

# Providing Forever Homes

## LESSON FIVE: Citizen Science



Shedd Aquarium works every day to protect wildlife, and you can too! You might choose a career path that allows you to help with animal welfare, rescue and rehabilitation at a place like Shedd Aquarium. You might be a scientist who studies animals to learn what they need to survive in the wild. You might be someone who teaches or shares what you know about protecting the planet with others. The possibilities for protecting wildlife are endless, and you don't have to wait until you've graduated from college to make a difference.

Citizen science projects give people who are not researchers an opportunity to help scientists with their work. For example, Shedd Aquarium created iSeahorse, a citizen science project that enables people who visit the coral reefs of the Philippines to report sightings of endangered seahorses, providing scientists with much more data than they could collect on their own. They can then use this data to protect the reefs where these seahorses live. The following activities will give you examples and ideas of ways to help protect wildlife all over the world.

**CONNECTION TO UNIT: Why this matters for your students**

In addition to understanding ecosystems and population dynamics, students need to understand how and why we are connected to and impact our planet. This lesson focuses on what scientists are doing to protect our planet, how and why. It also shows that we all have the ability and responsibility to help by being citizen scientists.

**NGSS DISCIPLINARY CORE IDEAS**

**LS4.D: Biodiversity and Humans**

> Changes in biodiversity can influence humans’ resources, such as food, energy and medicines, as well as ecosystem services that humans rely on, for example, water purification and recycling. (Secondary to MS2-5)

**ETS1.B: Developing Possible Solutions**

> There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (Secondary to MS-LS2-5)

**NGSS SCIENCE AND ENGINEERING PRACTICES**

**Developing and using models**

> Modeling in 6-8 builds on K-5 experiences and progresses to developing, using and revising models to describe, test and predict more abstract phenomena and design systems.

**Engaging in argument from evidence**

> Construct a written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

**KEY POINTS**

**Students will**

- > be able to explain how humans are connected to and impact our planet.
- > summarize and explain the work of current Shedd scientists in environmental conservation.
- > be able to define what a citizen scientist is and explain how this work is important.
- > think of citizen science projects they can do with Shedd Aquarium.
- > create an action plan to help with environmental conservation.

<b>MATERIALS/SETUP</b>	<b>AGENDA</b>	<b>IMPORTANT VOCABULARY</b>
<ul style="list-style-type: none"> <li>&gt; Student handout (one per student)</li> <li>&gt; Links to citizen science projects are provided. Information can printed or students can directly access it online.</li> </ul>	<ol style="list-style-type: none"> <li>1. Engage (5 min)</li> <li>2. Explore (10 min)</li> <li>3. Explain (5 min)</li> <li>4. Elaborate (5 min)</li> <li>5. Evaluate (25 min)</li> </ol> <p>Option to extend the evaluation section into its own full-day lesson.</p>	<ul style="list-style-type: none"> <li>&gt; Scientist</li> <li>&gt; Environmental conservation</li> <li>&gt; Citizen science</li> </ul>

## ENGAGE: Key points previewed

Grab students' attention, recall prior knowledge and set framework for today's lesson.

Students will brainstorm in the Engage section, expressing their definitions of what a scientist is and also why scientists might need to protect life on our planet.

Students share responses with small groups and/or whole group. It is recommended that you record responses to questions to leave up for the entirety of the session.

- > *What do they already know that will help them be successful?*
- > *How can I frame today's investigation?*

## EXPLORE: Key points discovered

Students conduct a mini investigation to challenge or confirm initial model. They should make observations, collect/record data and interpret their results.

Students will read two articles and answer follow-up questions in the Explore section. It is recommended that students read and independently answer questions, have time to discuss with small groups or partners, then answer questions 3, 4, and 8 in a whole-group discussion.

**ARTICLE 1:** What is environmental conservation and why is it important?

- > Students will be able to explain how humans are connected to and impact our planet.

**ARTICLE 1:** Career highlights of three Shedd experts

- > Students will summarize and explain the work of current scientists in environmental conservation.

Students can read and answer all of the information in one block of time or the information could be chunked into two smaller reading sessions, with breaks to review questions in between. It is recommended that for younger students or struggling reading students you should chunk the two articles and questions. They can read, answer questions, review their work and repeat with the second text.

- > *What key points do my students need to gain information about here? How are they going to learn it?*
- > *What are students doing during this section? How are they pushing their understanding? How is each student being held accountable?*

## EXPLAIN: Key points formalized

Students are guided toward creating explanations of their results. Here is where they really connect their investigation back to the content. Key vocabulary, scientific principles and theories are introduced. Additional sense-making activities may be used or can be follow-up questions/discussion.

Explain section of handout: Give students 5 minutes to answer questions 9 and 10. Ask students to share their answers to number 10 out loud and record their responses. Optional: Have students create wall posters or decorations for number 10 to put up in the room. These could have their "evaluation" projects added to them later.

- > *How will I guide student learning in a student-centered way? How will I ensure that students have a clear understanding of the essential content topics?*

## ELABORATE: Key points used

Students continue to complete practice problems of skills and/or apply new knowledge to the situation or new scenario. Teacher checks student comprehension and push extension of content.

Students will read a short text about citizen science and determine what a citizen scientist is, and explain how this work is important in the Elaborate section of their handout.

Call on one or more students to share their definitions and explain why this is important work.

> *How will students use the new knowledge/prove understanding?*

> *How will I check for student understanding: independently, small group and whole group?*

## EVALUATE: Key points assessed

In this section, both students and teacher check students' acquisition of knowledge. Students should gain a clear understanding of what they have learned. As the teacher, you can use this information to begin to formulate the next day's lesson.

There are two project options below. You will pick one of the two options to complete.

**OPTION 1:** Research and plan how to join an existing specific citizen science project.

**OPTION 2:** Develop your own citizen science project around an environmental conservation issue.

Teacher can give students the option to choose or pick one option for all students to do. Students can also use option 1 as research to then complete option 2 (read about other citizen science projects to help them create their own). These options and follow-up questions are both provided in the Evaluate section of their handout.

Please see Notes/Considerations for links to citizen science projects and sample problems for option 2.

> *What will student evaluation look like?*

> *What will need to be created for this evaluation: quiz/rubric/writing prompt?*

## NOTES/CONSIDERATIONS

### Citizen science projects:

<http://scistarter.com/> Use this citizen science search engine to find projects that you can help with.

<https://www.zooniverse.org/> This website lists many citizen science projects that you can help with on the computer.

<http://ebird.org/content/ebird/about/> Report bird sightings to help scientists track populations and migrations.

<http://budburst.org/> Observe a plant and report when it goes through seasonal changes to help scientists learn more about the changing climate.

<http://www.sheddaquarium.org/plan-a-visit/Explore/Experiences/Shedd-Adventures/Iguana-Research-Expedition/>

Each year, citizen scientists assist Dr. Knapp with iguana research in the Bahamas.

### Sample problems:

Littering, the feeding of wild animals, running the faucet while brushing teeth, etc.

> *Remediation: What additional explicit instruction or supports will students need so they can accomplish tasks?*

> *Catching up students who miss part of the exercises:*

- *How will students easily jump in to any part of the lesson cycle?*

- *What will students need to participate fully?*

> *Timing and pacing: If the 5E model goes beyond one day, what is the clear output for each day?*

## **We would love to learn from you!**

Please take a moment to share your thoughts about the NextGen Animal Responders curriculum. You can complete our brief survey—and boost Shedd learning—at <http://bit.ly/NextGenSurvey>.

# How Are Humans Connected to Our Planet?

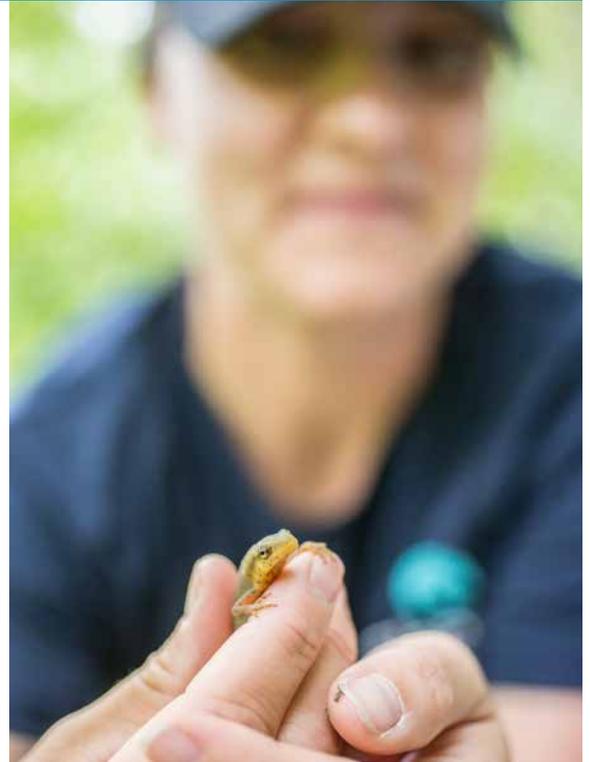
## STUDENT HANDOUT

Name \_\_\_\_\_ Class period: \_\_\_\_\_

### ENGAGE

Answer the following questions.

1. How do you define a scientist? What makes someone a scientist?



2. How do scientists help protect living things on our planet?

## EXPLORE

Read the information and answer the questions.

Many humans live inside houses and many live in cities. Do we have any connection to nature? Yes! Even with all our technology we are still very connected to other living things on our planet. For five decades, Shedd Aquarium has responded when animals are in urgent need. Shedd Aquarium has also conducted numerous environmental conservation projects. Environmental conservation is any effort made to help make life on Earth more sustainable (in a way that protects our ecosystems and resources). Environmental conservation is important to all humans because our food, energy and even medicine are dependent on a healthy planet.

Our animal care and veterinary teams apply their knowledge and skills to safely and expertly assist the wild counterparts of the species they know so well at Shedd. While the goal is to return rehabilitated animals to the wild, that's not always possible. Working with federal and state wildlife officials, Shedd has been able to provide forever homes, along with specialized care, to animals that can no longer survive on their own. In fact, some of the animals most beloved by our guests—including our sea turtle, sea otters and sea lions—were rescues.

3. What is environmental conservation?

4. Why is a healthy planet good for humans?

Read the information about the careers of these Shedd experts and answer the questions following.

**Dr. Charles Knapp**, *vice president, conservation and research*

Dr. Charles Knapp oversees Shedd's on-site and global conservation research programs. For more than 20 years, his work has included field research in the Bahamas and in the Caribbean for the conservation of endangered iguanas. By studying the iguanas, he focuses on understanding how endangered animals can be affected by human activity and works to create solutions. Through his work with students, citizens, government officials and scientists, a land-and-sea national park in the Bahamas has been expanded to protect more of the habitat needed by the iguanas and other species.

**Sheri Hendricks**, *animal care specialist, marine mammals*

Sheri Hendricks is an animal care specialist who spends most days caring for the whales and dolphins at Shedd Aquarium. Her animal care expertise was recently put to use in South Africa, however, where she assisted with the rescue and rehabilitation of abandoned African penguin chicks. Each day, Sheri prepared food for the chicks to help them gain the strength they needed to return to the ocean. She also cleaned the chicks' pens and administered medical treatments when needed. African penguins are endangered, so every chick that Sheri rehabilitated was important to helping the species survive and recover.

**Dr. Caryn Poll**, *senior staff veterinarian*

Dr. Caryn Poll is veterinarian to more than 1,500 species at Shedd Aquarium. With her team she provides on-site and on-call preventive, urgent and emergent care. She is also a member of Shedd's Research Committee, conducting and advising a variety of research projects in exotic animal medicine and biology. In addition, Dr. Poll oversees Shedd's robust veterinary preceptorship program, which trains veterinary students from the United States and abroad in aquatic animal medicine. When rescued animals come to Shedd, Dr. Caryn and her team give them medical exams, recommend any treatments and get them started on a new, healthy life.

5. How does Dr. Knapp help with environmental conservation?

6. How does Dr. Poll help with environmental conservation?

7. How does Sheri Hendricks help with environmental conservation?

8. All three of these Shedd experts have dedicated their careers to protecting our planet. Do you notice any things they have in common?

## EXPLAIN

9. Which career do you like the most? Why?

10. In what ways are you a scientist? What are things you do to help protect our planet?

## ELABORATE

Citizen science is defined as the collection and analysis of data about the natural world by everyday people working with professional scientists. Citizen science allows everyone to take an important role in helping the health of our planet, regardless of age and experience.

11. In your own words, what is citizen science? What questions do you have about it?

12. How can citizen scientists help with environmental conservation?

## EVALUATE

Pick one of the two project options below to complete.

**OPTION 1:** Research and plan how to join an existing citizen science project.

**OPTION 2:** Develop your own citizen science project around an environmental conservation issue.

Once you have picked your project, complete the section for that option.





Shedd Aquarium works every day to protect wildlife, and you can too! You might choose a career path that allows you to help with animal welfare, rescue and rehabilitation at a place like Shedd Aquarium. You might be a scientist who studies animals to learn what they need to survive in the wild. You might be someone who teaches or shares what you know about protecting the planet with others. The possibilities for protecting wildlife are endless, and you don't have to wait until you've graduated from college to make a difference. Citizen science projects give people who are not researchers an opportunity to help scientists with their work. For example, Shedd Aquarium created iSeahorse, a citizen science project that enables people who visit the coral reefs of the Philippines to report sightings of endangered seahorses, providing scientists with much more data than they could collect on their own. Scientists can then use this data to protect the reefs where these seahorses live. The following activities will give you examples and ideas of ways to help protect wildlife all over the world.