

Rulemaking to List Four Constrictor Snake Species Under the Lacey Act

[Reticulated python (*Python reticulatus*), Green anaconda (*Eunectes murinus*), Beni anaconda (*Eunectes beniensis*), and DeSchauensee's anaconda (*Eunectes deschauenseei*)]

Final Economic Analysis

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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 (reticulated python (*Python reticulatus*), DeSchauensee's anaconda (*Eunectes deschauenseei*), green anaconda (*Eunectes murinus*), and Beni anaconda (*Eunectes beniensis*)) 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 five species of large constrictor snakes to the list of injurious wildlife (reticulated python, boa constrictor (*Boa constrictor*), DeSchauensee's anaconda, green anaconda, and Beni anaconda); Alternative 2B – Add four species of large constrictor snakes to the list of injurious wildlife, excluding the boa constrictor); Alternative 3 – Add three species of large constrictor snakes to the list of injurious wildlife (excluding the Beni and DeSchauensee's anacondas); and Alternative 4 – Add one species of large constrictor snakes (boa constrictor) to the list of injurious wildlife. Economic impacts are estimated on the projected biological impacts from invasive 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 section **BENEFITS OF THE PROPOSED ALTERNATIVES**).

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. The Service is completing this economic analysis as required under these executive orders. 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 transport, 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 ecosystems 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
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
Consumer Surplus	Decrease in probability of detrimental impacts of constrictor snake infestation	Consumers would have less choice or opportunities for constrictor snake ownership

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. Due to data limitations, we are also 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** discusses qualitatively the various benefits associated with the final rule. Consequently, this analysis relies on a limited quantitative assessment of the cost and qualitative assessment of benefits of the regulatory alternatives.

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 interstate transport of the five species of large constrictor snakes would continue and would be expected to be

similar to recent years. The threat to select ecosystems would continue in the absence of effective State controls. With the listing of four species (Burmese python *Python molurus*, Northern African python *Python sebae*, Southern African python *Python natalensis* and yellow anaconda *Eunectes notaeus*) in effect as of March 23, 2012, it is possible that substitutions for nonlisted species may occur, but this analysis does not account for this type of substitution effect.

Alternative 2A

Under Alternative 2A, the importation and interstate transport of five species of large constrictor snakes [reticulated python (*Python reticulatus*), boa constrictor (*Boa constrictor*), DeSchauensee'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 and others 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 \$9.3 million to \$20.1 million. This represents the loss of revenue to companies or individuals importing or breeding these large constrictor snakes. Under Alternative 2A, the probability of large constrictor snakes establishing a population outside southern Florida and other vulnerable areas of the United States would likely decrease compared to Alternative 1 in the absence of effective State controls. The estimated benefits associated with this alternative do not quantify ecological, commercial, recreational, and non-use values of at-risk ecosystems. The change in probability is unknown.

Alternative 2B

Under Alternative 2B, the importation and interstate transport of four species of large constrictor snakes (reticulated python, green anaconda, Beni anaconda, and DeSchauensee's anaconda) 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 and others 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 \$1.9 million to \$4.1 million. This represents the loss of revenue to companies or individuals importing or breeding these large constrictor snakes. Under Alternative 2B, the probability of large constrictor snakes establishing a population outside southern Florida and other vulnerable areas of the United States would likely decrease compared to Alternative 1 in the absence of effective State controls. The estimated benefits associated with this alternative do not quantify ecological, commercial, recreational, and non-use values of at-risk ecosystems. The change in probability is unknown.

Alternative 3

Under Alternative 3, the importation and interstate transport of three species of large constrictor snakes (reticulated python, boa constrictor, and green anaconda) 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 and other vulnerable areas of the United States would likely decrease compared to Alternative 1 in the absence of effective State controls. It is unknown what the new probability of establishment would be under Alternative 3. The estimated benefits associated with this alternative do 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 one species of large constrictor snake (boa constrictor) would be prohibited. The annual retail value losses for Alternative 4 are estimated to range from \$7.4 million to \$15.9 million. The cost estimate represents the loss of revenue to companies or individuals importing or breeding this large constrictor snake. Under Alternative 4, the probability of the boa constrictor establishing additional populations outside southern Florida and other vulnerable areas of the United States would likely decrease compared to Alternative 1 in the absence of effective State controls. It is unknown what the new probability of establishment would be under Alternative 4. The estimated benefits associated with this alternative do not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems.

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	\$9.3 – \$20.1
Alternative 2B	\$1.9 – \$4.1
Alternative 3	\$9.3 – \$20.1
Alternative 4	\$7.4 – \$15.9

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 five species are included in this alternative, would have the highest potential benefits, other things equal, in the absence of effective State controls. Alternative 3 has the same cost in retail value as Alternative 2A since *E. deschauenseei* and *E. beniensis* are not currently imported. However, we note that Alternative 2A could 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 3 could have a higher potential environmental benefit than 2B (which has more species) because Alternative 3 includes the high-risk boa constrictor, which is also the highest species in trade of the five remaining species, and is the only other constrictor that has established populations in the United States. Alternative 4 would have lower relative potential benefits compared with Alternatives 2A and 3 since only boa constrictors would be listed.

Table ES-3 Relative Social Benefits of Alternatives 2, 3, and 4				
Species	Alternative 2A	Alternative 2B	Alternative 3	Alternative 4
<i>Boa constrictor</i>	High		High	High
<i>Python reticulatus</i>	Medium	Medium	Medium	
<i>Eunectes murinus</i>	Medium	Medium	Medium	
<i>Eunectes deschauensei</i> *	Medium	Medium		
<i>Eunectes beniensis</i> *	Medium	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. The impact categories cannot be added together because this would double-count the impacts. For example, both job income and tax revenue are derived from total change in economic output. Similarly, both labor costs and taxes are paid out of total sales revenue for a company.

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.

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	\$26.5 – \$57.1	236 – 509	\$9.5 - \$20.5	\$3.6 - \$7.8
Alternative 2B	\$5.3- \$11.4	49 – 105	\$1.9 - \$4.1	\$0.7 - \$1.6
Alternative 3	\$26.5 - \$57.1	236 – 509	\$9.5 - \$20.5	\$3.6 - \$7.8
Alternative 4	\$21.1 - \$45.4	188 – 405	\$7.7 - \$16.5	\$2.9 - \$6.2

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-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	\$1.6 – \$3.4	\$4.1 – \$8.8	32 – 69	\$1.4 – \$3.0
Alternative 2B	\$0.3 - \$0.6	\$0.8 - \$1.8	7- 16	\$0.3 - \$0.6
Alternative 3	\$1.6 – \$3.4	\$4.1 – \$8.8	32 - 70	\$1.4 – \$3.0
Alternative 4	\$1.4 – \$3.0	\$3.3 – \$7.1	25 – 54	\$1.1 – \$2.4

The Fish and Wildlife Service is making a final determination to list four of the five remaining proposed species. The following analysis was revised from the final economic analysis in 2012 (listing the Burmese python, Northern and Southern African pythons, and yellow anaconda) to omit those species already listed in the alternatives.

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 the likelihood that they could become established in the wild and the resulting potential effects on the environment of the United States. 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 were the Burmese python, Northern African python, Southern African python, reticulated python, green anaconda, yellow anaconda, Beni anaconda, DeSchauensee's anaconda, and boa constrictor.

The Service has the authority to prohibit the importation and interstate transport of species found to be injurious under the Lacey Act. The regulations contained in 50 CFR part 16 that 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. The lists of injurious wildlife species are at 50 CFR 16.11-15.

For selected constrictor snakes listed as injurious, 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 is 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 can be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the U.S. Fish and Wildlife Service. The rule would not prohibit intrastate transport or possession of these constrictor snakes within States, the District of Columbia, and territories (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 request for information period that closed April 30, 2008. A Proposed Rule to add nine constrictor snake species to the list of injurious wildlife under the Lacey Act was published in the *Federal Register* on March 12, 2010 (Volume 75, pages 11808-11829) and the public comment period closed on May 11, 2010. 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-

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

38070). The Service received approximately 56,500 comments during these two comment periods, of which few contained new, substantive economic information. Another notice was published in the *Federal Register* reopening the public comment period on June 24, 2014, and ending on July 24, 2014 (Volume 79, pages 35719-35720), garnering nearly 29,000 comments, few of which contained new, substantive information. Among the new information we considered was an economic analysis of the reptile industry from Georgetown Economic Services (GES; GES 2011), which is considered in this final report. Another economic report was from Blue Sky Consulting Group (2013). The Blue Sky report supports the Service's analysis, except that it adds the impact of alternative purchases, and concludes that: "Listing five additional species of large constrictor snakes as injurious under the Lacey Act would result in little or no net change in economic activity, consumer spending, or employment. Any decline in consumer spending and economic activity related to the five listed snakes would be offset by increased spending and economic activity in other sub-sectors of the reptile trade and in other sectors of the economy, with little or no net change in overall economic activity or employment. In addition, to the extent that Lacey Act listing reduces the likelihood of these species becoming established as invasive species, federal, state and local agencies will experience reduced costs for habitat restoration and invasive species control."

We attempted to obtain more economic information to supplement what we received from public comments (during a total of 210 days in four public comment periods) and from our own searches. On February 29, 2008, we participated in a panel discussion arranged by the pet industry. The Service met with the Small Business Administration (SBA) on April 20, 2010, to determine the pertinent information that the SBA and the Service needed; this meeting was held 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.

On January 23, 2012, we published a final rule to list four of the nine proposed species (Burmese python, Northern African python, Southern African python, and yellow anaconda), while five remained under consideration (77 FR 3330). We are currently finalizing the listing as injurious of another subset of the proposed species (four more species, with one removed from consideration). This means that there is a second final rule and thus a second final economic analysis. We have noted in the following alternatives used in the 2012 final economic analysis (Final Economic Analysis 2012) that four species were listed in 2012. The alternatives we considered are based on the proposed rule to list nine species of large constrictor snakes as injurious (75 FR 11808; March 12, 2010), as well as peer review of the proposed rule and information and comments received from the public during the public comment periods. 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 described in this analysis. 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.

Groups impacted by the listing would include: (1) companies importing live large constrictor snakes, (2) companies (breeders and wholesalers) with interstate sales of live large constrictor snakes, (3) companies selling reptile-related products and services, and (4) pet owners who own or would like to own snakes listed under the rulemaking. Impacts to these groups depend on the amount of interstate sales within the constrictor snake market. All importation and interstate transport of snakes listed under the rulemaking would be eliminated, except as authorized under permit for one of the allowed statutory purposes. 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 definitions of terms used in this document.
- **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 five constrictor snakes, including the reticulated python (*Python reticulatus*), boa constrictor (*Boa constrictor*), 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 five snake species are listed as injurious.
- **Alternative 2B - List as Injurious the reticulated python (*Python reticulatus*), green anaconda (*Eunectes murinus*), Beni anaconda (*Eunectes beniensis*), and DeSchauensee’s anaconda (*Eunectes deschauenseei*):** 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 three constrictor snakes, including the reticulated python (*Python reticulatus*), boa constrictor (*Boa constrictor*), and green anaconda (*Eunectes murinus*).** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if these three snake species are listed as injurious.
- **Alternative 4 – List as Injurious the boa constrictor (*Boa constrictor*):** This section analyzes the impacts to the constrictor snake market and the environment that would be incurred if this snake species is 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 species in the genera *Boa*, *Python*, and *Eunectes*. While other genera (such as *Morelia*) may also be categorized as large constrictor snakes, 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

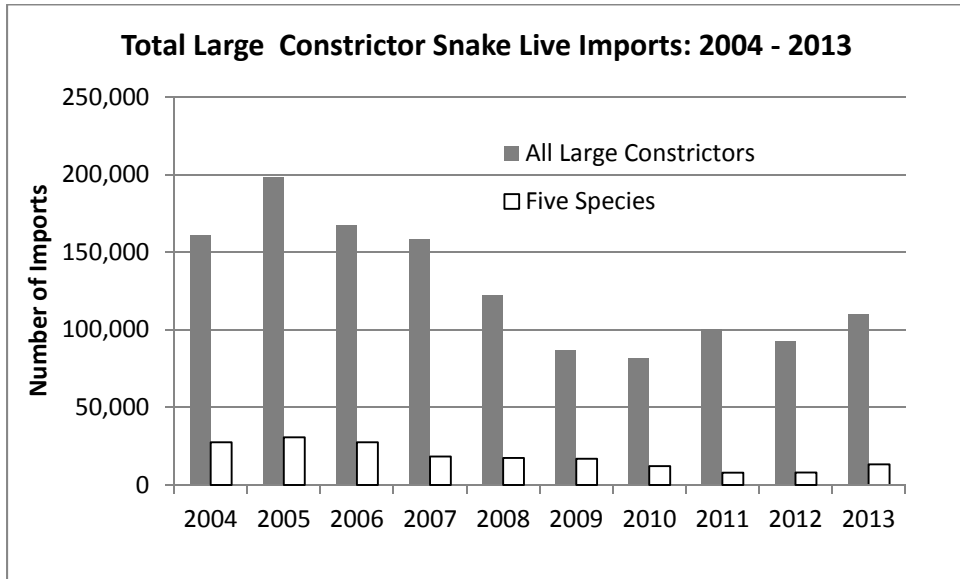
A number of data sources detailing live snake importation are available including the Service's Office of Law Enforcement, the Service's Division of Management Authority, World Conservation Monitoring Center, and public comments from the Notice of Inquiry. For the description and analysis of snake importation, we used data from the Service's Office of Law Enforcement (2014) 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). For the most recent 10 years of available data (2004 to 2013), almost 1.3 million live constrictor snakes of 13 different species were imported into the United States (**Table 1**). *Python regius* (ball python, a species not proposed for listing as injurious) comprised a significant percentage (81.9 percent) of these imports. **Table 2** shows total imports (all 13 species) for the most recent 3 years, 2011 to 2013. *Python regius* accounts for 88.1 percent and *Boa constrictor* accounts for 8.8 percent of imports of the 13 species for these 3 years. The reticulated python accounts for 1.4 percent, and all other species account for less than 1 percent.

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 of a specific morph could be important until U.S. breeders learn to captive breed that particular morph (Reaser 2009). However, once the U.S. capabilities to produce the morph are perfected and a supply developed, the need to import the morph may decrease. Because it is difficult to estimate the long-term trends, this analysis uses a 3-year moving average when available (2011 - 2013). This overview section simply attempts to describe a summary of the last 10 years of available data of the importation and breeding of large constrictor snakes in the United States.

Figure 1 shows the total numbers of imports for all large constrictors and for the five species for the period 2004 - 2013. Imports peaked in 2005 and declined by greater than 44 percent between 2005 and 2013.

Figure 1. Total Large Constrictor Snake Live Imports, 2004 – 2013



Source: USFWS 2014, Import data

Table 1 shows total large live constrictor snake imports from 2004 to 2013. *Python regius* accounts for 81.9 percent, and *Boa constrictor* accounts for 12.0 percent of total imports over this period.

Table 1

Total Large Live Constrictor Snake Imports: 2004 -2013				
Genus	Species	Total Imports	Percent of Total Imports	Annual Average
<i>Python</i>	<i>regius</i>	1,046,135	81.9	104,614
<i>Boa</i>	<i>constrictor</i>	153,397	12.0	15,340
<i>Python</i>	<i>molurus bivittatus</i> ¹	23,926	1.9	2,393
<i>Python</i>	<i>reticulatus</i>	21,087	1.7	2,109
<i>Python</i>	<i>curtus</i>	8,542	0.7	854
<i>Python</i>	<i>brongersmai</i>	13,732	1.1	1,373
<i>Python</i>	<i>sebae</i> ¹	4,334	*	433
<i>Eunectes</i>	<i>murinus</i>	5,504	*	550
<i>Eunectes</i>	<i>species</i>	100	*	10
<i>Python</i>	<i>species</i>	100	*	10
<i>Python</i>	<i>breitensteini</i>	667	*	67
<i>Eunectes</i>	<i>notaeus</i> ¹	25	*	3
<i>Python</i>	<i>timoriensis</i>	85	*	9
<i>Python</i>	<i>anchietae</i>	0	*	0
<i>Python</i>	<i>natalensis</i> ¹	0	0	0
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	0
Total		1,277,634	100.0	127,763

* = less than 1 percent

Bold = The five species considered in this final rule

¹Species listed as injurious in 2012, with imports prohibited as of March 23, 2012

Source: USFWS 2014, Import data

Table 2 shows live large constrictor snake imports from 2011 to 2013. *Python regius* accounted for 88.1 percent of total constrictor snake imports and *Boa constrictor* 8.8 percent.

Table 2

Total Live Large Constrictor Snake Imports: 2011 – 2013				
Genus	Species	Total Imports	Annual Average	Percent of Total Imports
<i>Python</i>	<i>regius</i>	266,928	88,976	88.1
<i>Boa</i>	<i>constrictor</i>	26,506	8,835	8.8
<i>Python</i>	<i>molurus bivittatus</i> ¹	1,314	438	*
<i>Python</i>	<i>brongersmai</i>	4,139	1,380	1.4
<i>Python</i>	<i>reticulatus</i>	1,709	570	*
<i>Eunectes</i>	<i>murinus</i>	1,096	365	*
<i>Python</i>	<i>sebae</i> ¹	436	145	*
<i>Python</i>	<i>curtus</i>	550	183	*
<i>Python</i>	<i>breitensteini</i>	110	37	*
<i>Python</i>	<i>species</i>	0	0	*
<i>Eunectes</i>	<i>notaeus</i> ¹	0	0	*
<i>Python</i>	<i>timoriensis</i>	68	23	*
<i>Python</i>	<i>anchietae</i>	0	0	*
<i>Python</i>	<i>natalensis</i> ¹	0	0	*
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	*
Total		302,856	100,952	100.0

* = less than 1 percent

Bold = The five species considered in this final rule

¹Species listed as injurious in 2012, with imports prohibited as of March 23, 2012

Source: USFWS 2014, Import data

Table 3 compares average annual large constrictor snake imports for the periods 2004 to 2013 and 2011 to 2013. We are basing our analysis on data for the latter three years, since this period best reflects the conditions that would be affected by the final rulemaking.

Table 3

Live Large Constrictor Snake Imports, All Species and Five Species, Annual Average –2004 - 2013 and 2011 – 2013		
Imported Constrictor Snakes	2004 - 2013 Annual Average	2011 - 2013 Annual Average
Total Number of Imported Live Constrictor Snakes: All Species	127,763	100,952
Total Number of Imported Live Constrictor Snakes: Five Species	17,999	9,770
Five Species as Percentage of Total Live Constrictor Snake Imports	14.1	9.7

Source: USFWS 2014, Import data

Importation of constrictor snakes is not distributed evenly across the United States (**Table 4**). Instead, imports were concentrated in three ports from 2011 to 2013: Miami, Los Angeles, and Dallas-Ft. Worth. These three ports have consistently represented about 99 percent of imported live constrictor snakes since 2004 (USFWS 2014). Approximately 152 companies or individuals imported live constrictor snakes from one of the five species during the 10-year period.

Table 4

Live Large Constrictor Snake Five Species Imports by Port of Entry: 2004 - 2013 and 2011 – 2013				
Port	Total Imports: Five Species 2004 - 2013	Percent	Total Imports: Five Species 2011 - 2013	Percent
Miami	162,857	91.2	27,151	94.2
Los Angeles	8,531	4.8	1,324	4.5
Dallas-Ft. Worth	5,265	3.0	359	1.2
All other Ports	1,173	1.0	477	1.6
Total	177,826	100	29,311	100.0

Source: USFWS 2014, Import data

Table 5 shows total number of importers of all species and those importers who import one or more of the five species, as well as other constrictor species. From 2004 to 2013, 244 firms or individuals imported large constrictor snakes of all species. The top five firms in terms of number of snakes imported accounted for 42 percent of imports, while the top 25 accounted for 71.3 percent. For the period 2011 to 2013, 85 firms imported large constrictor snakes with the top five accounting for 64.0 percent and the top 25 accounting for 94.5 percent. From 2004 to 2013, 152 importers imported one or more of the five species, with the top five accounting for 57.0 percent and the top 25 accounting for 90.7 percent. For the

period 2011 - 2013, 50 importers imported one of the five species with the top five accounting for 88.6 percent and the top 25 accounting for 99.5 percent.

Table 5

Number of Importers of Live Large Constrictor Snakes and Percent of Total Imports by Top 5, 10, and 25 Importers				
	All Species 2004 – 2013	Five Species 2004 – 2013	All Species 2011 – 2013	Five Species 2011 - 2013
Total Importers	244	152	85	50
Top 5 percent	42.0	57.0	64.0	88.6
Top 10 percent	54.0	73.4	80.1	97.5
Top 25 percent	71.3	90.7	94.5	99.5

Source: USFWS 2014, Import data

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 15 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 (p.21).” 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 for verification. The 100,000 to 150,000 range is 4 to 6 times higher than the previous PIJAC estimate (Table 2A, p. 11, PIJAC 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 (PIJAC 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). *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). *Python molurus* and *P. reticulatus* account for 18.7 and 9.8 percent, respectively. Together, these four species account for 91.3 percent of all large constrictor snakes bred in the United States.

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*, *Eunectes beniensis*, and *Eunectes notaeus*.

Table 6

Live Large 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
Boa	<i>constrictor</i>	14,550	28.5
<i>Python</i>	<i>molurus</i>	9,500	18.7
Python	<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	*
Eunectes	<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 percent

Bold = One of the five species considered in this 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. 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 non-regulated snakes) in addition to the breeding of large constrictor snakes.

Table 7 summarizes total annual constrictor snake imports and U.S.-bred snakes for 2011 to 2013. *Python regius* accounts for 70.1 percent and *Boa constrictor* accounts for 15.4 percent of the average annual total of imported and U.S. bred snakes. **Table 8** shows the same information for the five species for the period 2011 to 2013. *Boa constrictor* accounts for 79.2 percent and *Python reticulatus* accounts for 18.9 percent of the total of imports and U.S.-bred snakes of the five species.

⁴ The three states with the most imports from 2011 to 2013, Florida, Texas, and California, have State or local regulations regarding the commercial and private use of large constrictor snakes (see in References: Florida Fish and Wildlife Conservation Commission, Texas Parks and Wildlife Department, and Los Angeles Animal Services).

Table 7

All Species: Total Live Large Constrictor Snake Imports and U.S. Bred Snakes: Annual Average 2011-2013					
Genus	Species	Total Imports	Total U.S. Bred	Percentage of Total	Annual Average
<i>Python</i>	<i>regius</i>	88,976	17,500	70.1	106,476
<i>Boa</i>	<i>constrictor</i>	8,835	14,550	15.4	23,385
	<i>molurus</i>				
<i>Python</i>	<i>bivittatus</i>	438	9,500	6.5	9,938
<i>Python</i>	<i>reticulatus</i>	570	5,000	3.7	5,570
<i>Python</i>	<i>brongersmai</i>	1,380	1,500	1.9	2,880
<i>Python</i>	<i>breitensteini</i>	37	1,250	*	1,287
<i>Python</i>	<i>curtus</i>	183	850	*	1,033
<i>Eunectes</i>	<i>murinus</i>	365	200	*	565
<i>Python</i>	<i>anchietae</i>	0	350	*	350
<i>Python</i>	<i>sebae</i>	145	100	*	245
<i>Eunectes</i>	<i>notaeus</i>	0	100	*	100
<i>Python</i>	<i>natalensis</i>	0	100	*	100
<i>Python</i>	<i>species</i>	0	0	*	0
<i>Python</i>	<i>timoriensis</i>	23	20	*	43
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	*	0
Total		100,952	51,020	100.0	151,972

* = less than 1 percent

Bold = The five species considered in this final rule

Source: USFWS 2014; PIJAC 2008, 2010

Table 8

Five Species: Total Live Large Constrictor Snake Imports and U.S.-Bred Snakes: Annual Average 2011-2013					
Genus	Species	Total Imports	Total U.S. Bred	Percentage of Total	Annual Average
<i>Boa</i>	<i>constrictor</i>	8,835	14,550	79.2	23,385
<i>Python</i>	<i>reticulatus</i>	570	5,000	18.9	5,570
<i>Eunectes</i>	<i>murinus</i>	365	200	1.9	565
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	*	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	*	0
Total		9,770	19,750	100.0	29,520

* = less than 1 percent

Bold = One of the five species affected by this final rule

Source: USFWS 2014; PIJAC 2008, 2010

Table 9 summarizes the number of imports and U.S.-bred snakes for all large constrictor snake species in Table 7 and for the five species in the proposed rule for the period 2011 – 2013 (annual average).

Table 9

Summary of Annual Live Imports and Domestic Breeding of Large Constrictor Snakes: Annual Average 2011 – 2013	
	Annual Average 2011-2013
Total number of live constrictor snakes imported: all species	100,952
Total number of live constrictor snakes imported: five species	9,770
Total U.S. bred constrictor snakes: all species	51,020
Total U.S. bred constrictor snakes: five species	19,750
Total live constrictor snake imports and U.S.-bred snakes: all species	151,972
Total live constrictor snake imports and U.S.-bred snakes: five species	29,520
Five species as percent of total imports and U.S.-bred snakes	19.4

Source: USFWS 2014, Import data; 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 survey conducted in 2012 by the American Pet Products Association (APPA 2014, p. 432), 5.6 million U.S. households own a reptile (a broad category that includes amphibians and scorpions) as a pet; this is a 19 percent increase over the 2010 survey (APPA 2012). At 2.05 reptiles per reptile-owning household (APPA 2014, p. 433), the total number of “reptiles” owned as pets is 11.5 million (2.05 multiplied by 5.6 million households (APPA 2014); this is a 15 percent decrease from the 2010 survey of 13.6 million (APPA 2012). The survey shows that 18 percent of all reptile owners owned at least one snake (all species)(APPA 2014,p. 434, Table 4b). This translates to 1 million households in 2012 owning at least one snake (all species). In comparison, the survey shows that 20 percent of all reptile owners owned at least one frog (all species) (APPA 2014, p. 434, Table 4a), translating to 1,120,000 households owning at least one frog. More detailed information on constrictor snake ownership is not available. 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 large constrictor snakes in this rule 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 economic activity in a variety of ways. Breeders, individual retailers, wholesalers, chain pet shops, snake-related care and food suppliers, and hobbyists all spend 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 that 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 light source, aquarium, substrate), 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; 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.

Large constrictor snake retail values were used in conjunction with an economic modeling method known as *input-output analysis*⁵ to estimate the secondary effects of this industry (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 the establishment of new or range expansion of existing python and anaconda 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 (such as 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, and non-governmental organizations) 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 and trials; impacts analysis; pilot studies on genetics and salinity tolerance; and potential use of unmanned aerial vehicles with thermal infrared cameras to detect

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 1985 *Input-Output Analysis*.

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 (2012, 2015).

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 (2008, 2010) and USARK (2009, 2010) 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 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 survey conducted in 2012 by the American Pet Products Association (APPA 2014, p. 432), 5.6 million U.S. households own a reptile (a broad category that includes amphibians and scorpions) as a pet; this is a 19 percent increase over the survey based on data collected in 2010 (APPA 2012). At 2.05 reptiles per household for households owning reptiles (APPA 2014, p. 433), the total number of reptiles owned as pets is 11.5 million (2.05 multiplied by 5.6 million households (APPA 2014); this is a 15 percent decrease from the 2010 survey of 13.6 million (APPA 2012). The survey shows that 18 percent of all reptile owners owned at least one snake (all species) (APPA 2014, p. 434, Table 4b). This translates to 1 million households in 2012 owning at least one snake (all species). In comparison, the survey shows that 23 percent of all reptile owners owned at

least one frog or salamander (all species)(APPA 2014,p. 434, Table 4a), translating to 1,120,000 households owning at least one frog. More detailed information on constrictor snake ownership is not available. 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 large constrictor snakes in this rule is currently unknown. Impacts to pet owners and hobbyists are discussed in the sections under each alternative.

Importers: From 2004 to 2013, 244 importers (**Table 5**) imported 1.3 million live large constrictor snakes of all species (**Table 1**). 17,999 of these imports were one of the five species addressed in the proposed rule (**Table 3**). From 2011 to 2013, most of these imports came through Miami (94.2 percent), Los Angeles (4.5 percent) and Dallas-Ft. Worth (1.2 percent) (**Table 4**).

Hobbyist and commercial breeders: Some 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 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 large constrictor snakes. Information on the number of individual hobbyists and businesses that breed one or more of the five remaining unlisted 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 any of the five species is not available.

Exhibitors: A number of individuals and firms attend reptile shows and exhibits throughout the U.S. PIJAC (2008, 2010) 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 large 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, 2014**), resulting in over 3,500 prices obtained from 137 sellers for boas, anacondas, and pythons; and
- (3) USARK (2010) provided information on “high-end” sales of constrictor snakes.

We also reviewed the report “The Modern U.S. Reptile Industry” (Collis and Fenili 2011), but it did not contain any substantive data for the prices of any snakes (only a report of one species by one dealer). We received no new substantive information on the prices of the proposed 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 large constrictor snake sales). This averages to \$400 per snake.

We recognize the price data are not all inclusive. While an overall range of \$25 to \$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 was not available for this rulemaking from the public comment periods.

With the average price range based on these three sources of \$200 to \$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 this final rule on sales of the five species affected by the rule. This information would include: (1) total large constrictor snake sales for all species; (2) total large constrictor snake sales of the five 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 available, this analysis used two approaches (Scenario A and Scenario B) to estimate sales.

Scenario A: This approach used import and U.S. bred snake data to estimate constrictor snake sales. This approach assumed 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 used information from USARK (2009) on high-end sales and their value (information obtained through the public comment process). The following method used this information to estimate the number of the nine species originally proposed that were sold annually.

1. Total number of large constrictor snake imports and U.S.-bred snakes (all species) annually: 151,972 (see Table 7).
2. Total number of five large constrictor snake species imports and U.S. bred snakes annually: 29,520 (Table 8).
3. Five species as percentage of total imports and U.S.-bred snakes annually: 19.4 (Table 9).
4. Number of high-end large constrictor snakes annual sales (USARK 2010): 150,000 (Table 10).

5. From retail price data observations on constrictor snakes, 47 percent are above \$400 (high end) and 53 percent are below \$400 (low end). (information from kingsnake.com)

6. Since there is no information on the number of constrictor snakes sold below \$400 per snake, this will be estimated as follows: it is assumed that 150,000 constrictor snakes comprise 47 percent of total sales (high end). Consequently, 150,000 divided by 0.47 equals 319,149, an estimate of the total number of low- and high-end large constrictor snakes sold annually.

7. From 3. above, if the five species constitute 19.4 percent of total sales, then the five species, using estimates derived in 6. from USARK information would total 61,915 in annual sales.

8. From 5. And 7. above, 47 percent of 61,915 equals 29,100 high end snakes, and 53 percent equals 32,815 low-end snakes.

9. Using information from USARK on high-end sales and information on retail sales from websites, the total number of large constrictor snakes sold is estimated at 319,149 with the five species comprising 61,195 in annual sales (29,100 high-end and 32,815 low-end).

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 (\$428 average price) and low-end (\$214 average price), adjusted for inflation to 2013 dollars.

Scenario A: Estimated Sales and Associated Economic Impacts

Imported Large Constrictor Snake Market

Table 11 shows low-end and high-end large constrictor snake imports along with total imports for all species for the period 2011 to 2013. Ball pythons and boas account for most of the imports with 94.2 percent of the total. Total imports during the period 2011 to 2013 averaged 100,952 annually.

Table 12 shows estimated sales revenue for low-end and high-end large constrictor snake imports (all species) along with total sales revenue for the period 2011 to 2013. Low-end imports accounts for \$11.5 million and high-end imports account for \$20.3 million. Total sales revenue is estimated at \$31.8 million annually based on the period 2011 – 2013.

Table 11

Alternative 1 – Total Live Large Constrictor Snake Imports, All Species: Estimated High-end and Low-end Imports: 2011 -2013 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
Python	regius	47,157	41,819	88,976	78.6
Boa	constrictor	4,683	4,153	8,835	15.6
Python	brongersmai	731	648	1,380	2.6
Python	reticulatus	302	268	570	1.7
Python	molurus	232	206	438	*
Eunectes	murinus	194	172	365	*
Python	curtus	97	86	183	*
Python	sebae	77	68	145	*
Python	breitensteini	19	17	37	*
Python	timoriensis	12	11	23	*
Eunectes	beniensis	0	0	0	*
Eunectes	deschauenseei	0	0	0	*
Eunectes	notaesus	0	0	0	*
Python	natalensis	0	0	0	*
Eunectes	species	0	0	0	*
Python	species	0	0	0	*
Total		53,505	47,447	100,952	100

* = less than 1 percent

Bold = The five species considered in this final rule

Source: USFWS 2014, Import data

Table 12

Alternative 1: Total Live Large Constrictor Snake Imports, All Species: Estimated High-end and Low-end Imports and Sales Revenue: 2011 - 2013 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$214/snake	High-end Imports	Total Sales @ \$428/snake	Total Sales Revenue
<i>Python</i>	<i>regius</i>	47,157	\$10,091,658	41,819	\$17,898,412	\$27,990,070
Boa	constrictor	4,683	\$1,002,104	4,153	\$1,777,316	\$2,779,419
<i>Python</i>	<i>brongersmai</i>	731	\$156,482	648	\$277,534	\$434,016
Python	reticulatus	302	\$64,612	268	\$114,594	\$179,206
<i>Python</i>	<i>molurus</i>	232	\$49,678	206	\$88,108	\$137,786
Eunectes	murinus	194	\$41,436	172	\$73,490	\$114,927
<i>Python</i>	<i>curtus</i>	97	\$20,794	86	\$36,879	\$57,673
<i>Python</i>	<i>sebae</i>	77	\$16,484	68	\$29,235	\$45,719
<i>Python</i>	<i>breitensteini</i>	19	\$4,159	17	\$7,376	\$11,535
<i>Python</i>	<i>timoriensis</i>	12	\$2,571	11	\$4,560	\$7,130
Eunectes	beniensis	0	\$0	0	\$0	\$0
Eunectes	deschauenseei	0	\$0	0	\$0	\$0

<i>Eunectes notaeus</i>	0	\$0	0	\$0	\$0
<i>Python natalensis</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i> species	0	\$0	0	\$0	\$0
<i>Python</i> species	0	\$0	0	\$0	\$0
Total	53,505	\$11,449,976	47,447	\$20,307,504	\$31,757,480

Bold = The five species considered in this final rule
Source: USFWS 2014; 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 for the period 2011 to 2013. More than 27,000 low-end snakes have an estimated sales revenue of \$5.8 million, while 23,981 high-end snakes have an estimated sales revenue of \$10.3 million annually.

Table 14 summarizes the annual number of imports (see Table 2) and U.S.-bred snakes (see Table 7) and their estimated retail value for the period 2011 to 2013. A total of 151,952 snakes have an estimated retail value of \$47.8 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: 2011 - 2013 Annual Average						
Genus	Species	Low-end	Total Sales @ \$214/snake	High-end	Total Sales @ \$428/snake	Total Sales Revenue
<i>Python</i>	<i>regius</i>	9,275	\$1,984,850	8,225	\$3,520,300	\$5,505,150
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,650,368	6,839	\$2,927,092	\$4,577,460
<i>Python</i>	<i>molurus</i>	5,035	\$1,077,490	4,465	\$1,911,020	\$2,988,510
<i>Python</i>	<i>reticulatus</i>	2,650	\$567,100	2,350	\$1,005,800	\$1,572,900
<i>Python</i>	<i>brongersmai</i>	795	\$170,130	705	\$301,740	\$471,870
<i>Python</i>	<i>breitensteini</i>	663	\$141,882	588	\$251,664	\$393,546
<i>Python</i>	<i>curtus</i>	451	\$96,514	400	\$171,200	\$267,714
<i>Python</i>	<i>anchietae</i>	186	\$39,804	165	\$70,620	\$110,424
<i>Eunectes</i>	<i>murinus</i>	106	\$22,684	94	\$40,232	\$62,916
<i>Python</i>	<i>sebae</i>	53	\$11,342	47	\$20,116	\$31,458
<i>Eunectes</i>	<i>notaeus</i>	53	\$11,342	47	\$20,116	\$31,458
<i>Python</i>	<i>natalensis</i>	53	\$11,342	47	\$20,116	\$31,458
<i>Python</i>	<i>timoriensis</i>	11	\$2,354	9	\$3,852	\$6,206
	<i>deschauens</i>	0		0		
<i>Eunectes</i>	<i>eei</i>		\$0		\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		27,043	\$5,787,202	23,981	\$10,263,868	\$16,051,070

Bold = The five species considered in this final rule
Source: PIJAC 2008, 2010; USARK 2010

Table 14 Alternative 1: Total Annual Imports and U.S. Bred Snakes and Total Retail value: 2011 – 2013 Annual Average

Genus	Species	Total Imports Average Annual	Total U.S. Bred	Total Imports and U.S. Bred Snakes	Total Retail Value
<i>Python</i>	<i>regius</i>	88,976	17,500	106,476	\$33,495,220
<i>Boa</i>	<i>constrictor</i>	8,835	14,550	23,385	\$7,356,879
<i>Python</i>	<i>molurus</i>	438	9,500	9,938	\$3,126,296
<i>Python</i>	<i>reticulatus</i>	570	5,000	5,570	\$1,752,106
<i>Python</i>	<i>brongersmai</i>	1,380	1,500	2,880	\$905,886
<i>Python</i>	<i>breitensteini</i>	37	1,250	1,287	\$405,081
<i>Python</i>	<i>curtus</i>	183	850	1,033	\$325,387
<i>Eunectes</i>	<i>murinus</i>	365	200	565	\$177,843
<i>Python</i>	<i>anchietae</i>	0	350	350	\$110,424
<i>Python</i>	<i>sebae</i>	145	100	245	\$77,177
<i>Eunectes</i>	<i>notaeus</i>	0	100	100	\$31,458
<i>Python</i>	<i>natalensis</i>	0	100	100	\$31,458
<i>Python</i>	<i>species</i>	0	0	0	\$0
<i>Python</i>	<i>timoriensis</i>	23	20	43	\$13,336
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	\$0
Total		100,952	51,020	151,952	\$47,808,551

Bold = The five species considered in this final rule
 Source: USFWS 2014, Import data; 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 2011 to 2013. With a retail value of \$47.8 million, economic output is \$125.5 million, employment is 1,111, related employment income is \$44.8 million and total Federal, state, and local tax revenue is \$17.1 million.

Table 15

Scenario A: Alternative 1 (No Action) Impacts: 2011-2013 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
\$47.8	\$125.5	1,111	\$44.8	\$10.3	\$6.8	\$17.1

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 a manufacturer to reduce their demand for all the necessary inputs into the manufacturing of the goods and services provided by the firm. Accordingly, this can include economic impacts on various industry sectors, such mining, construction, and manufacturing. 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

Scenario A: Alternative 1 (No Action) Secondary Impacts by Major Industry			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$2,771,074	18	\$646,933
Mining	\$4,509,716	16	\$1,162,488
Construction	\$344,511	1	\$20,538
Manufacturing	\$65,263,655	384	\$18,243,804
TCPU	\$8,627,595	70	\$4,342,195
Trade	\$15,144,505	150	\$7,177,233
FIRE	\$3,951,397	62	\$1,660,511
Services	\$24,929,986	411	\$11,529,552
Total	\$125,542,439	1,111	\$44,783,254

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 312,567 snakes annually based on 2011 – 2013 information. 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
\$98.9	\$260	2,300	\$92.7	\$21.3	\$14.1	\$35.4

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	\$5,736,123	37	\$1,339,151
Mining	\$9,335,112	33	\$2,406,350
Construction	\$713,138	2	\$42,514
Manufacturing	\$135,095,766	795	\$37,764,674
TCPU	\$17,859,122	145	\$8,988,344
Trade	\$31,349,125	311	\$14,856,872
FIRE	\$8,179,392	128	\$3,437,258
Services	\$51,605,071	851	\$23,866,173
Total	\$259,872,849	2,302	\$92,701,336

Retail Value and secondary impacts under Georgetown Economic Services Study (Scenario C)

A study by Georgetown Economic Services (GES) “The Modern U.S. Reptile Industry” (Collis and Fenili 2011), estimated lost sales revenue and ancillary (secondary) impacts to the constrictor snake industry from the implementation of the rule to restrict importation and inter-state sales of nine constrictor snake species. The study estimated the first-year impact of the proposed rule to range from \$42.8 million to \$103.6 million (Table 4.5, p.73). The Service final economic analysis for the proposed rule (March 12, 2010) affecting nine species estimated lost sales revenue and secondary impacts at between \$48.5 million and \$99.6 million. The difference between the upper bounds of the GES study and the Service study is \$4 million, or 4 percent. In the analysis of the alternatives that follows, Scenario B estimates will be adjusted by 4 percent to reflect the findings of the GES study. The GES study did not show detailed estimates on the secondary impacts of economic output, employment, employment income and tax revenue. Consequently, Scenario B secondary impacts will also be adjusted by 4 percent for comparison purposes. Scenario C will consist of these adjusted estimates based on the GES study.

Summary of Scenarios A, B, and C for Alternative 1

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

Table 19

Alternative 1: Retail Value and Secondary Impacts under Scenarios A, B, and C (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	\$47.8	\$125.5	1,111	\$44.8	\$10.3	\$6.8	\$17.1
B	\$98.9	\$260.0	2,300	\$92.7	\$21.3	\$14.1	\$35.4
C	\$103.6	\$272.3	2,409	\$97.1	\$22.3	\$14.8	\$37.1

Environmental Benefits

The Risk Assessment (Reed and Rodda 2009) for giant constrictors conducted by the U.S. Geological Survey concluded that, of the five remaining unlisted species, the boa constrictor (*Boa constrictor*) has an Organism Risk Potential (ORP) ranking of “High” and four species [reticulated python (*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 and impact by one species and a medium risk of establishment and impact 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 section **BENEFITS OF THE PROPOSED ALTERNATIVES** for a more detailed discussion of benefits.

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

Under Alternative 2A, the Service will list five constrictor snakes: the reticulated python (*Python reticulatus*), boa constrictor (*Boa constrictor*), 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 five 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, and retailers would no longer be able to ship these five 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 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 an injurious wildlife violation under the Lacey Act 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 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. Therefore, we assume that no substitution would occur. 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* would be impacted the most, comprising 90.4 percent of annual imports. Total number of snakes affected would average 9,770 annually.

Table 21 shows the decrease in imported retail value compared with Alternative 1. The decrease in low-end sales revenue would be \$1.1 million and the decrease in high-end sales revenue would be \$2.0 million for a total annual decrease in imported snake revenue of \$3.1 million annually.

Table 20

Alternative 2A: Impacted Live Large Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2011 -2013 Annual Average						
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total	
<i>Boa</i>	<i>constrictor</i>	4,683	4,153	8,835	90.4	
<i>Python</i>	<i>reticulatus</i>	302	268	570	5.8	
<i>Eunectes</i>	<i>murinus</i>	194	172	365	3.7	
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	0	
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	0	
Total		5,179	4,593	9,770	100.0	

Source: based on USFWS 2014 Import data

Table 21

Alternative 2A – Decrease in Imported Retail Value from Alternative 1: 2011 -2013 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$214/snake	High-end Imports	Total Sales @ \$428/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	4,683	\$1,002,104	4,153	\$1,777,316	\$2,779,419
<i>Python</i>	<i>reticulatus</i>	302	\$64,612	268	\$114,594	\$179,206
<i>Eunectes</i>	<i>murinus</i>	194	\$41,436	172	\$73,490	\$114,927
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		5,179	\$1,108,152	4,593	\$1,965,400	\$3,073,552

Source: based on USFWS 2014 Import data; 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 five constrictor snakes would be discontinued, although all intrastate and some export (directly from States with designated ports) trade would not be discontinued. Thus, any revenue earned from the interstate 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 was not available for this rulemaking on interstate sales of constrictor snakes, we conservatively assumed that eliminating interstate trade would eliminate all sales of the five constrictor snakes, although we recognize that intrastate and some export trade can continue.

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.

Assuming that intrastate and some export trade continues after an injurious wildlife listing, 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* (73.7 percent) and *Python reticulatus* (25.3 percent)] would be most affected, accounting for over 98 percent of annual U.S.-bred snakes for these five species.

Table 22

Alternative 2A – Total Live Constrictor Snakes Bred in U.S., Five 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	73.7
<i>Python</i>	<i>reticulatus</i>	2,650	2,350	5,000	25.3
<i>Eunectes</i>	<i>murinus</i>	106	94	200	1.0
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	*
Total		10,468	9,282	19,750	100.0

* = less than 1 percent

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 \$2.2 million for low-end snakes and \$4.0 million for high-end snakes. Total decline in U.S.-bred snake sales revenue would be \$6.2 million annually.

Table 23

Alternative 2A – Total U.S. Bred Constrictor Snakes, Five Species: Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue: 2011 - 2013 Annual Average						
Genus	Species	Total Sales @			Total Sales @ Total Sales Revenue	
		Low-end	\$214/snake	High-end	\$428/snake	
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,650,368	6,838	\$2,927,092	\$4,577,460
<i>Python</i>	<i>reticulatus</i>	2,650	\$567,100	2,350	\$1,005,800	\$1,572,900
<i>Eunectes</i>	<i>murinus</i>	106	\$22,684	94	\$40,232	\$62,916
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		10,468	\$2,240,152	9,282	\$3,973,124	\$6,213,276

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 \$10.9 million annually. **Table 24** shows the decrease in economic impacts from Alternative 1, the No Action

alternative. Economic output would decrease by \$26.5 million, employment by 236, employment income by \$9.5 million, and Federal, State, and local tax revenue by \$3.6 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
\$9.3	\$26.5	236	\$9.5	\$2.1	\$1.4	\$3.6

Table 25 shows the major industries affected by the decline in sales revenue. The manufacturing, trade and services sectors would be 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 manufacturers to reduce their demand for the all the necessary inputs into the manufacturing of the goods and services provided by the firm. 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	\$584,376	3	\$136,428
Mining	\$951,028	3	\$245,150
Construction	\$72,652	1	\$4,300
Manufacturing	\$13,763,075	81	\$3,847,330
TCPU	\$1,819,423	15	\$915,701
Trade	\$3,193,738	32	\$1,513,566
FIRE	\$833,287	14	\$350,176
Services	\$5,257,342	87	\$2,431,402
Total	\$26,474,922	236	\$9,444,052

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 60,815 snakes. Estimated retail value would be \$19.3 million, with decreased impacts of \$54.9 million in economic output, 489 jobs, \$19.7 million in employment income, and \$7.5 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
\$19.3	\$54.9	489	\$19.7	\$4.3	\$2.9	\$7.5

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	\$1,209,658	6	\$282,406
Mining	\$1,968,628	6	\$507,461
Construction	\$150,390	2	\$8,901
Manufacturing	\$28,489,565	168	\$7,963,973
TCPU	\$3,766,206	31	\$1,895,501
Trade	\$6,611,038	66	\$3,133,082
FIRE	\$1,724,904	29	\$724,864
Services	\$10,882,698	180	\$5,033,002
Total	\$54,803,086	489	\$19,549,190

TCPU = Transportation, Communications, Public Utilities
 Trade = Retail and Wholesale trade
 FIRE = Finance, Insurance, Real Estate

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

Table 28 shows a comparison of annual impacts estimated from Scenarios A, B, and C. Retail value impacts range from \$9.3 to \$20.1 million; output impacts from \$26.5 to \$57.1 million, employment from 236 to 509 jobs; employment income from \$9.5 to \$20.5 million; and total tax revenue from \$3.6 to \$7.8 million. Given both the information available and the information not available for this rulemaking, it is assumed that these scenarios are equally valid and represent a reasonable range of economic impacts based upon the best currently available information for this rulemaking.

Table 28

Alternative 2A: Range of Retail Value and Secondary Impacts based on Scenarios A, B, and C							
(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	\$9.3	\$26.5	236	\$9.5	\$2.1	\$1.4	\$3.6
B	\$19.3	\$54.9	489	\$19.7	\$4.3	\$2.9	\$7.5
C	\$20.1	\$57.1	509	\$20.5	\$4.5	\$3.0	\$7.8

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 five species offered within their respective State, if allowed under State law; 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 (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 29** shows the decline in shipping expenditures for scenarios A, B, and C. The decline in shipping expenditures is estimated to range between \$1.6 and \$3.4 million with declines in

output between \$4.1 and \$8.8 million, employment between 32 and 69, employment income between \$1.4 and \$3.0 million and Federal, state and local tax revenue declining between \$500,000 and \$1 million.

Table 29

Alternative 2A: Estimated Maximum Decrease in Shipping Expenditures (Dollars in Millions)					
Scenario	Shipping Costs (Retail Value)	Economic Output	Employment	Employment Income	Tax revenue
A	\$1.6	\$4.1	32	\$1.4	\$0.5
B	\$3.3	\$8.5	66	\$2.9	\$1.0
C	\$3.4	\$8.8	69	\$3.0	\$1.0

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	\$129,295	1	\$28,395
Mining	\$99,993	1	\$27,492
Construction	\$10,663	0	\$647
Manufacturing	\$2,465,580	14	\$737,452
TCPU	\$255,286	2	\$127,270
Trade	\$204,238	3	\$98,106
FIRE	\$270,107	3	\$93,961
Services	\$635,638	9	\$216,038
Total	\$4,070,800	32	\$1,329,361

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	\$267,641	2	\$58,778
Mining	\$206,986	2	\$56,908
Construction	\$22,072	0	\$1,339
Manufacturing	\$5,103,751	29	\$1,526,526
TCPU	\$528,442	4	\$263,449
Trade	\$422,773	6	\$203,079
FIRE	\$559,121	6	\$194,499
Services	\$1,315,771	19	\$447,199
Total	\$8,426,556	68	\$2,751,777

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 importation and interstate transport of five large constrictor snakes. While not eliminating these snakes as a threat, this alternative could reduce the pathways and risk of their introduction 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 present in the United States. 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 regulates five species compared with four species under Alternative 2B, three species under Alternative 3 and one species under Alternative 4, we estimate that Alternative 2A would have the highest relative (relative to the other alternatives) benefits of the four action alternatives.

Please see the section **BENEFITS OF THE PROPOSED ALTERNATIVES** 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 will list four constrictor snakes: the reticulated python (*Python reticulatus*), 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 four live constrictor snakes, hybrids, and their eggs. This alternative will not prohibit intrastate transport or any use of these four 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, and retailers would no longer be able to ship these four 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 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 title 18 Lacey Act violations. The penalty for an injurious wildlife violation under title 18 of the Lacey Act 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 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 shows the impacted snake species imports for Alternative 2B. *Python reticulatus* imports would be impacted the most as they comprise 60.9 percent, respectively, of the total number of species affected. The total number of snakes affected would average 936 annually.

Table 33 shows the decrease in imported retail value compared with Alternative 1. The decrease in low-end sales revenue would be \$106,048 and the decrease in high-end sales revenue would be \$188,084 for a total annual decrease in imported snake revenue of \$294,133 annually.

Table 32

Alternative 2B: Impacted Live Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2011 - 2013 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Python</i>	<i>reticulatus</i>	302	268	570	60.9
<i>Eunectes</i>	<i>murinus</i>	194	172	366	39.1
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	*
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	*
Total		496	440	936	100.0

* = less than 1 %

Source: USFWS 2014

Table 33

Alternative 2B – Decrease in Imported Retail Value from Alternative 1: 2011 -2013 Annual Average						
Genus	Species	Total Sales			Total Sales	
		Low-end Imports	@ \$214/snake	High-end Imports	@ \$428/snake	Total Sales Revenue
<i>Python</i>	<i>reticulatus</i>	302	\$64,612	268	\$114,594	\$179,206
<i>Eunectes</i>	<i>murinus</i>	194	\$41,436	172	\$73,490	\$114,927
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		496	\$106,048	440	\$188,084	\$294,133

Source: USFWS 2014; 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 four constrictor snakes would be discontinued, although all intrastate and some export trade (directly from States with designated ports) would not be discontinued. Thus, any revenue earned from the interstate 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 four constrictor snakes, although we recognize that intrastate and some export trade can continue.

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.

Assuming that intrastate and some export trade continues after an injurious wildlife listing, 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 annual number of U.S.-bred snakes that would be affected by Alternative 2B. *Python reticulatus* would be the most affected species, comprising over 96.2 percent of affected species under this alternative

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>reticulatus</i>	2,650	2,350	5,000	96.2
<i>Eunectes</i>	<i>murinus</i>	106	94	200	3.8
<i>Eunectes</i>	<i>deschauenseei</i>	0	0	0	0
<i>Eunectes</i>	<i>beniensis</i>	0	0	0	0
Total		2,756	2,444	5,200	100.0

Source: PIJAC 2008, 2010; USARK 2010

Table 35 shows the impact of Alternative 2B on estimated sales revenue of U.S.-bred snakes. Total sales of U.S.-bred snakes would decline by \$589,784 for low-end snakes and \$1,046,032 for high-end snakes. Total decline in U.S.-bred snake sales revenue would be \$1.6 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: 2011 - 2013 Annual Average						
Genus	Species	Low-end	Total Sales @ \$214/snake	High-end	Total Sales @ \$428/snake	Total Sales Revenue
<i>Python</i>	<i>reticulatus</i>	2,650	\$567,100	2,350	\$1,005,800	\$1,572,900
<i>Eunectes</i>	<i>murinus</i>	106	\$22,684	94	\$40,232	\$62,916
<i>Eunectes</i>	<i>deschauenseei</i>	0	\$0	0	\$0	\$0
<i>Eunectes</i>	<i>beniensis</i>	0	\$0	0	\$0	\$0
Total		2,756	\$589,784	2,444	\$1,046,032	\$1,635,816

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 \$1.9 million annually under Alternative 2B, Scenario A. **Table 36** shows the decrease in economic impacts from Alternative 1, the No Action alternative. Economic output would decrease by \$5.3 million, employment by 49, employment income by \$1.9 million, and Federal, State, and local tax revenue by \$0.7 million.

Table 36

Alternative 2B – 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
\$1.9	\$5.3	49	\$1.9	\$0.4	\$0.3	\$0.7

Table 37 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 manufacturers to reduce their demand for the all the necessary inputs into the manufacturing of the goods and services provided by the firm. 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 37** then disaggregates the economic output in **Table 36** to show which industries are affected and the magnitude of the impacts. The above 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	\$116,600	1	\$27,221
Mining	\$189,759	2	\$48,917
Construction	\$14,496	1	\$858
Manufacturing	\$2,746,145	16	\$767,657
TCPU	\$363,029	3	\$182,710
Trade	\$637,246	6	\$302,002
FIRE	\$166,266	3	\$69,871
Services	\$1,048,997	17	\$485,138
Total	\$5,282,538	49	\$1,884,374

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 38 shows the impact of Alternative 2B under Scenario B discussed under Alternative 1. Under this scenario, annual sales would decline by 12,640 snakes. Estimated retail value would be \$3.9 million, with decreased impacts of \$11.0 million in economic output, 101 jobs, \$3.9 million in employment income, and \$1.5 million in tax revenue.

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
\$3.9	\$11.0	101	\$3.9	\$0.8	\$0.6	\$1.5

Table 39 shows the major industries affected by Alternative 2B under Scenario B. Manufacturing, services and trade would be the industries most affected by Alternative 2B.

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	\$241,362	2	\$56,347
Mining	\$392,801	4	\$101,258
Construction	\$30,007	2	\$1,776
Manufacturing	\$5,684,520	33	\$1,589,050
TCPU	\$751,470	6	\$378,210
Trade	\$1,319,099	12	\$625,144
FIRE	\$344,171	6	\$144,633
Services	\$2,171,424	35	\$1,004,236
Total	\$10,934,854	101	\$3,900,654

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

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

Table 40 shows a comparison of annual impacts estimated from Scenarios A, B, and C. Retail value impacts range from \$1.9 to \$4.1 million; output impacts from \$5.3 to \$11.4 million, employment

from 49 to 105 jobs; employment income from \$1.9 to \$4.1 million; and total tax revenue from \$0.7 to \$1.6 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 40

Alternative 2B: Range of Retail Value and Secondary Impacts based on Scenarios A, B, and C							
(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	\$1.9	\$5.3	49	\$1.9	\$0.4	\$0.3	\$0.7
B	\$3.9	\$11.0	101	\$3.9	\$0.8	\$0.6	\$1.5
C	\$4.1	\$11.4	105	\$4.1	\$0.8	\$0.6	\$1.6

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 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, B, and C. The decline in shipping expenditures is estimated to range between \$0.3 and \$0.6 million with declines in output between \$0.8 and \$1.8 million, employment between 7 and 16, employment income between \$0.3 and \$0.6 million and federal, state and local tax revenue declining between \$0.1 and \$0.2 million.

Table 41

Alternative 2B: Estimated Maximum Decrease in Shipping Expenditures based on Scenarios A, B, and C (Dollars in Millions)					
Scenario	Shipping Costs (Retail Value)	Economic Output	Employment	Employment Income	Tax revenue
A	\$0.3	\$0.8	7	\$0.3	\$0.1
B	\$0.6	\$1.7	15	\$0.6	\$0.2
C	\$0.6	\$1.8	16	\$0.6	\$0.2

Tables 42 and 43 show the major industrial sectors affected by the decline in shipping expenditures for Scenarios A and B respectively.

Table 42

Alternative 2B: Scenario A Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$25,798	0	\$5,666
Mining	\$19,952	0	\$5,486
Construction	\$2,128	0	\$129
Manufacturing	\$491,957	3	\$147,144
TCPU	\$50,937	0	\$25,394
Trade	\$40,752	1	\$19,575
FIRE	\$53,894	1	\$18,748
Services	\$126,829	2	\$43,106
Total	\$812,246	7	\$265,248

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Table 43

Alternative 2B: Scenario B			
Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$53,402	0	\$11,729
Mining	\$41,301	0	\$11,356
Construction	\$4,405	0	\$267
Manufacturing	\$1,018,351	6	\$304,588
TCPU	\$105,440	0	\$52,566
Trade	\$84,357	2	\$40,520
FIRE	\$111,561	2	\$38,808
Services	\$262,536	4	\$89,229
Total	\$1,681,351	14	\$549,063

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Environmental Benefits

Alternative 2B would likely be effective in preventing the importation and interstate transport of four large constrictor snakes. While not eliminating these snakes as a threat, this alternative could reduce the pathways and risk of introduction 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 present in the United States. 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 impacts four species compared with five species under Alternative 2A, three species under Alternative 3 and one species under Alternative 4, we estimate that Alternative 2B would have the next highest relative (relative to the other alternatives) benefits of the four action alternatives compared with Alternative 2A.

Please see the section **BENEFITS OF THE PROPOSED ALTERNATIVES** for a more detailed discussion of benefits.

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

Under Alternative 3, the Service will list three constrictor snakes: the reticulated python (*Python reticulatus*), boa constrictor (*Boa constrictor*), and the green anaconda (*Eunectes murinus*) 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 three constrictor snakes within a State, where not regulated by the State. This alternative has the same economic effect as Alternative 2A, because the two additional species in 2A (Beni and DeSchauensee's anacondas) are not in trade.

Large Constrictor Snake Market

Businesses would no longer have the option to import these three large constrictor snakes, and breeders, wholesalers, and retailers would no longer be able to ship these three 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 three 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 three constrictor snakes currently in trade 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 44 shows the impacted snake species imports for Alternative 3. *Boa constrictor* would be impacted the most as they comprise 90.4 percent, respectively, of affected species. Total number of snakes affected would average 9,770 annually.

Table 45 shows the decrease in imported retail value compared with Alternative 1. The decrease in low-end sales revenue would be \$1.1 million and the decrease in high-end sales revenue would be \$1.9 million for a total annual decrease in imported snake revenue of \$3.0 million annually.

Table 44

Alternative 3: Impacted Live Constrictor Snake Imports, Estimated High-end and Low-end Imports: 2011 -2013 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total
<i>Boa</i>	<i>constrictor</i>	4,683	4,153	8,835	90.4%
<i>Python</i>	<i>reticulatus</i>	302	268	570	5.8%
<i>Eunectes</i>	<i>murinus</i>	194	172	365	3.7%
Total		5,179	4,593	9,770	100.0%

Source: USFWS 2014

Table 45

Alternative 3– Decrease in Imported Retail Value from Alternative 1: 2011 - 2013 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$214/snake	High-end Imports	Total Sales @ \$428/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	4,683	\$1,002,104	4,153	\$1,777,316	\$2,779,419
<i>Python</i>	<i>reticulatus</i>	302	\$64,612	268	\$114,594	\$179,206
<i>Eunectes</i>	<i>murinus</i>	194	\$41,436	172	\$73,490	\$114,927
Total		5,179	\$1,108,152	4,593	\$1,965,400	\$3,073,552

Source: USFWS 2014; 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 three constrictor snakes would be discontinued, although all intrastate and some export (directly from States with designated ports) trade would not be discontinued. Thus, any revenue earned from the interstate 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 three constrictor snakes, although we recognize that intrastate and some export trade can continue.

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.

Assuming that intrastate and some export trade continues after an injurious wildlife listing, 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* and *Python reticulatus* would be most affected, accounting for 99 percent of species affected by the alternative.

Table 46

Alternative 3 – Total Live Constrictor Snakes Bred in U.S., Three 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	73.7
<i>Python</i>	<i>reticulatus</i>	2,650	2,350	5,000	25.3
<i>Eunectes</i>	<i>murinus</i>	106	94	200	1.0
Total		10,468	9,282	19,750	100.0

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 \$2.2 million for low-end snakes and \$4.0 million for high-end snakes. Total decline in U.S.-bred snake sales revenue would be \$6.2 million annually.

Table 47

Alternative 3– Total U.S. Bred Constrictor Snakes, Three Species: Estimated High-end and Low-end U.S. Bred Snakes and Sales Revenue: 2011 -2013 Annual Average						
Genus	Species	Total Sales @		Total Sales @		Total Sales Revenue
		Low-end	\$214/snake	High-end	\$428/snake	
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,650,368	6,838	\$2,927,092	\$4,577,460
<i>Python</i>	<i>reticulatus</i>	2,650	\$567,100	2,350	\$1,005,800	\$1,572,900
<i>Eunectes</i>	<i>murinus</i>	106	\$22,684	94	\$40,232	\$62,916
Total		10,468	\$2,240,152	9,282	\$3,973,124	\$6,213,276

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 \$9.3 million annually. **Table 48** shows the decrease in economic impacts from Alternative 1, the No Action alternative. Economic output would decrease by \$26.5 million, employment by 236, employment income by \$9.5 million, and Federal, State, and local tax revenue by \$3.6 million.

Table 48

Scenario A: Alternative 3 : 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
\$9.3	\$26.5	236	\$9.5	\$2.1	\$1.4	\$3.6

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 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 manufacturers to reduce their demand for the all the necessary inputs into the manufacturing of the goods and services provided by the firm. 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 49** then disaggregates the economic output in **Table 48** to show which industries are affected and the magnitude of the impacts. The above 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	\$584,376	3	\$136,428
Mining	\$951,028	3	\$245,150
Construction	\$72,652	1	\$4,300
Manufacturing	\$13,763,075	81	\$3,847,330
TCPU	\$1,819,423	15	\$915,701
Trade	\$3,193,738	32	\$1,513,566
FIRE	\$833,287	14	\$350,176
Services	\$5,257,342	87	\$2,431,402
Total	\$26,474,922	236	\$9,444,052

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 50 shows the impact of Alternative 3 under Scenario B discussed under Alternative 1. Under this scenario, annual sales would decline by 60,811 snakes. Estimated retail value would be \$19.3 million, with decreased impacts of \$54.9 million in economic output, 489 jobs, \$19.7 million in employment income, and \$7.5 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
\$19.3	\$54.9	489	\$19.7	\$4.3	\$2.9	\$7.5

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	\$1,209,658	6	\$282,406
Mining	\$1,968,628	6	\$507,461
Construction	\$150,390	2	\$8,901
Manufacturing	\$28,489,565	168	\$7,963,973
TCPU	\$3,766,206	31	\$1,895,501
Trade	\$6,611,038	66	\$3,133,082
FIRE	\$1,724,904	29	\$724,864
Services	\$10,882,698	180	\$5,033,002
Total	\$54,803,086	489	\$19,549,190

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

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

Table 52 shows a comparison of annual impacts estimated from Scenarios A, B, and C. Retail value impacts range from \$9.3 to \$20.1 million; economic output impacts from \$26.5 to \$57.1 million,

employment from 236 to 509 jobs; employment income from \$9.5 to \$20.5 million; and total tax revenue from \$3.6 to \$7.8 million. Given both the information available and the information not currently available for this rulemaking, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts.

Table 52

Alternative 3: Range of Retail Value and Secondary Impacts based on Scenarios A, B, and C							
(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	\$9.3	\$26.5	236	\$9.5	\$2.1	\$1.4	\$3.6
B	\$19.3	\$54.9	489	\$19.7	\$4.3	\$2.9	\$7.5
C	\$20.1	\$57.1	509	\$20.5	\$4.5	\$3.0	\$7.8

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 three 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 (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 \$1.6 and \$3.4 million with declines in output between \$4.1 and \$8.5 million, employment between 32 and 70, employment income between \$1.4 and \$3.0 million and federal, state and local tax revenue declining between \$500,000 and \$1million

Table 53

Alternative 3: Estimated Maximum Decrease in Shipping Expenditures based on Scenarios A, B, and C (Dollars in Millions)					
Scenario	Shipping Costs (Retail Value)	Economic Output	Employment	Employment Income	Tax revenue
A	\$1.6	\$4.1	32	\$1.4	\$0.5
B	\$3.3	\$8.5	67	\$2.9	\$1.0
C	\$3.4	\$8.8	70.0	\$3.0	\$1.0

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

Table 54

Alternative 3: Scenario A Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$129,295	1	\$28,395
Mining	\$99,993	1	\$27,492
Construction	\$10,663	0	\$647
Manufacturing	\$2,465,580	14	\$737,452
TCPU	\$255,286	2	\$127,270
Trade	\$204,238	3	\$98,106
FIRE	\$270,107	3	\$93,961
Services	\$635,638	9	\$216,038
Total	\$4,070,800	32	\$1,329,361

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Table 55

Alternative 3: Scenario B			
Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$267,641	2	\$58,778
Mining	\$206,986	2	\$56,908
Construction	\$22,072	0	\$1,339
Manufacturing	\$5,103,751	29	\$1,526,526
TCPU	\$528,442	4	\$263,449
Trade	\$422,773	6	\$203,079
FIRE	\$559,121	6	\$194,499
Services	\$1,315,771	19	\$447,199
Total	\$8,426,556	68	\$2,751,777

TCPU = Transportation, Communications, Public Utilities

Trade = Retail and Wholesale trade

FIRE = Finance, Insurance, Real Estate

Environmental Benefits

Alternative 3 would likely be effective in preventing the importation and interstate transport of three large constrictor snakes. While not eliminating these snakes as a threat, this alternative could reduce the pathways and risk of their introduction 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 present in the United States. 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 impacts three species compared with five species under Alternative 2A, four species under Alternative 2B, and one species under Alternative 4, we estimate that Alternative 3 could have the third highest relative (relative to the other alternatives) benefits of the four action alternatives. However, as noted above, the addition of the boa in Alternative 3 could provide greater benefits, and could mean that it has the second highest relative benefit after Alternative 2A.

Please see the section **BENEFITS OF THE PROPOSED ALTERNATIVES** for a more detailed discussion of benefits.

ALTERNATIVE 4 – ADD ONE LARGE CONSTRICTOR SNAKE TO THE LIST OF INJURIOUS WILDLIFE

Under Alternative 4, the Service would list one constrictor snake species: boa constrictor (*Boa constrictor*) as an injurious species under the Lacey Act. This designation would prohibit the importation and interstate transport of this live constrictor snakes, hybrids, and its eggs. This Alternative would not prohibit intrastate transport or any use of this constrictor snake within a State, where not regulated by the State.

Large Constrictor Snake Market

Businesses would no longer have the option to import this large constrictor snake, and breeders, wholesalers, and retailers would no longer be able to ship boa constrictors out of State. Pet owners would not be able to transport their boa constrictors 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 boa constrictors 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 title 18 Lacey Act violations. The penalty for an injurious wildlife violation under title 18 of the Lacey Act 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 boa constrictors 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 boa constrictor, which would be listed as injurious in Alternative 4. Total annual imports affected are estimated to be 8,835, with 4,683 low-end imports and 4,153 high-end imports affected.

Table 57 shows the effect of Alternative 4 on the sales revenue. Sales revenue associated with boa constrictors would decline by \$2.8 million.

Table 56

Alternative 4 – Impacted Live Constrictor Snake Imports Estimated High-end and Low-end Imports: 2011 -2013 Annual Average					
Genus	Species	Low-end Imports	High-end Imports	Total Imports	Percentage of Total Imports
<i>Boa</i>	<i>constrictor</i>	4,683	4,153	8,835	8.8%

Source: USFWS 2014

Table 57

Alternative 4 – Decrease in Imported Retail Value from Alternative 1: 2011 - 2013 Annual Average						
Genus	Species	Low-end Imports	Total Sales @ \$214/snake	High-end Imports	Total Sales @ \$414/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	4,683	\$1,002,104	4,153	\$1,777,316	\$2,779,419

Source: USFWS 2014; 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 one species of constrictor snakes would be discontinued, although all intrastate and some export (directly from States with designated ports) trade would not be discontinued. Thus, any revenue earned from the interstate portion of a business would be eliminated. The amount of sales impacted for U.S. breeding is 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 one snake species would be eliminated, although we recognize that intrastate and some export trade can continue.

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.

Assuming that intrastate and some export trade continues after an injurious wildlife listing, 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 bred in the U.S. totaled 14,551 with the low-end accounting for 7,712 and the high-end accounting for 6,839.

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	100.0%

Source: PIJAC 2008, 2010; USARK 2010

Table 59 shows the decline in estimated sales revenue of the one species affected by Alternative 4. Sales revenue associated with boa constrictors would decline by \$4.6 million.

Table 59

Alternative 4: Total U.S.-Bred Constrictor Snakes Estimated High-end and Low-end U.S.-Bred Snakes and Sales Revenue: 2011 -2013 Annual Average						
Genus	Species	Low-end	Total Sales @ \$214/snake	High-end	Total Sales @ \$428/snake	Total Sales Revenue
<i>Boa</i>	<i>constrictor</i>	7,712	\$1,650,368	6,839	\$2,927,092	\$4,577,460

Source: PIJAC 2008, 2010; USARK 2010

Retail Value and Secondary Impacts (Scenario A)

Table 60 shows the economic impacts on the boa constrictor with the implementation of Alternative 4. Retail value would decline by \$7.4 million annually. Economic output would decrease by \$21.1 million, employment by 188, employment income by \$7.7 million and total tax revenue by \$2.9 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
\$7.4	\$21.1	188	\$7.7	\$1.7	\$1.1	\$2.9

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 their demand for the all the necessary inputs into the manufacturing of the goods and services provided by the firm. 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	\$466,562	3	\$108,922
Mining	\$759,296	3	\$195,726
Construction	\$58,004	1	\$3,459
Manufacturing	\$10,988,370	65	\$3,071,689
TCPU	\$1,452,618	12	\$731,108
Trade	\$2,549,864	25	\$1,208,423
FIRE	\$665,293	11	\$279,579
Services	\$4,197,434	69	\$1,941,217
Total	\$21,137,441	189	\$7,540,123

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). Retail value would decline by \$15.3 million, economic output by \$43.7 million, employment by 389, employment income by \$15.9 million and total tax revenue by \$6.0 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
\$15.3	\$43.7	389	\$15.9	\$3.5	\$2.3	\$6.0

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	\$965,783	6	\$225,469
Mining	\$1,571,743	6	\$405,153
Construction	\$120,068	2	\$7,160
Manufacturing	\$22,745,926	135	\$6,358,396
TCPU	\$3,006,919	25	\$1,513,394
Trade	\$5,278,218	52	\$2,501,436
FIRE	\$1,377,157	23	\$578,729
Services	\$8,688,688	143	\$4,018,319
Total	\$43,754,503	391	\$15,608,055

Summary of Economic Impacts (Scenarios A, B, and C)

Table 64 shows a comparison of annual impacts estimated from Scenarios A, B, and C. Retail value impacts range from \$7.4 to \$15.9 million; output impacts from \$21.1 to \$45.4 million, employment from 188 to 405 jobs; employment income from \$7.7 to \$16.5 million; and total tax revenue from \$2.9 to \$6.2 million. Given both the information available and the information not currently available for this

rulemaking, it is assumed that both scenarios are equally valid and represent a reasonable range of economic impacts.

Table 64

Alternative 4: Range of Retail Value and Secondary Impacts based on Scenarios A, B, and C (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	\$7.4	\$21.1	188	\$7.7	\$1.7	\$1.1	\$2.9
B	\$15.3	\$43.7	389	\$15.9	\$3.5	\$2.3	\$6.0
C	\$15.9	\$45.4	405	\$16.5	\$3.6	\$2.4	\$6.2

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 boa constrictor snakes 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 to \$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, B, and C. The decline in shipping expenditures is estimated to range between \$1.4 and \$3.0 million with declines in output between \$3.3 and \$7.1 million, employment between 25 and 54, employment income between \$1.1 and \$2.4 million and Federal, state and local tax revenue declining between \$0.4 and \$0.8 million.

Table 65

Alternative 4: Estimated Maximum Decrease in Shipping Expenditures (Dollars in Millions)					
Scenario	Shipping Costs	Output	Employment	Employment Income	Tax revenue
A	\$1.4	\$3.3	25	\$1.1	\$0.4
B	\$2.9	\$6.8	52	\$2.3	\$0.8
C	\$3.0	\$7.1	54	\$2.4	\$0.8

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	\$103,228	1	\$22,671
Mining	\$79,833	1	\$21,949
Construction	\$8,513	0	\$516
Manufacturing	\$1,968,523	11	\$588,779
TCPU	\$203,820	2	\$101,612
Trade	\$163,063	2	\$78,328
FIRE	\$215,652	2	\$75,018
Services	\$507,491	7	\$170,767
Total	\$3,250,124	26	\$1,059,640

Table 67

Alternative 4: Scenario B. Major Industry Sectors Affected by Decrease in Shipping Expenditures			
Industry Sector	Economic Output	Employment	Employment Income
Agriculture	\$213,682	2	\$46,929
Mining	\$165,254	2	\$45,434
Construction	\$17,622	0	\$1,068
Manufacturing	\$4,074,843	23	\$1,218,773
TCPU	\$421,907	4	\$210,337
Trade	\$337,540	4	\$162,139
FIRE	\$446,400	4	\$155,287
Services	\$1,050,506	14	\$353,488
Total	\$6,727,755	54	\$2,193,455

Environmental Benefits

Alternative 4 would likely be effective in preventing the importation and interstate transport of boa constrictors. While not eliminating these snakes as a threat, particularly because the boa constrictor is widely held in private ownership throughout much of the United States, this alternative could reduce the pathways and risk of introduction 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 the boa constrictor as injurious may decrease the risk of introduction into U.S. ecosystems by potentially decreasing the number of snakes present in the United States, although the boa constrictor is unique among the nine species proposed for listing in 2010 because it has been imported in large numbers and is already widely owned throughout the United States. 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 one species, Alternative 4 would have relatively lower benefits than the other three action alternatives.

Please see the section **BENEFITS OF THE PROPOSED ALTERNATIVES** 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 transport. 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 transport would have a high ranking for economic benefits (again, relative to the other alternatives, not necessarily in an absolute sense). Alternative 2A, since all five 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 Alternative 2A, since only one species is affected. Although Alternative 2B includes four of the five species, the benefits associated with this alternative relative to Alternative 4, which includes only one species, would need to take into account the higher organism risk potential of the boa constrictor. 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>Boa constrictor</i>	High		High	High
<i>Python reticulatus</i>	Medium	Medium	Medium	
<i>Eunectes murinus</i>	Medium	Medium	Medium	
<i>Eunectes deschauenseei</i>	Medium	Medium		
<i>Eunectes beniensis</i>	Medium	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 U.S. ecosystems 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 2009 p. 5 and Varian 1987 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 (1993), Cummings et al. (1986), and Bjornstad and Kahn (1996) 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. (1995) 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 reticulated python 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 five constrictor snake species, information not available for this rulemaking included: (1) the economic value of policies to reduce potential damage from constrictor snake populations in nonnative areas; (2) probability estimates of introductions, or introductions resulting in establishment of, constrictor snake populations in nonnative areas; and (3) cost estimates of introductions or establishments if they occur. While the various alternatives eliminate imports of up to five species of constrictor snakes and prohibit interstate transport, 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 in captivity, it is unclear if, or to what extent, restricting imports is going to affect the likelihood of the snakes ending up in the Everglades or other ecosystems and causing the various impacts identified above (1. through 6. 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. Another scenario is that demand by hobbyists for large constrictor snakes will decrease, even if domestically produced, given their listing as injurious wildlife under Federal law and associated interstate transport prohibitions. Consequently, due to 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 2009). 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 found to be injurious to wildlife and wildlife resources. Consequently, Alternative 2A would potentially have the greatest benefits, followed by Alternatives 2B, 3, and 4 in that order. However, ranking the alternatives is difficult because not all large constrictor snakes are equal. For example, the boa constrictor, which has already proven that it can establish in Florida, is in trade and thus has greater opportunities for release or escape, and has a broader climate match than any of the other four remaining species. Therefore, alternatives that include boa constrictor could be considered as having a greater benefit with listing. However, off-setting this is that Lacey Act prohibitions on import and interstate transport are likely to be less effective in preventing the further spread and establishment of species that have already been imported into the United States in large numbers and are now widespread throughout the United States, owned and used by a large number and wide variety of people. Of the nine species proposed for listing in 2010, the boa constrictor fits that description the best, having the broadest trade and ownership. Therefore, ranking the alternatives in terms of benefits is difficult because of differences in risks of establishment and impacts among the five species.

2. Tourism

Tourism may be decreased by constrictor snake populations in two ways: (1) reluctance of tourists to visit areas populated by constrictor snakes, and (2) constrictor snakes preying on and decreasing wildlife populations that visitors come to see (Reed and Rodda 2009). 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 2011, over 1.9 million people (Florida state residents and non-residents) engaged in some form of non-residential (away from home) wildlife watching activity with associated expenditures (travel-related and equipment) of \$3.0 billion (U.S. Department of the Interior 2013). 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. Referring to 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). Other species of pythons and anacondas also prey on native birds, amphibians, reptiles, fish, and mammals. A study in Everglades National Park correlated the decline of raccoons (99.3 percent), opossums (98.9 percent), rabbits (possibly 100 percent), foxes (possibly 100 percent), and bobcats (87.5 percent) with the timing and geographic spread of the presence of Burmese pythons (Dorcas *et al.* 2012). Although the study is based on Burmese pythons, we believe that the constrictor species in this final rule could have a similar devastating effect on small- and medium-sized mammals wherever the snakes are found because all species in this final rule prey on similar animal types

For another 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.

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

The main focus of these expenditures is research, containment, and control (such as trapping constrictor snakes). Presumably, if the likelihood of constrictor snake spread and impacts are reduced because of title 18 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 or updated ones is not currently available, some examples of constrictor snake related expenditures on the part of government agencies and non-government organizations are summarized below. The Service has spent more than \$600,000 over a 3-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. More recently, the Service and USGS has spent up to \$20,000 over the 2012 - 2013 period on planning efforts to address constrictor snake infestations and can expect to spend between \$25,000 and \$50,000 from 2014 to 2018 (U.S. Fish and Wildlife Service, Rebekah Gibble, personal communication 2014) . 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 an average of \$380,000 annually from 2004 to 2014 on various programs related to constrictor snake issues in the Everglades National Park (National Park Service, Carol Mitchell, personal communication 2014). All these expenditures total \$6.5 million from 2004 to approximately 2014, or roughly an average of \$586,000 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 2A would potentially have the greatest economic benefits, followed by the other alternatives. Ranking the remaining alternatives in terms of benefits is difficult because of differences in risks of establishment and impacts among the five species.

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 2A would potentially have the greatest economic benefits, followed by the other alternatives. Ranking the remaining alternatives in terms of benefits is difficult because of differences in risks of establishment and impacts among the five species.

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

Pet Industry Joint Advisory Council : 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>notaeus</i>		NA	NA	NA	\$100	\$200	\$300

Source: PIJAC 2008, 2010 Note: NA is not applicable, the species either was not imported or not bred

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