

# Inquiry Into Action

## Ecosystems and Animals

BY MEGAN ENNES, DENNIS KUBASKO, AND M. GAIL JONES

Each year, zoos and aquariums see more than 40,000 students during field trips to learn about animals, habitats, conservation issues, and ways students can help protect the animals (AZA 2017). However, for field trips to be effective, they need to be connected to the classroom content (DeWitt and Osborne 2007). Pre- and post-visit activities help teachers and students relate their classroom content to the knowledge gained during a visit to an informal learning setting. Most facilities accredited by the Association of Zoos and Aquariums (AZA) offer standards-based lessons for teachers to use in the classroom or onsite at their facility. Often, these lessons are tied to the variety of organisms housed at the facility.

As part of their conservation work, AZA has implemented a new program called “Saving Animals From Extinction” (SAFE; see Resources). The goal of SAFE is to promote conservation and species protection. SAFE is currently focusing on the following 10 species: African penguin, Asian elephant, black rhinoceros, cheetah, gorilla, sea turtles, sharks, vaquita, western pond turtle, and whooping crane (AZA 2017). The goals articulated and promoted by SAFE are easily connected to classroom curriculum. This activity fits best with your unit on ecosystems.

### CONTENT AREA

Life science/Earth science

### GRADE LEVEL

6–8

### BIG IDEA/UNIT

Human activity impacts populations through resource use and competition. Zoos and aquariums across the country are working to protect wild species by getting their visitors involved.

### ESSENTIAL PRE-EXISTING KNOWLEDGE

A basic understanding of ecosystems

### TIME REQUIRED

About three class periods

### COST

The cost of a field trip [optional]

### SAFETY

See school regulations regarding field trips

## Saving Animals lesson

In this lesson, Saving Animals, students explore some of the animals that zoos and aquariums are working hard to protect. In small collaborative groups, students conduct research on one of the signature species featured in AZA's SAFE program and develop a digital presentation that introduces their classroom peers to their highlighted species.

One way to group students for this project is to allow them to select which animal they would like to research. First, decide how many students you would like in a group; we recommend 2–4 students per group. Next, print the correct number of grouping cards (see Online Supplemental Materials for the animal cards; see Figure 1 for an example). For example, in a class of 20 students with groups of two, you would print two of each animal. You will also need note cards numbered one through the number of students in your class. Hold the note cards upside down and have students select a card. Then in the order on their cards, have students come to the front and select the animal they would like to research. This will group students based on the animals in which they are interested. Each group will be responsible for researching only one of the signature species.

Once the groups have been organized and students have their animal identification card, introduce them to the research project. Briefly describe AZA SAFE and the work they are doing to protect endangered species. Explain that each group will be researching one of the

### Encouraging students to find solutions

When addressing issues such as population decline or habitat loss, it is critically important for children to discuss ways to help offset the problem. This provides a unique opportunity for children to generate their own ideas and personalize their experiences with the content by proposing unique solutions. Ending lessons without solutions to problems make an issue seem much larger and hopeless, which may cause students stress.

SAFE signature species. On their card, students will find a link to a website with introductory information about their animal. Tell students that they will be developing a 5- to 10-minute informative presentation to introduce the class to their animal and ways the class can help protect their animal. Pass out the research outline (Figure 2). Review each of the topics students should include in their presentation: information on the animal, threats to the animal, and ways students can help protect the animal. Students should begin with the link on their card, but they should also use other educational websites to research information on their animals. See Resources for potential websites. Here are a few tips for differentiation and classroom management for the research portion of the activity.

**FIGURE 1:** Gorilla animal card



WWW.AZA.ORG/SAFE-GORILLA

### Differentiation tips

- Students can brainstorm research ideas and discuss each of the research topics in a small group prior to sitting at the computer.
- Students can work in groups at the computer and communicate with one another as they find information about their SAFE signature species.
- Allow students some choices in their web exploration; communicate that students have multiple textual resources available to them as well.
- The teacher should move from student to student, small group to small group, informally and formatively assessing their research and progress.

**FIGURE 2:** Research outline

**Saving Animals research outline**

**My animal is:**

I found a photo of my animal on this website:  
 I found information on my animal on this website:

**My animal:**

Lives in this part of the world:  
 Lives in this habitat:  
 Eats:  
 Is eaten by:  
 Is threatened in the wild by:  
 Its population is [circle one]: Increasing Decreasing  
 I found a graph of my animal’s population on this website:

**Other fun facts about my animal:**

Things AZA SAFE is doing to protect my animal are:  
 Things other people can do to help protect my animal are:

**Assignment:**

Now that you have collected your information, create a presentation using PowerPoint, Prezi, Google Slides, or other digital media. You must include all of the information from the worksheet and cite your sources.



**Rubric**

	3	2	1
<b>Content:</b> Did you include all of the content from the outline worksheet?	All of the content is included from the outline worksheet.	One or two pieces of content are missing in the presentation.	There are several items missing from the presentation.
<b>Organization:</b> Is the presentation well organized and easy to follow?	The presentation is well organized and easy to follow.	The presentation is somewhat organized and the audience can mostly follow what is being said.	The presentation is disorganized and it is difficult to follow.
<b>Presentation media:</b> Is the presentation media easy to follow? Are there photos? Is it easy to read?	The presentation media supports the presentation. There are photos and the font size and color are easy to read. There is just enough text on the slides.	The presentation media is a little difficult to read. The slides have a lot of words and few photos. The color or size of the font is hard to read.	The presentation media is very difficult to read. There is too much text, too few photos, and the color and size of the font is very difficult to read.
<b>Voice, eye contact, and body language:</b> Can the audience hear you? Do you make eye contact with the audience? Do you stand in a relaxed position?	The speakers make eye contact with the audience and do not fidget while speaking. The voices are easy to hear and understand.	The speakers sometimes make eye contact with the audience. There is some fidgeting during the presentation. The voices are mostly easy to hear and understand.	The speakers do not make eye contact. There is a lot of fidgeting during the presentation. The voices are difficult to hear or understand.
<b>References:</b> Are references cited so the audience knows where the information came from?	All references are cited in the presentation. References are in the appropriate format.	One or two references are missing from the presentation. References are in the appropriate format.	More than two references are missing from the presentation. References are not in the appropriate format.

**FIGURE 3:** Presentation rubric

Presentation criteria	Inadequate	Emerging	Developing	Proficient
Students demonstrate knowledge of animals kept for educational and conservation purposes.	Students only list one animal (or none) being kept for educational and conservational purposes and fail the presentation expectations; they demonstrate no knowledge of Species Survival Plans.	Students list 2–5 different animals being kept for educational and conservational purposes and approach the presentation expectations; a Species Survival Plan is acknowledged to exist.	Students list 6–9 different animals being kept for educational and conservational purposes and meet the presentation expectations; Species Survival Plans are generally highlighted.	Students list 10 or more different animals being kept for educational and conservational purposes and exceed the presentation expectations; Species Survival Plans are clearly articulated for at least one of the species.
Students demonstrate an understanding of the AZA SAFE Signature Species program.	Students fail to share any understanding as to why zoos and aquariums keep animals for educational and conservation purposes; little to no knowledge of the AZA SAFE Signature Species Program is demonstrated.	Students share an emerging explanation as to why zoos and aquariums keep animals for educational and conservation purposes; some knowledge of the AZA SAFE Signature Species Program is demonstrated.	Students share a detailed explanation as to why zoos and aquariums keep animals for educational and conservation purposes; a developing knowledge of the AZA SAFE Signature Species Program is demonstrated.	Students provide a robust explanation as to why zoos and aquariums keep animals for educational and conservation purposes; a proficient knowledge of the AZA SAFE Signature Species Program is demonstrated.
Students research and create a presentation of one AZA SAFE species.	Students fail to create an adequate digital presentation that introduces their classroom peers to their highlighted species; there is very little evidence of student research.	Students create an emerging digital presentation that introduces their classroom peers to their highlighted species but only approaches expectations; there is some evidence of student research.	Students create a digital presentation that adequately introduces their classroom peers to their highlighted species; there is evidence of student research.	Students create a digital presentation that introduces their classroom peers to their highlighted species and exceeds all expectations; student research is judged to be exhaustive and thorough.

**FIGURE 3:** Presentation rubric (continued)

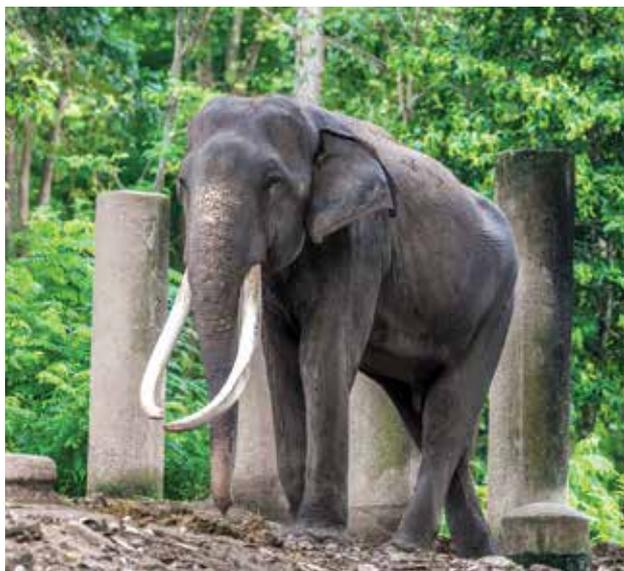
Presentation criteria	Inadequate	Emerging	Developing	Proficient
Students disseminate their research on an AZA SAFE species with the class.	Student presentations fail to contain general information such as habitat, food, predators, and an image; students fail to discuss threats to the species in the wild and do not include a graphical representation demonstrating any changes in population.	Student presentations include general information such as habitat, food, predators, and an image; students fail to discuss threats to the species in the wild and/or fail to include a graphical representation demonstrating any changes in population.	Student presentations include general information such as habitat, food, predators, and an image; students discuss threats to the species in the wild and include a graphical representation demonstrating any changes in population.	Student presentations explain general information such as habitat, food, and predators, and an image is included; students extensively discuss threats to the species in the wild and include a graphical representation demonstrating any changes in population.
Students synthesize information from peer presentations to develop a local solution-based action plan featuring endangered and local species.	Students fail to identify a local plan of action that a middle school class can take to help protect their selected species and sustain critically threatened ecosystems.	Students identify a local plan of action that their class can take to help protect species and sustain critically threatened ecosystems; the local plan is not feasible.	Students identify a local plan of action that their class can take to help protect species and sustain critically threatened ecosystems; the local plan, while challenging to integrate, is feasible.	Students identify a local plan of action that their class can take to help protect species and sustain critically threatened ecosystems; the local plan is both feasible and engaging.

**Classroom management tips**

- Middle schools students need clear performance instructions and they need their research outline prior to using a computer or being taken to a computer lab.
  - Prior to researching their SAFE signature species, the teacher may need to model meaningful research strategies building to an effective presentation. These efforts will promote on-task computer time.
  - Be sure that all AZA SAFE websites are accessible and that students’ log-in information is clearly displayed for all to see.
  - As some students finish their research prior to others, be sure to have an extension task prepared.
  - Always have a back-up plan if there are computer difficulties.
- To address real solutions for protecting species, students will discuss the ways AZA facilities are working

together to save their signature species. This information is located on the AZA SAFE profiles for each species. Each group should discuss relevant ways students can help protect the species or partner with an accessible AZA facility (with the understanding that this is not a requirement of the assignment). If AZA protection and sustainability efforts are not explicitly discussed for their species, student groups should provide examples of how protecting their animal's ecosystem can help protect its populations. For example, the western pond turtle populations declined due to habitat alteration such as logging and building of homes. One potential solution would be to determine where western pond turtles are located and prevent logging or the building of homes in that area. Protecting the habitat will protect the species.

Once students have developed their presentation, you will need one or two class periods for each group to present. The teacher can use a presentation rubric for each group (Figure 3). Each group should be given 5–10 minutes to present its animal to the class. Students should take notes on other groups' presentations, including items they find of interest and other ideas they may have for protecting the species being presented. After each presentation, the class should discuss any additional ideas they have that may be useful for protecting the species that was covered. These ideas will be used to help develop students' global plan of action outlined in the next paragraph. (See Figure 3 for the presentation rubric.)



When all the presentations have been given, the class should develop a global plan of action. Students should identify actions that they can take as a class to help protect species around the world and sustain critically threatened ecosystems. This can include simple actions such as bringing waste-free lunches or more complicated actions such as turning their drop-off and pick-up area into a “no idle zone.” Each class should identify which actions they believe they can take as a class or individuals that will make a difference for species at home and around the world (see Figure 4 for examples of conservation actions).

### Conservation in action

To evaluate what students have learned in this activity, it is highly recommended that students engage in a field trip to a local AZA-accredited zoo or aquarium to explore conservation in action. A field trip can be used to evaluate how much students learned about ecosystems, animals, and conservation. As students explore their local zoo or aquarium, they identify places where the facility discusses its conservation efforts. Conservation efforts are typically listed on exhibit signage or during educational presentations. Examples of conservation messages can be found on the International Zoo Educators Association website (see Resources). Another example of AZA conservation messaging, for elephants, includes:

“Elephants are a keystone species that influence the composition of their environment while often benefiting other species:

- The activities of elephants often benefit other species. The African elephants' ability to locate underground water and dig pools helps provide many other species with water during droughts. African elephants may destroy trees and shrubs, allowing grasses to grow that other species eat. In the process, African elephants, and perhaps particularly the forest elephant, create an environment conducive to the regeneration of healthy forest ecosystems. Management of elephants in the wild means maintaining a balance between elephants and the ecosystem.

## FIGURE 4: Conservation actions for classrooms

### Individual actions: Actions a single person can take to make a difference

1. Create a backyard wildlife habitat to offer food and shelter for wild animals: [www.nwf.org/Garden-For-Wildlife/Create.aspx](http://www.nwf.org/Garden-For-Wildlife/Create.aspx)
2. Participate in Reptile Citizen Science through HerpMapper: [www.herpmapper.org](http://www.herpmapper.org)
  - a. Herp Mapper is a cooperative project, designed to gather and share information about reptile and amphibian observations across the planet. Using Herp Mapper, you can create records of your herpetology observations and keep them all in one place. In turn, your data are made available to Herp Mapper Partners (groups who use your recorded observations for research, conservation, and preservation purposes). Your observations can make valuable contributions on behalf of amphibians and reptiles.
3. Use the Good Guide App to find sustainable and environmentally friendly products: [www.goodguide.com/about/mobile](http://www.goodguide.com/about/mobile)
4. Reduce your use of plastics by using reusable grocery bags, water bottles, etc.
5. Take waste-free lunches to school using reusable lunch bags and food containers.
6. Buy sustainable seafood by looking for packaging marked with sustainable certifications.
7. Buy products that do not contain palm oil.
8. Observe wildlife from a distance. Do not interact with them for your safety as well as theirs.
9. Consider keeping your cat indoors to protect reptiles, amphibians, and birds.
10. Clean up after your dog to keep waste and diseases out of the water.



### Collective actions: Actions people can take in groups to make an even larger impact

1. Set up a classroom recycling center. Even better, find ways to decrease the use of plastics and other resources in the classroom.
2. Create a schoolyard wildlife habitat: [www.nwf.org/Garden-For-Wildlife/Create/Schoolyards.aspx](http://www.nwf.org/Garden-For-Wildlife/Create/Schoolyards.aspx)
3. Create community habitats such as green spaces, parks, and preserves.
4. Conduct a classroom plastic audit and find ways to decrease plastic use in class.
5. Turn your pick-up lane into a “no-idle zone” and ask parents to turn off cars if they are waiting more than 30 seconds.
6. Conduct an energy audit to reduce energy use in the classroom: [www.ceeonline.org/greenGuide/energy/take/TakeAudit.aspx](http://www.ceeonline.org/greenGuide/energy/take/TakeAudit.aspx)
7. Become a green certified school: <http://centerforgreenschools.org/green-school>

*During the field trip, students will also identify opportunities for increasing conservation messaging. This will culminate in an assessment report discussing the facilities' conservation strengths and areas for improvement.*

- Though much less numerous in the wild, Asian elephants also impact their environment and increasingly come into conflict with humans and agriculture.
- Saving habitats for elephants means saving habitats for many other species as well.” (AZA)

For the field trip portion of the Saving Animals lesson, explain to your students that they will be putting their conservation knowledge into practice. During the field trip, students should be on the lookout for their specific signature species, if they are present. Using the information they learned about AZA SAFE and protecting animal species around the world, they will evaluate the conservation messaging found at the zoo or aquarium. To help students identify conservation messaging, share examples of the signs from the International Zoo Educators Association. You may also want to give examples from AZA’s conservation messaging outline found in the Resources. See sidebar at right for more information on preparing students for a field trip.

During the field trip, students will also identify opportunities for increasing conservation messaging. This will culminate in an assessment report discussing the facilities’ conservation strengths and areas for improvement. Students will be evaluated based on their completion of an Exhibit Evaluation (Figure 5) and a written report when returning to school. The Exhibit Evaluation will be used as an outline to write their report. The report will explain the importance of conservation messaging, where conservation messages were found at the zoo or aquarium, and suggestions for improving conservation throughout the facility they visited. This may be done individually or with the students in their presentation groups. If you reach out to the education department at the facility you visited, they may be interested in the final reports and sug-

### Field trip preparation

1. Assign students to groups so that there are students from different presentation groups. The number of students in each group will depend on your school’s rules and the number of chaperones available.
2. Pass out Exhibit Evaluation worksheets to each group [see Online Supplemental Materials]. You may have students work independently or as a team.
3. As students explore the zoo or aquarium, they will find examples of conservation in action. Students will determine if the facility has any of the AZA SAFE signature species. If so, how do they discuss the work being done by AZA facilities?
4. As they explore the zoo, students identify opportunities to increase conservation messaging at the facility. They will brainstorm ways to incorporate what they learned about SAFE at school into the exhibits.
5. When students return to school, they will write a report detailing their findings and opportunities for improvement.

### Field trip safety

Before taking a field trip, it is important to discuss safety and appropriate behaviors with students. When planning a field trip to a zoo or aquarium, follow your school’s procedures for field trips. Review the NSTA Field Trip Safety document found here: <http://static.nsta.org/pdfs/FieldTripSafety.pdf>. Zoos and aquariums often have their own set of safety rules they will send in a teacher packet. This may include things such as do not run, do not bang on the windows of enclosures, do not feed the animals, and stay on the path.

**FIGURE 5:** Exhibit evaluation

1. The name of the zoo or aquarium is:
2. Does this zoo have one of the SAFE species we learned about in class? Yes/No  
If yes, the animal is:
3. The *first exhibit* where I looked for conservation messaging is:
4. The conservation messages at the exhibit included:
5. Other conservation messages that could have been included are:
6. My recommendations for improving conservation messaging about endangered species include:
7. The *second exhibit* where I looked for conservation messaging is:
8. The conservation messages at the exhibit included:
9. Other conservation messages that could have been included are:
10. My recommendations for improving conservation messaging about endangered species include:
11. The *third exhibit* where I looked for conservation messaging is:
12. The conservation messages at the exhibit included:
13. Other conservation messages that could have been included are:
14. My recommendations for improving conservation messaging about endangered species include:

**Assignment:** Now that you have collected data about conservation messaging at the zoo, please write a report summarizing your findings and recommendations. Your report will include a summary discussing the importance of protecting endangered species in zoos and aquariums, your findings from the website, and your recommendations.

**Rubric**

	3	2	1
<b>Introduction:</b> Why did you conduct this research? Why is this important?	The reason for the research is clearly stated and the reader can understand why the report was written.	There is some explanation about why the research was conducted, but the reasons are not very clear.	There is no explanation and it is unclear why the research was conducted or why the report was written.
<b>Research:</b> Did you follow the template and answer all the questions?	The Exhibit Evaluation worksheet is completed and all relevant information was collected.	Some information is missing from the Exhibit Evaluation worksheet, but most of it is there.	There are many questions unanswered on the Exhibit Evaluation worksheet.
<b>Findings:</b> What information did you find on the conservation messaging at the zoo/aquarium?	The findings are clearly explained in a logical manner.	The findings are listed but there is no logical order and some information is unclear.	There are few findings listed and there is no organization to the information.
<b>Recommendations:</b> What recommendations do you have for improving the conservation messaging based on what we learned in class?	There are 3–5 recommendations for improving the conservation messaging based on the information learned in class.	There are only one or two recommendations for improving the conservation messaging or they are not connected to the information learned in class.	There is only one recommendation for improving the conservation messaging given and there is no connection to the information learned in class.
<b>Spelling and Grammar:</b> Is your spelling and grammar correct?	There are 0–2 grammar or spelling errors	There are 3–5 grammar or spelling errors.	There are more than five grammar or spelling errors.

gestions for conservation messaging. However, this will vary from facility to facility. Before leaving for the field trip, please review the Field Trip Preparation Information (see sidebar) and the Field Trip Safety Information (see sidebar).

While taking field trips can have a positive influence on students' social and affective learning experiences (DeWitt and Storksdieck 2008), we understand that not all schools have access to zoos or aquariums. If taking a field trip is not a possibility, a similar activity can be done in class by having students assess and evaluate the websites for different AZA facilities. Assign each student or group of students an AZA-accredited zoo or aquarium or allow them to select a facility they are interested in (see Resources for a link to a list of accredited zoos and aquariums). Students look for places where the website includes information on their conservation practices and places where students think there could be more conservation messaging. Using the Website Evaluation worksheet (Figure 6), students will write a one- or two-page report summarizing their findings and constructive recommendations for improving conservation messaging on the website.

## Conclusion

It is important that students are presented with opportunities to have a positive impact on our planet and its organisms. As human populations continue to expand, we will continue to see adverse human impacts on ecosystems and their inhabitants. By connecting curriculum to current issues in conservation, students find greater relevance in the topics and are encouraged and empowered to help preserve our planet. ●

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## REFERENCES

- Association of Zoos and Aquariums [AZA]. Elephant TAG/SSP key messages. <http://bit.ly/2iXUtNg>.
- DeWitt, J., and J. Osborne. 2007. Supporting teachers on science-focused school trips: Towards an integrated framework of theory and practice. *International Journal of Science Education* 29 [6]: 685–710. <http://doi.org/10.1080/09500690600802254>.
- DeWitt, J., and M. Storksdieck. 2008. A short review of school field trips: Key findings from the past and implications for the future. *Visitor Studies* 11 [2]: 181–97. <http://bit.ly/2xKre3X>.
- National Governors Association Center for Best Practices and Council of Chief State School Officers [NGAC and CCSSO]. 2010. *Common core state standards*. Washington, DC: NGAC and CCSSO.
- NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states*. Washington, DC: National Academies Press. [www.nextgenscience.org/next-generation-science-standards](http://www.nextgenscience.org/next-generation-science-standards).

## RESOURCES

- AZA Conservation Messaging—<http://bit.ly/2ezoHkC>
- AZA facilities—[www.aza.org/current-accreditation-list](http://www.aza.org/current-accreditation-list)
- AZA SAFE—[www.aza.org/aza-safe](http://www.aza.org/aza-safe)
- International Zoo Educators Association: Conservation Signage—<http://bit.ly/2iYEdM6>
- Making field trips work—[www.nsta.org/publications/news/story.aspx?id=51363](http://www.nsta.org/publications/news/story.aspx?id=51363)
- Monterey Bay Aquarium Animal Guides—[www.montereybayaquarium.org/animal-guide](http://www.montereybayaquarium.org/animal-guide)
- Monterey Bay Aquarium Explorer Guides [includes a guide on sharks in Spanish]—<http://bit.ly/2eEpJzC>
- North Carolina Aquarium at Fort Fisher's Sea Turtle Exploration—<http://seaturtleexploration.com>
- NSTA field trip Safety—<http://static.nsta.org/pdfs/FieldTripSafety.pdf>
- San Diego Zoo Animals—<http://animals.sandiegozoo.org/animals>
- Woodland Park Zoo: Western Pond Turtle—<http://bit.ly/2gG2K7J>
- World Wildlife Fund: Species—[www.worldwildlife.org/species](http://www.worldwildlife.org/species)

## ONLINE SUPPLEMENTAL MATERIALS

- Animal cards—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Conservation actions—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Exhibit evaluation—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Presentation rubric—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Saving Animals research outline—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Saving Animals research outline: Student example—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)
- Website evaluation—[www.nsta.org/scope1711](http://www.nsta.org/scope1711)

**FIGURE 6: Website evaluation**

1. My website is:
2. The name of the zoo or aquarium is:
3. This website discusses one of the SAFE species we learned about in class: Yes/No  
If yes, the animal on the website is:
4. The web address where I found conservation messaging is:
5. The conservation messages on the website included:
6. Other conservation messages that could have been included are:
7. My recommendations for improving conservation messaging about endangered species include:
8. This connects to the class presentations because:



**Assignment:** Now that you have collected data about your website, please write a report summarizing your findings and recommendations. Your report will include a summary discussing the importance of protecting endangered species in zoos and aquariums, your findings from the website, and your recommendations.

**Rubric**

	3	2	1
<b>Introduction:</b> Why did you conduct this research? Why is this important?	The reason for the research is clearly stated and the reader can understand why the report was written.	There is some explanation about why the research was conducted, but the reasons are not very clear.	There is no explanation and it is unclear why the research was conducted or why the report was written.
<b>Research:</b> Did you follow the template and answer all the questions?	The Website Evaluation worksheet is completed and all relevant information was collected.	Some information is missing from the Website Evaluation worksheet, but most of it is there.	There are many questions unanswered on the Website Evaluation worksheet.
<b>Findings:</b> What information did you find on your website?	The findings are clearly explained in a logical manner.	The findings are listed, but there is no logical order and some information is unclear.	There are few findings listed and there is no organization to the information.
<b>Recommendations:</b> What recommendations do you have for improving the website based on what we learned in class?	There are 3–5 recommendations for improving the conservation messaging based on the information learned in class.	There are only one or two recommendations for improving the conservation messaging or they are not connected to the information learned in class.	There is only one recommendation for improving the conservation messaging given and there is no connection to the information learned in class.
<b>Spelling and grammar:</b> Is your spelling and grammar correct?	There are 0–2 grammar or spelling errors.	There are 3–5 grammar or spelling errors.	There are more than five grammar or spelling errors.

## Connecting to the *Next Generation Science Standards* (NGSS Lead States 2013)

- The chart below makes one set of connections between the instruction outlined in this article and the NGSS. Other valid connections are likely; however, space restrictions prevent us from listing all possibilities.
- The materials, lessons, and activities outlined in the article are just one step toward reaching the performance expectations listed below.

### Standard

MS-ESS3: Earth and Human Activity

[www.nextgenscience.org/dci-arrangement/ms-ess3-earth-and-human-activity](http://www.nextgenscience.org/dci-arrangement/ms-ess3-earth-and-human-activity)

### Performance Expectation

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

DIMENSIONS	CLASSROOM CONNECTIONS
<b>Science and Engineering Practice</b>	
Constructing Explanations and Designing Solutions	Students research a threatened species, identify reasons for its decreasing numbers, and develop a conservation action plan.
<b>Disciplinary Core Idea</b>	
ESS3.C. Human Impacts on Earth Systems <ul style="list-style-type: none"> <li>• Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things.</li> </ul>	Students research how humans have impacted animal populations, leading to extinction, and how zoos and aquariums are working to protect ecosystems and the organisms that live there.
<b>Crosscutting Concept</b>	
Cause and Effect	Students will examine solutions for human impacts on the environment.

## Connections to the *Common Core State Standards* (NGAC and CCSSO 2010)

### ELA

WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration (MS-ESS3-3).

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