

CONTROLLING THE THREAT OF INVASIVE AMERICAN BULLFROGS

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Executive Summary

The state of California currently has an annual influx of several million non-native American Bullfrogs, which cause significant problems for the state's native wildlife. The best way to fix this problem is by adding the American Bullfrog to the list of harmful, prohibited species in Sections 671-671.7, Title 14 of the California Code of Regulations.

Background

Amphibian populations have been declining at unprecedented rates in recent decades, and over one-third of the world's amphibian species are threatened with extinction. Up to 200 amphibian species have completely disappeared since 1979 – an extinction rate several thousand times higher than they historically experience. California is home to 16 threatened species, including the iconic California Red-Legged Frog and the California Tiger Salamander. California's amphibian populations are faced with an onslaught of environmental problems, including climate change, pollution, habitat loss, predatory non-native trout and bullfrogs, and a deadly chytrid fungus that is being transported around the world by human activities. Protecting California's remaining amphibian populations is extremely important as amphibians control insect populations, serve as food for a variety of wildlife, act as bio-indicators, are commonly used in medical research that benefits humans, and provide a source of enjoyment for nature enthusiasts and children.

American Bullfrogs: a primary threat to California's environment

Of particular concern to California's environmental conservation efforts is the importation of several million American Bullfrogs (*Rana catesbeiana* or *Lithobates catesbeianus*; hereafter "bullfrogs") into the state each year, for use in the food, pet and dissection trades. Bullfrogs are native to eastern North America, but have established populations throughout California, where they cause massive ecological damage due to their voracious appetites for native wildlife; their propensity to spread deadly diseases; and their role as competitors with native amphibians for limited food resources. Bullfrogs are listed on the IUCN's list of 100 worst invasive species (Lowe et al. 2000).

The eradication of bullfrogs from critical amphibian habitat is an integral part of the management plans for many of California's threatened amphibian species (D'Amore et al. 2009). However, efforts to eradicate bullfrogs will be futile in the long-term so long as bullfrogs are still being imported into the state, as the frogs inevitably escape into the wild or are intentionally set free. Thus the continued importation of American Bullfrogs into California runs contrary to state and federal Endangered Species Acts and is in the worst interest of California's ecosystems and native wildlife.

Amphibians face an abundance of threats in the 21st century. Some, like global warming, habitat destruction and pesticide usage are extremely difficult to contend with due to logistical, economic, and or social barriers. Conversely, halting the importation of American Bullfrogs into the state is

relatively simple, yet serves as an extremely important step towards protecting California's natural heritage for current and future generations.

The invasion of bullfrogs

Bullfrogs were originally introduced to the western United States in the late 1800's to provide an additional source of frog legs after the California gold miners ate the California Red-Legged Frogs (*Rana draytonii*) to near extinction (Jennings and Hayes 1985). Bullfrogs have many traits that allow them to be perfect invaders outside their native range: female bullfrogs can lay more than 40,000 eggs (Bury and Whelan 1984), and they can occupy a wide variety of habitats, including manmade and natural wetlands, streams, lakes, ponds and temporary pools.

Bullfrogs have become established in California, Oregon, Washington, British Columbia, Colorado, China, Colombia, Cuba, Dominican Republic, France, Haiti, Italy, Jamaica, Japan, Mexico, the Netherlands, Puerto Rico, South Korea, Taiwan, Venezuela and Uruguay. Due to the ease with which they can be farmed, bullfrogs and bullfrog farms have proliferated around the world in recent years. Combined with America's growing appetite for frog legs (we now eat 20% of the world's frog legs, and are the world's third largest frog legs importer), and the increasing use of bullfrogs in the pet and dissection trades, the importation of bullfrogs into California has been on the rise. Upon arrival in the state, some bullfrogs inevitably escape their holding facilities; others are purposely set free by well-intentioned owners. A more insidious problem is the release into the environment of water from the tanks in which the bullfrogs were held -- and the diseases contained therein.

Predation of native species by bullfrogs

Bullfrogs are the largest frog in North America, and they are "gape-limited predators", meaning they eat any living animal that fits in their mouth. As such, they can eat a large variety of native wildlife including frogs, salamanders, birds, bats and snakes. One bullfrog was found with a 33-inch garter snake in its stomach, and bullfrogs are regularly found consuming endangered California Red-Legged Frogs and California Tiger Salamanders. Their voracious appetites are implicated in the declines of more than a dozen North American amphibian species (Casper and Hendricks 2005).

The spread of deadly diseases by bullfrogs

American bullfrogs are a primary contributor to the spread of chytrid fungus (*Batrachochytrium dendrobatidis*), a potentially lethal skin disease that has decimated California's amphibian populations and driven up to 100 amphibian species worldwide to complete extinction in recent decades. In terms of biodiversity loss, chytridiomycosis is the single worst disease in recorded history -- not just for frogs, but for any known organism. Bullfrogs are raised and transported in high density containers where they share water and climb on each other: perfect conditions for the spread of chytrid fungus, which has waterborne zoospores and infects amphibian skin.

Several million bullfrogs get imported into San Francisco and Los Angeles each year, primarily from China, Taiwan, Uruguay and Brazil, and a recent study demonstrated that up to 62% of these frogs are infected with the deadly chytrid fungus (Schloegel et al. 2009). Importantly, the high prevalence of chytrid infections in the California study was not an anomaly: 96% of the invasive bullfrogs sampled in a Venezuela study were infected (Hanselmann et al. 2004); in a South Korean study, 23% of the bullfrogs were infected, and bullfrogs were the most infected amphibian species in the country (Yang et al. 2009). The chytrid fungus is thought to have originated in Japan, but now infects frogs throughout California (including Santa Cruz and San Mateo counties), and is a primary

contributor to the near extinction of the Sierra Nevada Yellow Legged Frogs (*Rana sierrae* and *Rana muscosa*; Rachowicz et al. 2006). Different strains of the chytrid fungus exist, and thus further influx of the fungus will inhibit the ability of amphibian species to develop resistance to chytridiomycosis.

“A complete ban on both harvesting native amphibians and importing non-natives is likely the only means of stopping the continued problem of pathogen contamination and over-harvesting of native species”. – Dr. Nina D’Amore, resident amphibian biologist at the Elkhorn Slough National Estuarine Research Reserve

Why California’s amphibians are important

Amphibians are extremely important for a variety of reasons. They eat pest species like mosquitoes, flies and ticks that carry vector-borne human diseases. Tadpoles are natural filtration systems, eating algae and leaf matter, and thereby keeping our water clean and reducing the costs to operate our community filtration systems. Amphibians are food for fish, snakes, birds, dragonflies and beetles, and their disappearance would cause cascading effects that threaten other wildlife species. Due to their permeable skin; their need for healthy aquatic and terrestrial environments; and their inability to disperse quickly, amphibians serve as excellent bio-indicators (early warning systems of environmental decay). Furthermore, 10% of the Nobel Prizes in Physiology and Medicine have come from research that depended on amphibians; when an amphibian species disappears, so does any potential to benefit human health and well-being through the continued existence of that species. But most importantly, frogs, newts, salamanders and toads are cool. Kids love them, and it is our duty to protect them for future generations.

Bullfrog Legislation

Legislation to prevent the importation, sale and purchase of bullfrogs into California is necessary and would serve two purposes:

- (1) Prevent new bullfrogs and their diseases from entering the state of California; and
- (2) Drastically reduce the likelihood that California residents who currently own bullfrogs will pursue large-scale bullfrog breeding or distribution activities.

Proposed Legislation

The best way to address California's bullfrog problem is by adding the American Bullfrog to the list of harmful, prohibited species in Sections 671-671.7, Title 14 of the California Code of Regulations. If specific language is needed, we propose the following:

WHEREAS, American Bullfrogs (*Rana catesbeiana*; also known as *Lithobates catesbeianus*) are not native to California; and

WHEREAS, American Bullfrogs are widely regarded as one of the world's most harmful invasive species; and

WHEREAS, American Bullfrogs cause significant and lasting damage to California's ecosystems by preying on native wildlife, spreading harmful infectious diseases, and competing with native wildlife for limited food resources; and

WHEREAS, California taxpayers are forced to pay for efforts to eradicate or manage feral American Bullfrog populations; and

WHEREAS, American Bullfrogs delay or prevent the recovery of many of California's legally protected endangered species, such as the California Red-Legged Frog and California Tiger Salamander; and

WHEREAS, we believe in the right of children to see, hear and catch amphibians in their native habitat, and the presence of American Bullfrog populations forms a significant obstacle to amphibian conservation efforts in California;

NOW, THEREFORE, I, Bill Monning, do hereby call for a ban on the importation, sale and purchase of American Bullfrogs into and within the STATE OF CALIFORNIA, and I call this observance to the attention of all our citizens.

Similar legislation

A wide and growing body of such legislation exists around the world:

-- The City and County of Santa Cruz, California enacted legislation in February 2012 prohibiting the importation, sale and purchase of American Bullfrogs (City Code 6.18.070 and County Code 6.18.10-030).

--Under Sections 671-671.7, Title 14 of the California Code of Regulations, the following amphibian species are already prohibited and it shall be unlawful to import, transport or possess these species alive except under permit issued by the Department of Fish and Game: *Bufo marinus*, *Bufo paracnemis*, *Bufo horribilis* and all other large toads from Mexico and Central and South America; all species of genus *Xenopus*; all species of tiger salamanders, genus *Ambystoma*; Coqui frog, *Eleutherodactylus coqui*. Such permits may only be granted to zoological gardens, colleges, universities, government research agencies, other bona fide scientific institutions for valid purposes.

--In March 2010, the California Fish and Game Commission voted unanimously to stop issuing permits for the importation of non-native frogs and turtles into the state for use as food, and in May 2010, the Commission held a “re-consideration” hearing and upheld the motion. American Bullfrogs were the primary culprit that the Commission was acting to control. This sets an important precedent, as California is the first state in the USA to enact such restrictions. Unfortunately, the composition of the Commission changes regularly and thus these measures are by no means permanent. Furthermore, the Commission’s decisions do not restrict the sale of bullfrogs, and thus businesses or amateurs can still conceivably propagate and distribute bullfrogs within the state.

--The European Union banned the importation of American Bullfrogs in 1997. The particular article of legislation is Council Regulation (EC) No. 338/97, which you can learn more about here: http://ec.europa.eu/environment/cites/legis_wildlife_en.htm

--In 2003, Australia enacted what are perhaps the world’s strictest regulations on the importation of non-native amphibians, this being due to the infectious disease chytridiomycosis driving at least seven of Australia’s frog species to complete extinction after it was introduced into the country in the late 1970’s. Amphibian importation is now allowed only for zoological and laboratory usage, and must be accompanied by certificates demonstrating that stringent disease control measures (including quarantine) have taken place.

--Japan has had an invasive bullfrog problem since 1918; the country banned both their sale and import in 2006.

--South Korea has invasive American Bullfrogs and banned their importation circa 2007.

Economic Assessment

Invasive species are not only one of the most significant threats to biodiversity in California and worldwide, they are also one of the most costly: the Nature Conservancy estimates that invasive species cost Americans 120 billion dollars each year. Bullfrog eradication programs are consistently required to manage threatened amphibian populations throughout California. These programs are resource intensive and thus extremely costly to California's taxpayers when local, state and federal wildlife protection agencies are responsible for their implementation. Similarly, the broader missions of non-governmental organizations are hindered by the resources that get squandered in managing feral bullfrog populations. Furthermore, from an economic standpoint, businesses are often negatively affected by the presence of legally protected endangered species on their property as their development options and business activities become restricted. As bullfrogs contribute to native species being listed as endangered, a reduction in California's bullfrog populations provides a significant economic benefit to a wide variety of businesses and entrepreneurs.

Only an extremely small proportion of California's population benefits economically from the trade in American Bullfrogs, this being (1) restaurants and supermarkets that sell frog legs; (2) pet stores; and (3) biological supply companies that sell bullfrogs for dissection purposes. None of these businesses are reliant exclusively on the sale of bullfrogs. On the contrary, bullfrog sales generally constitute only an extremely small proportion of their business. As such, the removal of bullfrogs from their menus or list of products should not present any major economic problem for these businesses.

Supporters

The proposed legislation has the full support of a broad array of citizens and organizations, including:

(1) Santa Cruz's Former Mayor Mike Rotkin and Santa Cruz Fish & Game Commission Member Chris Berry.

(2) Over 2,365 nature lovers have signed our petition asking California Governor Jerry Brown to ban the importation, sale, release and possession bullfrogs.

(3) The Board of Directors and Advisory Committee Members of SAVE THE FROGS (www.savethefrogs.com), as well as our 500+ members and 2,000+ financial supporters, and the 1,196 SAVE THE FROGS supporters who sent letters to the California Fish & Game Commission in May 2010 urging them to stop issuing permits for the importation of non-native frogs (and turtles) into the state for use as food.

(4) A large number of environmental protection and animal rights organizations including Defenders of Wildlife, The Humane Society of the United States, and Action for Animals.

(5) The scientific community, including extremely well-respected amphibian biologists from California and around the world. You can find three supporting letters from scientists in the USA and Australia here:

<http://savethefrogs.com/amphibians/pdfs/rana-catesbeiana-whit-gibbons-letter.pdf>

<http://savethefrogs.com/amphibians/pdfs/rana-catesbeiana-peter-daszak-letter.pdf>

<http://savethefrogs.com/amphibians/pdfs/rana-catesbeiana-pearl-symonds-letter.pdf>

(6) The overwhelming majority of citizens who have been educated on the topic.

The proposed legislation is also fully supported by California's 16 threatened amphibian species.

Opposition

Few people benefit from the continued sale and importation of American Bullfrogs in California, and thus the opposition represents only a very small proportion of Californians, specifically:

(1) Some people who buy and sell amphibians for use as pets. Even though bullfrogs are not a highly sought after pet among frog pet enthusiasts, some of these people view any regulations on the trade as the beginning of a slippery slope that will affect their ability to buy and sell their frogs of choice.

(2) Some restaurants and supermarkets that sell frog legs, and some people who like to eat frog legs. This demographic is disproportionately first generation Chinese Americans, who claim that not only are frog legs tasty and good medicine, but that eating frogs is part of their 5,000 year old cultural tradition. However, there exists no published literature supporting their medical claims, and American Bullfrogs have only a very recent history in Chinese cuisine.