Injurious Wildlife Species;

Listing Salamanders Due to Risk of Salamander Chytrid Fungus

[Genera *Chioglossa, Cynops, Euproctus, Hydromantes, Hynobius, Ichthyosaura, Lissotriton, Neurergus, Notophthalmus, Onychodactylus, Paramesotriton, Plethodon, Pleurodeles, Salamandra, Salamandrella, Salamandrina, Siren, Taricha, Triturus,* and *Tylototriton* of the Order Caudata]

Draft Economic Analysis
&
Draft Regulatory Flexibility Analysis

Prepared by:
Division of Economics
U.S. Fish and Wildlife Service
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ES 1.0 EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) published an interim rule (IR) to add 20 genera from the order Caudata commonly referred to as salamanders, newts, and other names (hereafter, salamanders) to the list of injurious wildlife under the Lacey Act (18 U.S.C. 42, as amended) because of the risk of these species carrying a fungus (*Batrachochytrium salamandrivorans*; Bsal) that can be lethal to U.S. native salamanders. The fungus is not known to be present in the United States, and the Service's action is intended to prevent Bsal's introduction, establishment, and spread. If Bsal is introduced into wild populations of salamanders, we expect it to cause significant harm to wildlife and the wildlife resources of the United States and federally endangered and threatened species. Furthermore, once introduced and established, eradicating Bsal would be extremely difficult, if not impossible. An injurious wildlife listing will prohibit both importation into the United States and interstate transportation between States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States of any live or dead specimen, including parts, of these 20 genera of salamanders, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit conditions) or by Federal agencies without a permit solely for their own use. The Service has conducted an injuriousness evaluation in the IR that documents our analysis of the risk. This combined Draft Economic Analysis and Draft Regulatory Flexibility Analysis are based on the Service's assessment.

This document analyzes the economic effects and conducts the regulatory flexibility analysis of five alternatives: Alternative 1 – No Action (baseline); Alternative 2 – Add 27 species of salamanders to the list of injurious wildlife; Alternative 3 – Add 20 genera (201 species) of salamanders to the list of injurious wildlife (Preferred Alternative), Alternative 4 – Add all salamander species to the list of injurious wildlife, and Alternative 5 – Require health certificates stating that the shipment is free of Bsal on importation or interstate transportation. Economic impacts are predicated on the industry impacts from changes in commerce and from biological impacts of Bsal on salamander populations.

ES 1.1 Economic Analysis

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

In the context of the regulation under consideration, the economic effects on three groups would be addressed: (1) producers, (2) consumers, and (3) the public. With the prohibition of imports and interstate movement, importers, breeders, suppliers, and ancillary industries (shipping, veterinary) would be affected in several ways. Depending on the characteristics of a given business (such as what portion of their sales depends on interstate transportation or imports), sales revenue would be reduced or eliminated, thus decreasing total producer surplus compared to the situation without the regulation. Consumers (pet owners or potential pet owners) would be affected by having a more limited choice of salamanders. Of the listed species, only those salamanders within the state when the rule is promulgated would be available; the effect on salamander variety could vary widely. Consequently, total consumer surplus for pet owners or potential pet owners would decrease compared to the situation without the regulation. Conversely the public may have a non-consumptive use value for salamander conservation. This segment of the public may get value out of the knowledge that the risk to natural areas and other potential impacts from salamander populations introducing Bsal is reduced by implementing one of the alternatives that were proposed. In this case, consumer surplus for these segments of society would increase compared to the situation without the regulation. If comprehensive information was available on these different types of producer and consumer surplus, a comparison of benefits and costs would be relatively straightforward. These data are not publically and readily available and gathering the information on these values is beyond the scope of the analysis. In its place the alternative methodology is used as described in this report.

The Law Enforcement Management and Information System (LEMIS) is an electronic database utilized by all Service law enforcement offices, including Service Conservation Officers, Wildlife Inspectors, Refuge Officers and Special Agents. LEMIS serves as the portal in which all Service wildlife violations are documented and intelligence is gathered and shared between law enforcement offices across the country. LEMIS also serves as the conduit for all declared (lawful) imports and exports of wildlife and wildlife products and the database of all wildlife trade data in the United States, both legal and illegal. As such, LEMIS records, among other things, the number of salamander imports each year. LEMIS reports the number of salamanders declared when imported, but it does not extrapolate to an estimate of what is not declared or is lumped by weight. Therefore the database is useful to look at historical trends and to establish a minimum level of salamanders imported each year. Data available on salamanders bred in the United States and a range of retail prices for a selection of salamander species was obtained through industry representatives through conversations and data sharing. We use foregone salamander retail sales as an approximation of the impacts to the salamander industry of this interim rulemaking. In addition, we used data from IMPLAN® (Minnesota IMPLAN Group, 2013) to estimate the direct effects of this rulemaking – job impacts and job income impacts on the primary, ancillary, and support industries (discussed below). Aggregate economic costs are shown solely for salamander retail sales. This is due to it being the primary industry impacted, and to avoid double counting. Economic benefits due to wildlife resources conservation and possible avoided costs from Bsal are qualitatively described. The economic impact indicators used are not measures of consumer and producer surplus, thus are not measures of the social costs and benefits as defined in Executive Order 12866 and OMB Circular A-4 (U.S. Office of Management and Budget 2003). Limited available information currently precludes the estimation of consumer and producer surplus. The results, based upon the IMPLAN® data, provides a reconnaissance level estimate of the impacts of the IR on the salamander industry, not on society

in general. However, these impacts, along with the qualitative discussion of the benefits of the IR, provide a context to assist decision-makers and the public in evaluating the final rule.

ES 1.2 Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (Public Law 96-354; Act) requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations, and small governmental jurisdictions. This draft regulatory flexibility analysis (DRFA) is built upon the economic analysis. The effects on small businesses, which are a portion of the general economic analysis results, are identified. The effects are separated based on U.S. Census Bureau data of the composition of the potentially affected industries.

The DRFA is in lieu of the standard Initial Regulatory Flexibility Analysis and final regulatory flexibility analysis (FRFA). Requirements of a regulatory flexibility analysis are listed below, along with the component's equivalent in this report.

A. A succinct statement of the need for, and objectives of, the final rule. (**ES 1.3 Need for and Objectives of the Interim Rule**)
B. A summary of the significant issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis, a summary of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments. (**Appendix B: Comments and Questions**)
C. A description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available. (**2.3 Industries Affected by the Action Alternatives**)
D. A description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities which will be the subject to the requirement and the type of professional skills necessary for preparation of the report or record. (**1.2 Reporting, Recordkeeping, and Compliance Requirements**)
E. A description of the steps the agency has taken to minimize the significant adverse economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each of the other significant alternatives to the rule considered by the agency was rejected. (**4.1 Alternative Formulation**)

The DRFA will be revised in response to substantive public comments and peer review. A combined report containing the regulatory flexibility analysis and the final economic analysis will be made publicly available with the Final Rule.

ES 1.3 Need for and Objectives of the Interim Rule

The U.S. Fish and Wildlife Service is amending 50 CFR 16.14 to list 20 salamander genera comprised of 201 species (See IR part 16 for species list) as injurious amphibians. This listing will prohibit both the importation into the United States and the interstate transport within the United States of any animal of these salamander species. This action is necessary to protect the interests of wildlife and wildlife resources from the adverse effects that may result from the

purposeful or accidental introduction and subsequent establishment of Bsal in native populations of salamanders in the ecosystems of the United States.

The regulations contained in 50 CFR part 16 implement the Lacey Act (18 U.S.C. 42, as amended). Under the terms of the law, the Secretary of the Interior is authorized to prescribe by regulation those wild mammals, wild birds, fish, 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 can be found at 50 CFR 16.11-15. The penalty for an injurious wildlife violation under the Lacey Act is not more than six months in prison and not more than a $5,000 fine for an individual, and not more than a $10,000 fine for an organization.

By adding 20 genera of salamanders to the list of injurious wildlife, their importation into the United States or transportation between States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States by any means whatsoever is prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use (in accordance with regulations at 50 CFR 16.32). Federal agencies that wish to import these 20 genera for their own use must file a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service Inspector at the port of entry. None of these 20 genera imported or transported under permit may be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the U.S. Fish and Wildlife Service. The interstate transportation of any of the 20 genera in the United States for any purpose is prohibited without a permit. Any regulation pertaining to the possession or use of the 20 salamander genera within States continues to be the responsibility of each State.

The Service has identified 201 described species within the 20 genera to be listed. Additional species discovered in these genera after the rule is promulgated are listed by this rule. The economic analysis and regulatory flexibility analysis is based solely on the currently known species. Out of the 20 genera (201 currently known species) to be listed, 15 genera (30 species) have been imported over the period of analysis. The Lacey Act makes no provision for regulatory exemptions or alternative standards that will reduce the impact of a listing action on small entities. As explained in greater detail below, many of the entities breeding or selling salamanders are small businesses; to allow them to continue to engage in interstate transport while prohibiting large entities from doing so would reduce the benefits of listing the species as injurious.

ES 1.4 Alternatives Considered

The economic costs of the alternatives are based on the lost revenue; it focuses on direct effects and includes indirect and induced effects as appropriate. The direct effects incurred through the implementation of regulatory alternatives and the respective annual losses in revenue are summarized below.

ES 1.4.1 Alternative 1

Alternative 1 is the No Action alternative, the baseline against which the other alternatives are measured. Under Alternative 1, the Service would not take regulatory action to prevent the introduction, establishment, and spread of Bsal in the United States. The salamander market

would not incur direct economic effects due to an action by the Service. Small businesses would not incur direct economic effects due to regulation. The establishment of Bsal in the United States could lead to a decrease or change in supply of salamanders, which may have a negative effect on salamander producers and consumers. The threat to native salamander populations, and federally endangered and threatened ones, would continue. The extent of the negative effects to U.S. ecosystems from salamander population declines is currently unknown but may be severe.

It is assumed that importation and interstate movement of salamanders would continue without action by other jurisdictions. While it is possible that other entities may take actions on their own to reduce the risk of Bsal being introduced and established, the nature, timing, and impact of those are independent from this listing action and unknown. In order to conduct the analysis, the expected outcome of an action alternative is compared to the status quo. The action alternatives are regulatory options by the Service. The purpose of this report is to present the effects of those alternatives.

ES 1.4.2 Alternative 2

The importation and interstate transport of 27 species of salamanders (See Appendix A **Table A1-1 All Species Data** for species identification) would be prohibited under Alternative 2. The 27 species have been identified as carriers of Bsal by the Service based on data obtained from Martel *et al.* (2014), and Cunningham *et al*. (2015), with clarification from Chytridcrisis (2015b). As a result, any importation of these salamanders would be eliminated, except as specifically permitted. Furthermore, any interstate transport in the U.S. would also be eliminated, except as specifically permitted. This alternative analyzes the impacts to the salamander market and economy that would be incurred if these 27 species are listed as injurious.

Under Alternative 2, the probability of Bsal establishing in the United States would decrease compared to Alternative 1. The change in probability is unknown, but is expected to be meaningful as known carriers will be restricted. Ecosystems that might otherwise be impacted will have a lower probability of consequences, and native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, will face a lower risk of exposure to Bsal. The reduced likelihood of exposure will avoid the need to rely on restoration activities which would be expected to be very difficult to implement and have a low probability of success.

The annual retail sales loss for Alternative 2 is estimated to be $2.1 million of which $1.2 million are losses to small businesses. The cost estimate represents the loss of revenue to companies or individuals involved in the importation or interstate movement of these 27 salamander species. No significant economic impact on a substantial number of small entities is anticipated. The economic loss including direct (retail), indirect, and induced effects from loss in revenue to pet stores is estimated to be $5.6 million. Benefits from decreases in risk from Bsal for ecological, commercial, recreational, and non-use values are not quantified. The benefits from these additional factors are unknown, but are certainly positive to some degree.

ES 1.4.3 Alternative 3

The importation and interstate transport of 20 genera, comprising at least 201 species, of salamanders (See IR part 16 for species list) will be prohibited under Alternative 3. The 20 genera of salamanders include all species that are in the same genera as the 27 species identified in Alternative 2, meaning that all species are listed within a given genus; where at least one

species within a genus has been confirmed as a carrier of Bsal and there is no countervailing conclusive evidence suggesting that some species within the genus are not carriers. As a result, any importation of salamanders in the 20 genera will be eliminated, except as specifically permitted. Furthermore, any interstate transport by breeders in the U.S. will also be eliminated, except as specifically permitted.

Under Alternative 3, the probability of Bsal establishing in the United States would decrease compared to Alternative 2. The change in probability is unknown, but is expected to be substantial because known carriers and species that are expected to be carriers will be restricted. Ecosystems that might otherwise be impacted will have a lower probability of adverse consequences, and native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, will face a lower risk of exposure to Bsal. The reduced likelihood of exposure will avoid the need to rely on restoration activities that would be expected to be very difficult to implement and have a low probability of success.

The annual retail sales loss for Alternative 3, based on the 20 genera listed, is estimated to be $3.8 million of which $2.3 million are losses to small businesses. The cost estimate represents the loss of revenue to companies or individuals involved in the importation or interstate movement of these 201 salamander species. No significant economic impact on a substantial number of small entities is anticipated though they would be higher than Alternative 2. The economic loss including direct, indirect, and induced effects from loss in revenue to pet stores is estimated to be $10.0 million. Benefits from decreases in risk from Bsal for ecological, commercial, recreational, and non-use values are not quantifiable. The benefits from these additional factors are unknown, but are certainly positive to some degree.

ES 1.4.4 Alternative 4

The importation and interstate transport of all species of salamanders (the entire order Caudata) (See Appendix A **Table A1-1 All Species Data** for families, genera, and species) would be prohibited under Alternative 4. As a result, any importation of these salamanders will be eliminated, except as specifically permitted. Furthermore, any interstate transport by breeders in the U.S. will also be eliminated, except as specifically permitted.

Under Alternative 4, the probability of Bsal establishing in the United States would be expected to decrease compared to Alternative 3. The change in probability is unknown. The majority of known salamander species have not been tested for Bsal. Many of the species tested have been shown to be carriers of the Bsal fungus with varying levels of vulnerability; more species from more genera in the order Caudata may be carriers . Listing all species of salamanders as injurious removes the key pathway for Bsal to enter the United States by prohibiting untested species that may be carriers. While not quantifiable, ecosystems that might otherwise be impacted are expected to have a lower probability of consequences. Native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, may face a lower risk of exposure to Bsal. The reduced likelihood of exposure will avoid the need to rely on restoration activities, which would be expected to be very difficult to implement and have a low chance of success.

The annual retail sales loss for Alternative 4 is estimated to be $4.0 million of which $2.4 million are losses to small businesses. The cost estimate represents the loss of direct sales revenue to companies or individuals involved in the importation or interstate movement of any salamander species. No significant economic impact on a substantial number of small entities is

anticipated though they would be higher than Alternative 3. The loss in economic output including direct, indirect, and induced effects is estimated to be $10.7 million. Benefits from decreases in risk from Bsal for ecological, commercial, recreational, and non-use values are not quantifiable. The benefits from these additional factors are unknown, but are certainly positive to some degree.

ES 1.4.5 Alternative 5

The Service would require Bsal-free health certificates to accompany all salamanders on importation or interstate transportation under Alternative 5. Exceptions would be allowed through Service permits as described in the Service's interim rule and summarized in this report.

Under Alternative 5, the probability of Bsal establishing in the United States may decrease compared to Alternative 1. The change in probability is unknown in part due to the lack of an established health certification process for salamanders.

The cost estimate represents the decrease in profit due to higher production costs from obtaining a health certificate. The cost estimate represents the loss of revenue to companies or individuals involved in the importation or interstate movement of any salamander species. The losses for Alternative 4 are annual maximum retail sales losses. For Alternative 5, the minimum loss is unknown but likely positive. Lost revenue would range from none to $4.0 million. Small business losses are zero at a minimum to a maximum of $2.4 million. No significant economic impact on a substantial number of small entities is anticipated. The maximum economic loss including direct, indirect, and induced effects from loss in revenue to pet stores is estimated to be $10.7 million. Benefits from decreases in risk from Bsal for ecological, commercial, recreational, and non-use values are not quantifiable. The benefits from these additional factors are unknown, but are certainly positive to some degree.

ES 1.5 Summary

Tables ES-1 and **ES-2** provides an overview of the potential direct adverse economic effects from each alternative as summarized above. Loss of sales revenue is used as an indicator of the impacts of the alternatives on the salamander industry. A decrease in profits negatively affects individual businesses. Impacts to individual small businesses will be detailed in the RFA discussion. If revenue remains constant with a decrease in profit, it does not necessarily indicate that there is a net loss to the economy as a whole. **Table ES-3** shows the aggregate adverse economic effects due to loss of revenue in pet stores. It shows the direct revenue lost, the indirect effects, and induced effects along with possible tax revenue decreases. The indirect and induced effects represent any multiplier effects due to the loss of revenue. Potential quantitative effects on alternate and ancillary industries are detailed in this report but are not reflected in the tables below due to an inability to aggregate them. These effects and possible economic benefits are detailed qualitatively in this report.

Table ES-4 depicts the numerical results of the Regulatory Flexibility Analysis. **Table ES-5** shows the qualitative economic costs and benefits, and ecological benefits, relative effects to Alternative 1 of the action alternative. This shows the comparative trade-offs between effects that are monetary, quantitative, or qualitative throughout this analysis.

ES 1.5.1 Economic Costs

Table ES-1 shows both the annual range of direct revenue impacts on the salamander industry relative to the status quo. Business revenue is the retail sales made by the business and is defined as the product of the quantity sold and the sales price. In order, from least to greatest, of adverse impacts to small businesses are Alternatives 2, 3, and 4 (Alternative 5 is unknown).

Table ES-1. Decrease Overall and Small Business Salamander Industry Revenue (Million $2015)

	Total Annual Decrease in Sales Revenue	Percent of Impacts to Small Businesses	Total Annual Decrease in Sales Revenue for Small Businesses
Alternative 1	$0 – $+	0% to +%	$0 – $+
Alternative 2	$2.1	60%**, 85%***	$1.2
Alternative 3*	**$3.8**	**60%**, 85%*****	**$2.3**
Alternative 4	$4.0	60%**, 85%***	$2.4
Alternative 5	$+ to $4.0	0% to +%	$0 to $2.4

Notes: Values represent effects incurred directly from the rule, effects due to the the establishment of Bsal or the action of others is qualitatively discussed in the report. *IR, **Pet Stores, and ***Breeders.

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

Table ES-2 shows the annual decrease in salamander industry economic impacts as reflected by jobs and job income (note: the impact categories such as revenue and income cannot be added together since this would double-count the impacts). Job income is derived from total economic output (aggregate sales). For example, labor costs are paid out of total sales revenue for a company.

Job losses would occur once during the first year of implementing a given alternative but would not occur thereafter. For example, after the initial losses of 73 - 139 jobs occur, there would not be additional jobs lost in the second year, nor the third year. However, job income would be lost over succeeding years when compared with baseline conditions. In order, from least to greatest, of adverse impacts to small businesses are Alternatives 2, 3, and 4 (alternative 1 and 5 are unknown).

Table ES-2. Annual Decrease in Salamander Industry Related Employment and Job Income (Million $2015)				
	Salamander Industry (Aggregate Economic Effect)		Salamander Industry -Small Business- (Direct Effect Only)	
	Jobs	Job Income	Jobs	Job Income
Alternative 2	73	$2.3	31	$1.2
Alternative 3*	**131**	**$4.2**	**56**	**$2.2**
Alternative 4	139	$4.4	60	$2.3
Alternative 5	139	$4.4	60	$2.3
*IR				

Table ES-3 shows the effect on **economic output** from pet store revenue losses. Economic output shows the total industrial output associated with the estimated retail sales. Total output is the production value (alternatively, the value of all sales plus or minus inventory) of all output generated by these sales. Total output includes the direct, indirect and induced effects of decreases in salamander-related expenditures.

Table ES-3. Aggregate Adverse Economics Effects				
Revenue (Millions $2015)	**Direct**	**Indirect**	**Induced**	**Total**
Alternative 2	2.1	1.2	2.3	5.6
Alternative 3*	**3.8**	2.1	4.1	10.0
Alternative 4	4.0	2.3	4.4	10.7
Alternative 5	4.0	2.3	4.4	10.7
Jobs	**Direct**	**Indirect**	**Induced**	**Total**
Alternative 2	52	6	15	73
Alternative 3*	94	11	26	131
Alternative 4	99	12	28	139
Alternative 5	99	12	28	139
*IR				

ES 1.5.2 Regulatory Flexibility Analysis Summary

Table ES-4 summarizes the two methods used to estimate the magnitude of the economic effects on the affected small business entities among pet stores and breeders. Estimates at the industry level are the minimum adverse impacts, since it includes many entities that are not

involved in the salamander industry. The effect of having more firms lowers the impact per firm, making the economic effects less significant. Estimates using the unique importers (average of 5 a year), or one breeder, yield the maximum adverse impacts; no fewer entities would be impacted under the status quo. Bracketing the impacts on small businesses in this way shows that the impacts on importers or pet stores can be $110 per entity (effectively zero percent), up to $453,000 (47 percent). The impacts on breeders can be $0.11 per entity (effectively zero percent) up to $23,000 (48 percent). Both extremes are unlikely. Additional data would be necessary for a more precise estimation. Based on the lack of evidence to support the maximum estimation, the preferred alternative is not expected to have a significant economic impact on a substantial number of small entities.

Table ES-4. Regulatory Flexability Analysis Summary

Industry	Estimate Level	Number of Small Businesses	Average Annual Revenue Per Firm	Average Annual Revenue Lost per Small Business	Revenue Lost Per Small Business	Percent of Revenue Lost
Pet Stores (Importers)	Industry Total (Method 1)	8,820	$970,000	$2,263,000	$110	0.01%
	Average Annual Unique Importers (Method 2)	5			$452,500	47%
Domestic Breeders	Industry Total (Method 1)	219,964	$48,000	$23,000	$0.11	0.00%
	One Breeder (Method 2)	1			$23,000	48%

Notes: Pet store analysis includes all revenue losses for small businesses due to pet stores and breeders possibly overlapping. Domestic breeders only include losses directly to breeders that are small businesses. The losses cannot be summed.

ES 1.5.2 Economic and Ecological Benefits

Bsal poses a critical risk to at least 2 native salamander species. The decrease in salamander abundance or localized extirpation of salamander species can negatively affect wildlife and wildlife resources having cascading effects on ecosystem form, function, and structure. The expected economic benefits of each alternative mirror the ecological benefits that come directly from the alternative's risk reduction. The benefit estimates do not quantify ecological, commercial, recreational, and non-use values of at-risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree. For example, certain segments of the public may value the knowledge that the risk to salamander populations and other potential negative impacts to natural areas is reduced by implementing one of the action alternatives. Additionally, the establishment of Bsal in the United States could lead to a decrease or change in the supply of salamanders, which may have a negative effect on salamander producers and consumers.

Under Alternative 1 there is no Service action, therefore it has no expected risk reduction and related benefits. Alternatives 2 through 5 are composed of measures to decrease the risk of Bsal's introduction into the United States. The order of beneficial impacts to the overall

economy or small businesses through avoided costs, and wildlife and wildlife resources from greatest to least is Alternative 4, 3, and 2. The order of Alternative 5 is unknown.

ES 1.6 Conclusion

Table ES-5 summarizes the qualitative results for the alternatives. Alternative 1 (No Action) is expected to have no effects on risk reduction or economic costs and benefits. The effects of alternatives 2-5 are depicted qualitatively relative to Alternative 1.

Table ES-5. Ecological and Economic Effects (Qualitative Summary)

	Alternative 1: No Action	Alternative 2: List 27 Species (Tested Carriers)	**Alternative 3*: List 20 Genera (201 Species)**	Alternative 4: List All Species in Order Caudata	Alternative 5: List All Species in Order Caudata (Health Certificate)
Economic Costs	None**	-	- -	- - -	-***
Economic Benefit	None**	+	+ +	+ + +	+****
Ecological Benefits	None**	+	+ +	+ + +	+****

Notes: *IR; ** No risk reduction by Service actions exist; reduction may occur through other's actions such as states and industry. ***Cost can not be known until compliance method is developed. **** Given current testing, treatment, and health certification processes that could be put in place immediately, it is predicted to be low.

The qualitative trade-offs allows the net effects of an alternative that are monetized, quantified, and or qualitatively described to be compared. As is discussed in the IR assessment (USFWS OLE 2015) the alternative that yields the best ecological outcome based on the available evidence of which genera are carriers is Alternative 3. This alternative will list 201 species under the Lacey Act as injurious.

As described above, the reduction of the risk of Bsal becoming established drives the ecological and economic benefits. For the IR the risk reduction is solely due to the prohibition of imports and interstate movement. Economic costs stem exclusively from this prohibition, therefore economic benefits and costs increase or decrease together; the preferred alternative has middle range economic effects when compared to Alternatives 2 and 4. No ranking of economic costs between the preferred alternative to Alternative 5 can be made because it is unclear how much testing, treatment, and the health certification processes would cost. Due to the qualitative nature of the economic benefits, no conclusion on the net monetary benefits of any alternative can be made. The preferred alternative has the same proportional distribution of impact on small businesses as Alternatives 2 and 4. It is unknown if small businesses are more impacted under Alternative 5. The preferred alternative is not expected to have a significantly negative impact on small businesses.

There are quantifiable adverse economic impacts as discussed above. The presence of Bsal is expected to have direct negative effects on native populations of salamanders and indirect negative effects on wildlife and wildlife resources and socioeconomic factors.

Due to the negative impacts of Bsal to salamanders, as identified under experimental conditions, we believe that the introduction of Bsal into the United States would cause significant adverse effects in native species that are negatively affected by the fungus. We believe that ecosystems where the dominant salamander species are adversely affected by the Bsal fungus would be at risk from an introduction of the pathogen. We also believe that species that depend on salamanders for aspects of their life cycle or ecology may be adversely affected if salamanders decline in response to a Bsal introduction.

Preventing Bsal's establishment would benefit wildlife, wildlife resources, and society by avoiding these negative impacts. The IR is imminently necessary to decrease the risk of Bsal establishing in the United States. It bases its actions on known science about Bsal carriers, while acknowledging that uncertainties exist due to untested genera that represent possible threats. Delaying action risks decreasing the benefits while the expected costs would remain the same, possibly leading to an overall less positive net outcome.

1.0 INTRODUCTION

1.1 Background

Martel et al. (2014) and Cunningham et al. (2015) (as explained further in Chytridcrisis (2015b)) identified salamander species that can carry *Batrachochytrium salamandrivorans* (hereafter, Bsal) and are at risk from infection. The research clearly indicates a threat from many species of salamanders that are carriers of Bsal, as well as the significant threat to many species that are lethally vulnerable to the disease, including species that are native to the United States. The research results about Bsal and concerns about emerging infectious disease, especially Spitzen-van der Sluijs et al. (2013), Martel et al. (2013), and Martel et al. (2014) have generated a strong response from academia, industry groups, conservation, and other organizations who have written the U.S. Fish and Wildlife Service (Service) seeking quick and decisive action to ensure Bsal does not have a similar impact on salamander populations that *Batrachochytrium dendrobatidis* (Bd) has had on frogs. We also received a petition from the Center for Biological Diversity and SAVE THE FROGS! on May 18, 2015, to take action to prevent the introduction of Bsal into the United States (Center for Biological Diversity and SAVE THE FROGS! 2015). The scientific findings, letters to the Service, and the petition have caused the Service to determine whether salamanders capable of carrying Bsal should be listed as injurious.

The Interim Rule (IR) addresses the need to take action to prevent Bsal by listing injurious salamander species under the Lacey Act. Scientific information has been compiled on salamanders and Bsal that has helped enable a rigorous assessment of risk and potential impacts to native salamander populations and ecosystems. Of 68 genera (681 species) of salamanders identified by the Service, three genera (37 species) have been classified as **non-carriers**; there is evidence that they are not affected by the fungus and cannot transmit it (**Table 1**). Twenty genera have been classified as **carriers**; all 201 within these 20 genera are considered carriers because at least one species within each genus has been confirmed to be a carrier and there is not countervailing conclusive evidence suggesting that some species within the genus are not carriers. The vulnerability to Bsal and carrier status of the remaining 45 genera (443 species) is unknown since no species within their respective genera have been tested. Based on current research, at least 2native species are lethally vulnerable to Bsal infection, and 1 native U.S. species has tolerant vulnerability.

Table 1. Carriers of Bsal:

	Genera	Species
Carriers	20	201
Not Carriers	3	37
Unknown	45	443
Total	**68**	**681**

Note: refer to the Salamander Nomenclature and Taxonomy section of the IR and Table A1-1 All Species Data for explanation of the number of species listed in each category.

The scientific information is based on an understanding of Bsal; impacts observed to one species of salamander in the Netherlands; laboratory testing of Bsal on salamanders; knowledge of the ecological traits and history of other pathogenic fungi, such as the lethal effects caused by *Batrachochytrium dendrobatidis* (Bd) in frogs; and the understanding of pathways by which Bsal can be transmitted. The U.S. Geological Survey (USGS 2015) shared a draft risk assessment of Bsal with the Service in 2015, currently under review for publication. This risk assessment was not on specific salamander species but focused on Bsal and the effects it could have on the environment of the United States. The risk assessment found a high risk of the fungus becoming introduced and establishing in the wild. A high risk rating was also concluded by the Canadian Wildlife Health Cooperative in 2015 (CWHC 2015) through a separate risk assessment of impacts of Bsal to Canada. Yap *et al.* (2015) also identified risks to North American salamander species and predicted that parts of the United States are at high risk from Bsal.

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

For salamanders listed as injurious, both importation into the United States and transportation between States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States by any means whatsoever will be prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use (in accordance with regulations at 50 CFR 16.32), upon filing a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service Inspector at the port of entry. In addition, no live or dead listed salamanders imported or transported under permit could be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the Director of the U.S. Fish and Wildlife Service. The interstate transportation of any of these live or dead salamanders currently held in the United States for any purposes not permitted would be prohibited. The rule would not prohibit intrastate transport or possession of these salamanders within States, where not prohibited by the State. Any regulation pertaining to the use of salamanders within States would continue to be the responsibility of each State.

The Service has not published a Notice of Inquiry in the Federal Register. The IR is the initial Federal action. This action is necessary to protect the interests of wildlife and wildlife resources from the purposeful or accidental introduction and subsequent establishment of salamanders that may serve as carriers of the fungus Bsal into ecosystems of the United States. The fungus is known to affect only salamanders, many lethally, but the fungus is not yet known to be found in the United States. Because of the potentially devastating effect that the fungus could have on native U.S. salamanders, the Service is foregoing a proposed rule and publishing this IR. The information from the two risk assessments, additional published scientific research, and industry interviews and data has informed the formulation of alternatives and the results of

the analysis. Public comments and peer review regarding the publication of the IR may lead to future alterations in the rule that could affect the costs and benefits described herein. This information along with the USGS risk assessment (USGS 2015) and other references are being used in the evaluation under the Lacey Act.

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

1.2 Reporting, Recordkeeping, and Compliance Requirements

The interim rule prohibits the importation or interstate transportation of any live or dead specimen of salamander from the listed genera. No reporting, recordkeeping, or other compliance requirements are necessary to comply with the regulation, unless a permit is requested for authorized exceptions (scientific, educational, medical, or zoological purposes). The types of small entities that will be affected include researchers, zoos, and educational operations. The permit application is OMB No. 1018-0093, and no professional skills are required to prepare the application.

1.3 Structure of This Report

The remainder of this report is structured as follows:

- **Overview:** This section presents an overview and structure of the salamander industry and its ancillary industries. It then discusses the ecological need for the action.
- **Methodology –** Shows how losses will be quantified or qualitatively discussed.
- **Alternatives –**
  - **Alternative 1 (Baseline) – The No Action Alternative:** This section details the salamander industry baseline as well as the potential ecological and economic effects of exposure to Bsal.
  - **Alternative 2 – List as injurious 27 salamander species:** This section analyzes the impacts to the salamander market and the environment that would be incurred if the 27 species identified as carriers by the Service from data contained in Martel *et al.* (2014) and Cunningham *et al*. (2015), with clarification from Chytridcrisis (2015b), are listed as injurious.
  - **Alternative 3 - List as injurious 20 salamander genera:** This section analyzes the impacts to the salamander market and the environment that would be incurred if the 20 genera, including the 27 species identified in Alternative 2, were listed. Genera are listed as injurious if there is at least one confirmed carrier and all species in that genus are projected to be a carrier.

- **Alternative 4 – List as injurious all salamander species:** This section analyzes the impacts to the salamander market and the environment that would be incurred if all species of salamanders are listed as injurious.
- **Alternative 5 – Health certification:** This section analyzes the impacts to the salamander market and the environment that would be incurred if health certificates were required for all salamanders upon importation or interstate transportation.

▪ **Conclusion –** This section describes the economic costs and benefits, and biological benefits of action, focusing on the preferred alternative.

▪ **Appendix A – Detailed Tables**

▪ **Appendix B – Comments and Questions**

▪ **Appendix C – Key Terms**

▪ **References**

2.0 OVERVIEW

2.1 Ecological Benefits of Action

Bsal came to the attention of the scientific community only recently. Spitzen-van der Sluijs *et al.* (2013) observed a precipitous decline in fire salamander *Salamandra salamandra* populations in the Netherlands but was unable to attribute this to any known cause of amphibian decline, such as *Batrachochytrium dendrobatidis* (Bd), (a fungus affecting other amphibians besides salamanders), ranavirus, or habitat degradation. Martel *et al.* (2013) later identified the cause as a previously unknown chytrid fungus, Bsal. Martel *et al.* (2014) confirmed that Bsal is capable of causing the clinical disease chytridiomycosis. The natural host ranges of Bsal remain unknown, but so far Bsal appears capable of causing lethal chytridiomycosis only in salamanders.

Bsal infects the skin of amphibians but not deeper tissues or internal organs (Berger 2004; Martel *et al.* 2013). The cells of the fungus (thalli) embed themselves in the skin cells of the salamander thereby causing erosive lesions. Lesions consist of sores on the skin that erode and ulcerate, with secondary bacterial infection occurring after the sores appear (Martel *et al.* 2013). At the beginning of the European Bsal outbreak many of the salamanders reported lacked obvious external lesions (Spitzen-van der Sluijs *et al.* 2013). Experimental infections of fire salamanders in the laboratory caused death 12 to 18 days after exposure, with the same clinical signs and pathological lesions found in the European outbreak (Martel *et al.* 2013). Martel *et al.* (2013) found that infected fire salamanders developed shallow skin lesions and deep ulcerations all over the body, became anorexic, apathetic, and suffered from neurological signs including a loss of voluntary movement and muscle coordination. Death occurred within seven days of clinical signs first appearing in species with lethal vulnerability. Other species have been tested with varying levels of vulnerability ranging from tolerant to lethal.

With more native salamander species than any other country in the world, the United States is a salamander diversity hotspot (Partners in Amphibian and Reptile Conservation 2015). Salamanders are widespread in the United States. (Caudata Culture 2015a; U.S. National Park Service 2015). Areas of particularly high salamander diversity include the southeastern United States, with large numbers of plethodontid salamanders in the southern Appalachian Mountains (USGS 2015).

Salamanders play important roles in ecosystem function and as indicators of ecosystem health and stability (Davic and Welsh 2004). In forests, salamanders are also among the most abundant vertebrates, which contribute to a significant amount of biomass in the ecosystem, and therefore make significant contributions to nutrient cycling and transport (Burton and Likens 1975). By consuming arthropods (insects and related invertebrates) that would otherwise release carbon dioxide into the atmosphere by decomposing leaf litter in forests, salamanders reduce carbon emissions from leaf litter decomposition, which has implications for the global carbon cycle (Wyman 1998, Best and Welsh 2014). Salamanders that live underground also contribute to soil dynamics by creating, modifying, and otherwise regulating the systems of underground burrows in which they live (Davic and Welsh 2004).

As a specific example, the eastern newt (*Notophthalmus viridescens*) is one of the most widespread salamander species in North America, and is lethally vulnerable to Bsal infection (Roe and Grayson 2008, Martel *et al.* 2014). As top predators in pond ecosystems, *N. viridescens* regulates frog tadpole abundance and therefore affects the amount and type of

nutrients available in the ponds, keeping them in ecological balance (Morin 1983, 1995). If wild *N. viridescens* populations experienced Bsal caused die-offs, an imbalance in ponds and ecosystems throughout the eastern United States could result. *N. viridescens* also travels long distances between aquatic and terrestrial habitats (Roe and Grayson 2008), so if the species were to be extirpated from an area, the amount of nutrients available in upland areas would also be affected.

The presence of Bsal is expected to have direct negative effects on native populations of salamanders and indirect negative effects on wildlife resources and socioeconomic factors. Several pathogens, including Bsal, Bd, ranaviruses, and *Saprolegnia* sp. (water molds) have caused significant population-level declines in a range of amphibian species, and disease is thought to be a major driver of global amphibian decline (Bosch *et al.* 2001; Martel *et al.* 2013; Daszak *et al.* 2003). Disease poses a greater risk to small, isolated populations as well as those with decreased genetic diversity (Smith *et al.* 2008). Due to the overall sensitivity of amphibian populations to disease; a history of adverse, population-level effects in native amphibians; a direct association between Bsal and the decline of at least one European salamander population; and the adverse effects to some native salamanders to Bsal under experimental conditions, we believe that the introduction of Bsal into the United States would cause significant adverse population-level effects in affected native species. We believe that ecosystems where the dominant salamander species is vulnerable to lethal or susceptible infections with Bsal would be at risk from an introduction of this pathogen. We also believe species that depend on salamanders for aspects of their life cycle or ecology may be adversely affected if their host species declines in response to a Bsal introduction. Because of their abundance under normal circumstances, salamanders are important prey species themselves and are energy sources for higher predators including fish, reptiles, birds, and mammals; these predators would also be affected by a decline in salamanders. Salamanders are keystone species, meaning that they occupy niches that affect ecosystems and have little functional overlap with other species; losing these keystone species would result in significant ecosystem-level changes.

For additional information regarding the risk that Bsal represents, refer to the IR.

2.2 Salamander Market

This section provides an overview of importation, breeding, and ownership of salamanders in the United States. In this analysis, the term "salamanders" is a general category for all animals from the order Caudata commonly referred to as salamanders, newts, and other names (hereafter, salamanders). We include all salamanders as the baseline for the salamander trade industry to analyze the impact of the final rule.

An overview of the salamander industry and of pet ownership is qualitatively discussed; the quantitative portion of this report focuses on **retail sales** (see **Appendix C: Key Terms** for this and other definitions) from importation and domestic breeding. For the description and analysis of salamander importation, we used data from the Service's Office of Law Enforcement (2015) for quantity estimate and the Pet Industry Joint Advisory Council (PIJAC) for pricing. Limited information on the breeding of salamanders in the United States for domestic trade was provided by PIJAC.

In general, it is difficult to describe long term trends for the importation or breeding of salamanders. Trends are consumer-driven. This overview section attempts to describe the past and current status of the importation and breeding of salamanders in the United States.

Salamanders are almost entirely imported for the commercial pet trade (PIJAC 2015). **Figure 1** shows that salamander importation was highest for the 11 year period in 2004 and has since declined overall.

Publically available information on the breeding of salamanders domestically is minimal. No wholesale price data was obtained. The Service has acquired limited data on domestic retail salamander pricing. The most detailed data on the salamander market is import data where 99.9 percent are for commercial purposes (USFWS OLE 2015). From 2004 to 2014, salamanders were imported through 14 ports of entry into the United States; the 3 ports of entry with the largest numbers of imported salamanders were Los Angeles (California), Tampa (Florida), and New York (New York) (USGS 2015). After import, many of the salamanders are transported to animal wholesalers, who then transport the salamanders to pet retailers.

2.2.1 Salamander Importation

The trade in wildlife occurs on a global scale, and amphibians are one of the most commonly traded animals (Smith et al. 2009). Based on the U.S. Fish and Wildlife Service's Office of Law Enforcement's (USFWS OLE) Law Enforcement Management Information Systems (LEMIS) data (USFWS OLE 2015) more than 52,149,000 documented amphibians were imported into the United States from 2004 to 2014. Salamanders comprised 2,504,590 (4.8 percent) of the total imports of amphibians (USFWS OLE 2015). LEMIS data shows that 65 percent of imported salamanders came from captive sources, and 35 percent are from wild sources (USFWS OLE 2015).

Importation of salamanders is not distributed evenly across the United States (**Table 7**). Instead, imports were concentrated in three ports over the last 5 years: Los Angeles, Tampa, and New York. These three ports have consistently represented about 96 percent of imported live salamanders since 2004 (USFWS OLE 2015). Approximately 96 companies or individuals imported salamanders during the last 11 years.

The LEMIS data recorded 83 percent of declared salamander imports at the species level, whereas 17 percent were recorded to the genus level (USFWS OLE 2015). The species with the highest number of salamanders imported into the United States from 2004 to 2014 was the Chinese fire-belly newt (*Cynops orientalis)*; which comprised 54 percent of the total number of salamanders (USFWS OLE 2015). The four most commonly imported salamander genera into the United States from 2004 to 2014 were *Cynops*, *Paramesotriton*, *Triturus,* and *Pachytriton* (USFWS OLE 2015). *Cynops, Triturus*, and *Paramesotriton* are three genera that can serve as carriers of Bsal (Martel *et al.* 2014). Given the large numbers of individuals in these genera imported into the United States annually, the risk of introduction from these genera is high (USGS 2015). From 2004 – 2014, 12 species of salamanders that are native to the United States were imported into the United States from other countries (USFWS OLE 2015).

The 2004 to 2014 LEMIS dataset should be considered as a conservative estimate because many import records only identified the import as a member of the Class Amphibia (rather than identifying it to species or even genus level). In addition, incorrect salamander identifications to genus and species level appear to have occurred in reporting to LEMIS (USFWS OLE 2015).

We received industry information from PIJAC (PIJAC 2015b). The information obtained was on imported species. The data included number of recently imported individuals, price ranges, and whether the species were bred or wild-caught.

2.3 Industries Affected by the Action Alternatives

The report includes quantitative and qualitative description of importers and retailers as entities that may be impacted by the rule. We qualitatively describe effects to wholesalers, breeders, hobbyists, exhibitors, and ancillary industries as well. A description and estimate of the number of small entities to which the rule will apply, and the impacts on them, is presented or an explanation is provided for its absence.

Entities impacted by the listing include: (1) companies importing salamanders of the listed species; (2) companies transporting salamanders of the listed species between States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States (breeders, wholesalers, retailers, hobbyists, and exhibitors or trade shows); (3) entities selling amphibian-related products and services (pet stores, veterinarians, and shipping companies); and (4) research organizations, zoos, and educational operations. While many entities may focus solely on a particular function (breeder, wholesaler, retailer, etc.), many others combine several functions. For example, a particular firm may import salamanders, breed them, and sell progeny over-the-counter or over the internet to consumers and provide support services. Therefore, it is possible to double-count the number of businesses impacted. Furthermore, determining the primary function of the businesses and, thus, determining the industry classifications and size standards for these businesses are complex.

As documented in the IR, the salamander industry will incur effects due to: (1) the prohibition of import of salamanders listed as injurious and (2) prohibition of interstate transport of salamanders listed as injurious. The size of the effects are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts.

The Service has identified 201 described species within the 20 genera to be listed. These 201 species will be referred to as the 20 genera throughout the analysis. Additional species discovered in these genera after the rule is promulgated are listed by this rule. The economic analysis and regulatory flexibility analysis is based solely on the currently known species. The addition of new species in a genus would be unlikely to change the results. Out of the 20 genera (201 currently described species) to be listed, 15 genera (30 species) have been imported over the period of analysis.

In addition to the impacts discussed below for each group, businesses will face the risk of fines or prison if caught importing any species in the 20 genera of listed salamanders or transporting them across State lines. The penalty for a Title 18 Lacey Act violation under the injurious wildlife provisions is not more than six months in prison and not more than a $5,000 fine for an individual and not more than a $10,000 fine for an organization.

The salamander industry is not large enough to have major data collection and reporting requirements such as is required of the agricultural crop industry or the car manufacturing industry. Since the salamander market is below the commerce data threshold, only limited amounts of data are available. Import data are available from the Service's Office of Law Enforcement. We have considered all available information by conducting data reviews, internet searches, and consulting with industry representatives (PIJAC 2015a, PIJAC 2015b). PIJAC stated that the size of the U.S.-bred salamander industry is unknown; they consulted with businesses in the industry to provide the Service with additional data. On the whole, this information, including qualitative data, provides a general overview of the salamander market,

including a range of the retail sales prices. Information on business profiles to determine the percent of revenue affected by the rule are currently unavailable. Using the data available, we use reasonable assumptions to approximate the potential impact of the rule.

Within the description of each industry below is an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available.

2.3.1 Entities Breeding and Selling Salamanders of All Species

Entities that breed and sell salamanders (including species not proposed for listing as injurious) include distributors, retailers, breeders and hobbyists, and exhibitors and trade shows. These entities will potentially be affected in two ways: (1) by eliminating interstate sales, entities will only be able to buy or sell salamanders of the 201 species offered within their respective States; and (2) persons moving will not be able to transport their salamander(s) across state lines. The affected entities are described in detail below.

Distributors: Distributors include firms and individuals that sell salamanders to other businesses, either in lieu of or in addition to selling to consumers.

Retailers: Salamander sales by retailers may include over-the-counter sales such as pet stores, internet-based sales, and mail-order firms.

Hobbyist and Commercial Breeders: A number of salamander owners also breed their salamanders. Some owners may do so strictly for their own enjoyment with no intent to sell the salamanders, while others may intend to sell in limited quantities to other pet owners or breeders. Commercial breeders run businesses that sell salamanders to wholesalers, retailers, other breeders, zoos, research organizations, and other entities. Harvesting of wild salamanders is also conducted by commercial breeders.

Exhibitors: A number of individuals and firms attend amphibian shows and exhibits nationwide.

Those entities above involved in the selling and breeding of salamanders that are directly affected by the alteration of salamander imports will be represented by data from the North American Industry Classification System (NAICS). The “Pet and Pet Supplies Stores” (NAICS 453910) industry classification is used for sellers and will be referred to as pet stores in this report. The “All Other Animal Production” (NAICS 112990) industry is used for those involved in breeding salamanders and will be referred to as breeders.

Due to limited data, the number of small businesses in the salamander industry is extrapolated from the NAICS industries data. The U.S. Small Business Administration (SBA) defines a “small business” as one with annual revenue that meets, or is below the established size standard. Those benchmarks are $20.5 million for “Pet and Pet Supplies Stores” and $750,000 for “All Other Animal Production” (USSBA 2014). No data were available for pet store or breeder revenue by business or disaggregated to allow for the percent of small businesses to be identified using USSBA benchmarks. U.S. Census data is used in its place. According to the U.S. Census Bureau the most recent data for “Pet and Pet Supplies Stores” shows that about 60 percent of establishments qualify as small businesses (less than 10 employees) (U.S. Census Bureau 2012). The U.S. Census Bureau does not publish detailed data for NAICS 112990. The highest level of detail is the two-digit NAICS code for “Forestry, Fishing, Hunting, and Agriculture Support” which is 11. The most recent data for NAICS 11 shows that about 85

percent of establishments qualify as small businesses (less than 10 employees) (U.S. Census Bureau 2012). **Table 2** reviews the industries identified and their percent small business.

Table 2. Identified Industries and Small Business		
Group	Industry (NAICS)	Percent Small Business
Pet Stores	Pet and Pet Supply Stores (453910)	60%
Breeders	Forestry, Fishing, Hunting, and Agriculture Support (11)	85%

Table 3 gives the number of firms, revenue, jobs, and payroll for all pet stores (U.S. Census Bureau 2007). We estimate the small business allotments by assuming that 60 percent of each number of firms, revenue, jobs, and payroll are small businesses or describe them.

Table 3. Pet Stores Industry (Pet and Pet Supply Stores NAICS 453910) ($2015)				
	Number of firms with or without paid employees	**Sales, receipts, or value of shipments of firms with or without paid employees ($1,000)**	**Number of paid employees for pay period including March 12**	**Annual payroll ($1,000)**
All	350	$8,750,500	63,930	$1,198,300
Small Business*	210	$5,250,300	38,358	$5,250,300

Source: US Census, 2007 Survey of Business Owners.
Note: *Estimated based on 60% of firms, revenue, jobs, and payroll being small business.

2.3.2 Entities Providing Support Services for Salamanders

In addition to salamander sellers and breeders, ancillary and support services comprise part of the salamander industry and will experience indirect effects. Three major categories include: (1) food and equipment suppliers (such as for cages, containers, and lights), (2) shipping companies, and (3) veterinary care and other health-related items. In general, most of these types of companies provide services to other industries besides the salamander market. The first category would primarily come from pet and pet supplies stores; that industry's small business information is outlined above. Details on the additional two industries are below. **Table 4** introduces the industries identified and their percent small business.

Table 4. Identified Industries and Small Business		
Group	Industry (NAICS)	Percent Small Business
Shipping Companies	Transportation and Warehousing (48-49)	72%
Veterinary Services	Veterinary Services (54194)	60%

2.3.2.1 Shipping Companies

The U.S. Small Business Administration (USSBA) established size standard for shipping companies is $7.5 million (Postal Service NAICS 491110). No data were available for shipping veterinary revenue by business or disaggregated to allow for the percent of small businesses to be identified using USSBA benchmarks. U.S. Census data is used in its place. The U.S. Census Bureau does not publish detailed data for NAICS 491110. The highest level of detail is the two-digit code for "Transportation and Warehousing" in NAICS 48-49. The most recent data for NAICS 48-49 shows that about 72 percent of establishments qualify as small businesses (less than 10 employees) (U.S. Census Bureau 2012). In general, the types of businesses that ship live animals are large businesses such as FedEx and Delta Airlines. The number of businesses that provide shipping services for salamanders is unreported. Thus, we do not know the impact to individual businesses.

2.3.2.2 Veterinary Services

USSBA established size standard for veterinarian services is $7.5 million (Veterinary Services NAICS 54194, USSBA 2012). No data were available for veterinary revenue by business or disaggregated to allow for the percent of small businesses to be identified using USSBA benchmarks. The most recent data for NAICS 54194 shows that about 60 percent of establishments qualify as small businesses (less than 10 employees) (U.S. Census Bureau 2012). The number of veterinary businesses that provide services for salamanders is unreported. These entities may be adversely affected because the number of pet salamanders could decline. The effect of pet owners who are no longer able to transport their salamanders across State lines for treatment is unknown.

2.3.3 Research, educational, medical, and zoological entities

Businesses with zoological, educational, medical, or scientific purposes may apply to conduct otherwise prohibited activities by permit under the Lacey Act (in accordance with permit regulations at 50 CFR 16.22). If these entities desire to import or transport salamanders across State lines, they would be required to apply for a permit. One permit can cover multiple individuals and species in a shipment. However, each separate shipment requires a permit. For travelling educational programs, only one permit is required for a set period of time for specific animals. The educational operation will not need a new permit each time they travel. (They will need to amend their permit, however, if they were to add new animals or remove others from the permit). Provided that the travelling educational operation can meet the issuance criteria,

permits can be issued. Permit costs are either $25 (transportation permits) or $100 (acquisition and import permits). The length of time it takes for an applicant to complete a permit application averages about 1 hour. In general, permit applications are processed within 60 to 90 days.

2.3.4 Entities Importing Salamanders

From 2004 to 2014, nearly 2.5 million live salamanders of at least 59 species (see **Table A1-1 All Species Data**) were imported into the United States (USFWS OLE 2015b). Salamanders are believed to be mainly imported to be sold as pets (PIJAC 2015a). The IR uses 2004-2014 import data. The economic analysis and RFA for the IR uses this same time period to be consistent with the IR. The 11-year time frame is used for describing trade since a recent report (USFWS OLE 2015) became available summarizing this timeframe. Salamander imports and the number of businesses declined during this period, which may lead to an overestimation of the economic losses due to the uncertainty of industry and consumer responses over the time period used. The time frame of the trade analysis does not make a difference from a biological perspective of risk. Species are being listed regardless of whether they are in trade. The alternatives are based on the level of perceived risk as informed by the current state of scientific knowledge. From 2004 to 2014, less than 100 total businesses, institutions, and individuals imported at least one of the 59 species with an annual average of total imports of 228,000 salamanders a year (USFWS OLE 2015b).

We assume that companies importing the salamanders are predominantly pet stores that directly sell the salamanders or are wholesalers selling to these pet stores. By applying the knowledge that 60 percent of "pet and pet supply stores" (NAICS 453910) are small businesses, we estimate the number of importers that are classified as small businesses to be 56 (**Table 5**).

Table 5. Estimated Number of Salamander Importers

	Number of Salamander Importers	Number of Small Importers
11-Year Average (2004 - 2014)	94	56

Source: USFWS OLE 2015. U.S. Census Bureau 2007

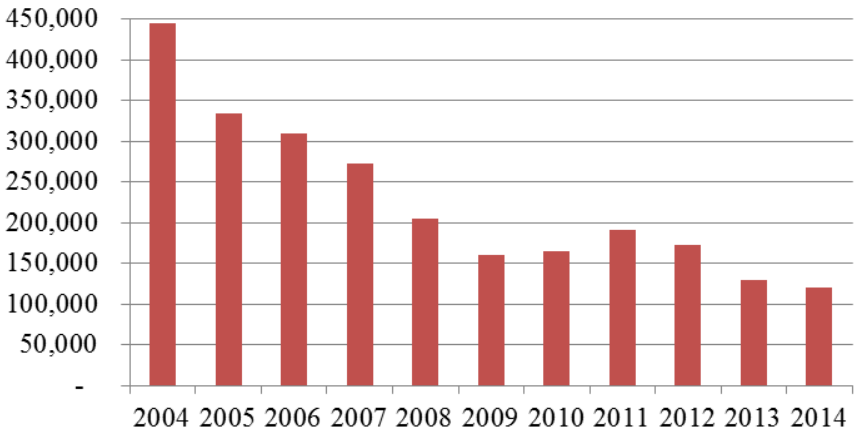
Table 6 shows total salamander imports from 2004 to 2014. **Table A1-1 All Species Data** includes this information by species.

Table 6. Total Salamander Imports: 2004-2014				
Genus	**Species Traded**	**Number Imported (2004 - 2014)**	**Annual Average Number Imported***	**Percent of Imports****
Ambystoma	7	2,104	191	0.1%
Andrias	2	7	1	0.0%
Batrachoseps	1	5	0	0.0%
Batrachuperus	1	83	8	0.0%
Bolitoglossa	2	688	63	0.0%
Chioglossa	**1**	**10**	**1**	**0.0%**
Chiropterotriton	1	15	1	0.0%
Cynops	**4**	**1,756,270**	**159,661**	**70.1%**
Desmognathus	1	1	0	0.0%
Dicamptodon	1	7	1	0.0%
Ensatina	1	3	0	0.0%
Eurycea	1	5	0	0.0%
Hydromantes	**1**	**35**	**3**	**0.0%**
Hynobius	**1**	**265**	**24**	**0.0%**
Necturus	2	1,511	137	0.1%
Neurergus	**2**	**826**	**75**	**0.0%**
Notophthalmus	**1**	**769**	**70**	**0.0%**
Oedipina	1	1	0	0.0%
Onychodactylus	**1**	**33**	**3**	**0.0%**
Pachyhynobius	1	413	38	0.0%
Pachytriton	2	112,796	10,254	4.5%
Paramesotriton	**5**	**390,193**	**35,472**	**15.6%**
Plethodon	**1**	**287**	**26**	**0.0%**
Pleurodeles	**1**	**1,213**	**110**	**0.0%**
Proteus	1	4	0	0.0%
Pseudoeurycea	1	204	19	0.0%
Pseudotriton	1	6	1	0.0%
Rhyacotriton	1	6	1	0.0%
Salamandra	**1**	**19,360**	**1,760**	**0.8%**
Salamandrella	**1**	**2**	**0**	**0.0%**
Siren	**1**	**12**	**1**	**0.0%**
Thorius	1	16	1	0.0%
Triturus	**5**	**200,701**	**18,246**	**8.0%**
Tylototriton	**4**	**16,739**	**1,522**	**0.7%**
Listed (15 genera)	**30**	**2,386,715**	**117,875**	**95%**
Not Listed (19 genera)	29	117,875	10,716	5%
Total	*59****	*2,504,590*	*227,690*	*100%*

Source: USFWS 2015, Notes: Bold are genera affected by the IR. * Rounded to a whole number. ** Zero percent, rounded to a tenth of a percent. ***Minimum number of species due to some LEMIS data being at the gensu level is 57, two additional species were added to Triturus due to name discrepancies.

Figure 1 shows the total annual numbers of salamander imports from 2004 through 2014. Imports were highest in 2004 at 445,000 and have declined significantly since then to 120,000 in 2014. Consumer and producer trends cannot be predicted with currently publically available data, therefore long run averages are used in this analysis.

Figure 1. Total Annual Imported Salamanders



Source: USFWS OLE 2015

Table 7 shows the top ports of entry for importation of Salamanders. Los Angeles, Tampa, and New York account for 96 percent of all imports.

Table 7. Live Salamander Imports by Port of Entry:

Port	Total Imports 2010 - 2014	Percent of Total
Los Angeles, CA	419,900	54%
Tampa, FL	272,300	35%
New York, NY	55,400	7%
All Others	29,300	4%
Total	**777,000**	**100%**

Source: USGS 2015. Note: numbers are rounded.

Table 8 shows from 2004 to 2014, that the top five firms in terms of number of salamanders imported accounted for 76 percent of imports while the top 15 accounted for 94 percent.

Table 8. Percent of Total Imports by Top 5 and 15 Importers (All Species 2004 - 2014)	
	Percent of Salamanders Imported
Top 5 Importers	76%
Top 15 Importers	94%
Source: USFWS OLE 2015	

2.3.5 U.S. Bred Salamanders

Impacted businesses in the salamander market are not typically large enough to have major data collections and reporting requirements such as the agricultural crop industry or the car manufacturing industry. Thus, current data for the U.S. bred salamander market are limited to the data provided by PIJAC (2015b). The data include estimates for five species of salamanders. These data do not represent all of domestic breeding and sales and is a small sample instead. The name and location of the retailers were not supplied due to PIJAC's confidentiality concerns, nor is there any citation or source for these numbers.

Table 9 shows the estimated number of the five species bred in the United States in 2012 through 2014 (PIJAC 2015b). As shown, *Ambystoma tigrinum* (Eastern Tiger Salamander) comprises the largest percentage of U.S.-bred salamanders at 43 percent, *Ambystoma mexicanum* (Mexican Axolotl or Salamandra Ajolote) at 27 percent, Pleurodeles (Ribbed Newts) at 17 percent, *Neurergus kaiseri* (known by several common names: Lorestan Newt, Luristan Newt, Emperor Spotted Newt, Zagros Newt, Iranian Harlequin Newt, and Kaiser Newt) at 11 percent, and *Ambystoma tigrinum stebbinsi* (actually likely *Ambystoma mavortium stebbinsi* (Sonoran Tiger Salamander)) at 2 percent.

Table 9. Salamanders Bred Domestically			
Species or Genus	Number of U.S. Bred Salamanders 2012-2014	Average Annual Bred	Percent of Total
Ambystoma mexicanum	1,000	333	27%
Ambystoma tigrinum	1,582	527	43%
Ambystoma tigrinum stebbinsi	62	21	2%
Neurergus kaiseri*	**400**	**133**	**11%**
Pleurodeles*	**615**	**205**	**17%**
Total	3,659	1,220	100%
Source: PIJAC 2015b			
Notes: ***** species or genus affected by the IR. Total does not add to 100% due to rounding error.			

While PIJAC provided data on the number of salamanders bred in the United States and their retail value for both 2012 and 2014, we were unable to find any other data sources for U.S.-bred salamanders specifically. Thus, we do not know where these breeders or wholesalers are located, nor do we know where the salamanders are shipped after purchase. Furthermore, we do

not know the business profiles of these entities. That is, we do not know if these businesses are diversified by earning income in other areas (such as selling non-salamander amphibians or nonregulated salamanders) in addition to the breeding of salamanders listed by this IR.

Table 10 presents the 2012-2014 salamander imports and U.S. bred salamanders for the five species for which there are data shown. Domestic breeding within the *Ambystoma* genus accounts for 82 percent of those that are commercially available. Domestic breeding within the *Neurergus* genus accounts for 64 percent of those that are commercially available. Within the *Pleurodeles* genus, domestically bred individuals account for 65 percent of those that are commercially available. Domestically bred salamanders would represent less than one percent of the United States salamander sales between 2012 through 2014 if this data depicts the entire domestic supply.

Table 10. Domestic Industry: Salamander Imports and U.S. Bred Salamanders Average Annual (2012-2014)

Species or Genus	Number of Salamander Imports	U.S. Bred Salamanders	U.S. Bred as Percentage of Commercial Salamanders
Ambystoma mexicanum	-	*333*	
Ambystoma tigrinum		*527*	
Ambystoma tigrinum stebbinsi		*21*	
Ambystoma Total	191	881	82%
Neurergus kaiseri*	**75 (Total Genus)**	**133**	**64%**
Pleurodeles	**111 (Total Genus)**	**205**	**65%**
	Number of Salamander Imports	U.S. Bred Salamanders	U.S. Bred as Percentage of Commercial Salamanders
Total	377	1,220	76%

Source: USFWS 2015 and PIJAC 2015b. Notes: **Bold** are species or genera affected by the IR.
* Import data is for the Neurergus genus. Domestic data is for the species Neurergus kaiseri only.

2.3.6 Pet Owners and Hobbyists

Pet owners and hobbyists drive the salamander market because their consumer profiles dictate how breeders, importers, and retailers market their products. The number of salamander pet owners and hobbyists is unknown. According to a 2013-2014 survey by the American Pet Products Association (APPA) (APPA 2015), 5.6 million U.S. households own an amphibian or reptile as a pet; the data does not distinguish between amphibians and reptiles. Total numbers of amphibians and reptiles owned as pets is estimated to be 11.5 million (APPA 2015). Of these pets, 5 percent are bred at home, 27 percent are wild caught, and the remaining 68 percent are purchased (including trading and adoption). This survey did not detail salamanders specifically and data for amphibians and reptiles were given as one group. We assume these trends for "amphibians and reptiles" are similar for all species within those classes. These data from the

APPA are used in the report as it is the most disaggregated information about pet ownership available to the Service. Impacts to pet owners and hobbyists are discussed in the sections under each alternative.

3.0 METHODOLOGY

3.1 Economic Effects

The commercial and recreational uses of salamanders generate economic activity in a variety of ways. For example, when a salamander is sold, part of the total purchase price goes to the local retailer. The retailer in turn pays a wholesaler who in turn pays an importer. The importer then spends a portion of this income to cover importation expenses. In this way, each dollar of local retail expenditures can affect a variety of businesses at the local, regional, and national level. The same is true for hobbyists' expenditures. Consequently, spending associated with commercial and recreational use of salamanders can have an impact on economic activity, employment, income and local, state, and Federal tax revenue.

Bsal poses a critical risk to at least 2 native salamander species in the United States. The decrease in salamander abundance or elimination of salamander species can negatively affect the ecosystem at large. The expected economic benefits mirror the ecological benefits that come directly from the alternative's risk reduction. The benefit estimates do not quantify ecological, commercial, recreational, and non-use values of at-risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree. For example certain segments of the public may value the knowledge that the risk to salamander populations and other potential negative impacts to natural areas are reduced by implementing one of the action alternatives. Additionally the establishment of Bsal in the United States could lead to a decrease or change of the supply of salamanders, which may have a negative effect on salamander producers and consumers.

There are quantifiable adverse economic impacts as discussed below. The presence of Bsal is expected to have direct negative effects on native populations of salamanders and indirect negative effects on wildlife and wildlife resources, and socioeconomic factors.

3.1.1 Analysis of Economic Benefits

The economic benefits, broadly defined, of a reduction in the potential consequences of Bsal becoming established in U.S. ecosystems can be conceptualized in two ways. First, benefits can be defined as economic value (also known as net willingness to pay or consumer surplus), which is the amount people or households would be willing to pay for a given good or service over and above the actual cost of obtaining the good or service (see Aiken 2009 p. 5 and Varian 1987 p. 242 for a discussion of economic value). This is the theoretically correct definition of economic value and is the appropriate measure of economic benefits for project analysis (see U.S. Water Resources Council 1983 and U.S. Environmental Protection Agency 2000). In the context of this analysis, one measure of economic value would be to determine the extent to which society would value a program that would reduce the potential negative consequences of Bsal (see Freeman III (1993), Cummings et al. (1986), and Bjornstad and Kahn (1996) for discussions on a variety of methods for determining such values). Once such values were estimated, aggregation across the appropriate number of households would give an estimate of the economic value of the alternatives under consideration.

An alternative approach would be to consider the avoidance or reduction of the costs associated with the above consequences (due to the implementation of the alternative) as a measure of the benefits of the alternatives. These avoided costs are not, strictly speaking, measures of economic value, but may be a reasonable approximation given the paucity of data on

economic valuation. However, estimating avoided costs has its own requirements concerning: (1) the probability of a given event or situation occurring, and (2) a quantitative estimate of the cost associated with that event or situation (this is similar in concept to expected value; see Dixon et al. (1995) pp. 107-108). Ideally, information on (1) and (2) would be available for both the current situation and the effect of implementing a given alternative so that the net cost could be estimated. This net cost then would be the avoided cost that would be a measure of the benefits of the alternative. For example, in an area of salamander importance, a decline in salamander numbers due to Bsal establishment could lead to a decrease in wildlife watching quality. The quality of the experience may decline due to a decrease in chances to see salamanders or any negative effects that the decline in salamanders had on other wildlife and wildlife resources. A decrease in the quality of the experience could lead to fewer wildlife viewers. Less outdoor recreationists could lead to a decrease in expenditures; to demonstrate we use $25,000. Implementing a fictional alternative, Alternative Y would reduce the probability of Bsal establishment to 10 percent from 80 percent. The expected costs in the current situation would be $20,000 ($25,000 x 0.8); with Alternative Y, the expected costs would be $2,500 ($25,000 x 0.1). Net avoided costs would be $17,500 ($20,000-$2,500), one measure of the benefits of Alternative Y.

With respect to the economic analysis of the 20 salamander genera, information not available for this rulemaking included: (1) the economic value of policies to reduce potential damage from Bsal establishing in the US; (2) probability estimates of introductions, or introductions resulting in establishment of Bsal; (3) cost estimates of introductions or establishments if they occur. The preferred alternative eliminates imports of 20 genera of salamanders and prohibits interstate trade. Owner behavior in response to implementation of one of the alternatives is uncertain. If imports are eliminated, supply of salamanders may be significantly decreased (say, for example, by half) and other things equal, price will rise. Owners and suppliers may respond in different ways. If owners or potential owners face rising prices, they may substitute their preferred species with a different species of salamander or an amphibian or perhaps even give up the hobby. In response to higher prices, suppliers may increase the importation and breeding of one or more of the 45 untested genera (442 species) or a species from one of the three genera (37 species) that were found to not be a carrier. Another scenario is that demand by hobbyists for salamanders will decrease. Consequently, due to the lack of available information (as identified in (1), (2), and (3) above) and the uncertainty of how people might respond to the alternatives under consideration, quantitative estimates of the economic benefits of the alternatives are unavailable at present.

3.1.2 Analysis of Economic Costs

The economic analysis assumes that all or some portion of annual imports are sold and that all or some portion of the number of salamanders bred in the U.S. annually are sold. The number of salamanders actually sold consists of a percentage of imports (not all), a portion of U.S.-bred salamanders (not all), and a portion of salamanders that were neither imported nor bred that year, but were carry-overs from previous years (either imported or bred).

Since there is very limited information of domestic breeding of salamanders and none on the yearly stock of salamanders in the United States, we focus on the imported salamanders for the quantitative analysis and supplement with qualitative information when necessary. LEMIS import data and domestic breeding data from PIJAC are both used to estimate the minimum

annual number of salamanders sold in the US. Species-specific price data from PIJAC and average price data from the APPA are used to estimate the average annual revenue for annual salamander sales and for the possible loss in retail sales for an alternative. When species or genus level pricing data had been provided by PIJAC, it was used in the analysis (see **Table A1-2**), while the APPA (2015) datum of $22 per salamander was used otherwise.

All import sales from those salamanders would be eliminated. The prohibitions on importing a species may increase domestic breeding, which would lower overall economic losses associated with the rule. The losses presented in this report from the prohibition on importation are a maximum. Losses for domestic producers due to the prohibition on interstate transport cannot be fully quantified at this time due to data deficiencies. We assume that companies importing the salamanders are predominately for pet stores that directly sell the salamanders. Salamanders caught in the wild in the United States are not covered in the economic costs though impacts from the prohibition of interstate transport are possible.

Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. Substitution is the act through which consumers would act on their next best choice based on personal preference and cost. As noted earlier, costs to the consumer are approximated in the analysis by retail price. In general, over all goods and consumers it can be generalized that a like product may be substituted as the next best option. There are no marketing data that estimate how consumer preference may change due to the listing, thus changing the types of salamanders or other pets that businesses sell. Therefore, this analysis does not account for this type of substitution effect.

3.1.2.1 U.S. Bred Salamander Market

In addition to impacts to the imported salamander market, there would also be impacts to the U.S. bred salamander market. Except for authorized purposes under a permit issued by the Service, the interstate transport of listed salamanders would be discontinued. Thus, any revenue earned from this portion of a business would be eliminated. The amount of sales impacted for U.S. breeding is completely dependent on the percentage of interstate transport. That is, the impact depends on where businesses are located and where their customers are located. Since information is not currently available on interstate sales of salamanders, it is conservatively assumed that all sales related to the 201 salamander species would be eliminated. We have no data to suggest that domestic breeding is a meaningful contributor to the sales in the U.S. salamander trade.

3.1.2.2 Small Businesses

Two methods are used to estimate the magnitude of the economic effects on the affected small business entities among pet stores and breeders. Estimates at the industry level are the minimum adverse impacts, since it includes many entities that are not involved in the salamander industry. The effect of having more firms lowers the impact per firm, making the economic effects less significant. Estimates using the unique importers (average of 5 a year), or one breeder, yield the maximum adverse impacts; no fewer entities would be impacted under the status quo. Applying these two methods brackets the impacts on importers and pet stores.

For the pet stores under Method One, we extrapolated the size distribution from the U.S. Census Bureau employment for NAICS 453910, we calculate that out of the total 14,700 companies that 8,820 companies (60 percent) qualify as small businesses (**Table 2)**. We assume

that all pet stores in the United States sell salamanders and the losses are distributed evenly across them, therefore the loss per entity is assumed to be equal for all companies within the industry regardless of size.

Alternately applying Method Two: the effects would be entirely on the importer and not any later retail sales entity. Assuming importers can be classified as pet stores, 56 out of the 94 importers between 2004 and 2014 would be small businesses. Five small business importers a year would incur impacts. If 5 pet stores are impacted a year, the average retail sales lost would be over one thousand times greater per firm. The results should not be directly compared as they are showing the differences in assumptions about the industry and not the sensitivity to an input value. The numbers represent a bracket for the effects on individual small businesses. The choice of affected group does not alter the aggregate effect on small business; it does change the impact on an individual small business.

3.1.3 Secondary Economic Impacts and Estimation Method

Breeders, individual retailers, wholesalers, chain pet stores, and hobbyists all spend money obtaining and caring for salamanders. Such spending can generate a substantial amount of economic activity in the local, regional and national economies. For example, a firm that imports and sells salamanders spends money on a wide variety of goods and services, such as food, veterinary services, habitat-related items (such as heat and light source, aquarium substrate), office supplies, rent, utilities, and a variety of other goods and services. Consequently, businesses and industries that supply the local retailer also benefit from salamander expenditures. Terms and definitions that are commonly used in economic impact analyses, as well as this report, can be found in **Appendix C: Key Terms** (Minnesota IMPLAN Group, Inc. 2004; Miller and Blair 1985).

Salamander retail sales were used in conjunction with an economic modeling method known as input-output analysis[1] to estimate the secondary effects of this industry (economic output, employment, and employment income and tax revenue associated with these expenditures). The estimated impacts are nationwide impacts. We do not have sufficient information to disaggregate the national impacts to regional, State, or local impacts. The specific modeling approach we use, IMPLAN (see footnote), is a static approach to impacts in that the impact estimates are for a specific point in time. Ideally, we would like to have a dynamic estimate of impacts, where the economy makes a series of comprehensive adjustments over time. This can be done by using a computable general equilibrium model (CGE). However, sufficient information is not available to undertake this particular approach.

Table 11 shows the effects for example of a $100,000 loss in revenue in the pet store industry. These values will be applied to revenue loss for importers and retail sales.

[1] The estimates of total economic activity, employment, employment income, and Federal and state taxes in this report were derived using IMPLAN, a regional input-output model and software system. "IMPLAN…was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning." (Minnesota IMPLAN Group, Inc. 2004). First developed in 1979, IMPLAN data and software was privatized in 1993 by the Minnesota IMPLAN Group, Inc. For additional information, see www.implan.com. For additional information on input-output modeling, see Miller and Blair 1985 *Input-Output Analysis*.

Table 11. Economic Effects of Revenue Changes: Pet Shores			
(406) Retail - Miscellaneous store retailers (IMPLAN 2015)			
	Revenue Losses	Job Losses	Small Business Job Losses
Direct	$100,000	2.5	0.0
Indirect	$57,263	0.3	
Induced	$110,407	0.7	
Total	$267,670	3.5	
Multiplier	2.68		
Source: 2015 Minnesota IMPLAN Group, Inc., oridinal data table displayed, total may not sum due to rounding.			

Tables 12-14 show the detailed economic effects of a $100,000 pet store revenue change by industrial sector. This includes direct effects of the loss on the pet stores, as well as the indirect and **induced effects** on sectors of the economy. They are shown for output (revenue), employment, and labor income.

Table 12. Pet Stores $100,000 Decrease in Revenue: Direct, Indirect, and Induced OutputLosses					
Sector	Description	Direct	Indirect	Induced	Total
0	Total	$100,000	$57,263	$110,407	$267,670
1	Agriculture	$0	$129	$1,783	$1,912
2	Mining	$0	$660	$1,424	$2,084
3	Construction	$0	$1,191	$1,422	$2,612
4	Manufacturing	$0	$5,683	$19,004	$24,687
5	TIPU	$0	$13,996	$12,387	$26,383
6	Trade	$100,000	$3,244	$11,997	$115,241
7	Service	$0	$30,932	$60,405	$91,337
8	Government	$0	$1,429	$1,987	$3,415
Source: IMPLAN 2015					

Table 13. Pet Stores $100,000 Decrease in Revenue: Direct, Indirect, and Induced Employment Losses					
Sector	Description	Direct	Indirect	Induced	Total
0	Total	2.5	0.3	0.7	3.5
1	Agriculture	0.0	0.0	0.0	0.0
2	Mining	0.0	0.0	0.0	0.0
3	Construction	0.0	0.0	0.0	0.0
4	Manufacturing	0.0	0.0	0.0	0.0
5	TIPU	0.0	0.1	0.0	0.1
6	Trade	2.5	0.0	0.1	2.7
7	Service	0.0	0.2	0.5	0.7
8	Government	0.0	0.0	0.0	0.0
Source: IMPLAN 2015					

Table 14. Pet Stores $100,000 Decrease in Revenue: Direct, Indirect, and Induced Labor Income Losses					
Sector	**Description**	**Direct**	**Indirect**	**Induced**	**Total**
0	Total	$58,407	$18,055	$34,594	$111,056
1	Agriculture	$0	$54	$545	$599
2	Mining	$0	$184	$409	$593
3	Construction	$0	$429	$503	$931
4	Manufacturing	$0	$987	$2,392	$3,379
5	TIPU	$0	$4,116	$2,958	$7,074
6	Trade	$58,407	$1,172	$4,756	$64,335
7	Service	$0	$10,447	$22,328	$32,775
8	Government	$0	$667	$703	$1,370
Source: IMPLAN 2015					

Table 15 shows the detailed effects of a $100,000 revenue change on pet stores has on tax receipts.

Table 15. Business Taxes $100,000 Loss in Pet Store Revenue					
Sector	Description	Direct	Indirect	Induced	Total
0	Total	$11,449	$2,005	$5,134	$18,588
1	Agriculture	$0	$1	$18	$19
2	Mining	$0	$47	$109	$157
3	Construction	$0	$7	$7	$14
4	Manufacturing	$0	$47	$254	$301
5	TIPU	$0	$449	$578	$1,027
6	Trade	$11,449	$430	$1,579	$13,458
7	Service	$0	$1,056	$2,673	$3,729
8	Government	$0	-$32	-$84	-$116
Source: 2015 Minnesota IMPLAN Group, Inc., oridinal data table displayed, total may not sum due to rounding.					

Table 16 shows the effects of a $100,000 loss in revenue in the salamander breeders industry. These values apply to revenue loss for domestic breeders.

Table 16. Breeders			
(14) Animal production, except cattle and poultry and eggs (IMPLAN 2015)			
	Revenue Losses	Job Losses	Small Business Job Losses
Direct	$100,000	1.2	1.0
Indirect	$25,780	0.1	
Induced	$78,894	0.5	
Total	$204,673	1.8	
Multiplier	2.1	1.8	
Source: 2015 Minnesota IMPLAN Group, Inc., oridinal data table displayed, total may not sum due to rounding.			

Tables 17-19 show the direct effects of a $100,000 loss in revenue in the shipping industry and in the veterinary services industry. Overall job losses and job losses specific to small entities are shown.

Table 17. Postal Shipping		
(518) Postal service (IMPLAN 2015)		
Direct Revenue Loss	Direct Job Losses	Direct Small Business Job Losses
$100,000	0.9	0.6

Table 18. Air Shipping		
(415) Couriers and messengers (IMPLAN 2015)		
Direct Revenue Loss	Direct Job Losses	Direct Small Business Job Losses
$100,000	0.9	0.6

Table 19. Veterinary		
(459) Veterinary services (IMPLAN 2015)		
Direct Revenue Loss	Direct Job Losses	Direct Small Business Job Losses
$100,000	1.4	0.8

Shipping and veterinary services are evaluated qualitatively for discussion purposes only as minimal to no information was available on shipping costs, the number of salamanders shipped each year, and the use of veterinary services to facilitate quantitative analysis. Detailed information on effects due to indirect and induced effects are not shown as the numbers are speculative and shown only as examples of methodological purposes.

The decline in salamander sales will affect shipping expenditures. Shipping expenditures are often comparable with the price of the salamander, these impacts are estimated separately from impacts to the salamander industry (shipping costs are not usually included in the sales price). Shipping expenses for wholesale movement can be based on weight, making calculations

per salamander basis problematic. Shipment prices for retail sales were compiling via the Internet sales, a majority of the shipping costs for a purchase were in the range of $40 - $45 per shipment (Reptiles-N-Critters 2015, Backwater Reptiles 2015).

4.0 ALTERNATIVES

4.1 Alternative Formulation

The IR concluded the establishment of Bsal poses a significant risk to U.S. ecosystems and that immediate action is necessary while the threat can still be averted. The risk assessment conducted by the USGS states that "the total risk of Bsal to U.S. salamanders as high overall, based on the high potential for introduction and severe biological consequences should Bsal invade." (USGS 2015) Infected salamanders can transmit Bsal to other species even if the introduced salamander fails to establish a population. There is evidence that salamanders listed by this rule have the potential to escape and introduce Bsal into the environment. Though its full effect on all native salamander species is unknown, we anticipate significant consequences to at least 2 native species that are lethally vulnerable. The current capability to prevent escape of infected salamanders and release of Bsal to the environment is low. Rehabilitation of disturbed ecosystems is expected to be very difficult. The ability and effectiveness of measures to prevent or control Bsal is currently low. There are no known benefits of Bsal.

To satisfy the requirements of an RFA in this DRFA we have a "Description of the steps the agency has taken to minimize the significant adverse economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each of the other significant alternatives to the rule considered by the agency was rejected." The analysis of alternatives allows decision makers and the public to see the effect of regulatory options. This demonstrates, in a transparent manner, why the Service has selected the preferred alternative. The following outlines why each alternative was considered. Next we detail the expected biological outcomes, as well as effects on the aggregate economy and on small businesses.

4.1.1 Interim Rule Alternatives

The Service is publishing an IR to add 201 salamander species to the list of injurious wildlife under the Lacey Act (18 U.S.C. 42 as amended; Lacey Act). Five alternatives were developed for consideration in the assessment. These alternatives included: Alternative 1 (Baseline) – no action; Alternative 2 – List 27 Salamander Species; Alternative 3 – List 201 Salamander Species; Alternative 4 – List all Salamander Species; and Alternative 5 – Health Certificates. The alternatives are summarized below. For more information pertaining to the formulation of the various alternatives analyzed, please refer to the injuriousness assessment in the IR.

4.1.1.1 Alternative 1 (Baseline)

Alternative 1 was no action. This is the status quo. We would not list any species of salamanders as injurious or pursue other actions to prevent the introduction of Bsal into the United States. We did not select this option because of the significant risk that Bsal poses to native species and other wildlife resources in the United States. We expect that significantly greater financial and natural resources losses will be incurred by us and our partners in having to manage and respond to Bsal if the fungus establishes and spreads in the United States than by taking action now to prevent its introduction. There would be no loss of retail sales or economic output due to actions by the Service. It is expected that costs would be incurred by the salamander and ancillary industries due to the effects of Bsal on the supply of salamanders.

4.1.1.2 Alternative 2 – Listing 27 Salamander Species

Alternative 2 involves listing only those species where data from Martel *et al.* (2014), and Cunningham *et al.* (2015), as explained further in Chytridcrisis (2015b), confirmed are carriers of Bsal. The IR includes 201 species, while the list of species that Martel *et al.* (2014) and Cunningham *et al.* (2015) evaluated is considerably smaller. Martel *et al.* (2014) investigated vulnerability of salamanders to Bsal through laboratory testing and tested other salamander species to see whether they were carrying Bsal without specifically measuring their vulnerability. Martel *et al.* (2014) identified some of the salamander species at risk from infection by Bsal. The research tested a limited number of the approximately 681 known species of salamanders that exist worldwide and found that not every species tested had lethal, susceptible, or tolerant vulnerability. However, the results clearly indicate a severe threat to many species, including a number of species native to the United States. The research consisted of two elements. The first part consisted of conducting laboratory tests where salamanders were swabbed with Bsal, and the response by the salamanders was measured to determine their vulnerability. The second part consisted of testing salamanders found in the field to determine whether they were carriers of Bsal, though their vulnerability could not be measured. A negative result on a field test did not demonstrate the species in question could not be a carrier of Bsal, only that the individual organism was not carrying Bsal at the time it was tested in the field. Cunningham *et al.* (2015) identified additional species as carriers of Bsal through routine testing of quarantined salamanders; these species were later specifically identified in Chytridcrisis (2015b).

The current capacity to prevent escape and establishment of Bsal is low. Rehabilitation of disturbed ecosystems is expected to be very difficult. The ability and effectiveness of measures to prevent or control Bsal is currently low. There are no known benefits of Bsal. As a result, selecting this option would leave open a significant gap whereby many salamander species expected to be carriers of Bsal could still enter the United States and cause harm by transmitting Bsal to adversely affected species. Infected salamanders can transmit Bsal to other species even if the introduced salamander fails to establish a population. There is evidence that salamanders listed by this rule have the potential to escape and spread Bsal. Several of the species listed by this rule can survive long enough in the wild to transmit Bsal. Listing only the 27 salamander species in Alternative 2 is not expected to sufficiently protect the United States from the harm caused by Bsal if it is introduced through other expected carriers.

4.1.1.3 Alternative 3 – Listing 201 Salamander Species

Alternative 3, our Preferred Alternative, involves listing all species in a given genus where we have confirmation that at least one species in that genus is a carrier of Bsal, and there is no countervailing conclusive evidence suggesting that some species within the genus are not carriers. As described in the IR, we determined based on the scientific information available that all species in a genus will share similar characteristics in regards to whether they are capable of serving as a carrier of Bsal. Our analysis of Martel *et al.* (2014) did not find conclusive examples of species in a genus where one species was regarded as a carrier and another species was not. Given the risk that Bsal poses, we believe it is important to list those species that are also likely to be carriers of the fungus based on the data available. Doing so ensures that such species are prohibited from carrying Bsal into the United States, transmitting it to native species, and spreading it throughout the United States. This alternative provides the greatest opportunity to

minimize the risk caused by species of salamander that the Service has found to be carriers of Bsal.

4.1.1.4 Alternative 4 – Listing all Salamander Species

Alternative 4 includes all 681 species of salamanders, since individual species in untested genera may also be capable of carrying Bsal. This Alternative lists the species included under Alternative 3 along with the remaining 480 species of salamanders. There are no data available on the vulnerability or carrier status of the untested 443 species from 45 genera. Thirty-seven species from three genera have been identified as not being carriers. Untested genera may also be capable of carrying Bsal. It is unknown to what extent this Alternative would further reduce the risk of Bsal being introduced into the United States. This alternative also addresses stakeholder requests to list all species of salamanders.

4.1.1.5 Alternative 5 – Health Certificates

Alternative 5 requires a health certificate that must accompany salamanders being imported or transported across State lines stating that the animal being imported or moved through interstate movement is free of Bsal in lieu of or in addition to listing. The Service rejected this option because of concerns regarding the effectiveness of current testing methods, the lack of available testing capacity, expenses associated with testing each shipment, and inadequate agency resources to conduct inspections, interpret the results, and issue health certificates. As such, the Service considers it to be considerably less effective than the Preferred Alternative.

4.1.1.6 Additional Options Considered

We considered other alternatives that we rejected because we do not have the authority under the Lacey Act to implement them. For example, while we have the ability to require a health certificate, we do not have the authority or capacity to establish a quarantine system and require it to be used. As a result, we cannot require all shipments to wait in quarantine for a period of time sufficient to prove that imported animals do not carry Bsal or to treat them prophylactically.

We also considered encouraging partners to take nonregulatory action, such as voluntary best management practices or individual state action. The Service will pursue such actions as it moves forward, and we are working with partners on efforts such as Habitattitude™, which encourages responsible consumer actions with respect to pet ownership. Voluntary actions, such as applying heat therapy as described in Blooi *et al*. (2015), may also help reduce the threat posed by Bsal.

Although voluntary actions are vital to help minimize the threat of invasive species, the Service is highly concerned about the extensive damage that introduction of Bsal could do to the resources of the United States and concluded that we cannot rely on voluntary actions alone at this time to address the severity and immediacy of the threat that Bsal poses.

The Service does not have authority under the Lacey Act to apply the rule differently to small businesses in order to directly alleviate their compliance burden. Furthermore, applying prohibitions differently by size of business would be unlikely to yield the same reduction in risk of Bsal introduction into the United States.

4.2 Alternative 1 (No Action) - Baseline Analysis

Accepting the No Action Alternative (Alternative 1) would have no effect on the economic impacts of salamander importation and sales described in this section, and there would continue to be a high risk of establishment by Bsal in select ecosystems in the United States. Costs would not be imposed and benefits would not be obtained.

We estimated the average annual retail value for the species that were included in the IR. **Table 20** shows that the average retail revenue for all salamander sales is nearly $4 million. The annual retail sales of the salamander species that are currently being imported is $3.9 million. The annual retail sales of the salamander species that are currently being bred domestically for sale are $60,000.

Table 20. Estimated Annual Salamander Sales ($2015)

	Average Retail Price Per Salamander	Average Annual Sold (2004-2014)	Average Annual Revenue (2004-2014)
Imported	$17	227,700	$3,934,000
Domestic Bred	$49	1,200	$60,000
All	$17	228,900	$3,995,000
Listed (20 Genera)	$17	217,300	$3,760,000
Not Listed (480 Species)	$20	11,600	$235,000

Note: Products may be different due to rounding.

We believe implementation of the injurious wildlife prohibitions reflects the shared State-Federal governance of invasive species challenges facing the United States as originally intended by Congress. State governments do not have the personnel or other resources to basically shut their borders, through the establishment of border checkpoints, to the movement of Bsal or the listed salamanders. Likewise, State and local governments do not have the mechanism to establish internal control point at airports and harbors to control movement of these species by air or boat. We believe federally regulating movements of salamanders listed by the IR is a necessary and important step in limiting the effects of Bsal.

4.3 Alternative 2 Analysis

For the 27 species, 1.6 million (**Table 21**) salamanders were imported between 2004 and 2014 (USFWS OLE 2015) that sold for estimated retail sales of $22.8 million. None of these species are known to be domestically bred for commercial purposes. For detailed information on species level data including numbers imported, bred domestically, and prices refer to **Table A1-1 All Species Data**. The maximum annual loss to entities that deal in these species is $2.1 million in annual revenue. Of the $2.1 million reduction in revenue, $1.2 million is expected to be from small businesses.

Table 21. Alternative 2: Direct and Aggregate Economic Effects of Revenue Losses ($2015)				
	Number of Salamanders (Thousands)	Direct Revenue Loss (all)	Direct Revenue Loss (small business)	Aggregate Economic Loss
Total (11 year)	1,564	$22.8	$13.7	$61.1
Per Year	142	$2.1	$1.2	$5.6

Listing these 27 species and incurring the decline in imported salamanders and ensuing revenue decline leads to the following job and job incomes losses for the pet store industry and for small businesses therein. The change in revenue would lead to a decrease of 73 (**Table 22**) jobs, 31 are expected to be from direct effects on small businesses. A decline of $2.3 million in job income would occur, of which $1.2 million are expected to be from direct effects on small businesses.

Table 22. Alternative Two: Annual Decrease in Salamander Industry Related Employment and Job Income (Million $2015)			
Salamander Industry (Aggregate Effect)		Salamander Industry -Small Business- (Direct Effect Only)	
Jobs	Job Income	Jobs	Job Income
73	$2.3	31	$1.2

The annual impacts are shown over the standard ten year effects period below. Effects are discounted to the present value and then summed. **Table 23** shows these discounted values for direct and aggregate on all businesses.

Table 23. 10 Year Discounted Effects From Revenue Losses (Millions $2015)						
Year	Non Discounted		3% Discount Rate		7% Discount Rate	
	Direct	Aggregate	Direct	Aggregate	Direct	Aggregate
2015	2.1	5.6	2.1	5.6	2.1	5.6
2016	2.1	5.6	2.0	5.4	1.9	5.2
2017	2.1	5.6	2.0	5.2	1.8	4.9
2018	2.1	5.6	1.9	5.1	1.7	4.5
2019	2.1	5.6	1.8	4.9	1.6	4.2
2020	2.1	5.6	1.8	4.8	1.5	4.0
2021	2.1	5.6	1.7	4.7	1.4	3.7
2022	2.1	5.6	1.7	4.5	1.3	3.5
2023	2.1	5.6	1.6	4.4	1.2	3.2
2024	2.1	5.6	1.6	4.3	1.1	3.0
Total	20.8	55.5	18.2	48.8	15.6	41.7
Note: May not sum to total due to rounding.						

Under Alternative 2, the probability of Bsal establishing in the United States will decrease compared to Alternative 1. The change in probability is unknown, but is expected to be meaningful as known carriers will be restricted. Ecosystems that might otherwise be impacted will have a lower probability of consequences, and native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, will face a lower risk of exposure to Bsal. The reduced risk of exposure will avoid the need to rely on restoration activities which would likely be very difficult to implement and have a low probability of success. This benefit estimate does not quantify ecological, commercial, recreational, and non-use values of at-risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree.

4.4 Alternative 3 (Preferred Alternative) Analysis

For the 201 species, 2.4 million (**Table 24**) salamanders were imported and sold between 2004 and 2014 (USFWS OLE 2015) that sold for an estimated retail sales of $41.4 million. For detailed information on species level data including numbers imported, bred domestically, and prices refer to **Table A1-1 All Species Data**. The maximum annual loss to entities that deal in these species is $3.8 million in annual revenue. Of the $3.8 million decline in revenue, $2.3 million is expected to be from small businesses. In addition to any impacts listed above, individuals or businesses could face penalties for violating the Lacey Act. The penalty for a Lacey Act violation is not more than six months in prison and not more than a $5,000 fine for an individual, and not more than a $10,000 fine for an organization.

Table 24. Alternative 3: Direct and Aggregate Economic Effects of Revenue Losses ($2015)				
	Number of Salamanders (Thousands)	Direct Revenue Loss (all)	Direct Revenue Loss (small business)	Aggregate Economic Loss
Total (11 year)	2,390	$41.4	$24.9	$110.5
Per Year	217	$3.8	$2.3	$10.0

This alternative lists the 201 species that comprise all species from the 20 genera that contained the initial 27 species identified in Alternative 2. It would lead to additional decline in imported salamanders and ensuing revenue decline leads to the following job and job incomes losses for the entire pet store industry and for small businesses therein. The change in revenue would lead to a decrease of 131 (**Table 25**) jobs, 56 of those jobs from direct effects on small businesses. A decline of $4.2 million in job income would occur, of which $2.2 million would be direct effects on small businesses.

Table 25. Alternative Three: Annual Decrease in Salamander Industry Related Employment and Job Income			
(Million $2015)			
Salamander Industry (Aggregate Effect)		Salamander Industry -Small Business- (Direct Effect Only)	
Jobs	Job Income	Jobs	Job Income
131	$4.2	56	$2.2

The annual impacts are shown over the standard ten year effects period below. Effects are discounted to the present value and then summed. **Table 26** shows these discounted values for direct revenue losses for all businesses, aggregate on all businesses, and direct on small businesses.

Table 26. 10 Year Discounted Effects From Revenue Losses (Millions $2015)						
Year	Non Discounted		3% Discount Rate		7% Discount Rate	
	Direct	Aggregate	Direct	Aggregate	Direct	Aggregate
2015	3.8	10.0	3.8	10.0	3.8	10.0
2016	3.8	10.0	3.7	9.8	3.5	9.4
2017	3.8	10.0	3.5	9.5	3.3	8.8
2018	3.8	10.0	3.4	9.2	3.1	8.2
2019	3.8	10.0	3.3	8.9	2.9	7.7
2020	3.8	10.0	3.2	8.7	2.7	7.2
2021	3.8	10.0	3.1	8.4	2.5	6.7
2022	3.8	10.0	3.1	8.2	2.3	6.3
2023	3.8	10.0	3.0	7.9	2.2	5.8
2024	3.8	10.0	2.9	7.7	2.0	5.5
Total	37.6	100.5	33.0	88.3	28.3	75.5

Note: May not sum to total due to rounding.

4.4.1 Regulatory Flexibility Analysis Conclusion

The full regulatory flexibility analysis is presented here for the IR's Preferred Alternative. Minimal information on small business effects for alternatives 2, 4, and 5 are shown in this report for comparison, and do not impact the RFA or the determination if the IR has a significant economic impact on a substantial number of small entities.

Two methods are used to estimate the number of small businesses affected and their individual revenue losses. Method One estimates the impact if effects were divided equally among all pet stores. Using Method One, **Table 27** shows that 8,820 small businesses would be affected. The revenue losses per firm would be $260. For Method Two, we assume that if effects fall entirely on the importers (assuming they are pet stores), 56 out of the 94 importers over the last 11 years, or 5 a year, would be impacted. If 5 pet stores were impacted a year, the average retail sales lost as a result of the rule would be $453,000 per entity (**Table 28**).

Table 27. Small Business Pet Store Effects				
	Number of Firms	**Sales, Receipts, or Value of Shipments (1,000 $2015)**	**Number of Paid Employees**	**Annual Payroll (1,000 $2015)**
Small Business Total	8,820	$8,551,966	64,292	$1,177,127
Per Entity		$970	7	$133
	Small Businesses Affected	**Loss in Retail Sales ($2015)**	**Jobs Decline**	**Job Income Decline ($2015)**
Prefered Alternative	8,820	$2,263,000	56	$2,196,000
Effects Per Entity		$260	0.01	$250
Revenue, Jobs, and Job Income		0.03%	0.09%	0.19%

Source: US Census, 2007 Survey of Business Owners. Note: The $260 loss in retail sales and the $250 loss in job income effects per entity are rounded to the tens and not thousands in order to show an effect.

Table 28. Annual Impacts on Initial Importers (1,000 $2015)				
Number of Small Businesses	Total Losses	Loss per Business	Revenue per Business	Percent of Revenue Lost
5	$2,263	$453	$970	47%

Under Alternative 3, the probability of Bsal establishing in the United States will decrease compared to Alternative 2. The change in probability is unknown, but is expected to be substantial as known carriers and species which are expected to be carriers will be prohibited. Ecosystems that might otherwise be impacted will have a lower probability of consequences, and native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, will face a lower risk of exposure to Bsal. The reduced risk of exposure will avoid the need to rely on restoration activities which would likely to be very difficult to implement and have a low probability of success. This benefit estimate does not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree.

Table 29a and Table 29b display the result of the impacts on small business domestic breeders of salamanders. While we have limited information on the annual number of salamanders produced, no data was available on the number of domestic breeders. The production data that was received from PIJAC (2015b) is a portion of domestic production. What portion it represents is unknown. PIJAC (2015b) provided complete price estimations for 4 species within 2 genera and 1 species within another genus (**Table A1-2**). Therefore, while using only the publically available data may underestimate domestic production, this subset is likely to

be a more accurate estimation of the retail value for those species being analyzed than the imported salamanders.

To estimate the revenue per firm, census data on the number of firms and total revenue from the 2007 Survey of Business Owners for "Agriculture, forestry, fishing and hunting" (NAICS 11) was used. There was no data for "All Other Animal Production" (NAICS 112990) which led to the broader group of industries being used. This method estimates the most accurate measure of revenue per firm that can be derived from currently publically available data. The revenue per U.S. breeder is $48,500. The same method applied to the percent of revenue lost to each firm is underestimated due to the number of entities from many other industries under "Agriculture, forestry, fishing and hunting" (NAICS 11). Method One estimates the impact if effects were divided equally between all "Agriculture, forestry, fishing and hunting" entities. Using Method One, 219,964 entities would be affected and 0.0002 percent of each firm's revenue would be lost due to the IR. Method Two gives us a maximum impact and is likely to overestimate the impacts, yet should be more accurate than the first method. For Method Two, we assume all effects are on one entity. The total annual losses for small businesses are $23,382; therefore one business would experience revenue losses of $23,382. If this were the case, then the firm would lose 48 percent of their revenue.

Table 29a. Small Business Domestic Breeder Effects: All Businesses in Industry

	Number of Firms	Sales, Receipts, or Value of Shipments (1,000 $2015)	Number of Paid Employees	Annual Payroll (1,000 $2015)
Number of firms	258,781	$12,544,965	170,421	$6,328,613
Per Firm	-	$48.5	-	-
		Total Loss in Retail Sales ($2015)	Direct Jobs Decline	
Prefered Alternative		$27,508	0.33	

Table 29b. Small Business Domestic Breeder Effects: Small Businesses

Method 1			
	Small Businesses Affected	Small Business Lost Retail Sales ($2015)	Jobs Decline
Prefered Alternative	219,964	$23,382	0.28
Effect on One Firm	-	$0.11	-
Percent of Firm's Revenue	-	0.0002%	-
Method 2			
	Small Businesses Affected	Small Business Lost Retail Sales ($2015)	Jobs Decline
Maximum Effect on One Firm	1	$23,382	0.28
Maximum Percent of One Firm's Revenue	-	48%	-

Table 30 summarizes the two methods used to estimate the magnitude of the economic effects on the affected entities among pet stores and breeders. Estimates at the industry level are the minimum adverse impacts, since it includes many entities that are not involved in the salamander industry. The effect of having more firms lowers the impact per firm, making the economic effects less significant. Estimates using the unique importers (average of 5 a year), or one breeder, yield the maximum adverse impacts; no fewer entities would be impacted under the status quo. Bracketing the impacts on small businesses in this way shows that the impacts on importers or pet stores can be $110 per entity (effectively zero percent), up to $453,000 (47 percent). The impacts on breeders can be $0.11 per entity (effectively zero percent), up to $23,000 (48 percent). Both extremes are unlikely. Additional data would be necessary for a more precise estimation. Based on the lack of evidence to support the maximum estimation; the preferred alternative is not expected to have a significant economic impact on a substantial number of small entities.

Table 30. Regulatory Flexability Analysis Summary

Industry	Estimate Level	Number of Small Businesses	Average Annual Revenue Per Firm	Average Annual Revenue Lost per Small Business	Revenue Lost Per Small Business	Percent of Revenue Lost
Pet Stores (Importers)	Industry Total (Method 1)	8,820	$970,000	$2,263,000	$110	0.01%
	Average Annual Unique Importers (Method 2)	5			$452,500	47%
Domestic Breeders	Industry Total (Method 1)	219,964	$48,000	$23,000	$0.11	0.00%
	One Breeder (Method 2)	1			$23,000	48%

Notes: Pet store analysis includes all revenue losses for small businesses due to pet stores and breeders possibly overlapping. Domestic breeders only include losses directly to breeders that are small businesses. The losses cannot be summed.

4.5 Alternative 4 Analysis

In total, 2.5 million (**Table 31**) salamanders were imported between 2004 and 2014 (USFWS OLE 2015), the 2.5 million salamanders in the market during that time frame that sold for an estimated retail sales of $43.9 million. For detailed information on species level data including numbers imported, bred domestically, and prices refer to **Table A1-1 All Species Data**. The maximum annual loss to entities that deal in these species is $4.0 million in annual revenue. Of the $4.0 million decline in revenue, $2.4 million is expected to be direct effects on small businesses.

Table 31. Alternative 4: Direct and Aggregate Economic Effects of Revenue Losses ($2015)				
	Number of Salamanders (Thousands)	Direct Revenue Loss (all)	Direct Revenue Loss (small business)	Aggregate Economic Loss
Total (11 year)	2,518	$43.9	$26.5	$117.2
Per Year	229	$4.0	$2.4	$10.7

Listing all species and incurring the decline in imported salamanders and ensuing revenue decline leads to the following job and job incomes losses for the entire pet store industry and for small businesses therein. The change in revenue would lead to a decrease of 139 (**Table 32**) jobs, 60 of those from direct effects on small businesses. A decline of $4.4 million in job income includes a $2.3 million direct effect on small businesses.

Table 32. Alternative Four: Annual Decrease in Salamander Industry Related Employment and Job Income			
(Million $2015)			
Salamander Industry (Aggregate Effect)		Salamander Industry -Small Business- (Direct Effect Only)	
Jobs	Job Income	Jobs	Job Income
139	$4.4	60	$2.3

The annual impacts are shown over the standard ten year effects period below. Effects are discounted to the present value and then summed. **Table 33** shows these discounted values for direct revenue losses for all businesses, aggregate on all businesses, and direct on small businesses.

Table 33. 10 Year Discounted Effects From Revenue Losses (Millions $2015)						
Year	Non Discounted		3% Discount Rate		7% Discount Rate	
	Direct	Aggregate	Direct	Aggregate	Direct	Aggregate
2015	4.0	10.7	4.0	10.7	4.0	10.7
2016	4.0	10.7	3.9	10.3	3.7	10.0
2017	4.0	10.7	3.8	10.0	3.5	9.3
2018	4.0	10.7	3.7	9.8	3.3	8.7
2019	4.0	10.7	3.5	9.5	3.0	8.1
2020	4.0	10.7	3.4	9.2	2.8	7.6
2021	4.0	10.7	3.3	8.9	2.7	7.1
2022	4.0	10.7	3.2	8.7	2.5	6.6
2023	4.0	10.7	3.2	8.4	2.3	6.2
2024	4.0	10.7	3.1	8.2	2.2	5.8
Total	39.9	106.5	35.1	93.6	30.0	80.1
Note: May not sum to total due to rounding.						

Under Alternative 4, the probability of Bsal establishing in the United States is expected to decrease compared to Alternative 3. The change in probability is unknown. Not all known salamander species have been tested for Bsal. Many of the species tested have been shown to be adversely affected and capable of carrying Bsal; more species from more genera in the order Caudata may be carriers with varying levels of vulnerability. Listing all species of salamanders as injurious removes the key pathway for Bsal to enter the United States by prohibiting all species that comprise the order Caudata. While not quantifiable, ecosystems that might otherwise be impacted are expected to have a lower probability of consequences. Native species that are lethally vulnerable to Bsal, and those that are endangered or threatened, may face a lower risk of exposure to Bsal. The reduced risk of exposure will avoid the need to rely on restoration activities, which would likely be very difficult to implement and have a low probability of success. No significant impacts on small businesses are anticipated though they would be higher than Alternative 2 and 3. This benefit estimate does not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree.

4.6 Alternative 5 Analysis

The minimum effect would be identical to Alternative 1 (No Action) and the maximum effect would be that of Alternative 4 (prohibiting all salamanders). The effect on the number imported depends on the cost of compliance. Therefore, of the 2.5 million salamanders that were imported and sold between 2004 and 2014 (USFWS OLE 2015), all or none may have been imported and bred under these circumstances. They would have been sold for up to an estimated retail sales of $43.9 million (**Table 34**). For detailed information on species level data including numbers imported, bred domestically, and prices refer to **Table A1-1 All Species Data**. The maximum annual loss to entities that deal in these species is $4.0 million in revenue. Of the $4.0 million decline in revenue, $2.4 million is expected to be from direct effects on small businesses.

Table 34. Alternative 5: Direct and Aggregate Economic Effects of Revenue Losses ($2015)				
	Number of Salamanders (Thousands)	Direct Revenue Loss (all)	Direct Revenue Loss (small business)	Aggregate Economic Loss
Total (11 year)	2,518	$43.9	$26.5	$117.2
Per Year	229	$4.0	$2.4	$10.7

Mandating a health certificate for all species of salamanders declaring that they are free of Bsal could have a range of impacts. Listing all species so that they are not banned but instead require a health certificate could lead to a wide variety of effects. The decline in imported salamanders and ensuing revenue depicted here is the maximum job and job income losses for the entire pet store industry and small businesses therein. The change in revenue would lead to a decrease of 139 (**Table 35**) jobs, 60 jobs from direct effects on small businesses. A decline of $4.4 million in job income would occur, of which $2.3 million would be from direct effects on small businesses. The maximum loss depicted would occur if the process or cost of getting a health certificate increased business costs such that no salamanders were imported. Losses could also be as low as no jobs or job income, but are likely to be positive.

Table 35. Alternative Five: Annual Decrease in Salamander Industry Related Employment and Job Income			
(Million $2015)			
Salamander Industry (Aggregate Effect)		Salamander Industry -Small Business- (Direct Effect Only)	
Jobs	Job Income	Jobs	Job Income
139	$4.4	60	$2.3

The annual impacts are shown over the standard ten year effects period below. Effects are discounted to the present value and then summed. **Table 36** shows these discounted values for direct revenue losses for all businesses, aggregate on all businesses, and direct on small businesses.

Table 36. 10 Year Discounted Effects From Revenue Losses (Millions $2015)						
Year	Non Discounted		3% Discount Rate		7% Discount Rate	
	Direct	Aggregate	Direct	Aggregate	Direct	Aggregate
2015	4.0	10.7	4.0	10.7	4.0	10.7
2016	4.0	10.7	3.9	10.3	3.7	10.0
2017	4.0	10.7	3.8	10.0	3.5	9.3
2018	4.0	10.7	3.7	9.8	3.3	8.7
2019	4.0	10.7	3.5	9.5	3.0	8.1
2020	4.0	10.7	3.4	9.2	2.8	7.6
2021	4.0	10.7	3.3	8.9	2.7	7.1
2022	4.0	10.7	3.2	8.7	2.5	6.6
2023	4.0	10.7	3.2	8.4	2.3	6.2
2024	4.0	10.7	3.1	8.2	2.2	5.8
Total	39.9	106.5	35.1	93.6	30.0	80.1
Note: May not sum to total due to rounding.						

Under Alternative 5, the probability of Bsal establishing in the United States may decrease compared to Alternative 1. The change in probability is unknown. This benefit estimate does not quantify ecological, commercial, recreational, and non-use values of at risk ecosystems. The benefits from these additional factors are unknown, but are certainly positive to some degree.

4.7 Alternatives Summary

The ability of entities to deal in other species would decrease losses from the rule. However, individual businesses that breed or sell salamanders listed as injurious may face a range of impacts from minimal revenue decrease to closure. The total number of businesses and small businesses within that group, that may close is uncertain. Impacts to individual businesses are dependent upon: (1) whether these businesses sell other substitutable salamanders, pets or products as well, (2) if the species being listed are more profitable than non-listed salamanders or other aspects of the business, or (3) if consumers would substitute the purchase of other salamanders or that are not listed as injurious. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of salamanders or other pets that businesses sell. This analysis does not account for this type of substitution effect, thereby overestimating overall industry impacts to breeding and selling salamanders domestically.

4.7.1 Effects on Entities Importing and Selling Salamanders

Of the 20 genera (201 species) listed by the IR, 133 species are not native to the United States. From 2004 to 2014, nearly 2.5 million live salamanders of at least 59 species (see **Table A1-1 All Species Data**) were imported into the United States (USFWS OLE 2015b). Of the traded species, 30 would be listed and 29 would not be listed as injurious under the IR. Listing these 30 traded species, (51 percent of the species traded), accounts for 95% of individual

salamanders imported. The other 171 species that are being listed are not currently imported. Assuming that on average an importer will continue to purchase the same salamanders given a choice, it can be seen in **Table 37** that most importers, including small entities, are expected to be impacted.

Table 37. Estimated 11 Year Number of Salamander Importers Affected by Listing 20 Genera

	Number of Importers	Number of Expected Small Business Importers	Number of Affected Importers	Number of Expected Small Business Importers Affected
11-Year Average (2004 - 2014)	94	56	89	53
Source: USFWS OLE 2015; U.S. Census Bureau 2007				

Importers incur most losses in revenue; **Table 38** shows how the impacts are nearly identical to the total revenue losses detailed in the analysis of each alternative.

Table 38. Estimated Annual Impact on Salamander Import Sales
(Millions $2015)

	Average Annual Revenue from Imported Salamanders	Average Annual Importing Revenue from Affected Species	Percentage of Imported Revenue Lost Due to Listing	Average Annual Losses per Importer
Alternative 2	$3.9	$2.1	53%	$0.2
Alternative 3		$3.7	95%	$0.4
Alternative 4		$3.9	100%	$0.5
Alternative 5		$3.9	100%	$0.5

Table 39 Details the possible effects on tax receipts for the alternatives direct effect of inducing the loss of retail sales.

Table 39. Business Taxes Losses by Alternative (Thousands $2015)					
Description	**Reduction in Revenue**	**Direct**	**Indirect**	**Induced**	**Total Tax Losses**
Alternative 2	$2,075	$238	$42	$107	$386
Alternative 3	$3,760	$430	$75	$193	$699
Alternative 4	$3,995	$457	$80	$205	$743
Alternative 5	$3,995	$457	$80	$205	$743

Source: 2015 Minnesota IMPLAN Group, Inc.
Note: Numbers may not sum to total due to rounding.

4.7.2 10–Year Present Value Impacts

The present value of the effects of the alternatives on the economy and direct effects on small businesses within the salamander industry market is shown in **Table 40**. To calculate the present value for a 10 year time period, the social discount rates of 3 percent and 7 percent are applied per OMB guidance (U.S. Office of Management and Budget, 1992). The 10-year retail sales losses for the alternatives are estimated to range from $48.8 million to $93.6 million discounted at 3 percent or range from $41.7 million to $80.1 million discounted at 7 percent.

As noted earlier, these estimates are based on a variety of assumptions. The amount of sales impacted for U.S. breeding is completely dependent on the percentage of interstate transport. That is, the impact depends on where businesses are located and where their customers are located. Impacts also are dependent upon whether or not consumers would substitute the purchase of an animal that is not listed, which would thereby reduce economic impacts. There are no marketing data that estimate how consumer preference may change due to the listing thus changing the types of salamanders or other pets that businesses will sell. This analysis does not account for this type of substitution effect and thus may overestimate impacts, other things equal.

Table 40. 10-Year Present Value of Aggregate Economic Impacts (Millions $2015)				
	Alternative 2	**Alternative 3**	Alternative 4	Alternative 5
No Discounting	55.5	**100.5**	106.5	106.5
3 Percent Discount Rate	48.8	**88.3**	93.6	93.6
7 Percent Discount Rate	41.7	**75.5**	80.1	80.1

5.0 SUMMARY

The reduction of the risk of Bsal becoming established drives the ecological and economic benefits. For the IR, the risk reduction is solely due to the prohibition of imports and interstate transport. Economic costs stem exclusively from the prohibition of these activities, therefore economic benefits and costs increase or decrease together. The preferred alternative has middle range economic effects when compared to Alternatives 2 and 4. No ranking of economic costs between the preferred alternative to Alternative 5 can be made because it is unclear how much testing, treatment, and the health certification processes would cost. Due to the qualitative nature of the economic benefits, no conclusion on the net monetary benefits of alternatives can be made. Since the effects of the alternatives are in this analysis distributed evenly between all businesses and alternatives 2 through 4 are scales of each other. The preferred alternative has the same proportional impact on small businesses as Alternatives 2 and 4 though the magnitude changes. It is unknown if small businesses are more impacted under Alternative 5. The preferred alternative does not meet the cost criteria to be a significant rule. Furthermore the preferred alternative is not expected to have a significant economic impact on a substantial number of small entities.

Table 42 summarizes the results for the alternatives. Alternative 1 (No Action) is expected to have no effects on risk reduction or economic costs and benefits. The effects of alternatives 2-5 are depicted qualitatively relative to Alternative 1.

Table 42. Ecological and Economic Effects (Qualitative Summary)

	Alternative 1: No Action	Alternative 2: List 27 Species (Tested Carriers)	**Alternative 3*: List 20 Genera (201 Species)**	Alternative 4: List All Species in Order Caudata	Alternative 5: List All Species in Order Caudata (Health Certificate)
Economic Costs	None**	-	- -	- - -	-***
Economic Benefit	None**	+	+ +	+ + +	+****
Ecological Benefits	None**	+	+ +	+ + +	+****

Notes: *IR; ** No risk reduction by Service actions exist; reduction may occur through other's actions such as states and industry. ***Cost can not be known until compliance method is developed. **** Given current testing, treatment, and health certification processes that could be put in place immediately, it is predicted to be low.

The qualitative trade-offs between alternatives are above. This allows the net effects of an alternative that are monetized, quantified, and/or qualitatively described to be compared. As is discussed in the IR assessment the alternative that yields the best ecological outcome based on the available evidence of which genera are carriers is Alternative 3. This alternative will list 201 species under the Lacey Act as injurious.

Due to the adverse effects of Bsal on some native salamanders under laboratory conditions, we believe that the introduction of Bsal into the United States would cause significant impacts in affected native species. Infected salamanders can also transmit Bsal to other species even if the introduced salamander fails to establish a population. There is evidence that salamanders listed by this rule have the potential to escape and spread Bsal. Several of the species listed by this rule can survive long enough in the wild to transmit Bsal. Bsal can also persist long enough in the environment without a host to represent a threat.

The salamander species listed by this rule are those found within genera for which we have evidence that at least one species in that genus is a carrier of Bsal with no countervailing conclusive evidence that other species in that genus are not carriers. Our analysis found no conclusive evidence to the contrary that suggested all species within such genera are not carriers. Those species have the potential to introduce Bsal into the United States by transferring the pathogen to wild populations and thereby severely affecting wildlife resources. Although additional salamander species could be at risk from Bsal infection or could serve as a carrier, we are not listing species from 45 genera because they have not yet been tested. The current capacity to prevent escape, establishment, and spread is low. Rehabilitation of disturbed ecosystems is expected to be very difficult. The ability and effectiveness of measures to prevent or control Bsal is currently low. There are no known benefits of Bsal.

We believe that ecosystems where the dominant salamander species is vulnerable to lethal or susceptible infections with Bsal would be at risk from an introduction of this pathogen. We also believe that species that depend on salamanders for aspects of their life cycle or ecology may be adversely affected if salamanders decline in response to a Bsal introduction.

Preventing Bsal's establishment would benefit wildlife, wildlife resources, and society by avoiding these negative impacts. The IR is imminently necessary to decrease the risk of Bsal establishing in the United States. It bases its actions on current science about Bsal carriers, while acknowledging that uncertainties exist due to untested genera that may represent threats. Delaying action risks decreasing the benefits while the expected costs would remain the same, possibly leading to a less positive net outcome. For the reasons stated, the Service finds the 201 species of salamanders to be injurious to the wildlife and wildlife resources of the United States. By listing species that can carry Bsal, we are taking immediate action to help ensure the fungus does not infect native populations and cause severe individual mortality, population declines, and ecosystem harm.

APPENDIX A: DETAILED TABLES

Table A1-1 All Species Data displays salamander data at the species, genius, or family level, which have been used in this analysis. The groups of salamanders are the 201 species in the 20 genera to be listed in the rule. All imported and or domestically bred salamanders are also listed. The table includes retail pricing and importation data when it was able to be acquired. Depending on the availability of data, it is displayed at the species or genus level. Additional summary data is given such that all families within the order Caudata are accounted for.

Table A1-1 All Species Data

Family	Genus	Species	Number of Species	Price level	Number Bred in the US				Price per Salamander 2015			Analysis Price	Total Quantity (2004-2014)	Annual Average Quantity	Traded Species (1=Yes)	Domestic Retail Breeding (1=Yes)	20 Genera (1=Yes)	27 Species (1=Yes)
					2012	2013	2014	Average Annual US Bred	Low	Medium	High							
Ambystomatidae	**Ambystoma**	**All Species**	**32**														**0**	
Ambystomatidae	Ambystoma	-		Genus					$20	$20	$50	$30	68	6	1	1	0	0
Ambystomatidae	Ambystoma	Andersoni		Species					$25	-	$190	$107	4	0	1	0	0	0
Ambystomatidae	Ambystoma	Laterale		Species					$20	$25	$40	$28	1	0	1	0	0	0
Ambystomatidae	Ambystoma	Macrodactylum		Species					$20	$25	$40	$28	5	0	1	0	0	0
Ambystomatidae	Ambystoma	Maculatum		Species					$20	$30	$40	$30	454	41	1	0	0	0
Ambystomatidae	Ambystoma	Mexicanum		Species	200	300	500	333	$29	$39	$70	$46	1,421	129	1	1	0	0
Ambystomatidae	Ambystoma	Opacum		Species					$20	$25	$40	$28	3	0	1	0	0	0
Ambystomatidae	Ambystoma	Tigrinum		Species	106	416	1,060	527	$20	$25	$50	$32	50	5	1	1	0	0
Ambystomatidae	Ambystoma	Tigrinum Stebbinsi		Species	20	10	32	21	$30	$30	$40	$33	98	9	1	1	0	0
Cryptobranchidae	**Andrias**	**All Species**	**2**														**0**	
Cryptobranchidae	Andrias	-		None								$22	0	0	0	0	0	0
Cryptobranchidae	Andrias	Davidianus		None								$22	1	0	1	0	0	0
Cryptobranchidae	Andrias	Japonicus		None								$22	6	1	1	0	0	0
Plethodontidae	**Batrachoseps**	**All Species**	**22**														**0**	
Plethodontidae	Batrachoseps	-		None								$22	0	0	0	0	0	0
Plethodontidae	Batrachoseps	Stebbinsi		None								$22	5	0	1	0	0	0
Hynobiidae	**Batrachuperus**	**All Species**	**5**														**0**	
Hynobiidae	Batrachuperus	-		None								$22	83	8	0	0	0	0
Plethodontidae	**Bolitoglossa**	**All Species**	**130**														**0**	
Plethodontidae	Bolitoglossa	-		None								$22	102	9	0	0	0	0
Plethodontidae	Bolitoglossa	Dofleini		Species							$70	$70	581	53	1	0	0	0
Plethodontidae	Bolitoglossa	Mexicana		Species							$70	$70	5	0	1	0	0	0
Salamandridae	**Chioglossa**	**All Species**	**1**														**1**	
Salamandridae	Chioglossa	-		None								$22	0	0	0	0	1	0
Salamandridae	Chioglossa	Lusitanica		None								$22	10	1	1	0	1	1
Plethodontidae	**Chiropterotriton**	**All Species**	**13**														**0**	
Plethodontidae	Chiropterotriton	-		None								$22	15	1	0	0	0	0
Salamandridae	**Cynops**	**All Species**	**9**														**1**	
Salamandridae	Cynops	-		None								$22	216,412	19,674	1	0	1	0
Salamandridae	Cynops	Cyanurus		Species					$9	$13	$25	$16	2,291	208	1	0	1	1
Salamandridae	Cynops	Ensicauda		Species						$25		$25	14	1	1	0	1	1
Salamandridae	Cynops	Orientalis		Species					$10	$13	$16	$13	1,340,680	121,880	1	0	1	1
Salamandridae	Cynops	Pyrrhogaster		None								$22	196,873	17,898	1	0	1	1
Plethodontidae	**Desmognathus**	**All Species**	**21**														**0**	
Plethodontidae	Desmognathus	-		Genus					$13	$20	$30	$21	1	0	1	0	0	0
Dicamptodontidae	**Dicamptodon**	**All Species**	**4**														**0**	
Dicamptodontidae	Dicamptodon	-		None								$22	7	1	1	0	0	0
Plethodontidae	**Ensatina**	**All Species**	**1**														**0**	
Plethodontidae	Ensatina	-		None								$22	0	0	0	0	0	0
Plethodontidae	Ensatina	Eschscholtzii		Species							$30	$30	3	0	1	0	0	0
Salamandridae	**Euproctus**	**All Species**	**2**														**1**	
Salamandridae	Euproctus	-		None								$22	0	0	0	0	1	0
Salamandridae	Euproctus	Platycephalus		None								$22	0	0	0	0	1	1
Plethodontidae	**Eurycea**	**All Species**	**28**														**0**	
Plethodontidae	Eurycea	-		Genus					$12		$20	$16	5	0	1	0	0	0
Plethodontidae	**Hydromantes**	**All Species**	**11**														**1**	
Plethodontidae	Hydromantes	-		Genus							$24	$24	35	3	1	0	1	0
Plethodontidae	Hydromantes	Strinatii		Genus							$24	$24	0	0	0	0	1	1

Table A1-1 All Species Data Continued

Family	Genus	Species	Number of Species	Price level	Number Bred in the US				Price per Salamander 2015			Analysis Price	Total Quantity (2004-2014)	Annual Average Quantity	Traded Species (1=Yes)	Domestic Retail Breeding (1=Yes)	20 Genera (1=Yes)	27 Species (1=Yes)
					2012	2013	2014	Average Annual US Bred	Low	Medium	High							
Hynobiidae	**Hynobius**	**All Species**	**35**														**1**	
Hynobiidae	Hynobius	-		Genus					$20	$30	$37	$29	264	24	1	0	1	0
Hynobiidae	Hynobius	Amjiensis		Species					$20		$30	$25	1	0	1	0	1	0
Hynobiidae	Hynobius	Nebulosus		Genus					$20	$30	$37	$29	0	0	0	0	1	1
Salamandridae	**Ichthyosaura**	**All Species**	**1**														**1**	
Salamandridae	Ichthyosaura	-		None								$22	0	0	0	0	1	0
Salamandridae	Ichthyosaura	Alpestris		None								$22	0	0	0	0	1	1
Salamandridae	**Lissotriton**	**All Species**	**7**														**1**	
Salamandridae	Lissotriton	-		None								$22	0	0	0	0	1	0
Salamandridae	Lissotriton	Helveticus		None								$22	0	0	0	0	1	1
Salamandridae	Lissotriton	Italicus		None								$22	0	0	0	0	1	1
Proteidae	**Necturus**	**All Species**	**5**														**0**	
Proteidae	Necturus	-		None								$22	0	0	0	0	0	0
Proteidae	Necturus	Beyeri		None								$22	10	1	1	0	0	0
Proteidae	Necturus	Maculosus		Species							$45	$45	1,501	136	1	0	0	0
Salamandridae	**Neurergus**	**All Species**	**4**														**1**	
Salamandridae	Neurergus	-		Genus						$130	$150	$140	136	12	1	0	1	0
Salamandridae	Neurergus	Crocatus		Genus						$130	$150	$140	205	19	1	0	1	1
Salamandridae	Neurergus	Kaiseri		Species	100	100	200	133	$100	$130	$260	$163	485	44	1	1	1	0
Salamandridae	**Notophthalmus**	**All Species**	**3**														**1**	
Salamandridae	Notophthalmus	-		Genus					$13		$15	$14	15	1	1	0	1	0
Salamandridae	Notophthalmus	Viridescens		Genus					$13		$15	$14	754	69	1	0	1	1
Plethodontidae	**Oedipina**	**All Species**	**36**														**0**	
Plethodontidae	Oedipina	-		Genus							$13	$13	1	0	1	0	0	0
Hynobiidae	**Onychodactylus**	**All Species**	**10**														**1**	
Hynobiidae	Onychodactylus	-		None								$22	0	0	0	0	1	0
Hynobiidae	Onychodactylus	Japonicus		Species							$50	$50	33	3	1	0	1	1
Hynobiidae	**Pachyhynobius**	**All Species**	**1**														**0**	
Hynobiidae	Pachyhynobius	-		None								$22	0	0	0	0	0	0
Hynobiidae	Pachyhynobius	Shangchengensis		None								$22	413	38	1	0	0	0
Salamandridae	**Pachytriton**	**All Species**	**8**														**0**	
Salamandridae	Pachytriton	-		Genus					$19		$25	$22	7,833	712	1	0	0	0
Salamandridae	Pachytriton	Brevipes		Species							$16	$16	78,356	7,123	1	0	0	0
Salamandridae	Pachytriton	Labiatus		Genus					$19		$25	$22	26,607	2,419	1	0	0	0
Salamandridae	**Paramesotriton**	**All Species**	**13**														**1**	
Salamandridae	Paramesotriton	-		None								$22	195	18	1	0	1	0
Salamandridae	Paramesotriton	Caudopunctatus		Species					$19		$25	$22	463	42	1	0	1	0
Salamandridae	Paramesotriton	Chinensis		Species							$33	$33	2,670	243	1	0	1	0
Salamandridae	Paramesotriton	Deloustali		Species							$33	$33	16	1	1	0	1	1
Salamandridae	Paramesotriton	Hongkongensis*		None								$22	386,819	35,165	1	0	1	0
Salamandridae	Paramesotriton	Laoensis		None								$22	30	3	1	0	1	0
Plethodontidae	**Plethodon**	**All Species**	**55**														**1**	
Plethodontidae	Plethodon	-		Genus					$10		$29	$19	287	26	1	0	1	0
Plethodontidae	Plethodon	Glutinosus		Genus					$10		$29	$19	0	0	0	0	1	1
Salamandridae	**Pleurodeles**	**All Species**	**3**														**1**	
Salamandridae	Pleurodeles	-		Genus	50	175	390	205	$20	$24	$40	$28	30	3	1	1	1	0
Salamandridae	Pleurodeles	Waltl		Species					$20		$40	$30	1,183	108	1	1	1	1
Proteidae	**Proteus**	**All Species**	**1**														**0**	
Proteidae	Proteus	-		None								$22	0	0	0	0	0	0
Proteidae	Proteus	Anguinus		None								$22	4	0	1	0	0	0
Plethodontidae	**Pseudoeurycea**	**All Species**	**39**														**0**	
Plethodontidae	Pseudoeurycea	-		None								$22	204	19	1	0	0	0
Pseudotriton	**Pseudotriton**	**All Species**	**2**														**0**	
Pseudotriton	Pseudotriton	-		Genus							$40	$40	6	1	1	0	0	0
Rhyacotritonidae	**Rhyacotriton**	**All Species**	**4**														**0**	
Rhyacotritonidae	Rhyacotriton	-		None								$22	6	1	1	0	0	0

Table A1-1 All Species Data Continued

Family	Genus	Species	Number of Species	Price level	Number Bred in the US				Price per Salamander 2015			Analysis Price	Total Quantity (2004-2014)	Annual Average Quantity	Traded Species (1=Yes)	Domestic Retail Breeding (1=Yes)	20 Genera (1=Yes)	27 Species (1=Yes)
					2012	2013	2014	Average Annual US Bred	Low	Medium	High							
Salamandridae	**Salamandra**	**All Species**	**6**														**1**	
Salamandridae	Salamandra	-		None								$22	1,848	168	1	0	1	0
Salamandridae	Salamandra	Salamandra		Species							$50	$50	17,512	1,592	1	0	1	1
Hynobiidae	**Salamandrella**	**All Species**	**2**														**1**	
Hynobiidae	Salamandrella	-		None								$22	0	0	0	0	1	0
Hynobiidae	Salamandrella	Keyserlingii		Species					$40		$50	$45	2	0	1	0	1	1
Salamandridae	**Salamandrina**	**All Species**	**2**														**1**	
Salamandridae	Salamandrina	-		None								$22	0	0	0	0	1	0
Salamandridae	Salamandrina	Perspicillata		None								$22	0	0	0	0	1	1
Sirenidae	**Siren**	**All Species**	**2**														**1**	
Sirenidae	Siren	-		None								$22	0	0	0	0	1	0
Sirenidae	Siren	Intermedia		None								$22	0	0	0	0	1	1
Sirenidae	Siren	Lacertina		Species							$139	$139	12	1	1	0	1	0
Salamandridae	**Taricha**	**All Species**	**4**														**1**	
Salamandridae	Taricha	-		None								$22	0	0	0	0	1	0
Salamandridae	Taricha	Granulosa		None								$22	0	0	0	0	1	1
Plethodontidae	**Thorius**	**All Species**	**26**														**0**	
Plethodontidae	Thorius	-		None								$22	16	1	1	0	0	0
Salamandridae	**Triturus**	**All Species**	**10**														**1**	
Salamandridae	Triturus	-		None								$22	200,639	18,240	1	0	1	0
Salamandridae	Triturus	Cristatus		None								$22	37	3	1	0	1	1
Salamandridae	Triturus	Hongkongensis		None								$22	0	0	1	0	1	0
Salamandridae	Triturus	Pygmaeus		None								$22	0	0	0	0	1	1
Salamandridae	Triturus	Vittatus		None								$22	25	2	1	0	1	0
Salamandridae	**Tylototriton**	**All Species**	**21**														**1**	
Salamandridae	Tylototriton	-		None								$22	4,015	365	1	0	1	0
Salamandridae	Tylototriton	Kweichowensis		None								$22	3,906	355	1	0	1	1
Salamandridae	Tylototriton	Shanjing		None								$22	640	58	1	0	1	0
Salamandridae	Tylototriton	Taliangensis		None								$22	332	30	1	0	1	0
Salamandridae	Tylototriton	Uyenoi		None								$22	0	0	0	0	1	1
Salamandridae	Tylototriton	Verrucosus		None								$22	7,846	713	1	0	1	0
Salamandridae	Tylototriton	Ziegleri		None								$22	0	0	0	0	1	1
Ambystomatidae	***Genera (1)***		***32***															
Amphiumidae	***Genera (1)***		***3***															
Cryptobranchidae	***Genera (2)***		***3***															
Dicamptodontidae	***Genera (1)***		***4***															
Hynobiidae	***Genera (9)***		***64***															
Plethodontidae	***Genera (28)***		***448***															
Proteidae	***Genera (2)***		***6***															
Rhyacotritonidae	***Genera (1)***		***4***															
Salamandridae	***Genera (21)***		***113***															
Sirenidae	***Genera (2)***		***4***															
Order Caudata	***Genera (68)***		***681***															

Table A1-2. PIJAC Salamander Industry Survey: Species Level Prices and Quantity Domestically Bred For Retail							
		Number Bred in the US	Number Bred in the US	Number Bred in the US	Price per Salamander 2015		
Genus	Species	2012	2013	2014	Low	Medium	High
Ambystoma	Andersoni				$24.99	-	$189.99
Ambystoma	Laterale				$20.00	$24.99	$40.00
Ambystoma	Macrodactylum				$20.00	$24.99	$40.00
Ambystoma	Maculatum				$20.00	$29.99	$40.00
Ambystoma	Mexicanum	200	300	500	$29.00	$39.00	$69.99
Ambystoma	Opacum				$20.00	$24.99	$39.99
Ambystoma	Tigrinum	106	416	1,060	$19.99	$24.99	$49.99
Ambystoma	Tigrinum (Stebbinsi)	20	10	32	$29.99	$29.99	$39.99
Ambystoma					$19.99	$19.99	$49.99
Bolitoglossa	Dofleini				-	-	$69.99
Bolitoglossa	Mexicana				-	-	$69.99
Cynops	Cyanurus				$8.99	$12.99	$25.00
Cynops	Ensicauda					$24.99	-
Cynops	Orientalis				$10.00	$12.99	$15.99
Desmognathus					$12.99	$19.99	$29.99
Ensatina	Eschscholtzii				-	-	$29.99
Eurycea					$11.99	-	$19.99
Hydromantes					-	-	$24.49
Hynobius	Amjiensis				$19.99	-	$29.99
Hynobius					$19.99	$29.99	$36.99
Necturus	Maculosus				-	-	$44.99
Neurergus	Kaiseri	100	100	200	$99.99	$129.99	$259.99
Neurergus						$129.95	$149.99
Notophthalmus					$12.99		$14.99
Oedipina							$12.99
Onychodactylus	Japonicus						$49.99
Pachytriton	Brevipes						$15.99
Pachytriton					$18.99		$24.99
Paramesotriton	Caudopunctatus				$18.99		$24.99
Paramesotriton	Chinensis						$32.99
Paramesotriton	Deloustali						$32.99
Plethodon					$9.99		$28.99
Pleurodeles	Waltl				$19.99		$39.99
Pleurodeles		50	175	390	$19.99	$24.00	$39.89
Pseudotriton							$39.99
Salamandra	Salamandra						$49.99
Salamandrella	Keyserlingii				$39.99		$49.99
Siren	Lacertina						$139.00
Source: PIJAC 2015b							

APPENDIX B: COMMENTS AND QUESTIONS

Under the process for an interim rule, we are soliciting comments that will be addressed after the rule goes into effect. With the interim rule, we are attempting to prevent the introduction and subsequent establishment of the chytrid fungus, Bsal, which is a pathogen that could cause significant harm to native salamander species and their ecosystems. Based on the Service's analysis, the opportunity exists to take urgent action to prevent the introduction of Bsal. This action will safeguard U.S. wildlife and natural resources, while providing time for monitoring and other measures to be developed that may allow safe trade in salamanders to resume later. As such, we are soliciting public comments and supporting data on the draft economic analysis and the interim rule to add 201 species of salamanders to the list of injurious amphibians under the Act. We will also submit the rule for peer review concurrent with public comments. In conducting peer review, we will follow guidance from the Office of Management and Budget "Final Information Quality Bulletin for Peer Review" (OMB 2004) and the Service's own guidance. We will review the public and peer review comments for the preparation of our final rule. The draft economic analysis, draft regulatory flexibility analysis, and the interim rule will be available on *http://www.regulations.gov* under Docket No. FWS-HQ-FAC-2015-0005. A summary of the significant issues raised by the public comments in response to this report, a summary of the assessment of the agency of such issues, and a statement of any changes made in the interim rule as a result of such comments is delayed pending comments.

We are soliciting public comments and supporting data to gain additional information, and we specifically seek comment on the following economic questions:

1. How many of the species listed by this rule are currently in production for wholesale or retail sale, and in how many and which States?
2. How many businesses sell one or more of the species listed by this rule?
3. How prevalent is the shipping of salamanders? What are the costs involved?
4. What are the average costs of veterinary care for a salamander per year or over its lifespan?
5. How many businesses breed one or more of the species?
6. What provisions in the interim rule should the Service have considered with regard to: (a) the impact of the provision(s) (including any benefits and costs), if any, and (b) what alternatives, if any, the Service should consider, as well as the costs and benefits of those alternatives, paying specific attention to the effect of the rule on small entities?
7. How could the interim rule be modified to reduce costs or burdens for small entities consistent with the Service's requirements?
8. What are the relevant Federal, State, or local rules that may duplicate, overlap, or conflict with the proposed rule?

APPENDIX C: KEY TERMS

Direct effects are simply the initial effects or impacts of spending money; for example, spending money in a pet store for a salamander.

Distributors: Distributors include firms and individuals that sell salamanders to other businesses, either in lieu of or in addition to selling to consumers.

Economic output shows the total industrial output associated with the estimated retail sales. Total output is the production value (alternatively, the value of all sales plus or minus inventory) of all output generated by these sales. Total output includes the direct, indirect and induced effects of salamander-related expenditures.

Exhibitors: A number of individuals and firms attend amphibian shows and exhibits nationwide.

Hobbyist and Commercial Breeders: A number of salamander owners also breed their salamanders. Some owners may do so strictly for their own enjoyment with no intent to sell the salamanders, while others may intend to sell in limited quantities to other pet owners or breeders. Commercial breeders run businesses that sell salamanders to wholesalers, retailers, other breeders, zoos, research organizations, and other entities. Commercial breeders may also acquire salamanders through harvesting individuals from the wild.

Indirect effects: The purchase of salamander-related supplies by the retailer.

Induced effects refer to the changes in production associated with changes in household income (and spending) caused by changes in employment related to both direct and indirect effects. More simply, people who are employed by the retailer, by the wholesaler, and by the manufacturer of salamander-related supplies spend their income on various goods and services, which in turn generate a given level of output. The dollar value of this output is the induced effect of the initial retail salamander purchase.

Jobs and job income (direct): include those directly employed by pet stores and breeders. Employment includes both full and part-time jobs, with a job defined as one person working for at least part of the calendar year, whether one day or the entire year.

Jobs and job income (indirect and induced): as described above and for secondary effects indirect and induced effects are included in a manner similar to total industrial output.

Response to Bsal -

***Carrier*:** Salamander specimens are capable of transmitting Bsal to other salamanders and introducing the fungus into the United States.

***Lethal*:** Salamander specimen dies as a result of infection.

Non-Carrier: Salamander specimens are not capable of transmitting Bsal to other salamanders and introducing the fungus into the United States

***Resistant*:** Salamander specimen that shows no sign of infection or disease following exposure to Bsal.

***Susceptible*:** Salamander specimen is infected and has clinical signs of disease with the possibility of subsequent recovery.

***Tolerant*:** Salamander specimen shows infection but no signs of disease.

***Unknown*:** Salamander specimen's response to Bsal is undetermined.

Retail sales: The income accrued from the selling of goods and/or services over a given period. Salamander retail sales are herein defined as the quantity sold times the price of a salamander.

Retailers: Salamander sales by retailers may include over-the-counter sales such as pet stores, internet-based sales, and mail-order firms.

Revenue: Total income of a business including but not limited to retail sales.

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

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