BEFORE THE SECRETARY OF THE U.S. DEPARTMENT OF INTERIOR

PETITION TO INSTITUTE AN EMERGENCY MORATORIUM ON IMPORTS OF ALL LIVE SALAMANDERS AND TO LIST ALL LIVE SALAMANDERS IN TRADE AS INJURIOUS UNDER THE LACEY ACT UNLESS FREE OF *BATRACHOCHYTRIUM SALAMANDRIVORANS*

Photo of Eastern Newt by Patrick Coin

CENTER FOR BIOLOGICAL DIVERSITY & SAVE THE FROGS!

May 14, 2015

PETITION ON SALAMANDER IMPORTS - DEPARTMENT OF INTERIOR

INTRODUCTION

Pursuant to Section 553(e) of the Administrative Procedure Act ("APA"), 5 U.S.C. §§ 553(e), the Center for Biological Diversity ("Center") and SAVE THE FROGS! submit this petition to prevent the introduction of *Batrachochytrium salamandrivorans* (*Bsal*) into the United States, and thus avoid potentially catastrophic consequences for salamanders and newts.[1] *Bsal* is a novel, highly virulent pathogen that through trade could be introduced into the United States and subsequently infect native salamander species. A rare opportunity exists to keep this deadly disease out of the United States and the Department of Interior must act swiftly before this opportunity is lost. We request an emergency moratorium on imports of all live salamanders into the United States to prevent the introduction of this disease while the Service sets up longer-term regulatory measures.

Amphibians are in crisis. Widespread amphibian declines have been recognized since the late 1980s and were confirmed in a comprehensive global assessment of amphibian status in 2004 that suggested that approximately one third of amphibians worldwide and in the United States are declining.[2] This extinction crisis was confirmed by a 2013 study that utilized comprehensive data on occupancy rates collected throughout the United States by the U.S. Geological Survey's Amphibian Research and Monitoring Initiative.[3] The researchers found a 3.7% annual decline in overall occupancy by amphibians from 2002 to 2011 and an average of 11.6% annual declines in overall occupancy for the subset of species that are Red-listed by the International Union for Conservation of Nature (IUCN).[4]

Worldwide, approximately half of salamander species are threatened or extinct according to the IUCN's 2008 red list assessment.[5] The United States is a global hotspot for salamander biodiversity, with about 190 species, more species of salamanders than any other place on earth. However, many of these species are already struggling to deal with numerous stressors, including habitat loss and degradation, climate change, pollution, and other diseases such as *Bsal*'s relative *Batrachochytrium dendrobatidis* (*Bd*). Twenty of these salamander species are listed under the Endangered Species Act (ESA) as threatened or endangered by the U.S. Fish and Wildlife Service (FWS) and three are ESA candidate species. Many more salamander species have suffered declines in the United States, including 37 species currently awaiting ESA listing decisions from the FWS. The introduction of a novel, highly virulent pathogen like *Bsal* is a significant threat that would likely lead to further declines and more listings of salamander species under the ESA.

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[1] 43 C.F.R. § 14.2 provides that:

> [A]ny person may petition for the issuance, amendment, or repeal of a rule (5 U.S.C. 553(e)). The petition will be addressed to the Secretary of the Interior, U.S. Department of the Interior, Washington, DC 20240. It will identify the rule requested to be repealed or provide the text of a proposed rule or amendment and include reasons in support of the petition.

The regulatory text for the proposed rule amendments are provided below.

[2] Simon N. Stuart et al. *Status and trends of amphibian declines and extinctions worldwide*. 306 Science 1783–1786 (2004).

[3] Michael J. Adams et al. *Trends in Amphibian Occupancy in the United States.* 8 PLoS ONE e64347 (2013)

[4] *Id.*

[5] International Union for the Conservation of Nature. *Amphibians IUCN Red List Status*. Available at http://www.iucnredlist.org/initiatives/amphibians/analysis/red-list-status (last accessed April 20, 2015).

PETITIONERS

This petition is presented on behalf of the following organizations. The APA directs that "[e]ach agency [of the Federal Government] shall give an interested person the right to petition for the issuance…of a rule."[6] Each organization listed below and its members are "interested persons" within the meaning of the APA, and hence petition the Service for the requested actions to protect U.S. native salamanders pursuant to the APA and in accordance with the Lacey Act.[7]

Center for Biological Diversity
The Center is a non-profit, public interest environmental organization dedicated to the protection of species and their habitats through science, policy and environmental law. The Center has over 825,000 members and online activists.
Contact: Jenny Loda, jloda@biologicaldiversity.org, (415) 436-9682 x336

SAVE THE FROGS!
SAVE THE FROGS! is the world's leading amphibian conservation organization. SAVE THE FROGS! works in California, across the USA, and around the world to prevent the extinction of amphibians, and to create a better planet for humans and wildlife.
Contact: Kerry Kriger, kerry@savethefrogs.com

BACKGROUND

No species of amphibian is currently regulated as injurious under the Lacey Act. No amphibian shipments are quarantined by any Federal agency upon entry and many shipments are neither visually inspected nor fully identified to the species level when they arrive in the United States.[8] This is despite the mounting evidence of the role of trade in the spread of the pathogens *Batrachochytrium dendrobatidis* (*Bd*) and ranaviruses and the link between these pathogens and amphibian declines and extinctions.[9] Both of these pathogens have been added to the World Organization for Animal Health's (OIE) list of "notifiable" aquatic diseases in the OIE Aquatic Animal Health Code.[10] *Bd* has already spread throughout most of the world. As a relative of *Bd*, and exhibiting similar characteristics, *Bsal* is likely to spread at a similarly fast pace and contribute further to amphibian declines and extinctions if emergency action is not taken.

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[6] 5 U.S.C. § 553(e).
[7] *Id*.; 18 U.S.C. § 42(a)(1).
[8] Defenders of Wildlife. 2007. *Broken Screens - The Regulation of Live Animal Imports in the United States.* Report by Defenders of Wildlife, Washington, DC. Available at: http://www.defenders.org/publications/broken_screens_report.pdf
[9] Lisa M. Schloegel et al. *Two amphibian diseases, chytridiomycosis and ranaviral disease, are now globally notifiable to the World Organization for Animal Health (OIE): an assessment*. 92 Diseases of Aquatic Organisms 101-108 (2010).
[10] *Id.* The OIE lists high-priority animal diseases as "notifiable" in order to enhance their surveillance and control their spread through trade. The U.S. has not yet adopted the OIE recommended standard for *Bd*.

Current regulations do nothing to prevent the introduction of amphibian diseases like *Bsal* into the United States. Under current Lacey Act regulations all amphibians "may be imported, transported, and possessed in captivity" in this country for most purposes. 50 C.F.R § 16.14 provides:

> *Upon the filing of a written declaration with the District Director of Customs at the port of entry as required under Sec. 14.61, all species of live amphibians or their eggs may be imported, transported, and possessed in captivity, without a permit, for scientific, medical, education, exhibition, or propagating purposes, but no such live amphibians or any progeny or eggs thereof may be released into the wild except by the State wildlife conservation agency having jurisdiction over the release from such agency.*

The FWS should amend 50 C.F.R § 16.14 to modify this blanket exemption of live amphibians or their eggs from any permit requirements. Petitioners request that the FWS amend this regulation on an emergency basis to repeal this complete exemption for live salamanders and their eggs and only allow their import for exceptional, permitted circumstances such as scientific research. Once the FWS establishes this emergency moratorium on salamander imports, the agency should work to establish certification and/or testing protocols that can be used for a long-term amendment allowing salamanders to be imported if they have been certified/tested to be free of *Bsal*.

Bsal is a highly pathogenic chytrid fungus that was recently discovered as a novel cause of the amphibian disease chytridiomycosis.[11] This disease caused a dramatic and enigmatic mortality event in fire salamanders (*Salamandra salamandra*) in the Netherlands.[12] Yearly monitoring of the fire salamander showed relatively stable populations until repeated sightings of dead individuals began in 2008, leading to a rapid decline from 2010-2012 that resulted in a total population decrease of 96% over the 15 year monitoring period.[13] *Bsal* was isolated from the skin of fire salamanders from this population and infected fire salamanders died within 7 days, following an episode of anorexia, apathy, and ataxia.[14] Infected salamanders exhibited superficial erosions and deep ulcerations in the skin all over the body.[15]

Bsal is the second chytrid fungus known to parasitize and kill amphibians. Its relative, *Batrachochytrium dendrobatidis* (*Bd*), causes an infectious disease that is considered to be one of the major drivers of amphibian declines and extinctions throughout the world. *Bd* has now been detected in 56 countries and in 516 species, of 82 countries and 1240 species tested.[16] Like *Bd*, *Bsal* induces a lethal skin disease and is associated with mortality events and severe population

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[11] An Martel et al. *Batrachochytrium salamandrivorans sp. nov. causes lethal chytridiomycosis in amphibians.* 110 Proceedings of the National Academy of Sciences 15325-15329 (2013).
12 *Id.*
[13] Annemarieke Spitzen-van der Sluijs at al. *Rapid enigmatic decline drives the fire salamander (Salamandra salamandra) to the edge of extinction in the Netherlands*. 34 Amphibia-Reptilia 233-239 (2013).
[14] Martel et al. (2013) *supra* note 11 at page 15326.
[15] *Id.*
[16] Deanna H. Olson et al. *Mapping the global emergence of Batrachochytrium dendrobatidis, the amphibian chytrid fungus.* 8 PLoS One e56802 (2013).

declines.[17] However, important differences exist between these diseases. The most striking difference is a differential host specificity. *Bd* is capable of infecting a broad amphibian host range, but *Bsal* is restricted to salamanders and newts.[18] In addition, *Bsal* has a lower thermal preference than *Bd*, and *Bsal* causes lesions that are characterized by marked skin ulceration, while lesions caused by *Bd* typically induce hyperplasia and hyperkeratosis.[19]

Unlike in the early days of *Bd*'s discovery, researchers now have a good understanding of chytridiomycosis and have been able to respond quickly with investigations into this newly discovered chytrid fungus. A DNA-based test has already been developed that can be used to reliably and accurately provide a rapid diagnosis for *Bsal* (as well as *Bd*).[20] In addition, scientists have determined that heat treatment is a viable option for clearing *Bsal* infections.[21] Exposure of salamanders to 25º C not only prevented infection with *Bsal*, it also completely eliminated *Bsal* in infected salamanders exposed to 25º C temperatures for 10 days and resolved *Bsal* lesions. Thermal treatment of *Bsal* infected amphibians would allow large groups of animals to be treated simultaneously at low costs. Detecting and treating captive animals can help keep *Bsal* out of wild populations. If the disease gets into wild populations in the United States, it would be nearly impossible to stop its further spread.

Bsal has already spread from where it was first discovered in the southern Netherlands. Since that first outbreak during 2010-2012, another outbreak occurred in late 2013 in Eupen, Belgium about 30 km south of the first outbreak in the Netherlands.[22] Then in April of 2014 an outbreak occurred 30 km further south from Eupen, in Robertville, Belgium.[23] If the disease continues to spread at this rate all salamanders in Europe will be affected in approximately 25-50 years.[24] In addition, four captive European salamanders imported into the U.K. were reported to be infected with *Bsal* in a report published May 2, 2015.[25]

Bsal has so far only been found in samples from Asia, Northern Europe, and the U.K. and has not yet spread to North or South America.[26] Tests of 5391 wild amphibian individuals from four continents resulted in detections of *Bsal* from East Asia (Thailand, Vietnam, and Japan) and Europe (Netherlands and Belgium).[27] Additional testing for *Bsal* has been done in the United States and so far it has not been detected. 94 samples from 6 Appalachian *Plethodon* salamanders

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[17] Martel et al. (2013) *supra* note 11 at page 15327.
[18] *Id.*; An Martel et al. *Recent introduction of a chytrid fungus endangers Western Palearctic salamanders*. 346 Science 630-631 (2014).
[19] Martel et al. (2013) *supra* note 11 at page 15326.
[20] Mark Blooi et al. *Duplex real-time PCR for rapid simultaneous detection of Batrachochytrium dendrobatidis and Batrachochytrium salamandrivorans in amphibian samples*. 51 Journal of Clinical Microbiology 51, no. 12 (2013): 4173-4177.
[21] Mark Blooi et al. *Treatment of urodelans based on temperature dependent infection dynamics of Batrachochytrium salamandrivorans*. 5 Scientific reports (2015).
[22] Burke, Katie L. *New Disease Emerges as Threat to Salamanders*. 103 American Scientist no. 1: 6 (2015).
[23] *Id.*
[24] *Id.*
[25] Andrew A. Cunningham et al. *Surveillance: Emerging disease in UK amphibians*. 176 Veterinary Record 18, 468 (2015).
[26] *Id.*; Martel et al. (2014) supra note 18.
[27] Martel et al. (2014) *supra* note 18.

and samples from 91 eastern hellbenders from New York, Pennsylvania, Ohio, and Virginia were all negative for *Bsal*.[28]

Asia is a natural reservoir for *Bsal*.[29] Because *Bsal* has existed in Asia for millions of years, Asian salamanders have evolved with a resistance to the disease which now makes them carriers of the disease. The introduction of *Bsal* from Asia into Europe likely came through the large numbers of Asian salamanders and newts in international trade.[30] *Bsal*'s presence in captive populations was confirmed with three positive samples from a captive Asian newt species (*Tylototriton vietnamensis*) in Europe, two of which were imported into Europe in 2010.[31] Transmission experiments show that *Bsal* can effectively be transmitted across multiple salamander species through direct contact, so there is potential for pathogen spillover.[32] Large numbers of Asian salamanders are imported into the United States, including approximately 1.4 million live Chinese and Japanese newts from the genus *Cynops* imported over the past 10 years (70% of all salamander imports).[33] This creates a major threat of the introduction of the disease.

Infection experiments show that *Bsal* is lethal to at least some of the salamander species found in the United States, including the genera *Taricha* and *Notophthalmus* (Table 1).[34] Most U.S. species in these genera have widespread distributions and are often very abundant, which may assist the disease in spreading quickly across the country. For example, the eastern newt (*Notophthalmus viridescens*), a species that suffered lethal disease in *Bsal* infection experiments, ranges across 33 states. Eastern newts have been recorded in densities as high as $10/m^2$ in south-central Indiana ponds.[35] The widespread and sometimes abundant nature of some of these species also means that major die-offs will likely lead to severe and widespread ecosystem impacts, as these species can play a major role in the functioning of their local ecosystems.[36] Salamanders in the genus *Notophthalmus* are dominant vertebrate predators in seasonal pools and ponds.[37]

[28] Carly Muletz et al. Unexpected Rarity of the Pathogen Batrachochytrium dendrobatidis in Appalachian Plethodon Salamanders: 1957–2011. 9 PloS one e103728 (2014); Emma K. Bales et al. Pathogenic Chytrid Fungus *Batrachochytrium dendrobatidis*, but Not *B. salamandrivorans*, Detected on Eastern Hellbenders. 10 PloS one e0116405 (2015).
[29] Martel et al. (2014) *supra* note 18.
[30] *Id.*
[31] *Id.*
[32] *Id.*
[33] U.S. Fish and Wildlife Service. Law Enforcement Management Information Systems (LEMIS). Live amphibians imported into the United States for the dates 4/23/2005 - 4/23/2015.
[34] Martel et al. (2014) *supra* note 18.
[35] Spencer A. Cortwright. *Ten-to eleven-year population trends of two pond-breeding amphibian species, red-spotted newts and green frogs*. Status and conservation of midwestern amphibians. University of Iowa Press, Iowa City, Iowa, USA (1998): 61-71.
[36] Robert D. Davic & Hartwell H. Welsh Jr. *On the ecological roles of salamanders*. Annual Review of Ecology, Evolution, and Systematics 405-434 (2004).
[37] *Id.*

Table 1: U.S. Native Salamander Species Susceptibility to *Bsal* in Experimental Infection Tests. "Lethal": Infection Resulting in Lethal Disease in all Infected Animals; "Tolerant": Infection in the Absence of Disease; "Resistant": no Infection, no Disease.[38]

Susceptibility	Scientific Name	Common Name	Range States
Lethal	*Taricha granulosa*	Rough Skinned Newt	CA, OR, WA
Lethal	*Notophthalmus viridescens*	Eastern Newt	AL, AR, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MN, MO, MS, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, TX, VA, VT, WI, WV
Tolerant	*Siren intermedia*	Lesser Siren	AL, AR, FL, GA, IL, IN, KY, LA, MI, MO, MS, NC, OH, OK, SC, TN, TX, VA
Resistant	*Ambystoma opacum*	Marbled Salamander	AL, AR, CT, DE, FL, GA, IL, IN, KY, LA, MA, MD, MI, MO, MS, NC, NH, NJ, NY, OH, OK, PA, RI, TN, TX, VA, WV
Resistant	*Plethodon glutinosus*	Northern Slimy Salamander	AL, CT, GA, IL, IN, KY, MD, NC, NH, NJ, NY, OH, PA, TN, VA, WV
Resistant	*Gyrinophilus porphyriticus*	Spring Salamander	AL, CT, GA, IN, KY, MA, MD, MN, MS, NC, NH, NJ, NY, PA, RI, SC, TN, VA, VT, WV

Another distressing finding is that the lesser siren (*Siren intermedia*) has a tolerance for *Bsal*, meaning that the *Bsal* infection was present but the species did not suffer from the disease (Table 1).[39] As such, this species may act as a carrier of the disease, assisting its spread throughout the country. This is especially concerning for a species whose range spans 18 states throughout the Southeast and Midwest, as well as Mexico.

Although some U.S. native salamander species appeared to be resistant to *Bsal* in infection experiments, wild populations of salamanders are generally exposed to numerous other stressors and diseases that may reduce their ability to resist *Bsal* infections (Table 1). Environmental stressors have been shown to weaken the immune systems of amphibians, increasing their vulnerability to disease. For example, ecologically relevant concentrations of the herbicide atrazine caused immune system impacts and significantly increased the susceptibility of tiger salamander larvae (*Ambystoma tigrinum*) to the *Ambystoma tigrinum* virus.[40] In the

[38] Martel et al. (2014) *supra* note 18.
[39] Martel et al. (2014) *supra* note 18.
[40] Diane Denise Forson & Andrew Storfer. *Atrazine increases ranavirus susceptibility in the tiger salamander, Ambystoma tigrinum*. Ecological Applications 16.6: 2325-2332 (2006).

Pacific Northwest, climate-induced reductions in water depth led to increased UV-B radiation exposure for amphibian embryos, increasing their vulnerability to infection by the pathogen *Saprolegnia ferax*, resulting in high mortality rates.[41]

The available data show that if *Bsal* is allowed to enter the United States it is likely to have fatal impacts on native species and it will be nearly impossible to stop its spread. *Bsal*'s introduction would have devastating impacts, with likely massive salamander die-offs, population extirpations and species extinctions across the United States.

Justification for Regulating the Entire Order

The Secretary must adopt a regulation restricting imports of the entire order of salamanders (Caudata) in order to minimize the risk of *Bsal* entering the United States. There are four main reasons that the import restrictions must apply to the entire order. First, a minimal level of testing already shows a high rate of infection and ability to act as carriers.[42] Out of ten families of salamanders, five have been minimally tested with infection experiments. Four of these five families (80%) had members that can be infected with *Bsal* and act as carriers. Based on this high rate of infection with minimal sampling, there is a high probability that the other six families will include species that can be infected with *Bsal* and act as carriers.

Second, because the lesser siren is a member of an ancient family (Sirenidae), its status as a carrier strongly suggests that the ability to carry *Bsal* is an early-evolved, primitive trait and thus all salamander families should be presumed to be able to act as carriers.

Third, while some salamander species appeared to be resistant to *Bsal* in infection experiments, it is unclear how strong this resistance will be outside of the optimal husbandry conditions found in laboratory settings.[43] Amphibians in trade may respond differently as they are often kept in overcrowded, unhygienic conditions that can cause stress-induced immunosuppression, lowering their ability to fight off the disease.[44]

Fourth, salamanders in trade are often misidentified, mislabeled, or difficult to identify. The number of new wildlife species imported into the United States each year is on the rise. Although the numbers vary greatly among ports, the wildlife inspection staff at the Port of San Francisco/Oakland estimated that they receive one new amphibian species every other week.[45] Reaser and Waugh's investigation into U.S. Ports also revealed that “the ports differ in their

[41] Joseph M. Kiesecker at al. *Complex causes of amphibian population declines.* Nature 410.6829: 681-684 (2001).
[42] Martel et al. (2014) *supra* note 18.
[43] *Id.*
[44] *See* Shawn Ashley et al. *Morbidity and Mortality of Invertebrates, Amphibians, Reptiles, and Mammals at a Major Exotic Companion Animal Wholesaler*. Journal of Applied Animal Welfare Science 17, no. 4: 308-321 (2014). (An investigation of a major international wildlife wholesaler in Texas revealed that approximately 80% of the nonhuman animals, including 39 species of amphibians, were grossly sick, injured, or dead, with the remaining in suspected suboptimal condition. Contributing factors for disease and injury included poor hygienic conditions, overcrowding, dehydration, inadequate provisions of food, and inappropriate temperature and humidity.)
[45] Jamie K. Reaser & John D. Waugh. *Denying Entry: Opportunities to Build Capacity to Prevent the Introduction of Invasive Species and Improve Biosecurity at US Ports*. Gland, Switzerland: IUCN. 108pp, 63 (2007).

capacities to identify and thus regulate these species new to the wildlife trade."[46] The frequent difficulty in identifying all imported species is illustrated by the FWS's law enforcement data where imports are often only identified to the genus level. Over the past 10 years, 17 percent of imported live salamanders were only identified to genus.[47] In addition, there is often inconsistent usage of scientific and common names. For example, *Triturus hongkongensis* is not a currently recognized species but numerous imports have been documented under this name in recent years.[48] These inadequacies support the need for a comprehensive moratorium on the import of all salamander species, rather than attempting a piecemeal approach.

Text of Proposed Amendment

Pursuant to Section 553(e) of the Administrative Procedure Act ("APA"), petitioners request that the Secretary of Interior adopt the following amendment, on an emergency, temporary basis, to the FWS regulation on amphibian imports at 50 C.F.R. § 16.14, (additions shown in *redline italics*):

> § 16.14 Importation of live amphibians or their eggs
>
> *(a) The importation is prohibited of live specimens or eggs of any species of amphibian within the order Caudata (Urodela) except as provided under the terms and conditions set forth in § 16.22.*[49]
>
> *(b)* Upon the filing of a written declaration with the District Director of Customs at the port of entry as required under Sec. 14.61, all species of live amphibians or their eggs *(except as provided in paragraph (a) of this section)* may be imported, transported, and possessed in captivity, without a permit, for scientific, medical, education, exhibition, or propagating purposes, but no such live amphibians or any progeny or eggs thereof may be released into the wild except by the State wildlife conservation agency having jurisdiction over the release from such agency.

After this amendment is in place, the FWS should work with scientists and other countries to establish protocols for testing and certifying that salamanders are free of *Bsal*. Once these protocols are established petitioners request that the Secretary of Interior further amend the new section at 50 C.F.R. § 16.14(a) as follows (additions shown in *redline italics*):

> (a) The importation is prohibited of live specimens or eggs of any species of amphibian within the order Caudata (Urodela)*, unless certified free of Batrachochytrium salamandrivorans,* except as provided under the terms and conditions set forth in § 16.22.

[46] *Id.*
[47] Data compiled from LEMIS database records, *supra* note 33; *see* Table 2.
[48] *Id.*
[49] 50 C.F.R. § 16.22 allows permits to be issued for the import of injurious wildlife "for zoological, educational, medical, or scientific purposes."

ANALYSIS

U.S. Amphibian Imports

Amphibians are among the most commonly traded animals and the United States imports huge numbers of amphibians annually. Herrel and Meijden determined that the United States is the biggest importer of live amphibians.[50] The number of individuals and species of wildlife imported into the United States, including amphibians, has increased over the years. Over seven million vertebrate individuals were imported annually into the United States from 2002-2006, double the amount imported annually in 1968-1972.[51] The difference between the two time periods was driven mostly by the substantial increase in the number of amphibians imported.[52]

A change in geographic patterns has also been seen from the 1970s to the 2000s, with an increase in the number of countries from which the majority of animals were imported.[53] In the 1970s, over 80% of all amphibians and reptiles were imported from only one country per taxonomic group, whereas in the 2000s the number of individuals imported per country was more evenly distributed with no country contributing more than 19%, on average, of the animals imported into the United States.[54] Over that time period countries in Asia have also become more important trading partners, replacing the dominance of South America in the 1970s.[55] Smith et al. (2009) also found a new dominance of Asian imports, with over 69% of live animal imports originating in Southeast Asia for the period 2000–06.[56]

We obtained records from the FWS's Office of Law Enforcement of all live amphibians imported into the United States from April 23, 2005 to April 23, 2015 and compiled the information on salamander imports (Table 2).[57] Over this ten year period nearly two million salamanders were imported into the United States, the vast majority of which originated in Asia. 70 percent of these salamanders were from the *Cynops* genus, a genus found in China and Japan and containing at least two species that are likely *Bsal* reservoirs (*C. cyanurus* and *C. pyrrhogaster*). The Chinese fire belly newt (*Cynops orientalis*) and the Japanese fire belly newt (*Cynops pyrrhogaster*) were among the most numerous of salamanders imported into the United States, with imports of approximately 1 million Chinese fire belly newts (50.65%) and 158,861 Japanese fire belly newts (7.95%). The Japanese fire belly newt is a potential reservoir species for *Bsal*.[58] The Chinese fire belly newt was not included in Martel et al.'s infection experiments and it is still unknown if this species is a potential *Bsal* reservoir; however, it seems likely given that two other species within its genus can act as carriers of this disease.[59]

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[50] Anthony Herrel & Arie van der Meijden. *An analysis of the live reptile and amphibian trade in the USA compared to the global trade in endangered species.* 24 The Herpetological Journal no. 2: 103-110 (2014).
[51] Christina M. Romagosa. *United States Commerce in Live Vertebrates: Patterns and Contribution to Biological Invasions and Homogenization*. Ph.D. dissertation, Auburn University. Auburn, AL. 118 pp., page 17 (2009).
[52] *Id.*
[53] *Id*.
[54] *Id.*
[55] *Id.*
[56] Katherine F. Smith et al. *Reducing the risks of the wildlife trade*. 324 Science 594 (2009).
[57] Data compiled from LEMIS database records, *supra* note 33.
[58] Martel et al. (2014) *supra* note 18 at 631.
[59] *Id.*

Table 2: Top 15 live salamander species most commonly imported into the United States during a 10-year period (April 23, 2005 - April 23, 2015).

Species	Quantity
Cynops orientalis	1,012,298
Triturus hongkongensis	337,291
Cynops sp.	222,066
Cynops pyrrhogaster	158,861
Triturus sp.	107,474
Pachytriton brevipes	63,951
Pachytriton labiatus	24,707
Paramesotriton hongkongensis	17,870
Salamandra salamandra	16,674
Pachytriton sp.	6,870
Tylotriton verrucossu	6,804
Tylotriton kweichowensis	3,906
Cynops cyanurus	3,116
Pleurodeles waltl	2,318
Paramesotriton chinensis	2,272

Ecological, Economic and Other Values of Native Salamander Populations

Salamanders are ancient vertebrates that have been around for at least the past 150-200 million years. Over this long time span salamanders have evolved to fit into a diversity of ecosystems within which salamanders play key ecological roles.[60] Salamanders serve to regulate food webs and contribute to ecosystem resilience in numerous ways. As mid-level predators, salamanders control species diversity and ecosystem processes along grazer and detritus pathways.[61] Salamanders transfer energy between different ecosystems as they migrate and move between terrestrial and aquatic ecosystems.[62] They also contribute to soil dynamics through their association with underground burrow systems.[63]

In North America's temperate forests woodland salamanders are the top predator in food web processes at the forest floor/belowground interface.[64] Because of their enormous numbers and highly efficient conversion of invertebrate to vertebrate biomass, woodland salamanders are ecologically dominant taxa in nutrient cycling and energy flow in North American forests.[65]

[60] Davic & Welsh Jr. (2004) *supra* note 36.
[61] *Id.*
[62] *Id.*
[63] *Id.*
[64] Michael L. Best & Hartwell H. Welsh, Jr. *The trophic role of a forest salamander: impacts on invertebrates, leaf litter retention, and the humification process.* 5 Ecosphere 2, Article 16, 2 (2014).
[65] *Id.*

Woodland salamanders play a major role in the forest energy cycle and support carbon storage in forests through their consumption of massive amounts of invertebrates that shred leaf litter and downed wood.[66]

Salamanders also provide important economic benefits through their control of insects that can be agricultural pests or carriers of pathogens that can affect humans, domestic animals, and wildlife. Salamanders can also serve as sentinels of ecosystem integrity and can be used as cost-effective, readily quantifiable metrics of ecosystem resilience.[67] Salamanders may also be an important economic resource for the pet industry; however, any economic impact to this industry from an emergency import moratorium will be dwarfed by the potential costs of trying to mitigate the effects of *Bsal* if it is allowed to enter the United States.

Regulatory Authority

Lacey Act

The Department of Interior's Fish and Wildlife Service has authority to address the amphibian trade under the Lacey Act, through its program of listing and regulating Injurious Wildlife, codified at 18 U.S.C. § 42(a)(1). For listed taxa the FWS can prohibit:

> *…importation into the United States, any territory of the United States, the District of Columbia, the Commonwealth of Puerto Rico, or any possession of the United States, or any shipment between the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any possession of the United States.*

To be listed under the Lacey Act, the FWS must find that the taxa is “injurious”:

> *which the Secretary of the Interior may prescribe by regulation to be injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States.*

Salamander imports that potentially carry *Bsal* clearly threaten "wildlife" and “wildlife resources” of the United States. It is also arguable that these imports can also be injurious to “agriculture” and “forestry,” as reductions in salamander populations from *Bsal* can negatively affect these industries due to the role salamanders play in controlling insect pests.

The Secretary of the Interior has previously demonstrated the legal authority of the FWS to regulate a broad category of animals, based on risks of disease, as potentially injurious under the Lacey Act. The broad listing for “all salmonids” regulates all U.S. imports of potentially

[66] *Id.* at 11. When these shredders consume leaf litter, carbon dioxide and methane is released into the atmosphere. Salamanders contribute to forest carbon storage by preying on large numbers of these shredders, limiting the leaf litter decomposition.
[67] Davic & Welsh Jr. (2004) *supra* note 36 at 423.

hundreds of salmon, trout or whitefish species worldwide based on a certification requirement.[68] This sets a clear precedent for the Secretary to regulate a broad category of disease-prone animals as potentially injurious, not just to list "species by species."

Because *Bsal* has not yet been detected in the United States, this petition only requests a moratorium on imports of all salamander species into the United States and does not seek restrictions on interstate commerce. Under the Lacey Act, the FWS has the authority to focus its regulation only at the import stage. FWS has previously utilized this authority with its "all salmonids" regulation, which only prohibits "entry into the United States."[69] However, if *Bsal* is detected in the United States, then it would be important to also restrict interstate commerce to prevent the spread of the disease across the country.

International Law

The FWS's ability to restrict salamander imports is not limited by any international laws or treaty obligations. The only mandatory treaty obligation which relates to the proposed restriction of salamander imports is the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).[70] However, this agreement does not limit the ability to enact the proposed restrictions because inadequate information is available for a full risk assessment. The agreement allows for provisional regulations while adequate scientific information is sought in order to adequately assess their potential risk. The applicable provisional measure under SPS Agreement Article 5.7 provides:

> *In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.*

The "sanitary measures" allowed under this WTO provision can include prohibitions on proposed animal imports. Thus the United States can remain in compliance with the WTO's SPS agreement when they provisionally prohibit or regulate salamander imports, even in the absence of complete scientific evidence, so long as it makes reasonably timely attempts to obtain the needed information.

Administrative Procedure Act

The FWS's ability to prohibit imports of salamanders on an emergency, provisional basis is also not restricted by the agency's obligations under the Administrative Procedure Act (APA).

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[68] 50 CFR § 16.13(a)(3).
[69] *Id.*
[70] World Trade Organization. *Agreement on the Application of Sanitary and Phytosanitary Measures.* Available at: https://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm (Last accessed April 20, 2015).

Under the APA the typical "notice and comment" process can be bypassed to allow the agency to issue an emergency interim rule if there is "good cause" and public interest supports rapid action.[71] The statute provides (in pertinent part):

> *General notice of proposed rulemaking..... does not apply..... when the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefore in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.*

The threat of *Bsal* getting into the United States, and its potentially devastating effects on native salamander populations, is one that clearly demands swift action to prevent the import of diseased animals. The typical Lacey Act rulemaking process takes an average of 4 years from initiation to final rule. That plainly is inadequate to the newly-recognized risks of *Bsal* and contrary to the public interest in keeping this disease out of the country. Once the emergency, provisional rule is issued, the FWS can follow up with a notice and comment process for the rule, and the rule can be modified as additional scientific information is obtained.

Obligation to Act Under the Endangered Species Act

The Endangered Species Act (ESA) requires the Secretary of Interior to use her authority under the Lacey Act to take action to prevent the import of *Bsal* and its likely devastating impact on species listed under the Act. Under the ESA the Secretary of Interior is directed to:

> *review other programs administered by him and utilize such programs in furtherance of the purposes of this Act.*[72]

The statute also clearly states that Congress' policy requires:

> *that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.*[73]

Under the ESA's mandate, the Secretary must use her Lacey Act authority to protect the many listed species that may be impacted by the introduction of a deadly disease like *Bsal*.

The ESA's stated purposes are to:

> *provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species...*[74]

[71] 5 U.S.C. § 553(b)(3)(B).
[72] 16 U.S.C. § 1536(a)(1).
[73] 16 U.S.C. § 1531(c).
[74] 16 U.S.C. § 1531(b).

The purposes of the ESA are harmed by the unrestricted importation of amphibians into the United States. *Bsal* threatens U.S. salamanders and preventing its introduction here is a key element in furthering the conservation "of such endangered species and threatened species." In addition to the direct impact the disease may have on listed salamander species, disease-driven salamander declines may indirectly harm other types of listed species by affecting ecosystems "upon which endangered species and threatened species depend."

In addition to the potentially devastating impacts on ESA listed and candidate species, *Bsal* poses a threat to all salamanders that is likely to drive more species to the point of requiring protection under the ESA. *Bsal*'s relative *Bd* was a factor in declines and recent decisions to list several native amphibian species under the ESA (i.e. Sierra Nevada yellow-legged frog, mountain yellow-legged frog, Yosemite toad).[75] At least one species, the Wyoming toad (*Anaxyrus baxteri*), is now classified as "extinct in the wild" due largely to the effects of *Bd.*[76] If *Bsal* is allowed to enter the United States and spread the way that *Bd* has, it is likely produce similar results.

Currently 20 species of salamanders are listed under the ESA as threatened or endangered in all or part of their range (Table 3). Three species of salamanders and newts are candidates for protection under the ESA (Table 4). In addition, 13 salamander species are currently undergoing status reviews by the FWS to determine if listing is warranted, following up on a 2011 decision that the Center's 2010 listing petition presents substantial scientific or commercial information indicating that listing may be warranted (Table 5).[77] In 2012 the Center petitioned the FWS to list an additional 24 salamander species under the ESA and these species are still awaiting decisions from the FWS (Table 6). In total at least 60 species, almost one-third of all U.S. native salamander species, are at risk for extinction.

[75] 79 Fed. Reg. 24256 (April 29, 2014).
[76] Simon N. Stuart et al. (eds.) *Threatened amphibians of the world*. Barcelona, Spain: Lynx Edicions, 2008.
[77] 76 Fed. Reg. 59836 (September 27, 2011).

Table 3: Listings of U.S. Native Salamanders Threatened or Endangered in All or Part of Their Range.

Scientific Name	**Common Name**	**Range (if delineated)**	**Threatened (T) or Endangered (E)**
Ambystoma bishopi	Reticulated Flatwoods Salamander	-	E
Ambystoma californiense	California Tiger Salamander (Santa Barbara)	CA - Santa Barbara County Distinct Population Segment (DPS)	E
Ambystoma californiense	California Tiger Salamander	Central CA DPS, not including Santa Barbara and Sonoma DPS	T
Ambystoma californiense	California Tiger Salamander (Sonoma)	CA - Sonoma County DPS	E
Ambystoma cingulatum	Frosted Flatwoods Salamander	-	T
Ambystoma macrodactylum croceum	Santa Cruz Long-toed Salamander	-	E
Ambystoma tigrinum stebbinsi	Sonora Tiger Salamander	-	E
Batrachoseps aridus	Desert Slender Salamander	-	E
Cryptobranchus alleganiensis bishopi	Ozark Hellbender	-	E
Eurycea chisholmensis	Salado Salamander	-	T
Eurycea nana	San Marcos Salamander	-	T
Eurycea naufragia	Georgetown Salamander	-	T
Eurycea sosorum	Barton Springs Salamander	-	E
Eurycea tonkawae	Jollyville Plateau Salamander	-	T
Eurycea waterlooensis	Austin Blind Salamander	-	E
Phaeognathus hubrichti	Red Hills Salamander	-	T
Plethodon neomexicanus	Jemez Mountains Salamander	-	E
Plethodon nettingi	Cheat Mountain Salamander	-	T
Plethodon shenandoah	Shenandoah Salamander	-	E
Typhlomolge rathbuni	Texas Blind Salamander	-	E

Table 4: Candidate Native Salamander Species for ESA listing in All or Part of Their Range.

Scientific Name	**Common Name**	**Range State(s)**	**Listing Priority**
Gyrinophilus gulolineatus	Berry Cave Salamander	TN	8
Notophthalmus perstriatus	Striped Newt	FL, GA	8
Necturus alabamensis	Black Warrior Waterdog (=Sipsey Fork)	AL	2

Table 5: Native Salamander Species Undergoing ESA Status Reviews.

Scientific Name	**Common Name**	**Range State(s)**
Haideotriton wallacei	Georgia Blind Salamander	FL, GA
Cryptobranchus alleganiensis	Hellbender	AL, AR, GA, IL, IN, IA, KS, KY, MD, MN, MO, MS, NY, NC, OH, PA, SC, TN, VA, WV
Pseudobranchus striatus lustricolus	Gulf Hammock Dwarf Siren	FL
Amphiuma pholeter	One-toed Amphiuma	AL, FL,GA, MS
Desmognathus abditus	Cumberland Dusky Salamander	TN
Gyrinophilus subterraneus	West Virginia Spring Salamander	WV
Eurycea chamberlaini	Chamberlain's Dwarf Salamander	NC, SC
Necturus lewisi	Neuse River Waterdog	NC
Desmognathus aeneus	Seepage Salamander	AL, GA, NC, TN
Urspelerpes brucei	Patch-nosed Salamander	GA, SC
Ambystoma barbouri	Streamside Salamander	IN, KY, OH, TN, WV
Gyrinophilus palleucus	Tennessee Cave Salamander	AL, GA, TN
Eurycea tynerensis	Oklahoma Salamander	AR, MO, OK

Table 6: Native Salamander Species Petitioned for ESA listing in 2012 (awaiting 90-day findings from FWS).

Scientific Name	Common Name	Range State(s)
Aneides aeneus	Green Salamander	AL, GA, KY, NC, MD, MI, OH, PA, SC, TN
Batrachoseps campi	Inyo Mountains Salamander	CA
Batrachoseps minor	Lesser Slender Salamander	CA
Batrachoseps regius	Kings River Slender Salamander	CA
Batrachoseps relictus	Relictual Slender Salamander	CA
Batrachoseps robustus	Kern Plateau Salamander	CA
Batrachoseps simatus	Kern Canyon Slender Salamander	CA
Batrachoseps wrightorum	Oregon Slender Salamander	OR
Dicamptodon ensatus	California Giant Salamander	CA
Eurycea latitans	Cascade Caverns Salamander	TX
Hydromantes brunus	Limestone Salamander	CA
Hydromantes shastae	Shasta Salamander	CA
Plethodon amplus	Blue Ridge Gray-cheeked Salamander	NC
Plethodon caddoensis	Caddo Mountain Salamander	AR
Plethodon cheoah	Cheoah Bald Salamander	NC
Plethodon fourchensis	Fourche Mountain Salamander	AR
Plethodon hubrichti	Peaks of Otter Salamander	VA
Plethodon meridianus	South Mountain Gray-cheeked Salamander	NC
Plethodon petraeus	Pigeon Mountain Salamander	GA
Plethodon punctatus	White-spotted Salamander	VA, WV
Plethodon welleri	Weller's Salamander	NC, TN, VA
Rhyacotriton cascadae	Cascade Torrent Salamander	OR, WA
Rhyacotriton kezeri	Columbia Torrent Salamander	OR, WA
Rhyacotriton olympicus	Olympic Torrent Salamander	WA

Results from infection experiments so far show that *Bsal* is especially lethal to newts. The striped newt (*Notophthalmus perstriatus*) has been a candidate for Endangered Species Act protection since 2011.[78] If *Bsal* is allowed to spread to the United States and cause die-offs of striped newts akin to those seen in Europe, the species will require an emergency listing under the ESA and impacts may be enough to push this species to extinction. Given the widespread, severe impacts seen with *Bd* and the evidence for similar impacts from *Bsal*, the FWS must use

[78] 76 Fed. Reg. 32911 (June 7, 2011).

its authority to prevent *Bsal*'s introduction to the United States and therefore, prevent further impacts to already imperiled species and ecosystems. If the FWS fails to act, many of the species protected by the ESA, and those awaiting ESA protections, will experience further declines and some may be driven to extinction. Those species that do survive in smaller numbers will require more resources and time to save and restore them to the point where they will no longer need ESA protection.

CONCLUSION

Bsal clearly poses a genuine, severe threat to the United States' salamander biodiversity. Salamanders are already experiencing declines from multiple other stressors, and some may not be able to survive yet another threat, especially in the form of this highly virulent pathogen. The importation of large numbers of salamanders from Asia and elsewhere, with the continued lack of regulation, poses a clear pathway for *Bsal*'s introduction into the United States. This is an unnecessary risk that will threaten the survival of numerous salamander species, including species the Secretary is required to conserve under the Endangered Species Act. The Secretary must act now to use her authority to keep this pathogen from entering the country through trade, by imposing an emergency moratorium on imports of all salamanders.

For further information, please contact Jennifer Loda, Amphibian and Reptile Staff Attorney, at (415) 436-9682 x336 or by email at JLoda@BiologicalDiversity.org.

Respectfully submitted,

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