| If . . . | Then include . . . |
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| (j) the estimated value of the acquisition exceeds $10 million ............... | 52.222–24 Pre-award On-site Equal Opportunity Compliance Evaluation. |
| (k) the contracting officer requires cost or pricing data for work or services exceeding the threshold identified in FAR 15.403–4. | 52.215–10 Price Reduction for Defective Certified Cost or Pricing Data.<br>52.215–12 Subcontractor Certified Cost or Pricing Data. |
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[FR Doc. 2016–00475 Filed 1–12–16; 8:45 am]

**BILLING CODE 6820–161–P**

## DEPARTMENT OF THE INTERIOR

### Fish and Wildlife Service

### 50 CFR Part 16

**RIN 1018–BA77**

**[Docket No. FWS–HQ–FAC–2015–0005; FXFR13360900000–156–FF09F14000]**

## Injurious Wildlife Species; Listing Salamanders Due to Risk of Salamander Chytrid Fungus

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Interim rule; request for comments; notice of availability of economic analysis.

**SUMMARY:** The U.S. Fish and Wildlife Service is amending its regulations under the Lacey Act to add all species of salamanders from 20 genera, of which there are 201 species, to the list of injurious amphibians. With this interim rule, 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 are prohibited, 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. This action is necessary to protect the interests of wildlife and wildlife resources from the introduction, establishment, and spread of the chytrid fungus *Batrachochytrium salamandrivorans* into ecosystems of the United States. The fungus affects salamanders, with lethal effects on many species, and is not yet known to be found in the United States. Because of the devastating effect that we expect the fungus will have on native U.S. salamanders if introduced and, therefore, the need to act immediately to prevent the disease from being introduced into the United States, the Service is publishing this interim rule.

**DATES:** This interim rule is effective as of January 28, 2016. Interested persons are invited to submit written comments on this interim rule on or before March 14, 2016

**ADDRESSES:** You may submit comments by any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Search for Docket No. FWS–HQ–FAC–2015–0005 and follow the instructions for submitting comments.
- *Mail, Hand Delivery, or Courier:* Public Comments Processing, Attn: FWS–HQ–FAC–2015–0005; Division of Policy, Performance, and Management Programs; United States Fish and Wildlife Service; MS: BPHC; 5275 Leesburg Pike; Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see *Comments on the Content of the Interim Rule* for more information). All submissions received must include ‘‘Docket No. FWS–HQ–FAC–2015–0005’’ for this rulemaking. For detailed instructions on submitting comments and additional information on the rulemaking process, see *Comments on the Content of the Interim Rule.*

*Docket:* For access to the docket to read background documents or comments received, go to *http://www.regulations.gov* and find Docket No. FWS–HQ–FAC–2015–0005.

**FOR FURTHER INFORMATION CONTACT:** Jason Goldberg or Susan Jewell, Injurious Wildlife Listing Coordinators, United States Fish and Wildlife Service, Branch of Aquatic Invasive Species; MS: FAC; 5275 Leesburg Pike; Falls Church, VA 22041–3803 telephone 703–358–1715. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

**SUPPLEMENTARY INFORMATION:**

### Executive Summary

Under the Lacey Act (18 U.S.C. 42, as amended), the Secretary of the Interior may list by regulation those wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, reptiles, and the offspring or eggs of any of the foregoing 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.

We have determined that salamanders that can carry the fungus *Batrachochytrium salamandrivorans* (Bsal) are injurious to wildlife and wildlife resources of the United States. This determination was based on a review of the literature and an evaluation under the criteria for injuriousness by the Service. The salamander species listed by this interim rule are those found within a genus for which 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. We find that, due to shared characteristics by species within a genus, other species within these genera are also highly likely to be carriers of Bsal. Although additional salamander species could be at risk from Bsal infection or could serve as a carrier, we are not listing species in those genera because they have not yet been tested.

The U.S. Fish and Wildlife Service (Service, USFWS, or we) is amending its regulations under the Lacey Act to add to the list of injurious wildlife all species of live and dead specimens from 20 genera, including body parts, from the amphibian order Caudata, which includes animals commonly referred to as salamanders, newts, and other names (hereafter, salamanders). The purpose of listing these species as injurious wildlife is to prevent the introduction, establishment, and spread of the fungus (Bsal) in the wild in the United States. The fungus affects only salamanders, has lethal effects on many salamander species, and is not yet known to be found in the United States.

The United States has the greatest diversity of salamanders in the world, the salamanders are a vital part of native ecosystems, and numerous salamander populations are at risk of endangerment from Bsal. Experience with the introduction of Bsal into the Netherlands and associated deleterious effects to native salamanders, along with laboratory research, confirms that Bsal can be introduced and cause substantial and immediate harm in the United States.

A risk assessment conducted by the U.S. Geological Survey concluded that the potential for Bsal introduction into the United States is high, the United States has suitable conditions for Bsal survival, and the consequences of introduction into the United States are expected to be severe and occur across a wide range of the United States. The main pathway for the global spread of Bsal is the international trade in salamanders. The ability and effectiveness of measures to prevent or control Bsal is currently low. Trade in wildlife occurs on a global scale, and amphibians are one of the most commonly traded animals. Therefore, listing the 20 genera will be effective at reducing the likelihood that Bsal enters the United States and presents a threat to native salamander species.

Of the 190 native U.S. salamander species, at least 2 species are lethally vulnerable to Bsal and at least 1 is tolerant of Bsal infection. At least four are resistant to Bsal infection, of which one is expected to be a carrier because Bsal was able to invade the skin of that species long enough to move or transmit the fungus to other salamanders. In addition, researchers have identified a non-native species that is lethally vulnerable to Bsal that is found within a fifth genus that also includes native species. On this basis, the Service finds that at least 67 native species from 5 genera are carriers of Bsal.

Native salamander species that demonstrate limited disease under experimental conditions may demonstrate more severe clinical disease when infection is combined with additional stressors in the wild. We concluded from our analysis that the introduction of Bsal into the United States can cause significant, adverse, population-level effects in native species. As keystone species, loss of salamanders from Bsal infection would have significant impacts on ecosystems, including food webs and nutrient cycling.

All 20 genera of salamanders, plus any new species that may be identified in the future within the genera listed by this interim rule, are found to be injurious. Even if a salamander found to be injurious could not establish a population in the wild, an infected salamander in captivity can still transmit Bsal to native populations if that salamander escapes or if material touching it is disposed of improperly. Bsal is capable of surviving outside of a host and causing extensive damage to wildlife and wildlife resources, including federally endangered and threatened species. Eradicating Bsal would be extremely difficult once introduced and established, the ability to rehabilitate disturbed ecosystems is expected to be low, and controlling Bsal is not practical. Prophylactic treatments for imports of salamanders to manage Bsal are in development but are not yet fully tested or feasible.

We are amending our regulations under an interim rule and are foregoing a proposed rule. The interim rule will take effect on the date specified above in **DATES**, with public comment to conclude as set forth in **DATES**. Based on public comments received, the interim rule may be revised. If Bsal is introduced into the United States, it is expected to have negative effects on many species of native salamanders. No conclusive evidence exists that suggests that Bsal is found in the United States. Therefore, the opportunity exists to take urgent action now to prevent the introduction of Bsal. Listing 20 genera of salamanders as injurious wildlife is an essential step in helping to keep Bsal out of the United States by preventing introduction of salamanders that serve as carriers of the fungus and are capable of introducing it to the United States. This interim rule lists some species that are currently in trade and some that are not; the focus is on species that are likely carriers of Bsal and capable of transmitting it to the same or other species.

Consistent with the statutory language and congressional intent, it is the Service's longstanding and continued position that the Lacey Act, 18 U.S.C. 42, prohibits both the importation into the United States and all interstate transportation between States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States, including interstate transportation between States within the Continental United States, of injurious wildlife, regardless of the preliminary injunction decision in *U.S. Association of Reptile Keepers* v. *Jewell,* No. 13–2007 (D.D.C. May 12, 2015). The Service's interpretation of 18 U.S.C. 42(a)(1) finds support in the plain language of the statute, the Lacey Act's purpose, legislative history, and congressional ratification. First, the statute's use of the disjunctive ''or'' to separate the listed geographic entities indicates that each location has independent significance. Second, Congress enacted the Lacey Act in 1900 for the purpose of, among other things, regulating the introduction of species in localities, not merely large territories, where they have not previously existed. See 16 U.S.C. 701. Third, the legislative history of Congress's many amendments to the Lacey Act since its enactment in 1900 shows that Congress intended, from the very beginning, for the Service to regulate the interstate shipment of certain injurious wildlife. Finally, recent Congresses have made clear that Congress interprets 18 U.S.C. 42(a)(1) as prohibiting interstate transport of injurious wildlife between the states within the continental United States. In amending § 42(a)(1) to add bighead carp and zebra mussels as injurious wildlife without making other changes to the provision, Congress repeated and ratified the Service's interpretation of the statute as prohibiting all interstate transport of injurious species.

The prohibitions on importation and all interstate transportation are both necessary to prevent the introduction, establishment, and spread of injurious species that threaten human health or the interests of agriculture, horticulture, forestry, or the wildlife or wildlife resources of the United States. By listing the 20 genera as injurious wildlife, both importation and interstate transportation of any live or dead specimen, including parts, is prohibited, except by permit (in accordance with conditions) for zoological, educational, medical, or scientific purposes or by Federal agencies without a permit solely for their own use.

The Service conducted an economic analysis and regulatory flexibility analysis as required under the rulemaking process. The draft economic analysis considers five alternatives: (1) No action; (2) list species that were shown by Martel *et al.* (2014) and other sources to be carriers of Bsal; (3) list all species in genera where there is at least one confirmed carrier and all species in the genus are likely to be a carrier, and there is no countervailing conclusive evidence suggesting that some species within the genus are not carriers; (4) list all salamanders; and (5) require a health certificate stating that the animal being moved is free of Bsal, in lieu of or in addition to listing.

The annual retail sales loss of listing 201 species, based on the 20 genera listed, is estimated to be $3.9 million, of which $2.3 million are losses to small businesses. Impacts per small business may be as high as $453,000 for importers and $23,000 for domestic breeders. The cost estimate represents the loss of revenue from listing the species to companies or individuals involved in the importation, interstate movement, or final consumer sales of salamanders that are imported and moved between States. No significant economic impact on a substantial number of small entities is anticipated. 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.

From 2004 to 2014, nearly 2.5 million live salamanders of at least 59 species were imported into the United States. The 228,000 average annually imported salamanders are primarily for the pet trade. Fewer than 100 total businesses, institutions, and individuals imported salamanders over this time period (USFWS OLE 2015) for a retail value of $44 million dollars. 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 timeframe 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, which is informed by the current state of scientific knowledge.

This interim rule is effective as of the date specified above in **DATES**. Interested persons are invited to submit written comments on this interim rule on or before the date set forth in **DATES**.

## Background

### *Purpose of Listing as Injurious*

The purpose of listing the 20 genera of live and dead specimens, including parts, from the order Caudata commonly referred to as salamanders, newts, and other names (hereafter, salamanders) as injurious wildlife is to prevent the accidental or intentional introduction of salamanders into the United States that are expected to serve as carriers of *Batrachochytrium salamandrivorans* (hereafter, Bsal), a fungus that poses a risk to native species of salamanders. If Bsal is introduced into wild populations of native salamanders, we expect it to cause significant damage to wildlife and the wildlife resources of the United States.

### *Need for the Interim Rule*

Under the Lacey Act (Act) (18 U.S.C. 42, as amended), the Service, through the Secretary of the Interior, may prescribe by regulation any wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, reptiles, or the offspring or eggs of any of the foregoing found to be injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States. Salamanders are amphibians, and the Service has the authority to list them under the Lacey Act when it finds that they are injurious to one or more of the statutory interests. We may list species before they are introduced into the United States and, therefore, are able to harm interests of the United States as defined under the Act. We have determined that salamanders that potentially carry Bsal are injurious to wildlife and wildlife resources of the United States. With this interim rule, we are attempting to prevent the introduction and subsequent establishment of the chytrid fungus, Bsal, which is a pathogen capable of causing significant harm to native salamander species and their ecosystems. As described below under *Role of Salamanders in the Ecosystem,* the benefits that these native salamander species provide to ecosystems in ensuring ecosystem health and stability, and, in turn, the ecosystem services that benefit people, are significant.

Martel *et al.* (2014) and Cunningham *et al.* (2015) (as explained further in Chytridcrisis (2015b)) identified some of the salamander species that can carry Bsal and are at risk from infection. The research tested a limited number of the approximately 681 known species of salamanders that exist worldwide and found that not every species was negatively affected by the fungus. However, the results clearly indicate a severe threat for many species of salamanders that will be negatively affected by this pathogen, including 2 of the 7 species tested that are also native to the United States and were found to be lethally vulnerable to the fungus. Recent research has highlighted concerns of emerging infectious disease of fungal origin that can cause a significant loss in biodiversity and ecosystem services (Fisher *et al.* 2012); Bsal appears to be the latest.

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, and conservation and other organizations who have written the 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). In response to the scientific findings, letters to the Service, and the petition the Service initiated a review to determine whether salamanders capable of carrying Bsal should be listed as injurious. Based on the Service's genus-level carrier extrapolation from data obtained from Martel *et al.* (2014), and because Bsal has not been found in the United States (Martel *et al.* 2014; Muletz *et al.* 2014; Bales *et al.* 2015), the opportunity exists to take urgent action to prevent the introduction of Bsal. This action will help 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.

We reviewed Bsal and the salamander species that carry this fungus using the Injurious Wildlife Evaluation Criteria, described in more detail as part of this interim rule in *Factors That Contribute to Salamanders Being Considered Injurious,* which the Service developed to evaluate whether a species qualifies as injurious under the Act. The resulting analysis serves as a basis for the Service's regulatory decision regarding injurious wildlife species listings. This interim rule finds that Bsal is a significant threat to the wildlife and wildlife resources of the United States and lists 20 genera of salamanders that we have determined to be injurious because they are likely carriers of Bsal.

Rulemaking under the Act is governed by the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq.*). The process of issuing a proposed rule, providing the opportunity for public comment, and completing a final rule can take a significant amount of time to complete. During this time, the species proposed for listing are still allowed to be imported and transported, offering increased opportunities for introduction, establishment, and harm. Under section 553(b)(3)(B) of the APA, however, a proposed rule is not required ''when the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.'' There is good cause to forgo notice and public comment on a proposed rule in this instance and instead take immediate action in the form of an interim rule to help prevent this fungus from being introduced, established, or spread in the United

States. Providing notice and public comment prior to implementing the injurious wildlife prohibitions would be contrary to the public interest because of the need to take immediate action due to the significant risk from Bsal. For these reasons, we also find good cause in accordance with 5 U.S.C. 553(d)(3) to make the interim rule effective less than 30 days after the date of publication. Due to the significant risk of introduction, establishment, and spread of Bsal in the United States, this interim rule will take effect 15 days after publication in the **Federal Register**. Based on prior experience, a shorter-than-normal effective date will also help reduce the risk that importers will rush to import these species before the listing becomes effective. For example, in the case of snakeheads (Channidae), the Service documented a nearly three-fold increase in the importation of snakeheads after the proposed rule was first announced (67 FR 48855; July 26, 2002) and before the final rule took effect, approximately two months later (67 FR 62202; October 4, 2002). However, we also recognize that an immediate effective date is not practical when live animals may be in transit on the day the interim rule takes effect. A delay of 15 days before the interim rule goes into effect will allow for the reasonable completion of imports and transports already in progress and give wildlife inspectors and other law enforcement officers time to enforce the interim rule.

Experience with the introduction of Bsal into the Netherlands and associated deleterious effects to native salamanders, along with laboratory research, confirms that Bsal can be introduced, establish, and spread and cause substantial and immediate harm in the United States (Spitzen-van der Sluijs *et al.* 2013; Martel *et al.* 2014; Cunningham *et al.* 2015; Chytridcrisis 2015b). The United States leads all other countries in salamander diversity (Partners in Amphibian and Reptile Conservation, Stein and Kutner 2000). Based on scientific evidence, we know that the fungus is lethal to at least 2 salamander species native to the United States. Of the 190 native U.S. species, we find that at least 67 species are carriers and 20 are not carriers. The remaining 103 species have not been evaluated, and many of these species may also be affected by this potentially deadly fungus. While the Service's greatest concern will be for species that are lethally vulnerable to Bsal, salamander species known to be tolerant of or susceptible to Bsal infection under experimental conditions may also develop clinical disease or increased severity of disease, respectively, when infection is combined with additional stressors in the wild, as has been found for other diseases, including those in amphibians (Wobeser 2007; Kerby *et al.* 2011; Kiesecker 2011).

In the United States, Bsal has either not been introduced, has been introduced but has failed to establish, or is present but has not been positively detected. Although we do not have any conclusive evidence showing that introductions have occurred, history from other pathogens similar to Bsal, such as Bd, however, suggests that the fungus is likely to spread quickly throughout the United States if it is not prevented from being introduced. Moreover, efforts to control or eradicate introduced or established invasive species and manage the costs they incur to society are generally less effective and more expensive and difficult than efforts that prevent establishment (Leung *et al.* 2002; Finnoff *et al.* 2007). Prevention of invasive species is typically the most cost-effective measure to avoid the damage that such species cause (Leung *et al.* 2002; Lodge *et al.* 2006; Keller and Springborn 2014). As noted in the National Invasive Species Management Plan, ''prevention is the first line of defense'' and ''can be the most cost effective approach because once a species becomes widespread, controlling it may require significant and sustained expenditures'' (National Invasive Species Council 2008).

If Bsal has unknowingly been introduced but failed to establish for unknown reasons, it is still important to take action now because additional introductions increase the likelihood of establishment and harm. As more salamanders that can carry Bsal are imported into the United States, the probability increases that one or more of those salamanders, through a phenomenon called propagule pressure or ''introduction effort,'' described in Lockwood *et al.* (2005) as a measure of the number of nonnative individuals released into a region, will give Bsal the opportunity to establish and spread.

Listing the salamanders as injurious will help keep Bsal out of the United States by preventing the importation of salamanders capable of carrying the fungus and serving as the vector of introduction into U.S. ecosystems, thereby causing injurious effects consistent with the Act. Given the expected consequences that Bsal's introduction would have to wildlife and wildlife resources of the United States, we are listing species that we have determined to be injurious. This interim rule lists some species that are currently in trade as well as some that are not. We have the authority under the Act to list certain species as injurious even if they are not currently in trade or known to exist in the United States.

The salamander species listed by this interim 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. We describe our rationale for this course of action below under *Classification and Status as Carriers.* Our decision-making included the following considerations: All 20 genera of salamanders, plus any new species identified within the genera listed by this interim rule, are found to be injurious because suitable climate exists in parts of the United States to support Bsal; even if a salamander listed by this interim rule could not establish a population in the wild, an infected salamander in captivity (or the water and soil in which it came into contact) can transmit Bsal to native populations; Bsal is capable of causing extensive damage to wildlife and wildlife resources, including federally endangered and threatened species; eradicating Bsal would be extremely difficult once introduced and established; and controlling Bsal is not practical.

Although this interim rule takes effect on the date specified above in **DATES**, it will still provide the public with a period of time to comment on the listing and associated documents. The final rule will contain responses to comments received on the interim rule, state the final decision, and provide the justification for that decision.

*Listing Species That Carry Pathogens*

Pathogens are agents such as viruses, bacteria, and fungi that cause diseases in animals and plants. The Service does not have the direct authority under the Act to list pathogens as injurious. We also cannot list or regulate fomites (materials such as water that can transmit pathogens). However, wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, or reptiles that are hosts to pathogens, such as viruses, bacteria, or fungi that cause disease, can be injurious if the likelihood, scope, and severity of effects significantly affect one or more of the interests listed in the Act. Even if the host species cannot establish populations in the wild, it can present significant risk if the pathogen the host is carrying can infect wildlife or wildlife resources or affect human beings or the interests of agriculture, horticulture, or forestry in the United States. Among other impacts, diseases caused by introduced pathogens reduce biodiversity (the variety of different types of life on earth) and have been implicated in the local extinction of many animal taxa (Daszak *et al.* 2000).

We have previously listed species under the Act that serve as hosts to pathogens, as in the case of fish in the salmon family Salmonidae (32 FR 20655; December 21, 1967, 33 FR 6827; May 4, 1968, and 58 FR 58976; November 5, 1993). Members of the family Salmonidae (salmon, trout, and char) are not injurious provided they are free from certain pathogens. However, salmon that are alive or are dead and uneviscerated (internal organs have not been removed) without a health certificate declaring that the fish are pathogen free are injurious to wildlife and wildlife resources due to the risk of transmitting pathogens that cause devastating diseases in fish. Although prophylactic treatments for imports of salamanders to manage Bsal are in development, they are not yet fully tested or feasible.

*Listing and Evaluation Process*

The regulations contained in part 16 of title 50 of the Code of Federal Regulations (CFR) implement the Lacey Act and include the lists of all species determined by the Service or by Congress to be injurious. Under the terms of the Act, the Secretary of the Interior may prescribe by regulation those wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, reptiles, and the offspring or eggs of any of the foregoing that are injurious to humans, to the interests of agriculture, horticulture, or forestry, or to the wildlife or wildlife resources of the United States. The lists of injurious wildlife species are found at 50 CFR 16.11–16.15. Under these regulations, species are added to the lists of injurious wildlife to protect statutorily defined interests from potential and known negative effects. Most species listed have the capacity to establish populations in the wild, spread, and cause harm. However, a species can be listed based solely on its capacity to cause harm. As noted in the previous section, dead, uneviscerated salmonids without a health certificate are not capable of establishing in the United States, but they are injurious because the pathogens they may carry are harmful.

Under the Act, the Service can list species that are nonnative or indigenous to the United States. In the case of an indigenous species, for example, the Service may find that it is injurious because its transport and release into another State outside the species' range will cause harm to human beings, agricultural or forestry interests, or natural systems. Furthermore, a species does not have to be currently imported or present in the wild in the United States for the Service to list it as injurious. For species not yet imported into the United States, the objective of listing is to prevent that species' importation and likely introduction and possible establishment and spread in the wild, thereby preventing injurious effects consistent with the purposes of the Act. For species that are present in the United States, the Act prevents the further introduction, establishment, or spread of the species by prohibiting interstate transport.

Importation into the United States of an injurious species is prohibited. Transportation between the States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States of an injurious species is also prohibited. These prohibited activities may be undertaken by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use, upon filing a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service inspector at the port of entry. The Act does not regulate intrastate transport (transport within a State or territory) or possession of injurious species. Any regulations pertaining to the transport or use of these species within a particular State or U.S. territory are the responsibility of that State or territory.

The Service uses criteria, identified below, to evaluate whether a species does or does not qualify as injurious under the Act. The analysis that is developed using these criteria serves as a general basis for the Service's regulatory decision regarding injurious wildlife species listings. Biologists and risk managers within the Service who are knowledgeable about a species that is being evaluated assess both the factors that contribute to and the factors that reduce the likelihood of injuriousness.

(1) Factors that contribute to being considered injurious:

- The likelihood of release or escape;
- Potential to survive, become established, and spread;
- Impacts on wildlife resources or ecosystems through hybridization and competition for food and habitats, habitat degradation and destruction, predation, and pathogen transfer;
- Impacts to threatened and endangered species and their habitats;
- Impacts to human beings, forestry, horticulture, and agriculture; and
- Wildlife or habitat damages that may occur from control measures.

(2) Factors that reduce the likelihood of the species being considered as injurious:

- Ability to prevent escape and establishment;
- Potential to eradicate or manage established populations (for example, making organisms sterile);
- Ability to rehabilitate disturbed ecosystems;
- Ability to prevent or control the spread of pathogens or parasites; and
- Any potential ecological benefits to introduction.

In the case of this interim rule, the issue is not whether a given salamander species is invasive, but rather the role of salamanders in introducing the Bsal fungus into the United States and the scope and severity of effects caused by salamanders that are carriers of Bsal on human beings or the interests of agriculture, horticulture, or forestry, or the wildlife or wildlife resources of the United States.

## Comments on the Content of the Interim Rule

We are soliciting public comments and supporting data on the draft economic analysis, the draft regulatory flexibility analysis, and this interim rule to add all species from 20 genera of salamanders to the list of injurious amphibians under the Act. We will review the public comments for the preparation of our final rule. The draft economic analysis and regulatory flexibility analysis and this interim rule will be available on *http://www.regulations.gov* under Docket No. FWS–HQ–FAC–2015–0005. You may submit your comments and materials concerning this interim rule by one of the methods listed in **ADDRESSES**. We will not accept comments sent by email or fax or to an address not listed in **ADDRESSES**.

We will post your entire comment—including your personal identifying information—on *http://www.regulations.gov*. If your written comments provide personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so.

Comments and materials we receive, as well as supporting documentation we used in preparing this interim rule, will be available for public inspection on *http://www.regulations.gov* under Docket No. FWS–HQ–FAC–2015–0005, or by appointment, during normal business hours at the Service's office in Falls Church, VA (see **FOR FURTHER INFORMATION CONTACT**).

We are soliciting public comments and supporting data to gain additional information, and we specifically seek comment on the following 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 many businesses breed one or more of the species?

(4) What species listed as threatened or endangered by one or more States would be affected by the introduction of Bsal?

(5) 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?

(6) How could the interim rule be modified to reduce costs or burdens for some or all entities, including small entities, consistent with the Service's requirements? For example, we seek comment on the distinct benefits and costs, both quantitative and qualitative, of (a) the prohibitions on importation and (b) the prohibitions on interstate transport of the species listed by this rule. What are the costs and benefits of the modifications?

(7) Is there any evidence suggesting that Bsal has been introduced into the United States or may have already established?

(8) Are there other pathways for Bsal into the United States that we should address? If so, what are they?

(9) Is there evidence suggesting that any of the species listed by this rule are not carriers of Bsal? If so, what species?

(10) Is there any evidence suggesting that additional species are carriers of Bsal and should be listed by this rule? If so, what species?

(11) Are there methods (such as thermal exposure) that would allow salamanders imported into the United States to be reliably treated to help ensure Bsal is not introduced into the United States, and how could compliance be monitored?

(12) Should the Service add eggs or other reproductive material of listed salamanders to the list of injurious wildlife because they may also carry Bsal?

(13) For the species we are listing, are the scientific and common names the most appropriate ones accepted by the scientific community?

(14) What are relevant Federal, State, or local rules that may duplicate, overlap, or conflict with the interim rule?

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.

## Species Information for Salamanders

### *Salamander Nomenclature and Taxonomy*

Salamander nomenclature and taxonomy remained relatively unchanged from the 1960s until the 1990s, when advances in DNA sequencing enabled researchers to examine species relationships more closely (Petranka 1998). The Service does not have a uniform policy for taxonomically identifying amphibians. In this interim rule, we use taxonomic nomenclature as described by AmphibiaWeb (*http://amphibiaweb.org*) and the Integrated Taxonomic Information System (ITIS) (*http://www.itis.gov*). The system used by AmphibiaWeb represents one of the most widely accepted salamander taxonomic systems in the scientific community because it relies on criteria including, but not limited to, monophyly (common descent from a single ancestor), stability, expertise of scientists, and general acceptance by the amphibian community (Amphibiaweb 2015b). As a Federal resource for taxonomic information, the Service also uses ITIS as an agency resource (ITIS 2015).

The two databases have some differences. For example, AmphibiaWeb contains some species that are not in ITIS. We addressed all species found in either ITIS or AmphibiaWeb for a given genus to avoid confusion over which species we intended to list by this interim rule. We have also used additional resources where necessary to clarify taxonomy, specifically:

- The Kurdistan newt (*Neurergus microspilotus*) is in ITIS but is not in AmphibiaWeb. According to the American Museum of Natural History (AMNH 2015a), it is likely the same species as *N. derjugini;* consequently, we have included both scientific names in 50 CFR 16.14.
- Martel *et al.* (2014) identified the great crested newt (*Triturus cristatus*) as being lethally vulnerable to Bsal. Another species in the genus, *T. vittatus* (no common name), appears in the U.S. Fish and Wildlife Service's Office of Law Enforcement's (USFWS OLE) Law Enforcement Management Information System (LEMIS) data (USFWS OLE 2015). 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. *T. vittatus* does not appear in ITIS or AmphibiaWeb but is listed in AMNH (2015b). Because it appears in LEMIS data, we are including it in 50 CFR 16.14 as a species under the same genus, even though that species does not appear in either ITIS or AmphibiaWeb.
- LEMIS also includes the species *Triturus hongkongensis* (no common name), even though it is not a valid scientific name in ITIS or AmphibiaWeb. The name may be confused with *Paramesotriton hongkongensis* (no common name) due to its similarity.
- As a result, even though sources such as AmphibiaWeb state that there are approximately 679 species of salamanders (AmphibiaWeb 2015c), for purposes of this interim rule, we have identified approximately 681 species.
- *Hynobius fuca* and *H. fucus* appear to be the same species (Taiwan lesser salamander) (AMNH 2015c); we have included both of these names in 50 CFR 16.14.
- *Speleomantes strinatii* is a synonym for *Hydromantes strinatii* (Nanjappa, pers. comm.; Caudata Culture 2015b), of which the French cave salamander or Strinati's cave salamander are common names; we have included all of these names in 50 CFR 16.14.

In this interim rule, when we refer to salamanders, we include a variety of animals from the order Caudata, including those commonly referred to as salamanders and newts. Other common names, such as mudpuppy, also exist for certain animals in Caudata.

### *Salamander Biology*

Salamanders belong to the class Amphibia, a group of cold-blooded animals with a spinal column. The word ''amphibian'' is derived from the fact that most of the species spend part of their lives in water and part on land. The class Amphibia also includes frogs and toads, which have legs but no tails as adults, and caecilians, which have tails but no legs. Morphologically, salamanders are characterized by their relatively large, vertically flattened tails, two front and two hind legs that are approximately the same size (Petranka 1998), and skin with glands that can be either rough or smooth (Stebbins and Cohen 1997). Salamanders range in length from around 4 centimeters (1.5 inches) to over 1.5 meters (5 feet) (Stebbins and Cohen 1997).

Salamanders can live for long periods, but documented lifespans vary. Larger salamanders tend to live longer than smaller ones, and with proper care, salamanders in captivity frequently live longer than those in the wild (Duellman and Trueb 1986). Records for captive animals range from 5 years for most plethodontids to 55 years for the Japanese giant salamander (*Andrias japonicus*) (Duellman and Trueb 1986). The Olm or blind cave salamander (*Proteus anguinus*), which lives in caves in southern Europe, has been documented living for at least 48 years in the wild, with an estimated lifespan of more than 100 years (Live Science 2015).

Salamanders are carnivorous and eat a wide variety of prey, depending on habitat and the stage of their life cycle. Terrestrial salamanders eat earthworms, insect eggs, and other small invertebrates, while aquatic salamanders eat all of these in addition to small fish, aquatic insects, and other amphibians. Some salamander larvae can also be omnivorous and eat both plants and animals.

Many salamanders have unique structural features, including costal grooves (grooves on the sides of the body that increase skin surface area for water absorption and transport) and nasolabial grooves (vertical slits between the nostril and upper lip used for sensing chemical stimuli in the environment), that can be used to differentiate between salamander species (Petranka 1998). Important features for identifying salamanders include head shape and size, fin shape and color, gill morphology, color patterns, number of toes, size, body shape, tooth patterns, and number of costal grooves. Some species appear similar. For example, similarity of appearance within the family Salamandridae can make it difficult to differentiate between species, requiring close inspection of small physical characteristics.

Salamanders occupy a wide range of habitats, including streams, trees, land (including forests, grasslands, and rocky slopes), underground, and caves (Amphibiaweb 2015a). Salamanders are cryptic (difficult to find) partly because they occupy moist, cool places, such as underneath logs and between rock crevices on land or under rocks and logs in the water.

Salamander courtship between males and females is regulated by chemicals that are released from specialized glands in the skin. Most salamanders reproduce by laying eggs in water with two exceptions: members of family Plethodontidae lay their eggs on land, and the European species known as the alpine salamander (*Salamandra atra*) gives birth to live young (Stebbins and Cohen 1997). Eggs are surrounded by a protective jelly or membrane that keeps them from drying out. Almost all species of salamanders breed during specific seasons, and the length of time between mating and egg-laying varies considerably between species (Petranka 1998). Species that lay aquatic eggs place them in either streams or ponds, and species that lay their eggs on land choose hidden places, such as underground burrows, decaying logs, and moist rock crevices (Petranka 1998).

One example of a species that spends most of its life on land, but that moves to aquatic areas to breed, is the California tiger salamander (*Ambystoma californiense*). During winter rains, this species migrates across land to aquatic pools, such as cattle tanks and ephemeral pools, for breeding purposes. At the breeding pools, individuals come in contact with each other, even though they may not come in contact with each other during most of the rest of their lives on land (Barry and Shaffer 1994).

*Habitat Conditions and Native Range of U.S. Salamanders*

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; Stein and Kutner 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 (Richgels *et al.* in review).

Salamanders in the United States occupy a wide range of habitats, including streams, trees, land (including forests, grasslands, and rocky slopes), underground, and caves (Amphibiaweb 2015a). These locations are most conducive to the relatively cool, moist conditions under which both salamanders and Bsal thrive (Duellman and Trueb 1986; Piotrowski *et al.* 2004; Blooi *et al.* 2015a). Central and North American salamanders as a group are active at average temperatures of 11 °C (52 °F) to 20 °C (68 °F) (Duellman and Trueb 1986), fully encompassing the optimum temperature for Bsal growth as described below under *Climate Tolerance.* Most salamanders require some amount of constant moisture, either for respiration, as in the lungless family Plethodontidae, or for temperature regulation (Duellman and Trueb 1986).

Twenty species, subspecies, or populations of U.S. salamanders from six genera are currently listed as endangered or threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA). An additional three species (three genera) are candidates for listing (U.S. Fish and Wildlife Service 2015). The specific vulnerability and carrier status of these species to Bsal is described below in *Vulnerability and Carrier Status of Threatened and Endangered Species*.

Of the 190 salamander species native to the United States, we find that at least 67 species in 5 genera and in 3 families are capable of being carriers of Bsal: Salamandridae, Sirenidae, and Plethodontidae. In North America, species in the family Salamandridae occur on the west coast of the United States and Canada from southern California to southeastern Alaska, and much of the eastern half of the United States and extreme southeastern Canada (Amphibiaweb 2015a; Caudata Culture 2015a). Members of the family Sirendidae occur throughout the southeastern Atlantic and Gulf of Mexico coastal plains and the Mississippi River Valley (Leja 2005) (lesser siren (*Siren intermedia*)) and in the Atlantic coastal plains from south Florida to Virginia (greater siren (*Siren lacertina*)) (Hendricks 2005). The distribution of salamanders of the family Plethodontidae in the western hemisphere is from southern Canada to Bolivia and Brazil, except for members of the genus *Hydromantes,* which occur in California (Amphibiaweb 2015a, Caudata Culture 2015a).

*Role of Salamanders in the Ecosystem*

Salamanders play important roles in ecosystem function and as indicators of ecosystem health and stability (Davic and Welsh 2004). For example, salamanders of family Plethodontidae have life-history characteristics that make them exceptional indicators of forest health (Welsh and Droege 2001).

In forests, salamanders are also among the most abundant vertebrates. Despite the relatively small size of most salamanders compared to most other native vertebrates, this sheer abundance contributes to a significant amount of biomass in the ecosystem, and, therefore, salamanders make significant contributions to nutrient cycling and transport (Burton and Likens 1975). For example, Ambystomatid salamanders can make significant contributions to energy and nutrient transport in forest ecosystems (Regester *et al.* 2006) and in pond ecosystems (Holomuzki *et al.* 1994). 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).

In vernal pond communities, *Ambystoma* species are the top predators and, therefore, control the abundance of aquatic invertebrates and other amphibians (Petranka 1998). The high numbers of many amphibians, including salamanders, in some ecosystems also provide a substantial source of prey for other vertebrates in the ecosystem (Harper *et al.* 2008; Davic and Welsh 2004); therefore, other native species that prey on salamanders can also be affected by disease-related declines.

**Species Information for Bsal**

*General Description of Chytrid Fungus*

In drawing some of our conclusions about the effects of Bsal on U.S. wildlife and wildlife resources, the Service has used Bd as a surrogate. Considerably more is known about Bd than Bsal due to its discovery and description more than 15 years ago (Berger *et al.* 1998, Longcore *et al.* 1999), while Bsal was discovered 2 years ago (Martel *et al.* 2013). The severe effects that Bd, a species closely related to Bsal, has had on amphibian populations, has raised additional alarm about the expected consequences of a Bsal introduction and the need to take immediate action under an interim rule. The two risk assessments of Bsal that have been conducted both used Bd in determining the risk of Bsal based on transmission, spread, and population-level effects (Richgels *et al.* in review; Stephen *et al.* 2015).

Until Bsal was discovered, the fungal disease chytridiomycosis was thought to be caused by a single species of pathogenic fungus, Bd, which was the only chytridiomycete taxon known to parasitize vertebrate hosts (Longcore 1999; Johnson and Speare 2003). Bd has been implicated in the decline and extinction of amphibian species at the global scale (Berger *et al.* 1998; Daszak *et al.* 2003; Lips *et al.* 2006; Walker *et al.* 2008; Vredenburg *et al.* 2010; Cheng *et al.* 2011). Bd has been found on every continent except Antarctica, and it is known to have affected more than 500 species of amphibians, including all orders of amphibians (frogs, salamanders, and caecilians) worldwide (Chytridcrisis 2015a; Fisher *et al.* 2009; Olson *et al.* 2013).

Bsal came to the attention of the scientific community only recently. Spitzen-van der Sluijs *et al.* (2013) observed a 96 percent decline in fire salamanders (*Salamandra salamandra*) in the Netherlands but was ''unable to attribute this to any known cause of amphibian decline, such as chytridiomycosis [at the time, thought only to be caused by Bd], ranavirus or habitat degradation.'' Martel *et al.* (2013) later identified the cause of the salamander decline in the Netherlands as a newly described species of fungus now known as Bsal. Their work confirmed that Bsal is related to Bd and is also capable of causing chytridiomycosis. Analysis of a broad range of representative chytrid fungi show that Bsal represents a previously undescribed species that shares early evolutionary origins with the pathogenic fungus Bd (Martel *et al.* 2013). Until Bsal was discovered, Bd was the only species from that phylum known to infect vertebrates.

While Bd has been found in North America, Bsal has not yet been found in North America, and the two fungi do not have the same effects on the same animals. As the authors noted, ''Chytridiomycosis has resulted in the serious decline and extinction of [more than] 200 species of amphibians worldwide and poses the greatest threat to biodiversity of any known disease * * *. We [have discovered] a second * * * chytrid pathogen, [Bsal], that causes lethal skin infections in salamanders * * *. Our finding provides another explanation for the phenomenon of amphibian biodiversity loss that is emblematic of the current global biodiversity crisis.'' The natural host ranges of Bsal remain unknown, but so far it has been found only in salamanders and appears capable of causing lethal chytridiomycosis only in salamanders (Martel *et al.* 2014).

*How the Fungus Affects Salamanders*

The ''salamandrivorans'' in *Batrachochytrium salamandrivorans* translates to ''salamandereating'' and accurately describes the effects of the fungus on 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), although many of the salamanders reported at the beginning of the European Bsal outbreak seemed to lack 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, and became anorexic, apathetic, and suffered from neurological signs including a loss of voluntary movement and muscle coordination. Death occurred within 7 days of clinical signs first appearing in species with lethal vulnerability.

Bsal does not appear to affect reproductive tissue, such as eggs or gametes. Using Bd for comparison, Bd requires keratin, a structural component of organisms found in amphibian skin, which is not found in salamander eggs or gametes (Berger 1998).

*Climate Tolerance*

Temperature has a significant impact on the growth and disease development of Bsal in salamanders (Martel *et al.* 2014). Bsal appears to prefer a temperature range for growth and infection of 10–15 °C (50–59 °F) (Blooi *et al.* 2015a; Stephen *et al.* 2015, Martel *et al.* 2013). Bsal has shown some growth in temperatures as low as 5 °C (41 °F) and dies at 25 °C (77 °F) and above (Martel *et al.* 2013). In a laboratory study, salamanders were most easily infected by Bsal at temperatures of 15 °C (59 °F) and 20 °C (68 °F), while Bsal growth was inhibited at 25 °C (77 °F) (Blooi *et al.* 2015a). The same temperature response was also observed for Bsal raised in culture (Blooi *et al.* 2015a).

This experimental data suggests that salamanders living at lower temperatures are more at risk to infection by Bsal. Animals that survive at temperatures above the optimal range for fungal growth are likely to be at reduced risk to infection. However, the average temperature ranges of North and Central American salamander species is from 11 °C (52 °F) to 20 °C (68 °F) (Duellman and Trueb 1986; the citation does not separate North and Central American data), so salamanders regularly reaching 25 °C (77 °F) in the natural environment is uncommon. Bales *et al.* (2015) noted that the native salamander species, and by extension ecosystems, most at risk from a Bsal introduction would likely be those that occupy similar thermal ranges as the European fire salamander (Bales *et al.* 2015).

*Ecology and Habitat Preferences*

The chytrid fungus Bd can live outside of a host and requires water to disperse because it reproduces asexually by forming motile zoospores; preliminary studies of Bsal indicate that similar modes of survival and transmission are highly likely (Longcore 1999; Martel *et al.* 2013). As the threat assessment by Stephen *et al.* 2015) noted, ''Bd is known to remain viable for several days to weeks in water (Johnson and Speare 2013) and moist organic matter (Johnson and Speare 2003), even in the absence of nutrients. It is likely that Bsal can also survive in moist environments, independent of an amphibian host.''

*Environmental Conditions Needed To Survive*

The transmission and ecology of Bsal in the wild is likely to be similar to Bd based on the close taxonomic relationship between the species, their structural similarities, and their comparable pathophysiology (Martel *et al.* 2013, Stephen *et al.* (2015). Johnson and Speare (2003) reported that Bd can survive in tap water and deionized water for up to 3 and 4 weeks, respectively, and up to 7 weeks in lake water. Bsal is also likely to survive in moist environments independent of an amphibian host. While we do not have information on the response of Bsal to desiccation, Bd is highly impacted by drying and can survive desiccation for no more than 1 hour in the laboratory (Garmyn *et al.* 2012); Bsal would likely respond in a similar way. Bsal appears to be adapted to temperatures and humidity conditions most conducive to salamander survival, thus supporting the hypothesis that the pathogen co-evolved with salamanders in the part of the world from which it is endemic, most likely in Asia (Martel *et al.* 2014).

**Population- and Ecosystem-Level Effects of Bsal**

*Population-Level Effects*

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). Within the United States, diseases have been cited as contributing factors in the listing or recovery of several native amphibian species under the ESA. Examples include Bd in the Ozark hellbender (*Cryptobranchus alleganiensis bishopi*) (76 FR 61956, October 6, 2011), an undiagnosed disease in Sonora tiger salamanders (*Ambystoma tigrinum stebbinsi*) (62 FR 665, January 6, 1997), and Bd in the mountain yellow-legged frog (*Rana muscosa*) (82 FR 24256, April 29, 2014; Vredenburg *et al.* 2010).

As noted above in *General Description of Fungus,* Bsal is the most recently discovered pathogen associated with population-level amphibian declines, including a 96 percent reduction in Dutch populations of the European fire salamander between 2010–2013 (Spitzen-van der Sluijs *et al.* 2013; Martel *et al.* 2013). 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 of some native salamanders to Bsal under experimental conditions, we conclude that the introduction of Bsal into the United States would cause significant, adverse, population-level effects in a number of native species.

*Ecosystem-Level Effects*

The preferred temperature range of Bsal can help predict those ecosystems that are at greatest risk should Bsal be introduced into the United States (Stephen *et al.* 2015). The native salamander species, and by extension ecosystems, most at risk from a Bsal introduction would likely be those that occupy similar thermal ranges as the European fire salamander (Bales *et al.* 2015).

Salamanders are important parts of the ecosystems in which they occur. Salamanders are often the most abundant vertebrates in terrestrial forest and riparian (the banks of watercourses) ecosystems, where they may compose a total biomass greater than or equal to birds or small mammals (Davic and Welsh 2004). This means that, despite their small size, the total weight of all salamanders in a given area may be more than the combined total weight of all birds or all small mammals. Because of their abundance under normal circumstances, salamanders are important prey species themselves and are energy sources for higher predators (Davic and Welsh 2004), including fish, reptiles, birds, and mammals.

Salamanders may be the dominant predator in headwater streams and ephemeral waterbodies where fish are absent (Davic and Welsh 2004). Within some food webs, salamanders are considered keystone predators due to their control of invertebrate prey populations and their resulting regulation of detritus decomposition and nutrient cycling (Davic and Welsh 2004). By definition, keystone species are those that occupy niches that affect ecosystems and have little functional overlap with other species (Davic and Welsh 2004). Therefore, loss of these keystone species would result in significant ecosystem-level change.

In addition to their roles in food webs and nutrient cycling, salamanders participate in a number of interspecific (between species) ecological relationships. Salamander species interact with one another through competition and predation to control the composition of their assemblages (taxonomically related species that occur within the same geographic community) (Davic and Welsh 2004; Fauth *et al.* 1996). Frequently, a single species is dominant within a given assemblage, particularly in terrestrial habitats, but which species dominates varies by location and ecosystem (Davic and Welsh 2004). We find 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.

Salamanders also interact with invertebrate species in other ecologically important ways. Semi-aquatic salamander species can move mollusks and shrimp eggs between waterbodies during their migrations, allowing these invertebrates to inhabit new areas (Davic and Welsh 2004). Additionally, one species of salamander, the mudpuppy (*Necturus maculosus*), is a required host for developing stages of the salamander mussel (*Simpsonaias ambigua*), a native, freshwater mollusk for which a positive 90-day finding has been made under the Endangered Species Act of

1973, as amended (16 U.S.C. 1531 *et seq.*) (76 FR 59836; September 27, 2011) (Davic and Welsh 2004; Gangloff and Folkerts 2006; United States Fish and Wildlife Service 2015b, United States Fish and Wildlife Service 2015c). We conclude that invertebrate species that depend on salamanders for aspects of their life cycle or ecology are likely to be adversely affected if their host species declines in response to a Bsal introduction.

**Invasiveness of Salamanders and Bsal**

*Invasiveness of Salamanders*

Some salamanders have the ability to invade new environments in which they are not native. Globally, 90 percent of salamander introductions have occurred through intentional releases (Tingley *et al.* 2010). As of 2010, salamanders comprised 22 percent of all recorded amphibian introductions, with the highest number of salamander introductions (15) from the family Salamandridae, followed by salamanders from the families Ambystomatidae (4), Cryptobranchidae (2), and Proteidae (2) (Tingley *et al.* 2010).

Nonnative salamander introductions have been documented in the United States. As described below under *Likelihood of Release or Escape,* the United States Geological Survey (USGS) Nonindigenous Aquatic Species database has U.S. records for 14 salamander species that have been observed outside their native range. Of those, 11 are native to the United States but were discovered outside of their native ranges, and 3 (Japanese newt (also called the Japanese fire-bellied newt, *Cynops pyrrhogaster*), Oriental fire belly newt (also called the Oriental fire-bellied newt, *Cynops orientalis*), and the spotless stout newt (*Pachytriton labiatus*)) are exotic species from outside the United States (USGS 2015). In Florida, the Oriental fire belly newt and spotless stout newt, which are native to China (family Salamandridae), have been found in the wild near an animal importer's facility, either as the result of intentional releases or escapes from enclosures (Krysko *et al.* 2011).

Other invasions have been attributed to the use and subsequent release of salamanders used as fishing bait. Surveys of anglers have indicated that they routinely release salamanders into the areas where they fish, which includes areas that are not part of the salamander's native U.S. habitats, suggesting that animals are routinely moved long distances (Picco and Collins 2008). Furthermore, Picco and Collins (2008) found that salamanders sold as bait were highly infected with both ranavirus and Bd, thereby increasing the likelihood of disease transmission into new areas of the United States through the act of fishing.

*Invasiveness and Transmission of Bsal*

As noted above under *General Description of Fungus,* Europe has been experiencing a severe decline in wild fire salamander populations in the Netherlands (Spitzen-van der Sluijs *et al.* 2013). This decline is so significant that fire salamander populations are facing local extinction in the Netherlands, though other populations throughout Europe appear to be stable (AmphibiaWeb 2015c). A sharp decline in numbers has been observed since 2010, despite the species being listed as endangered on the Netherlands Red List, and at population levels that were thought to be stable. This enigmatic decline was not attributed to any known cause of amphibian decline, such as chytridiomycosis due to Bd, ranavirus, or habitat degradation. In late 2013, Bsal was isolated from infected fire salamanders in the Netherlands (Martel *et al.* 2013).

Martel *et al.* (2014) later established the highly pathogenic nature of this new chytrid fungus. Molecular testing found Bsal in specimens collected from the wild (though none from North America) and even in an archival (museum) sample that was 150 years old (Martel *et al.* 2014). A wide variety of salamanders are negatively affected by the pathogen, but frogs, toads, and caecilians do not appear to be (Martel *et al.* 2014). The pathogenic nature of the fungus and its ability to infect a wide variety of salamanders, as described below in *Classification and Status as Carriers,* definitively demonstrate an invasive threat to salamanders in the United States.

In Bd, the ability of the pathogen to be transmitted between individuals is dependent upon the density of populations (Rachowicz and Briggs 2007) and the presence of a vector that can carry the disease to uninfected populations (Greenspan *et al.* 2012); we expect the same for Bsal. Experiments have shown that Bsal can be transmitted from one species to another when the species come into contact (Martel *et al.* 2014).

Salamanders that breed in ponds and temporary wetlands are often explosive breeders, meaning that hundreds to multiple thousands of individuals will reproduce at the same time (Gill 1978), creating dense numbers of individuals and increasing opportunities for the pathogen to spread. Pathogens are also likely to be transmitted by salamander species that travel long distances for breeding and dispersal migrations, such as those that exhibit a metapopulation structure (Bancroft *et al.* 2011). A metapopulation is a group of discrete breeding populations of the same species (Gill 1978). For example, within salamander metapopulations, California tiger salamanders (*Ambystoma californiense*) have been documented traveling up to 1.2 miles (1.9 kilometers) from upland habitat to aquatic breeding sites (USFWS 2000), and newts travel many kilometers to breeding sites (Gill 1978).

Salamander species that have abundant populations with widespread distributions can also contribute to the spread of Bsal because of the increased likelihood that they will come in close contact with other salamanders that could then become infected. Salamanders that can carry Bsal from one place to another are more likely to do so if they have a broad range where they will come in contact with other members of the same species (for abundant distributions) or other species (for widespread distributions). Species with broad distributions are adapted to a wide range of environmental conditions that are more likely to overlap with habitat suitable for Bsal as well as habitat suitable for that species, providing increased opportunities for Bsal to spread.

For example, the rough-skinned newt (*Taricha granulosa*) has a wide range along the West Coast from Alaska to California, and the eastern newt (*Notophthalmus viridescens*) ranges widely across the eastern United States, occurring in 34 States (Amphibiaweb 2015a). Both species have had lethal responses with laboratory infections of Bsal (Martel *et al.* 2014), and both are capable of carrying Bsal. In addition to its broad range, *N. viridescens* also migrates long distances; this species will frequently travel many kilometers to migrate to new ponds (Gill 1978), further increasing the risk of this species spreading Bsal.

**Pathway Analysis**

*Introduction Pathways*

The main pathway for the global spread of Bsal is the international trade in salamanders (Martel *et al.* 2014). The introduction of Bsal into mainland Europe is linked with the commercial trade of Asian salamanders (*Cynops* spp.) from East Asia, particularly Thailand, Vietnam, and Japan (Martel *et al.* 2014). As described above in *How the Fungus Affects Salamanders,* eggs and gametes are not expected to be pathways. However, salamanders that have been identified as carriers, whether live or dead, are expected to transmit Bsal through their skin, which contains keratin. We are also concerned that any salamanders that are infected and lethally vulnerable may die in transport and continue to carry Bsal into the United States. As such, we also expect dead salamanders and body parts to be a pathway.

Individual amphibians in trade are often transported in containers with many other individuals of the same species or with many other species that can all be from different sources. These conditions are highly conducive to pathogen transmission and dispersal. Pathogens can transfer from host to host in crowded conditions, and crowded conditions create stress on animals that can reduce amphibian hosts' natural ability to ward off infections (Rowley *et al.* 2007, Rachowicz *et al.* 2005, Rollins-Smith *et al.* 2011).

Bsal can also be introduced into the environment through the improper disposal of contaminated water or other materials used to transport salamanders. As described above under *Environmental Conditions Needed to Survive,* the fungus can likely persist in such materials independent of whether a salamander is present. Water and other materials have served as fomites to introduce other similar pathogens into the environment. For example, Bd has been found in water used to transport amphibians that were traded in Hong Kong (Kolby *et al.* 2014). As the authors noted, ''[T]he abundance of aquatic amphibian species traded by Hong Kong . . ., prolonged environmental persistence of infectious . . . Bd particles, and employment of trade activities that neither disinfect water nor safely dispose of deceased animals creates an ideal pathway for disease transmission to native Hong Kong amphibians.''

Drawing on this evidence, the primary pathway for the entry of salamanders that are hosts of Bsal into the United States is through the international commercial wildlife trade. Overall, 99.9 percent of salamander importation into the United States is for commercial purposes (USFWS OLE 2015). From 2010 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) (Richgels *et al.* in review). After import, many of the salamanders are transported to animal wholesalers, who then transport the salamanders to pet retailers.

The most likely pathway of a salamander that is a host to Bsal into the United States would include a pet store or online retailer. Individuals would purchase the salamander from a pet store (or online retailer) and keep it in captivity as a pet. Many amphibians and reptiles first kept as pets are released by their owners into the wild either intentionally or accidentally (Kraus 2009, Krysko *et al.* 2011). For example, owners may no longer be able to care for their pets or an animal may escape its enclosure. In addition to the risk from a release of an infected pet salamander into the wild, the water that is used to house an infected pet in captivity would feasibly contain Bsal zoospores. As a result, the discharge of untreated water used to house infected, captive animals could be a pathway for releasing infective zoospores into the environment and exposing native salamanders to Bsal (Stephen *et al.* 2015).

*International Trade in Salamanders*

Trade in wildlife occurs on a global scale, and amphibians are one of the most commonly traded animals (Smith *et al.* 2009). More than 52,149,000 documented amphibians were imported into the United States from 2004 to 2014, based on the Service's LEMIS data (USFWS OLE 2015). Salamanders comprised 2,504,590 (4.8 percent) of the total imports of amphibians (USFWS OLE 2015). The 2004 to 2014 LEMIS dataset should be considered as a conservative estimate because many import records identified the animal being imported only as a member of the Class Amphibia (rather than identifying it to species or genus level). In addition, incorrect salamander identifications to genus and species level appear to have commonly occurred in reporting to LEMIS (USFWS OLE 2015). LEMIS data shows that 65 percent of imported salamanders came from captive sources and 35 percent were from wild sources (USFWS OLE 2015). The LEMIS data recorded only 83 percent of declared imports at the species level, whereas 17 percent were recorded to the genus level (USFWS OLE 2015).

The four salamander genera most commonly imported 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 for Bsal (Martel *et al.* 2014). Of the 20 genera listed by this interim rule, 15 have been traded over the 11 years. Salamanders that can carry Bsal have comprised 95 percent of imported salamanders.

The species with the highest number of imports into the United States from 2004 to 2014 was the Oriental fire belly newt; this species comprised 54 percent of the total number of imported salamanders (USFWS OLE 2015). Twelve species of salamanders that are native to the United States were also imported into the United States from other countries from 2004 through 2014 (USFWS OLE 2015).

**Risk Assessments and Salamander Effects From Bsal**

*Bsal Risk Assessments*

Two Bsal risk assessments are available to help determine the risk associated with Bsal introduction into North America. The USGS conducted a risk assessment for the United States that helped us determine the level of risk associated with Bsal introduction (Richgels *et al.* in review). Stephen *et al.* (2015) also conducted a Bsal risk assessment for Canada that showed Canada is also at risk.

The USGS risk assessment concludes that the potential for Bsal introduction into the United States is high, the United States has suitable conditions for Bsal survival, and the consequences of introduction into the United States are expected to be severe and occur across a wide range of the United States (Richgels *et al.* in review). To evaluate the potential for Bsal introduction, the USGS assessment combined information on the number of individual salamanders imported at each port of entry and the number of pet supply establishments by county. Based on this evaluation, Bsal introduction potential was highest in central and southern Florida, southern California, and near New York City, New York (Richgels *et al.* in review).

To determine the consequences of Bsal introduction into the United States, the USGS risk assessment evaluated environmental suitability, species richness, and predicted species susceptibility. Overall, the total risk of Bsal to native salamanders is high. Based on both likely introduction and resultant consequences, the risk of Bsal is the highest for the Pacific coast, southern Appalachian Mountains, and mid-Atlantic regions (Richgels *et al.* in review). The areas most likely to have consequences from Bsal introduction are the Pacific Coast and Appalachian Mountains (Richgels *et al.* in review). Based on environmental suitability, areas of the United States most suited to Bsal growth (Blooi *et al.* 2015a), including the Southwest, Southeast, and Pacific regions, are also the areas of highest salamander diversity (Richgels *et al.* in review). Yap *et al.* (2015) also identified the southeastern and western United States as zones of high risk.

Some species may be protected from Bsal by temperatures in their regions that are outside of the Bsal optimal growth range (Richgels *et al.* in review), but the average temperature preferences of salamanders from Central and North America (Duellman and Trueb 1986), which range from −2.0 °C (28.4 °F) to 30.0 °C (86.0 °F), suggest that most salamander species, including those within the United States, are active near the thermal growth optimum for Bsal (Blooi *et al.* 2015a). Most U.S. salamander species are also dependent upon forests, a habitat type dominated by relatively cool, moist conditions, for the majority of their life cycle (Davic and Welsh 2004).

*Vulnerability and Carrier Status*

The urgent need to prevent Bsal introduction risks was raised by evidence presented by Martel *et al.* (2014), who tested Bsal on 35 species from all three orders of amphibians: frogs, salamanders, and caecilians. Martel *et al.* (2014) further screened 5,391 specimens collected from 4 continents for evidence of Bsal infection.

Martel *et al.* (2014) defines a ''resistant'' salamander as one that either was not infected or developed a short-term infection without clinical signs following exposure to Bsal; a ''tolerant'' salamander is one that maintains a more prolonged infection with no signs of disease; a ''susceptible'' salamander becomes infected and has clinical signs of disease with the possibility of subsequent recovery; and a salamander that responds in a ''lethal'' manner to Bsal dies as a result of infection. According to Martel *et al.* (2014), resistant salamanders are not a risk for transmitting Bsal. However, based on the available scientific data, we concluded that resistant species with evidence of short-term infection, as well as those reported to have tolerant, susceptible, or lethal responses to Bsal, are ''carriers'' capable of transmitting Bsal to other salamanders and introducing the fungus into the United States. The Service finds that a species is considered to be a ''non-carrier'' when Martel *et al.* (2014) classified the species as ''resistant'' and no histologic or field surveillance data was found to suggest that short-term Bsal infection could occur; ''non-carriers'' are considered incapable of transmitting Bsal to other salamanders or introducing the fungus into the United States.

We also find the likelihood of a species within the same genus being a carrier can be drawn from a comparison to Bd, which as described above under *General Description of Chytrid Fungus* is a close relative of Bsal. As noted earlier, the two risk assessments of Bsal that have been conducted both used Bd in determining the risk of Bsal based on transmission, spread, and population-level effects (Richgels *et al.* in review; Stephen et al. 2015). Considerably more is known about Bd than Bsal due to its discovery and description more than 15 years ago (Berger *et al.* 1998; Longcore *et al.* 1999), while Bsal was discovered only 2 years ago (Martel *et al.* 2013). Bd has caused amphibian declines and extinctions worldwide (Skerratt *et al.* 2007). Bd affects species in patterns (Skerratt *et al.* 2007), and more closely related species have similar outcomes for Bd at the family level (Smith *et al.* 2009; Bancroft *et al.* 2011). Amphibians experiencing the most severe declines are grouped by relatedness, which is likely due to the shared evolutionary histories of closely related species with a similar response to chytridiomycosis (Corey and Waite 2008). The U.S. Department of Agriculture (USDA) uses a similar approach. Closely related species are considered more likely to have similar traits and are used in risk assessments to determine threats from a target species of interest; a potential pest is regarded as a threat when other species in a genus pose a similar threat (Wapshere 1974; Gilbert *et al.* 2012).

We find that, due to shared characteristics by species within a genus, other species within these genera are also highly likely to be carriers of Bsal if one species has been identified as a carrier, even if not every species in the genus has been tested to verify that it is a carrier of Bsal. Our analysis found no conclusive countervailing evidence that species differed within a genus with respect to their ability to act as carriers. As such, we expect all species in a genus to respond similarly as carriers or non-carriers to Bsal. Therefore, based on existing scientific evidence, and as described in more detail below, we are listing all species in the 20 genera, including 201 known species, that we now conclude constitute a threat to introducing and spreading Bsal in the United States because such species can carry the fungus and transmit it to other species which would be negatively impacted.

While frogs and caecilians showed resistance to Bsal, many salamanders exhibited a strong, adverse response to Bsal infection; many species from outside of the native range of the fungus (Asia) exhibited lethal vulnerability. Our analysis of Martel *et al.* (2014) and follow-up communication (Martel, pers. comm.) found 25 species from 19 genera are carriers of Bsal. Additional communications (Chytridcrisis 2015b; Cunningham *et al.* 2015; Nanjappa, pers. comm.) identified another two species from two separate genera as carriers: The pygmy marbled newt (*Triturus pygmaeus*) and the golden striped salamander (*Chioglossa lusitanica*). Because Martel *et al.* (2014) had previously identified members of the *Triturus* genus as carriers, it is already accounted for within the 19 genera. The addition of this species brings the total number of known carrier species to 26. In addition to *Triturus, Chioglossa* was identified as another genus capable of serving as a carrier by Chytridcrisis (2015b), Cunningham *et al.* (2015), and Nanjappa (pers. comm.). As a result, the total number of species known to serve as carriers of Bsal is 27 from 20 genera. These 20 genera include the following: *Chioglossa, Cynops, Euproctus, Hydromantes, Hynobius, Ichthyosaura, Lissotriton, Neurergus, Notophthalmus, Onychodactylus, Paramesotriton, Plethodon, Pleurodeles, Salamandra, Salamandrella, Salamandrina, Siren, Taricha, Triturus,* and *Tylototriton.*

In conducting its analysis, the Service initially focused on identifying species for listing as injurious that scientific evidence demonstrates are capable of carrying Bsal. As we described above, however, we find that, due to shared characteristics by species within a genus, other species within these genera are also highly likely to be carriers of Bsal, even if not every species in the genus has been tested to verify that it is a carrier of Bsal. This conclusion is because more closely related species, such as those found within the same genus, share common traits. Our analysis found no conclusive evidence to the contrary that suggested that all species within such genera are not carriers.

We have focused our findings on salamanders and the genera in which they are found that we concluded are capable of carrying Bsal, and we are not listing genera that Martel *et al.* (2014) identified are not carriers of Bsal: Based on our analysis of their data, such salamanders are not capable of introducing Bsal to the United States or otherwise transmitting Bsal to native populations. In addition, we are not listing genera at this time where there is no data because we do not have a basis for doing so, even though the Service recognizes that it is possible that untested genera may also be capable of carrying Bsal. Likewise, we are not listing hybrids derived from species consisting of a listed genera and an unlisted one because we do not know their status as carriers. However, consistent with our view that species within a genus are likely to be carriers of Bsal if one species within that genus has been identified as a carrier, hybrids consisting of two species from within the same genus are expected also to be carriers.

In conclusion, we have decided to list all 201 species in the 20 genera where at least one species has been positively identified as a carrier of Bsal and there is no countervailing conclusive evidence suggesting that some species within the genus are not carriers. Where one species has been identified as a carrier, we find that the other species in that genus are also carriers. This finding includes hybrids consisting of species found within the genus.

In reaching this conclusion, it is worth noting that Martel *et al.* (2014) classified the slimy salamander (or northern slimy salamander, *Plethodon glutinosus*) as resistant to infection. Martel *et al.* (2014) demonstrated by histology, however, that Bsal could invade the skin of the slimy salamander, even though it was otherwise resistant through challenge testing and did not show signs of infection. Our examination of the supplementary data of Martel *et al.* (2014), including histology (microscopy) tests and subsequent discussions with the authors, indicate that there is sufficient evidence that Bsal was able to invade the skin of this species long enough to move or transmit the infection to other salamanders (Martel *et al.* 2014; Martel, pers. comm.; Lips, pers. comm.). Because we expect all species within a genus to respond in a similar way as a carrier or not of Bsal, we conclude that all species of *Plethodon* are carriers.

Martel *et al.* (2014) also classified the palmate newt (*Lissotriton helveticus*) as resistant to infection even though the Italian newt (*Lissotriton italicus*) was identified as lethally vulnerable to Bsal. Martel conducted histological tests that showed the palmate newt could carry Bsal even though it demonstrated resistant vulnerability. Our examination of the data of Martel *et al.* (2014), as well as a personal communication from K. Lips (2015), indicates that there is sufficient evidence that Bsal was able to invade the skin of the palmate newt long enough to pass the infection to other salamanders. Because we expect all species within a genus to respond in a similar way as a carrier or not of Bsal, we also conclude that all species of *Lissotriton* are carriers.

In addition, Martel *et al.* (2014) classified the Hokkaido salamander (*Hynobius retardatus*) as resistant to Bsal under experimental conditions. However, we find that the misty salamander (*H. nebulosus*) is a carrier based on detection of Bsal by Martel *et al.* (2014) in a free-ranging specimen from Japan. The histology tests that were conducted for the slimy salamander and the palmate newt, and which we used to find that these species are carriers, were not conducted for the Hokkaido salamander. Bsal's ability to invade the skin of the Hokkaido salamander remains unknown because histologic examination of the skin was not conducted for the species. Because the Hokkaido salamander was resistant in experimental tests but was not tested histologically to look for invasion in the skin, we find that the Hokkaido salamander has an inconclusive status as a carrier and base our finding of whether species from the genus *Hynobius* are carriers on results identified for the misty salamander (a carrier from the same genus). Because we expect all species within a genus to respond in a similar way as a carrier or not of Bsal, we concluded that all species from the genus *Hynobius* are also carriers.

Finally, although Martel *et al.* (2014) did not test species from the genus *Onychodactylus* in the laboratory, Martel *et al.* (2014) observed Bsal on the Japanese clawed salamander (*O. japonicas*) in a free-ranging specimen from Japan. Based on that evidence, we concluded that this species is a carrier. Because we expect all species within a genus to respond in a similar way as a carrier or not of Bsal, we concluded that the other species in the genus *Onychodactylus* are also carriers.

*Vulnerability and Carrier Status of Native Species*

There are 190 species of salamander in 23 genera native to the United States (AmphibiaWeb 2015b). Of the 201 salamander species that we conclude are carriers of Bsal (20 genera in 4 families), 67 species (5 genera in 3 families) are native to the United States. Of the remaining 123 species native to the United States, we found that 20 species are not carriers and the vulnerability and carrier status of the remaining 103 species from the other 16 genera is unknown.

We based our findings of the 67 native species on tests conducted by Martel *et al.* (2014), who tested 7 native species in the laboratory for Bsal vulnerability. The native species that Martel *et al.* (2014) tested were the eastern newt (*Notophthalmus viridescens*), rough-skinned newt (*Taricha granulosa*), lesser siren (*Siren intermedia*), slimy salamander (*Plethodon glutinosus*), spring salamander (*Gyrinophilus porphyriticus*), marbled salamander (*Ambystoma opacum*), and spotted salamander (*A. maculatum*). Of these, 2 species were found to be lethally affected, 1 was tolerant, and 4 were described as resistant, although additional evidence indicates that one of the resistant species is capable of transmitting the fungus, resulting in a positive carrier status. As we described above in *Vulnerability and Carrier Status,* although the Service found evidence that species within a genus may vary in their specific vulnerability (that is, lethal, susceptible, tolerant, or resistant, as defined in Martel *et al.* (2014)), we expect all species in a genus to respond similarly as carriers or non-carriers to Bsal due to the shared characteristics between species. Therefore, we are listing all species within a genus where at least one species in that genus has been identified as a carrier of Bsal.

Based on the results of Martel et al. (2014), at least 2 native U.S. species, the eastern newt and rough-skinned newt, were found to be lethally vulnerable to Bsal. The French cave salamander (*Hydromantes strinatii*), which is not native to the United States, was also tested and identified as lethally vulnerable to Bsal (Martel *et al.* 2014). The *Notophthalmus* genus has two additional native species: The black-spotted newt (*N. meridionalis*) and the striped newt (*N. perstriatus*). The *Taricha* genus has three additional native species: The red-bellied newt (*T. rivularis*), Sierra newt (*T. sierra*), and California newt (*T. torosa*). The *Hydromantes* genus has three native U.S. species: The limestone salamander (*H. brunus*), Mount Lyell salamander (*H. platycephalus*), and Shasta salamander (*H. shastae*).

At least 1 native U.S. species from the *Siren* genus, the lesser siren, has a tolerant vulnerability (Martel *et al.* (2014). The genus has one additional native species: The greater siren (*S. lacertina*).

Four native species have been identified as resistant by Martel *et al.* (2014), but we have concluded that one of these species is still capable of carrying Bsal. As we describe above in *Vulnerability and Carrier Status,* we conclude that the slimy salamander is resistant to sustained infection but it can serve as a short-term carrier of Bsal. The *Plethodon* genus has 54 other species, all of which are native to the United States (AmphibiaWeb 2015b), bringing the total number of native carrier species to 67.

Three additional native salamander species were identified as resistant to

Bsal infection: The spring salamander (*Gyrinophilus porphyriticus*), marbled salamander (*Ambystoma opacum*), and spotted salamander (*A. maculatum*) (Martel *et al.* 2014). They are not expected to be carriers; therefore, we conclude that the 20 native U.S. species in their genera are not capable of carrying Bsal. This includes 4 species from the genus *Gyrinophilus* and 16 species from the genus *Ambystoma* (AmphibiaWeb 2015b).

Of the 190 native U.S. salamander species, carrier status has not been assessed in 103 species from 16 genera. The untested genera are *Amphiuma, Aneides, Batrachoseps, Cryptobranchus, Desmognathus, Dicamptodon, Ensatina, Eurycea, Hemidactylium, Necturus, Phaeognathus, Pseudobranchus, Pseudotriton, Rhyacotriton, Stereochilus,* and *Urspelerpes* (AmphibiaWeb 2015b). Although based on the gradient responses, from resisting infection to lethal response, among the genera Martel *et al.* (2014) tested experimentally, some of these additional species could be at risk from Bsal infection or could serve as a carrier, we are not listing species in those genera because these genera have not yet been tested.

*Vulnerability and Carrier Status of Threatened and Endangered Species*

None of the salamander species listed as endangered or threatened under the ESA in the United States has been specifically tested for Bsal vulnerability under laboratory conditions; Bsal has not been detected in their wild populations (Martel *et al.* 2014, Bales *et al.* 2015). However, several species from the same genera have been tested and on that basis identified as carriers. As we describe above in *Vulnerability and Carrier Status,* while the Service did find evidence that shows some species within a genus may vary in their specific vulnerability, the carrier status of tested species can be extrapolated to related species including those that are listed as endangered or threatened, are candidates for ESA listing, and under review.

Of the genera that include native species that we have identified as carriers, the following species are federally listed as threatened or endangered: Jemez Mountains salamander (*P. neomexicanus*), Cheat Mountain salamander (*P. netting*), Shenandoah salamander (*P. shenandoah*) and, one species, the striped newt (*Notophthalmus perstriatus*) is a candidate species (USFWS 2015).

Seven of the species, subspecies, or distinct population segments (DPSs) listed as federally endangered or threatened are classified within the *Ambystoma* genus, which we find is not a carrier of the fungus: Reticulated flatwoods salamander (*A. bishopi*), California tiger salamander (three DPSs), frosted flatwoods salamander (*A. cingulatum*), Santa Cruz long-toed salamander (*A. macrodactylum croceum*), and Sonora tiger salamander (Martel *et al.* 2014; USFWS 2015).

No information is available regarding Bsal vulnerability or carrier status of the remaining 11 ESA-listed or candidate species or subspecies native to the United States: desert slender salamander (*Batrachoseps aridus*), Ozark hellbender, Salado salamander (*Eurycea chisholmensis*), San Marcos salamander (*E. nana*), Georgetown salamander (*E. naufragia*), Texas blind salamander (*E. (Typhlomolge) rathbuni*), Barton springs salamander (*E. sosorum*), Jollyville Plateau salamander (*E. tonkawae*), Austin blind salamander (*E. waterlooensis*), Berry Cave salamander (*Gyrinophilus gulolineatus*), and the Alabama waterdog (*Necturus alabamensis*).

In addition to those species currently recognized as federally endangered, threatened, or candidates for listing under the ESA, 36 species of native salamander from 16 genera are in various stages of review for possible ESA listing in the future (USFWS 2015). Of the genera that include native species that we have identified as carriers, the following species are currently under review for ESA listing: Limestone salamander (petitioned), Shasta salamander (petitioned), the black-spotted newt (positive 90-day finding completed), Cheoah bald salamander (*P. cheoah,* petitioned), Fourche Mountain salamander (*P. fourchensis,* petitioned), Peaks of Otter salamander (*P. hubrichti,* positive 90-day finding completed), South Mountain gray-cheeked salamander (*P. meridianus,* petitioned), and the white-spotted salamander (*P. punctatus,* petitioned) (Martel *et al.* 2014; USFWS 2015).

Three species under ESA review are members of genera that are not carriers: (Streamside salamander (*Ambystoma barbouri*) (substantial 90-day finding completed—76 FR 59836, September 27, 2011), Tennessee cave salamander (*Gyrinophilus palleucus*) (substantial 90-day finding completed—76 FR 59836, September 27, 2011), West Virginia spring salamander (*G. subterraneus*) (substantial 90-day finding completed—76 FR 59836, September 27, 2011) (Martel *et al.* 2014; USFWS 2015).

No information is available regarding the carrier status for the remaining 25 native species in 11 genera that are currently under review for ESA listing (USFWS 2015).

**Additional Factors That Contribute to Consideration of Salamanders as Injurious**

*Likelihood of Release or Escape*

In general, there is widespread concern over the increasing spread of pathogens moved through the wildlife trade (for example, Karesh *et al.* 2005). Substantial evidence shows that Bd has spread extensively throughout the world through the amphibian trade (Fisher and Garner 2007; Schloegel *et al.* 2009; Schloegel *et al.* 2012; Galindo-Bustos 2014; Kolby 2014; Kolby *et al.* 2014). Similar mechanisms of transmission and persistence in the closely related Bsal pathogen, along with detection of Bsal in captive salamanders imported by the pet trade into Great Britain, indicate that global movement of Bsal, similar to that of Bd, is not only possible but is already occurring (Cunningham 2015). Considering the occurrence of Bsal in the global pet trade, the risk to North American native species, and the number of salamanders that are imported into and transported throughout the United States through trade, Bsal is likely to be introduced into and spread throughout native salamander populations in the United States unless immediate action is taken to limit the import and interstate transport of salamanders that are likely to carry Bsal.

Infected salamanders can transmit Bsal to other species even if the introduced salamander fails to establish a population. Evidence indicates that at least some of the salamanders capable of carrying Bsal can escape or be released and introduce Bsal into the environment. As described earlier, evidence exists for release of salamanders into the wild in the United States (Picco and Collins 2008; USGS 2015). As noted above in *Invasiveness of Salamanders,* the USGS Nonindigenous Aquatic Species database has records for 14 salamander species that have been observed outside their native range. Of those, 11 are native to the United States and were discovered outside of their native ranges, and 3 are exotic species from outside the United States. These findings mean that salamanders have been shown to exist, even if temporarily, outside their native range. As such, they are capable of transmitting Bsal into nonindigenous ecosystems. Infected native species that are imported and escape or are released into native habitats would also be capable of carrying Bsal into native salamander ecosystems where Bsal has not previously been found.

Infective Bsal zoospores can also be released into the environment if water or other materials used to house infected salamanders enter the environment due to improper disinfection and disposal methods. The water and materials become fomites to introduce the fungus into the environment if not decontaminated or disposed of properly. As described above under *Environmental Conditions Needed to Survive,* Bsal can likely live independent of a host long enough to infect other salamanders. Bd is known to remain viable for weeks in water and moist organic matter. Given our finding that Bd can serve as a surrogate for predicting Bsal's effects in salamanders at the population level, and since Bd does not require an amphibian host to remain viable, we expect that Bsal can also persist outside salamanders (as long as it has sufficient water or soil) long enough to come into contact with uninfected salamanders and start the disease cycle anew. As stated earlier, we also find that Bsal can be transmitted on dead salamanders or body parts.

As discussed above in *Introduction Pathways,* there is evidence that Bd has escaped into the environment through untreated wastewater, increasing the likelihood that Bsal could also escape if brought in via contaminated water or improperly disposed of materials. While standards for the treatment and prevention of Bd exist, in part due to recognition of its status as an internationally notifiable disease under the World Organization for Animal Health (OIE), the effectiveness and widespread application of those standards are uncertain given that international protocols for responding to Bd do not exist and the need to improve international mechanisms to respond to disease-related threats to biodiversity (Voyles *et al.* 2014).

Given the number of specimens that have been imported into the United States and Canada, it is unclear why Bsal has not yet been found in these countries (Muletz *et al.* 2014; Bales *et al.* 2015; Richgels *et al.* in review; Stephen *et al.* 2015). A comparison of Bd, which has spread in the United States, to Bsal yields some insights. Based on genetic analyses and examination of historical specimens, Bd may have originated from different places, including Japan, South Africa, or South America (Farrer *et al.* 2011; Rodriguez *et al.* 2014). In contrast, Bsal may have originated only from Asia, giving it fewer pathways to the United States (Martel *et al.* 2014). Importation of salamanders into the United States has also declined in recent years, suggesting that the propagule pressure may also be a factor by limiting the number of times in which Bsal could possibly be introduced through trade (Lockwood *et al.* 2005; USFWS OLE 2015). Bd may have spread more quickly than Bsal because of its ability to infect frogs, whereas research suggests that Bsal does not (Martel *et al.* 2014). Based on LEMIS data, frogs are traded in higher volumes than salamanders, increasing the probability of trade of a Bd-infected individual over a Bsal-infected individual. The USGS Nonindigenous Aquatic Species database also provides evidence for this higher level of trade, in that greater numbers of frogs are reported than salamanders. In addition, many frogs in trade, such as *Rana catesbeiana* (bullfrogs), are adaptable to a wide variety of environments and can easily become invasive once released in a watershed, as bullfrogs have become in the American West (Jennings and Hayes 1994; Rosen and Schwalbe 1995; Funk *et al.* 2011; Sepulveda *et al.* 2015; USGS 2015).

Taken together with the other data we reviewed, this evidence suggests that Bsal is less likely to enter the United States than Bd. However, without action, the pathways for introduction and escape of Bsal are a significant and imminent threat that can best be managed by listing salamanders that can carry Bsal as injurious wildlife, thereby minimizing opportunities for Bsal to be introduced, establish, and spread in the United States.

*Potential To Survive, Become Established, and Spread*

There is evidence that several of the species capable of carrying Bsal can survive long enough in the wild to transmit Bsal. The USGS Nonindigenous Aquatic Species database has records of 14 species and populations that have been observed in the United States outside of their native range (USGS 2015). Of those, 11 are native and have established populations outside of their native U.S. range: Eastern tiger salamander (*Ambystoma tigrinum*), barred tiger salamander (*Ambystoma mavortium mavortium*), blotched tiger salamander (*Ambystoma mavortium melanostictum*), long-toed salamander (*Ambystoma macrodactylum*), three-toed amphiuma (*Amphiuma tridactylum*), black-bellied salamander (*Desmognathus quadramaculatus*), Santeetlah dusky salamander (*Desmognathus santeetlah*), mudpuppy, eastern newt, lesser siren, and rough-skinned newt. The three species from outside the United States include Japanese newt, Oriental fire belly newt, and spotless stout newt (*Pachytriton labiatus*).

According to Richgels *et al.* (in review), ''Although prevalence of Bsal in live amphibian shipments, probability of release of infected materials (including live or dead animals or wastewater), and likelihood of interaction between infectious material and naïve free-ranging salamanders is unknown, given the large quantities of imported amphibians, even a small probability of infected animals or materials escaping into the wild could lead to introduction of [Bsal].'' As discussed earlier under *Introduction Pathways* and *Environmental Conditions Needed to Survive,* Bsal is expected to be able to survive outside of salamander hosts for several weeks given suitable conditions in water. If a salamander comes in contact with Bsal and then transmits it during a time when salamanders congregate, such as during breeding as described above under *Habitats, Reproductive Processes, and Seasonal Habits,* the potential for Bsal to survive, establish, and spread through animals or animal parts is significant. As we describe above under *How the Fungus Affects Salamanders,* Bsal can be transmitted on dead tissue where keratin is present, particularly skin, but do not find that Bsal can be transmitted through reproductive tissue including eggs and gametes.

As Richgels *et al.* (in review) noted, ''[T]he patterns of global Bd spread suggests that given release, exposure of native populations is likely. If Bsal follows similar patterns to the spread of Bd and no additional risk mitigation steps are taken, Bsal is likely to be introduced to the US.'' The Service finds that the capacity of infected salamanders to serve as the vector for infecting wild salamanders, together with the capacity of Bsal to survive for an extended period independent of an amphibian host, suggests that Bsal has a high likelihood of surviving, establishing, and spreading once it is introduced into a new area.

*Impacts on Wildlife Resources or Ecosystems*

If Bsal is introduced into the United States, we expect the species with lethal vulnerability would be at greatest risk. However, disease outbreaks can result from a combination of biotic and abiotic factors, including species vulnerability, exposure, behavior, immunity, co-infections, and environmental conditions (Wobeser 2007). Therefore, the vulnerability of individuals under laboratory conditions is an incomplete predictor of disease effects (Wobeser

2007). Native salamander species known to be tolerant of Bsal infection under experimental conditions may demonstrate more severe clinical disease when infection is combined with additional stressors in the wild, as has been found for other diseases, including those in amphibians (Wobeser 2007; Kerby *et al.* 2011; Kiesecker 2011). For example, Bodinof *et al.* (2011) noted that Bd may be found more frequently in hellbenders that are immune-compromised or that Bd infection increases the adverse effects of such species to other infections. Considering these cumulative factors, as well as the lack of data for the majority of native salamander species, our assessment of risk in native species is likely conservative.

Bsal can severely affect wildlife resources. At least 2 native species are lethally vulnerable to Bsal and at least 1 is tolerant to Bsal infection. At least 67 native species can act as carriers or sources of infection for other species. While not all species have been tested for their response to Bsal, based on the high rates of infection that have been observed, the fungus may have significant negative effects on additional species.

As described above in *Ecosystem-Level Effects,* salamanders are important parts of the ecosystems in which they occur. They are often the most abundant vertebrates in their ecosystems, and, as a vital part of the food web, they are both important prey for and predators of many species (Holomuzki *et al.* 1994; Regester *et al.* 2006). In some places, they are considered keystone species that help control some invertebrate populations and affect cycling of nutrients in an ecosystem, contributing significantly to overall ecosystem health. For example, by consuming arthropods that would otherwise release carbon dioxide into the atmosphere by decomposing leaf litter in forests, salamanders slow carbon emissions from leaf litter decomposition, which has implications for the global carbon cycle (Best and Welsh 2014). As described earlier, invertebrate species that depend on salamanders for aspects of their life cycle or ecology are likely to be adversely affected if their host species declines in response to a Bsal introduction. Loss of these keystone species would result in significant ecosystem-level change.

Salamanders constitute much of the vertebrate biomass of forests, and they play an important role in ecosystems as insect consumers, shapers of the landscape, and climate mediators (Burton and Likens 1975; Davic and Welsh 2004; Wyman 1998; Best and Welsh 2014). If native U.S. salamander species were to experience declines from Bsal infection as the fire salamander experienced in the Netherlands (Spitzen-van der Sluijs *et al.* 2013), we expect detrimental ecological effects.

The eastern newt, one of the lethally vulnerable species, is one of the most widespread salamander species in North America (Roe and Grayson 2008, Martel *et al.* 2014). As top predators in pond ecosystems, eastern newts regulate frog tadpole abundance and, therefore, affect the amount and type of nutrients available in the ponds, keeping them in ecological balance (Morin *et al.* 1983; Morin 1995). If eastern newt populations decline because of Bsal infection in the wild, imbalances could result in ponds and ecosystems throughout the eastern United States. Eastern newts also travel long distances between aquatic and terrestrial habitats (Roe and Grayson 2008), so if the species was to be eliminated from an area, the amount of nutrients available in upland areas would also be affected.

The other native U.S. species known to be lethally vulnerable to Bsal, the rough-skinned newt, is geographically widespread along the Pacific Coast of North America from Santa Cruz, California, to southeastern Alaska (Martel *et al.* 2014; Amphibiaweb 2015a). The rough-skinned newt plays an important role in ecosystems through its consumption of invertebrates that break down leaf litter and release carbon into the atmosphere (Davic and Welsh 2004). If rough-skinned newt populations were to experience severe declines from Bsal infection, a result could be significant additional inputs of carbon in the atmosphere, as has been observed with other species (Wyman 1998; Best and Welsh 2014).

As Richgels *et al.* (in review) noted, some parts of the United States may reach temperatures above the thermal tolerance of Bsal on a seasonal basis. However, wildlife and habitats would suffer losses if local populations of salamanders affected by Bsal prior to temperatures rising as part of the regular seasonal cycle suffered declines (and possible extirpation) and were unable to return to pre-infection levels in those ecosystems.

For these reasons, we conclude that the negative impact to wildlife resources or ecosystems is expected to be high if Bsal is introduced into U.S. ecosystems.

*Impact to Threatened and Endangered Species and Their Habitats*

None of the salamander species listed as endangered or threatened under the ESA in the United States have been specifically tested for Bsal vulnerability under laboratory conditions; Bsal has not been detected in their wild populations (Martel *et al.* 2014, Bales *et al.* 2015). Of the genera that include native species that we have identified as carriers, 4 species are federally listed as threatened or endangered or are candidates for listing. In addition, 8 species of native salamanders from genera that were identified as carriers are in various stages of review for possible ESA listing in the future (USFWS 2015). Because not all species have been tested, it is possible that the fungus will negatively affect other ESA-protected species.

*Impacts to Human Beings, Forestry, Horticulture, and Agriculture*

We do not expect direct effects to forestry, horticulture, or agriculture. Bsal does not appear to infect humans or other animals except for salamanders. Trees and other plants are also not affected. Indirectly, the introduction or establishment of Bsal would have negative effects on humans primarily from the loss of native wildlife biodiversity. These losses would affect the aesthetic, recreational, and economic values currently provided by native wildlife and healthy ecosystems. Educational values would also be diminished through the loss of biodiversity and ecosystem health. However, we are not listing the species because of the indirect impacts to forestry, horticulture, or agriculture, but rather due to their impacts to wildlife and wildlife resources.

*Wildlife or Habitat Damages That May Occur From Control Measures*

Richgels *et al.* (in review) stated, ''[T]here are few known viable treatment or management options for responding to the introduction of Bsal . . . hence mitigation strategies should focus on prevention or reduction of introduction events.'' As discussed below in *Ability to Prevent or Control the Spread of Pathogens or Parasites,* current control strategies appear to focus on treating salamanders in a controlled laboratory setting. We are not aware of control measures that are effective in treating infected salamanders over a large-scale area that could eliminate Bsal without killing the salamanders themselves.

In an effort to control Bsal, it might be possible to kill all salamanders in an area and repopulate it after the fungus has been given enough time to clear from the environment. However, the life history of salamanders makes it highly unlikely that all individuals, including those that are infected, could be completely eradicated. Many species are long-lived and inhabit areas that may be hard to reach. In addition, the effects on other wildlife of chemically treating an area in order to eradicate infected salamanders is unknown but could be expected to be severe.

*Ability To Prevent Escape and Establishment*

We considered whether it was practical for an exporting foreign nation to produce a health certificate stating that a possible carrier of Bsal has been found to be free of the fungus. Such action would help ensure that Bsal does not escape from an exporting nation by being carried on an infected salamander. However, there are significant concerns regarding the effectiveness and sensitivity of current testing methods (including the return of false negatives), lack of validation and sufficient testing capacity, and agency resources required to conduct inspections, interpret results, and issue health certificates. Although some countries may have the necessary skills to prepare a health certification that salamanders are free of Bsal, not all exporting nations may have the necessary skills or resources. Scientists and diagnostic laboratories are also working to standardize laboratory protocols (Ballard, pers. comm.).

As discussed below in *Ability to Prevent or Control the Spread of Pathogens or Parasites,* the ability and effectiveness of measures to prevent or control Bsal is currently low. While less certain, we also expect the ability to prevent escape and establishment is also low. Nonregulatory actions, such as implementing voluntary Best Management Practices or individual State action, are possible. The Service, for example, is working with partners on efforts such as Habitattitude™, which encourages responsible consumer actions with respect to pet ownership. Such actions include finding alternatives to releasing pets into the environment. Voluntary actions, such as applying heat therapy as described in Blooi *et al.* (2015a) and Blooi *et al.* (2015b), may help reduce the threat posed by Bsal. However, at this time it is not possible to determine the likelihood of success of such measures.

As described earlier under *Invasiveness of Salamanders* and *General Description of Chytrid Fungus,* salamanders have escaped into the ecosystem, and Bd, a related fungus, has also escaped and established in the United States. Therefore, we expect the likelihood of the Service's ability to prevent escape and establishment of Bsal through infected salamanders to be low. 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 would do to this nation's resources. As a result, we concluded that we cannot rely on voluntary actions alone to address the severity of the threat that Bsal poses and that other measures to prevent escape and establishment are not sufficient to ensure Bsal is not successfully introduced.

Therefore, we find that we cannot rely on these approaches to prevent escape and establishment of Bsal and that our current capacity to prevent escape and establishment is low.

*Potential To Eradicate or Manage Established Populations*

While some introduced salamanders in the United States have been successfully controlled, such as the lesser siren (which was eliminated from a backyard pond outside its native U.S. range), others such as the three-toed amphiuma have not (USGS 2015). However, evidence for control is sparse. Given the high rates of infection among salamanders tested by Martel *et al.* (2014), and the lack of control measures for Bsal that could be employed outside of a controlled facility, it is likely that Bsal would persist once introduced into the environment given appropriate environmental conditions, especially if a tolerant or susceptible salamander established a population and continued to spread Bsal.

*Ability To Rehabilitate Disturbed Ecosystems*

Bsal infection can lead to the loss of keystone species in the ecosystem. The ability to rehabilitate disturbed ecosystems is expected to be low. We considered whether the Service's National Fish Hatchery System (NFHS) could be used to maintain salamanders in refugia while areas are treated, much as we maintain a population of the San Marcos salamander, which is listed as threatened, at the Uvalde National Fish Hatchery. However, it is impractical to equip NFHS facilities to be able to rapidly protect numerous salamander populations and maintain them for an extended time such as might be required due to Bsal's introduction. Although, as described in the next section, a few options exist to treat individual salamanders, none have been identified that can be used to clear Bsal from a widespread area. Consequently, we expect that once Bsal has been introduced, it will persist and spread with little opportunity for widespread disinfection from ecosystems.

Studies have also questioned the effectiveness of captive-breeding programs to address threats, such as infectious disease, to amphibians, including salamanders (Harding *et al.* 2015). Research on booroolong frogs (*Litoria booroolongensis*) demonstrated that exposing them to Bd did not improve their chances of mitigating future reinfection (Cashins *et al.* 2013). We expect, given similarities of Bd to Bsal, that salamanders will also show a similar response to Bsal infection. As a result, it may not be possible to stimulate an immune response in captive salamander populations that would allow them to be reintroduced into ecosystems where Bsal may still exist.

Therefore, the ability to rehabilitate disturbed ecosystems is expected to be low because the Service would be unable to ensure that it could treat and protect all salamander populations expected to be affected by Bsal in the wild.

*Ability To Prevent or Control the Spread of Pathogens or Parasites*

The ability and effectiveness of measures to prevent or control Bsal is currently low. Few options can ensure potentially infected salamanders do not carry Bsal. Blooi *et al.* (2015a) has shown that treating salamanders infected with Bsal by exposing them ''to 25 °C [77 °F] for 10 days resulted in complete clearance of infection and clinically cured all experimentally infected animals. This treatment protocol was validated in naturally infected wild fire salamanders.'' The authors found that temperature treatment could be an effective option given the host salamander's thermal tolerance. However, the treatment does have some shortcomings. It is unknown whether all salamander species can tolerate the thermal regime required (Kolby, pers. comm.). Blooi *et al.* (2015a) also noted that there is some uncertainty as to whether the method is completely effective, as evidence of Bsal was found after thermal treatment, although it is possible that the evidence consisted of dead cells only.

Other treatment options also exist, such as treatment with antifungal medications that can be applied on animals that do not tolerate 25 °C (77 °F) (Martel, pers. comm; Blooi *et al.* 2015b). It may be possible to treat amphibians in the wild for Bd with antifungals by capturing individuals and soaking them in a bath of the chemical, then releasing them back into the environment. This process does not seem to be as effective as desired, but may delay the eventual outcome of an outbreak enough to help individuals persist in the population (Hardy *et al.* 2015). Blooi *et al.* (2015b) identified a method for treating infected salamanders with a combination of antifungals and temperature control that successfully cleared Bsal; however, such treatment worked only for controlled settings such as those found in a laboratory or conservation facility and is impractical to treat widespread areas in the natural environment given the likely cost, personnel, and time needed to locate and treat all salamanders in the wild. As we have noted above under *Environmental Conditions Needed to Survive,* Bsal is likely capable of persisting in the environment without a host by transmission to infected materials. Even if all individuals of a population could be successfully treated, the threat of reintroduction from environmental contamination would still exist.

Given the expected severity of consequences of Bsal introduction, all imported salamanders that could be carriers would need to be treated, which is not practical at this time due to the limited conditions under which this treatment is effective. Not all species will tolerate treatment, and reliable diagnostic capacity is needed to verify that animals do not carry Bsal following treatment. If an outbreak occurs, it would not be practical to locate and treat all individuals in the wild in U.S. ecosystems. While antifungal agents could be applied to all animals, either in the laboratory or perhaps applied over a large geographic area, we are concerned about side effects on the animals being treated. We are also concerned about possible negative environmental effects if a chemical was widely applied (Gyllenhammar *et al.* 2009; Hasselberg *et al.* 2008).

*Any Potential Ecological Benefits to Introduction*

There are no known benefits of Bsal or of salamanders carrying Bsal. The risks to native wildlife and wildlife resources greatly outweigh any unlikely benefits. There are no other potential ecological benefits for the introduction of Bsal or of Bsal-infected or Bsal-carrier salamanders into the United States.

**Conclusion**

Overall, there is a high risk to the wildlife and wildlife resources of the United States from salamanders that are capable of carrying Bsal. The United States leads all other countries in salamander diversity. Of the 190 native U.S. species, the vulnerability of 7 has been tested. We find that the fungus can infect and is lethal to at least 2 salamander species native to the United States and that a total of 67 native species are carriers of Bsal. The vulnerability and carrier status of 103 species have not been evaluated, many of which may also be vulnerable to this potentially deadly fungus. The disease may stress species with less lethal vulnerability under wild conditions; if these species are stressed by other factors, Bsal could cause harm to additional species in the face of cumulative stressors. The benefits that these native salamander species provide to ecosystems, and in turn the ecosystem services that benefit people, are significant. The Service concludes that preventing Bsal from infecting native salamanders will prevent harmful effects to the wildlife and wildlife resources of the United States and merits listing of salamanders capable of carrying Bsal as injurious.

Salamanders capable of carrying Bsal have the potential to escape and spread Bsal. Species capable of carrying Bsal can survive long enough in the wild to transmit the fungus or can transmit it to other carriers while in transit. Bsal can also be introduced and infect native salamanders by improper disposal of material that comes in contact with infected salamanders, and persist long enough in the environment without a host to represent a threat.

There is evidence that all species within a genus, where at least one species has been identified as a carrier of Bsal, can also be a threat. Our analysis found no conclusive evidence to the contrary. We find that, due to shared characteristics by species within a genus, other species within these genera are also highly likely to be carriers of Bsal, even if not every species in the genus has been tested to verify that it is a carrier of Bsal. Hybrids consisting of species found entirely within a genus identified as a carrier are also expected to be carriers.

The main pathway for the global spread of Bsal is the international trade in salamanders. The most likely pathway of a salamander that is a host to Bsal into the United States would include a pet store or online retailer. Listing salamanders that are capable of carrying Bsal as injurious wildlife will significantly confine this pathway and limit Bsal's capacity to be introduced, establish, and spread in the United States.

The current capacity to prevent escape and establishment 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.

The Service is listing live and dead specimens, including parts. We find the risk of transmission of Bsal to other salamanders is high from both live and dead specimens. Any salamanders that are infected and lethally vulnerable may die in transport and continue to carry Bsal into the United States. The risk is also high from improper disposal of materials that might be contaminated by those live or dead specimens. While we cannot list contaminated materials as injurious under the authority of the Act, by listing the carriers of Bsal, we seek to prevent the introduction of such materials.

The Service is not adding eggs or gametes because Bsal does not appear to affect reproductive tissue such as eggs or gametes. The Service is not listing genera that we find are not carriers of Bsal because such salamanders are not capable of introducing Bsal to the United States or otherwise transmitting it to native populations. We are also not listing genera where there is no data, even though it is possible that untested genera may also be capable of carrying Bsal.

For the reasons stated, the Service finds the 20 genera of salamanders to be injurious to the wildlife and wildlife resources of the United States. The potential for Bsal introduction into the United States is high, the United States has suitable conditions for Bsal survival, and the consequences of introduction into the United States are expected to be significant and occur across a wide range of the United States. By listing species that can carry Bsal, we are taking immediate action to help ensure the fungus does not enter the United States and infect native salamander populations and cause severe individual mortality, population declines, and ecosystem harm. We are not listing genera for which data is unavailable because we do not have a basis for doing so.

**Required Determinations**

*Regulatory Planning and Review*

Executive Order 12866 provides that the Office of Information and Regulatory Affairs in the Office of Management and Budget (OMB) will review all significant rules. The Office of Information and Regulatory Affairs has determined that this rule is not significant.

Executive Order 13563 reaffirms the principles of Executive Order 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. Executive Order 13563 emphasizes further that the regulatory system must allow for public participation and an open exchange of ideas. We have developed this rule in a manner consistent with these principles.

Executive Order 12866, Economic Analysis of Federal Regulations under Executive Order 12866 (OMB 1996), and Circular A–4 (OMB 2003) identify guidelines or ''best practices'' for the economic analysis of Federal regulations. In the context of the specific regulation under consideration, we anticipate minor economic impacts.

The rule listing 20 genera of salamanders would prohibit an estimated 217,000 salamanders from being imported per year, and a minimum of 338 domestically bred salamanders may be affected due to the interstate transportation prohibition. The maximum annual loss to entities that deal in these species is $3.8 million in revenue. The maximum annual loss to the economy is estimated to be $10.0 million. The preferred alternative (Alternative 3, described below) does not meet the cost criteria for a significant rule. Furthermore, the preferred alternative is not expected to have a significant economic impact on a substantial number of small entities.

In the long term, the rule is expected to benefit the economy. Efforts to control or eradicate invasive species, and manage the costs they incur to society, once they have become established are generally recognized as being less effective and more expensive than efforts to prevent potentially invasive species from establishing in the first place (Leung *et al.* 2002, Finnoff *et al.* 2007). As a result, sectors of the economy that will not need to expend resources to control or manage injurious wildlife will be expected to gain from a timely listing process.

The Service considered five alternatives under Executive Order 12866 for the economic analysis for this rule: (1) No action; (2) listing species that were identified by Martel *et al.* (2014) and other sources to be carriers of Bsal; (3) listing all species in genera in which there is at least one confirmed carrier and all species in the genus are likely to be a carrier; (4) listing all salamanders; and (5) requiring a health certificate stating that the animal being moved is free of Bsal, in lieu of or in addition to listing. The purpose of considering alternatives is to identify whether there is a more effective option that can achieve the desired goals of the rule.

Alternative 1 was no action. This is the status quo. We would not list any species of salamanders as injurious. 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 and minimize its introduction. No loss of retail sales or economic output due to actions by the Service would result from this alternative. It is expected that costs would be incurred by the salamander and ancillary industries due to Bsal management and the impact of Bsal on the supply of salamanders.

Alternative 2 was listing only those species that Martel *et al.* (2014) and Cunningham *et al.* (2015) (as explained further in Chytridcrisis 2015b) confirmed are carriers of Bsal. The list of species that Martel *et al.* (2014) and Cunningham *et al.* (2015) evaluated is considerably smaller and consists of 27 species. As described earlier in *Vulnerability and Carrier Status,* we have determined that all species in a genus will share similar characteristics that make them capable of serving as a carrier of Bsal. Between 2004 and 2014 (USFWS OLE 2015), 1.6 million salamanders of these species were imported that would have been sold for an estimated retail value of $22.8 million; the maximum annual loss to entities that deal in these species would be $2.1 million in revenue. The maximum annual loss to the economy under this alternative is estimated to be $5.6 million.

Alternative 3 was listing all species in genera where there is at least one confirmed carrier and all species in that genus are likely to be a carrier. As we described earlier, we have a sound scientific basis to conclude that all species in a genus will share similar characteristics in regards to whether they are capable of serving as a carrier of Bsal. Martel *et al.* (2014) did not find any examples of species in a genus where one species was likely to be a carrier and another species was not, with two exceptions as discussed above. Given the significant risk that Bsal poses, we find it is important to list all species that are likely to be carriers of the fungus. This alternative was selected for this interim rule. Between 2004 and 2014 (USFWS OLE 2015), 2.4 million salamanders of these genera were imported that would have been sold for an estimated retail value of $41.4 million; the maximum annual loss to entities that deal in these species would be $3.8 million in revenue. The maximum annual loss to the economy under this alternative is estimated to be $10.0 million.

Alternative 4 was listing all salamanders in the world. There are approximately 681 species of salamanders. Although some species that we are not listing may be negatively vulnerable to or serve as carriers of Bsal, we are taking immediate action against those species that current scientific research and analysis has confirmed are carriers of Bsal, along with other species in the genus that share the same traits that make them highly likely to be carriers of Bsal. Between 2004 and 2014 (USFWS OLE 2015), 2.5 million salamanders were imported that would have been sold for an estimated retail value of $43.9 million. The maximum annual loss to entities that deal in these species is estimated to be $4.0 million in revenue. The maximum annual loss to the economy under this alternative is estimated to be $10.7 million.

Alternative 5 would have required a health certificate that must accompany salamanders being imported and transported across State lines that states that the animal being imported or moved through interstate movement is free of Bsal in lieu of or in addition to listing. The Service did not select 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. It is uncertain what the loss in revenue and economic output would be due to this alternative. 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 or transported depends on the cost of compliance. Therefore, of the 2.5 million salamanders that were imported between 2004 and 2014 (USFWS OLE 2015), all or none may have been imported or transported under these circumstances. They would have been sold for up to an estimated retail value of $43.9 million. The maximum annual loss to entities that deal in these species is $4.0 million in revenue. The maximum annual loss to the economy is estimated to be $10.7 million.

We considered other alternatives that we rejected because we do not have the authority under the Lacey Act to implement them ourselves. For example, we do not have the authority or capacity to establish and enforce a quarantine system. 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.* (2015a) and Blooi *et al.* (2015b), may 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 would do to this nation's resources and concluded that we cannot rely on voluntary actions alone in this instance to address the severity of the threat that Bsal poses.

*Regulatory Flexibility Act*

The Secretary of the Interior certifies that this rule will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act [SBREFA] of 1996) (5 U.S.C. 601, *et seq.*), is not required. The factual basis for this certification is provided in a draft regulatory flexibility analysis in the economic analysis, prepared to accompany this rule, which we briefly summarize below. See **FOR FURTHER INFORMATION CONTACT** or *http://www.regulations.gov* under Docket No. FWS–HQ–FAC–2015–0005 for the complete document.

Although an interim rule allows us to move more quickly to implement the listing, it does not change the substantive basis for the listing decision, modify the types of organizations that would be affected by the rule, or affect the future administration of the Act as it applies to small entities to which the listing decision applies. In general, entities that are affected by an injurious listing decision would include:

(1) entities importing animals, gametes, viable eggs, and hybrids of species; and

(2) entities (including breeders and wholesalers) with interstate sales of animals, gametes, viable eggs, and hybrids. (However, this rule does not include provisions pertaining to gametes and viable eggs.)

The ultimate effects of any listing on these entities would depend on the amount of interstate sales within the taxon's market. Impacts would also depend upon whether or not close substitutes for the species listed by this rule exist. In this case, the rule:

a. Will not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete with foreign-based enterprises.

Listing 20 genera of salamanders would prohibit an estimated 217,000 salamanders imported per year; 338 domestically bred salamanders would face the interstate transportation prohibition. The maximum annual loss to entities that deal in these species is $3.8 million in revenue. Small businesses are expected to incur $2.3 million of the burden. Impacts per small business may be as high as $453,000 for importers and $23,000 for domestic breeders.

The interim rule makes no changes in the compliance requirements of any business. The Service is unaware of any duplicative, overlapping, or conflicting Federal rules. Several States implement similar acts that are more restrictive than the Federal law.

*Small Business Regulatory Enforcement Fairness Act*

The interim rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more. The rule listing 20 genera of salamanders, including 201 species, would prohibit an estimated 217,000 salamanders imported per year, and prohibit the interstate movement of at least 338 domestically bred individuals. The maximum annual loss to entities that deal in these species is $3.8 million in revenue. Small businesses are expected to incur $2.3 million of the burden. Impacts per small business may be as high as $453,000 for importers and $23,000 for domestic breeders. In addition, businesses would also face the risk of fines if caught transporting these salamanders or their parts across State lines. The penalty for violation of the Act is not more than 6 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.

b. Would not cause a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions. Businesses breeding or selling the listed salamanders would be able to substitute other species and maintain business. Some businesses, however, may close. We do not have data for the potential substitutions, and, therefore, we do not know the number of businesses that may close.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete with foreign-based enterprises.

*Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)*

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501), the Service makes the following findings:

a. This rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or tribal governments, or the private sector.

b. The rule would not have a significant or unique effect on State, local, or tribal governments or the private sector. A statement containing the information required by the Unfunded Mandates Reform Act (2 U.S.C. 1531 *et seq.*) is not required.

*Takings*

In accordance with Executive Order 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), the rule does not have significant takings implications. A takings implication assessment is not required. This rule would not impose significant requirements or limitations on private property use. While import and interstate transport of any of the listed species is prohibited, any person who currently owns one of the listed species can continue to possess the salamander and engage in intrastate transport and other activities within their State or territory, as allowed under State, tribal, or territorial law.

*Federalism*

In accordance with Executive Order 13132 (Federalism), this interim rule does not have significant Federalism effects. A Federalism assessment is not required. This rule would not have any direct effects on States, on the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 13132, we determine that this rule does not have sufficient Federalism implications to warrant the preparation of a Federalism Assessment.

*Civil Justice Reform*

In accordance with Executive Order 12988, the Office of the Solicitor has determined that the interim rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Executive Order. The interim rule has been reviewed to eliminate drafting errors and ambiguity, was written to minimize litigation, provides a clear legal standard for affected conduct rather than a general standard, and promotes simplification and burden reduction.

*Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)*

This rule does not contain any new collections of information that require approval by OMB under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). This rule will not impose new recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. OMB has approved the information collection requirements associated with the required permits and assigned OMB Control No. 1018–0093, which expires May 31, 2017. We may not conduct or sponsor, and you are not required to respond to, a collection of information unless it displays a currently valid OMB control number.

*National Environmental Policy Act*

We have reviewed this rule in accordance with the criteria of the National Environmental Policy Act (NEPA) and our Departmental Manual in 516 DM. This rule does not constitute a major Federal action significantly affecting the quality of the human environment. Under Department of the Interior agency policy and procedures, this rule is covered by a categorical exclusion and preparation of a detailed statement under NEPA is not required because it adds species to the list of injurious wildlife under 50 CFR subchapter B, part 16, which prohibits the importation into the United States and interstate transport of wildlife found to be injurious. (For further information, see 80 FR 66554; October 29, 2015.) We have also determined that the rule does not involve any of the extraordinary circumstances listed in 43 CFR 46.215 that would require further analysis under NEPA.

*Clarity of Rule*

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

a. Be logically organized;

b. Use the active voice to address readers directly;

c. Use clear language rather than jargon;

d. Be divided into short sections and sentences; and

e. Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, and the sections where you feel lists or tables would be useful.

*Government-to-Government Relationship With Tribes*

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. We have evaluated potential effects on federally recognized Indian tribes and have determined that there are no potential effects. This rule involves the importation and interstate movement of salamanders. We are unaware of such movement in these species by tribes.

*Effects on Energy*

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. This rule is not expected to affect energy supplies, distribution, and use. Therefore, this action is a not a significant energy action and no Statement of Energy Effects is required.

**References Cited**

A complete list of all references used in this rulemaking is available at *http://www.regulations.gov* under Docket No. FWS–HQ–FAC–2015–0005.

**Authors**

The primary authors of this interim rule are the staff members of the U.S. Fish and Wildlife Service.

**List of Subjects in 50 CFR Part 16**

Fish, Imports, Reporting and recordkeeping requirements, Transportation, Wildlife.

**Regulation Promulgation**

For the reasons discussed in the preamble, the U.S. Fish and Wildlife Service amends part 16, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

## PART 16—[AMENDED]

■ 1. The authority citation for part 16 continues to read as follows:

**Authority:** 18 U.S.C. 42.

■ 2. Revise § 16.14 to read as follows:

**§ 16.14 Importation of live or dead amphibians or their eggs.**

(a) The importation, transportation, or acquisition of any live or dead specimen, including parts, but not eggs or gametes, of the genera *Chioglossa, Cynops, Euproctus, Hydromantes, Hynobius, Ichthyosaura, Lissotriton, Neurergus, Notophthalmus, Onychodactylus, Paramesotriton, Plethodon, Pleurodeles, Salamandra, Salamandrella, Salamandrina, Siren, Taricha, Triturus,* and *Tylototriton,* including but not limited to, the species listed in this paragraph, is prohibited except as provided under the terms and conditions set forth at § 16.22 of this part:

(1) *Chioglossa lusitanica* (golden striped salamander).

(2) *Cynops chenggongensis* (Chenggong fire-bellied newt).

(3) *Cynops cyanurus* (blue-tailed fire-bellied newt).

(4) *Cynops ensicauda* (sword-tailed newt).

(5) *Cynops fudingensis* (Fuding fire-bellied newt).

(6) *Cynops glaucus* (bluish grey newt, Huilan Rongyuan).

(7) *Cynops orientalis* (Oriental fire belly newt, Oriental fire-bellied newt).

(8) *Cynops orphicus* (no common name).
(9) *Cynops pyrrhogaster* (Japanese newt, Japanese fire-bellied newt).
(10) *Cynops wolterstorffi* (Kunming Lake newt).
(11) *Euproctus montanus* (Corsican brook salamander).
(12) *Euproctus platycephalus* (Sardinian brook salamander).
(13) *Hydromantes ambrosii* (Ambrosi salamander).
(14) *Hydromantes brunus* (limestone salamander).
(15) *Hydromantes flavus* (Mount Albo cave salamander).
(16) *Hydromantes genei* (Sardinian cave salamander).
(17) *Hydromantes imperialis* (imperial cave salamander).
(18) *Hydromantes italicus* (Italian cave salamander).
(19) *Hydromantes platycephalus* (Mount Lyell salamander).
(20) *Hydromantes sarrabusensis* (no common name).
(21) *Hydromantes shastae* (Shasta salamander).
(22) *Hydromantes strinatii* or *Speleomantes strinatii* (French cave salamander, Strinati's cave salamander).
(23) *Hydromantes supramontis* (Supramonte cave salamander).
(24) *Hynobius abei* (Abe's salamander).
(25) *Hynobius amakusaensis* (Amakusa-sanshouo).
(26) *Hynobius amjiensis* (Anji salamander).
(27) *Hynobius arisanensis* (Arisan hynobid).
(28) *Hynobius boulengeri* (Odaigahara salamander).
(29) *Hynobius chinensis* (Chinese salamander).
(30) *Hynobius dunni* (Oita salamander).
(31) *Hynobius formosanus* (Taiwan salamander).
(32) *Hynobius fucus* or *Hynobius fuca* (Taiwan lesser salamander).
(33) *Hynobius glacialis* (Nanhu salamander).
(34) *Hynobius guabangshanensis* (no common name).
(35) *Hynobius hidamontanus* (Hakuba salamander).
(36) *Hynobius hirosei* (no common name).
(37) *Hynobius katoi* (Akaishi sansho-uo).
(38) *Hynobius kimurae* (Hida salamander).
(39) *Hynobius leechii* (northeastern China hynobiid salamander).
(40) *Hynobius lichenatus* (northeast salamander).
(41) *Hynobius maoershanensis* (no common name).
(42) *Hynobius naevius* (blotched salamander).
(43) *Hynobius nebulosus* (misty salamander).
(44) *Hynobius nigrescens* (black salamander).
(45) *Hynobius okiensis* (Oki salamander).
(46) *Hynobius osumiensis* (Osumi-sanshouo).
(47) *Hynobius quelpaertensis* (no common name).
(48) *Hynobius retardatus* (Hokkaido salamander).
(49) *Hynobius shinichisatoi* (Sobo-sanshouo).
(50) *Hynobius sonani* (Sonan's hynobiid).
(51) *Hynobius stejnegeri* (Bekko Sansho-uo).
(52) *Hynobius takedai* (Hokuriku Sansho-uo).
(53) *Hynobius tokyoensis* (Tokyo salamander).
(54) *Hynobius tsuensis* (Tsushima Sansho-uo).
(55) *Hynobius turkestanicus* (Turkestanian salamander).
(56) *Hynobius yangi* (no common name).
(57) *Hynobius yatsui* (no common name).
(58) *Hynobius yiwuensis* (Yiwu hynobiid).
(59) *Ichthyosaura alpestris* (alpine newt).
(60) *Lissotriton boscai* (Bosca's newt).
(61) *Lissotriton helveticus* (palmate newt).
(62) *Lissotriton italicus* (Italian newt).
(63) *Lissotriton kosswigi* (Triton pontue de Kosswig).
(64) *Lissotriton lantzi* (no common name).
(65) *Lissotriton montandoni* (Carpathian newt).
(66) *Lissotriton vulgaris* (smooth newt).
(67) *Neurergus crocatus* (no common name).
(68) *Neurergus derjugini* or *Neurergus microspilotus* (Kurdistan newt).
(69) *Neurergus kaiseri* (Lorestan newt, Luristan newt, emperor spotted newt, Zagros newt, Iranian harlequin newt, kaiser newt).
(70) *Neurergus strauchii* (no common name).
(71) *Notophthalmus meridionalis* (black-spotted newt).
(72) *Notophthalmus perstriatus* (striped newt).
(73) *Notophthalmus viridescens* (eastern newt).
(74) *Onychodactylus fischeri* (long-tailed clawed salamander).
(75) *Onychodactylus fuscus* (Tadami clawed salamander).
(76) *Onychodactylus intermedius* (Bandai clawed salamander).
(77) *Onychodactylus japonicus* (Japanese clawed salamander).
(78) *Onychodactylus kinneburi* (Shikoku clawed salamander).
(79) *Onychodactylus koreanus* (Korai-Sansyouo).
(80) *Onychodactylus nipponoborealis* (Riben Bei Zhaoni).
(81) *Onychodactylus tsukubaensis* (Tsukuba clawed salamander).
(82) *Onychodactylus zhangyapingi* (Jilin Zhaoni).
(83) *Onychodactylus zhaoermii* (Liaoning).
(84) *Paramesotriton caudopunctatus* (spot-tailed warty newt).
(85) *Paramesotriton chinensis* (Chinese warty newt).
(86) *Paramesotriton deloustali* (no common name).
(87) *Paramesotriton fuzhongensis* (no common name).
(88) *Paramesotriton guanxiensis* (Guangxi warty newt).
(89) *Paramesotriton hongkongensis* (no common name).
(90) *Paramesotriton labiatus* (spotless stout newt).
(91) *Paramesotriton longliensis* (no common name).
(92) *Paramesotriton maolanensis* (no common name).
(93) *Paramesotriton qixilingensis* (no common name).
(94) *Paramesotriton wulingensis* (no common name).
(95) *Paramesotriton yunwuensis* (no common name).
(96) *Paramesotriton zhijinensis* (no common name).
(97) *Plethodon ainsworthi* (Catahoula salamander, bay springs salamander).
(98) *Plethodon albagula* (western slimy salamander).
(99) *Plethodon amplus* (Blue Ridge gray-cheeked salamander).
(100) *Plethodon angusticlavius* (Ozark salamander, Ozark zigzag salamander).
(101) *Plethodon asupak* (Scott Bar salamander).
(102) *Plethodon aureolus* (Tellico salamander).
(103) *Plethodon caddoensis* (Caddo Mountain salamander).
(104) *Plethodon chattahoochee* (Chattahoochee slimy salamander).
(105) *Plethodon cheoah* (Cheoah bald salamander).
(106) *Plethodon chlorobryonis* (Atlantic Coast slimy salamander).
(107) *Plethodon cinereus* (eastern red-backed salamander, redback salamander, salamandre rayée, red-backed salamander).
(108) *Plethodon cylindraceus* (white-spotted slimy salamander).
(109) *Plethodon dorsalis* (zigzag salamander, northern zigzag salamander).

(110) *Plethodon dunni* (Dunn's salamander).
(111) *Plethodon electromorphus* (northern ravine salamander).
(112) *Plethodon elongatus* (Del Norte salamander).
(113) *Plethodon fourchensis* (Fourche Mountain salamander).
(114) *Plethodon glutinosus* (slimy salamander, northern slimy salamander).
(115) *Plethodon grobmani* (southeastern slimy salamander).
(116) *Plethodon hoffmani* (valley and ridge salamander).
(117) *Plethodon hubrichti* (Peaks of Otter salamander).
(118) *Plethodon idahoensis* (Coeur d'Alene salamander).
(119) *Plethodon jordani* (Appalachian salamander, red-cheeked salamander, Jordan's salamander).
(120) *Plethodon kentucki* (Kentucky salamander, Cumberland Plateau salamander).
(121) *Plethodon kiamichi* (Kiamichi slimy salamander).
(122) *Plethodon kisatchie* (Louisiana slimy salamander).
(123) *Plethodon larselli* (Larch Mountain salamander).
(124) *Plethodon meridianus* (South Mountain gray-cheeked salamander, southern gray-cheeked salamander).
(125) *Plethodon metcalfi* (southern gray-cheeked salamander).
(126) *Plethodon mississippi* (Mississippi slimy salamander).
(127) *Plethodon montanus* (northern gray-cheeked salamander).
(128) *Plethodon neomexicanus* (Jemez Mountains salamander).
(129) *Plethodon nettingi* (Cheat Mountain salamander).
(130) *Plethodon ocmulgee* (Ocmulgee slimy salamander).
(131) *Plethodon ouachitae* (Rich Mountain salamander).
(132) *Plethodon petraeus* (Pigeon Mountain salamander).
(133) *Plethodon punctatus* (white-spotted salamander, cow knob salamander).
(134) *Plethodon richmondi* (southern ravine salamander, ravine salamander).
(135) *Plethodon savannah* (Savannah slimy salamander).
(136) *Plethodon sequoyah* (Sequoyah slimy salamander).
(137) *Plethodon serratus* (southern red-backed salamander).
(138) *Plethodon shenandoah* (Shenandoah salamander).
(139) *Plethodon sherando* (Big Levels salamander).
(140) *Plethodon shermani* (red-legged salamander).
(141) *Plethodon stormi* (Siskiyou Mountains salamander).
(142) *Plethodon teyahalee* (Southern Appalachian salamander).
(143) *Plethodon vandykei* (Van Dyke's salamander).
(144) *Plethodon variolatus* (South Carolina slimy salamander).
(145) *Plethodon vehiculum* (western red-backed salamander).
(146) *Plethodon ventralis* (southern zigzag salamander).
(147) *Plethodon virginia* (Shenandoah Mountain salamander).
(148) *Plethodon websteri* (Webster's salamander).
(149) *Plethodon wehrlei* (Wehrle's salamander).
(150) *Plethodon welleri* (Weller's salamander).
(151) *Plethodon yonahlossee* (Yonahlossee salamander).
(152) *Pleurodeles nebulosus* (no common name).
(153) *Pleurodeles poireti* (Algerian newt).
(154) *Pleurodeles waltl* (Spanish newt).
(155) *Salamandra algira* (Algerian salamander).
(156) *Salamandra atra* (alpine salamander).
(157) *Salamandra corsica* (Corsican fire salamander).
(158) *Salamandra infraimmaculata* (no common name).
(159) *Salamandra lanzai* (Lanza's alpine salamander, Salamandra di Lanza).
(160) *Salamandra salamandra* (fire salamander).
(161) *Salamandrella keyserlingii* (Siberian newt).
(162) *Salamandrella tridactyla* (no common name).
(163) *Salamandrina perspicillata* (northern spectacled salamander).
(164) *Salamandrina terdigitata* (southern spectacled salamander).
(165) *Siren intermedia* (lesser siren).
(166) *Siren lacertina* (greater siren).
(167) *Taricha granulosa* (rough-skinned newt).
(168) *Taricha rivularis* (red-bellied newt).
(169) *Taricha sierrae* (Sierra newt).
(170) *Taricha torosa* (California newt).
(171) *Triturus carnifex* (Italian crested newt).
(172) *Triturus cristatus* (great crested newt).
(173) *Triturus dobrogicus* (Danube crested newt).
(174) *Triturus hongkongensis* (no common name)
(175) *Triturus ivanbureschi* (Balkan-Anatolian crested newt, Buresch's crested newt).
(176) *Triturus karelinii* (Southern crested newt).
(177) *Triturus macedonicus* (no common name).
(178) *Triturus marmoratus* (marbled newt).
(179) *Triturus pygmaeus* (pygmy marbled newt).
(180) *Triturus vittatus* (no common name).
(181) *Tylototriton anguliceps* (angular-headed newt).
(182) *Tylototriton asperrimus* (black knobby newt).
(183) *Tylototriton broadoridgus* (no common name).
(184) *Tylototriton dabienicus* (no common name).
(185) *Tylototriton daweishanensis* (no common name).
(186) *Tylototriton hainanensis* (Hainan knobby newt).
(187) *Tylototriton kweichowensis* (red-tailed knobby newt).
(188) *Tylototriton liuyangensis* (no common name).
(189) *Tylototriton lizhenchangi* (Mangshan crocodile newt).
(190) *Tylototriton notialis* (no common name).
(191) *Tylototriton panhai* (no common name).
(192) *Tylototriton pseudoverrucosus* (southern Sichuan crocodile newt).
(193) *Tylototriton shanjing* (Yunnan newt).
(194) *Tylototriton shanorum* (no common name).
(195) *Tylototriton taliangensis* (Thailand newt).
(196) *Tylototriton uyenoi* (no common name).
(197) *Tylototriton verrucosus* (Himalayan newt).
(198) *Tylototriton vietnamensis* (no common name).
(199) *Tylototriton wenxianensis* (Wenxian knobby newt).
(200) *Tylototriton yangi* (Tiannan crocodile newt).
(201) *Tylototriton ziegleri* (Ziegler's crocodile newt).

(b) Upon the filing of a written declaration with the District Director of Customs at the port of entry as required under § 14.61 of this chapter, all other species of amphibians may be imported, transported, and possessed in captivity, without a permit, for scientific, medical, education, exhibition, or propagating purposes, but no such amphibians or any progeny or eggs thereof may be released into the wild except by the State wildlife conservation agency having jurisdiction over the area of release or by persons having prior written permission for release from such agency.

Dated: December 30, 2015.

**Michael J. Bean,**
*Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.*

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