

## The Truth About Sharks

### Dive In!: Exploring Marine Protected Areas

|  |   |
|--|---|
| Grade: 9-12  | Implementation Practice: Making Argument from Evidence              |
| Subject Area: Life Science   | Estimated Duration: One 45-minute period and one 30-minute homework |
| Learning Objective - Students will be able to:<br>- <b>evaluate</b> evidence and <b>make an argument</b> related to the impacts of marine sanctuaries on species |   |

#### Standards Supported

|             |   |  |  |
|-------------|---|--|--|
| <b>NGSS</b> | Performance Expectation<br><b>HS-LS4-6.</b> Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. |  |  |
|             | Disciplinary Core Idea(s)   | Science and Engineering Practices  | Crosscutting Concept(s)  |
|             | <ul style="list-style-type: none"> <li>● LS2.C: Ecosystem Dynamics, Functioning, and Resilience</li> </ul>  | <ul style="list-style-type: none"> <li>● Engaging in Argument from Evidence</li> </ul> | <ul style="list-style-type: none"> <li>● Cause and Effect</li> <li>● Stability and Change</li> </ul> |

#### Activity Summary

Students use the Internet to research the benefits and drawbacks of the Bahamas Shark Sanctuary. Students organize their research in the table provided. Then, using the format CER (Claim, Evidence, Reasoning), students propose a way to revise the approach to marine protected areas to make them more effective.

#### Advance Preparation

- Review the Student Guide
- Review Content Background Information
- Gather necessary materials (listed below)

#### Materials Needed

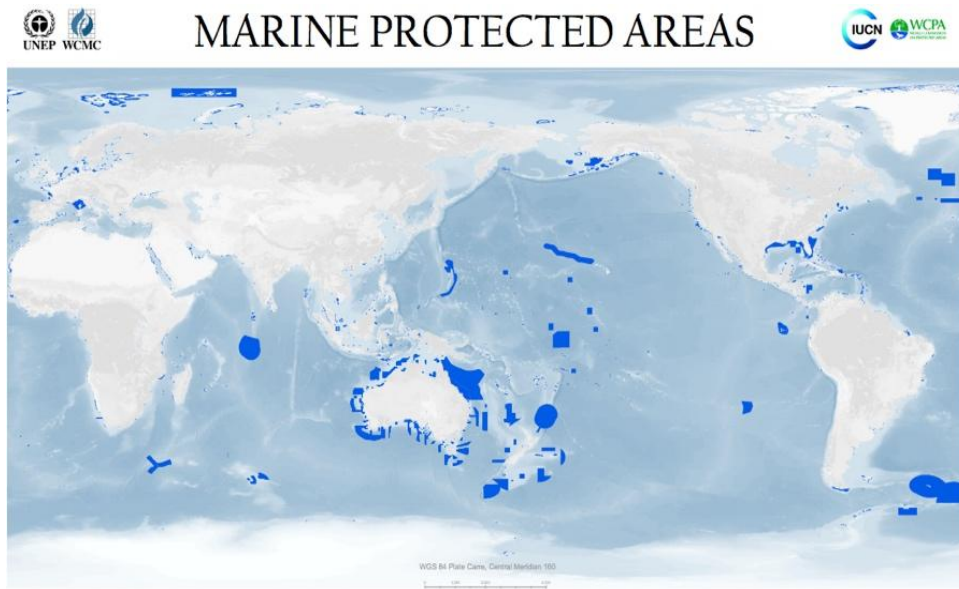
- Student guide: one per student. Consider delivering this resource digitally so that students may modify their work space as necessary.
- Instructor Rubric: one per student

#### Instructor Notes

Depending on your students' familiarity with the Claim, Evidence, Reasoning (CER) writing model, you may wish to do an example as a group using a familiar topic.

## Content Background Information

Just as nature reserves and national parks are ways to protect species and critical habitat on land, marine protected areas (MPAs) protect the environment of the sea. In 2010, there were 5,880 MPAs around the world, covering over 4.2 million square kilometers of ocean. In the U.S. alone, there are over 1,600 MPAs that protect about 41% of U.S. marine waters in some way. Although 4.2 million square kilometers may seem like a lot, the reality is that just over 2% of the world's ocean is protected in this manner.



A map of global MPAs.

Marine protected areas can serve to protect the ocean and the creatures living in it in several different ways. They can focus on protecting habitat that is important for many species, such as coral reefs, or they can focus on protecting a specific species or group of species. Most MPAs allow a variety of functions, including fishing, recreation, and research. However, some contain what are called no-take zones. These are areas where the extraction of resources (i.e. fishing, drilling for oil, treasure hunting) is not permitted. No-take zones generally have 20% - 30% more species than nearby areas that are fished. They also have a spillover effect; that is, they boost populations of fish surrounding their borders.

The Island nation of the Bahamas, located in the western Atlantic, has instituted strict conservation measures to protect sharks. Longline and gillnet fishing, practices that resulted in a high volume of shark bycatch, have been banned since 1993. In 2011, the Bahamas designated the entirety of its territorial waters as a shark sanctuary. This not only banned commercial shark fishing, but also prohibited the sale, trade, and possession of sharks or shark parts.

While the concept of a protected marine area and no-take zones might sound ideal, there are some challenges to such environmental conservation. For example, great hammerheads are just one of the endangered shark species that seasonally visits Bahamian waters. While protected in the Bahamas, this highly migratory species is not protected in U.S. waters, a mere 50 miles away. Marine species routinely drift, swim, or soar beyond MPA boundaries as part of their natural migratory routes or

while meeting their life cycle needs. Thus, simply marking one area as a no-take zone or MPA, even if it is an important habitat or includes a critical population, does not guarantee the protection of a species.

Additionally, any negative actions we carry out, such as polluting, or introducing nonnative species, have the potential to negatively impact the MPA, regardless of where the dumping or pollution occurred. Even if the currents carry the garbage or pollutants away from a protected area, fish and other sea creatures can easily bring it back by ingesting plastic particles or physically carrying debris with them.

Furthermore, the success of any MPA is dependent on the support of the local shareholders, which are the people that live near or on the area that's designated as protected. Without their support, any protected area, whether on land or in the sea, is destined to fail.

## The Truth About Sharks Dive In! Rubric

Name: \_\_\_\_\_

| <b>Glow:</b><br>Student meets or exceeds performance standard | <b>Performance Standard</b>  | <b>Grows:</b><br>Improvement needed in order to meet performance standard |
|---|--|---|
|   | Student explains with authority at least two benefits of the Bahamas shark sanctuary.  |   |
|   | Student explains with authority at least two drawbacks of the Bahamas shark sanctuary. |   |
|   | Student includes correctly cited sources in a Citations section.                       |   |
|   | Student makes a reasoned claim about how to improve the efficacy of MPAs.              |   |
|   | Student states at least three pieces of evidence in support of their claim.            |   |
|   | Student explains their reasoning with authority and in full sentences.                 |   |

**Comments:**

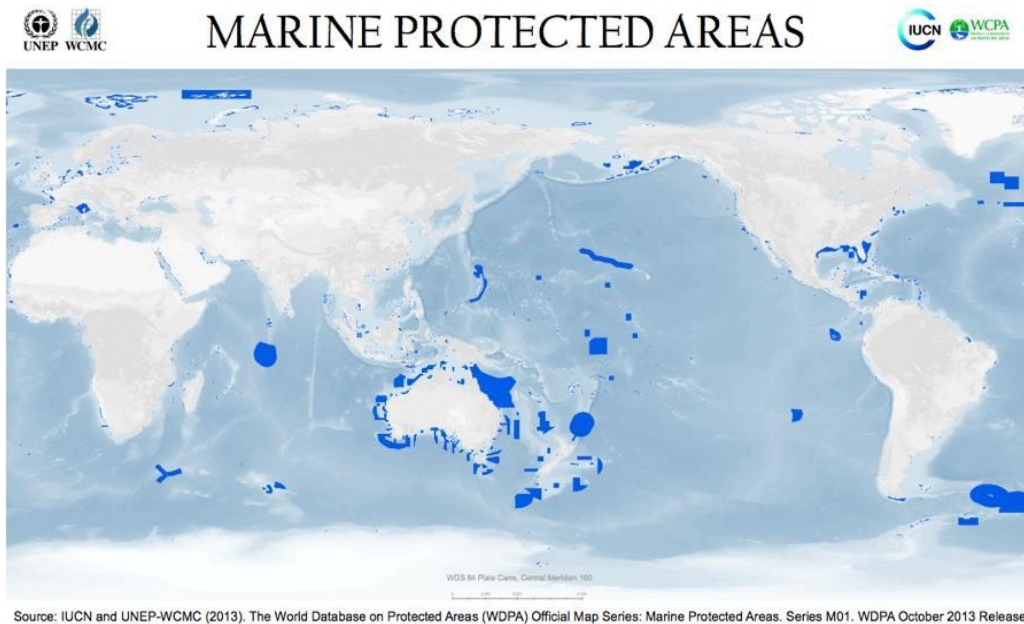
## The Truth About Sharks

### Dive In!: Exploring Marine Protected Areas

#### Student Guide

#### Introduction

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endangered shark species that seasonally visits Bahamian waters. While protected in the Bahamas, this highly migratory species is not protected in U.S. waters, a mere 50 miles away. Marine species routinely drift, swim, or soar beyond MPA boundaries as part of their natural migratory routes or while meeting their life cycle needs. Thus, simply marking one area as a no-take zone or MPA, even if it is an important habitat or includes a critical population, does not guarantee the protection of a species.

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### Exploration

Use the Internet to research the benefits and drawbacks of the Bahamas Shark Sanctuary. Make sure your sources are credible. Cite your sources in a "Citations" section by using the following format: Name of website, url. Organize your research in the table on the following page. Then, use the format CER (Claim, Evidence, Reasoning) to propose a way to revise the approach to marine protected areas to make them more effective. Use the CER template to guide you.

**Bahamas Shark Sanctuary Research**

| <b>Research Summary</b> |  |
|-------------------------|--|
| Benefits                |  |
| Drawbacks               |  |

**Citations**



## Claim, Evidence, Reasoning

**Claim:**

**Evidence #1:**

**Evidence #2:**

**Evidence #3:**

**Reasoning: Please use full sentences**



## Self-Reflection

Complete the self-reflection below.

| <b>Glow:</b><br>Things I can do well | <b>Standard</b>   | <b>Grows:</b><br>Things that I need to improve |
|--------------------------------------|---|--|
|                                      | I can explain with authority at least two benefits of the Bahamas shark sanctuary.  |  |
|                                      | I can explain with authority at least two drawbacks of the Bahamas shark sanctuary. |  |
|                                      | I included correctly cited sources in a Citations section.                          |  |
|                                      | I made a reasoned claim about how to improve the efficacy of MPAs.                  |  |
|                                      | I clearly stated at least three pieces of evidence in support of my claim.          |  |
|                                      | I explained my reasoning with authority and in full sentences.                      |  |

My favorite part of the Dive In! was...

The most important thing I learned is...

Something I'd like to know more about is...