Range Distribution Changes of the American Bullfrog due to Human Impacts

By: Emily Veale

Grade Levels: 5th/6th

Time: 1 - 60 minutes session
2 - 3 60 minute sessions with extensions

Overview: This lesson will analyze how human impact has changed the distribution of the American Bullfrog (Lithobates catesbeianus) across the United States. Students will describe the movement of Bullfrog populations while using attached primary resource U.S. Geological Survey (USGS) Bullfrog Distribution maps (or USGS interactive maps if computer labs are available).

This lesson can be used as a stand alone invasive species lesson or a mid unit lesson. The lesson and activities focus on the use of a map analysis tool with guided questions to gather information about the USGS maps and Bullfrog distribution. Supplemental activities attached include a Bullfrog “Wanted” poster, an exit ticket and an American Bullfrog Movement Predictions and Management worksheet. These activities can be completed individually or in small groups.

Geographic Question: How have humans impacted the distribution of this particular Bullfrog across the United States from its native habitat to non-native habitats?

National Geography Standards:
#14 Environment and Society – How human actions modify the physical environment.

Oregon Geography Content Standards
5.20 Gather, use and document information from multiple sources (e.g., print, electronic, human, primary, secondary) to examine an event, issue, or problem through inquiry and research.

5.22 Identify characteristics of an event, issue, or problem, suggesting possible causes and results.

Next Generation Science Standard (NGSS)
5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Connections to Common Core

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently
5.W.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

5.W.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

5.W.9 Draw evidence from literary or informational texts to support analysis, reflection and research

Objectives:
• Students will know why/how American Bullfrogs were originally introduced in non-native environments.
• Students will know the difference between indigenous (native) and non-indigenous (non-native) species.
• Students will be able to gather information from USGS maps evaluate and explain its meaning in regards to Bullfrog distribution while utilizing the Bullfrog Map Analysis Tool.
• Students will be able to accurately describe the spatial changes of American Bullfrog locations leading to it’s current range across the United States while using vocabulary from this lesson.

Materials:
• Printed copies of both maps for each individual/group (Appendix A)
• Two sided printed copies of the Map Analysis Tool and Key Vocabulary for each individual. (Appendix A)
• Printed and cut Exit Tickets for each student (Appendix A)
• Document camera to view video/maps
• Computer lab for interactive map option.

Wanted Poster Extension:
• Printed copies of the Oregon Department of Fish and Wildlife (ODFW) American Bullfrog Fact Sheets for each individual/group (Appendix B)
• Printed copies of the U.S. Fish & Wildlife American (FWS) Bullfrog Fact Sheet for each individual/group (Appendix B)
• Printed copy(ies) of the Wanted Poster examples. (Appendix B)
• Printed copies of “Wanted” poster rubric for each student/individual (Appendix B)
• Color pencils or crayons
• 11 X 17 or legal size paper for poster

Bullfrog Movement Prediction and Management Extension:
• Printed copies of Movement Prediction and Management Worksheet (Appendix C)
• Printed copies of Movement Prediction and Management Rubric (Appendix C)
• ODFW and U.S. Fish and Wildlife Bullfrog Fact Sheets (Appendix B)

Background:
The American Bullfrog (Lithobates catesbeiana) is indigenous (native) to the central and eastern United States and parts of Canada. Although they are indigenous to these portions of North America, the current distribution has reached much farther into the Western United States. Humans have significantly impacted the environment by the introduction of these species into non-native habitats. These spatial changes across the country outside their original range has brought them to be classified as a non-indigenous “Invasive Species”. The first recorded sighting is believed to be in the early 1893. Originally introduced as a harvestable game animal (frog legs), other means of introduction include pest control, aquatic pest release, and fish stocking programs all of which are human caused distributions. Once
populations are developed further populations are due to self-movement as they can travel considerable distances through watersheds.

The introduction, and increasing populations of the Bullfrog in the Western United States creates concern due to its voracious appetite, high reproduction rate and dispersal into critical native species habitats. The increase of the bullfrog populations threatens to drive many native frog populations to extinction as well as affect biodiversity of the habitats in which it is established.

Bullfrogs are noted for their distinct round eardrum. They also have two ridges that run along the midline of the back. They have a fold of skin that runs from the back of the eye to behind the ear drum. They can be dark green, olive or brown. The hind feet are completely webbed. They have distinct low call sounding like “jug-o-rum” or “br-wum”. They can reach up to 6 inches and weigh over one pound.

Notes:

English/Language Arts addition: Invasive = Root word “invade” which means; to intrude, to enter like an enemy or with forceful intent)

The word indigenous means occurring naturally in a place, native. It sounds like this in-dig-in-us. Everyone, let’s say indigenous together.

• So what does indigenous mean?
• If indigenous means occurring naturally in a place what does non-indigenous mean?

Questions during/after reading:

• Where does the word invasive come from? What would the root word be?
• Has anyone ever caught a Bullfrog?
• Does anyone know the specific physical characteristic of a Bullfrog?
• Has anyone ever eaten a Bullfrog?
• We read that a Bullfrog call sounds like “Jug-o-rum” or “br-wum”. Who can make their best Bullfrog call? Let’s try it as a class!

Key Vocabulary

Invasive: Characterized by involving invasion, or tending to invade.

Invasive Species: A species that is: 1) non-native (or alien) to the ecosystem under consideration and. 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health

Non-Indigenous: Not indigenous or native to a place, non-native.

Indigenous: Originating or occurring naturally in a particular place; native.

Range: Distribution of a species is the geographical area within which that species can be found.

Distribution: How specific species are spatially arranged.

Spatial: Relating to space.

Watershed: An area or ridge of land that separates waters flowing to different rivers, basins, or seas.

Biodiversity: The variety of life in the world or in a particular habitat or ecosystem.
Procedures:

Day 1

If using the computer lab have students navigate to the below websites before completing the first activity. Supporting documents found in appendix A.

**USGS Bullfrog Point Map**

**Animated Map of Bullfrog Introduction**

<table>
<thead>
<tr>
<th>Hook</th>
<th>Choose either video National Geographic Video “Fearsome Frogs” or Statesman’s Journal “Invasive Species-Bullfrog”</th>
<th>National Geographic Video <a href="http://nationalgeographic.org/media/fearsome-frogs/">http://nationalgeographic.org/media/fearsome-frogs/</a></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Think-Pair-Share</strong></td>
<td>Question: How did the Bullfrog become an invasive species?</td>
<td>Students will Think-Pair-Share their thoughts about what they learned from watching the video. They will be able to re-voice their partners response.</td>
</tr>
<tr>
<td><strong>Key Vocabulary &amp; Background Information read</strong></td>
<td>Review/introduce key vocabulary terms. Read Background Information</td>
<td>Students will fill out key vocabulary terms which are printed on the back of their map analysis tool. Terms can be either shown under a document camera or written on the board. Read background information together or as a class. Discuss</td>
</tr>
<tr>
<td><strong>Map Analysis Introduction</strong></td>
<td>Introduce the Map Analysis tool and USGS Maps</td>
<td>Give students clear direction that they should be answering the questions to complete the the map analysis tool using the attached USGS maps. These guided questions are on the worksheet.</td>
</tr>
<tr>
<td><strong>Map Analysis</strong></td>
<td>Complete Map Analysis Tool</td>
<td>Students can complete the Bullfrog map analysis questions individually or as groups. At the end of the allotted time discuss as a class the students answers to the questions.</td>
</tr>
<tr>
<td><strong>Exit Ticket</strong></td>
<td>Distribute exit tickets</td>
<td>Students complete and turn in exit ticket at the end of the class. Review for understanding.</td>
</tr>
</tbody>
</table>
### Day 2-3 ( Wanted Poster Extension )
Supporting documents found in appendix B.

<table>
<thead>
<tr>
<th>Vocabulary Review</th>
<th>Check students knowledge of vocabulary terms</th>
<th>Individually or in groups have students define key vocabulary terms. (Draw sticks, competition etc..)</th>
</tr>
</thead>
</table>
| ODFW and U.S. Fish & Wildlife Fact Sheet Exploration | Review the ODFW and U.S. Fish and Wildlife Fact Sheets | Students should have copies of the ODFW Bullfrog fact sheet and the U.S. Fish and Wildlife Bullfrog fact sheet.  
  - What do these two primary resources have in common.  
  - What information do these sheets tell us?  
  - Is there anything missing?  
  - What do you still want to know? |
| “Wanted” poster introduction | Introduce the “Wanted” poster activity | Distribute to students the “Wanted” poster criteria and review requirements.  
  - Show poster examples under a document camera or tape on board for review.  
  This project can be done individually or on pairs. |
| “Wanted” Poster Work | Work on posters | Students work on wanted posters |
| Poster presentations | Completed Posters | Upon completion of their wanted posters allow students to present them the class describing their poster. |

### Day 2-3 (Management Strategy Extension )
Supports found in appendices B and C.

<table>
<thead>
<tr>
<th>Vocabulary Review</th>
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  - What do these two primary resources have in common.  
  - What information do these sheets tell us?  
  - Is there anything missing?  
  What do you still want to know? |
| Management Strategy Exercise and Rubric Appendix C | Introduce the Management Strategy Exercise | This activity can be completed individually or in groups. |
Assessment:

- Students will use the Map Analysis tool to accurately describe the USGS – NAS Map using the Map Analysis Tool.
- Students will be able to describe the movement of the Bullfrog into non-native environments using maps of native habitats and current sightings in the United States.
- Students will use information to brainstorm/develop a unique strategy to combat increasing Bullfrog populations in the United States.
- Students will be able to integrate the use of key vocabulary terms while discussing the American Bullfrog as an invasive species.

Extensions and/or Adaptations:

Activity 2: Invasive Species Wanted Poster

For any age:
In pairs or individually create a “wanted” poster for the Bullfrog. Students will create a wanted poster likening the Bullfrog to a criminal in the state of Oregon. (Appendix B)

Print a set of the following for each student or student groups. They should already have the maps.

Oregon Department of Fish and Wildlife Bullfrog Fact Sheet (attached)
http://www.dfw.state.or.us/conservationstrategy/invasive_species/docs/bullfrog_fact_sheet.pdf

Fish and Wildlife Service Bullfrog Sheet (attached)

Activity 3: Management Strategies

Individually or small groups have students develop strategies on how to combat Bullfrog population increases in the United States. Appendices B and C
Sources

Columbia University; Introduced Species Summary Project; North American Bullfrog (Rana catesbeiana); Retrieved from: http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Rana_catesbeiana.htm#Introduction%20Facts

Oregon Department of Fish and Wildlife, Invasive Species Fact Sheet, Bullfrog; Retrieved from: file:///E:/bullfrog_fact_sheet.pdf

USGS NAS- Nonindigenous Aquatic Species Map, Recorded points; Retrieved from: http://nas.er.usgs.gov/viewer/omap.aspx?SpeciesID=71


Appendix A

Key Vocabulary and Background Information Worksheet

Student Map Analysis Tool

Map 1 USGS Hydrologic Unit Bullfrog Range Map

Map 2 USGS Historic Point Range Map

Exit Tickets
Background:
The American Bullfrog (Lithobates catesbeiana) is indigenous (in-dig-in-us) (native) to the central and eastern United States and parts of Canada. Although they are indigenous to these portions of North America, the current distribution has reached much farther into the Western United States. Humans have significantly impacted the environment by the introduction of these species into non-native habitats. These spatial changes across the country outside their original range has brought them to be classified as a non-indigenous “Invasive Species”. The first recorded sighting is believed to be in the early 1893. Originally introduced as a harvestable game animal (frog legs), other means of introduction include pest control, aquatic pest release and fish stocking programs all of which are human caused distributions. Once populations are developed further populations are due to self-movement as they can travel considerable distances through watersheds.

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Key Vocabulary

**Invasive:**

**Invasive Species:**

**Non-Indigenous:**

**Indigenous:**

**Range:**

**Distribution:**

**Spatial:**

**Watershed:**

**Biodiversity:**
Map Analysis Tool with a Geographic Lens of the Distribution Changes of the American Bullfrog

To begin: Have the three Usgs Maps of the American Bullfrog

Answer the following questions using the map and information available through species, species observations, reference layers and background.

<table>
<thead>
<tr>
<th>Observe</th>
<th>Reflect</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the date of map 1 and 2? When were these maps published?</td>
<td>Describe the human impact changed where the Bullfrog is currently located?</td>
<td>Why are these maps significant or important?</td>
</tr>
<tr>
<td>Who produced these maps?</td>
<td>Do these maps illustrate or describe spatial patterns (movement, connections, etc.)? What are they?</td>
<td>How do these maps illustrate the movement of the American Bullfrog across the United States?</td>
</tr>
<tr>
<td>Do these maps show a large area of the Earth's surface or a small area?</td>
<td>Describe the spatial patterns illustrated on these maps (movement, connections, ecosystems, etc.).</td>
<td>How could you (as an individual) use this map?</td>
</tr>
<tr>
<td>What do the red dots on Map 2 represent?</td>
<td>What was the motivation of the organization or person making these maps?</td>
<td>How can you use these maps to connect with situations today and predict what might happen in the future?</td>
</tr>
<tr>
<td>On the maps what does the different shaded areas on Map 1 represent?</td>
<td>What other information can you infer from these maps?</td>
<td>Which of these maps makes the most sense to you? Why?</td>
</tr>
</tbody>
</table>
Map 1
Hydrologic Unit Bullfrog Range Map
HUC - Hydrologic Unit Code. They identify watersheds basins
Map 2 Historic Point Records Topographic Map
<table>
<thead>
<tr>
<th>Name:</th>
<th>How did humans change the range of the American Bullfrog?</th>
<th>Name:</th>
<th>How did humans change the range of the American Bullfrog?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I’m still curious/confused about:</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Appendix B

Oregon Department of Fish and Wildlife (ODFW) Bullfrog Fact Sheet

U.S. Fish & Wildlife Fact Sheet

“Wanted” poster instructions

“Wanted” poster rubric
Bullfrog Invasive Species “Wanted Poster”

You are a natural resource manager in charge of managing your state’s lands for native frog species. Over the years your research has shown that the native frog populations have started to decrease due to impacts caused by increases in the invasive American Bullfrog’s populations. It’s time to get the word out to the public to get their help in saving native frogs.

Create a “Wanted” poster for the Bullfrog. Refer to the attached information fact sheet from the Oregon Department of Fish and Wildlife (ODFW) U.S. Fish & Wildlife Poster and USGS Maps.

Remember, this is an invasive species which is taking over native species habitats and is not indigenous to your area. Your poster must be legible and easy the information must be labeled.

You may use web searches if computers are available. Cite your sources!

Your poster must include:

- Common and species name of the Bullfrog
- Native location
- Origin
- Description of key characteristics
- Drawing of the Bullfrog
  - Draw it on your own and make it colorful.
- Map of Bullfrog sightings in your state or the United States as a whole
- Ecology (Where does it live? What does it eat?)
- Status
- Interesting Facts
- Impact
- What should you do if you see one?
- Who to call (Can be made up)
- Reward (Be creative)
Layout Examples of Invasive Species Wanted Posters

**Zebra Mussel Outlaws**

**Threats to the West – Why Be Concerned?**

Zebra mussels cause devastating impacts on municipal water systems, recreation and fisheries. Currently, they are widespread in Eastern USA and as far west as Oklahoma. We don't want these outlaws in California where they would rapidly reproduce and cause millions of dollars in damage to our water resources and recreation. We need your help to stop these mussels from entering our lakes, rivers and streams.

**HOW COULD THESE OUTLAWS TRAVE HERE?**

- On偶尔的娱乐活动者通过出售和使用未处理过的从外来的水体如密西西比河和密尔沃基湖的淡水鱼

**HOW CAN WE ARREST THE SPREAD?**

- **LEARN** how to identify zebra mussels (see sidebar)
- Monitor all aquatic plants and animals from boats, motor, trailer, and equipment
- **DOWNSIZE** your boat and equipment and keep it clean
- **DISCONNECT** boats and equipment by washing down with high pressure hot water, especially if coming from out of state. OR
- **DRAIN** everything for at least 30 minutes

**MERCHANDISE with a suspected introduction.**

- Report sightings on watercraft or in a lake or river—note location and movement as correct time and place information is crucial for successful eradication. Call the Zebra Mussel Watch hotline: 1-888-338-1607

**VOLUNTEER FOR A POSSE**

- Each department has its own protocol and engaging mussels of zebra mussels. If you would like to help as a volunteer member to protect your lake or river, please contact:

Zebra Mussel Watch Program
1-888-338-1607 (toll free)
zebramussel@ca.gov

- Pick up a size of mussels each year to control in your boat or trailer

- Clean surfaces of boats and equipment

- Close up on freshwater grass such as eelgrass and floating aquatic plants

- Cover up and remove

- Close up on freshwater weeds such as eelgrass and floating aquatic plants

- Close up on freshwater weeds such as eelgrass and floating aquatic plants

- Close up on freshwater weeds such as eelgrass and floating aquatic plants

- Close up on freshwater weeds such as eelgrass and floating aquatic plants
# Wanted Poster Rubric

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Title can be read from 6 ft. away and is quite creative.</td>
<td>Title can be read from 6 ft. away and describes content well.</td>
<td>Title can be read from 4 ft. away and describes the content well.</td>
<td>The title is too small and/or does not describe the content of the poster well.</td>
</tr>
<tr>
<td><strong>Required Elements</strong></td>
<td>The poster includes all required elements as well as additional information.</td>
<td>All required elements are included on the poster.</td>
<td>All but 1 of the required elements are included on the poster.</td>
<td>Several required elements were missing.</td>
</tr>
<tr>
<td><strong>Grammar</strong></td>
<td>There are no grammatical mistakes on the poster.</td>
<td>There is 1 grammatical mistake on the poster.</td>
<td>There are 2 grammatical mistakes on the poster.</td>
<td>There are more than 2 grammatical mistakes on the poster.</td>
</tr>
<tr>
<td><strong>Attractiveness</strong></td>
<td>The poster is exceptionally attractive in terms of design, layout, and neatness.</td>
<td>The poster is attractive in terms of design, layout and neatness.</td>
<td>The poster is acceptably attractive though it may be a bit messy.</td>
<td>The poster is distractingly messy or very poorly designed. It is not attractive.</td>
</tr>
</tbody>
</table>
American Bullfrog  *(Lithobates catesbeianus)*

**What is it?**

The bullfrog is the largest species of frog in the United States with males reaching 8 inches in length and weighing up to one pound. They inhabit a variety of freshwater habitats including ponds, marshes, streams, and rivers; as well as man-made habitats such as canals and storm water ponds.

**FACT:** Unlike other frogs, bullfrogs spend most of their time in the water where they feed.

**What does it look like?**

Tadpoles are dark green with black dots and yellow bellies and are up to 6 inches long. Adults are greenish to dark brown with dark spots and gold eyes. They have an exposed eardrum (tympanum) which can be twice the size of their eye in males. The bullfrog lacks the two parallel lines of raised glandular skin between the back and side found on native frogs. Instead a fold of skin begins just behind the eye and extends to its ear.

**FACT:** The BULLfrog is named after its distinct call which sounds like a cow mooing.

**Where is it from & where it is now?**

The bullfrog is native to the eastern United States and southern Quebec and Ontario. It has been introduced to many areas of the western United States, Europe, South America, and Asia.

**FACT:** The bullfrog can now be found in all of the lower 48 states.

**How did it get here?**

Bullfrogs were probably originally introduced accidentally during fish stocking into many lakes in western states. They were intentionally introduced as a food item (frog legs) during the early 1900’s and have been widely distributed through the aquarium trade.
**Common Name:** Bullfrog  
**Family:** Ranidae  
**Order:** Anura  
**Class:** Amphibia  
**Species:** *Lithobates catesbeianus*  
(formerly *Rana catesbeiana*)  
**Origin:** Eastern United States  
**Size:**  
- Adults: 3.5 – 8 inches (9cm -20.3 cm)  
- Tadpoles: 4 - 6 inches (10.2cm -15.3 cm)  

**Description:**  
- Tadpoles are dark green with black spots, orange or bronze eyes and yellowish underbellies.  
- Metamorphosis of tadpoles can take up to two years. (The process of change from tadpole to frog).  
- Juveniles are green to brown with tiny black spots, and orange- or bronze-colored eyes.  
- Adult females are larger than the males, ranging in color from green to dark brown with dark spots on top and a cream or white colored throat. Both sexes have a large tympanum (eardrum) located just behind the eye.  
- The females’ tympanum is about the same size as its eye.  
- Adult males range in color from green to dark brown with dark spots on top and a yellow throat. The males’ tympanum is about the twice the size as its eye.  
- Adults have golden colored eyes.  
- The male emits a loud mating call.  

**Ecology:**  
- Thrives in the warm water of ponds, lakes, marshes, sloughs, irrigation ditches and streams.  
- Diet of adult consists of about anything it can fit down its throat including fish, reptiles, small mammals, birds, amphibians and insects.  
- Tolerates a wide range of water temperatures.  

**Status:** Controlled species in Oregon. Can be legally harvested year-round; no angling license required.
Interesting facts: Introduced into Oregon as a food item (frog legs) in the early 1900s. Bullfrogs lay up 20,000 eggs each season while native species such as red-legged frogs lay up to 5,000 eggs.

Impact: Devour native turtles and frogs, adversely affecting native populations; transmit disease to native species; aggressively compete for food and habitat; outproduce reproductively, overwhelming native populations.

Action: Don’t release bullfrogs—pets or science projects—into the wild. If you see adults or tadpoles for sale in stores or online in Oregon, please report them to ODFW.

If you see bullfrogs in the wild, remove them to eat or kill them. One accepted method is stunning the frog with a sharp blow to the head, followed by decapitation. Make sure you have first identified the frog as a bullfrog; most native frogs are protected and cannot be removed from the wild or killed.

Bullfrogs are most accurately identified by: golden eyes and a large tympanum (eardrum) located just behind the eye. Bullfrogs often have black polka dots on the top of the head and body, blotchy striping on the legs, and a whitish underside with gray mottling. The upper lip is bright green; on males the lower lip is yellowish in color.
Appendix C

American Bullfrog Movement Predictions and Management Exercise

American Bullfrog Movement Predictions and Management Rubric
American Bullfrog Movement Predictions and Management

Please answer the following questions. Your answers must be well thought out and refer to the maps used in the previous exercise. Answers should include vocabulary words reviewed in this lesson and be complete sentences.

After examining the USGS maps (or working with the USGS interactive maps) what predictions can you make about the future populations and movement of the American Bullfrog across the United States?

Sketch a map of the United States with your predictions of future Bullfrog Populations. Don’t forget T.O.A.D.S Title, Orientation, Author, Date, Symbols (key)
American Bullfrog Movement Predictions and Management

As a natural resource manager there have been reported sightings of the American Bullfrog where no previous populations. What steps will you take to inform the public about the significance of these populations?

Design and describe a plan to try and keep the American Bullfrog out of your state. Be creative!
# American Bullfrog Movement Predictions and Management Rubric

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<tr>
<td><strong>Quality of Information</strong></td>
<td>Information clearly relates to the main topic. It includes several supporting details and/or examples.</td>
<td>Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.</td>
<td>Information clearly relates to the main topic. No details and/or examples are given.</td>
<td>Information has little or nothing to do with the main topic.</td>
</tr>
<tr>
<td><strong>Amount of Information</strong></td>
<td>All topics are addressed and all questions answered with at least 2 sentences about each.</td>
<td>All topics are addressed and most questions answered with at least 2 sentences about each.</td>
<td>All topics are addressed, and most questions answered with 1 sentence about each.</td>
<td>One or more topics were not addressed.</td>
</tr>
<tr>
<td><strong>Map/Illustrations</strong></td>
<td>Maps and illustrations are neat, accurate and add to the reader's understanding of the topic.</td>
<td>Maps and illustrations are accurate and add to the reader's understanding of the topic.</td>
<td>Maps and illustrations are neat and accurate and sometimes add to the reader's understanding of the topic.</td>
<td>Maps and illustrations are not accurate OR do not add to the reader's understanding of the topic.</td>
</tr>
</tbody>
</table>
Other Helpful and Interesting Resources

Bullfrog Calling - YouTube
Video of Bullfrog call sounds
https://www.youtube.com/watch?v=mtAdhpTKmgg

CABI – Center for Agriculture and Biosciences International
International not-for-profit organization that improves people’s lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment
www.cabi.org

Center for Invasive Species and Ecosystem Health
Information, some maps and images
http://www.invasive.org/browse/subthumb.cfm?sub=12246&start=1

Eat the Invaders
Fighting Invasive Species One Bite at a Time - recipes
www.eattheinvaders.com

Global Invasive Species Database
Search global information database, comprehensive species information

Next Generation Science Standards
http://www.nextgenscience.org/

USDA National Agriculture Library; National Invasive Species Information Center
Species profiles, links and research
https://www.invasivespeciesinfo.gov/aquatics/bullfrog.shtml#cit

University of Michigan Museum of Zoology Animal Diversity Web
Extremely Comprehensive Species Information
http://animaldiversity.org/accounts/Lithobates_catesbeianus/

Oregon Public Broadcasting Video: Amphibian Declines Driven by Complex Causes

Oregon Public Broadcasting Video: Oregon Field Guide: Invasive Species BBQ
http://watch.opb.org/video/2365665461/
American Bullfrog
Rana catesbeiana

large eardrums (tympanic membranes) behind their eyes

olive-green to brown in color with darker spots on their backs and legs

big back legs for jumping

large eyes

large mouth

largest frogs in the U.S. reaching up to 8" long

www.exploringnature.org

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