



REPORT THIS SPECIES!

Oregon: 1 866 INVADER or OregonInvasivesHotline.org
Washington: 1 877 9 INFEST or www.invasivespecies.wa.gov/report.shtml
California: www.dfg.ca.gov/delta/mittencrab/sightings.asp

The **American bullfrog** (*Rana catesbeiana*) is the largest frog in the U.S., weighing up to one pound. It has been cultivated globally for its edible legs and has been introduced and spread to many regions around the globe as a food source and through aquaculture escape. The bullfrog is native to the eastern U.S., and invasive in much of the western U.S. and on several other continents. It is often a dominant species in new environments, due to a limited number of predators (e.g., dragonfly larvae) and its generalist eating habit (they will eat anything that fits in their mouths, even their own young!).

Species in the news

Case Study: Bullfrogs aid in the spread of Ranaviruses that is infecting native frogs internationally, as well as the chytrid fungus and other infectious threats.

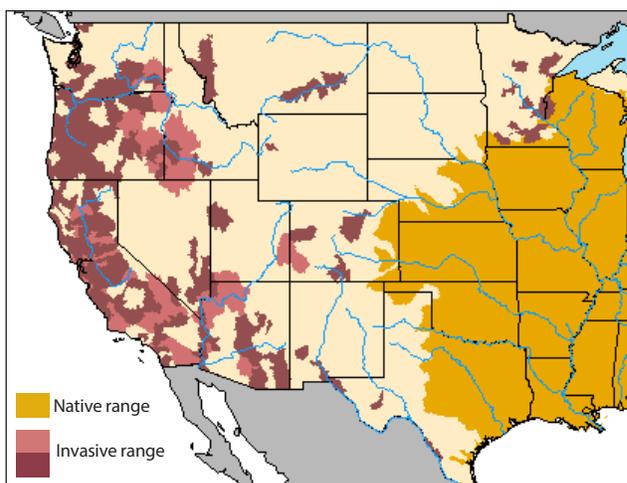
“Ranaviruses in invasive bullfrogs, Belgium” <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3311206>

Learning extensions

“How many bullfrogs can you find?” learning activity. Investigate the role of the pet trade on spread of bullfrogs and/or other invasives.

Resources

USDA National Agricultural Library Fact Sheet. <http://www.invasivespeciesinfo.gov/aquatics/bullfrog.shtml>



Bullfrog invasive range in the western U.S. (map created on July 9, 2016 by USGS). For an interactive map on bullfrog invasion, visit <http://nas.er.usgs.gov/viewer/omap.aspx/SpeciesID=71>.

Why you should care

Bullfrogs, which were commonly harvested for game meat, are a highly invasive species in the western U.S., Asia, Europe, and South America. They are able to thrive because they are voracious predators and their natural predators are absent. Bullfrogs cause decline of native species through competition and predation. The bullfrog can also be a carrier of the chytrid fungus that affects frogs and amphibians, and is a contributor to many dwindling native amphibian populations around the world.

How they got here and spread

Bullfrogs were accidentally introduced as a contaminant in fish stocking. They were also introduced as a food source (frog legs) in the 1900s. Since then, they have spread into natural areas by escaping or release.

What you can do

- A female bullfrog can lay up to 20,000 eggs at one time. Native frogs only lay 2,000 to 5,000 eggs.
- Bullfrogs will eat anything they can fit in their mouths, including baby turtles and birds and even their own young.
- Tadpoles are herbivores and adults are carnivores.
- Do not release the bullfrog in any natural areas.
- Inform others about the problems of invasive vertebrates and the methods to prevent their spread.



Russ Ottens, University of Georgia, Bugwood.org

The bullfrog coloration varies from dull green or olive to brown, with dark blotches on the backs and legs. A characteristic feature of the bullfrog is the large eardrum located behind its eye.

Bullfrog

Rana catesbeiana

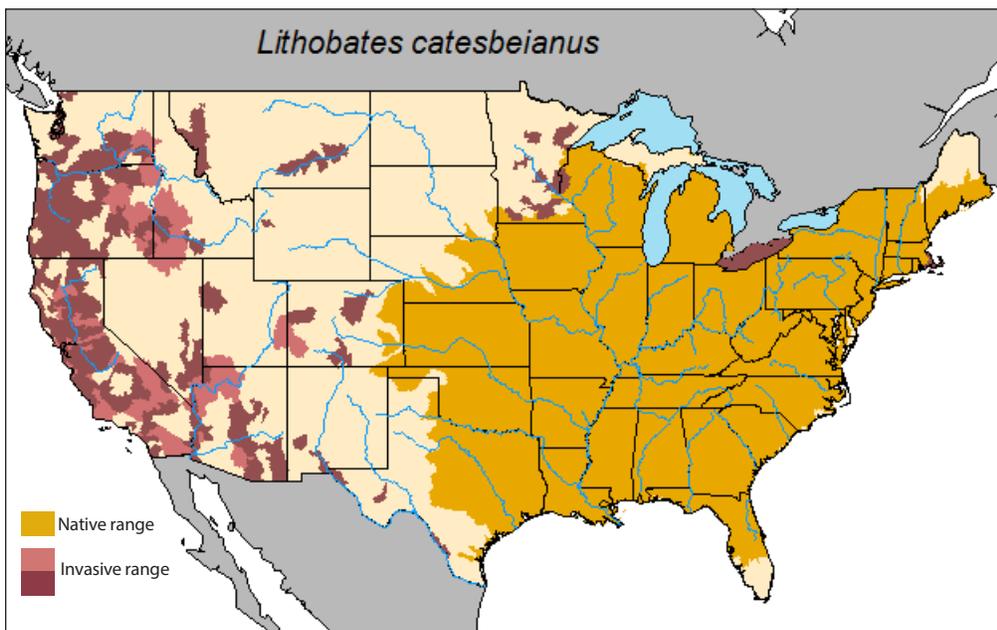
Synonym: *Lithobates catesbeianus*

IDENTIFICATION

Coloration varies from dull green or olive to brown, with dark blotches on the back and legs. Females have a dirty white ventral surface (underbelly) and males have a yellow ventral surface. A fold of skin wraps around their ear drum instead of running down the length of their back. In males, the eardrum is larger than the eye, whereas the female eardrum and eye are the same size. Bullfrog tadpoles can reach up to 15 cm in length. Adults have golden colored eyes. The male emits a loud, deep mating call that sounds like “jug-a-rum.” Click here to hear a recording of the bullfrog’s call: **Bull Frog Call** https://www.youtube.com/watch?v=M02_dnl9zCA

NATIVE AND INVASIVE RANGE

Bullfrogs are native to the central and eastern U.S. and southern Quebec and Ontario. Outside of the U.S., bullfrogs have also been introduced to Europe, South America, and Asia.



This map produced by the United States Geological Survey displays the current distribution of the bullfrog throughout the United States (USGS, July 9, 2016).

West Coast distribution

This species has been introduced to Oregon, Washington, and California. Since the early 1900s, they have been introduced and spread to many areas in the western U.S. for the harvesting of frog legs and through the release of pets and school projects into the wild.

American Bullfrog



Terry Spivey Photography

Bullfrogs are found in or near marshes, ponds, lakes, and streams in habitats ranging from Eastern swamps to desert oases. They prefer warm, slow water with thick aquatic vegetation.

ECOLOGY

Habitat

Bullfrogs are found in or near marshes, ponds, lakes, and streams in habitats ranging from Eastern swamps to desert oases. They prefer warm, slow water with thick aquatic vegetation.

Life cycles and migration patterns

Like all frogs, bullfrogs go through multiple life stages including the egg, hatchling, tadpole, juvenile, and adult. It can take as long as 2 to 3 years of growth and metamorphosis before a tadpole becomes a mature frog.

Bullfrogs do not migrate, yet they often disperse short distances to nearby ponds. Young bullfrogs will hop along small ponds in order to escape cannibalistic adults.

Habitat modification and food webs

Adult bullfrogs eat anything they can catch and swallow, including birds, fish, crustaceans, bats, snakes, turtles, small mammals, and other frogs. Snakes, turtles, fish, and birds will prey on tadpoles and young bullfrogs.

HOW IT GOT HERE

Bullfrogs were introduced as a food source (frog legs) in the 1900s, they were also accidentally introduced as a contaminant in fish stocking. Since then, they have spread into natural areas by escape or release.

HOW THIS SPECIES SPREADS

There are many ways that bullfrogs are able to distribute across the U.S. and even to other countries. First, bullfrogs originally kept as aquarium pets are released into the wild when they became unsuitable for home aquariums. Second, bullfrogs have been deliberately introduced to improve the aesthetics of a habitat or were intended to become a harvested game animal for their edible frog legs. Finally, bullfrogs can disperse between watersheds if suitable wetland habitats are interspersed throughout their path.

COOL FACTS

Extraordinarily high densities of juvenile frogs are common. A female bullfrog can lay up to 20,000 eggs at one time, which float on the surface of the water in a cluster. Frogs native to the western U.S. lay about 2,000 to 5,000 eggs, which gives bullfrogs an inherent advantage over native frogs.

Bullfrogs are commonly cannibalistic, and will eat anything smaller than their own heads! Adult bullfrogs have been recorded to eat tadpoles and young bullfrogs, as long as the young are well fed on a supply of algae and insects. This reliable food source allows the adults to grow to very large sizes.

This fun video shows bullfrogs on the hunt!
Bullfrog Hunts . . . Anything!

<https://www.youtube.com/watch?v=wXqK5QulbJ8>

ECOLOGICAL IMPACTS

- In ecosystems where they have been introduced, their presence has been blamed for the serious decline of native frogs, snakes, and amphibians, whose young fall prey to adult bullfrogs.
- A high reproduction rate and limited predation allow the bullfrog to quickly establish itself and proliferate in invaded areas.
- Bullfrogs aid in the spread of Ranavirosis that is infecting native frogs internationally. The bullfrog can also be a carrier of the chytrid fungus that affects amphibians and is a contributor to many dwindling frog populations around the world. The chytrid fungus can be fatal because it thickens the skin of organisms to the point that they are no longer able to breathe and it causes skin sloughing. The larval/ tadpole is less susceptible to this problem because they do not have keratin in their skin which is what chytrid eats. In a recent study at Oregon State University, researchers found that contrary to previous belief, bullfrogs are actually not immune to most strains of the chytrid fungus. It is estimated that of the nearly 5 million live frogs that are shipped into the United States each year, about half are infected with chytrid fungus.



Terry Spivey Photography

In their invasive range, bullfrog tadpoles lack a predator and are typically able to grow to adulthood. Considering that a female bullfrog can lay up to 20,000 eggs at one time, populations can grow rapidly once introduced.

ECONOMIC IMPACTS

Bullfrogs are considered game meat in some areas and are often bred for frog legs.

They can potentially damage water supply infrastructure if they enter a public water supply area.



Joy Viola, Northeastern University, Bugwood.org

Juveniles are green to brown, with tiny black spots, and orange- or bronze-colored eyes. Bullfrogs need two years to develop to maturity, and thus generally cannot survive in conditions with frequent drying.

LAWS CURRENTLY IN PLACE

In many states, such as Oregon and Washington, it is illegal to keep bullfrogs as aquarium pets. In Oregon, Washington and California, bullfrogs are classified as a controlled species and people are allowed to trap and kill bullfrogs found in these states without obtaining a permit.

Methods such as angling, hand dip netting, spearing (gigging), or capturing with bow and arrow are all permitted as methods to kill bullfrogs found in the wild.

American Bullfrog

HEALTH HAZARDS

Bullfrogs have the potential of damaging public water supply if they enter the reservoir or water supply area through the following ways:

- Change water quality parameters
- Damage water supply infrastructure
- Alter aquatic ecosystem, which could lead to downstream impacts on humans.

MANAGEMENT STRATEGIES

Successful, cost-effective management is best achieved through preventing spread, minimizing new introductions, and controlling populations before they become established.

One of the most important aspects of control is to kill adult females as early in the spring as possible (when they first emerge from hibernation) to prevent the large number of eggs that they disperse.

It is advised to destroy eggs when they are discovered which are easily identifiable by their large size.

If bullfrogs are seen in the wild, remove them, kill them, then eat them if you like (their legs taste good!). However, make sure that it is a bullfrog before killing because most native frogs are protected and cannot be removed from the wild or killed.

WHAT YOU CAN DO

- Do not release the bullfrog in any natural areas.
- Inform others about the problems of invasive vertebrates and the methods to prevent their spread.
- Identify and eradicate bullfrogs when found in the wild.

INFORMATION GAPS

Scientists and researchers need to develop information in the following areas:

- Most successful method of bullfrog spread and dispersal that can be decreased.
- Potential biological control methods.

REFERENCES

- Erickson, J. (2012). Global bullfrog trade spreads deadly amphibian fungus worldwide. University of Michigan News Service. <http://ns.umich.edu/new/releases/20667-global-bullfrog-trade-spreads-deadly-amphibian-fungus-worldwide>.
- Gervasi, S. S., J. Urbina, J. Hua, T. Chestnut, R. A. Relyea, and A. R. Blaustein. 2013. Experimental evidence for American bullfrog (*Lithobates catesbeianus*) susceptibility to chytrid fungus (*Batrachochytrium dendrobatidis*). *EcoHealth*. 10(2): 166–171. <http://link.springer.com/article/10.1007%2Fs10393-013-0832-8>.
- Link, R. 2005. Living with wildlife: Frogs. Washington Department of Fish and Wildlife. <http://wdfw.wa.gov/living/frogs.html#bullfrogs>
- Murphy, M. 2003. North American bullfrog (*Rana catesbeiana*). Introduced Species Summary Project. http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Rana_catesbeiana.htm
- Oregon Department of Fisheries and Wildlife. 2013. Invasive Species Fact Sheet. The Oregon Conservation Strategy. http://www.dfw.state.or.us/conservationstrategy/invasive_species/docs/bullfrog_fact_sheet.pdf
- Roach, J. 2004. Invading bullfrogs appear nearly unstoppable. National Geographic News. http://news.nationalgeographic.com/news/2004/09/0928_040928_bullfrog.html
- Sharifian-Fard, M., F. Pasmans, C. Adriaensen, S. Devisscher, T. Adriaens, G. Louette, and A. Martel. 2011. Ranaviruses in invasive bullfrogs, Belgium. *Emerging Infectious Diseases*, 17: 2371–2372. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3311206/>
- Stauth, D. (2013). Bullfrogs may help spread deadly amphibian fungus, but also die from it. Oregon State University, News and Research Communications. <http://oregonstate.edu/ua/ncs/archives/2013/jun/bullfrogs-may-help-spread-deadly-amphibian-fungus-also-die-it>

Stitt, T., R. Nordin, and S. Iwasawa. 2009. Examining the potential impacts of American Bullfrogs (*Rana catesbeiana*) on drinking water quality in the Greater Victoria Water Supply Area. Centre for Coastal Health. <http://www.centreforcoastalhealth.ca/projects/potential-impacts-of-american-bullfrogs-rana-catesbeiana-on-drinking-water-quality/>

ADDITIONAL RESOURCES

Video: Bullfrogs are (Literally) the Worst Pets

Bullfrogs make terrible pets.

<https://www.youtube.com/watch?v=e2Hon-Ciqbs>

Habitattitude

Habitattitude is a site for aquarium hobbyists, backyard pond owners, water gardeners and others who are concerned about aquatic resource conservation.

<http://www.habitattitude.net/>

Internet Center for Wildlife Damage Management

This site provides research-based wildlife control and management information from the experts.

<http://icwdm.org/>

Pet Pathway Toolkit, Pet Industry Joint Advisory Council

Information on helping governments, the pet industry, and their partners establish programs and policies to prevent the release of pets into an environment where they may become invasive.

<http://www.pijac.org/pet-trade-pathways-toolkit>

Save the Frogs

A nonprofit organization dedicated to amphibian conservation.

<http://savethefrogs.com/threats/index.html>

USDA National Agricultural Library

The United States Department of Agriculture has made a bullfrog species profile complete with links to fact sheets collected from other sources, such as the Oregon Department of Fish and Wildlife.

<http://www.invasivespeciesinfo.gov/aquatics/bullfrog.shtml>