

# **Final Environmental Assessment For Listing Large Constrictor Snakes As Injurious Wildlife under the Lacey Act**

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



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## Abstract

This document contains a Final Environmental Assessment (EA), which examines the potential environmental impacts of the Proposed Action to list as injurious nine large constrictor snake species including *Python molurus* [Burmese python (*Python molurus bivittatus*) and Indian python (*Python molurus molurus*); also referred to as Burmese python below unless otherwise noted], reticulated python (*Broghammerus reticulatus* or *Python reticulatus*), Northern African python (*Python sebae*), Southern African python (*Python natalensis*), boa constrictor (*Boa constrictor*), yellow anaconda (*Eunectes notaeus*), DeSchauensee's anaconda (*Eunectes deschauenseei*), green anaconda (*Eunectes murinus*), and Beni anaconda (*Eunectes beniensis*]. The draft environmental assessment was released to the public for review and comment on March 12, 2010. All public comments received regarding the draft environmental assessment are presented in the Appendix of this document, along with the U.S. Fish and Wildlife Service's written response to each comment.

In this environmental assessment, we considered four alternatives as the preferred action: (1) no action; (2A) list as injurious nine large constrictor snake species: Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, DeSchauensee's anaconda, green anaconda, and Beni anaconda; (2B) list as injurious four large constrictor snake species at this time: Burmese python, Northern African python, Southern African python, and yellow anaconda, (3) list as injurious seven large constrictor snake species: Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, and green anaconda; and (4) list as injurious five large constrictor snake species: Burmese python, Northern African python, Southern African python, boa constrictor, and the yellow anaconda. Two alternatives considered (instead of adding nine or a subset of the nine large constrictor snakes) but dismissed from further analysis were a Federal permitting system (such as a private hobbyist permit system) and State legislative initiatives (such as a State permitting program). These alternatives were dismissed from further consideration because they are not within the authorities of the injurious wildlife provisions of the Lacey Act or the U.S Fish and Wildlife Service.

This listing action is being implemented to protect native wildlife species, including threatened and endangered species, and to prevent harmful unalterable effects to natural ecosystem structure and function. This action seeks to reduce negative impacts of the nonnative large constrictor snakes by listing them as injurious and to prevent their importation and interstate movement which could result in further releases. In addition, consideration is being given to protection of human health and safety as well as preventing economic losses. The U.S. Fish and Wildlife Service's preferred alternative is to list Burmese python, Northern African python, Southern African python, and yellow anaconda, (live specimens, gametes, viable eggs, or hybrids) as injurious under the Lacey Act (Alternative 2B as described in this document).

The Secretary of the Interior is authorized under the Lacey Act (18 U.S.C. § 42, as amended) to prescribe by regulation those wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, reptiles, and the offspring or eggs of any of the aforementioned, that 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 are at 50 CFR 16.11-15.

With the listing of the four species of the large constrictor snakes as injurious, then as with all listed injurious animals, their importation into, or transportation between, States, District of Columbia, 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. The interstate transportation of any of the four species of large constrictor snakes (live specimens), gametes, viable eggs, or hybrids currently held in the United States for any purposes not permitted would be prohibited. An injurious wildlife listing would not prohibit intrastate transport or possession of the large constrictor snakes within States, where possession is not currently prohibited by the State. Any regulation pertaining to the use of large constrictor snakes within States is the responsibility of each State.

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## 1) Purpose

The purpose of the action to list Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, DeSchauensee's anaconda, green anaconda, and Beni anaconda as injurious species under the Lacey Act is to prevent the importation and interstate movement, thereby preventing the spread beyond their current locations and their introduction into natural areas of the United States.

This action is being implemented to protect native wildlife species, including threatened and endangered species, and prevent changes in natural ecosystem function from the potential negative impacts of the nonnative large constrictor snakes by listing them as injurious and preventing their importation and interstate movement. In addition, consideration is being given to protection of human health and safety as well as preventing economic losses. This listing will not prohibit intrastate transport or the current possession of large constrictor snakes within a State.

## 2) Need

The need for the action, to add nonnative large constrictor snakes to the list of injurious wildlife under the Lacey Act, developed as a result of the concern with Burmese pythons having established a self-sustaining breeding population in Everglades National Park (ENP) located in south Florida. Other large nonnative snakes—such as the boa constrictor, green anaconda, yellow anaconda, and reticulated python—have been observed alive or found dead in the wild in south Florida. Breeding populations are now confirmed for Burmese pythons, boa constrictors, and the Northern African python. Burmese pythons are established over thousands of acres of southern Florida. Boa constrictors have been established and breeding since approximately 1970 in the Charles Deering Estate at Cutler, southern Miami-Dade County. Boas have also been reported elsewhere in south Florida, but without evidence of breeding, and they are confirmed to be breeding in the wild in Puerto Rico. In 2009, evidence pointed to the presence of a breeding population of Northern African pythons along the western border of Miami adjacent to the Everglades. Recently, observations and removals of multiple adults, a gravid female, and young-of-year hatchlings suggest the presence of a reproducing population of *Python sebae* (Northern African python) (Reed et al. 2010).

The Secretary of the Interior is authorized under the Lacey Act (18 U.S.C. § 42, as amended) to prescribe by regulation those wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, reptiles, and the offspring or eggs of any of the aforementioned, that 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 are at 50 CFR 16.11-15.

If all nine large constrictor snakes or a subset of these snakes are determined to be injurious, then, as with all listed injurious animals, their importation into, or transportation between, States, District of Columbia, Commonwealth of Puerto Rico, or any territory or possession of the United States by any means whatsoever would be prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use, upon filing a



written declaration with the District Director of Customs and U.S. Fish and Wildlife Service (Service) Inspector at the port of entry. In addition, no live large constrictor snakes (live specimens), gametes, viable eggs, or hybrids imported or transported under permit could be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the Service. The interstate transportation of any live large constrictor snakes, gametes, viable eggs, or hybrids currently held in the United States for any purposes would be prohibited. An injurious wildlife listing would not prohibit intrastate transport or possession of large snakes within States, where possession is not currently prohibited by the State. Any regulation pertaining to the use of large constrictor snakes within States is the responsibility of each State.

### **3) Decisions Needed**

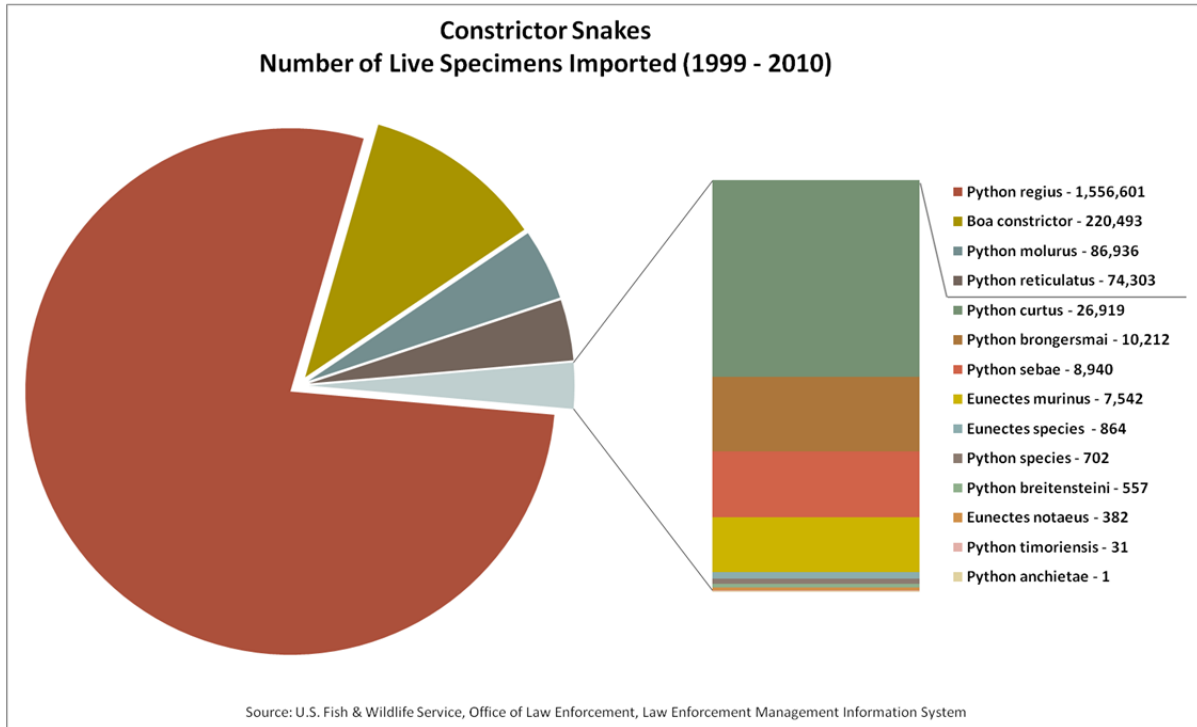
The Service is the lead agency for the proposed action. The decision facing the Service is whether some or all of the nine large constrictor snakes (live specimens), gametes, their viable eggs or hybrids are an injurious species and should be added to the list of injurious wildlife under the Lacey Act. The Service's Director will select one of the alternatives analyzed in detail and will determine, based on the facts and recommendations contained herein, whether this Environmental Assessment (EA) is adequate to support a Finding of No Significant Impact (FONSI) or whether an Environmental Impact Statement (EIS) is required.

### **4) Background**

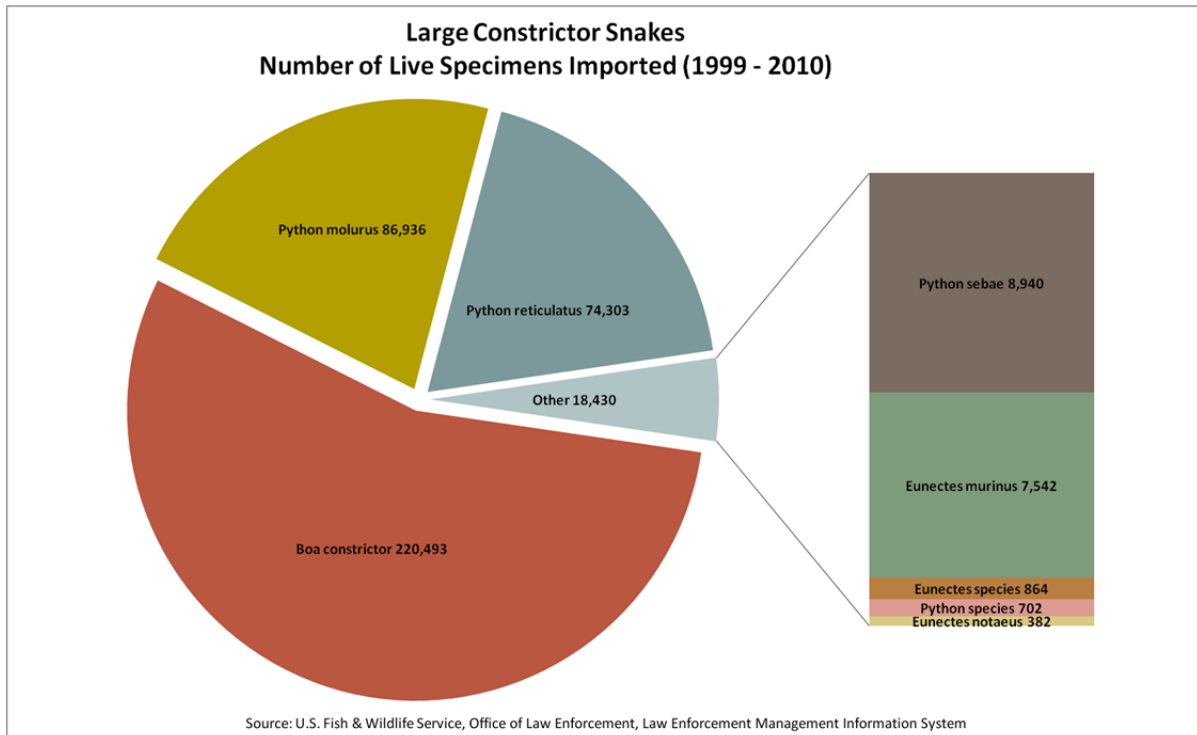
In June 2006, the Service received a petition from the South Florida Water Management District (District) requesting that Burmese pythons be considered for inclusion in the injurious wildlife regulations pursuant to the Lacey Act (18 U.S.C. 42). The District is concerned about the number of Burmese pythons found in Florida, particularly in ENP.

In aggregate, the trade in constrictor snakes is significant. From 1999 to 2010, more than 1.9 million live constrictor snakes of the genera *Python*, *Boa*, and *Eunectes* were imported into the United States (Figure 1), including the ball python (*Python regius*), which is not being considered for this large constrictor snake injurious wildlife evaluation due to its smaller size (U.S. Fish and Wildlife Service 2011). From 1999 to 2010, 400,162 large constrictor snake species being considered for listing of the genera *Python*, *Boa*, and *Eunectes* were imported into the United States, according to the Service Law Enforcement Management Information System data (Figure 2) with the majority of large constrictor snakes of the genera *Python*, *Boa*, and *Eunectes* imported into the country at the ports of Miami, Los Angeles, and Dallas-Fort Worth (Figure 3).

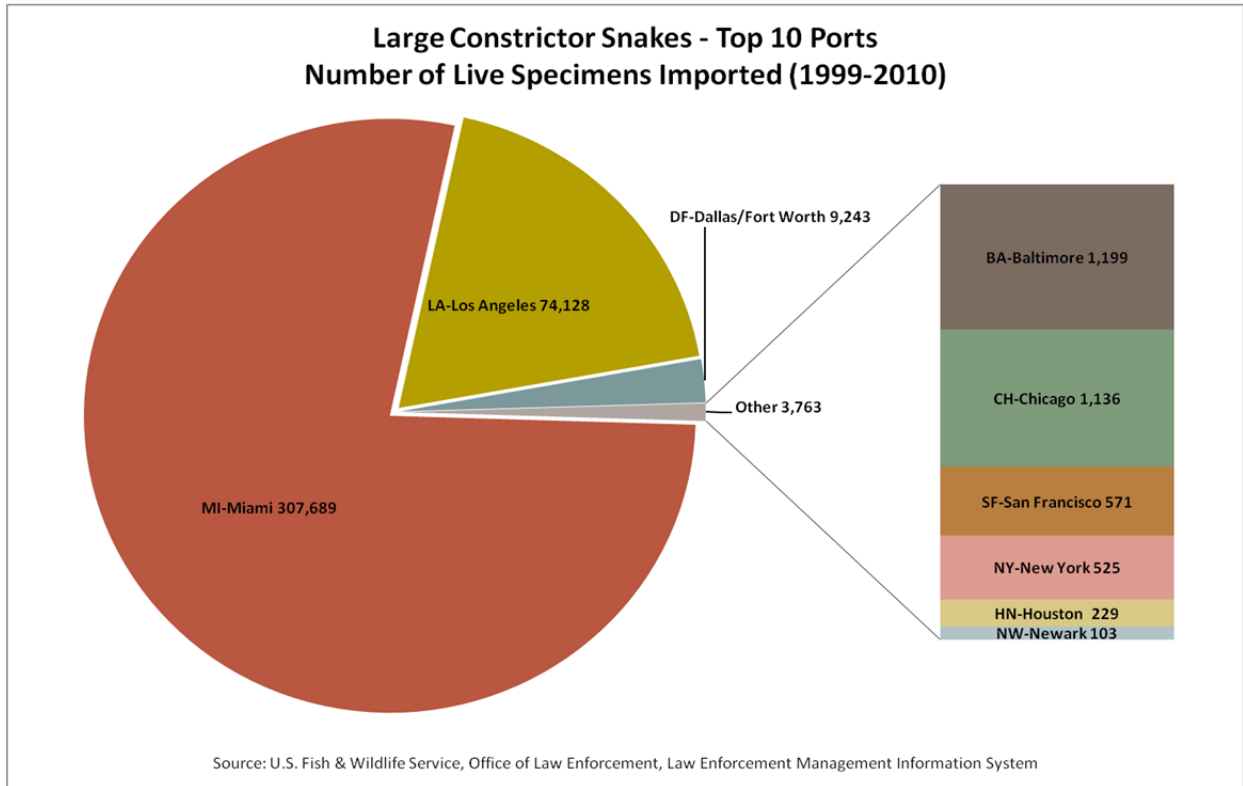
The best documented case of an invasive constrictor snake species in Florida is that of the Burmese python. Burmese pythons were first reported as established in ENP by Meshaka et al. (2000), based in part on specimens collected on the ENP main road in the mid-1990s. Since then, the number of Burmese pythons captured or found dead in and around the ENP has increased dramatically (Figure 4). Although the size of the wild population is not known, it has been estimated to number in the thousands (D. Hallac pers. comm. 2009). Burmese pythons have



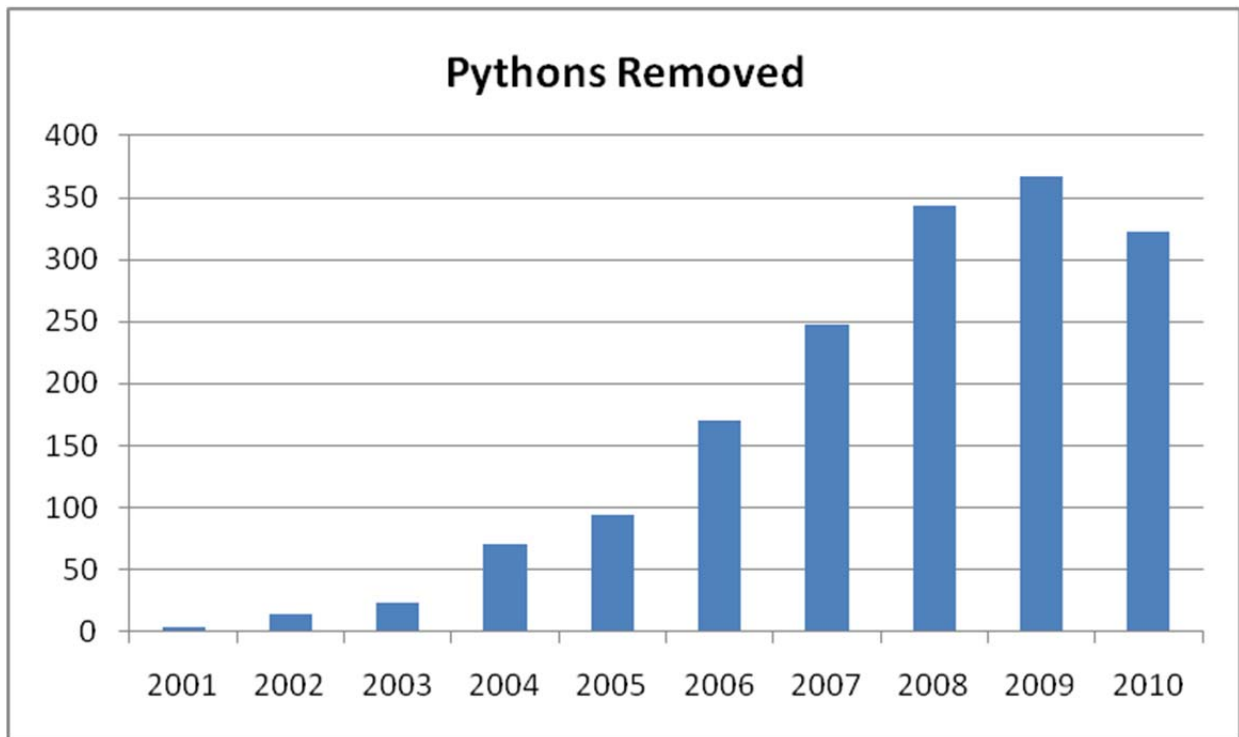
**Figure 1.** Constrictor snakes imported into the United States from 1999 to 2010.



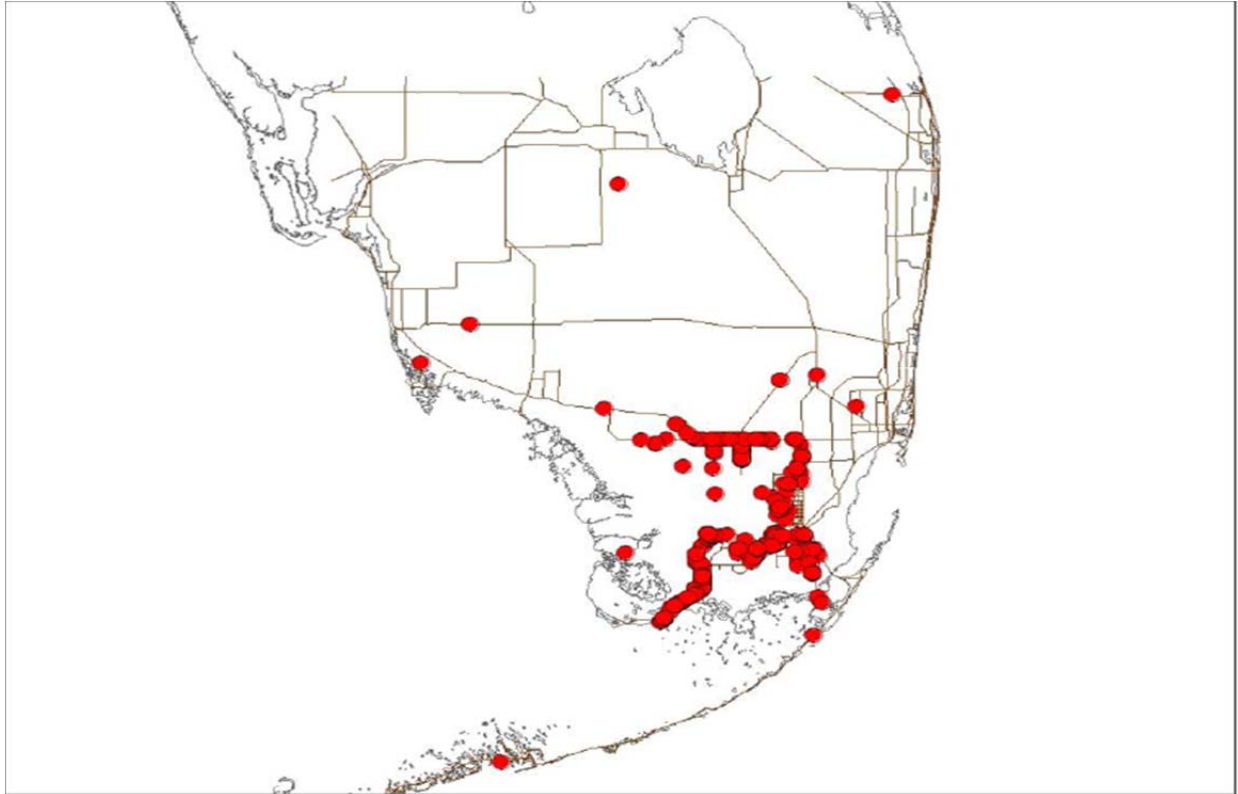
**Figure 2.** Large constrictor snakes imported into the United States from 1999 to 2010.



**Figure 3.** Top 10 ports of entry for the large constrictor snakes from 1999 to 2010.



**Figure 4.** Annual number of Burmese pythons removed (captured or found dead) from the population in ENP and vicinity from 2000 to 2010 (ENP 2010).



**Figure 5.** Pythons removed or found dead within ENP and surrounding areas (ENP 2010).

been seen with increasing frequency in and around ENP and on lands managed by the District along the park's eastern boundary (Figure 5).

Based on observations and reports in Florida by local residents and airboat tour operators, Burmese pythons might occur as far west as State Road 29 (Naples area), as far east as Krome Avenue in Miami, and as far north as the Hendry County line in southern Florida (Snow et al. 2007). Several Burmese pythons and Northern African pythons have also been captured and removed from Myakka River State Park in Sarasota County. The shed skin from a large Burmese python was found in extreme southern California.

Boa constrictors are known to be established and breeding in south Florida, although the population is confined to one location (Snow et al. 2007), and Puerto Rico. Recent evidence confirms that Northern African pythons are breeding in south Florida (Reed et al. 2010; Reed and Rodda 2009). A 95-pound boa constrictor was captured on No Name Key in the Florida Keys after being on the loose for several years. Biologists with the Puerto Rico Department of Natural and Environmental Resources believe that boa constrictors are breeding on the island (A. Atienza, pers. comm. 2010). In addition, a few individuals of yellow anacondas have been collected in the Villalba area.

The Puerto Rico Department of Natural and Environmental Resources reports that Burmese pythons have been collected or reported (eight individuals collected, including a 10-foot (ft)(3-

meter (m)) albino) on the island from Adjuntas, Arecibo, and Humacao; reticulated pythons have been collected in Aguadilla, Mayaguez, and Guayama (including an 18-ft (5-m) specimen); African pythons have been found in Mayaguez, the San Juan metro area, and Guayama; numerous boa constrictors (100 individuals) have been collected or reported in the wild, primarily on the west side of the island (particularly Mayaguez) but also throughout the island.

Free-ranging individuals of several additional species of nonnative large constrictors (which include anacondas, pythons, and boas) are commonly discovered in various parts of the United States, including a yellow anaconda from Big Cypress National Preserve, two yellow anacondas at Wapanocca National Wildlife Refuge in Arkansas (P. Fuller pers. comm. 2011), and a green anaconda at East Lake Fish Park in Florida.

The Burmese python is an invasive species that has already had negative impacts on native species in south Florida and could potentially expand into other suitable climate regions of the United States. A large breeding population exists in south Florida that poses a threat to national wildlife refuges, national parks, and threatened and endangered species. With increasing python sightings and population estimates, it is extremely possible and likely that mammal population reductions could be due to python predation (Holbrook and Chesnes 2011). In 2007, a single male python was found in Key Largo Hammock Botanical State Park. This was the first report of a Burmese python in the Florida Keys. Biologists found the snake while radio-tracking a Key Largo woodrat (*Neotoma floridana smalli*), an endangered species, that was subsequently found in the snake's stomach (Greene et al. 2007).

The Service uses the following criteria to evaluate whether a species does or does not qualify as injurious under the Lacey Act, 18 U.S.C. 42:

1. Factors that contribute to being considered injurious:
  - The likelihood of release or escape;
  - Potential to survive, become established, and spread;
  - Impacts on wildlife resources or ecosystems through hybridization and competition for food and habitats, habitat degradation and destruction, predation, and pathogen transfer;
  - Impact to threatened and endangered species and their habitats;
  - Impacts to human beings, forestry, horticulture, and agriculture; and
  - Wildlife or habitat damages that may occur from control measures.
  
2. Factors that reduce the likelihood of the species being considered as injurious:
  - Ability to prevent escape and establishment;
  - Potential to eradicate or manage established populations (for example, making organisms sterile);
  - Ability to rehabilitate disturbed ecosystems;
  - Ability to prevent or control the spread of pathogens or parasites; and
  - Any potential ecological benefits to introduction.

The U.S. Geological Survey's (USGS; Reed and Rodda 2009) biological and management profiles and risk assessment) provided much of the information used by the Service to evaluate the listing criteria. The risk assessment details the probability and consequences of establishment of nine nonnative boa, anaconda, and python species that are invasive or potentially invasive in the United States. The primary factors considered in judging the probability of establishment were: (1) history of establishment in other countries; (2) number of each species in commerce; (3) suitability of U.S. climates for each species; and (4) natural history traits, such as reproductive rate and dispersal ability, that influence the probability of establishment, spread, and impact. "High" risk is the most injurious category, "medium" risk is still a serious risk, and "low" is the smallest risk. Five giant nonnative snake species would pose high risks to the health of ecosystems in the United States if they become established here, according to the USGS report. Because all nine species share characteristics associated with greater risks, none was found to be a low ecological risk. Based on the biology and known natural history of the large constrictors, individuals of some species may also pose a small risk to people, although most snakes would not be large enough to consider a person as suitable prey. Mature individuals of the largest species—Burmese, reticulated, and northern and southern African pythons—have been documented killing people in the wild in their native range, though such unprovoked attacks appear to be quite rare (Reed and Rodda 2009). The snake most associated with unprovoked human fatalities in the wild is the reticulated python. The situation with human risk is similar to that experienced with alligators: attacks in the wild are improbable but possible.

The State of Florida formerly considered the Burmese python, Northern African python, Southern African python, reticulated python, and green anaconda as "Reptiles of Concern," requiring a permit for possession (see Table 1). On July 1, 2010, the Florida Fish and Wildlife Conservation Commission (FWC) implemented regulations changing Reptiles of Concern to Conditional reptiles. Conditional snakes may be acquired by dealers, breeders, or exhibitors for commercial use; can only be sold or transferred to Floridians with a valid conditional species permit or exported out of State; requires a Class III exhibition and sale license and conditional species permit; and now have new enclosure, recordkeeping, and transport requirements. There are also provisions for personal possession of grandfathered Reptiles of Concern; and 24/7 amnesty options for unwanted grandfathered Reptiles of Concern and conditional reptiles. The State of Florida did not designate the boa constrictor, yellow anaconda, DeSchauensee's anaconda, and Beni anaconda as former reptiles of concern or conditional reptiles. Table 1 lists the 11 States with nonnative large constrictor snake regulations (Pet Industry Joint Advisory Council 2008).

**Table 1.** State Regulations for pythons, boas, and anacondas, as well as other large constrictors.

State	Code/Regulations	Species	Summary
Florida	68A-6.007	<p><i>Python molurus</i>  <i>Python reticulatus</i>  <i>Python sebae</i>  <i>Python natalensis</i>  <i>Morelia amethistinus</i>  <i>Eunectes murinus</i></p> <p>As of July 1, 2010 designated as conditional species (formerly Reptiles of Concern)</p>	<p><b>Possession, Transportation, Exhibition, and Caging Venomous reptiles and Conditional Reptiles:</b>  Any person who possesses, keeps, exhibits or sells a conditional reptile must obtain an annual permit and comply with</p> <ul style="list-style-type: none"> <li>• Person must be at least 18 years of age with no prior violations of captive wildlife regulations, illegal commercialization of wildlife, animal cruelty, or violation of importation rules.</li> <li>• To qualify for a permit, must demonstrate knowledge of husbandry, nutritional, and behavioral characteristic of species.</li> <li>• Comply with facility standards to ensure “safe, secure and proper housing.”</li> <li>• Document Disaster and Critical Incident Plans (Form FWCDLE_619 (02-06)).</li> </ul>
	68A-6.004		<p><b>Standard Caging Requirements for Constrictors:</b>  Subpart (q) covers constrictors up to 5 ft, specimens 5 to 12 ft, specimens greater than 12 ft.</p>
	68A-6.0071		<p><b>Record Keeping and Reporting Requirements:</b></p> <ul style="list-style-type: none"> <li>• Inventory changes including births, deaths, acquisitions, sales, and transfers on Form FWCDLE_620IV-R (12-06).</li> <li>• Acquisition records include species, date, quantity, PIT tag data for each specimen and license identification number of recipient.</li> </ul>
	68A-6.0072		<p><b>Identification, Escape:</b></p> <ul style="list-style-type: none"> <li>• Permanently identified with unique passive integrated transponder (PIT tag).</li> <li>• Records (including species, specimen name, gender, age, ID number) must be maintained as long as specimen maintained.</li> <li>• For snakes with greater than 2 inch diameter, PIT tag implanted back 1/3 of same forward for anal plate.</li> <li>• Notification of escape required.</li> </ul>

**Table 1** (continued).

<b>State</b>	<b>Code/Regulations</b>	<b>Species</b>	<b>Summary</b>
<b>Hawaii</b>	HRS 150A-6.5 HI ADC Sec. 4-7-6, 4-7-10	All Squamata (snakes)	Importation and possession prohibited.
<b>Illinois</b>	720 ILCS 585/1 8 ILAC 8.25.110	<i>Python</i> spp. <i>Boa</i> spp. <i>Eunectes</i> spp.	Permit required for “any constrictor snake 6 ft or over in length, such as Boa, Python, and Anaconda.”
<b>Iowa</b>	Iowa Admin. Code 21-77.1 22-77.7	<i>Python reticulatus</i> <i>Eunectes</i> spp. <i>Python sebae</i>	Classified as “dangerous wild animal” and possession prohibited. Permits (\$100) allowed for specimens possessed prior to July 1, 2007, subject to detailed criteria, including an “electronic identification device, record-keeping, and disposition.
<b>Louisiana</b>	76 La. Admin Code Pt. XV. Sec 101.K	<i>Liasis olivacea</i> (= <i>olivaceus</i> ) <i>Morelia spilota</i> <i>Morelia kinghorni</i> <i>Python natalensis</i> <i>Python sebae</i> <i>Python molurus</i> <i>Python reticulatus</i> <i>Boa</i> spp. <i>Eunectes</i> spp.	Importation and private possession of constrictors in excess of 12 ft by a permit issued by the Department of Wildlife and Fisheries.
<b>Massachusetts</b>	321 CMR 9.01	<i>Python sebae</i> <i>Python reticulatus</i> <i>Eunectes</i> spp.	Permit required.
<b>Missouri</b>	Title 38, Crimes and Punishment Chapter 578.023		Keeper of dangerous wild animals must register animals with the local law enforcement agency in the county in which the animal is kept. Specifically refers to “dangerous reptile over 8 ft long.”
<b>New Jersey</b>	NJ ADC 7:25-4.3	Family <i>Pythonidae</i> Family <i>Boidae</i> (other than <i>Boa constrictor</i> )	Possession by permit provided applicant satisfies criteria within N.N.A.C. 7:25-4.7 (animal welfare, husbandry).



**Table 1** (continued).

State	Code/Regulations	Species	Summary
<b>New York</b>	Chapter 43-B Article 11-0103	<i>Python molurus bivittatus</i> <i>Python reticulatus</i> <i>Python sebae</i> <i>Eunectes murinus</i> <i>Morelia amethystinus</i>	Possession prohibited.
<b>Rhode Island</b>	RI Code R12 20 030 Sections 8.00	<i>Python reticulatus</i>	Import/Possession permit required. Permit criteria and conditions set forth in Section 3.00 – Section 5.00.
<b>Texas</b>	V.T.C.A. Parks & Wildlife Code Sec. 43.851 Texas Administrative Code Title 31 Part 2 Chapter 55.651 <i>et seq.</i>	<i>Python sebae</i> <i>Python molurus</i> <i>Python reticulatus</i> <i>Python natalensis</i> <i>Eunectes murinus</i>	A person may not possess, sell or transport through Texas a covered species without a permit (Note: a bill of lading functions as temporary permit). <ul style="list-style-type: none"> <li>• Annual permit (permits provided for both possession (\$20) and commercial activities (\$60))</li> <li>• Seller must notify purchaser at time of sale that <ul style="list-style-type: none"> <li>○ Sales receipt is temporary permit valid for 21 days</li> <li>○ A controlled exotic snake permit must be obtained within a 21 day timeframe</li> <li>○ If convicted of violating requirements result in a 5-year ban from obtaining a permit.</li> </ul> </li> <li>• Permit must be obtained for each permanent place where controlled species are sold or held for commercial purposes.</li> <li>• Commercial permit holder must maintain daily records of all activities involving acceptance, possession or transfer of a controlled species.</li> </ul>

## 5) Public Involvement

The Service published a notice of inquiry in the *Federal Register* (73 FR 5784; January 31, 2008) as the first step in the rulemaking process. We solicited biological, economic, and other information and data on the *Python*, *Boa*, and *Eunectes* genera for possible addition to the list of injurious wildlife under the Lacey Act, and we provided a 90-day period to submit information. We reviewed all information received for substantive issues and information regarding the injurious nature of species in the *Python*, *Boa*, and *Eunectes* genera. The Service received 1,528 responses during the information period that closed April 30, 2008, of which 115 provided economic, ecological, and other data responsive to 10 specific questions in the notice of inquiry. Most individuals responded to the notice of inquiry as though it was a proposed rule to list constrictor snakes in the *Python*, *Boa*, and *Eunectes* genera as injurious under the Lacey Act.

As a result, most responses expressed either opposition or support for listing the large constrictor snakes species. We considered the information provided in the 115 applicable comments in the preparation of the draft environmental assessment, draft economic analysis, and the proposed rule.

The Secretary of the Interior announced the proposed rule and public comment period in a press release issued on January 20, 2010, prior to being published in the *Federal Register*. On March 12, 2010, we published a proposed rule (75 FR 11808) to list Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, DeSchauensee's anaconda, green anaconda, and Beni anaconda as injurious reptiles under the Lacey Act (18 U.S.C. 42). This proposed rule established a 60-day comment period, ending May 11, 2010, and announced the availability of the draft economic analysis, draft initial regulatory flexibility analysis, and the draft environmental assessment of the proposed rule. At the request of the public, we reopened the comment period for an additional 30 days and requested that all interested parties submit factual reports, information, and comments that might contribute to development of a final determination for the nine large constrictor snakes. The public comment period closed on August 2, 2010.

During the public comment periods (90 days total) for the proposed rule and supplemental documents, we received approximately 56,500 comments, including form letters, petitions, and post cards. We received comments from Federal agencies, State agencies, local governments, commercial and trade organizations, conservation organizations, nongovernmental organizations, and private citizens. The commenter's provided a range of opinions on the proposed listing, as follows: (1) unequivocal support for the listing with no additional information included; (2) unequivocal support for the listing with additional information provided; (3) equivocal support for the listing with or without additional information included; (4) unequivocal opposition to the listing with no additional information included; and (5) unequivocal opposition to the listing with additional information included. The majority of comments received were in regard to the proposed rule and draft economic analysis. The final rule and economic analysis contains a broader description of comments received and our responses. The Appendix includes comments received only on the draft environmental assessment.

## 6) Alternatives

Alternatives were selected based on the overall consideration of risk posed by the individual snake species or subsets of snake species. High-risk species, if established in this country, put larger portions of the U.S. and insular territories at risk, constitute a greater ecological threat, and are more common in trade and commerce. High-risk species are Burmese pythons, Northern and Southern African pythons, boa constrictors, and yellow anacondas. Medium-risk species are reticulated pythons, DeSchauensee's anaconda, green anaconda, and Beni anaconda. These species constitute lesser threats in these areas, but still are potentially serious threats. Because all nine species share characteristics or traits associated with greater risks, none was found to be low-risk.

Four alternatives are considered in this assessment: (1) **no action**; (2A) **list as injurious nine large constrictor snake species** (Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, DeSchauensee's anaconda, green anaconda, and Beni anaconda); (2B) **list as injurious four large constrictor snake species while continuing to consider the status of five other large constrictor snakes** (boa constrictor, reticulated python, DeSchauensee's anaconda, green anaconda, and Beni anaconda), (3) **list as injurious seven large constrictor snake species** (Burmese python, reticulated python, Northern African python, Southern African python, boa constrictor, yellow anaconda, and green anaconda), and (4) **list as injurious five large constrictor snake species** (Burmese python, Northern African python, Southern African python, boa constrictor, and yellow anaconda).

### 6.1.1) Alternative 1: No Action

The No Action Alternative refers to no action being taken to list any of the large constrictor snakes as an injurious species under the Lacey Act, which would allow the continued importation and interstate transport of the nine large constrictors, eggs, and their hybrids. Introductions of the python species and boa constrictors in natural and urban areas of the United States have occurred and are likely to occur again. Additional large constrictor snake species (e.g., pythons, boa constrictors, and anacondas) could become established in the United States, threatening native wildlife, many of which are threatened or endangered under the Endangered Species Act (Act), and potentially impacting ecosystem stability and function.

If no action is taken, the Service would continue deferring to the States to regulate the subject large constrictor snakes (live specimens), gametes, viable eggs, or hybrids within State boundaries.

**6.1.2A) Alternative 2A: List as injurious *Python molurus* including Burmese python (*Python molurus bivittatus*) and Indian python (*Python molurus molurus*), Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, DeSchauensee’s Anaconda, Green Anaconda, and Beni Anaconda [Proposed Action]**

Under Alternative 2A, the Service would list nine species of large constrictor snakes as injurious wildlife under the Lacey Act, which would prohibit importation, and interstate transport of all nine species (live specimens), gametes, viable eggs, or hybrids, except by permit for zoological, educational, medical, or scientific purposes. An injurious wildlife listing would not prohibit intrastate transport or possession of the nine large constrictors within States, where possession is permitted by the State. Alternative 2A includes all nine of the large constrictor snakes determined by the Service to be injurious. The USGS risk assessment (Reed and Rodda 2009) explains how the risk rankings were assessed. Five species (Burmese python, Northern African python, Southern African python, boa constrictor, and yellow anaconda) have a risk ranking of “High” and four species (reticulated python, DeSchauensee’s anaconda, green anaconda, and Beni anaconda) are ranked as “Medium.”

**6.1.2B) Alternative 2B: List as injurious *Python molurus* including Burmese python (*Python molurus bivittatus*) and Indian python (*Python molurus molurus*), Northern African Python, Southern African Python, and Yellow Anaconda.**

This Alternative is the same as Alternative 2A, except that the Service would continue to consider the status of five of the nine species, the boa constrictor, reticulated python, DeSchauensee’s anaconda, green anaconda, and Beni anaconda. If the Service eventually lists these five species as injurious species, the environmental consequences of this Alternative would be the same as those for Alternative 2A, except that until such listing, importation and interstate transportation of boa constrictors, reticulated pythons, DeSchauensee’s anacondas, green anacondas, and Beni anacondas could continue, and therefore the environmental consequences of such continued importation and interstate transportation would occur. If the Service eventually lists these five species as injurious species, the environmental consequences of this Alternative would be as described in Part 8 of this Environmental Assessment.

**6.1.3) Alternative 3: List as injurious *Python molurus* including Burmese python (*Python molurus bivittatus*) and Indian python (*Python molurus molurus*), Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, and Green Anaconda**

Under Alternative 3, the Service would list seven species of large constrictor snakes as injurious wildlife under the Lacey Act, which would prohibit importation, and interstate transport of all seven species (live specimens), gametes, viable eggs or hybrids, except by permit for zoological, educational, medical, or scientific purposes. An injurious wildlife listing would not prohibit intrastate transport or possession of the seven large constrictors within States, where possession is permitted by the State.

The Burmese python and African (Northern and Southern) pythons, yellow anaconda, and boa constrictor have a risk ranking of “High” and the reticulated python and green Anaconda are ranked as “Medium” risk according to the USGS risk assessment (Reed and Rodda 2009). The State of Florida has listed the Burmese python, reticulated python, Northern African python, Southern African python, and green anaconda as Conditional Reptiles (former Reptiles of Concern). The FWC defined the former Reptiles of Concern as nonnative reptile species that have the potential to become established in Florida and can threaten native wildlife, cause economic damage or pose a threat to human safety.

The two species not considered in this alternative are the Beni and DeSchauensee’s anacondas. These two species have not been reported in the import data for 1999 to 2010 (U.S. Fish and Wildlife Service 2011), although they may have been mislabeled as yellow and green anaconda. A third species that was not specifically reported as imported was the Southern African python; however, it is difficult to distinguish this species from the more common Northern African python, and many reports simply listed “African python” or “African rock python,” which could have been either species. Therefore, for this alternative, we considered the effect of the seven species most likely to be imported.

**6.1.4) Alternative 4: List as Injurious *Python molurus* including Burmese python (*Python molurus bivittatus*) and Indian python (*Python molurus molurus*), Northern African Python, Southern African Python, Boa Constrictor, and Yellow Anaconda**

Under Alternative 4, the Service would list five species of large constrictor snakes as injurious wildlife under the Lacey Act, which would prohibit importation, and interstate transport of all five species (live specimens), gametes, viable eggs or hybrids, except by permit for zoological, educational, medical, or scientific purposes. An injurious wildlife listing would not prohibit intrastate transport or possession of the five large constrictors within States, where possession is permitted by the State.

These are the five of the nine species that have a ranking of “High Risk” according to the USGS risk assessment (Reed and Rodda 2009). High-risk species, if established in this country, put larger portions of the U.S. mainland at risk, constitute a greater ecological threat, and are more common in trade and commerce.

## 6.1) Summary Table of Alternative Actions

<b>Actions</b>	<b>Alternative 1: No Action</b>	<b>Alternative 2A: (Proposed Action)</b> (List as Injurious the Burmese or Indian Python, Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, DeSchauensee's Anaconda, Green Anaconda, and Beni Anaconda)	<b>Alternative 2B: (Subset of Alternative 2A)</b> (List as Injurious the Burmese or Indian Python, Northern African Python, Southern African Python, and Yellow Anaconda)	<b>Alternative 3:</b> (List as Injurious the Burmese or Indian Python, Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, and Green Anaconda)	<b>Alternative 4:</b> (List as Injurious the Burmese or Indian Python, Northern African Python, Southern African Python, Boa Constrictor, and Yellow Anaconda)
<b>Prohibit the importation of large constrictor snakes</b>	No	Yes—9 species	Yes—4 species with 5 species (boa constrictor, reticulated python, DeSchauensee's anaconda, green anaconda & Beni anaconda) still under consideration for listing.	Yes—7 species	Yes—5 species
<b>Prohibit the interstate transport of large constrictor snakes</b>	No	Yes—9 species	Yes—4 species with 5 species (boa constrictor, reticulated python, DeSchauensee's anaconda, green anaconda & Beni anaconda) still under consideration for listing.	Yes—7 species	Yes—5 species
<b>Reduce risk of escapement of large constrictors into the wild</b>	No	Yes. However, for States where the species are already present, risk will be reduced but not be eliminated.	Yes. However, for States where the species are already present, risk will be reduced but not be eliminated.	Yes. However, for States where the species are already present, risk will be reduced but not be eliminated.	Yes. However, for States where the species are already present, risk will be reduced but not be eliminated.
<b>Economic Impacts</b>	No losses to retail sales.  Potential costs to environment similar to recent years	The annual retail sales losses for Alternative 2A are estimated to range from \$14.7 million to \$30.1 million  Economic benefits from reduced potential costs to environment potentially greater than other alternatives.	The annual retail sales losses for Alternative 2B are estimated to range from \$3.7 million to \$7.6 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternative 1, less than Alternatives 2A, 3 and 4	The annual retail sales losses for Alternative 3 are estimated to range from \$14.7 million to \$30.1 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternatives 1, 2B and 4, less than Alternative 2A.	The annual retail sales losses for Alternative 4 are estimated to range from \$12.8 million to \$26.2 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternatives 1 and 2B, less than Alternatives 2A and 3.

## **6.2) Alternatives Not Considered For Detailed Analysis:**

### *6.2.1) Federal Permitting System such as a Private Hobbyist Permit System Instead of Listing the Nine Large Constrictor Snakes*

While the exact number of these large constrictor snakes that are held as pets or by hobbyists is unknown, there is strong evidence that they number in the hundreds of thousands. An alternative that relies on pet ownership permits would require an intricate and diverse system that would include importers, brokers, pet retail stores, and pet owners across the United States. In addition, the permitting system would need to be very responsive to activities that could occur on a daily basis, such as sales of animals at pet stores or death of pets. To adequately address the constantly changing situation and ensure that additional constrictors are not released into the wild, the Service would need to establish permitting offices across the United States that are constantly staffed. In addition, the cost of monitoring and enforcing the permitting system would require an increase in law enforcement officials. This would require a much greater level of resources than the Service currently has available. This type of permitting system would rely heavily on voluntary compliance to control the potential spread of these injurious species since it would be virtually impossible to monitor all transactions or interstate movement of specimens. An alternative that relies on monitoring and control once the snakes are brought into the country is not practical or feasible from an enforcement or economic standpoint for the Service to implement. Based on lessons learned in general from economic and environmental analyses, the best way to address harm from invasive species is to prevent their introductions. In turn, the most effective way to prevent introductions is to close pathways through which nonnative species enter the U.S. (Environmental Law Institute 2010). In addition, this alternative is not within the authorities of the injurious wildlife provisions of the Lacey Act (18 U.S.C. § 42, as amended).

### *6.2.2) State Legislative Initiatives such as a State Permitting Program Instead of Listing the Nine Large Constrictor Snakes*

This alternative was dismissed from further consideration because this alternative is not practical or feasible from a technical standpoint. Few States address all pathways and, because invasive species reproduce, spread, and are often moved by people, each State is hindered or helped by the quality of neighboring States' laws. As a result, State and local efforts depend on effective interstate collaboration. Despite amendments to State laws and regulations, States continue to apply different approaches to listing and prohibitions, making cooperative enforcement and management from State to State difficult (Environmental Law Institute 2010). The Service cannot rely on a State permitting program that is inconsistent and piecemeal nationally to protect native wildlife resources; and is not within the authorities of the injurious wildlife provisions of the Lacey Act (18 U.S.C. § 42, as amended).

## 7) Affected Environment

### Native Ranges

#### Burmese Python

The species *Python molurus* ranges widely over southern Asia. The most widely used name for the entire species is Indian python (Frank and Ramus 1995; Murphy and Henderson 1997) with *P. m. bivittatus* routinely distinguished as the Burmese python. Because the pet trade in *Python molurus* is composed almost entirely of *P. m. bivittatus*, most popular references to the species refer to it simply as the Burmese python. Therefore, we refer to the species as Burmese python hereafter, unless otherwise noted. In its native range, this species occurs in virtually every habitat from lowland tropical rainforest (Indonesia, Southeast Asia) to thorn-scrub desert (Pakistan) and grasslands (Sumbawa, India) to montane warm temperate forests (Nepal, China). The Indian python shows an extraordinary range of climates, including both temperate and tropical, as well as both very wet and very dry habitats (Reed and Rodda 2009).

#### Reticulated Python

*Python reticulatus* or *Broghammerus reticulatus* is a species of python found in Southeast Asia. They are found from sea level up to more than 4,265 ft (1,300 m). They inhabit lowland primary and secondary tropical wet forests, tropical open dry forests, tropical wet montane forests, rocky scrublands, swamps, marshes, plantations and cultivated areas, and suburban and urban areas (David and Vogel 1996). Reticulated pythons occur primarily in areas with a wet tropical climate. Though they also occur in areas that are seasonally dry, they do not occur in areas that are continuously dry or very cold at any time.

#### Northern African Python and Southern African Python

*Python sebae* and *P. natalensis* are closely related, large-bodied pythons of similar appearance found in sub-Saharan Africa. The most common English name for this species complex has been African rock python. After *P. sebae* was split from *P. natalensis*, some authors added ‘Northern’ and ‘Southern’ as a prefix to this common name (e.g., Spawls et al. 2002). Northern African pythons range from the coasts of Kenya and Tanzania across much of central Africa to Mali and Mauritania, as well as north to Ethiopia and perhaps Eritrea. The Northern African python has been described as, “. . . widespread in a great variety of sub-Saharan habitats but seldom if ever occurring far from permanent water” (Lanza and Nistri 2005).

In Nigeria, Northern African pythons are reported from suburban, forest, pond, stream, and swamp habitats (Butler and Reid 1986), including extensive use of Nigerian mangrove habitats (Luiselli and Akani 2002). In the arid northern parts of its range, Northern African pythons appear to be limited to wetlands, including the headwaters of the Nile, isolated wetlands in the Sahel of Mauritania and Senegal, and the Shabelle and Jubba Rivers of Somalia (Broadley 1984; Padiál 2003; Lanza and Nistri 2005). The Northern African python inhabits regions with some



of the highest mean monthly temperatures identified for any of the large constrictors, with means of exceeding 35°C in arid northern localities.

The Southern African python is found from Kenya southwest to Angola and south through parts of Namibia and much of eastern South Africa. Distribution of the species overlaps somewhat with Northern African pythons, although the southern species tends to inhabit higher elevations in regions where both species occur (Reed and Rodda 2009).

### **Boa Constrictor**

Boa constrictors range widely across dozens of marine and lacustrine islands in Mexico, Central America, and South America and have one of the widest latitudinal distributions of any snake in the world. There are nine recognized subspecies of *Boa constrictor*. The maximum body size of this species is roughly 13 ft (4 m). In their native range, boa constrictors inhabit environments from sea level to 3,280 ft (1,000 m), including wet and dry tropical forest, savanna, very dry thorn scrub, and cultivated fields (Wilson and Meyer 1985; Reed and Rodda 2009).

### **Yellow Anaconda and DeSchauensee's Anaconda**

As currently understood, the yellow anacondas comprise two species with entirely disjunct distributions. The DeSchauensee's anaconda is known from a small number of specimens and has a limited range in northeast South America. The yellow anaconda has a larger distribution in subtropical and temperate areas of South America, and has received more scientific attention. The yellow and DeSchauensee's anacondas are native to South America. The yellow anaconda appears to be restricted to swampy, seasonally flooded, or riverine habitats throughout its range (Dirksen 2002; Strüssmann and Sazima 1993; Waller et al. 2007). Although not as well known, DeSchauensee's anaconda apparently prefers swampy habitats that may be seasonally flooded (Dirksen and Henderson 2002). The yellow anaconda exhibits a moderate temperate climate range when compared to the other species of large constrictor snakes, including localities with cold-season monthly mean temperatures around 10°C ( 50°F) and no localities with monthly means exceeding 30°C (86°F) in the warm season.

### **Green Anaconda**

The native range of green anaconda includes aquatic habitats in much of South America below 2789 ft (850 m) elevation plus the insular population on Trinidad; encompassing the Amazon and Orinoco Basins; major Guianan rivers; the San Francisco, Parana and Paraguay Rivers in Brazil; and extending south as far as the Tropic of Capricorn in Northeast Paraguay. The habitat range of green anaconda is largely defined by availability of aquatic habitats. Depending on location within the wide distribution of the species, these appear to include deep, shallow, turbid, and clear waters, and both lacustrine and riverine habitats.

## **Beni Anaconda**

*Eunectes beniensis* is a recently described species (Dirksen 2002) from northern Bolivia, previously considered to be contained within *E. murinus*. *Eunectes beniensis* is a recently discovered anaconda species from Beni Province, Bolivia. The native range of the Beni anaconda is the Itenez/Guapore River in Bolivia along the border with Brazil, as well as the Baures River drainage in Bolivia. The green and Beni anacondas are similar in size and the range of the Beni anaconda is within the range of the green anaconda (Bolivia).

## **Areas Potentially Suitable for Establishment**

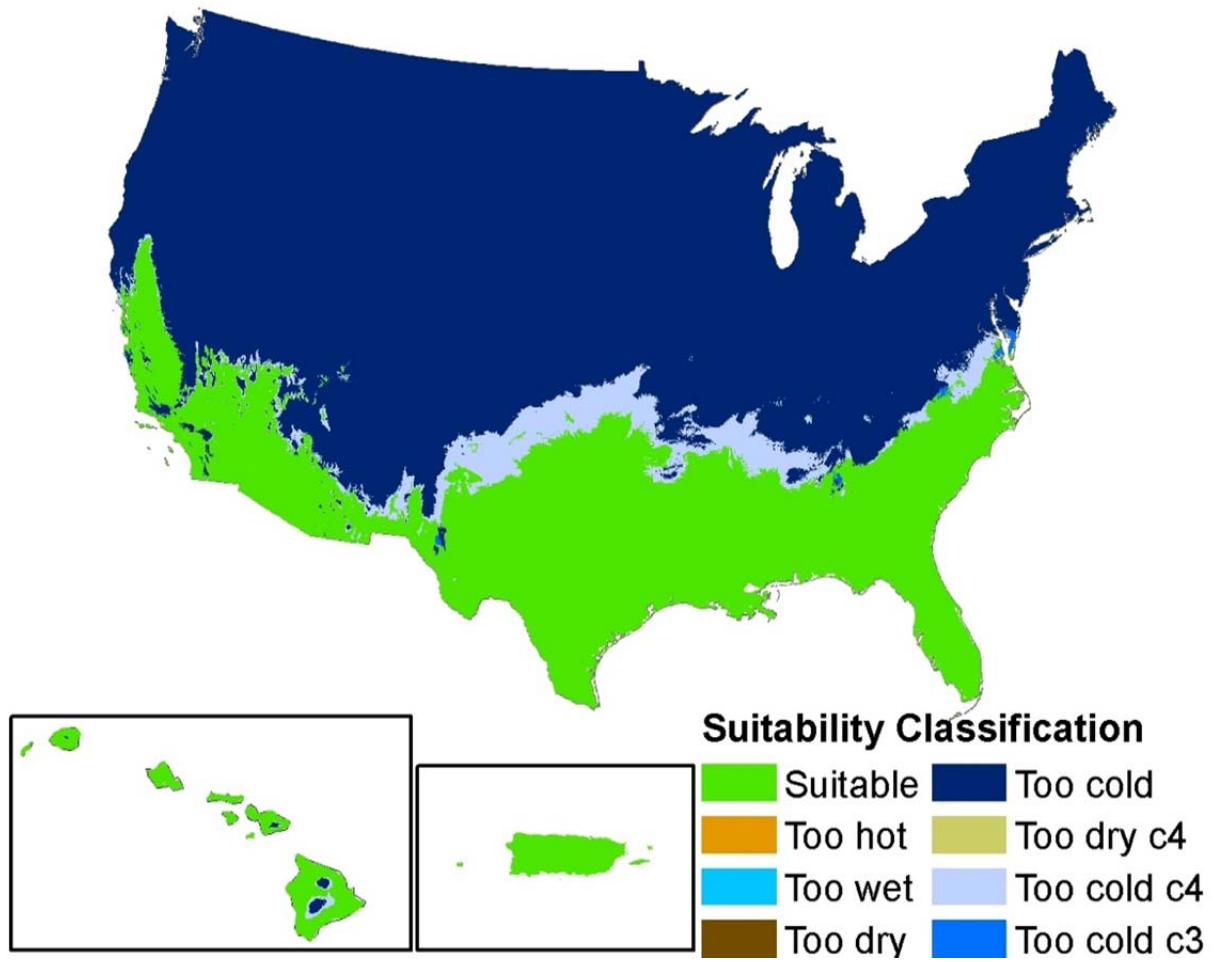
The USGS risk assessment (Reed and Rodda 2009) used a method called “climate matching” to estimate those areas of the United States exhibiting climates similar to those found in a species native range. Climate matching set the broad parameters for determining if an area is suitable for a species to establish. However, climate matching is not a complete account, because such biotic factors as the absence of suitable food (or prey), habitat for shelter and nest sites, or the presence of competitors and predators may exclude a species from an area with otherwise suitable climate. Considerable uncertainties exist about the native range limits of many of the large constrictors, and many factors other than climate alone can influence whether a species can establish a population in a particular location. Climate projections are therefore a useful benchmark to identify where climate alone may not be limiting a species from becoming established, but not a rigorous predictor of exactly where a species can establish a population. Based on climate alone, many of the species are likely to be limited to the warmest areas of the United States, including parts of Florida, extreme south Texas, Hawaii, and insular territories. For a few species, however, larger areas of the southern United States appear to exhibit suitable climatic conditions. Individual snake species are discussed below.

## **Burmese Python**

Due to the wide rainfall tolerance and extensive semi-temperate native range of Burmese python, large areas of the southern United States mainland appear to have a climate suitable for survival of this species (Figure 6). United States areas climatically matched at present ranged up the east and west coasts and across the interior south from Virginia to California, and throughout most of California, Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Florida, Georgia, and South and North Carolina.

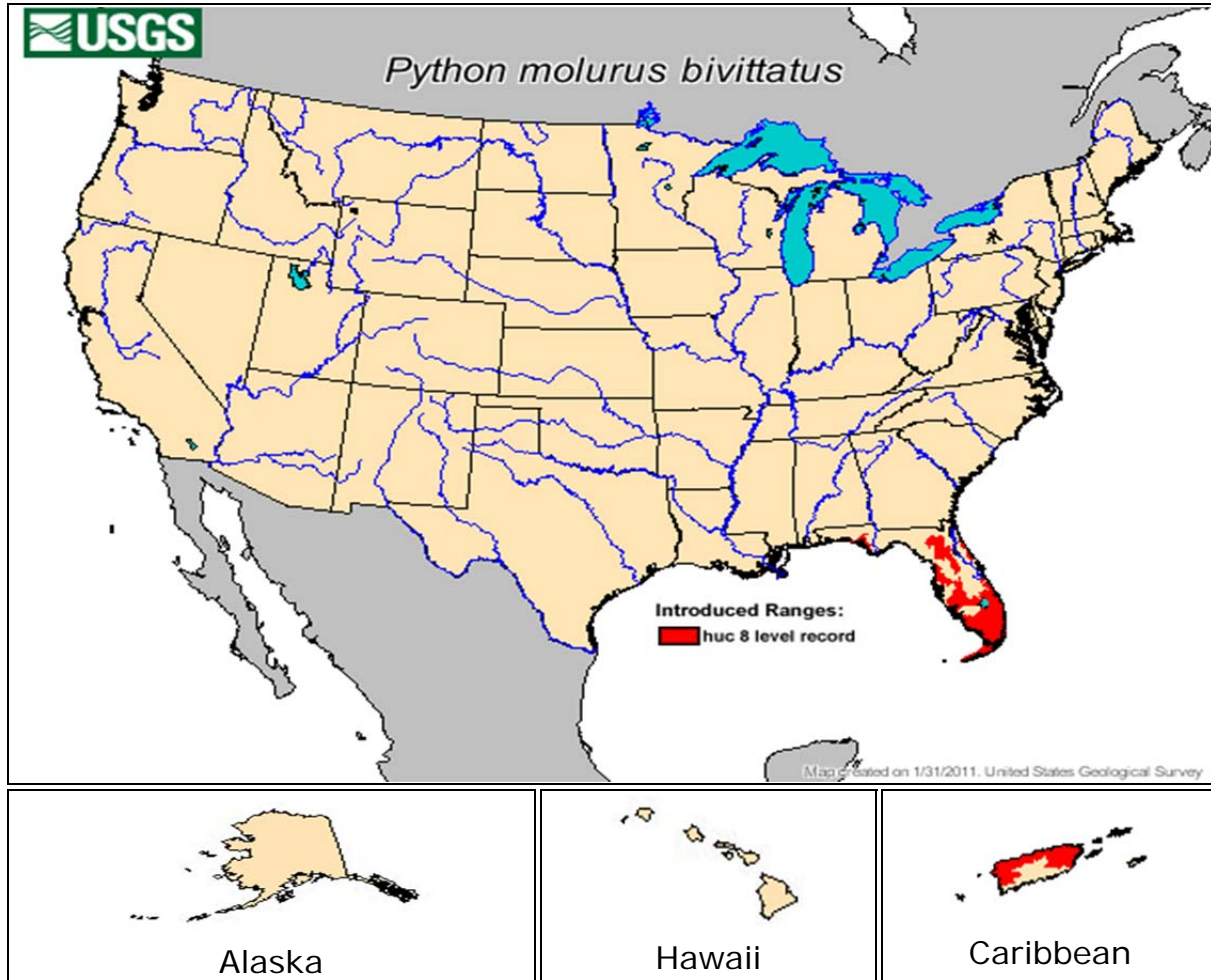
In addition to the mapped areas of the United States mainland, the territories of Guam, Northern Mariana Islands, American Samoa, Virgin Islands, and Puerto Rico appear to have suitable climate. Areas of the State of Hawaii with elevations under about 8,202 ft (2,500 m) also appear to be climatically suitable. Climate suitability is just one factor that needs to be considered when assessing the risk of establishment of an invasive species.

Figure 7 depicts the USGS hydrologic unit or watershed (red colored area) where Burmese pythons have been reported captured from the wild in the United States.

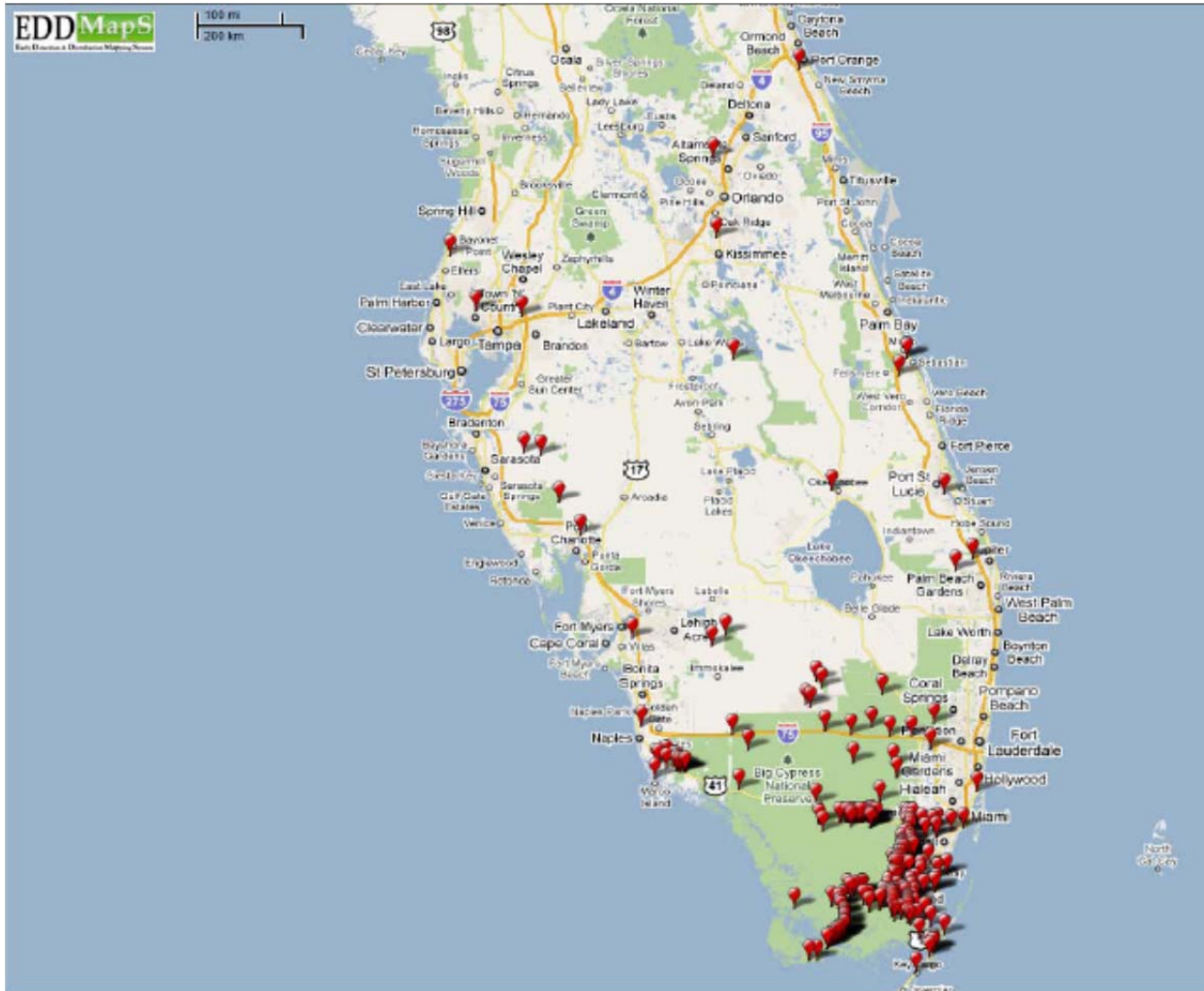


**Burmese Python (*Python molurus*)**

**Figure 6.** Climate map for Burmese python: areas potentially suitable for invasion (Reed and Rodda 2009).



**Figure 7.** The red-colored areas depict USGS hydrologic units or watersheds where Burmese pythons have been reported captured from the wild (USGS 2011).



**Figure 8.** The red-colored points denote localities in the State of Florida where Burmese pythons (*Python molurus bivittatus*) have been observed or removed (EDDMapS 2011).

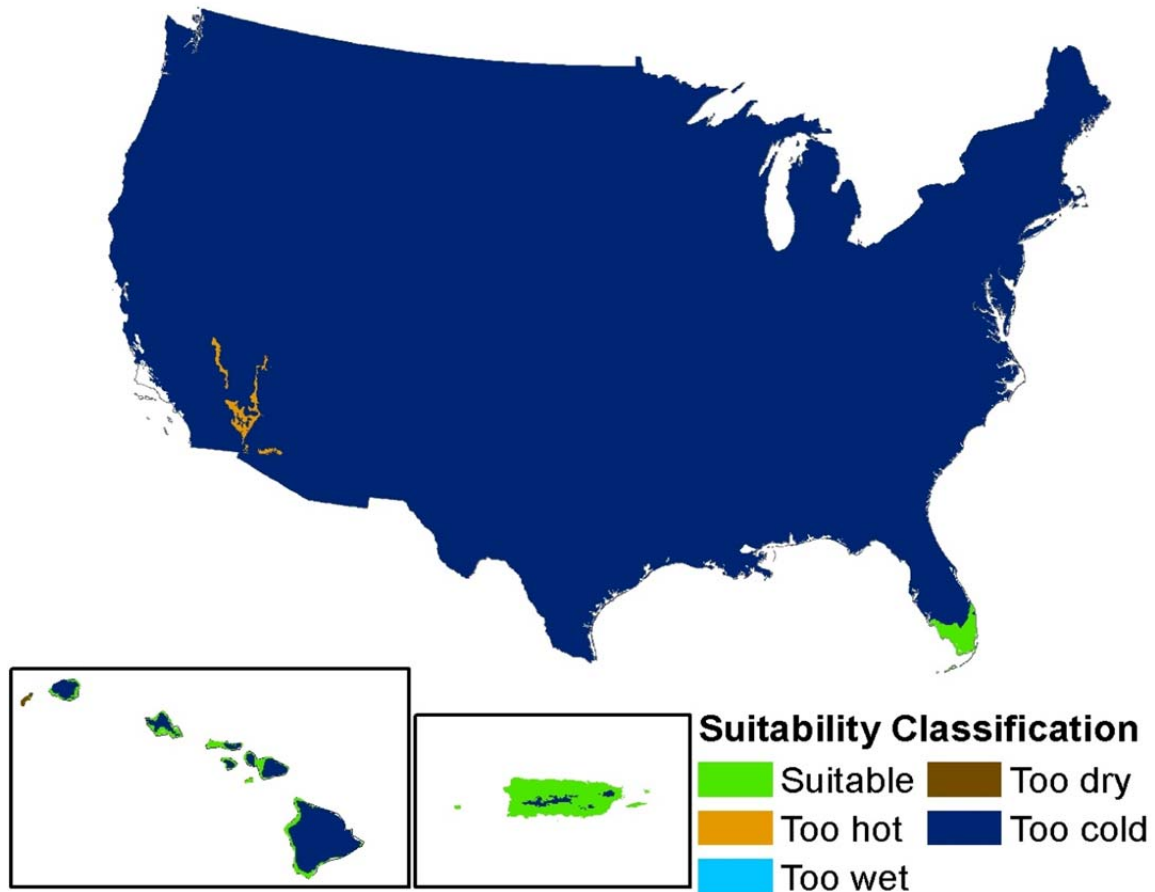
The USGS Burmese python collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2552>. Figure 8 documents the most recent verified removals or observations of *Python molurus bivittatus* in the State of Florida (EDDMapS 2011).

## Reticulated Python

Reticulated pythons have a more tropical distribution in their native range than Burmese pythons. Accordingly, the area of the mainland United States showing a climate match of uncontested sites is smaller, exclusively tropical, and limited to southern Florida (Figure 9). However, according to Reed and Rodda (2009), if those portions of the mainland Asia range are judged by some but not all observers to be occupied (i.e., based on literature cited), one obtains the climate match shown in Figure 10, which also includes much of central Florida and the lower Rio Grande section of Texas. If the range limit of the Reticulated Python at the northern limit of the native range reflects competition with Burmese pythons, it is conceivable that additional portions of the United States would be invaded by reticulated pythons if they were not already occupied by Burmese pythons. Given the current distribution of Burmese pythons in Florida, and the ongoing spread of that species, such a scenario seems unlikely in Florida, though it is plausible it could happen in extreme southern Texas.

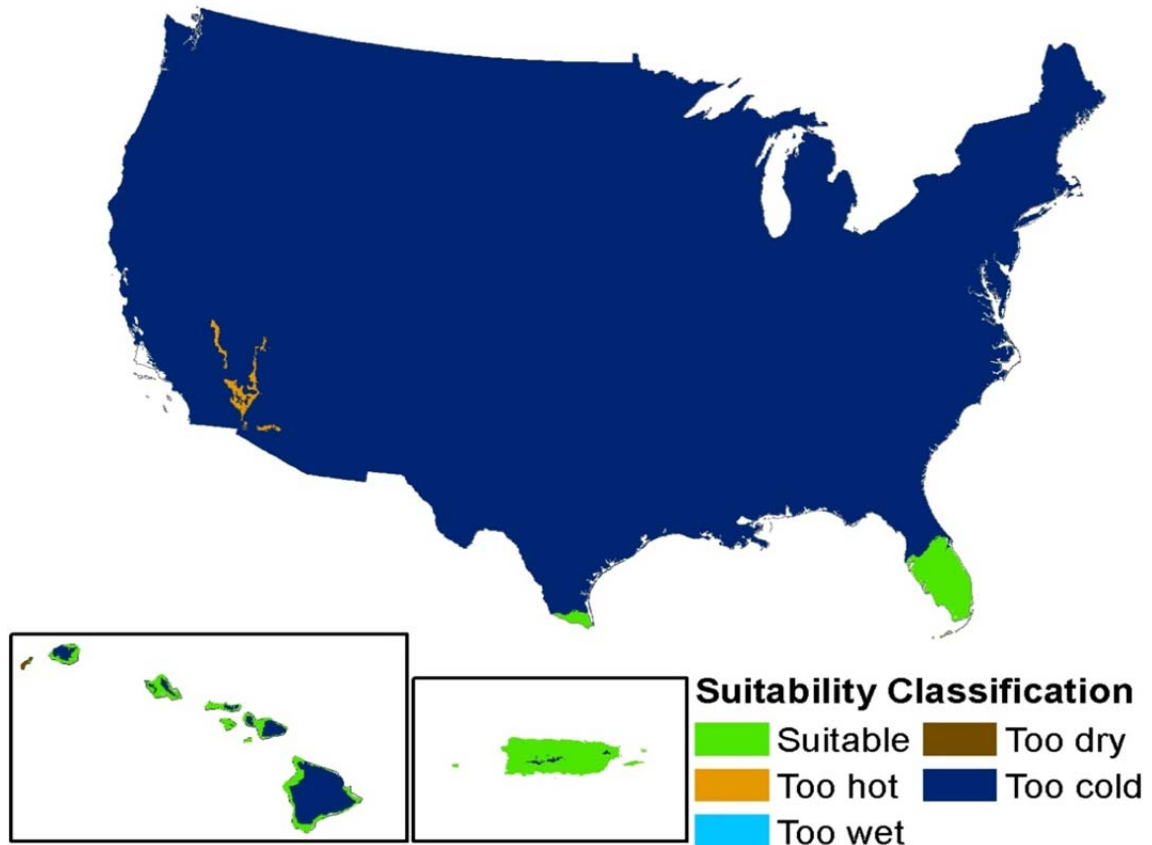
Low and mid-elevation sites in the United States' tropical territories (Guam, Northern Mariana Islands, American Samoa, Virgin Islands, Puerto Rico) and Hawaii also appear to have suitable climate for reticulated python, whether using all localities or the subset considered uncontested.

Figure 11 depicts USGS hydrologic units or watersheds (red colored area) where reticulated pythons have been reported captured from the wild in the United States. The USGS reticulated python collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2747>. Figure 12 documents the most recent verified removals or observations of *Python reticulatus* or *Broghammerus reticulatus* in the State of Florida (EDDMapS 2011).



**Reticulated Python (*Python reticulatus* or *Broghammerus reticulatus*)**

**Figure 9.** Climate map for reticulated python: areas potentially suitable for invasion (Reed and Rodda 2009).



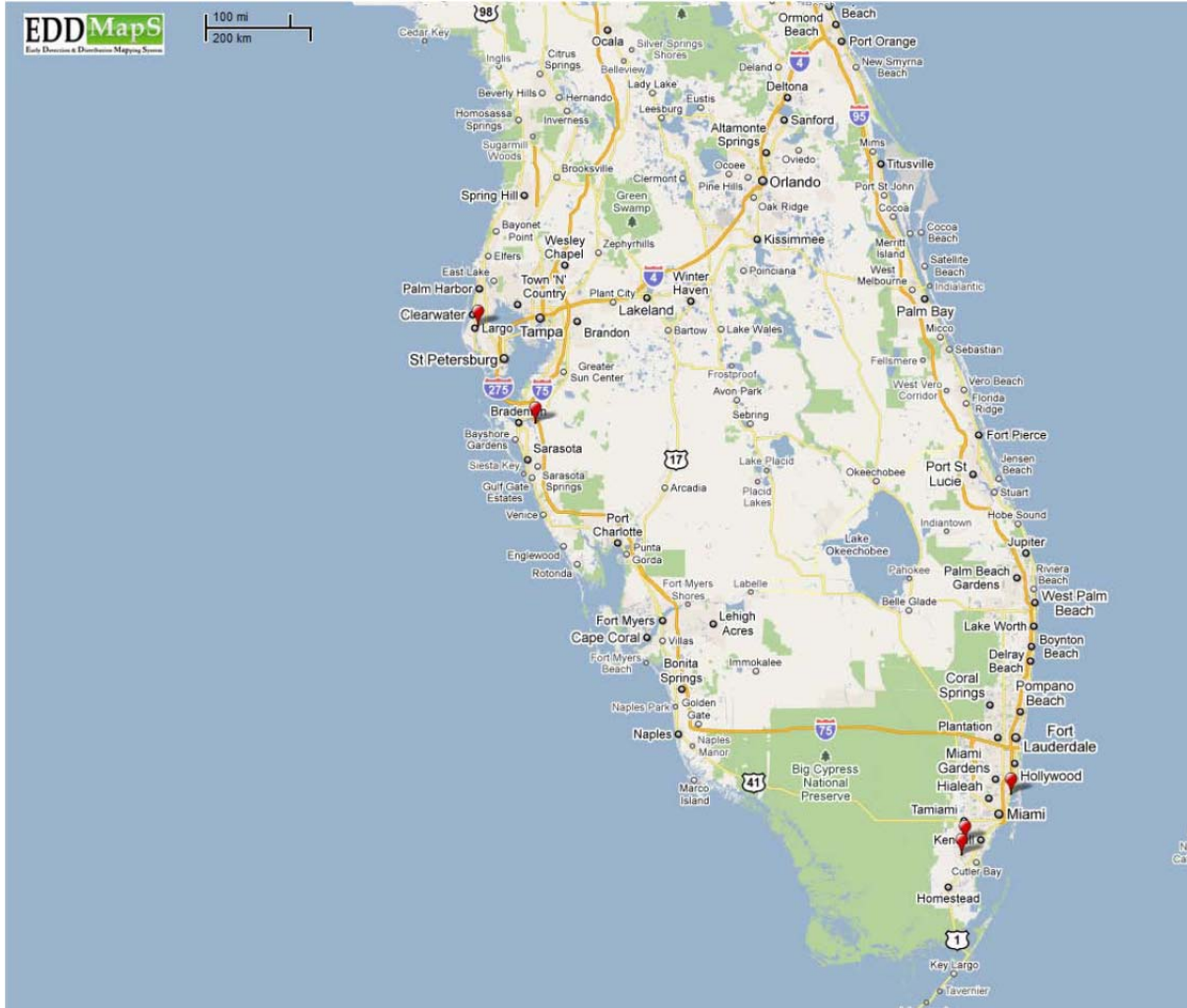
**Reticulated Python (*Python reticulatus* or *Broghammerus reticulatus*)**

**Figure 10.** Areas of the United States matching the climate envelope expressed by *B. reticulatus* using all portions of the native range deemed occupied by any of the observers (*i.e.*, based on literature cited) (Reed and Rodda 2009).





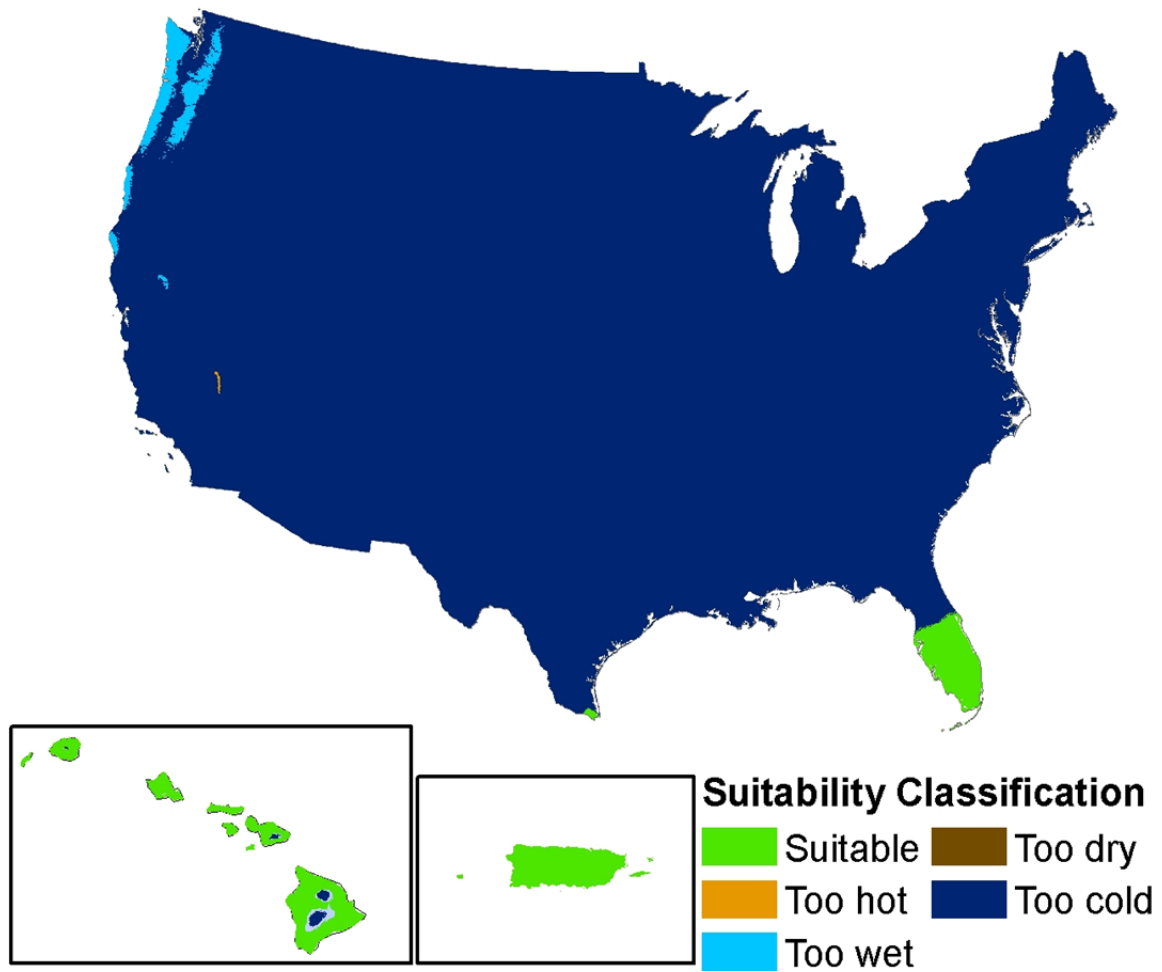
**Figure 11.** The red-colored areas depict USGS hydrologic units or watersheds where reticulated pythons have been reported captured from the wild (USGS 2011).



**Figure 12.** The red-colored points denote localities in the State of Florida where reticulated pythons (*Python reticulatus* or *Broghammerus reticulatus*) have been observed or removed (EDDMapS 2011).

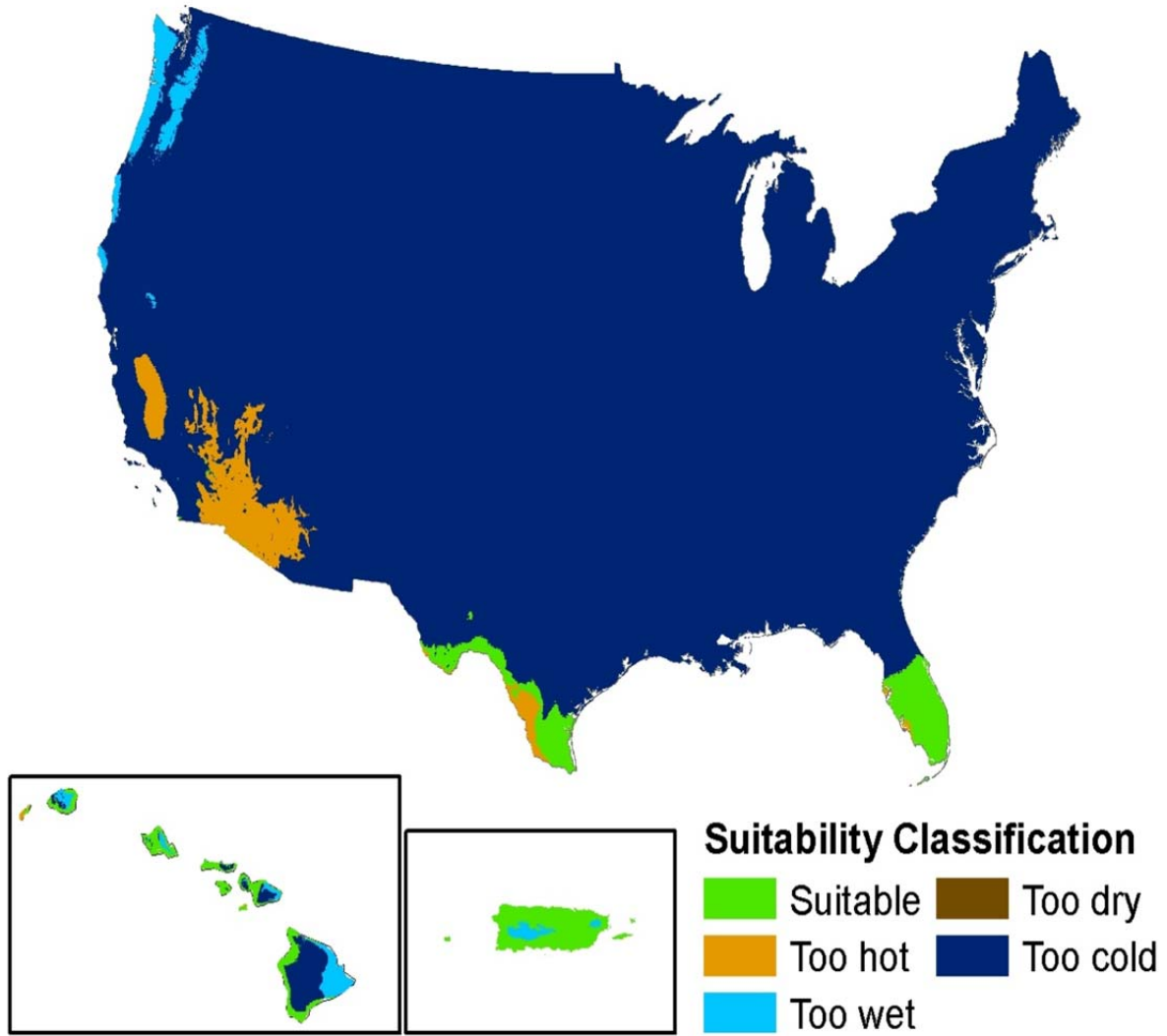
**Northern African Python (*Python sebae*) and Southern African Python (*Python natalensis*)**

Climate from the native range was extrapolated and mapped for the United States for Northern (*P. sebae*: Figure 13) and Southern (*P. natalensis*: Figure 14) African pythons separately. When considered separately, Northern and Southern African pythons both exhibit a climate match to the United States that includes a large portion of peninsular Florida, extreme south Texas, and parts of Hawaii and Puerto Rico. Suitable climate conditions for southern African python extend farther north in Florida and in parts of Texas from about the Big Bend region to the southeastern extent of the State (Reed and Rodda 2009). Figure 15 depicts locations where Northern African pythons have been reported captured from the wild in the United States. The USGS Northern African python collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2744>. Figure 16 documents the most recent verified removals or observations of Northern African pythons in the State of Florida (EDDMapS 2011).



**Northern African Python (*Python sebae*)**

**Figure 13.** Climate map for Northern African python: areas potentially suitable for invasion (Reed and Rodda 2009).

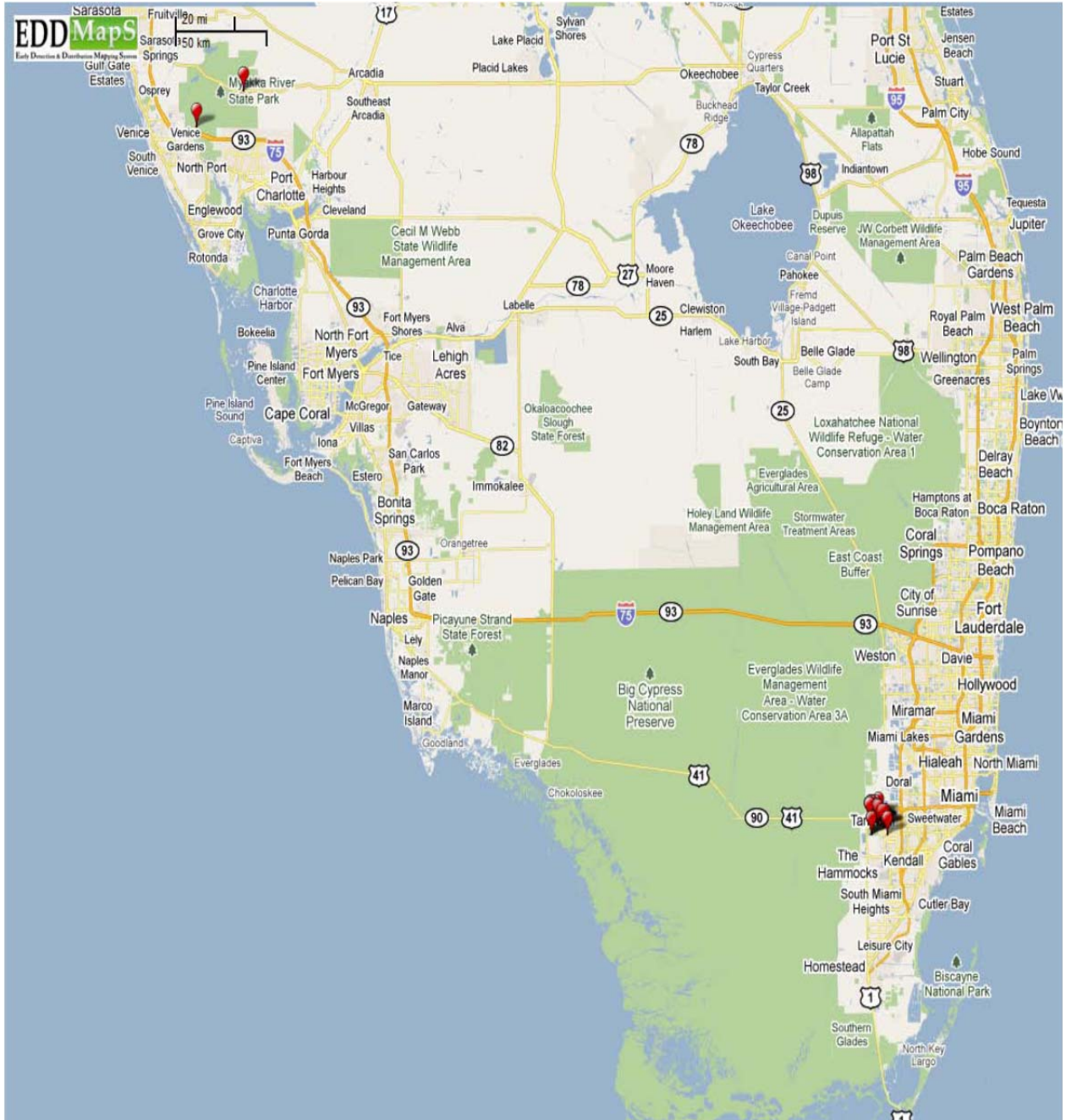


**Southern African Python (*Python natalensis*)**

**Figure 14.** Areas of the United States matching the climate envelope expressed by *P. natalensis* in its native range based on 87 known localities in their native (Reed and Rodda 2009).



**Figure 15.** The red-colored areas depict USGS hydrologic units or watersheds where Northern African pythons have been reported captured from the wild (USGS 2011).

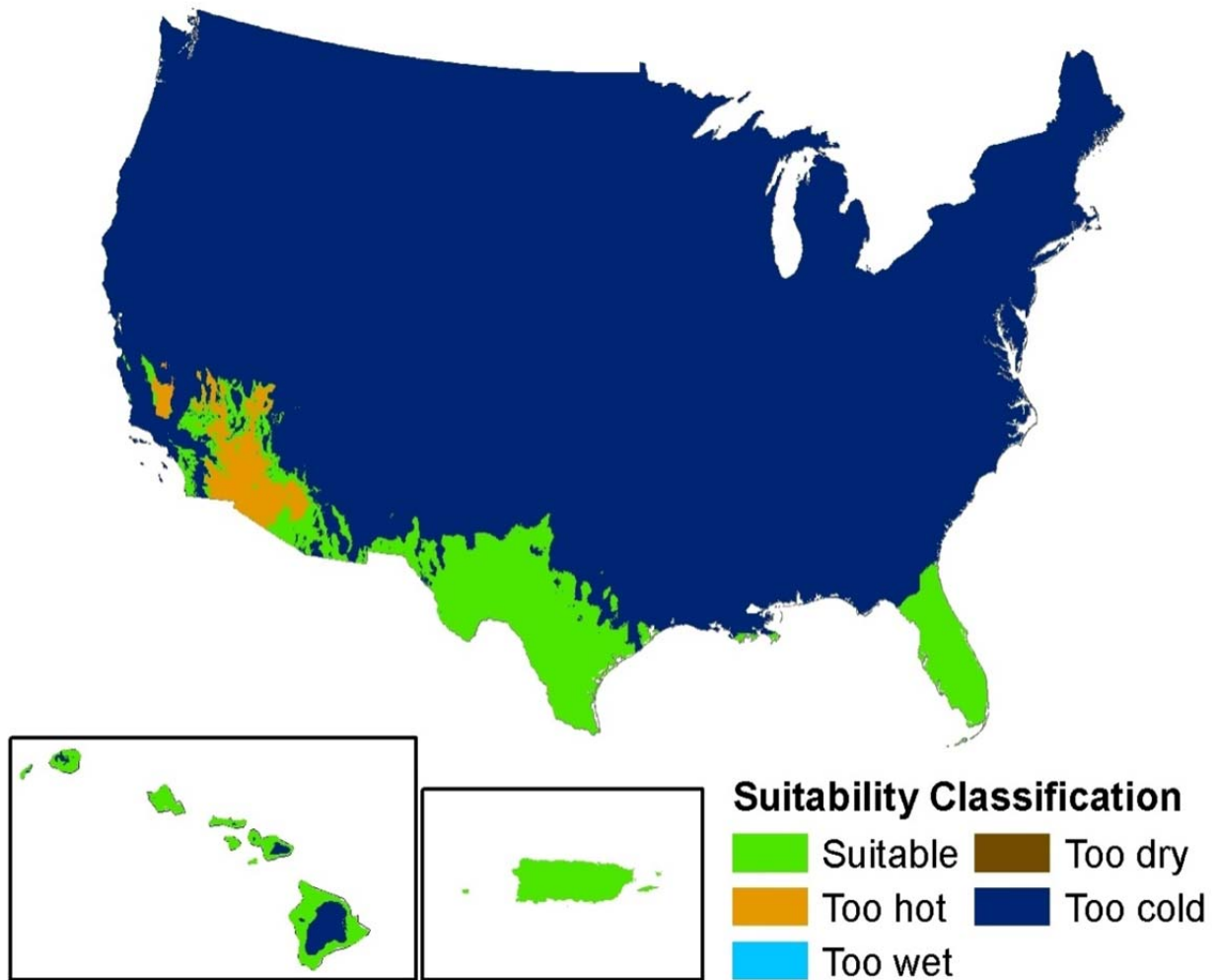


**Figure 16.** The red-colored points denote localities in the State of Florida where Northern African python (African rock python) (*Python sebae*) have been observed or removed (EDDMapS 2011).

**Boa Constrictor (*Boa constrictor*)**

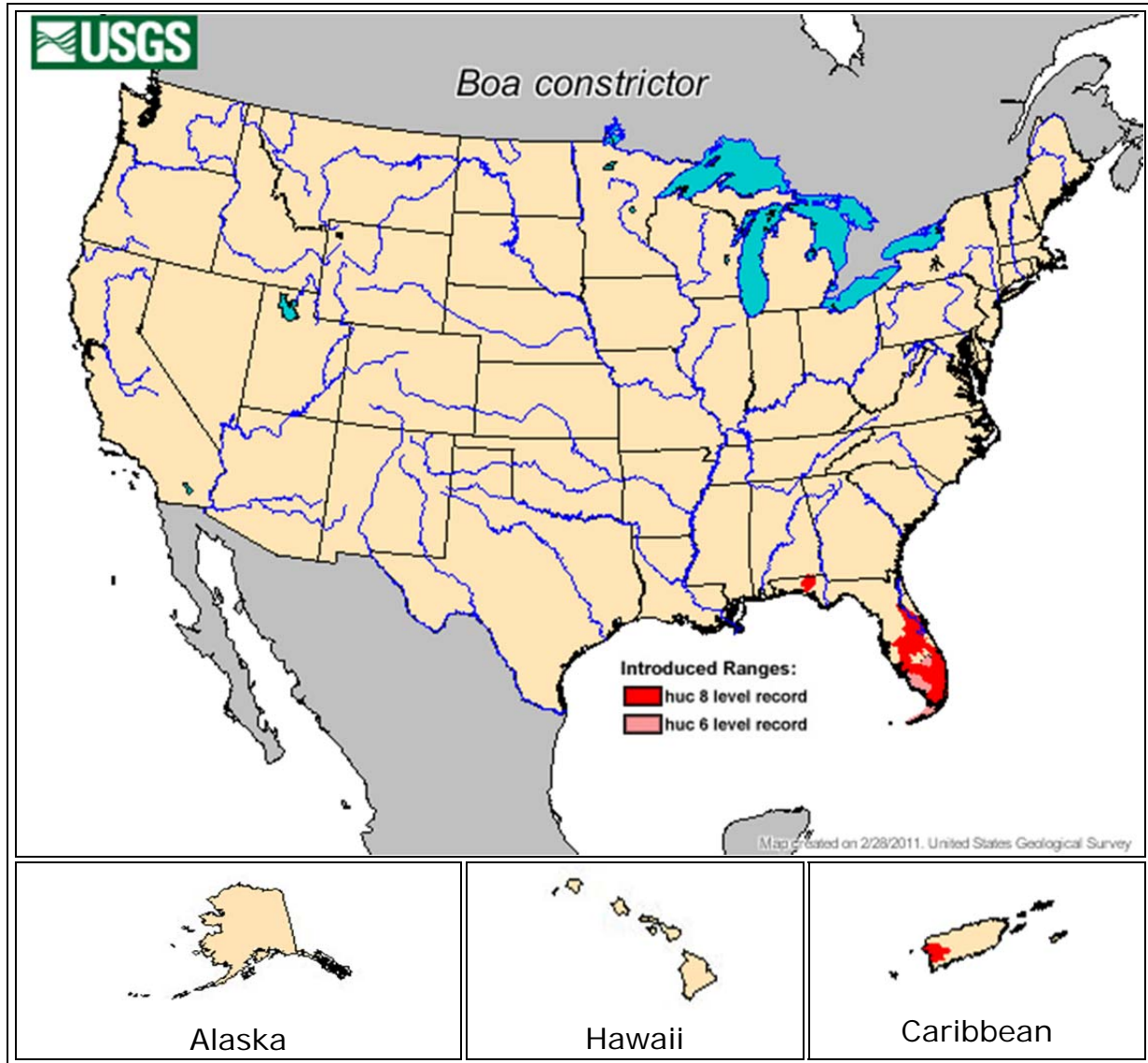
Native-range climate space of *Boa constrictor* in the United States was derived using records from all localities (Figure 17). Because Figure 17 depicts the United States extrapolation using climate space from the entire known native range (that is, the limits to which the

species is capable of dispersing on its own) using the more inclusive species definition as used by a majority of current workers in the field, this map is used for the overall risk assessment. Using all localities in the native range, suitable climate in the United States includes a large area of land in the southern United States. This area includes mesic areas, such as peninsular Florida and a corner of southeast Georgia, but also includes more arid zones, including the southern half of Texas and portions of New Mexico and Arizona. Much of Hawaii and Puerto Rico also appear climatically suitable. Figure 18 depicts locations where the boa constrictor has been reported captured from the wild in the United States. The USGS boa constrictor collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2746>. Figure 19 documents the most recent verified removals or observations of boa constrictors in the State of Florida (EDDMapS 2011).



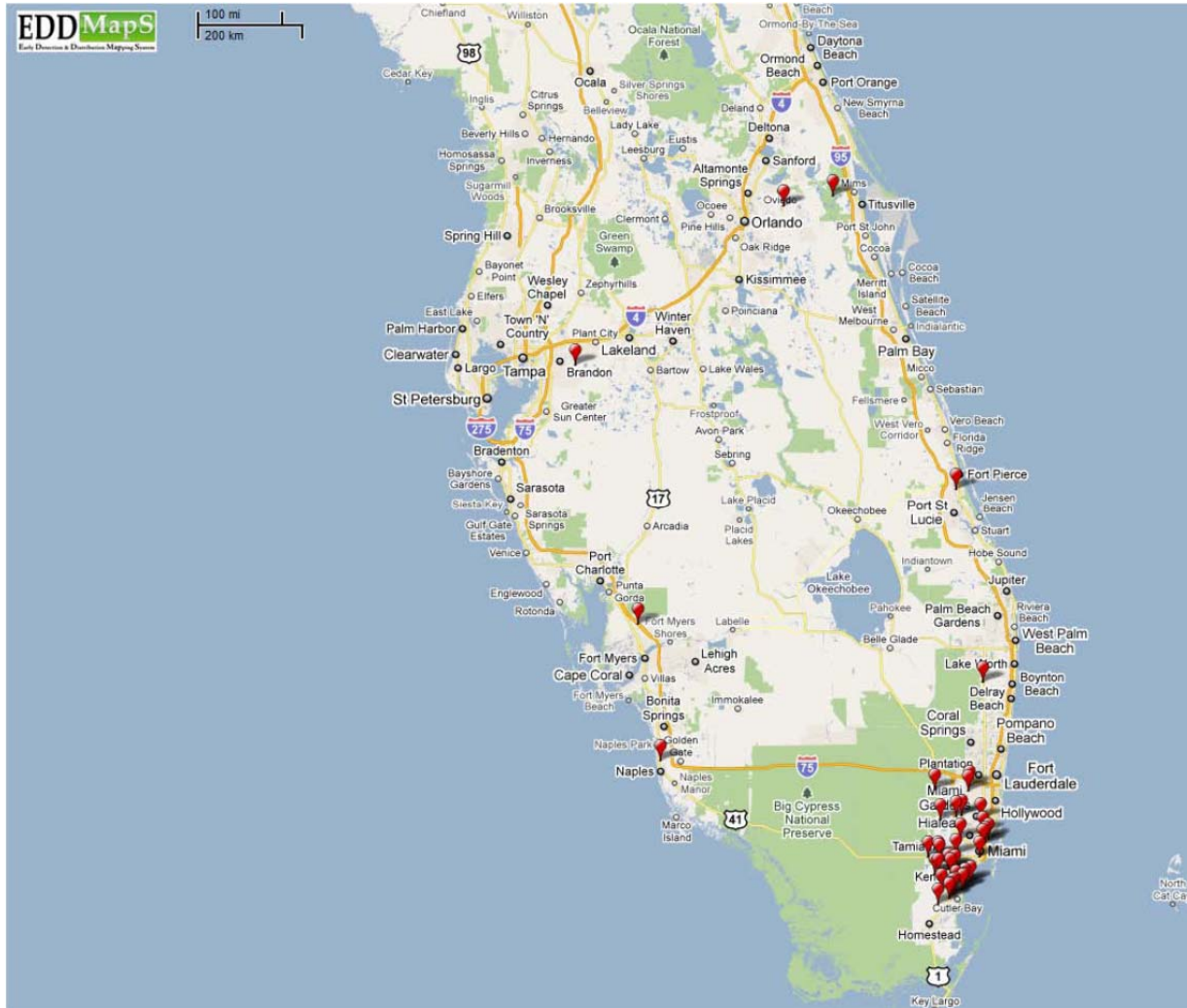
**Boa Constrictor (*Boa constrictor*)**

**Figure 17.** Areas of the United States matching the climate envelope expressed by *B. constrictor* in its native range, based on all known localities (Reed and Rodda 2009).



**Figure 18.** The red-colored areas depict USGS hydrologic units or watersheds where the boa constrictor has been reported captured from the wild (USGS 2011).





**Figure 19.** The red-colored points denote localities in the State of Florida where boa constrictor (*Boa constrictor*) have been observed or removed (EDDMapS 2011).

### **Yellow Anaconda (*Eunectes notaeus*)**

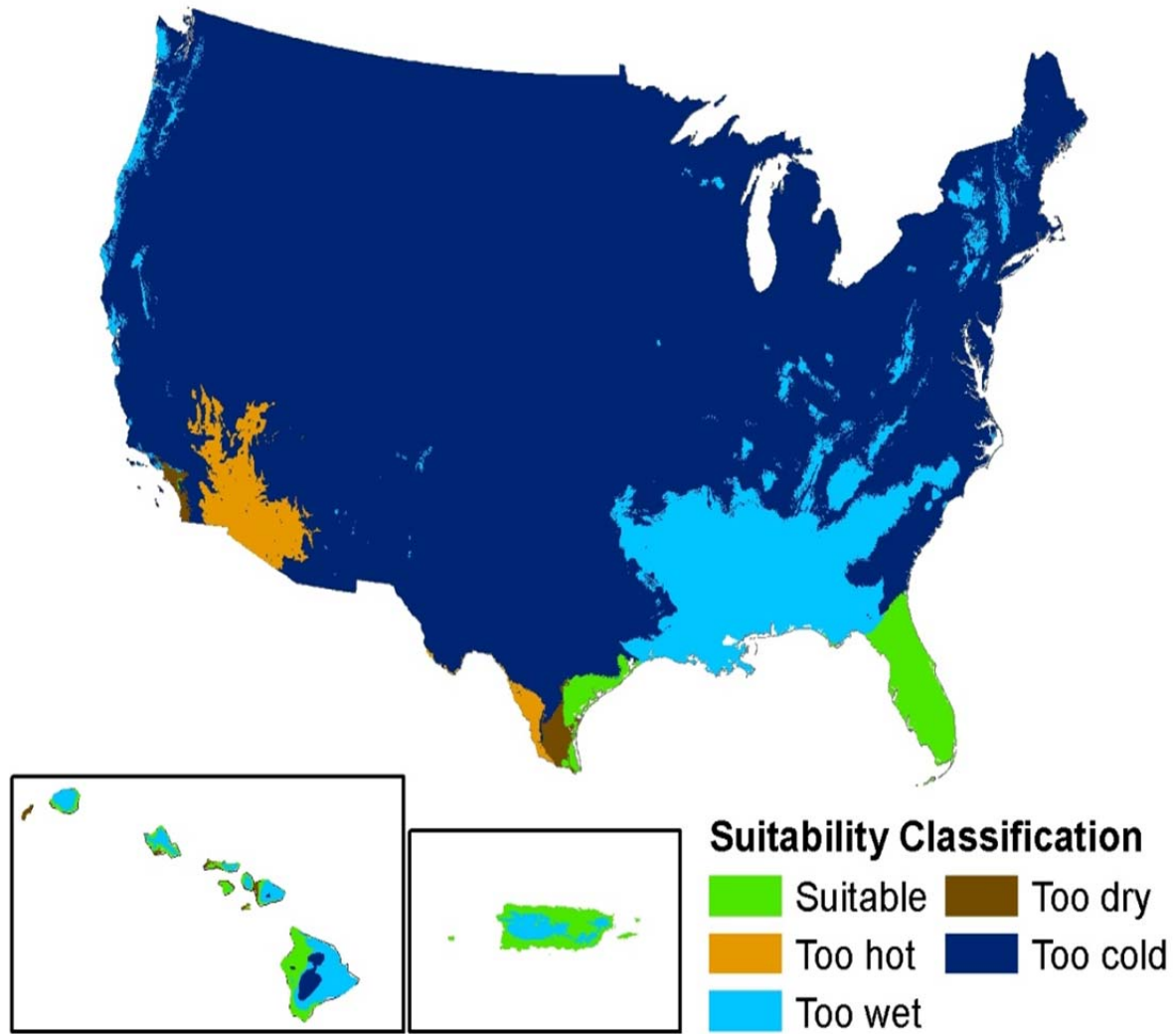
The yellow anaconda has a native-range distribution that includes highly seasonal and fairly temperate regions in South America. When projected to the United States, the climate space occupied by the yellow anaconda translates to a large area, including virtually all of peninsular Florida and a corner of southeast Georgia (to about the latitude of Brunswick), as well as large parts of southern and eastern Texas and a small portion of southern California (Figure 20). Large areas of Hawaii and Puerto Rico appear to exhibit suitable climates, and additional insular United States possessions (e.g., Guam, Northern Marianas, American Samoa) would probably be suitable as well.

Within the areas deemed suitable, however, the yellow anaconda would be expected to occupy only habitats with permanent surface water (Reed and Rodda 2009). The yellow anaconda is

able to escape temporary air temperatures below freezing in its native range by moving to deeper waters, and cold-season body temperatures of 6 °C (43 °F) have been recorded in free-ranging individuals. The ability of the species to similarly escape cold temperatures by behavioral means if introduced to the United States would likely depend on a poorly investigated interaction between the duration of periods of cold body temperature and the minimum water temperatures (Reed and Rodda 2009).

Rainfall has only an indirect effect on the life of an aquatic snake; it could be a misleading indicator of seasonal climate suitability. Much of the area described as “too wet” has a combination of rainfall characteristics and cool winter temperatures that are outside of the climate space bounded in Figure 20. This zone includes mean monthly rainfall values between 100 and 300 millimeters (mm) and mean monthly temperature values below about 25°C (77 °F) (in other words, the area just to the right of and below the bounded climate space of Figure 20). Although our climate space algorithm deemed this area unsuitable according to the boundaries we identified from native range climate records, we have no *a priori* ecological reason to believe that yellow anacondas would be adversely affected by additional rainfall up to a monthly maximum of 300 mm. Therefore, it seems likely that the species could persist in areas with additional rainfall as long as these areas were within the temperature limits known from the native range. If so, then the coastal plain portions of the area identified as too wet would actually be suitable. Similarly, areas in the Southwest deemed “too dry” under this climate space extrapolation could be thermally suitable as long as aquatic habitats are present. If these suggestions are valid, then Figure 20 would be a significant underprediction of suitable regions of the United States (Reed and Rodda 2009).

Figure 21 depicts locations where the yellow anaconda has been reported captured from the wild in the United States. The USGS yellow anaconda collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2576>. Figure 22 documents the most recent verified removals or observations of the yellow anaconda in the State of Florida (EDDMapS 2011).

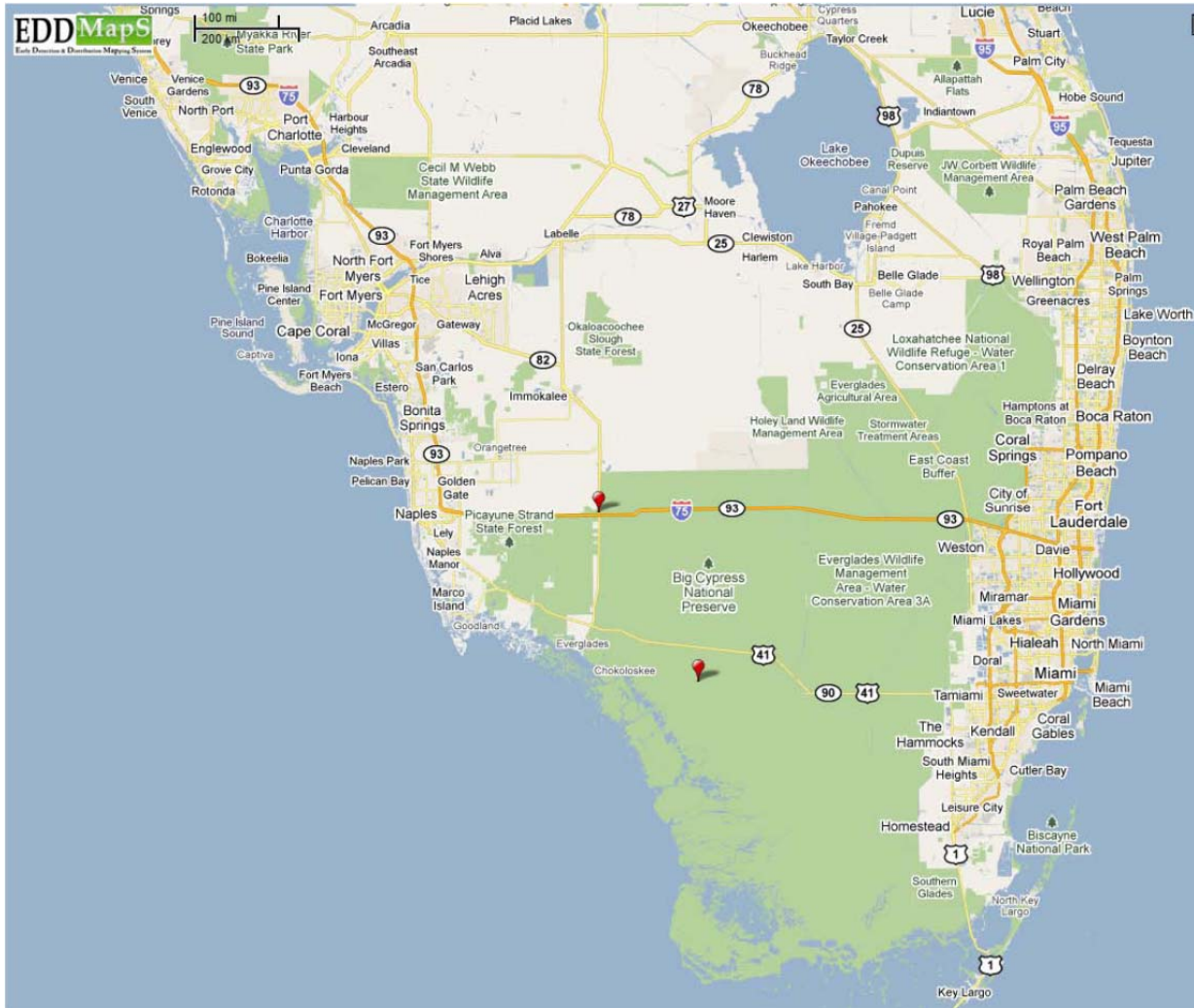


**Yellow Anaconda (*Eunectes notaeus*)**

**Figure 20.** Areas of the United States matching the climate envelope expressed by *E. notaeus* in its native range (Reed and Rodda 2009).



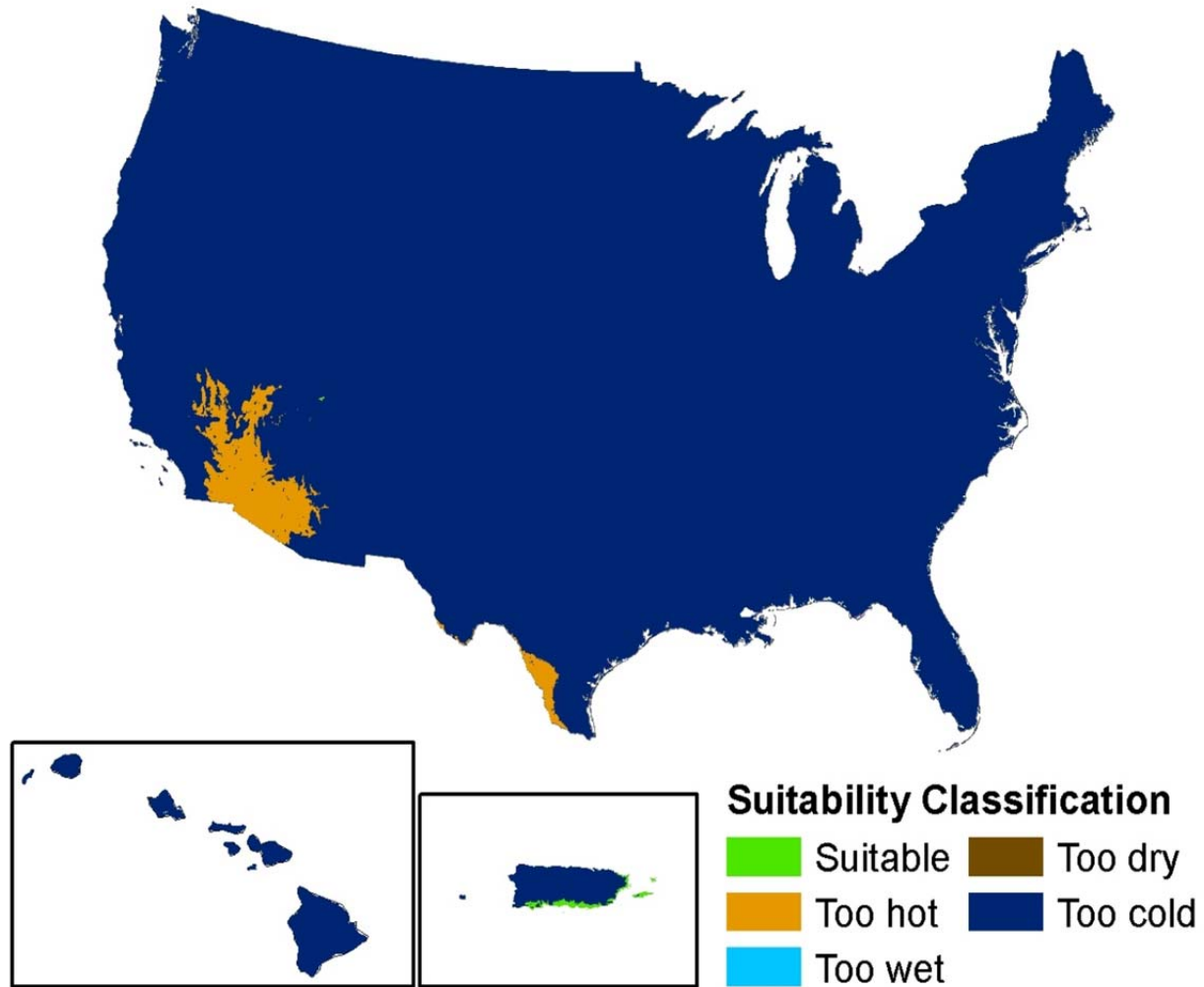
**Figure 21.** The red-colored areas depict USGS hydrologic units or watersheds where the yellow anaconda has been reported captured from the wild (USGS 2011).



**Figure 22.** The red-colored points denote localities in the State of Florida where yellow anaconda (*Eunectes notaeus*) have been observed or removed (EDDMapS 2011).

**DeSchauensee’s Anaconda (*Eunectes deschauenseei*)**

DeSchauensee’s anaconda appears to have a poor climate match with the United States (Figure 23). There are no areas of the continental United States or Hawaii that appear to have precipitation and temperature profiles similar to those observed in the species’ native range, although the southern margin of Puerto Rico and adjacent islands (for example, Vieques) appear suitable. However, extending the climate match to the globe (not depicted) indicates that much of the Amazon Basin and some other tropical areas of the world appear to be climatically suitable. Such a result indicates that the native range of DeSchauensee’s anaconda does not appear to be bounded by unsuitable climate, but may instead be due to other factors (e.g., biogeography, climate change, competition or other ecological factors). If the current range reflects historical or ecological limitations rather than climatic tolerances of the species, then Figure 23 could be an underestimate of actual suitable climate in the United States (Reed and Rodda 2009).



**DeSchauensee’s Anaconda (*Eunectes deschauenseei*)**

**Figure 23.** Areas of the United States matching the climate envelope expressed by *E. deschauenseei* in its native range (Reed and Rodda 2009).

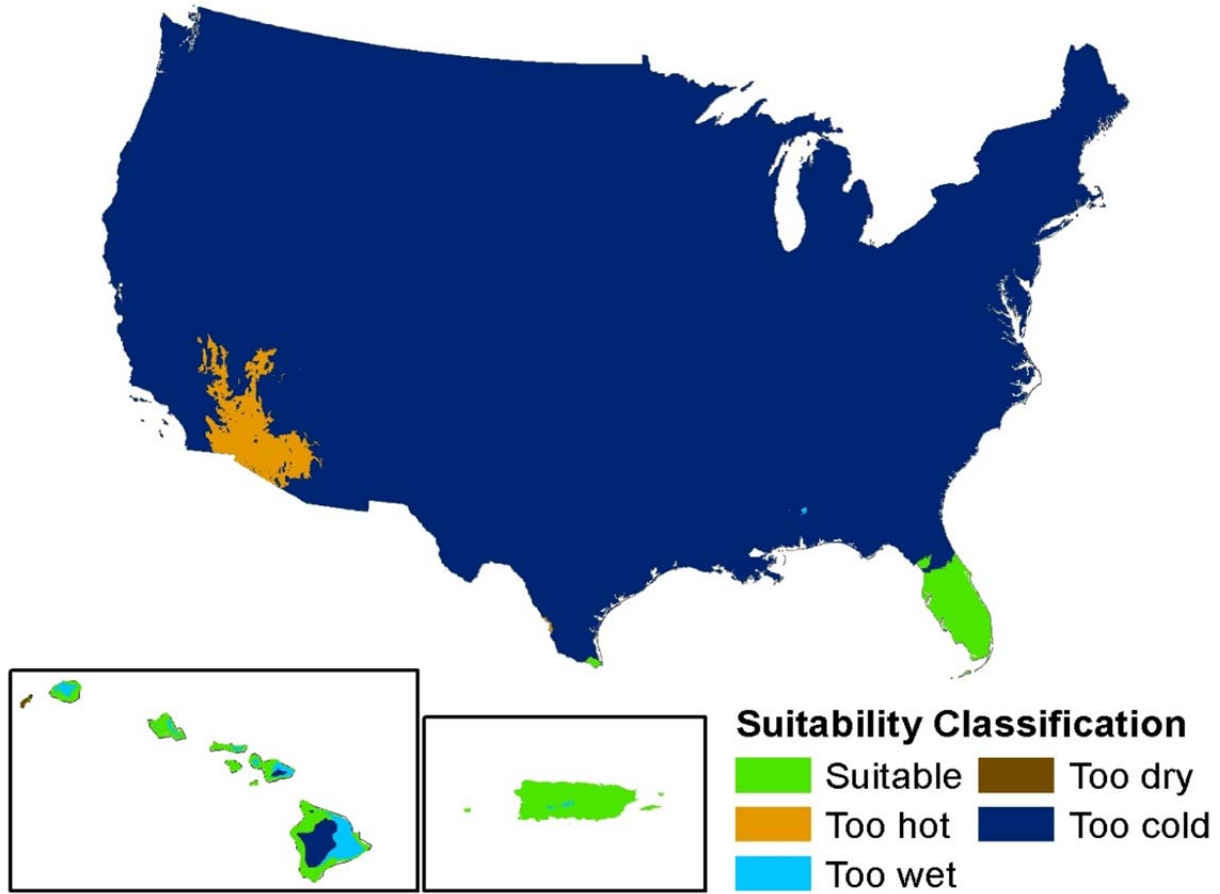
**Green Anaconda (*Eunectes murinus*) and Beni Anaconda (*Eunectes beniensis*)**

Much of peninsular Florida (roughly south of Gainesville) and extreme south Texas exhibit climatic conditions similar to those experienced by green anacondas in their large South American native range. Lower elevations in Hawaii and all of Puerto Rico have apparently suitable climates, but the rest of the country appears to be too cool and/or too arid (Figure 24). Within the climate-matched area, however, anacondas would not be at risk of establishment in sites lacking surface water. Conversely, the areas of the United States southwest that are deemed “too hot” could conceivably represent suitable climatic conditions if aquatic habitats with cooler water conditions are available as thermal refugia. However, such habitats are few and far between in much of this region. Climate suitability is just one factor in the establishment of an invasive species—a necessary but not sufficient condition. Regarding climate tolerance in

southern Florida, herpetologist and anaconda scientist, L. Dirksen states “There is no environmental reason why anacondas could not survive in the Everglades” (Reed and Rodda 2009).

The Beni anaconda is known from only a few specimens in a small part of Bolivia, and the numbers of available localities were judged to be insufficient for an attempt to delineate its climate space or extrapolate this space to the United States. Beni anacondas are known from sites with fairly low seasonality (mean monthly temperatures approximately 22.5°C to 27.5°C, mean monthly precipitation about 50 to 300 mm; and as such very little of the continental United States would appear to be climatically suitable (although insular States and territories may be at some risk). However, it is unknown whether the species’ native distribution is limited by factors other than climate; if the small native range is attributable to ecological (e.g., competition with *E. murinus*) or anthropogenic (e.g., habitat destruction) factors, then an estimate of the climatically suitable areas of the United States based on its current native distribution would be an underprediction (Reed and Rodda 2009).

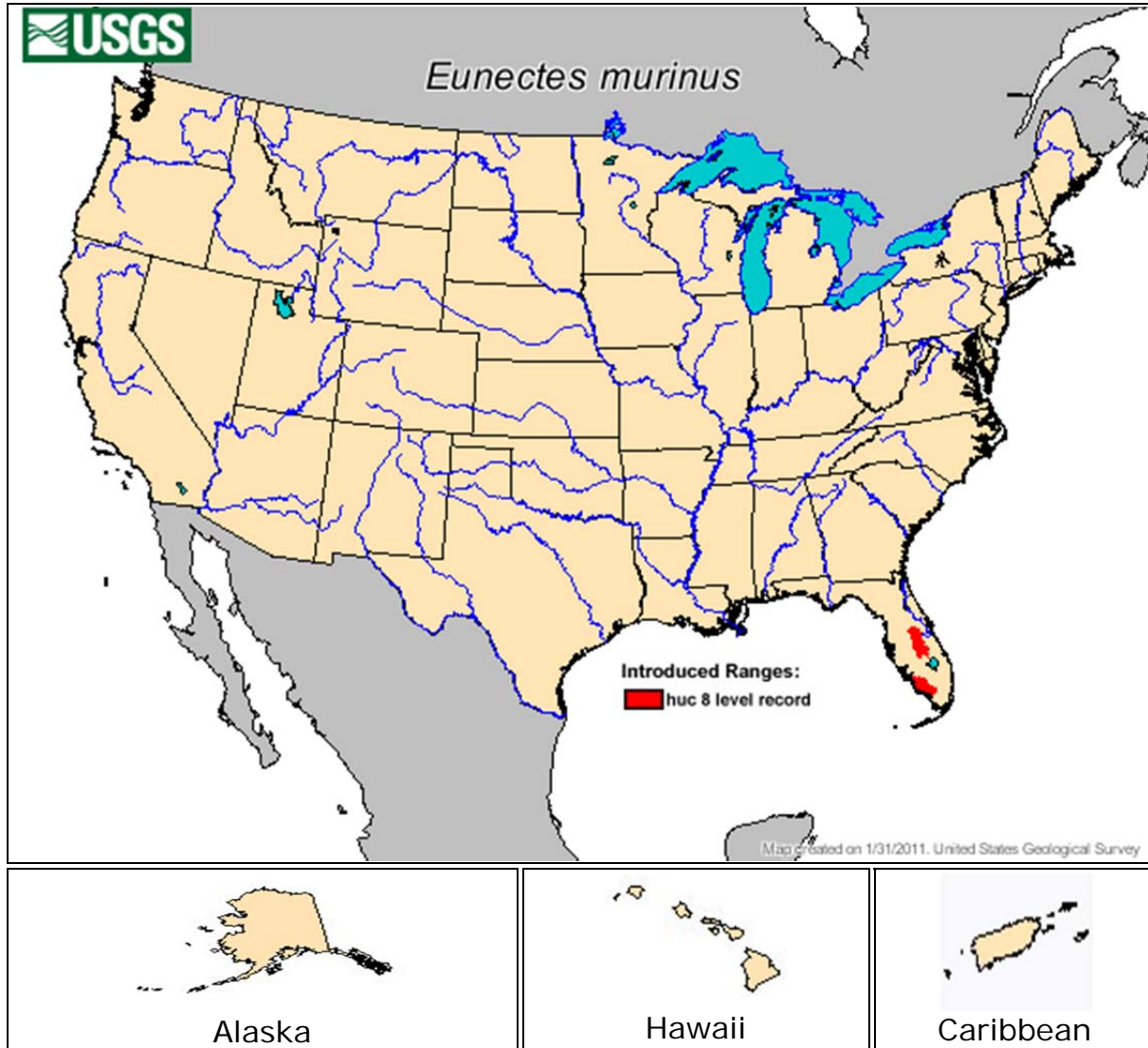
Figure 25 depicts locations where the green anaconda has been reported captured from the wild in the United States. The USGS green anaconda collection information can be found at the following Internet site: <http://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=2636>. Figure 26 documents the most recent verified removals or observations of *Eunectes murinus* in the State of Florida (EDDMapS 2011).



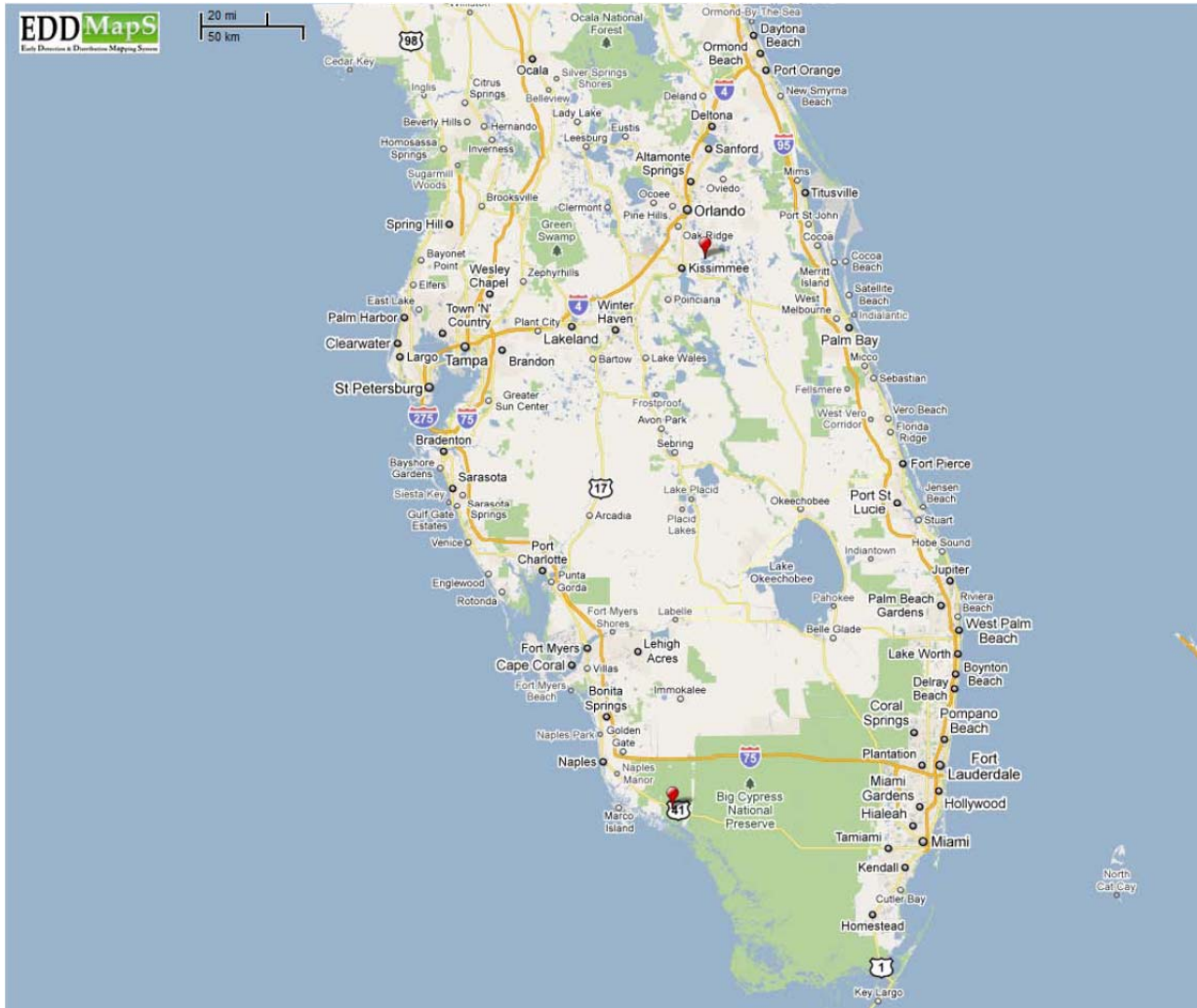
**Green Anaconda (*Eunectes murinus*)**

**Figure 24.** Areas of the United States matching the climate envelope expressed by *E. murinus* in its native range, based on 77 known localities in its native range (Reed and Rodda 2009).





**Figure 25.** The red-colored areas depict USGS hydrologic units or watersheds where the green anaconda has been reported captured from the wild (USGS 2011).



**Figure 26.** The red-colored points denote localities in the State of Florida where green anaconda (*Eunectes murinus*) have been observed or removed (EDDMapS 2011).

## 8) Environmental Consequences

### Alternative 1: No Action

#### Direct Effects

#### *Ecological Impacts*

If no nonnative large constrictor snakes are added to the list of injurious wildlife, ownership of large constrictor snakes could possibly be expanded to States where they are not already found or not regulated by the States. This would increase the risk of the snakes' introduction and establishment in the ecosystem, resulting in threats to native wildlife and ecosystems.

Increased numbers of established populations of the nonnative large constrictors would likely result in substantial reduction of native wildlife abundance. All nine species are 2 to 3 times larger than the largest native snakes in the United States. Even a small established population of a nonnative large constrictor snake in an ecologically sensitive area could cause unacceptable population effects to a species like the federally endangered Key Largo woodrat. These snakes have been shown to be effective at hunting and eating wildlife where they have been established. They have broad diets that can consist of mammals, birds, reptiles, amphibians, and even fish. Established populations of large constrictors should be expected to affect native wildlife communities and may constrain efforts to recover threatened and endangered species or perhaps lead to species extinctions (Clavero and Garcia-Berthou 2005). Wildlife managers' ability to eradicate or control large constrictor snake populations depends on where the snakes are found and in what stage of establishment. Early detection of incipient invasions and quickly coordinated responses are needed to eradicate or contain invasive species before they become too widespread and control becomes technically or financially impossible. If established in large natural areas or ecosystems such as national parks, eradication or control of large constrictor snakes is practically impossible and large constrictors would likely become permanent members of the native wildlife community and top predators.

All of the large constrictors are extremely cryptic in coloration. They are silent hunters that lie in wait along pathways used by their prey and then ambush them. They blend so well into their surroundings that observers have released radio telemetered snakes for research purposes and lost sight of them 5 ft (1.52 m) away in mixed ground cover vegetation (A. Roybal pers. comm. 2010). Therefore, effective and feasible tools are currently very limited to manage large constrictor snake species if they become introduced into natural areas. The currently available tools for control and management of invasive reptiles include traps and toxicants. Trapping is the best available option at this time, but its use on a large scale is prohibitively expensive and inefficient. Given the current state of knowledge and funding, it would be unlikely that any colonization of a giant constrictor could be eliminated through the use of toxicants, or even that an appropriate toxicant could be discovered and registered in time. Many tools have the potential to benefit from additional research, but none is ready for landscape-level control or eradication of giant constrictor snake populations (Reed and Rodda 2009).

### *Impacts on Native Species*

Failure to list the large constrictors as injurious will increase the risk of introduction to States where these snakes are not established, which may increase the risk of establishment of non-reproducing and reproducing populations in new ecosystems or natural areas of the United States. Already-established pythons will continue to prey on a wide variety of vertebrate wildlife, including birds and mammals. Since they are a novel, top predator within food webs where there is suitable climate in the U.S. and territories, they have the potential to cause extensive and irreversible changes to form and structure of ecosystems and may jeopardize the long-term sustainability of affected populations of native species.

*Impacts to Threatened and Endangered Species*

The large constrictor snakes have the potential to negatively affect federally threatened and endangered wildlife species. This Final Environmental Assessment contains tables of species that are federally threatened or endangered in climate-suitable States and territories, such as Florida, Hawaii, Guam, Puerto Rico, and the Virgin Islands. In Florida, introduced large constrictor snakes could severely impact and further imperil 31 species designated as threatened and endangered under the Endangered Species Act along with 26 State of Florida species of special concern (Table 2). These lists include only the size and types of species that would be expected to be directly affected by predation by the nine snake species. For example, plants and marine species were excluded. Puerto Rico has eight bird species and eight reptile species (Table 3). Hawaii has 34 bird species and 1 mammal (Table 4). The Virgin Islands have one bird species and three reptiles (Table 5). Guam has six bird species and two mammals (Table 6).

Constrictor snakes measure about 22 inches (56 centimeters) when they hatch and feed on small prey, such as small mammals and reptiles. As they grow, the size of their prey increases, and all federally threatened and endangered species would be appropriate size at some stage of the snakes' life.

**Table 2.** State and federally listed species of special concern (SSC), threatened (T) and endangered (E) wildlife species that are vulnerable to some growth stage of *P. molurus* or other giant constrictors in Florida (Reed and Rodda 2009). These species are potential prey of the nine constrictor snakes.

Class	Common Name	Scientific Name	Florida	Federal (ESA)
<b>Amphibians</b>				
	Gopher Frog	<i>Rana capito</i>	SSC	
<b>Birds</b>				
	Cape Sable Seaside Sparrow	<i>Ammodramus maritimus mirabilis</i>	E	E
	Scott's Seaside Sparrow	<i>Ammodramus maritimus peninsulae</i>	SSC	
	Florida Grasshopper Sparrow	<i>Ammodramus savannarum floridanus</i>	E	E
	Florida Scrub Jay	<i>Aphelocoma coerulescens</i>	T	T
	Limpkin	<i>Aramus guarauna</i>	SSC	
	Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	SSC	
	Crested Caracara	<i>Caracara cheriway</i>	T	T
	Snowy Plover	<i>Charadrius alexandrinus</i>	T	
	Piping Plover	<i>Charadrius melodus</i>	T	T
	Worthington's Marsh Wren	<i>Cistothorus palustris griseus</i>	SSC	
	Marian's Marsh Wren	<i>Cistothorus palustris marianae</i>	SSC	
	Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	E
	Little Blue Heron	<i>Egretta caerulea</i>	SSC	
	Reddish Egret	<i>Egretta rufescens</i>	SSC	
	Snowy Egret	<i>Egretta thula</i>	SSC	
	Tricolored Heron	<i>Egretta tricolor</i>	SSC	

**Table 2.** (continued)

<b>Class</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Florida</b>	<b>Federal (ESA)</b>
<b>Birds</b>	White Ibis	<i>Eudocimus albus</i>	SSC	
	Peregrine Falcon	<i>Falco peregrinus</i>	E	
	Southeastern American Kestrel	<i>Falco sparverius paulus</i>	T	
	Key West Quail-dove	<i>Geotrygon chrysis</i>	T	T
	Whooping Crane	<i>Grus americana</i>	SSC	E
	Florida Sandhill Crane	<i>Grus canadensis pratensis</i>	T	
	American Oystercatcher	<i>Haematopus palliatus</i>	SSC	
	Wood Stork	<i>Mycteria americana</i>	E	E
	Osprey	<i>Pandion haliaetus</i>	SSC	
	White-crowned Pigeon	<i>Patagioenas leucocephala</i>	T	
	Brown Pelican	<i>Pelecanus occidentalis</i>	SSC	
	Red-cockaded Woodpecker	<i>Picoides borealis</i>	SSC	E
	Roseate Spoonbill	<i>Platalea ajaja</i>	SSC	
	Everglade Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>		E
	Black Skimmer	<i>Rynchops niger</i>	SSC	
	Least Tern	<i>Sterna antillarum</i>	T	
	Roseate Tern	<i>Sterna dougallii</i>	T	T
Bachman's Warbler	<i>Vermivora bachmanii</i>	E	E	
<b>Mammals</b>	Sherman's Short-tailed Shrew	<i>Blarina carolinensis shermani</i>	SSC	
	Red Wolf	<i>Canis rufus</i>		E
	Florida Bonneted Bat	<i>Eumops floridanus</i>	E	
	Salt Marsh Vole	<i>Microtus pennsylvanicus dukecampbelli</i>	E	E
	Gray Bat	<i>Myotis grisescens</i>	E	E
	Indiana Bat	<i>Myotis sodalis</i>	E	E
	Key Largo Woodrat	<i>Neotoma floridana smalli</i>	E	E
	Southern Mink, So. FL pop	<i>Neovison vison pop 1</i>	T	
	Key Deer	<i>Odocoileus virginianus clavium</i>	E	E
	Sanibel Island Rice Rat	<i>Oryzomys palustris pop 2</i>	SSC.	
	Key Rice Rat	<i>Oryzomys palustris pop 3</i>	E	E
	Key Largo Cotton Mouse	<i>Peromyscus gossypinus pop 1</i>	E	E
	Choctawhatchee Beach Mouse	<i>Peromyscus polionotus allophrys</i>	E	E
	Southeastern Beach Mouse	<i>Peromyscus polionotus niveiventris</i>	T	T
	St. Andrews Beach Mouse	<i>Peromyscus polionotus peninsularis</i>	E	E
	Anastasia Beach Mouse	<i>Peromyscus polionotus phasma</i>	E	E
	Perdido Key Beach Mouse	<i>Peromyscus polionotus trissyllepsis</i>	E	E
	Florida Mouse	<i>Podomys floridanus</i>	SSC	
	Florida Panther	<i>Puma concolor coryi</i>	E	E
	Mangrove Fox Squirrel	<i>Sciurus niger avicennia</i>	T	
Sherman's Fox Squirrel	<i>Sciurus niger shermani</i>	SSC		

**Table 2.** (continued)

Class	Common Name	Scientific Name	Florida	Federal (ESA)
<b>Mammals</b>	Lower Keys Rabbit	<i>Sylvilagus palustris hefneri</i>	E	E
	Eastern Chipmunk	<i>Tamias striatus</i>	SSC	
	Florida Black Bear	<i>Ursus americanus floridanus</i>	T	
<b>Reptiles</b>	American Alligator	<i>Alligator mississippiensis</i>	SSC	
	American Crocodile	<i>Crocodylus acutus</i>	E	T
	Eastern Indigo Snake	<i>Drymarchon couperi</i>	T	T
	Red Rat Snake, Lower Keys pop	<i>Elaphe guttata, pop 1</i>	SSC	
	Gopher Tortoise	<i>Gopherus polyphemus</i>	T	
	Barbour's Map Turtle	<i>Graptemys barbouri</i>	SSC	

**Table 3.** Federally listed (ESA) threatened (T) and endangered (E) wildlife species that are vulnerable to some growth stage of the giant constrictors in Puerto Rico (Service 2010). These species are potential prey of the nine constrictor snakes.

Class	Common Name	Scientific Name	Status
<b>Birds</b>	Piping plover, except Great Lakes watershed	<i>Charadrius melodus</i>	T
	Puerto Rican broad-winged hawk	<i>Buteo platypterus brunnescens</i>	E
	Puerto Rican nightjar	<i>Caprimulgus noctitherus</i>	E
	Puerto Rican parrot	<i>Amazona vittata</i>	E
	Puerto Rican plain pigeon	<i>Columba inornata wetmorei</i>	E
	Puerto Rican sharp-shinned hawk	<i>Accipiter striatus venator</i>	E
	Roseate Tern, Western Hemisphere except NE U.S.	<i>Sterna dougallii dougallii</i>	T
	Yellow-shouldered blackbird	<i>Agelaius xanthomus</i>	E
<b>Reptiles</b>	Culebra Island giant anole	<i>Anolis roosevelti</i>	E
	Golden coqui	<i>Eleutherodactylus jasperii</i>	T
	Guajon	<i>Eleutherodactylus cookii</i>	T
	Mona boa	<i>Epicrates monensis monensis</i>	T
	Mona ground iguana	<i>Cyclura cornuta stejnegeri</i>	T
	Puerto Rican crested toad	<i>Peltophryne lemur</i>	T
	Puerto Rican boa	<i>Epicrates inornatus</i>	E
	Virgin Islands tree boa	<i>Epicrates monensis grantii</i>	E

**Table 4.** Federally listed (ESA) threatened (T) and endangered (E) wildlife species that are vulnerable to some growth stage of the giant constrictors in Hawaii (Service 2010). These species are potential prey of the nine constrictor snakes.

Class	Common Name	Scientific Name	Status
<b>Birds</b>	Akiapola`au (honeycreeper)	<i>Hemignathus munroi</i>	E
	Akikiki	<i>Oreomystis bairdi</i>	E
	Akekee	<i>Loxops caeruleirostris</i>	E
	Crested Honeycreeper	<i>Palmeria dolei</i>	E
	Hawaii (honeycreeper) akepa	<i>Loxops coccineus coccineus</i>	E
	Hawaiian common moorhen	<i>Gallinula chloropus sandvicensis</i>	E
	Hawaiian coot	<i>Fulica americana alai</i>	E
	Hawaii creeper	<i>Oreomystis mana</i>	E
	Hawaiian (alala) crow	<i>Corvus hawaiiensis</i>	E
	Hawaiian (koloa) duck	<i>Anas wyvilliana</i>	E
	Hawaiian goose	<i>Branta (=Nesochen) sandvicensis</i>	E
	Hawaiian (lo) hawk	<i>Buteo solitarius</i>	E
	Hawaiian dark-rumped petrel	<i>Pterodroma phaeopygia sandwichensis</i>	E
	Hawaiian stilt	<i>Himantopus mexicanus knudseni</i>	E
	Maui (honeycreeper) akepa	<i>Loxops coccineus ochraceus</i>	E
	Kauai (honeycreeper) akialoa	<i>Hemignathus procerus</i>	E
	Kauai (honeyeater) `O`o	<i>Moho braccatus</i>	E
	Large Kauai (kamao)	<i>Myadestes myadestinus</i>	E
	Laysan duck	<i>(Anas laysanensis)</i>	E
	Laysan (honeycreeper) finch	<i>Telespyza cantans</i>	E
	Maui parrotbill (honeycreeper)	<i>Pseudonestor xanthophrys</i>	E
	Molokai creeper	<i>Paroreomyza flammea</i>	E
	Molokai thrush	<i>Myadestes lanaiensis rutha</i>	E
	Nihoa (honeycreeper) finch	<i>Telespyza ultima</i>	E
	Nihoa (old world warbler) millerbird	<i>Acrocephalus familiaris kingi</i>	E
	Nukupu`u (honeycreeper)	<i>Hemignathus lucidus</i>	E
	Oahu elepaio	<i>Chasiempis sandwichensis ibidis</i>	E
	Oahu creeper	<i>Paroreomyza maculata</i>	E
`O`u (honeycreeper)	<i>Psittirostra psittacea</i>	E	
Palila (honeycreeper)	<i>Loxioides bailleui</i>	E	
Po`ouli (honeycreeper)	<i>Melamprosops phaeosoma</i>	E	
Shearwater Newell's townsend's	<i>Puffinus auricularis newelli</i>	E	
Short-tailed albatross	<i>Phoebastria (=Diomedea) albatrus</i>	T	
Small Kauai (puaiohi) thrush	<i>Myadestes palmeri</i>	E	
<b>Mammals</b>	Hawaiian hoary bat	<i>Lasiurus cinereus semotus</i>	E

**Table 5.** Federally listed (ESA) threatened (T) and endangered (E) wildlife species that are vulnerable to some growth stage of the giant constrictors in the Virgin Islands (Service 2010). These species are potential prey of the nine constrictor snakes.

Class	Common Name	Scientific Name	Status
<b>Birds</b>	Roseate Tern, Western Hemisphere except NE U.S.	<i>Sterna dougallii dougallii</i>	T
<b>Reptiles</b>	Culebra Island giant anole	<i>Anolis roosevelti</i>	E
	St. Croix ground lizard	<i>Ameiva polops</i>	E
	Virgin Islands tree boa	<i>Epicrates monensis granti</i>	E

**Table 6.** Federally listed threatened (T) and endangered (E) species that are imperiled wildlife vulnerable to some growth stage of the giant constrictors in Guam (Service 2010). These species are potential prey of the nine constrictor snakes.

Class	Common Name	Scientific Name	Status
<b>Birds</b>	Bridled white-eye	<i>Zosterops conspicillatus</i>	E
	Guam rail	<i>Rallus owstoni</i>	E
	Guam Micronesian kingfisher	<i>Halcyon cinnamomina cinnamomina</i>	E
	Mariana common moorhen	<i>Gallinula chloropus guami</i>	E
	Mariana (=aga) crow	<i>Corvus kubaryi</i>	E
	Mariana gray swiftlet	<i>Aerodramus vanikorensis bartschi</i>	E
<b>Mammals</b>	Little Mariana fruit bat	<i>Pteropus tokudae</i>	E
	Mariana fruit bat (=Mariana flying fox) bat	<i>Pteropus mariannus mariannus</i>	T

### Impacts to Humans

Nonnative large constrictor snakes pose a small but perceptible risk to human safety. Human fatalities from non-venomous snakes in the wild are rare, at most only a few per year worldwide. Although attacks on people are rare, they may occur and deaths are possible given the large size that some individual snakes can reach. A small number of human fatalities from nonnative large constrictor snakes in captivity have occurred in the past in the United States and a small number of human fatalities would be expected to continue under all alternatives analyzed in this Environmental Assessment since the proposed action and alternatives 3 and 4 would prohibit importation and interstate transport but not possession.

### Economic Impacts

Under this Alternative, there would be no loss of retail sales. Potential costs to the environment would be increasing from year to year.



## **Indirect Effects**

An indirect effect of not listing nonnative large constrictor snakes would be the cascading effects that emerge from increased predation on prey. Over time, a reduction in prey densities could reduce food resources of native predator species. Further, a reduction in herbivore density could potentially alter existing habitat structure.

Large constrictor snakes have also been found as carriers of harmful pathogens and may act as vectors of disease transmission to native wildlife and livestock. There is a risk of pathogens being introduced by large constrictors into new areas of the country, and new pathogens could be carried in with new importations. It is probable that ticks and other ectoparasites could be transmitted to native reptiles in the United States. Diseases borne by such parasites could potentially impact United States industries such as agriculture.

## **Cumulative Effects**

Large constrictor snakes have been found in the United States in the wild (including Florida, Puerto Rico, and California). Risk of accidental or intentional releases from pet owners and reptile breeders would continue in States currently allowing possession of large constrictor snakes. Eleven States either prohibit the possession of certain large constrictor snakes or require a permit for their import, possession, or distribution: Florida, Hawaii, Illinois, Iowa, Louisiana, Massachusetts, Missouri, New Jersey, New York, Rhode Island, and Texas. Since most States allow large constrictor snakes, a reproducing population could become established in the United States, thereby imperiling recovery of native threatened or endangered species. Presence of large constrictor snakes could pose a serious threat to many of the remaining populations of endangered and threatened species.

Nonnative large constrictor snake invasions are usually irreversible due to the lack of effective methods of control. Since effective measures to control or eradicate large constrictor snake populations are not available, the ability to rehabilitate or recover ecosystems disturbed by the species is low. Considerable risks associated with large constrictor snake establishment in the wild relate to endangerment and extinction of native wildlife populations. Re-establishment of extirpated populations, if biologically possible, would be labor and cost-intensive and would depend on eradication of large constrictor snakes within native habitats.

The Service continues to work with partners to research control technologies and snake life histories, increase public awareness, develop capacity to rapidly respond to sightings of snakes in the wild, and assist with Nonnative Pet Amnesty days led by our State partners, which provide an important alternative to release of pet snakes into the wild. If no action is taken to prohibit the importation and interstate transportation of large constrictor snakes, the introduction of these snakes to the natural areas of the United States will likely add to the cumulative impacts, such as habitat degradation from development, agriculture, and contaminants, that have already adversely affected native wildlife resources.

It is plausible that owners of large constrictor snakes may intentionally release their snakes in reaction to Federal regulation. This outcome would be contrary to the agency's intent of stopping spread through interstate movement and importation for approved purposes. Possession and movement within States would remain under the purview of each State and remain lawful under Federal law. Intentionally releasing any unwanted nonnative large constrictor snake would violate State law in most if not all cases; however, should this not dissuade pet owners from releasing animals into the wild, these actions could result in a greater likelihood that new populations of nonnative large constrictor snakes would become established. Alternative 1, the no action alternative, would minimize the unintended consequence of pet owners unlawfully releasing snakes in reaction to Federal regulation.

Not listing any large constrictor snakes as injurious would not result in a decreased demand for these nonnative snakes in the United States. There would not likely be a decrease in harvesting pressure in their native ranges. *Python molurus molurus* is listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I, which “lists species that are the most endangered among CITES-listed animals and plants.” All other subspecies in the family *Pythonidae* are listed in CITES Appendix II, which “lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” The subspecies *Boa constrictor occidentalis* is listed by CITES under Appendix I. All other species in the family *Boidae* are listed in CITES Appendix II. The IUCN Red List of Threatened Species lists *Python molurus* as “near threatened” (last updated in 1996). Species listed under CITES are taken from the wild for international trade. Trade in these species is regulated to prevent unsustainable use of the species. Actions that may result in decreased demand for these species in the wild are likely to provide benefits. Therefore, not listing any of the pythons and boas would result in no beneficial effects on the native populations. Beneficial impacts to wild populations of all nine species in their native countries will not improve under Alternative 1.

**Alternative 2A: List as Injurious Burmese python, Reticulated Python, Northern African Python, Southern African, Boa Constrictor, Yellow Anaconda, DeSchaunsee’s Anaconda, Green Anaconda, and Beni Anaconda [Proposed Action]**

**Direct Effects**

*Ecological Impacts*

Listing all nine large constrictor snakes as injurious will help protect fauna in ecosystems and watersheds of the United States. No negative impacts to habitats will result from listing large constrictor snakes. Because of the wide variety of mammals, birds, reptiles, amphibians, and fish that most of these hunt and eat, these giant snakes are likely to negatively affect threatened and endangered wildlife biodiversity, distribution, and abundance, as well as any ecosystem functions derived from those species. This alternative would reduce but not eliminate the risks to the environment in those States where the large constrictors are already present.

Under this alternative, there could be reproduction and spread of large constrictor snakes within States where the snakes already occur. There may be States where the nine species of large constrictor snakes are not yet established in the wild. Future escapes/releases from existing pet ownership could result in new wild populations. Ownership of all nine large constrictor snakes increases the risk of introduction and establishment of these large snakes in natural and developed areas. Because the Department of the Interior regulates importation and interstate transport of injurious wildlife under the Lacey Act, listing all nine species of large snakes as injurious could decrease the risk of these snakes from becoming established in the United States. However, the States independently may regulate the possession of large constrictor snakes within State boundaries; if a State allows the use or ownership, regardless of the Federal injurious listing status, this risk level may be reduced by any listing action.

### *Impacts on Native Species*

Prohibiting the importation and interstate transportation of the nine species of large constrictor snakes will reduce predation to native species. The lack of predation will remove a threat toward endangerment and help protect native vertebrate species of all classes in natural and developed areas. No negative impacts to native species will result from listing all nine large constrictor snakes. The alternative will not eliminate the environmental threats in those States where the large constrictor snakes are already present; however, some threats will be reduced because some States may not have all nine species present. Alternative 2A, by prohibiting the importation and interstate transportation of all nine large constrictor snakes, will do the most to protect native species from negative impacts due to large constrictor snake introduction.

### *Impacts to Threatened and Endangered Species*

Prohibiting the importation and interstate transportation of large constrictor snakes will help protect native threatened and endangered wildlife populations. No negative impacts to native species will result from listing the large constrictor snakes as injurious. This alternative will not eliminate the environmental threats in those States where large constrictor snakes are currently present. However, some threats will be reduced because some States may not have all nine species currently present. By prohibiting the importation and interstate transportation of all nine large constrictor snakes, Alternative 2A will do the most to protect threatened and endangered species from predation by large constrictor snakes. As described above, not listing all nine species of large constrictor snakes as injurious will increase the risk of impacts to threatened and endangered species, especially if more States fail to regulate the ownership and possession of large constrictor snakes. If the nine species are not listed as injurious, the level of risk would remain the same if additional States do not regulate possession of large constrictor snakes. Tables 2 through 5 list imperiled species that would have reduced threats of predation in several States by listing all nine species of the large constrictor snakes.

### *Impacts to Humans*

None of these snakes poses more than minimal risk to human safety. Human fatalities from non-venomous snakes in the wild are rare, probably only a few per year worldwide. However,

though attacks on people are improbable, they are possible given the large size that some individual snakes can reach.

### *Economic Impacts*

For Scenarios A and B respectively, retail value impacts range from \$14.7 to \$30.1 million; output impacts from \$42.0 to \$86.2 million, employment from 372 to 763 jobs; employment income from \$15.0 to \$30.8 million; and total tax revenue from \$5.7 to \$11.8 million. Please see Final Economic Analysis (U.S. Fish and Wildlife Service 2012) for more information on the potential economic costs and benefits of Alternative 2A.

### **Indirect Effects**

An indirect effect of listing all nine large constrictor snakes as injurious will be the reduced disruption of ecological trophic levels as the potential for range expansion and population increase of nonnative large constrictor snakes is lowered. Further, due to transport and importation restrictions of nonnative constrictor snakes, potential introduction of harmful pathogens or disease will be reduced.

### **Cumulative Effects**

Listing all nine species of nonnative large constrictors as an injurious species will protect the natural resources in areas not occupied by these snakes or where they have not been introduced to parks and natural areas of the United States. This alternative would reduce the potential for all nine large constrictor snakes to be released into additional areas where they are not yet found, through importation and other pathways. The southeastern United States and insular territories, where climatic conditions are suitable, is important habitat for native species, especially those designated as threatened or endangered. Releases or escapes of large constrictor snakes into natural areas have occurred and are likely to occur again without any action taken to prohibit their importation and interstate transport.

The listing of nine large constrictor snakes as injurious would likely result in a decreased demand for these nonnative snakes in the United States (because it would be illegal to import them) and thus a decrease in harvesting pressure in their native ranges. *Python molurus molurus* is listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I, which “lists species that are the most endangered among CITES-listed animals and plants.” All other subspecies in the family *Pythonidae* are listed in CITES Appendix II, which “lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” The subspecies *Boa constrictor occidentalis* is listed by CITES under Appendix I. All other species in the family *Boidae* are listed in CITES Appendix II. The IUCN Red List of Threatened Species lists *Python molurus* as “near threatened” (last updated in 1996). Species listed under CITES are taken from the wild for international trade. Trade in these species is regulated to prevent unsustainable use of the species. Actions that may result in decreased demand for these species in the wild are likely to provide benefits. Therefore, the listing of the pythons and boas is likely to have a beneficial

effect on the native populations. Beneficial impacts to wild populations of all nine species in their native countries will advance under Alternative 2A.

**Alternative 2B: List as Injurious Burmese python, Northern African Python, Southern African Python, and Yellow Anaconda.**

This alternative is the same as alternative 2A, except that the Service would continue to consider the status of five of the nine species, the boa constrictor, reticulated python, DeSchaunsee's anaconda, green anaconda, and Beni anaconda. If the Service eventually lists these five species as injurious species, the environmental consequences of this alternative would be the same as those for alternative 2A, except that until such listing, importation and interstate transportation for these five species could continue. If the Service eventually lists these five species as injurious species, the environmental consequences of this alternative would be as described below.

**Direct Effects**

*Ecological Impacts*

Listing seven nonnative large constrictor snakes as injurious will help protect fauna in ecosystems and watersheds of the United States. No negative impacts to habitats will result from listing large constrictor snakes. These giant snakes have the potential to negatively affect threatened and endangered wildlife species biodiversity, distribution and abundance. This alternative would not eliminate the risk to the environment in those States where the large constrictor snakes are already present. Listing the four species would reduce impacts from these species, but negative impacts to ecological systems, native species, threatened and endangered species, and human safety would continue unabated from the other two species. The negative impacts discussed under Alternative 1 for these four species would be expected to still occur.

Under this alternative, there could be reproduction and spread of large constrictor snakes within States where the snakes occur. Ownership of all four large constrictor snakes increases the risk of introduction and establishment of these large snakes in natural areas. This would increase the risk of introduction and establishment of large constrictor snakes also in urban areas. Because the Department of the Interior regulates importation and interstate transport of injurious wildlife under the Lacey Act, listing the four species of large snakes as injurious should decrease the risk of these snakes becoming established in the United States. However, the States independently may regulate the possession and use of large snakes within State boundaries; if a State allows possession, regardless of the Federal injurious listing status, this risk level may be reduced by any listing action.

*Impacts on Native Species*

Prohibiting the importation and interstate transportation of four species of nonnative large constrictor snakes will prevent predation of native vertebrate species of all classes in natural and urban areas. No negative impacts to native species will result from listing the four large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where the large constrictor snakes are present.

#### *Impacts to Threatened and Endangered Species*

Prohibiting the importation and interstate transportation of large constrictor snakes will reduce predation of native threatened and endangered wildlife populations. No negative impacts to native species will result from listing the four species of the large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where large constrictor snakes are currently owned and used; by prohibiting the importation and interstate transportation of all large constrictor snakes. As described above, not listing the five species of large constrictor snakes as injurious increases the risk of impacts to threatened and endangered species, if more States fail to regulate possession of large constrictor snakes. Tables 2 through 5 list imperiled species that would have somewhat reduced threats of predation in several States by listing the four species of large constrictor snakes.

#### *Impacts to Humans*

None of these snakes poses more than minimal risk to human safety. Human fatalities from non-venomous snakes in the wild are rare, probably only a few per year worldwide. However, though attacks on people are improbable, they are possible given the large size that some individual snakes can reach.

#### *Economic Impacts*

For Scenarios A and B respectively, retail value impacts (decrease from Alternative 1) range from \$3.7 to \$7.6 million; output impacts from \$10.7 to \$21.8 million, employment from 95 to 193 jobs; employment income from \$3.8 to \$7.8 million; and total tax revenue from \$1.4 to \$3.1 million. Please see Final Economic Analysis (U.S. Fish and Wildlife Service 2012) for more information on the potential economic costs and benefits of Alternative 2B.

### **Indirect Effects**

An indirect effect of listing only four large constrictor snakes as injurious will be the potential for an increase in the disruption of ecological trophic levels as the potential for range and population expansion of nonnative constrictor snakes increase. Further, the potential introduction of harmful pathogens or disease to native wildlife or livestock may increase.

## Cumulative Effects

Listing only four nonnative snakes as injurious would allow the continued importation and interstate transport of boa constrictors, which were rated as “High” risk, and reticulated pythons, which were rated as “Medium” risk, so fauna in ecosystems of the United States will still likely be at risk from large constrictor snake introductions, although those States where the large constrictor snakes are currently present, already face this risk. While listing the four snakes impede breeding of large constrictor snakes in the natural environment, the five other snakes are still likely to prey on and eat native wildlife populations, thereby causing extensive negative impacts locally. Numerous species of native wildlife are listed as threatened or endangered and many others are experiencing declines due to habitat loss and degradation. This is likely to continue based on current development and land use trends. Only listing four of the nine large constrictor snakes as injurious may result in the continued risk of introduction of other snakes into States where they are not currently present. Interstate transport of large constrictor snakes may still occur for these snakes with the potential for accidental introduction even in States that do not permit their use. No effective and feasible tools are currently available to manage large constrictor snakes, if they become introduced into ecosystems of the United States. Trapping is the best available option at this time, but their use on a large scale is prohibitively expensive and ineffective. Since effective measures to control or eradicate large constrictor snake populations are not available, the ability to rehabilitate or recover ecosystems impacted by these species, is low. Because large constrictor snakes are capable of living 20 or more years and would consume a substantial amount of native vertebrates during their lifespan, native wildlife, especially threatened and endangered species, face considerable risk of further endangerment and extinction if large constrictor snakes are released or escape into the wild. Entire populations of native wildlife may be very vulnerable to heavy predation by large constrictor snakes.

Re-establishment of extirpated threatened and endangered wildlife populations, if biologically possible, would be labor and cost intensive and would depend on eradication of large constrictor snakes within the habitat of native wildlife species. If no action is taken to prohibit the importation and transportation of the other five species of large constrictor snakes, the risk of introduction of these snakes to natural areas of the United States, outside of the States where they are already present, will likely add to the impacts that have already affected native wildlife species as discussed under Alternative 1.

The listing of four large constrictor snakes as injurious would likely result in a decreased demand for these nonnative snakes in the United States (because it would be illegal to import them) and thus a decrease in harvesting pressure in their native ranges. *Python molurus molurus* is listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I, which “lists species that are the most endangered among CITES-listed animals and plants.” All other subspecies in the family *Pythonidae* are listed in CITES Appendix II, which “lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” The IUCN Red List of Threatened Species lists *Python molurus* as “near threatened” (last updated in 1996). Species listed under CITES are taken from the wild for international trade. Trade in these species is regulated to prevent unsustainable use of the species. Actions that may result in decreased demand for these species

in the wild are likely to provide benefits. Therefore, the listing of the four species is likely to have a beneficial effect on the native populations. The beneficial impacts to wild populations in their native countries of listing the species will not accrue to the remaining five species under this alternative.

**Alternative 3: List as Injurious Burmese Python, Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, and Green Anaconda.**

**Direct Effects**

*Ecological Impacts*

Listing seven nonnative large constrictor snakes as injurious will help protect fauna in ecosystems and watersheds of the United States. No negative impacts to habitats will result from listing seven large constrictor snakes. These giant snakes have the potential to negatively affect threatened and endangered wildlife species biodiversity, distribution, and abundance. This alternative would not eliminate the risk to the environment in those States where the large constrictor snakes are already present. Listing the seven species would reduce impacts from these seven species, but negative impacts to ecological systems, native species, threatened and endangered species, and human safety would continue unabated from the other two species. The negative impacts discussed under Alternative 1 for these two species would be expected to still occur.

Under this alternative, there could be reproduction and spread of large constrictor snakes within States where the snakes occur. Ownership of seven large constrictor snakes increases the risk of introduction and establishment of these large snakes in natural areas. This increases the risk of introduction and establishment of large constrictor snakes also in urban areas. Because the Department of the Interior regulates importation and interstate transport of injurious wildlife under the Lacey Act, listing all seven species of large snakes as injurious will decrease the risk of these snakes becoming established in the United States. However, the States independently may regulate the possession and use of large snakes within State boundaries; if a State allows the possession, regardless of the Federal injurious listing status, this risk level may be reduced by any listing action.

*Impacts on Native Species*

Prohibiting the importation and interstate transportation of the seven species of large constrictor snakes will reduce predation of native vertebrate species of all classes in natural and urban areas. No negative impacts to native species will result from listing all seven large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where the large constrictor snakes are present.



### *Impacts to Threatened and Endangered Species*

Prohibiting the importation and interstate transportation of large constrictor snakes will help protect native threatened and endangered native wildlife populations. Only positive impacts to threatened and endangered species will result from listing the large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where large constrictor snakes are owned by prohibiting the importation and interstate transportation of all large constrictor snakes. As described above, not listing all nine species of large constrictor snakes as injurious could increase the risk of impacts to threatened and endangered species, if more States fail to regulate the ownership of large constrictor snakes. Tables 2 through 5 list imperiled species that would have somewhat reduced threats of predation in several States by listing the seven species of the large constrictor snakes.

### *Impacts to Humans*

None of these snakes poses more than minimal risk to human safety. Human fatalities from non-venomous snakes in the wild are rare, probably only a few per year worldwide. However, though attacks on people are improbable, they are possible given the large size that some individual snakes can reach.

### *Economic Impact*

For Scenarios A and B, retail value impacts range from \$14.7 to \$30.1 million; output impacts from \$42.0 to \$86.2 million, employment from 372 to 763 jobs; employment income from \$15.0 to \$30.8 million; and total tax revenue from \$5.7 to \$11.8 million. Please see Final Economic Analysis (U.S. Fish and Wildlife Service 2012) for more information on the potential economic costs and benefits of Alternative 3.

### **Indirect Effects**

An indirect effect of listing seven large constrictor snakes as injurious will be the potential for a slight increase in the disruption of ecological trophic levels as the potential for range and population expansion of nonnative constrictor snakes increase. Further, the potential introduction of harmful pathogens or diseases to native wildlife or livestock may also slightly increase.

### **Cumulative Effects**

Under this alternative, listing five nonnative snakes which were rated as “High” risk and two rated as “Medium” risk in the USGS risk assessment (Reed and Rodda 2009) as injurious would allow the continued importation and interstate transport of two other large constrictor snakes rated as “Medium” risk, so fauna in ecosystems of the United States will still likely be threatened by predation due to the introduction of these two large constrictor snake, although those States where the large constrictor snakes currently exist already face this risk. While listing the five snakes that were rated as “High” risk and the two rated as “Medium” risk may impede

establishment of large constrictor snakes in the natural environment, the two “Medium” risk snakes not listed are still likely to have extensive negative impacts on native wildlife populations by preying on them. Numerous species of native wildlife are listed as threatened or endangered and many others are experiencing declines due to habitat loss and degradation. This is likely to continue based on current development and land use trends. Only listing seven of the nine large constrictor snakes as injurious may result in the continued risk of introduction of the other two snakes into States where they do not currently exist. Interstate transport of large constrictor snakes may still occur with the potential for accidental or intentional introduction even in States that do not permit their ownership.

No effective and feasible tools are currently available to manage large constrictor snakes, if they become introduced into ecosystems of the United States. Trapping is the best available option at this time, but their use on a large scale is prohibitively expensive and ineffective. Since effective measures to control or eradicate large constrictor snake populations are not available, the ability to rehabilitate or recover ecosystems disturbed by these species, is low. Because large constrictor snakes are capable of living 20-plus years and would eat a substantial amount of native vertebrates during their lifespan, native wildlife (especially threatened and endangered species) would face considerable risk of further endangerment and extinction if large constrictor snakes are released or escape into the wild. Entire populations of native wildlife may be vulnerable to serious predation by large constrictor snakes.

Re-establishment of extirpated threatened and endangered wildlife populations, if biologically possible, would be labor and cost intensive and would depend on eradication of the nonnative large constrictor snakes that were causing harm to the habitat of native wildlife species. If no action is taken to prohibit the importation and transportation of the other two species of large constrictor snakes, the risk of introduction of these snakes to natural areas of the United States, outside of the States where they are already present, will likely add to the impacts that have already affected native wildlife species as discussed under Alternative 1.

The listing of seven large constrictor snakes as injurious would likely result in a decreased demand for these nonnative snakes in the United States (because it would be illegal to import them) and thus a decrease in harvesting pressure in their native ranges. *Python molurus molurus* is listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I, which “lists species that are the most endangered among CITES-listed animals and plants.” All other subspecies in the family *Pythonidae* are listed in CITES Appendix II, which “lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” The subspecies *Boa constrictor occidentalis* is listed by CITES under Appendix I. All other species in the family *Boidae* are listed in CITES Appendix II. The IUCN Red List of Threatened Species lists *Python molurus* as “near threatened” (last updated in 1996). Species listed under CITES are taken from the wild for international trade. Trade in these species is regulated to prevent unsustainable use of the species. Actions that may result in decreased demand for these species in the wild are likely to provide benefits. Therefore, the listing of the pythons and boas is likely to have a beneficial effect on the native populations. The beneficial impacts to wild populations in their native countries of listing the species will not accrue to two of the species under Alternative 3.

## **Alternative 4: List as Injurious Burmese python, Northern African Python, Southern African Python, Boa Constrictor, and Yellow Anaconda.**

### **Direct Effects**

#### *Ecological Impacts*

Listing five nonnative large constrictor snakes as injurious will help protect fauna in ecosystems and watersheds of the United States. No negative impacts to habitats will result from listing large constrictor snakes. These giant snakes have the potential to negatively affect threatened and endangered wildlife species biodiversity, distribution and abundance. This alternative would not eliminate the risk to the environment in those States where the large constrictor snakes are already present. Listing the five species would reduce impacts from these five species, but negative impacts to ecological systems, native species, threatened and endangered species, and human safety would continue unabated from the other four species. The negative impacts discussed under Alternative 1 for these four species would be expected to still occur.

Under this alternative, there could be reproduction and spread of large constrictor snakes within States where the snakes occur. Ownership of all five large constrictor snakes increases the risk of introduction and establishment of these large snakes in natural areas. This would increase the risk of introduction and establishment of large constrictor snakes also in urban areas. Because the Department of the Interior regulates importation and interstate transport of injurious wildlife under the Lacey Act, listing the five species of large snakes as injurious should decrease the risk of these snakes becoming established in the United States. However, the States independently may regulate the possession and use of large snakes within State boundaries; if a State allows possession, regardless of the Federal injurious listing status, this risk level may be reduced by any listing action.

#### *Impacts on Native Species*

Prohibiting the importation and interstate transportation of five species of nonnative large constrictor snakes will prevent predation of native vertebrate species of all classes in natural and urban areas. No negative impacts to native species will result from listing the five large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where the large constrictor snakes are present.

#### *Impacts to Threatened and Endangered Species*

Prohibiting the importation and interstate transportation of large constrictor snakes will reduce predation of native threatened and endangered wildlife populations. No negative impacts to native species will result from listing the five species of the large constrictor snakes. None of the alternatives will eliminate the environmental risks in those States where large constrictor snakes are currently owned and used; by prohibiting the importation and interstate transportation of all large constrictor snakes. As described above, not listing the five species of large constrictor

snakes as injurious increases the risk of impacts to threatened and endangered species, if more States fail to regulate possession of large constrictor snakes. Tables 2 through 5 list imperiled species that would have somewhat reduced threats of predation in several States by listing the five species of large constrictor snakes.

### *Impacts to Humans*

None of these snakes poses more than minimal risk to human safety. Human fatalities from non-venomous snakes in the wild are rare, probably only a few per year worldwide. However, though attacks on people are improbable, they are possible given the large size that some individual snakes can reach.

### *Economic Impacts*

For Scenarios A and B respectively, retail value impacts range from \$12.8 to \$26.2 million; output impacts from \$36.6 to \$75.2 million, employment from 324 to 665 jobs; employment income from \$13.1 to \$26.9 million; and total tax revenue from \$5.0 to \$10.3 million. Please see Final Economic Analysis (U.S. Fish and Wildlife Service 2012) for more information on the potential economic costs and benefits of Alternative 4.

### **Indirect Effects**

An indirect effect of listing five large constrictor snakes as injurious will be the potential for an increase in the disruption of ecological trophic levels as the potential for range and population expansion of nonnative constrictor snakes increase. Further, the potential introduction of harmful pathogens or disease to native wildlife or livestock may increase.

### **Cumulative Effects**

Listing only the five nonnative snakes that were rated as “High” risk in the USGS risk assessment (Reed and Rodda 2009) as injurious would allow the continued importation and interstate transport of four other large constrictor snakes rated as “Medium” risk, so fauna in ecosystems of the United States will still likely be at risk from large constrictor snake introductions, although those States where the large constrictor snakes are currently present, already face this risk. While listing the five snakes that were rated as “High” risk may impede breeding of large constrictor snakes in the natural environment, the other “Medium” risk snakes are still likely to prey on and eat native wildlife populations, thereby causing extensive negative impacts locally. Numerous species of native wildlife are listed as threatened or endangered and many others are experiencing declines due to habitat loss and degradation. This is likely to continue based on current development and land use trends. Only listing five of the nine large constrictor snakes as injurious may result in the continued risk of introduction of other snakes into States where they are not currently present. Interstate transport of large constrictor snakes may still occur for these snakes with the potential for accidental introduction even in States that do not permit their use. No effective and feasible tools are currently available to manage large constrictor snakes, if they become introduced into ecosystems of the United States. Trapping is

the best available option at this time, but their use on a large scale is prohibitively expensive and ineffective. Since effective measures to control or eradicate large constrictor snake populations are not available, the ability to rehabilitate or recover ecosystems impacted by these species, is low. Because large constrictor snakes are capable of living 20 or more years and would consume a substantial amount of native vertebrates during their lifespan, native wildlife, especially threatened and endangered species, face considerable risk of further endangerment and extinction if large constrictor snakes are released or escape into the wild. Entire populations of native wildlife may be very vulnerable to heavy predation by large constrictor snakes.

Re-establishment of extirpated threatened and endangered wildlife populations, if biologically possible, would be labor and cost intensive and would depend on eradication of large constrictor snakes within the habitat of native wildlife species. If no action is taken to prohibit the importation and transportation of the other four species of large constrictor snakes, the risk of introduction of these snakes to natural areas of the United States, outside of the States where they are already present, will likely add to the impacts that have already affected native wildlife species as discussed under Alternative 1.

The listing of five large constrictor snakes as injurious would likely result in a decreased demand for these nonnative snakes in the United States (because it would be illegal to import them) and thus a decrease in harvesting pressure in their native ranges. *Python molurus molurus* is listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) under Appendix I, which “lists species that are the most endangered among CITES-listed animals and plants.” All other subspecies in the family *Pythonidae* are listed in CITES Appendix II, which “lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” The subspecies *Boa constrictor occidentalis* is listed by CITES under Appendix I. All other species in the family *Boidae* are listed in CITES Appendix II. The IUCN Red List of Threatened Species lists *Python molurus* as “near threatened” (last updated in 1996). Species listed under CITES are taken from the wild for international trade. Trade in these species is regulated to prevent unsustainable use of the species. Actions that may result in decreased demand for these species in the wild are likely to provide benefits. Therefore, the listing of the pythons and boas is likely to have a beneficial effect on the native populations. The beneficial impacts to wild populations in their native countries of listing the species will not accrue to four of the species under Alternative 4.

### **Preferred Alternative**

Alternative 2A will do the most to protect wildlife and wildlife resources from negative impacts due to large constrictor snake introductions. However, the Service is listing four snake species as injurious species at this time, while continuing to consider the status of five others (Alternative 2B). Alternative 2B will reduce the risk of establishment of large constrictor snakes in the wild, and will reduce the likelihood that the species already present will spread beyond their current locations into other natural areas of the United States and insular territories. These four large constrictor snakes have been imported or could be imported into the United States. All but two species (possibly three, but identification of one is unconfirmed) have escaped or been released into natural and developed areas. If released, all these species are likely to survive

and become established, are likely to spread if introduced, and are likely to prey on native wildlife species and compete with native species for food. It will be difficult to prevent, eradicate, manage, or control the spread of large constrictor snakes, and it will be difficult to rehabilitate or recover ecosystems disturbed by these species. Furthermore, because of the predatory behavior of these species, the negative effects to threatened and endangered species could be permanent. This alternative provides an opportunity to prevent the importation of species not yet established in the United States.

The risk assessment conducted by USGS (Reed and Rodda 2009) concluded that the organism risk potential, which is calculated based on the probability and consequences of establishment, was “High” for all four species (Burmese python, Northern African python, Southern African python, and Yellow anaconda). The Service has determined that listing these species as injurious is necessary to protect wildlife and wildlife resources under the Lacey Act.

9) Summary Table of Environmental Consequences by Alternative

Action	Alternative 1:  No Action	Alternative 2A: Proposed Action  (List as Injurious the Burmese or Indian Python, Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, DeSchauensee’s Anaconda, Green Anaconda, and Beni Anaconda)	Alternative 2B: Subset of Alternative 2A  (List as Injurious the Burmese or Indian Python, Northern African Python, Southern African Python, and Yellow Anaconda)	Alternative 3:  (List as injurious the Burmese or Indian Python, Reticulated Python, Northern African Python, Southern African Python, Boa Constrictor, Yellow Anaconda, and Green Anaconda)	Alternative 4:  (List as Injurious the Burmese or Indian Python, Northern African Python, Southern African Python, Boa Constrictor, and Yellow Anaconda)
<b>Introduction of large constrictor snakes</b>	Has occurred and will likely continue to occur	<u>Greatly reduced risk. Prevent potential introduction of five “High” and four “Medium” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) Importation and interstate commerce would be prohibited. There may be reduced risk in States where they are already found.	<u>Reduced risk. Prevent potential introduction of four “High” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) Importation and interstate commerce would be prohibited. There may be reduced risk in States where they are already found.	<u>Reduced risk (but greater risk than Alternative 2A). Prevent potential introduction of five “High” and two “Medium” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) Importation and interstate commerce would be prohibited. There may be reduced risk in States where they are already found.	<u>Reduced risk (but greater risk than Alternative 3). Prevent potential introduction of five “High” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) Importation and interstate commerce would be prohibited. There may be reduced risk in States where they are already found.
<b>Establishment of populations of large constrictors</b>	Likely establishment	<u>Greatly reduced risk. Reduce potential establishment of five “High” and four “Medium” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) There may be reduced risk in States where they are already found	<u>Reduced risk. Reduce potential establishment of four “High” risk large constrictor snakes.</u> (Note: Some States may continue to allow possession of large constrictors) There may be reduced risk in States where they are already found	<u>Reduced risk (but greater risk than Alternative 2A) in States where they are not already found. Reduce potential establishment of five “High” and two “Medium” risk large constrictor snakes.</u> There may be reduced risk in States where they are already found.	<u>Reduced risk (but greater risk than Alternative 3) in States where they are not already found. Reduce potential establishment of five “High” risk large constrictor snakes.</u> There may be reduced risk in States where they are already found.
<b>Effect on natural ecosystems</b>	Likely negative	Greatly reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater risk than Alternative 2A) other than States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater than Alternative 3) other than States where they are already found. There may be reduced risk in States where they are already found.
<b>Impacts to native species</b>	Likely negative	Greatly reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater risk than Alternative 2A) other than States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater than Alternative 3) other than States where they are already found. There may be reduced risk in States where they are already found.

**Summary Table of Environmental Consequences by Alternative (continued)**

<b>Action</b>	<b>Alternative 1: No Action</b>	<b>Alternative 2A: Proposed Action</b>	<b>Alternative 2B: Subset of Alternative 2A</b>	<b>Alternative 3:</b>	<b>Alternative 4:</b>
<b>Impacts to Threatened and Endangered Species</b>	Likely reductions in threatened and endangered species	Greatly reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States other than those States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater than Alternative 2A) other than States where they are already found. There may be reduced risk in States where they are already found.	Reduced risk in States (but greater than Alternative 3) other than States where they are already found. There may be reduced risk in States where they are already found.
<b>Economic Impacts</b>	No losses to retail sales.  Potential costs to environment similar to recent years	The annual retail sales losses for Alternative 2A are estimated to range from \$14.7 million to \$30.1 million  Economic benefits from reduced potential costs to environment potentially greater than other alternatives.	The annual retail sales losses for Alternative 2B are estimated to range from \$3.7 million to \$7.6 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternative 1, less than Alternatives 2A, 3 and 4	The annual retail sales losses for Alternative 3 are estimated to range from \$14.7 million to \$30.1 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternatives 1, 2B and 4, less than Alternative 2A.	The annual retail sales losses for Alternative 4 are estimated to range from \$12.8 million to \$26.2 million.  Economic benefits from reduced potential costs to environment potentially greater than Alternatives 1 and 2B, less than Alternatives 2A and 3.
<b>Cumulative Impacts</b>	Risk of additional adverse impacts to threatened and endangered species;  Continued native range harvesting	Greatly reduced risk of additional impacts to threatened and endangered species in States other than those where large constrictors are already found. There may be reduced risk in States where they are already found.  Beneficial impacts to wild populations in their native countries will advance for all nine species.	Greatly reduced risk of additional impacts to threatened and endangered species in States other than those where large constrictors are already found. There may be reduced risk in States where they are already found.  Beneficial impacts to wild populations in their native countries will advance for four species while not accruing for five species.	Reduced risk (but greater than Alternative 2A) of additional impacts to threatened and endangered wildlife species. There may be reduced risk in States where they are already found.  Beneficial impacts to wild populations (of seven species) in their native countries will not accrue for two of the species.	Somewhat reduced risk (but greater than Alternative 3) of additional impacts to threatened and endangered wildlife species.  Beneficial impacts to wild populations (of five species) in their native countries will not accrue for four of the species.



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**Appendix A: Comments and Responses on the  
Draft Environmental Assessment for Listing Nine Large Constrictor Snakes  
As Injurious Wildlife under the Lacey Act**

**Comment:** Several commenters stated that the environmental assessment should consider the impacts of harvesting of the nine large constrictor snake species in their native ranges.

**Response:** We agree and have included discussion in the Final Environmental Assessment.