>	48,779	16,260	15.6 %
<i>Python</i>	<i>molurus bivittatus</i>	8,221	2,740	2.6 %
<i>Python</i>	<i>brongersmai</i>	5,288	1,763	1.7 %
<i>Python</i>	<i>reticulatus</i>	2,032	677	*
<i>Eunectes</i>	<i>murinus</i>	1,539	513	*
<i>Python</i>	<i>sebae</i>	580	193	*
<i>Python</i>	<i>curtus</i>	354	118	*
<i>Python</i>	<i>breitensteini</i>	282	94	*
<i>Python</i>	<i>species</i>	104	35	*
<i>Eunectes</i>	<i>notaeus</i>	23	8	*
<i>Python</i>	<i>timoriensis</i>	17	6	*
<i>Python</i>	<i>anchietae</i>	0	0	*
<i>Python</i>	<i>natalensis</i>	0	0	*
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	*
Total		313,524	104,508	100.0%

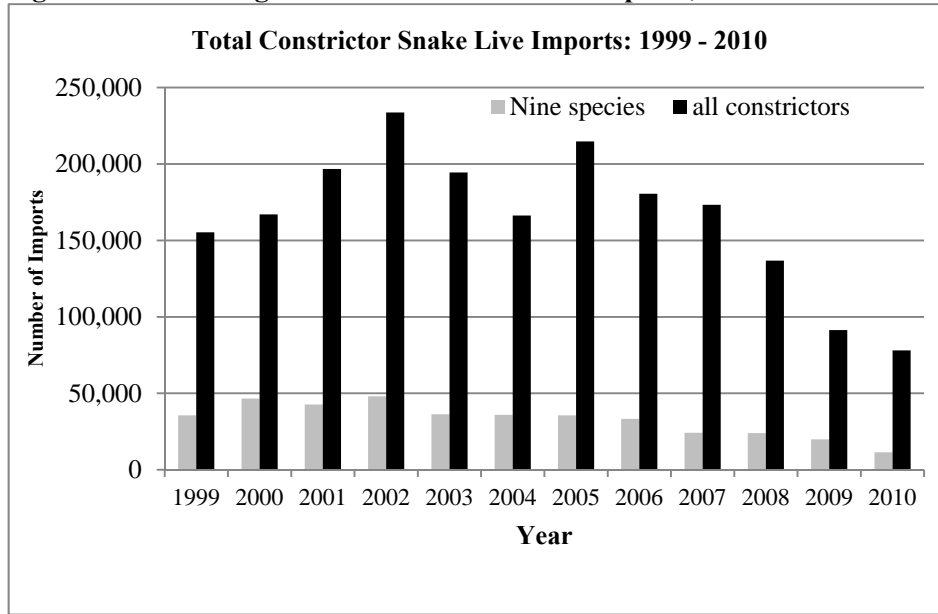
* = less than 1 %

Bold = One of the nine species affected by the final rule

Source: USFWS 2011

Figure 1 shows the total numbers of constrictor imports and imports of the nine species. Imports reached a peak in 2002 and have declined significantly since 2005.

Figure 1. Total Large Constrictor Snake Live Imports, 1999-2010.



Source: USFWS 2011

Table 3 compares average annual constrictor snake imports for the periods 1999 to 2010 and 2008 to 2010. We are basing our analysis on data for the most recent three years, since this period best reflects the conditions that would be affected by the final rulemaking.

Table 3

Live Constrictor Snake Imports, All Species and Nine Species, Annual Average 1999 - 2010 and 2008 - 2010		
Imported Constrictor Snakes	1999-2010 Annual Average	2008-2010 Annual Average
Total Number of Imported Live Constrictor Snakes: All Species	166,208	104,508
Total Number of Imported Live Constrictor Snakes: Nine Species	33,217	20,391
Nine Species as Percentage of Total Live Constrictor Snake Imports	20.0 %	19.5 %

Source: USFWS 2011

Table 4 shows the port of entry for imports of the nine species. Miami, Los Angeles, and Dallas - Ft. Worth account for 98 percent of all imports.

Table 4

Live Constrictor Snake Nine Species Imports by Port of Entry: 1999-2007 and 2008-2010				
Port	Total Imports 1999-2007	Percent	Total Imports 2008-2010	Percent
Miami	255,183	75.6%	52,793	86.3%
Los Angeles	68,849	20.4%	5,280	8.6%
Dallas-Ft. Worth	7,435	2.2%	1,808	3.0%
All other Ports	5,955	1.8%	1,293	2.1%
Total	337,422	100%	61,174	100.0%

Source: USFWS 2011

Table 5 shows total number of importers of all species and those importers who import one or more of the nine species, as well as other constrictor species. From 1999 to 2010, 354 firms or individuals imported constrictor snakes of all species. The top five firms in terms of number of snakes imported accounted for 25 percent of imports while the top 25 accounted for 39.6 percent. For the period 2008 - 2010, 112 firms imported constrictor snakes with the top five accounting for 49.2 percent and the top 25 accounting for 87.2 percent. From 1999 - 2010, 242 importers imported one or more of the nine species, with the top 5 accounting for 43.9 percent and the top 25 accounting for 87.5 percent. For the period 2008 - 2010, 84 importers imported one of the nine species with the top 5 accounting for 33.2 percent and the top 25 accounting for 48.7 percent.

Table 5

Number of Importers of Live Constrictor Snakes and Percent of Total Imports by Top 5, 10 and 25 Importers				
	All Species 1999 – 2010	Nine Species 1999 - 2010	All Species 2008 - 2010	Nine Species 2008 - 2010
Total Importers	354	242	112	84
Top 5	25.0%	43.9%	49.2%	33.2%
Top 10	30.7%	67.4%	66.9%	42.8%
Top 25	39.6%	87.5%	87.2%	48.7%

Source: USFWS 2011

U.S. Bred Large Constrictor Snakes

Impacted businesses in the constrictor snake market are not typically large enough to have major data collections and reporting requirements such as the agricultural crop industry or the car manufacturing industry. Thus, current data for the U.S. bred large constrictor snake market are limited to the data provided by the Pet Industry Joint Advisory Council during the public comment period of the Notice of

Inquiry (73 FR 5784; January 31, 2008). The data³ include estimates for 14 species of *Python*, *Boa*, and *Eunectes* (see Appendix). We considered another estimate of domestic production from the industry. PIJAC stated in their public comment of May 11, 2010 that “domestic production [of *Boa constrictor imperator*] in the pet trade ranges from 100,000 and 150,000 annually.” The comment explained that this was based on information they received from several multi-state retailers. The name and location of the retailers are not given in the comment, nor is there any citation or source for these numbers. The 100,000 to 150,000 range is seven to ten times higher than the previous PIJAC estimate (2008) and the 150,000 figure equals the estimate provided by USARK of high-end sales for *all* constrictor snake species (USARK 2009, 2010). However, since the range is an order of magnitude higher than previous estimates, and in the absence of any information as to the source and accuracy of the range estimate, our analysis relies on the original PIJAC estimate (2008) and additional information from USARK (2009, 2010).

Table 6 shows the average number of large constrictor snakes bred in the United States (PIJAC 2008, 2010). As shown, *Python regius* (ball python) comprises the largest percentage of U.S.-bred snakes (34.3 percent) and is closely followed by *Boa constrictor* (28.5 percent) and *P. molurus* (18.7 percent). Together, these three species account for 80 percent of all large constrictor snakes bred in the United States.

Table 6

Live Constrictor Snakes Bred in the U.S: Annual Average			
Genus	Species	Number of U.S. Bred Snakes	Percentage of Total
<i>Python</i>	<i>regius</i>	17,500	34.3%
<i>Boa</i>	<i>constrictor</i>	14,550	28.5%
<i>Python</i>	<i>molurus</i>	9,500	18.7%
<i>Python</i>	<i>reticulatus</i>	5,000	9.8%
<i>Python</i>	<i>brongersmai</i>	1,500	2.9%
<i>Python</i>	<i>breitensteini</i>	1,250	2.5%
<i>Python</i>	<i>curtus</i>	850	1.7%
<i>Python</i>	<i>anchietae</i>	350	*
<i>Eunectes</i>	<i>murinus</i>	200	*
<i>Python</i>	<i>natalensis</i>	100	*
<i>Python</i>	<i>sebae</i>	100	*
<i>Eunectes</i>	<i>notaeus</i>	100	*
<i>Python</i>	<i>timoriensis</i>	20	*
Annual Total		51,020	100.0%

* = less than 1 %

Bold = One of the nine species affected by the final rule

Source: PIJAC 2008, 2010

While PIJAC provided data on the number of U.S. bred snakes and their retail value in 2008, we were unable to find any other data sources for U.S. bred snakes specifically. Thus, we do not know where these breeders or wholesalers are located nor do we know where the snakes are shipped after purchase⁴.

³ The 14 species included are *Boa constrictor*, *Python anchietae*, *Python brongersmai*, *Python breitensteini*, *Python curtus*, *Python molurus*, *Python natalensis*, *Python regius*, *Python reticulatus*, *Python sebae*, *Python timoriensis*, *Eunectes murinus*, *Eunectes deschauenseei*, and *Eunectes notaeus*.

⁴ The three states with the most imports from 2008 to 2010, Florida, Texas, and California, have state or local regulations regarding the commercial and private use of constrictor snakes (see in References: Florida Fish and

Furthermore, we do not know the business profiles of these entities. That is, it is unknown if these businesses are diversified by earning income in other areas (such as selling non-snake reptiles or nonregulated snakes) in addition to the breeding of large constrictor snakes.

Table 7 summarizes total annual constrictor snake imports and U.S. bred snakes. *Python regius* accounts for 64.0 percent and *Boa constrictor* accounts for 19.8 percent of the average annual total of imported and U.S. bred snakes. **Table 8** shows the same information for the nine species for the period 2008 - 2010. *Boa constrictor* accounts for 61.7 percent and *Python molurus* accounts for 24.5 percent of the total of imports and U.S. bred snakes of the nine species.

Table 7

All Species: Total Live Constrictor Snake Imports and U.S. Bred Snakes: Annual Average 2008-2010					
Genus	Species	Total Imports	Total U.S. Bred	Percentage of Total	Annual Average
<i>Python</i>	<i>regius</i>	82,101	17,500	64.0%	99,601
<i>Boa</i>	<i>constrictor</i>	16,260	14,550	19.8%	30,810
<i>Python</i>	<i>bivittatus</i>	2,740	9,500	7.9%	12,240
<i>Python</i>	<i>reticulatus</i>	677	5,000	3.7%	5,677
<i>Python</i>	<i>brongersmai</i>	1,763	1,500	2.1%	3,263
<i>Python</i>	<i>breitensteini</i>	94	1,250	*	1,344
<i>Python</i>	<i>curtus</i>	118	850	*	968
<i>Eunectes</i>	<i>murinus</i>	513	200	*	713
<i>Python</i>	<i>anchietae</i>	0	350	*	350
<i>Python</i>	<i>sebae</i>	193	100	*	293
<i>Eunectes</i>	<i>notaeus</i>	8	100	*	108
<i>Python</i>	<i>natalensis</i>	0	100	*	100
<i>Python</i>	<i>species</i>	35	0	*	35
<i>Python</i>	<i>timoriensis</i>	6	20	*	26
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	*	0
Total		104,508	51,020	100.0%	155,528

* = less than 1 %

Bold = One of the nine species affected by the final rule

Source: USFWS 2011; PIJAC 2008, 2010

Wildlife Conservation Commission, Texas Parks and Wildlife Department, and Los Angeles Animal Services). For example, the Florida Fish and Wildlife Conservation Commission requires permits for designated “reptiles of concern” which include five of the nine species in the proposed rule and which requires the tracking of both in-state and out of state sales. In 2009, 809 specimens were sold out of state and 143 were sold in state, with out of state sales accounting for 85 percent of total sales.

Table 8

Nine Species: Total Live Constrictor Snake Imports and U.S. Bred Snakes: Annual Average 2008-2010					
Genus	Species	Total Imports	Total U.S. Bred	Percentage of Total	Annual Average
<i>Boa</i>	<i>constrictor</i> <i>molurus</i>	16,260	14,550	61.7%	30,810
<i>Python</i>	<i>bivittatus</i>	2,740	9,500	24.5%	12,240
<i>Python</i>	<i>reticulatus</i>	677	5,000	11.4%	5,677
<i>Eunectes</i>	<i>murinus</i>	513	200	1.4%	713
<i>Python</i>	<i>sebae</i>	193	100	*	293
<i>Eunectes</i>	<i>notaeus</i>	8	100	*	108
<i>Python</i>	<i>natalensis</i>	0	100	*	100
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	*	0
Total		20,391	29,550	100.0%	49,941

* = less than 1 %

Bold = One of the nine species affected by the final rule

Source: USFWS 2011; PIJAC 2008, 2010

Table 9 summarizes the number of imports and U.S. bred snakes for both all species and the nine species affected by the final rule for the period 2008 – 2010 (annual average).

Table 9

Summary of Annual Live Imports and Domestic Breeding of Constrictor Snakes: Annual Average 2008 – 2010	
	Annual Average 2008 - 2010
Total number of live constrictor snakes imported: all species	104,508
Total number of live constrictor snakes imported: nine species	20,391
Total U.S. bred constrictor snakes: all species	51,020
Total U.S. bred constrictor snakes: nine species	29,550
Total live constrictor snake imports and U.S. bred snakes: all species	155,528
Total live constrictor snake imports and U.S. bred snakes: nine species	49,941
Nine species as percent of total imports and U.S. bred snakes	32.1 %

Source: USFWS 2011; PIJAC 2008, 2010

Pet Owners and Hobbyists

Pet owners and hobbyists drive the constrictor snake market in that it is their consumer profiles that dictate how breeders, importers, and retailers market their products. The number of constrictor snake pet owners and hobbyists is unknown. According to a 2009-2010 survey by the American Pet Products Association (APPA), 4.7 million U.S. households own a reptile as a pet. Total number of reptiles owned as pets is estimated to be 13.6 million (APPA 2010). However, this survey did not detail large constrictor snake owners or even snake owners specifically. A survey by the American Veterinary Medical Association shows that 390,000 households in 2006 had snakes (all species) as pets, with a total pet snake population of 586,000 (American Veterinary Medical Association 2007). The United States Association of Reptile Keepers (USARK 2010) estimates that “2 million breeding age animals” with an asset value of \$800 million currently exist. What portion of the total number is composed of constrictor snakes is currently unknown. Impacts to pet owners and hobbyists are discussed in the sections under each alternative.

Secondary Economic Impacts and Estimation Method

The commercial and recreational uses of constrictor snakes generate a large amount of economic activity in a variety of ways. Breeders, individual retailers, wholesalers, chain pet shops, snake-related care and food suppliers, and hobbyists all spend a considerable amount of money obtaining and caring for constrictor snakes. Such spending can generate a substantial amount of economic activity in the local, regional and national economies. For example, a firm which imports and sells constrictor snakes spends money on a wide variety of goods and services, such as food, veterinary services, habitat-related items (such as heat and lighting source, bin/rack or aquarium, substrate, etc.), office supplies, rent, utilities, and a variety of other goods and services. Consequently, businesses and industries that supply the local retailer also benefit from snake expenditures. For example, when a snake is sold, part of the total purchase price goes to the local retailer. The retailer in turn pays a wholesaler who in turn pays an importer. The importer then spends a portion of this income to cover importation expenses. In this way, each dollar of local retail expenditures can affect a variety of businesses at the local, regional and national level. The same is true for hobbyists' expenditures. Consequently, spending associated with commercial and recreational use of constrictor snakes can have an impact on economic activity, employment, income, and local, state and federal tax revenue. The following is a list of terms and definitions that are commonly used in economic impact analysis (Minnesota IMPLAN Group, Inc. 2004 and Miller and Blair 1985).

Retail value shows the estimated retail value (quantity x price) of constrictor snakes.

Economic output shows the total industrial output associated with the estimated retail sales. Total output is the production value (alternatively, the value of all sales plus or minus inventory) of all output generated by these sales. Total output includes the direct, indirect and induced effects of constrictor snake-related expenditures. Direct effects are simply the initial effects or impacts of spending money; for example, spending money in a pet shop for a boa. The purchase of the boa by the pet shop retailer from a wholesaler would be examples of an indirect effect, as would the purchase of snake-related supplies by the retailer. Finally, induced effects refer to the changes in production associated with changes in household income (and spending) caused by changes in employment related to both direct and indirect effects. More simply, people who are employed by the retailer, by the wholesaler, and by the manufacturer of snake-related supplies spend their income on various goods and services, which in turn generate a given level of output. The dollar value of this output is the induced effect of the initial retail snake purchase.

Jobs and job income include direct, indirect and induced effects in a manner similar to total industrial output. Employment includes both full and part-time jobs, with a job defined as one person working for at least part of the calendar year, whether one day or the entire year.

Tax revenues are shown for business taxes, income taxes, and a variety of taxes at the local, state and national level. Like output, employment and income, tax impacts include direct, indirect and induced tax effects of snake expenditures.

Constrictor snake retail values were used in conjunction with an economic modeling method known as *input-output analysis*⁵ to estimate the secondary effects--economic output, employment, employment income and tax revenue associated with these expenditures. The estimated impacts are nation-wide impacts. We do not have sufficient information to disaggregate the national impacts to regional, state or local impacts. The specific modeling approach we use, IMPLAN (see footnote), is a *static* approach to impacts in that the impact estimates are for a specific point in time. Ideally, we would like to have a *dynamic* estimate of impacts, where the economy makes a series of comprehensive adjustments over time. This can be done by using a *computable general equilibrium* model (CGE). However, sufficient information is not available to undertake this particular approach.

Environmental Benefits

Populations of boas and pythons are currently established in southern Florida. These populations could have negative impacts on a variety of entities, such as agriculture, human health, and native animal species. Preventing their spread and establishment of new populations would benefit wildlife and society by reducing these negative impacts. However, quantitative estimates of the economic value of these impacts are not currently available. We provide qualitative assessment of benefits of the four alternatives later in the analysis.

Currently, a number of activities are being conducted by various agencies and entities (i.e., National Park Service (Everglades National Park), U.S. Fish and Wildlife Service, U.S. Department of Agriculture, South Florida Water Management District, U.S. Geological Survey, Florida Fish and Wildlife Conservation Commission, University of Florida, county governments, non-governmental organizations and others) to reduce the potential of the population increasing or spreading further. These actions include but are not limited to, capture and removal; public education and awareness; spatial ecology and movement studies using radio telemetry and satellite/GPS technology; diet analysis; thermal biology (implanted data loggers); trap development/trials; impacts analysis; pilot studies: genetics, salinity tolerance; and potential use of unmanned aerial vehicles with thermal infrared cameras to detect pythons in the field. Preventing the spread of large constrictor snakes also benefits society by reducing the need for and costs of the programs.

For more information regarding the status of large constrictor snakes, refer to the USGS Biological/Management Profiles and USGS Risk Assessment (Reed and Rodda 2009) or the USFWS Environmental Assessment.

⁵ The estimates of total economic activity, employment, employment income and federal and state taxes in this report were derived using IMPLAN, a regional input-output model and software system. "IMPLAN...was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning." (Minnesota IMPLAN Group, Inc. 2004). First developed in 1979, IMPLAN data and software was privatized in 1993 by the Minnesota IMPLAN Group, Inc. For additional information, See www.implan.com. For additional information on input-output modeling, see Miller and Blair *Input-Output Analysis*.

ALTERNATIVE 1 (STATUS QUO) – THE NO ACTION ALTERNATIVE

Large Constrictor Snake Market

This section of the report describes the constrictor snake market in terms of the number and value of snakes imported and U.S. bred snakes sold in the United States. Two indicators will be used to characterize the economic effects of the constrictor snake market and the impacts of the different alternatives on the status quo: (1) estimates of retail value and (2) estimates of secondary economic impacts, including economic output, employment, employment income and tax revenue.

The previous section of the report summarized size and composition of the large constrictor snake market. This section estimates retail value and economic impacts based on information provided by both industry and the Service. Data from the Service was used for imports, and both PIJAC and USARK provided information for U.S. bred constrictor snakes.

To estimate the impact of the rule on consumers and the large constrictor snake industry, a variety of data and information are needed. This includes an estimate of the number of snakes sold annually, what prices these snakes sold at, and what snakes and what percent of total snake sales would be affected or potentially affected by the rule. Information would also be needed on who is affected and how they might be affected. A comprehensive range of information to estimate these impacts to a decimal point degree of precision is not available. However, the information currently available, provided by industry, consumers and the Service, does allow a reconnaissance-level estimate of the expected impacts to industry and consumers of the adoption of the rule. Not all of these impacts can be addressed quantitatively; a qualitative discussion of the effects of the rule may be the only option in some cases.

Constrictor Snake Industry and Consumers

This section identifies the major components of the industry.

Pet Owners: According to a 2009-2010 survey by the American Pet Products Association (APPA), 4.7 million U.S. households own a reptile as a pet. Total number of reptiles owned as pets is estimated to be 13.6 million (APPA 2010). However, this survey did not detail large constrictor snake owners or even snake owners specifically. A survey by the American Veterinary Medical Association shows that 390,000 households in 2006 had snakes (all species) as pets, with a total pet snake population of 586,000 (American Veterinary Medical Association 2007). United States Association of Reptile Keepers (USARK 2009) estimates that “2 million breeding age animals” with an asset value of \$800 million currently exist. What portion of the total number is composed of constrictor snakes is currently unknown.

Importers: From 1999 to 2010, 354 importers imported almost 2 million live constrictor snakes of all species (**Table 1**). Over 398,000 of these imports were individuals of the nine species addressed in the final rule. In recent years (2008 - 2010), most of these imports came through Miami (86.7%), Los Angeles (8.7%) and Dallas-Ft. Worth (3.5%).

Hobbyist and commercial breeders: A number of pet snake owners also breed their snakes. Some owners may do so strictly for their own enjoyment with no intent to sell the snakes while others may intend to sell in limited quantities to other pet owners or breeders. Commercial breeders run businesses that sell snakes to wholesalers, retailers, other breeders, zoos, research organizations and other entities. PIJAC (2008, 2010) estimates that there are between 2,000 and 5,000 hobbyists in the U.S. and between

2,500 and 5,000 individuals and businesses that breed constrictor snakes. Information on the number of individual hobbyists and businesses that breed one or more of the nine species is not currently available.

Retailers: Snake sales by retailers may include over-the-counter sales such as a pet store, internet-based sales and mail-order firms. PIJAC (2008, 2010) estimates the number of U.S. retail firms selling constrictor snakes at 5,100. Information on the number of firms selling one or more of the nine species is not currently available.

Exhibitors: A number of individuals and firms attend reptile shows and exhibits throughout the U.S. PIJAC estimates that about 25 individuals and hobbyists contribute to or organize 350 to 400 shows annually.

Wholesalers: Wholesalers include firms and individuals that sell snakes to other businesses, either in lieu of or in addition to selling to consumers. Information on the number of constrictor snake wholesalers in the U.S. is not currently available.

Support services: In addition to snake sales, ancillary and support services comprise a significant part of the snake industry. Four major categories include: (1) food suppliers, mostly frozen or live rats and mice; (2) equipment suppliers, such as cages, containers, lights and other non-food items; (3) veterinarians and other health-related items; and (4) shipping companies.

Research organizations, zoos, reptile parks, and educational operations: Along with pet owners and hobbyists, these organizations are the other major users of live constrictor snakes.

While many entities may focus solely on a particular function (wholesaler, retailer, etc.), many others combine several functions. For example, a particular firm may import snakes, breed them, sell to wholesalers and retailers, sell snakes over-the-counter or over the internet to consumers and provide support services.

Estimating Industry Impacts: Sales Revenue and Economic Impacts

The major economic driver from the industry perspective is the elimination of imports and interstate sales and transport. To estimate these impacts on sales revenue and the resulting impacts on industrial output, employment, employment income and tax revenue, information on the current situation with regard to sale price (dollars per snake) and the number of sales is needed.

Prices: Three different sources are used to estimate snake prices:

- (1) PIJAC (2008, 2010) provided information on a range of average prices for snakes by genus and species (see Appendix);
- (2) Information on prices was gathered from advertisements by snake sellers on the internet (**kingsnake.com**), resulting in over 2,900 prices obtained from 158 sellers for boas, anacondas, and pythons; and
- (3) USARK (2010) provided information on “high-end” sales of constrictor snakes.

Table 10 shows price per snake estimates based on each of these three sources. PIJAC information showed a range for all species from \$100 to \$3,000. When combined with import and U.S.

bred snake numbers, the price per snake averaged \$200. The retail data from the internet included observations on price only, information on quantity sold or available was not available. Since estimating an average or mean price in the absence of quantity sold information is not feasible, we decided that the **median** (the midpoint of an array of numbers) price was an acceptable alternative. Based on over 2,900 observations, the median price was \$400 per snake with prices ranging from \$25 to \$35,000. USARK (2010) information stated that 150,000 ‘high-end animal sales’ occurred annually with a value of \$60 million (it is assumed that “animal sales” refers to constrictor snake sales). This averages to \$400 per snake.

We recognize the price data are not all inclusive. While an overall range of \$25 - \$35,000 is fairly wide, a number of constrictor snake species may sell for up to \$100,000, depending on morph, color and scarcity (USARK 2009). However, information on such sales in terms of quantity and price is not currently available.

With the average price range based on these three sources of \$200 - \$400 per snake, and along with the USARK information on high-end sales, it seems reasonable to segment the market into high-end and low-end sales. Using \$200 per snake would undervalue the high-end snakes, while using \$400 per snake would overvalue the low-end snakes.

Table 10

Sources of Price Information Used to Estimate Sales Revenue Impacts		
Source	Range/Basis	Average/Median
PIJAC (2008, 2010)	\$100 - \$3,000	\$200
Retail data (kingsnake.com)	\$25 - \$35,000	\$400 (median)
USARK (2010)	150,000 “high-end” snakes worth \$60 million	\$400

Estimating number of sales: Several types of sales information are needed in order to estimate the impacts of the final rule on sales of the nine species affected by the rule. This information would include: (1) total constrictor snake sales for all species; (2) total constrictor snake sales of the nine species; (3) proportion of sales that are out-of-state and (4) proportion of sales that are in-state.

Detailed information on sales is not currently available. The USARK information considers “high-end” sales, which presumably does not include “low-end” sales. Consequently, in order to use the USARK information to estimate total sales, some method must be used to estimate low-end sales. An alternative approach would use existing data on imports and U.S. bred snakes to estimate constrictor snake sales. In order to use all the information currently available, this analysis will use two approaches (Scenario A and Scenario B) to estimate sales.

Scenario A: This approach uses import and U.S. bred snake data to estimate constrictor snake sales. This approach assumes that all or some portion of annual imports are sold and that all or some portion of the number of constrictor snakes bred in the U.S. annually are sold. The number of snakes actually sold annually consists of some percentage of imports (not all) and some portion of U.S. bred snakes (not all) and some portion of snakes that were neither imported or bred that year, but carry-overs

from previous years (either imported or bred). Since the percentage of sales from carry-overs is not known, assuming that all imports and all U.S. bred snakes are sold, makes up for, at least to a certain extent, not explicitly considering carry-over sales. This was the approach used in the draft economic analysis.

Scenario B: This approach uses information from USARK (2009) on high-end sales and their value (new information obtained through the public comment process). The following method uses this information to estimate the number of the nine species sold annually.

1. Total number of constrictor snake imports and U.S. bred snakes (all species) annually: 155,528 (see Table 7).
2. Total number of nine constrictor snake species imports and U.S. bred snakes annually: 49,941 (Table 8).
3. Nine species as percentage of total imports and U.S. bred snakes annually: 32.1 % (Table 9).
4. Number of high-end constrictor snakes annually (USARK 2010): 150,000 (Table 10).
5. Number of nine species sold as high-end constrictor snakes annually: 48,178. (3. multiplied by 4.)
6. From retail price data observations on constrictor snakes, 47 percent are \$400 and above, 53 percent are below \$400. (information from kingsnake.com)
- 6a. Consequently, 48,178 is 47 percent of the total number of the nine species sold annually (48,178 divided by 0.47 equals 102,506. Low-end sales equal 102,506 minus 48,178 or 54,328.)
7. For both high and low end sales, total number of nine species sold annually: 102,506. (4. minus 5.)
8. Total annual constrictor snake sales are estimated to be 319,333 (7. divided by 3.)

The high-end and low-end designations are based, as in 6. above, on the percentage of price observations above and below \$400 per snake. It is not clear how USARK defines high-end sales, so in lieu of any other information, the percentages from the price data are used to segment the market into high-end (\$400 average price) and low-end (\$200 average price).

Scenario A: Estimated Sales and Associated Economic Impacts

Imported Large Constrictor Snake Market

Table 11 shows low-end and high-end constrictor snake imports along with total imports for all species. Ball pythons and boas account for most of the imports with 94 percent of the total. Total imports during the period 2008 – 2010 averaged over 104,000 annually.

Table 12 shows estimated sales revenue for low-end and high-end snake imports (all species) along with total sales revenue. Low-end imports accounts for \$11.1 million and high-end imports account for \$19.6 million. Total sales revenue is estimated at \$30.7 million annually based on the period 2008 – 2010.

Table 11

Alternative 1 – Total Live Constrictor Snake Imports, All Species: Estimated High-end and Low-end Imports: 2008 - 2010 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Python</i>	<i>regius</i>	43,514	38,587	82,101	78.6%
<i>Boa</i>	<i>constrictor</i>	8,618	7,642	16,260	15.6%
<i>Python</i>	<i>molurus</i>	1,452	1,288	2,740	2.6%
<i>Python</i>	<i>brongersmai</i>	934	829	1,763	1.7%
<i>Python</i>	<i>reticulatus</i>	359	318	677	*
<i>Eunectes</i>	<i>murinus</i>	272	241	513	*
<i>Python</i>	<i>sebae</i>	102	91	193	*
<i>Python</i>	<i>curtus</i>	63	55	118	*
<i>Python</i>	<i>breitensteini</i>	50	44	94	*
<i>Python</i>	<i>species</i>	19	16	35	*
<i>Eunectes</i>	<i>notaeus</i>	4	4	8	*
<i>Python</i>	<i>timoriensis</i>	3	3	6	*
<i>Python</i>	<i>anchietae</i>	0	0	0	*
<i>Python</i>	<i>natalensis</i>	0	0	0	*
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	*
Total		55,390	49,118	104,508	100%

* = less than 1%

Bold = One of the nine species affected by the final rule

Source: USFWS 2011

Table 12

Alternative 1: Total Live Constrictor Snake Imports, All Species: Estimated High-end and Low-end Imports and Sales Revenue: 2008 - 2010 Annual Average						
Genus	Species	Low-end Imports	Total Sales		Total Sales	
			@ \$200/snake	High-end Imports	@ \$400/snake	Total Sales Revenue
<i>Python</i>	<i>regius</i>	43,514	\$8,702,706	38,587	\$15,434,988	\$24,137,694
<i>Boa</i>	<i>constrictor</i>	8,618	\$1,723,560	7,642	\$3,056,880	\$4,780,440
<i>Python</i>	<i>molurus</i>	1,452	\$290,440	1,288	\$515,120	\$805,560
<i>Python</i>	<i>reticulatus</i>	359	\$71,762	318	\$127,276	\$199,038
<i>Python</i>	<i>curtus</i>	63	\$12,508	55	\$22,184	\$34,692
<i>Python</i>	<i>sebae</i>	102	\$20,458	91	\$36,284	\$56,742
<i>Eunectes</i>	<i>murinus</i>	272	\$54,378	241	\$96,444	\$150,822
<i>Python</i>	<i>brongersmai</i>	934	\$186,878	829	\$331,444	\$518,322
<i>Python</i>	<i>breitensteini</i>	50	\$9,964	44	\$17,672	\$27,636
<i>Python</i>	<i>species</i>	19	\$3,800	16	\$3,200	\$7,000
<i>Eunectes</i>	<i>notaeus</i>	4	\$848	4	\$1,504	\$2,352
<i>Python</i>	<i>timoriensis</i>	3	\$636	3	\$1,128	\$1,764
<i>Python</i>	<i>anchietae</i>	0	\$0	0	\$0	\$0
<i>Python</i>	<i>natalensis</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		55,390	\$11,077,938	49,118	\$19,644,124	\$30,722,062

Bold = One of the nine species affected by the final rule

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

U.S. Bred Large Constrictor Snake Market

In addition to the imported snake market, there is also a market for U.S. bred snakes. **Table 13** summarizes annual low and high-end U.S. bred snakes and their respective sales revenue estimates. Over 27,000 low-end snakes have an estimated sales revenue of \$5.4 million while 24,000 high-end snakes have an estimated sales revenue of \$9.5 million annually.

Table 14 summarizes the annual number of imports and U.S. bred snakes and their estimated retail value. A total of 155,493 snakes have an estimated retail value of \$45.7 million annually.

Table 13

Alternative 1: Total U.S. Bred Constrictor Snakes, All Species: Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue: 2008 - 2010 Annual Average						
Genus	Species	Total Sales			Total Sales	
		Low-end	@ \$200/snake	High-end	@ \$400/snake	Total Sales Revenue
<i>Python</i>	<i>regius</i>	9,275	\$1,855,000	8,225	\$3,290,000	\$5,145,000
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,542,300	6,839	\$2,735,400	\$4,277,700
<i>Python</i>	<i>molurus</i>	5,035	\$1,007,000	4,465	\$1,786,000	\$2,793,000
<i>Python</i>	<i>reticulatus</i>	2,650	\$530,000	2,350	\$940,000	\$1,470,000
<i>Python</i>	<i>brongersmai</i>	795	\$159,000	705	\$282,000	\$441,000
<i>Python</i>	<i>breitensteini</i>	663	\$132,500	588	\$235,000	\$367,500
<i>Python</i>	<i>curtus</i>	451	\$90,100	400	\$159,800	\$249,900
<i>Python</i>	<i>anchietae</i>	186	\$37,100	165	\$65,800	\$102,900
<i>Eunectes</i>	<i>murinus</i>	106	\$21,200	94	\$37,600	\$58,800
<i>Python</i>	<i>sebae</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>notaeus</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>natalensis</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>timoriensis</i>	11	\$2,120	9	\$3,760	\$5,880
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		27,041	\$5,408,120	23,979	\$9,591,760	\$14,999,880

Bold = One of the nine species affected by the final rule

Source: PIJAC 2008, 2010; USARK 2010

Table 14

Alternative 1: Total Annual Imports and U.S. Bred Snakes and Total Retail Value					
Genus	Species	Total Imports	Total U.S. Bred	Total Imports and U.S. Bred Snakes	Total Retail Value
<i>Python</i>	<i>regius</i>	82,101	17,500	99,601	\$29,282,694
<i>Boa</i>	<i>constrictor</i>	16,260	14,550	30,810	\$9,058,140
<i>Python</i>	<i>molurus</i>	2,740	9,500	12,240	\$3,598,560
<i>Python</i>	<i>reticulatus</i>	677	5,000	5,677	\$1,669,038
<i>Python</i>	<i>brongersmai</i>	1,763	1,500	3,263	\$959,322
<i>Python</i>	<i>breitensteini</i>	94	1,250	1,344	\$395,136
<i>Python</i>	<i>curtus</i>	118	850	968	\$284,592
<i>Eunectes</i>	<i>murinus</i>	513	200	713	\$209,622
<i>Python</i>	<i>anchietae</i>	0	350	350	\$102,900
<i>Python</i>	<i>sebae</i>	193	100	293	\$86,142
<i>Eunectes</i>	<i>notaeus</i>	8	100	108	\$31,752
<i>Python</i>	<i>natalensis</i>	0	100	100	\$29,400
<i>Python</i>	<i>species</i>	35	0	35	\$7,000
<i>Python</i>	<i>timoriensis</i>	6	20	26	\$7,644
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	\$0
Total		104,508	51,020	155,528	\$45,721,942

Bold = One of the nine species affected by the final rule

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

Retail Value and Secondary Impacts (Scenario A)

Table 15 shows an estimate of the annual economic impacts associated with the retail value of constrictor snake imports and U.S. bred snakes for 2008 - 2010. With a retail value of \$45.7 million, economic output is \$130.7 million, employment is 1,156, related employment income is \$46.6 million and total Federal, state and local tax revenue is \$17.9 million.

Table 15

Alternative 1 (No Action) Impacts: 2008-2010 Annual Average (Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$45.7	\$130.7	1,156	\$46.6	\$10.7	\$7.2	\$17.9

Table 16 shows economic impacts to major industrial sectors for Alternative 1. Manufacturing, trade and services account for 84 percent of the economic impacts. As discussed previously, economic impacts include the direct, indirect and induced effects of changes in retail spending associated with constrictor snakes. **Direct effects** are driven by changes in final demand, in this case reductions in retail sales. **Indirect effects** are changes in inter-industry purchases, such as a reduction in a wholesaler's demand for supplies and equipment because there has been a reduction in demand for goods and services provided by the wholesaler because of the reduction in retail sales. Another example of indirect effects is

a reduction in manufacturing goods and services (because of the reduction in retail sales) which in turn causes the manufacturer to reduce her demand for the all the necessary inputs into the manufacturing of the goods and services which her firm provides. For both direct and indirect effects, labor and income are affected, which in turn affects household expenditures and those industries which provide goods and services to households. **Table 16** then disaggregates the economic output in **Table 15** to show which industries are affected and the magnitude of the impacts.

Table 16

Alternative 1 (No Action) Secondary Impacts by Major Industry			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$2,885,850	18	\$673,729
Mining	\$4,696,505	16	\$1210,637
Construction	\$358,780	1	\$21,389
Manufacturing	\$67,966,832	400	\$18,999,450
TCPU	\$8,984,944	73	\$4,522,046
Trade	\$15,771,780	156	\$7,474,509
FIRE	\$4,115,061	64	\$1,729,289
Services	\$25,962,570	428	\$12,007,098
Total	\$130,742,321	1,156	\$46,638,144

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Retail Value and Secondary Impacts (Scenario B)

Under Scenario B, total constrictor snake sales are estimated at 319,333 annually. Using the procedures outlined above, Table 17 shows the economic impacts of Alternative 1 (No Action) under Scenario B.

Table 17

Scenario B: Alternative 1 (No Action) Impacts: 2008-2010 Annual Average						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$93.7	\$267.9	2,370	\$93.2	\$21.4	\$14.8	\$36.2

Table 18 shows the economic impacts of Alternative 1 under Scenario B by major industry.

Table 18

Scenario B: Alternative 1 (No Action) Secondary Impacts by Major Industry			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$5,901,563	37	\$1,377,776
Mining	\$9,604,353	33	\$2,475,753
Construction	\$733,705	2	\$43,741
Manufacturing	\$138,992,171	818	\$38,853,875
TCPU	\$18,374,210	149	\$9,247,584
Trade	\$32,253,290	319	\$15,285,371
FIRE	\$8,415,300	131	\$3,536,396
Services	\$53,093,456	875	\$24,554,515
Total	\$267,368,048	2,364	\$95,375,011

Summary of Scenarios A and B for Alternative 1

Table 19 shows a comparison of retail value and economic impacts for scenarios A and B under Alternative 1, the no action alternative.

Table 19

Alternative 1: Retail Value and Secondary Impacts under Scenarios A and B							
Scenario	Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax Revenue	State and Local Tax Revenue	Total Tax Revenue
A	\$45.7	\$130.7	1,156	\$46.6	\$10.7	\$7.2	\$17.9
B	\$93.7	\$267.9	2,370	\$93.2	\$21.4	\$14.8	\$36.2

Environmental Benefits

The Risk Assessment (Reed and Rodda 2009) for giant constrictors that was conducted by the U.S. Geological Survey concluded that five species [Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), and Yellow Anaconda (*Eunectes notaeus*)] have an Organism Risk Potential (ORP) ranking of “High” and four species [Reticulated Python (*Broghammerus reticulatus* or *Python reticulatus*), DeSchauensee’s Anaconda (*Eunectes deschauenseei*), Green Anaconda (*Eunectes murinus*), and Beni Anaconda (*Eunectes beniensis*)] are ranked as “Medium” (Reed and Rodda 2009). ORP is an overall assessment based on the

combination of probability of establishment and consequences of establishment based on anatomy, behavior and environment. If the No Action Alternative is taken, then there would continue to be a high risk of establishment by five species and a medium risk of establishment by four species in select ecosystems in the United States.

Accepting the No Action Alternative (Alternative 1) would have no effect on the economic impacts of snake importation and sales described in this section, nor would it reduce the risks of these species establishing themselves in new locations around the U.S. Costs would not be imposed and benefits would not be obtained.

Please see the **Benefits of the Proposed Alternatives** section (p. 64) for a more detailed discussion of benefits.

ALTERNATIVE 2A – ADD NINE LARGE CONSTRICTOR SNAKES TO THE LIST OF INJURIOUS WILDLIFE

Under Alternative 2A, the Service will list nine constrictor snakes: the Burmese Python (*Python molurus*), Reticulated Python (*Broghammerus (=Python) reticulatus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), DeSchauensee’s Anaconda (*Eunectes deschauenseei*), Green Anaconda (*Eunectes murinus*), and Beni Anaconda (*Eunectes beniensis*) as injurious species under the Lacey Act. This designation will prohibit the importation and interstate transport of these live constrictor snakes, hybrids, and their eggs. This alternative will not prohibit intrastate transport or any use of these nine constrictor snakes within a State, where not regulated by the State.

Large Constrictor Snake Market

Businesses would no longer have the option to import these nine large constrictor snakes, and breeders/wholesalers/retailers would no longer be able to ship these nine large constrictor snakes out of State. Furthermore, pet owners would not be able to transport their large constrictor snake out of State nor would they be able to purchase these large constrictor snakes without an in-State source. Therefore, the implementation of this Alternative would affect the sales of these nine large constrictor snakes and any associated reptile-related products and services, compared to Alternative 1 (No Action Alternative). In addition to any impacts listed below, individuals or businesses could face penalties for Lacey Act violations. The penalty for a Lacey Act violation is not more than six months in prison and not more than a \$5,000 fine for an individual and not more than a \$10,000 fine for an organization.

Two indicators will be used to characterize the economic effects of the constrictor snake market and the impacts of the different alternatives on the status quo: (1) retail value and (2) secondary economic impacts, including industrial output, employment, and tax revenue.

Imported Large Constrictor Snakes (Scenario A)

Under this Alternative, the importation of nine constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses import. The following discussion shows the impact to revenue earned by businesses importing these snakes.

Table 20 shows the impacted snake species imports for Alternative 2A. *Boa constrictor* and *Python molurus* imports would be impacted the most as they comprise 79.7 and 13.4 percent, respectively, of annual imports. Total number of snakes affected would average 20,391 annually.

Table 21 shows the decrease in imported retail value compared with Alternative 1. The decrease in low-end sales revenue would be \$2.2 million and the decrease in high-end sales revenue would be \$3.8 million for a total annual decrease in imported snake revenue of \$6.0 million annually.

Table 20

Alternative 2A: Impacted Live Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2008 - 2010 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	8,618	7,642	16,260	79.7%
<i>Python</i>	<i>molurus</i>	1,452	1,288	2,740	13.4%
<i>Python</i>	<i>reticulatus</i>	359	318	677	3.3%
<i>Eunectes</i>	<i>murinus</i>	272	241	513	2.5%
<i>Python</i>	<i>sebae</i>	102	91	193	0.9%
<i>Eunectes</i>	<i>notaeus</i>	4	4	8	*
<i>Python</i>	<i>natalensis</i>	0	0	0	*
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	*
Total		10,807	9,584	20,391	100.0%

* = less than 1 %

Source: USFWS 2011

Table 21

Alternative 2A – Decrease in Imported Retail Value from Alternative 1: 2008 - 2010 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$200/snake	High-end Imports	Total Sales @ \$400/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	8,618	\$1,723,560	7,642	\$3,056,880	\$4,780,440
<i>Python</i>	<i>molurus</i>	1,452	\$290,440	1,288	\$515,120	\$805,560
<i>Python</i>	<i>reticulatus</i>	359	\$71,762	318	\$127,276	\$199,038
<i>Eunectes</i>	<i>murinus</i>	272	\$54,378	241	\$96,444	\$150,822
<i>Python</i>	<i>sebae</i>	102	\$20,458	91	\$36,284	\$56,742
<i>Eunectes</i>	<i>notaeus</i>	4	\$848	4	\$1,504	\$2,352
<i>Python</i>	<i>natalensis</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		10,807	\$2,161,446	9,584	\$3,833,508	\$5,994,954

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

U.S. Bred Large Constrictor Snakes (Scenario A)

In addition to impacts to the imported large constrictor snake market, there would also be impacts to the U.S. bred large constrictor snake market. Under this Alternative, the interstate transport of nine constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. The amount of sales affected for U.S. breeding depends on the percentage of interstate transport. That is, the effect depends on where businesses are located and where their customers are located. Since information is not currently available on interstate sales of constrictor snakes, we conservatively assumed that eliminating interstate trade would eliminate all sales of the nine constrictor snakes.

Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses sell. This analysis does not account for this type of substitution effect.

The U.S. breeding program could also be impacted in non-quantifiable ways due to limitations in the development of morphs, which could impact future sales. For example, customers could be unsatisfied with the limited variety of snakes and choose to not buy a new snake. Or, businesses could face decreased revenue because they would no longer be able to potentially produce high-valued morphs in the future. These impacts would be dependent on what snakes could be developed with the morphs currently in the United States.

Table 22 shows the annual number of U.S. bred snakes that would be affected by Alternative 2A. *Boa constrictor* (49.2 percent) and two species of Pythons [*Python molurus* (32.1 percent) and *Python reticulatus* (16.9 percent)] would be most affected, accounting for over 98 percent of annual U.S. bred snakes.

Table 22

Alternative 2A – Total Live Constrictor Snakes Bred in U.S., Nine Species : Estimated High-end and Low-end Snakes: Annual Average					
Genus	Species	Low-end U.S. Bred Snakes	High-end U.S. Bred Snakes	Total U.S. Bred Snakes	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	7,712	6,838	14,550	49.2%
<i>Python</i>	<i>molurus</i>	5,035	4,465	9,500	32.1%
<i>Python</i>	<i>reticulatus</i>	2,650	2,350	5,000	16.9%
<i>Eunectes</i>	<i>murinus</i>	106	94	200	*
<i>Python</i>	<i>sebae</i>	53	47	100	*
<i>Eunectes</i>	<i>notaeus</i>	53	47	100	*
<i>Python</i>	<i>natalensis</i>	53	47	100	*
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	*
Total		15,662	13,888	29,550	100.0%

* = less than 1 %

Source: PIJAC 2008, 2010; USARK 2010

Table 23 shows the impact of Alternative 2A on estimated sales revenue of U.S. bred snakes. Total sales of U.S. bred snakes would decline by \$3.1 million for low-end snakes and \$5.6 million for high-end snakes. Total decline in U.S. bred snake sales revenue would be \$8.7 million annually.

Table 23

Alternative 2A – Total U.S. Bred Constrictor Snakes, Nine Species: Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue: 2008 - 2010 Annual Average						
Genus	Species	Total Sales			Total Sales	
		Low-end	@ \$200/snake	High-end	@ \$400/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,542,300	6,838	\$2,735,200	\$4,277,500
<i>Python</i>	<i>molurus</i>	5,035	\$1,007,000	4,465	\$1,786,000	\$2,793,000
<i>Python</i>	<i>reticulatus</i>	2,650	\$530,000	2,350	\$940,000	\$1,470,000
<i>Eunectes</i>	<i>murinus</i>	106	\$21,200	94	\$37,600	\$58,800
<i>Python</i>	<i>sebae</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>notaeus</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>natalensis</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		15,662	\$3,132,300	13,888	\$5,555,200	\$8,687,500

Source: PIJAC 2008, 2010; USARK 2010

Retail Value and Secondary Impacts (Scenario A)

The total decrease in estimated sales revenue for imports and U.S. bred snakes would be \$14.7 million annually. **Table 24** shows the decrease in economic impacts from Alternative 1, the No Action alternative. Economic output would decrease by \$42.0 million, employment by 372, employment income by \$15.0 million, and Federal, State, and local tax revenue by \$5.7 million.

Table 24

Alternative 2A – Scenario A: Decrease from Alternative 1 (No Action) (Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$14.7	\$42.0	372	\$15.0	\$3.4	\$2.3	\$5.7

Table 25 shows the major industries affected by the decline in sales revenue. Manufacturing, trade and services would be the sectors most affected. As discussed previously in *Alternative 1*, economic impacts include the direct, indirect and induced effects of changes in retail spending associated with constrictor snakes. **Direct effects** are driven by changes in final demand, in this case reductions in retail sales. **Indirect effects** are changes in inter-industry purchases, such as a reduction in a wholesaler's demand for supplies and equipment because there has been a reduction in demand for goods and services provided by the wholesaler because of the reduction in retail sales. Another example of indirect effects is a reduction in manufacturing goods and services (because of the reduction in retail sales) which in turn causes the manufacturer to reduce her demand for the all the necessary inputs into the manufacturing of the goods and services which her firm provides. For both direct and indirect effects, labor and income are affected, which in turn affects household expenditures and those industries that provide goods and services to households. **Table 25** then disaggregates the economic output in **Table 24** to show which

industries are affected and the magnitude of the impacts. The above discussion also applies to **Tables 24, 27 and 28**.

Table 25

Scenario A: Major Industry Sectors Affected by Alternative 2A: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$926,872	6	\$216,386
Mining	\$1,508,415	5	\$388,830
Construction	\$115,232	1	\$6,820
Manufacturing	\$21,829,454	129	\$6,102,206
TCPU	\$2,885,766	24	\$1,452,382
Trade	\$5,065,550	50	\$2,400,649
FIRE	\$1,321,667	21	\$555,410
Services	\$8,338,610	138	\$3,856,419
Total	\$41,991,565	372	\$14,979,149

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Retail Value and Secondary Impacts based on USARK data (Scenario B)

Table 26 shows the impact of Alternative 2A under Scenario B discussed under Alternative 1. Under this scenario, annual sales would decline by 102,506 snakes. Estimated retail value would be \$30.1 million, with decreased impacts of \$86.2 million in economic output, 763 jobs, \$30.8 million in employment income, and \$11.8 million in tax revenue.

Table 26

Alternative 2A – Scenario B: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$30.1	\$86.2	763	\$30.8	\$7.0	\$4.8	\$11.8

Table 27 shows the major industries affected by Alternative 2A under Scenario B. Manufacturing, services and trade would be the industries most affected by Alternative 2A.

Table 27

Scenario B: Major Industry Sectors Affected by Alternative 2A: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)

Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$1,902,448	12	\$444,142
Mining	\$3,096,088	11	\$798,091
Construction	\$236,519	1	\$14,100
Manufacturing	\$44,805,932	264	\$12,525,051
TCPU	\$5,922,165	48	\$2,981,079
Trade	\$10,397,267	102	\$4,927,438
FIRE	\$2,712,781	42	\$1,140,003
Services	\$17,115,364	282	\$7,915,467
Total	\$86,189,561	762	\$30,745,371

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Summary of Retail Value and Secondary Impacts (Scenarios A and B)

Table 28 shows a comparison of annual impacts estimated from Scenarios A and B. Retail value impacts range from \$14.7 to \$30.1 million; output impacts from \$42.0 to \$86.2 million, employment from 372 to 763 jobs; employment income from \$15.0 to \$30.8 million; and total tax revenue from \$5.7 to \$11.8 million. Given both the information available and the information not currently available, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts based upon the best currently available information.

Table 28

**Alternative 2A: Range of Retail Value and Secondary Impacts based on Scenarios A and B
(Dollars in Millions)**

Scenario	Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax Revenue	Total Tax Revenue
A	\$14.7	\$42.0	372	\$15.0	\$3.4	\$2.3	\$5.7
B	\$30.1	\$86.2	763	\$30.8	\$7.0	\$4.8	\$11.8

Impacts on Pet Owners and Hobbyists

Pet owners and hobbyists would be potentially affected in several ways: (1) by eliminating imports, pet owners, potential pet owners and hobbyists would have a smaller number of species to choose from; (2) by eliminating interstate sales, pet owners, potential pet owners and hobbyists would only be able to buy constrictor snakes of the nine species offered within their respective state; and (3) persons moving would not be able to transport their snake or snakes across state lines. Information is not available to quantify these impacts; however information from the Florida Fish and Wildlife Commission shows that 85 percent of constrictor snake sales are shipped out of state. If this percentage holds for other States as well, the impact on pet owners, potential pet owners and hobbyists would be considerable.

Impacts on Shipping Expenditures

The decline in constrictor snake sales would also affect shipping expenditures. Since shipping expenditures are usually the responsibility of the buyer, these impacts are estimated separately from impacts to the constrictor snake industry (shipping costs are not usually included in the sales price). Since shipping costs are not based on a per snake basis but typically by weight, putting shipping costs on a per snake basis is problematic. However, in compiling price data via the internet as discussed previously, a majority of the shipping costs for a purchase were in the range of \$35 - \$50 per shipment. Consequently, for a conservative estimate of shipping costs, the \$50 figure is used to estimate shipping costs and impacts. **Table 29** shows the decline in shipping expenditures for scenarios A and B. The decline in shipping expenditures is estimated to range between \$2.5 and \$5.1 million with declines in output between \$6.5 and \$13.4 million, employment between 49 and 101, employment income between \$2.1 and \$4.3 million and federal, state and local tax revenue declining between \$873,490 and \$1,792,840.

Table 29

Alternative 2A: Estimated Maximum Decrease in Shipping Expenditures (Dollars in Millions)					
	Shipping Costs (Retail Value)	Economic Output	Employment	Employment Income	Tax revenue
Scenario A	\$2.5	\$6.5	49	\$2.1	\$873,490
Scenario B	\$5.1	\$13.4	101	\$4.3	\$1,792,840

Tables 30 and **31** show the major industrial sectors affected by the decline in shipping expenditures for Scenarios A and B respectively.

Table 30

Alternative 2A: Scenario A			
Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$205,073	1	\$45,036
Mining	\$158,597	1	\$43,605
Construction	\$16,912	0	\$1,026
Manufacturing	\$3,9106,55	23	\$1,169,664
TCPU	\$404,907	3	\$201,862
Trade	\$323,939	4	\$155,605
FIRE	\$428,413	5	\$149,030
Services	\$1,008,178	13	\$342,656
Total	\$6,522,829	50	\$2,108,512

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Table 31

Alternative 2A: Scenario B			
Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$420,912	2	\$92,436
Mining	\$325,520	1	\$89,499
Construction	\$34,712	0	\$2,105
Manufacturing	\$8,026,624	48	\$2,400,736
TCPU	\$831,073	7	\$414,321
Trade	\$664,886	8	\$319,380
FIRE	\$879,317	10	\$305,884
Services	\$2,069,287	26	\$703,362
Total	\$13,388,113	102	\$4,327,723

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Environmental Benefits

Alternative 2A would likely be effective in preventing the interstate shipment and use of nine large constrictor snakes in States that currently allow their possession. While not eliminating these snakes as a threat, this alternative could reduce the pathways and chances for snakes being introduced into ecosystems. As such, reducing the probability of constrictor snake establishment would reduce the probability of negative impacts on a variety of entities, such as agriculture, human health, and native animal species. However, estimates of the economic value of reducing these impacts are not currently available.

Listing these large constrictor snakes as injurious would decrease the risk of introduction by potentially decreasing the number of snakes in the market place. This analysis has not dealt with the potential impacts associated with preventing new populations of constrictor snakes. Calculating exact impacts for such a scenario is beyond the scope of this analysis. In addition, this analysis has not incorporated the probability of released or escaped pets because the probability is unknown. In general, listing should decrease the probability of unintentional introduction compared to Alternative 1 (No Action Alternative). Since Alternative 2A impacts nine species compared with seven species under Alternative 3 and five species under Alternative 4, Alternative 2A would have the highest relative (relative to the other alternatives) benefits of the four action alternatives.

Please see the **Benefits of the Proposed Alternatives** section (p. 64) for a more detailed discussion of benefits.

ALTERNATIVE 2B – ADD FOUR LARGE CONSTRICTOR SNAKES TO THE LIST OF INJURIOUS WILDLIFE

Under Alternative 2B, the Service would list four constrictor snakes: the Burmese python (*Python molurus*), Northern African python (*Python sebae*), Southern African python (*Python natalensis*), and yellow anaconda (*Eunectes notaeus*) as injurious species under the Lacey Act. This designation would prohibit the importation and interstate transport of these live constrictor snakes, hybrids, and their eggs. This Alternative would not prohibit intrastate transport or any use of these constrictor snakes within a State, where not regulated by the State.

Large Constrictor Snake Market

Businesses would no longer have the option to import these four large constrictor snakes, and breeders/wholesalers/retailers would no longer be able to ship these four large constrictor snakes out of State. Pet owners would not be able to transport their large constrictor snake out of State nor would they be able to purchase these large constrictor snakes without an in-State source. Therefore, the implementation of this Alternative would affect the sales of these four large constrictor snakes and any associated reptile-related products and services, compared to Alternative 1 (No Action Alternative). In addition to any impacts listed below, individuals or businesses could face penalties for Lacey Act violations. The penalty for a Lacey Act violation is not more than six months in prison and not more than a \$5,000 fine for an individual and not more than a \$10,000 fine for an organization.

Two indicators will be used to characterize the economic effects of the constrictor snake market and the impacts of the different alternatives on the status quo: (1) retail value and (2) economic impacts, including industrial output, employment, income and tax revenue.

Imported Large Constrictor Snakes (Scenario A)

Under this Alternative, the importation of four constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses import. The following discussion shows the impact to revenue earned by businesses importing these snakes.

Table 32 lists the constrictor snakes that would be affected by Alternative 2B. Total annual imports affected are estimated to be 2,941, with 1,558 low-end imports and 1,383 high-end imports affected.

Table 33 shows the effect of Alternative 2B on the sales revenue of the four imported species. Sales revenue associated with *Python molurus* would decline by \$806,000, *Python sebae* by \$57,000, and *Eunectes notaeus* would decrease by \$2,352. Total sales revenue would decline by \$864,000.

Table 32

Alternative 2B: Impacted Live Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2008 - 2010 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Python</i>	<i>molurus</i>	1,452	1,288	2,740	93.2%
<i>Python</i>	<i>sebae</i>	102	91	193	6.6%
<i>Eunectes</i>	<i>notaeus</i>	4	4	8	*
<i>Python</i>	<i>natalensis</i>	0	0	0	*
Total		1558	1383	2941	100.0%

* = less than 1 %

Source: USFWS 2011

Table 33

Alternative 2B – Decrease in Imported Retail Value from Alternative 1: 2008 - 2010 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$200/snake	High-end Imports	Total Sales @ \$400/snake	Total Sales Revenue
<i>Python</i>	<i>molurus</i>	1,452	\$290,440	1,288	\$515,120	\$805,560
<i>Python</i>	<i>sebae</i>	102	\$20,458	91	\$36,284	\$56,742
<i>Eunectes</i>	<i>notaeus</i>	4	\$848	4	\$1,504	\$2,352
<i>Python</i>	<i>natalensis</i>	0	\$0	0	\$0	\$0
Total		1,558	\$311,746	1,383	\$552,908	\$864,654

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

U.S. Bred Large Constrictor Snake Market (Scenario A)

In addition to impacts to the imported large constrictor snake market, there would also be impacts to the U.S.-bred large constrictor snake market. Under this Alternative, the interstate transport of four constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. The amount of sales affected for U.S. breeding depends on the percentage of interstate transport. That is, the effect depends on where businesses are located and where their customers are located. Since information is not currently available on interstate sales of constrictor snakes, we conservatively assumed that all sales from the four snake species would be eliminated.

Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing, thus changing the types of snakes that businesses sell. This analysis does not account for this type of substitution effect.

The U.S. breeding program could also be impacted in non-quantifiable ways due to limitations in the development of morphs, which could impact future sales. For example, customers could be unsatisfied with the limited variety of snakes and choose to not buy a new snake. Or, businesses could face decreased revenue because they would no longer be able to potentially produce high-valued morphs in the future. These impacts would be dependent on what snakes could be developed with the morphs currently in the United States.

Table 34 shows the U.S. bred constrictor snakes impacted by Alternative 2B. This information is based on PIJAC data. Since the USFWS database does not have any information on U.S. bred snakes, only PIJAC data are used for U.S. bred snakes. Annual number of snakes bred in the U.S. totaled 9,800 with the low-end accounting for 5,194 and the high-end accounting for 4,606.

Table 34

Alternative 2B – Total Live Constrictor Snakes Bred in U.S., Four Species : Estimated High-end and Low-end Snakes: Annual Average					
Genus	Species	Low-end U.S. Bred Snakes	High-end U.S. Bred Snakes	Total U.S. Bred Snakes	Percentage of Total
<i>Python</i>	<i>molurus</i>	5,035	4,465	9,500	96.9%
<i>Python</i>	<i>sebae</i>	53	47	100	1.0%
<i>Eunectes</i>	<i>notaeus</i>	53	47	100	1.0%
<i>Python</i>	<i>natalensis</i>	53	47	100	1.0%
Total		5,194	4,606	9,800	100.0%

* = less than 1 %

Source: PIJAC 2008, 2010; USARK 2010

Table 35 shows the decline in estimated sales revenue of the four species affected by Alternative 2B. Sales revenue associated with the three python species would decline by nearly \$2.9 million, and *Eunectes notaeus* by \$29,400 for a total decrease in sales revenue of \$2.9 million annually.

Table 35

Alternative 2B – Total U.S. Bred Constrictor Snakes, Four Species: Estimated High-end and Low-end U.S.-Bred Snakes and Sales Revenue: 2008 - 2010 Annual Average						
Genus	Species	Low- end	Total Sales @ \$200/snake	High- end	Total Sales @ \$400/snake	Total Sales Revenue
<i>Python</i>	<i>molurus</i>	5,035	\$1,007,000	4,465	\$1,786,000	\$2,793,000
<i>Python</i>	<i>sebae</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>notaeus</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>natalensis</i>	53	\$10,600	47	\$18,800	\$29,400
Total		5,194	\$1,038,800	4,606	\$1,842,400	\$2,881,200

Source: PIJAC 2008, 2010; USARK 2010

Economic Impacts (Scenario A)

Table 36 shows the economic impacts on the four species with the implementation of Alternative 2B. Retail value would decline by \$3.7 million annually. Economic output would decrease by \$10.7 million, employment by 95, employment income by \$3.8 million and total tax revenue by \$1.4 million.

Table 36

Scenario A: Alternative 2B: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$3.7	\$10.7	95	\$3.8	\$0.85	\$0.57	\$1.4

Table 37 shows the impacts on major industrial sectors of implementing Alternative 2B. Manufacturing, services, and trade account for 84 percent of total impacts. As discussed previously in *Alternative 1*, economic impacts include the direct, indirect, and induced effects of changes in retail spending associated with constrictor snakes. **Direct effects** are driven by changes in final demand, in this case reductions in retail sales. **Indirect effects** are changes in interindustry purchases, such as a reduction in a wholesaler's demand for supplies and equipment because there has been a reduction in demand for goods and services provided by the wholesaler because of the reduction in retail sales. Another example of indirect effects is a reduction in manufacturing goods and services (because of the reduction in retail sales) which in turn causes the manufacturer to reduce her demand for the all the necessary inputs into the manufacturing of the goods and services which her firm provides. For both direct and indirect effects, labor and income are affected, which in turn affects household expenditures and those industries which provide goods and services to households. **Table 37** then disaggregates the economic output in **Table 36** to show which industries are affected and the magnitude of the impacts. This discussion also applies to **Tables 39, 42, and 43**.

Table 37

Scenario A: Major Industry Sectors Affected by Alternative 2B: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	236,363	2	55,181
Mining	384,664	1	99,156
Construction	29,385	1	1740
Manufacturing	5,566,773	32	1,556,135
TCPU	735,905	7	370,375
Trade	1,291,775	12	621,675
FIRE	337,041	6	151,116

Services	2,126,446	34	992,913
Total	10,708,351	95	3,848,291

Economic Impacts based on USARK data (Scenario B)

Table 38 shows the economic impacts of implementing Alternative 2B using information provided by USARK (Scenario B). Based on the impacts in Alternative 1, Scenario B, Alternative 2B Scenario B shows a 8.1 percent decrease in economic impacts from Alternative 1 (No Action). Retail value would decline by \$7.6 million, economic output by \$21.8 million, employment by 193, employment income by \$7.8 million and total tax revenue by \$3.1 million.

Table 38

Alternative 2B – Scenario B: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$7.6	\$21.8	193	\$7.8	\$1.8	\$1.3	\$3.1

Table 39 shows the major industrial sectors affected by implementation of Alternative 2B under Scenario B. Manufacturing, trade and services account for 84 percent of the impacts.

Table 39

Scenario B: Major Industry Sectors Affected by Alternative 2B: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$489,410	3	\$112,067
Mining	\$790,591	3	\$201,376
Construction	\$59,679	1	\$3,558
Manufacturing	\$11,324,282	68	\$3,160,346
TCPU	\$1,494,292	12	\$752,192
Trade	\$2,623,459	25	\$1,233,921
FIRE	\$703,254	10	\$287,648
Services	\$4,327,963	71	\$1,997,247
Total	\$21,812,931	193	\$7,757,735

Summary of Economic Impacts (Scenarios A and B)

Table 40 shows a comparison of annual impacts estimated from Scenarios A and B. Retail value impacts range from \$3.7 to \$7.6 million; output impacts from \$10.7 to \$21.8 million, employment from 95 to 193 jobs; employment income from \$3.8 to \$7.8 million; and total tax revenue from \$1.4 to \$3.1 million. Given both the information available and the information not currently available, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts based upon the best currently available information.

Method	Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax Revenue	Total Tax Revenue
A	\$3.7	\$10.7	95	\$3.8	\$0.8	\$0.6	\$1.4
B	\$7.6	\$21.8	193	\$7.8	\$1.8	\$1.3	\$3.1

Impacts on Pet Owners and Hobbyists

Pet owners and hobbyists would be potentially affected in several ways: (1) by eliminating imports, pet owners, potential pet owners, and hobbyists would have a smaller number of species to choose from; (2) by eliminating interstate sales, pet owners, potential pet owners and hobbyists would only be able to buy constrictor snakes of the four species offered within their respective state; and (3) persons moving would not be able to transport their snake or snakes across state lines. Information is not available to quantify these impacts, however information from the Florida Fish and Wildlife Conservation Commission (May 11, 2010) shows that 85 percent of constrictor snake sales are shipped out of state. If this percentage holds for other states as well, the impact on pet owners, potential pet owners and hobbyists would be considerable.

Impacts on Shipping Expenditures

The decline in constrictor snake sales would also affect shipping expenditures. Since shipping expenditures are usually the responsibility of the buyer, these impacts are estimated separately from impacts to the constrictor snake industry (shipping costs are not usually included in the sales price). Since shipping costs are not based on a per snake basis but typically by weight, putting shipping costs on a per snake basis is problematic. However, in compiling price data via the internet as discussed previously, a majority of the shipping costs for a purchase were in the range of \$35 - \$50 per shipment. Consequently, for a conservative estimate of shipping costs, the \$50 figure is used to estimate shipping costs and impacts. **Table 41** shows the decline in shipping expenditures for scenarios A and B. The decline in shipping expenditures is estimated to range between \$0.7 and \$1.4 million with declines in output between \$1.8 and \$3.6 million, employment between 13 and 27, employment income between \$0.6 and \$1.2 million and federal, state and local tax revenue declining between \$0.2 and \$0.5 million dollars.

Table 41

Alternative 2B: Estimated Maximum Decrease in Shipping Expenditures
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(Dollars in Millions)

	Shipping Costs	Output	Employment	Employment Income	Tax revenue
Scenario A	\$0.7	\$1.6	12	\$0.5	\$0.2
Scenario B	\$1.3	\$3.3	25	\$1.1	\$0.5

Tables 42 and 43 show the impacts on major industrial sectors resulting from a decline in shipping expenditures for Scenarios A and B.

Table 42

Alternative 2B: Scenario A. Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$51,303	0	\$11,267
Mining	\$39,677	0	\$10,909
Construction	\$4,231	0	\$257
Manufacturing	\$984,838	6	\$292,615
TCPU	\$103,156	1	\$50,500
Trade	\$82,900	1	\$38,926
FIRE	\$109,966	1	\$37,283
Services	\$252,216	3	\$85,723
Total	\$1,629,217	12	\$527,479

Table 43

Alternative 2B: Scenario B. Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$105,299	1	\$23,124
Mining	\$81,435	1	\$22,390
Construction	\$8683	0	\$526
Manufacturing	\$2,008,021	10	\$600,592
TCPU	\$207,909	2	\$103,650
Trade	\$166,334	2	\$79,899
FIRE	\$219,978	3	\$76,523

Services	\$517,673	6	\$175,960
Total	\$3,306,659	25	\$1,087,315

Environmental Benefits

Alternative 2B would likely be effective in preventing the interstate shipment and use of four large constrictor snake species in States that currently allow their possession. While not eliminating these snakes as a threat, this Alternative could reduce the pathways and chances for snakes being introduced into ecosystems. As such, reducing the probability of constrictor snake establishment would reduce the probability of negative impacts on a variety of entities, such as agriculture, human health, and native animal species. However, estimates of the economic value of reducing these impacts are not currently available.

Listing these large constrictor snakes as injurious would decrease the risk of introduction by potentially decreasing the number of snakes in the market place. This analysis has not dealt with the potential impacts associated with preventing new populations of constrictor snakes. Calculating exact impacts for such a scenario is beyond the scope of this analysis. In addition, this analysis has not incorporated the probability of released or escaped pets because the probability is unknown. In general, listing should decrease the probability of unintentional introduction compared to Alternative 1 (No Action Alternative). Since Alternative 2B addresses four species with a smaller number of individual snakes affected compared with the seven and nine species for Alternatives 3 and 2A respectively, Alternative 2B would have relatively less benefits than Alternatives 2A, 3, and 4.

Please see the **Benefits of the Proposed Alternatives** section (p. 64) for a more detailed discussion of benefits.

ALTERNATIVE 3 – ADD SEVEN LARGE CONSTRICTOR SNAKES TO THE LIST OF INJURIOUS WILDLIFE

Under Alternative 3, the Service would list seven constrictor snakes: the Burmese Python (*Python molurus*), Reticulated Python (*Broghammerus*(=*Python*) *reticulatus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), Yellow Anaconda (*Eunectes notaeus*), and Green Anaconda (*Eunectes murinus*), as injurious species under the Lacey Act. This designation would prohibit the importation and interstate transport of these live constrictor snakes, hybrids, and their eggs. This alternative would not prohibit intrastate transport or any use of these constrictor snakes within a State, where not regulated by the State. The Beni anaconda (*Eunectes beniensis*) and DeSchauensee's anaconda (*Eunectes deschauenseei*) would not be listed; these two species are not currently in trade in the United States.

Large Constrictor Snake Market

Businesses would no longer have the option to import these seven large constrictor snakes, and breeders/wholesalers/retailers would no longer be able to ship these seven large constrictor snakes out of State. Pet owners would not be able to transport their large constrictor snake out of State nor would they be able to purchase these large constrictor snakes without an in-State source. Therefore, the implementation of this Alternative would affect the sales of these seven large constrictor snakes and any associated reptile-related products and services, compared to Alternative 1 (No Action Alternative). In addition to any impacts listed below, individuals or businesses could face penalties for Lacey Act violations. The penalty for a Lacey Act violation is not more than six months in prison and not more than a \$5,000 fine for an individual and not more than a \$10,000 fine for an organization.

Two indicators will be used to characterize the economic effects of the constrictor snake market and the impacts of the different alternatives on the status quo: (1) retail value and (2) economic impacts, including industrial output, employment, income and tax revenue.

Imported Large Constrictor Snakes (Scenario A)

Under this Alternative, the importation of seven constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses import. This Alternative is essentially the same as Alternative 2A with the exception that *Eunectes deschauenseei* and *Eunectes beniensis* are not included in Alternative 3. Since these two species are not imported and very few if any are bred in the U.S., the economic effects for Alternative 3 are the same as Alternative 2A. The following discussion shows the impact to revenue earned by businesses importing these snakes.

Table 44 shows the impacted snake species imports for Alternative 3. *Boa constrictor* (79.7 percent) and *Python molurus* (13.4 percent) imports would be impacted the most as they comprise 93 percent of annual imports. Total number of snakes affected would average 20,391 annually.

Table 45 shows the decrease in imported retail value compared with Alternative 1. The decrease in low-end sales revenue would be \$2.2 million and the decrease in high-end sales revenue would be \$3.8 million for a total annual decrease in imported snake revenue of \$6.0 million annually.

Table 44

Alternative 3: Impacted Live Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2008 - 2010 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	8,618	7,642	16,260	79.7%
<i>Python</i>	<i>molurus</i>	1,452	1,288	2,740	13.4%
<i>Python</i>	<i>reticulatus</i>	359	318	677	3.3%
<i>Eunectes</i>	<i>murinus</i>	272	241	513	2.5%
<i>Python</i>	<i>sebae</i>	102	91	193	*
<i>Eunectes</i>	<i>notaeus</i>	4	4	8	*
<i>Python</i>	<i>natalensis</i>	0	0	0	*
Total		10,807	9,584	20,391	100.0%

* = less than 1%

Source: USFWS 2011

Table 45

Alternative 3 – Decrease in Imported Retail Value from Alternative 1: 2008 - 2010 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$200/snake	High-end Imports	Total Sales @ \$400/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	8,618	\$1,723,560	7,642	\$3,056,880	\$4,780,440
<i>Python</i>	<i>molurus</i>	1,452	\$290,440	1,288	\$515,120	\$805,560
<i>Python</i>	<i>reticulatus</i>	359	\$71,762	318	\$127,276	\$199,038
<i>Eunectes</i>	<i>murinus</i>	272	\$54,378	241	\$96,444	\$150,822
<i>Python</i>	<i>sebae</i>	102	\$20,458	91	\$36,284	\$56,742
<i>Eunectes</i>	<i>notaeus</i>	4	\$848	4	\$1,504	\$2,352
<i>Python</i>	<i>natalensis</i>	0	\$0	0	\$0	\$0
Total		10,807	\$2,161,446	9,584	\$3,833,508	\$5,994,954

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

U.S. Bred Large Constrictor Snake Market (Scenario A)

In addition to impacts to the imported large constrictor snake market, there would also be impacts to the U.S. bred large constrictor snake market. Under this Alternative, the inter-state transport of seven constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. The amount of sales impacted for U.S. breeding is completely dependent on the percentage of interstate transport. That is, the impact depends on where businesses are located and where their customers are located. Since information is not currently available on interstate sales of constrictor snakes, it is conservatively assumed that all sales related to the nine snake species would be eliminated.

Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that

estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses sell. This analysis does not account for this type of substitution effect.

The U.S. breeding program could also be impacted in non-quantifiable ways due to limitations in the development of morphs, which could impact future sales. For example, customers could be unsatisfied with the limited variety of snakes and choose to not buy a new snake. Or, businesses could face decreased revenue because they would no longer be able to potentially produce high-valued morphs in the future. These impacts would be dependent on what snakes could be developed with the morphs currently in the United States.

Table 46 shows the annual number of U.S. bred snakes that would be affected by Alternative 3. *Boa constrictor* (49.2 percent) and two species of Pythons [*Python molurus* (32.1 percent) and *Python reticulatus* (16.9 percent)] would be most affected; accounting for over 98 percent of annual U.S. bred snakes.

Table 46

Alternative 3 – Total Live Constrictor Snakes Bred in U.S., Seven Species :					
Estimated High-end and Low-end Snakes: Annual Average					
Genus	Species	Low-end U.S. Bred Snakes	High-end U.S. Bred Snakes	Total U.S. Bred Snakes	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	7,712	6,838	14,550	49.2%
<i>Python</i>	<i>molurus</i>	5,035	4,465	9,500	32.1%
<i>Python</i>	<i>reticulatus</i>	2,650	2,350	5,000	16.9%
<i>Eunectes</i>	<i>murinus</i>	106	94	200	*
<i>Python</i>	<i>sebae</i>	53	47	100	*
<i>Eunectes</i>	<i>notaeus</i>	53	47	100	*
<i>Python</i>	<i>natalensis</i>	53	47	100	*
Total		15,662	13,888	29,550	100%

* = less than 1%

Source: PIJAC 2008, 2010; USARK 2010

Table 47 shows the impact of Alternative 3 on estimated sales revenue of U.S. bred snakes. Total sales of U.S. bred snakes would decline by \$3.1 million for low-end snakes and \$5.6 million for high-end snakes. Total decline in U.S. bred snake sales revenue would be \$8.7 million annually.

Table 47

Alternative 3 – Total U.S. Bred Constrictor Snakes, Nine Species:						
Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue:						
2008 - 2010 Annual Average						
Genus	Species	Low-end	Total Sales		Total Sales	
			@	High-end	@	Total Sales Revenue
			\$200/snake		\$400/snake	
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,542,300	6,838	\$2,735,200	\$4,277,500
<i>Python</i>	<i>molurus</i>	5,035	\$1,007,000	4,465	\$1,786,000	\$2,793,000
<i>Python</i>	<i>reticulatus</i>	2,650	\$530,000	2,350	\$940,000	\$1,470,000
<i>Eunectes</i>	<i>murinus</i>	106	\$21,200	94	\$37,600	\$58,800
<i>Python</i>	<i>sebae</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>notaeus</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>natalensis</i>	53	\$10,600	47	\$18,800	\$29,400

Total	15,662	\$3,132,300	13,888	\$5,555,200	\$8,687,500
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Source: PIJAC 2008, 2010; USARK 2010

Retail Value and Secondary Impacts: Scenario A

The total decrease in estimated sales revenue for imports and U.S. bred snakes would be \$14.7 million annually. **Table 48** shows the decrease in economic impacts from Alternative 1, the No Action alternative. Economic output would decrease by \$42.0 million, employment by 372, employment income by \$15.0 million, and Federal, State, and local tax revenue by \$5.7 million.

Table 48

Alternative 3 – Scenario A: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$14.7	\$42.01	372	\$15.0	\$3.4	\$2.3	\$5.7

Table 49 shows the major industries affected by the decline in sales revenue. Manufacturing, trade and services would be the sectors most affected. As discussed previously, economic impacts include the direct, indirect and induced effects of changes in retail spending associated with constrictor snakes. **Direct effects** are driven by changes in final demand, in this case reductions in retail sales. **Indirect effects** are changes in inter-industry purchases, such as a reduction in a wholesaler’s demand for supplies and equipment because there has been a reduction in demand for goods and services provided by the wholesaler because of the reduction in retail sales. Another example of indirect effects is a reduction in manufacturing goods and services (because of the reduction in retail sales) which in turn causes the manufacturer to reduce her demand for the all the necessary inputs into the manufacturing of the goods and services which her firm provides. For both direct and indirect effects, labor and income are affected, which in turn affects household expenditures and those industries which provide goods and services to households. **Table 49** then disaggregates the economic output in **Table 48** to show which industries are affected and the magnitude of the impacts. This discussion also applies to **Tables 51, 54, and 55**.

Table 49

Scenario A: Major Industry Sectors Affected by Alternative 3: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$926,872	6	\$216,386
Mining	\$1,508,415	5	\$388,830
Construction	\$115,232	1	\$6,820
Manufacturing	\$21,829,454	129	\$6,102,206
TCPU	\$2,885,766	24	\$1,452,382
Trade	\$5,065,550	50	\$2,400,649
FIRE	\$1,321,667	21	\$555,410

Services	\$8,338,610	138	\$3,856,419
Total	\$41,991,565	372	\$14,979,149

Retail Value and Secondary Impacts based on USARK data (Scenario B)

Table 50 shows the impact of Alternative 3 under Scenario B discussed under Alternative 1. Under this scenario, annual sales would decline by 102,506 snakes. Estimated retail value would be \$30.1 million, with decreased impacts of \$86.2 million in economic output, 763 jobs, \$30.8 million in employment income, and \$11.8 million in tax revenue.

Table 50

Alternative 3 – Scenario B: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$30.1	\$86.2	763	\$30.8	\$7.0	\$4.8	\$11.8

Table 51 shows the major industries affected by Alternative 3 under Scenario B. Manufacturing, services and trade would be the industries most affected by Alternative 3.

Table 51

Scenario B: Major Industry Sectors Affected by Alternative 3: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$1,902,448	12	\$444,142
Mining	\$3,096,088	11	\$798,091
Construction	\$236,519	1	\$14,100
Manufacturing	\$44,805,932	264	\$12,525,051
TCPU	\$5,922,165	48	\$2,981,079
Trade	\$10,397,267	102	\$4,927,438
FIRE	\$2,712,781	42	\$1,140,003
Services	\$17,115,364	282	\$7,915,467
Total	\$86,189,561	762	\$30,745,371

Summary of Economic Impacts (Scenarios A and B)

Table 52 shows a comparison of annual impacts estimated from Scenarios A and B. Retail value impacts range from \$14.7 to \$30.1 million; output impacts from \$42.0 to \$86.2 million, employment from 372 to 763 jobs; employment income from \$15.0 to \$30.8 million; and total tax revenue from \$5.7 to \$11.8 million. Given both the information available and the information not currently available, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts based upon the best currently available information.

Table 52

Alternative 3: Range of Retail Value and Secondary Impacts based on Scenarios A and B.							
(Dollars in Millions)							
Scenario	Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax Revenue	Total Tax Revenue
A	\$14.7	\$42.0	372	\$15.0	\$3.4	\$2.3	\$5.7
B	\$30.1	\$86.2	763	\$30.8	\$7.0	\$4.8	\$11.8

Impacts on Pet Owners and Hobbyists

Pet owners and hobbyists would be potentially affected in several ways: (1) by eliminating imports, pet owners, potential pet owners, and hobbyists would have a smaller number of species to choose from; (2) by eliminating interstate sales, pet owners, potential pet owners, and hobbyists would only be able to buy constrictor snakes of the nine species offered within their respective state; and (3) persons moving would not be able to transport their snake or snakes across state lines. Information is not available to quantify these impacts, however information from the Florida Fish and Wildlife Conservation Commission (May 11, 2010) shows that 85 percent of constrictor snake sales are shipped out of state. If this percentage holds for other states as well, the impact on pet owners, potential pet owners and hobbyists would be considerable.

Impacts on Shipping Expenditures

The decline in constrictor snake sales would also affect shipping expenditures. Since shipping expenditures are usually the responsibility of the buyer, these impacts are estimated separately from impacts to the constrictor snake industry (shipping costs are not usually included in the sales price). Since shipping costs are not based on a per snake basis but typically by weight, putting shipping costs on a per snake basis is problematic. However, in compiling price data via the internet as discussed previously, a majority of the shipping costs for a purchase were in the range of \$35 - \$50 per shipment. Consequently, for a conservative estimate of shipping costs, the \$50 figure is used to estimate shipping costs and impacts. **Table 53** shows the decline in shipping expenditures for scenarios A and B. The decline in shipping expenditures is estimated to range between \$2.5 and \$5.1 million with declines in output between \$6.5 and \$13.4 million, employment between 49 and 101, employment income between \$2.1 and \$4.3 million and Federal, State and local tax revenue declining between \$873,490 and \$1,792,840.

Tables 54 and 55 show the major industrial sectors affected by the decline in shipping expenditures for Scenarios A and B.

Table 53

Alternative 3: Estimated Maximum Decrease in Shipping Expenditures (Dollars in Millions)					
	Shipping Costs (Retail Value)	Economic Output	Employment	Employment Income	Tax revenue
Scenario A	\$2.5	\$6.5	49	\$2.1	\$761,724
Scenario B	\$5.1	\$13.4	101	\$4.3	\$1,561,569

Table 54

Alternative 3: Scenario A Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$205,073	1	\$45,036
Mining	\$158,597	1	\$43,605
Construction	\$16,912	0	\$1,026
Manufacturing	\$3,9106,55	23	\$1,169,664
TCPU	\$404,907	3	\$201,862
Trade	\$323,939	4	\$155,605
FIRE	\$428,413	5	\$149,030
Services	\$1,008,178	13	\$342,656
Total	\$6,522,829	50	\$2,108,512

Table 55

Alternative 3: Scenario B Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$420,912	2	\$92,436
Mining	\$325,520	1	\$89,499
Construction	\$34,712	0	\$2,105
Manufacturing	\$8,026,624	48	\$2,400,736
TCPU	\$831,073	7	\$414,321
Trade	\$664,886	8	\$319,380
FIRE	\$879,317	10	\$305,884

Services	\$2,069,287	26	\$703,362
Total	\$13,388,113	102	\$4,327,723

Environmental Benefits

Alternative 3 would likely be effective in preventing the interstate shipment and use of seven large constrictor snakes in States that currently allow their possession. While not eliminating these snakes as a threat, this Alternative could reduce the pathways and chances for snakes being introduced into ecosystems. As such, reducing the probability of constrictor snake establishment would reduce the probability of negative impacts on a variety of entities, such as agriculture, human health, and native animal species. However, estimates of the economic value of reducing these impacts are not currently available.

Listing these large constrictor snakes as injurious would decrease the risk of introduction by potentially decreasing the number of snakes in the market place. This analysis has not dealt with the potential impacts associated with preventing new populations of constrictor snakes. Calculating exact impacts for such a scenario is beyond the scope of this analysis. In addition, this analysis has not incorporated the probability of released or escaped pets because the probability is unknown. In general, listing should decrease the probability of unintentional introduction compared to Alternative 1 (No Action Alternative). Since Alternative 3 addresses two fewer species than Alternative 2A, the benefits would be relatively lower for Alternative 3 but greater than Alternative 4, which addresses only five species.

Please see **the Benefits of the Proposed Alternatives** section (p. 64) for a more detailed discussion of benefits.

ALTERNATIVE 4 – ADD FIVE LARGE CONSTRICTOR SNAKES TO THE LIST OF INJURIOUS WILDLIFE

Under Alternative 4, the Service would list five constrictor snakes: the Burmese Python (*Python molurus*), Northern African Python (*Python sebae*), Southern African Python (*Python natalensis*), Boa Constrictor (*Boa constrictor*), and the Yellow Anaconda (*Eunectes notaeus*) as injurious species under the Lacey Act. This designation would prohibit the importation and interstate transport of these live constrictor snakes, hybrids, and their eggs. This Alternative would not prohibit intrastate transport or any use of these constrictor snakes within a State, where not regulated by the State.

Large Constrictor Snake Market

Businesses would no longer have the option to import these five large constrictor snakes, and breeders/wholesalers/retailers would no longer be able to ship these five large constrictor snakes out of State. Pet owners would not be able to transport their large constrictor snake out of State nor would they be able to purchase these large constrictor snakes without an in-State source. Therefore, the implementation of this Alternative would affect the sales of these five large constrictor snakes and any associated reptile-related products and services, compared to Alternative 1 (No Action Alternative). In addition to any impacts listed below, individuals or businesses could face penalties for Lacey Act violations. The penalty for a Lacey Act violation is not more than six months in prison and not more than a \$5,000 fine for an individual and not more than a \$10,000 fine for an organization.

Two indicators will be used to characterize the economic effects of the constrictor snake market and the impacts of the different alternatives on the status quo: (1) retail value and (2) economic impacts, including industrial output, employment, income and tax revenue.

Imported Large Constrictor Snakes (Scenario A)

Under this Alternative, the importation of five constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses import. The following discussion shows the impact to revenue earned by businesses importing these snakes.

Table 56 lists the constrictor snakes which will be listed as injurious in Alternative 4. Total annual imports affected are estimated to be 19,201, with 10,176 low-end imports and 9,025 high-end imports affected.

Table 57 shows the effect of Alternative 4 on the sales revenue of the five imported species. Sales revenue associated with Boa constrictors would decline by \$4.8 million, the two Python species by \$862,000, and *Eunectes notaeus* would decrease by \$2,352. Total sales revenue would decline by \$5.6 million.

Table 56

Alternative 4 – Impacted Live Constrictor Snake Imports Estimated High-end and Low-end Imports: 2008 - 2010 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total Imports
<i>Boa</i>	<i>constrictor</i>	8,618	7,642	16,260	84.7%
<i>Python</i>	<i>molurus</i>	1,452	1,288	2,740	14.3%
<i>Python</i>	<i>sebae</i>	102	91	193	1.0%
<i>Eunectes</i>	<i>notaeus</i>	4	4	8	*
<i>Python</i>	<i>natalensis</i>	0	0	0	*
Total		10,176	9,025	19,201	100.0%

* = less than 1%

Source: USFWS 2011

Table 57

Alternative 4 – Decrease in Imported Retail Value from Alternative 1: 2008 - 2010 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$200/snake	High-end Imports	Total Sales @ \$400/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	8,618	\$1,723,560	7,642	\$3,056,880	\$4,780,440
<i>Python</i>	<i>molurus</i>	1,452	\$290,440	1,288	\$515,120	\$805,560
<i>Python</i>	<i>sebae</i>	102	\$20,458	91	\$36,284	\$56,742
<i>Eunectes</i>	<i>notaeus</i>	4	\$848	4	\$1,504	\$2,352
<i>Python</i>	<i>natalensis</i>	0	\$0	0	\$0	\$0
Total		10,176	\$2,035,306	9,025	\$3,609,788	\$5,645,094

Source: USFWS 2011; PIJAC 2008, 2010; USARK 2010

U.S. Bred Large Constrictor Snake Market (Scenario A)

In addition to impacts to the imported large constrictor snake market, there would also be impacts to the U.S. bred large constrictor snake market. Under this Alternative, the inter-state transport of five constrictor snakes would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. The amount of sales impacted for U.S. breeding is completely dependent on the percentage of interstate transport. That is, the impact depends on where businesses are located and where their customers are located. Since information is not currently available on interstate sales of constrictor snakes, it is conservatively assumed that all sales from the nine snake species would be eliminated.

Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of snakes that businesses sell. This analysis does not account for this type of substitution effect.

The U.S. breeding program could also be impacted in non-quantifiable ways due to limitations in the development of morphs, which could impact future sales. For example, customers could be unsatisfied with the limited variety of snakes and choose to not buy a new snake. Or, businesses could face decreased revenue because they would no longer be able to potentially produce high-valued morphs

in the future. These impacts would be dependent on what snakes could be developed with the morphs currently in the United States.

Table 58 shows the U.S. bred constrictor snakes impacted by Alternative 4. This information is based on PIJAC data. Since the USFWS database does not have any information on U.S. bred snakes, only PIJAC data are used for U.S. bred snakes. Annual number of snakes bred in the U.S. totaled 24,351 with the low-end accounting for 12,096 and the high-end accounting for 11,445.

Table 58

Alternative 4 - Total Live Constrictor Snakes Bred in U.S.:					
Estimated High-end and Low-end Snakes: Annual Average					
Genus	Species	Low-end U.S. Bred Snakes	High-end U.S. Bred Snakes	Total U.S. Bred Snakes	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	7,712	6,839	14,551	59.8%
<i>Python</i>	<i>molurus</i>	5,035	4,465	9,500	39.0%
<i>Python</i>	<i>sebae</i>	53	47	100	0.4%
<i>Eunectes</i>	<i>notaeus</i>	53	47	100	0.4%
<i>Python</i>	<i>natalensis</i>	53	47	100	0.4%
Total		12,906	11,445	24,351	100.0%

* = less than 1%

Source: PIJAC 2008, 2010; USARK 2010

Table 59 shows the decline in estimated sales revenue of the five species affected by Alternative 4. Sales revenue associated with *Boa* constrictors would decline by \$4.3 million, *Pythons* by \$2.8 million, and *Eunectes notaeus* by \$29,400 for a total decrease in sales revenue of \$7.2 million annually.

Table 59

Alternative 4: Total U.S. Bred Constrictor Snakes						
Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue:						
2008 - 2010 Annual Average						
Genus	Species	Low-end	Total Sales		High-end	Total Sales Revenue
			@ \$200/snake	@ \$400/snake		
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,542,300	6,839	\$2,735,400	\$4,277,700
<i>Python</i>	<i>molurus</i>	5,035	\$1,007,000	4,465	\$1,786,000	\$2,793,000
<i>Python</i>	<i>sebae</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Eunectes</i>	<i>notaeus</i>	53	\$10,600	47	\$18,800	\$29,400
<i>Python</i>	<i>natalensis</i>	53	\$10,600	47	\$18,800	\$29,400
Total		12,906	\$2,581,100	11,445	\$4,577,800	\$7,158,900

Source: PIJAC 2008, 2010; USARK 2010

Retail Value and Secondary Impacts (Scenario A)

Table 60 shows the economic impacts on the five species with the implementation of Alternative 4. Retail value would decline by \$12.8 million annually. Economic output would decrease by \$36.6 million, employment by 324, employment income by \$13.1 million and total tax revenue by \$5.0 million.

Table 60

Scenario A: Alternative 4: Decrease from Alternative 1 (No Action) (Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$12.8	\$36.6	324	\$13.1	\$3.0	\$2.0	\$5.0

Table 61 shows the impacts on major industrial sectors of implementing Alternative 4. Manufacturing, services and trade account for 84 percent of total impacts. As discussed previously in *Alternative 1*, economic impacts include the direct, indirect and induced effects of changes in retail spending associated with constrictor snakes. **Direct effects** are driven by changes in final demand, in this case reductions in retail sales. **Indirect effects** are changes in inter-industry purchases, such as a reduction in a wholesaler's demand for supplies and equipment because there has been a reduction in demand for goods and services provided by the wholesaler because of the reduction in retail sales. Another example of indirect effects is a reduction in manufacturing goods and services (because of the reduction in retail sales) which in turn causes the manufacturer to reduce her demand for the all the necessary inputs into the manufacturing of the goods and services which her firm provides. For both direct and indirect effects, labor and income are affected, which in turn affects household expenditures and those industries which provide goods and services to households. **Table 61** then disaggregates the economic output in **Table 60** to show which industries are affected and the magnitude of the impacts. This discussion also applies to **Tables 63, 66, and 67**.

Table 61

Scenario A: Major Industry Sectors Affected by Alternative 4: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$808,278	5	\$188,699
Mining	\$1,315,413	5	\$339,079
Construction	\$100,488	1	\$5,991
Manufacturing	\$19,036,380	112	\$5,321,430
TCPU	\$2,516,533	21	\$1,266,580
Trade	\$4,417,414	44	\$2,093,486
FIRE	\$1,152,560	18	\$484,345
Services	\$7,271,684	120	\$3,362,988
Total	\$36,618,750	324	\$13,062,569

Retail Value and Secondary Impacts based on USARK data (Scenario B)

Table 62 shows the economic impacts of implementing Alternative 4 using information provided by USARK (Scenario B). Based on the impacts in Scenario A, Alternative 4 shows a 12.8 percent decrease in economic impacts from Alternative 1 (No Action). Retail value would decline by \$26.2 million, economic output by \$74.9 million, employment by 663, employment income by \$26.7 million and total tax revenue by \$10.3 million.

Table 62

Alternative 4 – Scenario B: Decrease from Alternative 1 (No Action)						
(Dollars in Millions)						
Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax revenue	Total Tax Revenue
\$26.2	\$74.9	663	\$26.7	\$6.1	\$4.2	\$10.3

Table 63 shows the major industrial sectors affected by implementation of Alternative 4 under Scenario B. Manufacturing, trade and services account for 84 percent of the impacts.

Table 63

Scenario B: Major Industry Sectors Affected by Alternative 4: Decrease in Secondary Economic Output, Employment and Employment Income from Alternative 1 (No Action)			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$1,653,929	10	\$386,124
Mining	\$2,691,646	9	\$693,837
Construction	\$205,623	1	\$12,258
Manufacturing	\$38,952,932	230	\$10,888,903
TCPU	\$5,149,422	42	\$2,591,660
Trade	\$9,039,072	90	\$4,283,767
FIRE	\$2,358,411	37	\$991,085
Services	\$14,879,584	246	\$6,881,470
Total	\$74,930,619	663	\$26,729,103

Summary of Economic Impacts (Scenarios A and B)

Table 64 shows a comparison of annual impacts estimated from Scenarios A and B. Retail value impacts range from \$12.8 to \$26.2 million; output impacts from \$36.6 to \$75.2 million, employment from

324 to 665 jobs; employment income from \$13.1 to \$26.9 million; and total tax revenue from \$5.0 to \$10.3 million. Given both the information available and the information not currently available, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts based upon the best currently available information.

Table 64. Alternative 4: Range of Retail Value and Secondary Impacts based on Scenarios A and B. (Dollars in Millions)

Method	Retail Value (Social Cost)	Economic Output	Employment	Employment Income	Federal Tax revenue	State and Local Tax Revenue	Total Tax Revenue
A	\$12.8	\$36.6	324	\$13.1	\$3.0	\$2.0	\$5.0
B	\$26.2	\$75.2	665	\$26.9	\$6.1	\$4.2	\$10.3

Impacts on Pet Owners and Hobbyists

Pet owners and hobbyists would be potentially affected in several ways: (1) by eliminating imports, pet owners, potential pet owners and hobbyists would have a smaller number of species to choose from; (2) by eliminating interstate sales, pet owners, potential pet owners and hobbyists would only be able to buy constrictor snakes of the nine species offered within their respective state; and (3) persons moving would not be able to transport their snake or snakes across state lines. Information is not available to quantify these impacts, however information from the Florida Fish and Wildlife Conservation Commission (May 11, 2010) shows that 85 percent of constrictor snake sales are shipped out of state. If this percentage holds for other states as well, the impact on pet owners, potential pet owners and hobbyists would be considerable.

Impacts on Shipping Expenditures

The decline in constrictor snake sales would also affect shipping expenditures. Since shipping expenditures are usually the responsibility of the buyer, these impacts are estimated separately from impacts to the constrictor snake industry (shipping costs are not usually included in the sales price). Since shipping costs are not based on a per snake basis but typically by weight, putting shipping costs on a per snake basis is problematic. However, in compiling price data via the internet as discussed previously, a majority of the shipping costs for a purchase were in the range of \$35 - \$50 per shipment. Consequently, for a conservative estimate of shipping costs, the \$50 figure is used to estimate shipping costs and impacts. **Table 65** shows the decline in shipping expenditures for scenarios A and B. The decline in shipping expenditures is estimated to range between \$2.2 and \$4.5 million with declines in output between \$5.7 and \$11.7 million, employment between 43 and 88, employment income between \$1.8 and \$3.8 million and federal, state and local tax revenue declining between \$761,724 and \$1,561,569.

Table 65

Alternative 4: Estimated Maximum Decrease in Shipping Expenditures (Dollars in Millions)					
	Shipping Costs	Output	Employment	Employment Income	Tax revenue
Scenario A	\$2.2	\$5.7	43	\$1.8	\$761,724
Scenario B	\$4.5	\$11.7	88	\$3.8	\$1,561,569

Tables 66 and 67 show the impacts on major industrial sectors of a decline in shipping expenditures for Scenarios A and B.

Table 66

Alternative 4: Scenario A. Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$178,834	1	\$39,274
Mining	\$138,304	1	\$38,026
Construction	\$14,748	0	\$894
Manufacturing	\$3,410,293	20	\$1,020,007
TCPU	\$353,100	3	\$176,034
Trade	\$282,492	4	\$135,696
FIRE	\$373,598	4	\$129,962
Services	\$879,183	11	\$295,840
Total	\$5,688,243	44	\$1,838,731

Table 67

Alternative 4: Scenario B. Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$366,616	2	\$80,512
Mining	\$283,528	1	\$77,954
Construction	\$30,324	0	\$1,834
Manufacturing	\$6,991,212	41	\$2,091,048
TCPU	\$723,867	6	\$36,0875
Trade	\$579,117	7	\$278,181
FIRE	\$765,888	8	\$266,426
Services	\$1,802,355	23	\$612,631
Total	\$11,661,085	88	\$3,769,459

Environmental Benefits

Alternative 4 would likely be effective in preventing the interstate shipment and use of five large constrictor snakes in States that currently allow their possession. While not eliminating these snakes as a threat, this Alternative could reduce the pathways and chances for snakes being introduced into ecosystems. As such, reducing the probability of constrictor snake establishment would reduce the probability of negative impacts on a variety of entities, such as agriculture, human health, and native animal species. However, estimates of the economic value of reducing these impacts are not currently available.

Listing these large constrictor snakes as injurious would decrease the risk of introduction by potentially decreasing the number of snakes in the market place. This analysis has not dealt with the potential impacts associated with preventing new populations of constrictor snakes. Calculating exact impacts for such a scenario is beyond the scope of this analysis. In addition, this analysis has not incorporated the probability of released or escaped pets because the probability is unknown. In general, listing should decrease the probability of unintentional introduction compared to Alternative 1 (No Action Alternative). Since Alternative 4 addresses five species compared with seven and nine for Alternatives 3 and 2 respectively, Alternative 4 would have relatively lower benefits than the other two action alternatives.

Please see the **Benefits of the Proposed Alternatives** section (p. 64) for a more detailed discussion of benefits.

BENEFITS OF THE PROPOSED ALTERNATIVES

The alternatives that we considered would prohibit the importation of the specified species and ban interstate trade. The benefits of a given alternative can be characterized as a reduction in the potential negative consequences of the establishment of constrictor snake populations in areas where they are not native.

Table 68 shows the relative (to the other alternatives) estimated benefits of Alternatives 2A, 2B, 3, and 4 for each species in the alternative. The high, medium, and low rankings are from the USGS Risk Assessment (Reed and Rodda 2009, Table 10.7, p. 260) and are based on the overall Organism Risk Potential for each species. For example, if a species has a high risk potential ranking, then an alternative that would prohibit importation and interstate trade would have a high ranking for economic benefits (again, relative to the other alternatives, not necessarily in an absolute sense). Alternative 2A, since all nine species are included in this alternative, would have the highest potential benefits, other things being equal. Alternative 3 has the same cost in retail value as Alternative 2A since *E. deschauenseei* and *E. beniensis* are not currently imported, but Alternative 2A will have higher potential benefits than Alternative 3 since any future imports of these two species will be prohibited, while under Alternative 3 such imports would be allowed. Alternative 4 would have relatively lower potential benefits compared with Alternatives 2A and 3, since only five species are affected. Alternative 2B would have the lowest potential benefits because *Boa constrictor*, the high-risk species that is first in terms of sale numbers of the nine species, is not included among the four species. However, Alternative 2B is likely to have the lowest costs of the four alternatives considered in this analysis. All social benefits are qualitative in nature.

Table 68

Relative Benefits of Alternatives 2A, 2B, 3, and 4

Species	Alternative 2A	Alternative 2B	Alternative 3	Alternative 4
<i>Python molurus</i>	High	High	High	High
<i>Python sebae</i>	High	High	High	High
<i>Python natalensis</i>	High	High	High	High
<i>Boa constrictor</i>	High		High	High
<i>Eunectes notaeus</i>	High	High	High	High
<i>Broghammerus reticulatus</i>	Medium		Medium	
<i>Eunectes murinus</i>	Medium		Medium	
<i>Eunectes deschauenseei</i>	Medium			
<i>Eunectes beniensis</i>	Medium			

Bold = Not currently imported

The USGS Risk Assessment (Reed and Rodda 2009) characterizes a number potential consequences associated with the establishment of constrictor snake populations in areas where they are not native, which are listed below. .

1. Impact on native species
2. Tourism
3. Expenditures associated with state and federal activities which address constrictor snake impacts
4. Damage to forestry, agriculture and horticulture
5. Pathogen vectors
6. Other

The economic benefits, broadly defined, of a reduction in the potential consequences of constrictor snake populations in non-native natural areas can be conceptualized in two ways. First, benefits can be defined as economic value (also known as *net willingness to pay* or *consumer surplus*), which is the amount people or households would be willing to pay for a given good or service over and above the actual cost of obtaining the good or service (see Aiken p. 5, and Varian p. 242 for a discussion of economic value). This is the theoretically correct definition of economic value and is the appropriate measure of economic benefits for project analysis (see U.S. Water Resources Council 1983, and U.S. Environmental Protection Agency 2000, p.60). In the context of this analysis, one measure of economic value would be to determine the extent to which society would value a program that would reduce the potential negative consequences of constrictor snakes inhabiting non-native areas (see Freeman III, Cummings et al. and Bjornstad and Kahn for discussions on a variety of methods for determining such values). Once such values were estimated, aggregation across the appropriate number of households would give an estimate of the economic value of the alternatives under consideration.

An alternative approach would be to consider the avoidance or reduction of the costs associated with the above consequences (due to the implementation of the alternative) as a measure of the benefits of the alternatives. These avoided costs are not, strictly speaking, measures of economic value, but may be a reasonable approximation given the paucity of data on economic valuation. However, estimating avoided costs has its own requirements concerning: (1) the probability of a given event or situation occurring, and (2) a quantitative estimate of the cost associated with that event or situation (this is similar in concept to **expected value**; see Dixon et al. pp. 107-108). Ideally, information on (1) and (2) would be available for both the current situation and the effect of implementing a given alternative so that the net cost could be estimated. This net cost then would be the avoided cost that would be a measure of the benefits of the alternative. For example, say that under current conditions, there is a three percent probability within the next five years that a Boa population would be of sufficient size to decrease the population of a particular bird species in the Everglades National Park so that 1,000 bird watchers no longer visit the area and \$25,000 in visitor expenditures are lost to the local area. Implementing alternative Y would reduce the three percent probability to one percent. The expected costs in the current situation would be \$750 ($\$25,000 \times 0.03$) with alternative Y the expected costs would be \$250 ($\$25,000 \times 0.01$). Net avoided costs would be \$500 ($\$750 - \250), one measure of the benefits of alternative Y.

With respect to the economic analysis of the nine constrictor snake species, information is not currently available on: (1) the economic value of policies to reduce potential damage from constrictor snake populations in non-native areas; (2) probability estimates of events or situations resulting from

constrictor snake populations in non-native areas; and (3) cost estimates of these events or situations if they occurred. While the various alternatives eliminate imports of up to nine species of constrictor snakes and prohibit interstate trade, constrictor snakes already in a given state are not affected by the proposed alternatives. For example, given the large constrictor snake population already in Florida (as pets), it is unclear how restricting imports is going to affect the likelihood of the snakes ending up in the Everglades or other natural areas and causing the various impacts identified above (1. through 9. above). Owner behavior in response to implementation of one of the alternatives is uncertain. If imports are eliminated, supply is significantly decreased (say, for example, by half) and other things equal, price will rise. Owners and suppliers may respond in different ways. If owners or potential owners face rising prices, they may turn to other substitutes such as different species of snakes or reptiles or perhaps even give up the hobby. In response to higher prices, suppliers may increase the breeding of one or more of the nine constrictor snake species already in the state. As a result, one possibility is that in-state breeding expands to at least partially compensate for the elimination of imports. Consequently, the lack of available information (as identified in (1), (2), and (3) above) and the uncertainty of how people might respond to the alternatives under consideration, quantitative estimates of the economic benefits of the alternatives are unavailable at present.

The discussion below summarizes potential benefits listed earlier in a qualitative manner based on the findings in the USGS Risk Assessment.

Potential Impacts and Economic Benefits as Summarized in Risk Assessment

1. Impact on native species, and threatened and endangered species.

The USGS Risk Assessment identifies 125 species in Florida as “potentially vulnerable” to constrictor snakes (Table 4.2, pp.17-20). This includes 74 bird species, 41 mammal species, 9 reptile species and 1 amphibian species. Species identified as having special legal status (in Florida, species of special concern; for the U.S., threatened or endangered species) include 33 bird species, 24 mammal species, 6 reptile species and 1 amphibian species. Numerous economic studies have shown that people can have a positive economic value for wildlife conservation in general and species preservation in particular (Richardson and Loomis). For example, Table 2, p. 1541 in Richardson and Loomis, shows the average economic value households place on various threatened and endangered species. Annual values per household range from \$241 for anadromous fish populations to \$16 for the woodpecker to \$8 for the striped shiner. Information on the economic value of the 125 species in Florida potentially affected by constrictor snake populations is currently unavailable; however it seems reasonable to assume that households in Florida, on average, have some positive economic value for these species. However, as with other impacts previously identified, there is insufficient information on the likelihood and magnitude of potential constrictor snake impacts on native species in general and threatened and endangered species in particular to develop quantitative economic estimates of such impacts. However, other things being equal, those alternatives affecting the most constrictor snake species would have the potential for higher relative (to the other alternatives) economic benefits than alternatives affecting a lesser number of species. Consequently, Alternative 2 would potentially have the greatest benefits, followed by Alternative 3 then Alternative 4.

2. Tourism

Tourism may be affected by constrictor snake populations in two ways: (1) reluctance on the part of tourists to visit areas populated by constrictor snakes, and (2) constrictor snakes affecting wildlife populations which in turn may reduce recreation visits to affected areas. If people perceive (accurately or not) that they may be in danger from constrictor snake attacks, they may be reluctant to visit areas

populated by constrictor snakes. The extent to which people hold these attitudes is unknown and whether or not visitation has been affected is also unknown.

Wildlife watching generates a significant amount of recreational visits and associated expenditures in Florida. In 2006, over 746,000 people engaged in some form of non-residential (away from home) wildlife watching activity with associated expenditures (travel-related and equipment) of \$645.6 million (Southwick and Allen). On average, each participant spent \$1,433 annually on non-residential wildlife watching. However, the extent to which visitation could decline because of a decrease in animal numbers is unknown, since it would depend on a number of factors, particularly people's knowledge and perception of the decrease and how they would react to it. Considering south Florida and specifically Everglades National Park, the National Park Service states, "Everglades National Park was the first national park dedicated for its biological diversity and maintaining this diversity is key to the visitor experience. The Everglades ecosystem supports diverse communities of native plants and animals that have developed over millions of years. Two of the primary visitor experiences in Everglades National Park are wildlife viewing and photography. Burmese pythons prey on native birds, amphibians, reptiles and mammals, therefore reducing their numbers and frequency of sightings. This impacts the desired visitor experience." (National Park Service 2010). For example, say that in a particular area, birders usually have a high probability of seeing a particular species. Assume that a population of constrictor snakes has reduced the population to the extent that there is only a medium probability of seeing the species. How would people react? Would marginal changes in probability have a noticeable effect on birder behavior or would catastrophic changes have to occur? Aside from how people would react to a given event, there is the question of to what extent the given event is likely to occur. Since this information is not available, a quantitative economic estimate of the potential impacts on tourism from constrictor snake populations is not possible. However, the USGS Risk Assessment identifies seven of the nine species as having high to medium consequences of establishment. (Table 10.5, p. 91).

3. Expenditures associated with state and federal activities which address constrictor snake impacts

The main focus of these expenditures are research and eradication (such as trapping constrictor snakes). Presumably if the likelihood of constrictor snake impacts are reduced because of Lacey Act restrictions, these expenditures would also be reduced. To the extent that this occurs, any such reductions would be a benefit associated with the implementation of one of the alternatives under consideration. While a complete listing of all expenditures is not currently available, a few agencies do have some information available (Roybal 2010). The U.S. Fish and Wildlife Service has spent \$604,656 over a three year period (2007-2009) on python trap design, deployment, and education in the Florida Keys to prevent the potential extinction of the endangered Key Largo woodrat at Crocodile Lake National Wildlife Refuge. The South Florida Water Management District has spent \$334,000 between 2005 and 2009 and anticipates spending an additional \$156,600 on research, salaries, and vehicles in the next several years. An additional \$300,000 will go for the assistance of USDA Wildlife Services (part of USDA Animal and Plant Health Inspection Service). The USDA Wildlife Research Center (Gainesville FL Field Station) has spent \$15,800 in 2008-2009 on salaries, travel and supplies. The USGS in conjunction with the University of Florida has spent over \$1.5 million on research, radio telemetry, and the development, testing, and implementation of constrictor snake traps. Miami-Dade County Parks and Recreation Department, Natural Areas Management and Department of Environmental Resources Management have spent \$60,875 annually on constrictor snake issues. The National Park Service has spent \$317,000 annually on various programs related to constrictor snake issues in the Everglades National Park. All these expenditures total \$5.7 million from 2005 to approximately 2012, or roughly an average of \$720,000 per year. The extent to which these expenditures would change with implementation of a particular alternative is not known. However, other things being equal, those alternatives affecting the most constrictor snake species would have the potential for higher relative (to the other alternatives) economic benefits (in the form of avoided costs) than alternatives affecting a lesser number of species.

Consequently, Alternative 2 would potentially have the greatest economic benefits, followed by Alternative 3 then Alternative 4.

4. Damage to forestry, agriculture and horticulture:

According to the USGS Risk Assessment, potential damage to forestry, agriculture and horticulture is small to negligible (p.4-43, p.5-46, p.6-58, p.7-74, p.8-47, and p.9-49).

5. Pathogen vectors

Constrictor snakes may act as pathogen vectors for tick-borne and other ectoparasitic diseases. In particular, constrictor snakes may play a role in heartwater disease, an often fatal disease which affects hoofed animals, such as horses and cattle. However, the likelihood of these impacts occurring is unknown, since it would depend on a variety of factors for which little information is available. Other things being equal, those alternatives affecting the most constrictor snake species would have the potential for higher relative (to the other alternatives) economic benefits than alternatives affecting a lesser number of species. Consequently, Alternative 2 would potentially have the greatest economic benefits, followed by Alternative 3, then Alternative 4.

6. Other

Several other potential consequences of constrictor snake populations may be reduced by listing them as injurious, and we discuss them here to provide a complete assessment of the consequences of not listing: (1) Predation on livestock by the large constrictors is possible because small livestock is raised in all states within the potential range of the constrictor snakes; however, we do not know the likelihood and magnitude of the consequences. (2) Predation on pets is possible by the large constrictor snakes, but there is little information on which to develop quantitative economic estimates of the consequences of such attacks. Similar to livestock predation, the impacts to pets would appear to be negligible unless constrictor snake populations become established in areas that would put pets at risk. (3) The likelihood of damage to electrical power systems is small to negligible (Reed and Rodda 2009). (4) The likelihood of traffic accidents and attacks on humans is small to negligible, but if such an attack or incident occurred, the consequences could be serious or fatal.

APPENDIX

Estimated Range of Retail Value of Constrictor Snakes by Species and Sub-species 2008 Estimate								
Genus	Species	Subspecies	Price per Snake for Imported Snakes			Price per Snake for U.S. Bred Snakes		
			Low	Medium	High	Low	Medium	High
<i>Boa</i>	<i>constrictor</i>	<i>amarali</i>	na	na	na	\$200	\$300	\$400
<i>Boa</i>	<i>constrictor</i>	<i>constrictor</i>	\$100	\$150	\$200	\$200	\$350	\$500
<i>Boa</i>	<i>constrictor</i>	<i>imperator</i>	\$100	\$150	\$200	\$150	\$175	\$200
<i>Boa</i>	<i>constrictor</i>	<i>longicauda</i>	na	na	na	\$250	\$300	\$350
<i>Boa</i>	<i>constrictor</i>	<i>nebulosa</i>	na	na	na	na	na	na
<i>Boa</i>	<i>constrictor</i>	<i>occidentalis</i>	na	na	na	\$175	\$200	\$225
<i>Boa</i>	<i>constrictor</i>	<i>orophias</i>	na	na	na	na	na	na
<i>Boa</i>	<i>constrictor</i>	<i>ortoni</i>	na	na	na	na	na	na
<i>Boa</i>	<i>constrictor</i>	<i>sabogae</i>	\$1,000	\$1,500	\$2,000	\$1,000	\$2,000	\$3,000
<i>Python</i>	<i>anchietae</i>		\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
<i>Python</i>	<i>brongersmai</i>		\$100	\$150	\$200	\$150	\$200	\$250
<i>Python</i>	<i>breitensteini</i>		\$120	\$120	\$120	\$125	\$188	\$250
<i>Python</i>	<i>curtus</i>		\$120	\$120	\$120	\$250	\$250	\$250
<i>Python</i>	<i>molurus</i>	<i>molurus</i>	na	na	na	\$50	\$150	\$250
<i>Python</i>	<i>molurus</i>	<i>bivittatus</i>	\$100	\$100	\$100	\$100	\$100	\$100
<i>Python</i>	<i>natalensis</i>		na	na	na	\$200	\$225	\$250
<i>Python</i>	<i>regius</i>		\$50	\$100	\$150	\$50	\$100	\$150
<i>Python</i>	<i>reticulatus</i>		\$100	\$100	\$100	\$100	\$125	\$150
<i>Python</i>	<i>sebae</i>	<i>sebae</i>	\$80	\$90	\$100	\$80	\$90	\$100
<i>Python</i>	<i>timoriensis</i>		na	na	na	\$500	\$650	\$700
<i>Eunectes</i>	<i>murinus</i>	<i>murinus</i>	\$100	\$150	\$200	\$100	\$150	\$200
<i>Eunectes</i>	<i>murinus</i>	<i>gigas</i>	included in <i>Eunectes murinus murinus</i>					
<i>Eunectes</i>	<i>deschauenseei</i>		na	na	na	na	na	Na
<i>Eunectes</i>	<i>notaesus</i>		na	na	na	\$100	\$200	\$300

Source: PIJAC 2008, 2010

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