

Citizen Science • Reflection Section Answer Guide

Lion in Wait

Introduction

The scientists wanted to understand how Indo-Pacific lionfish are impacting the Gulf of Mexico ecosystem. To do that, they first needed to ask a different question. What question did the scientists ask in this research? Why did they need to ask this question? *Students will have individual answers to this question, but they should understand that research questions must be answered one at a time. Before the scientists can understand what is happening with lionfish populations, they must understand the best ways to collect useful information about the lionfish population.*

Describe one challenge of collecting information about the lionfish population in the Gulf of Mexico. *The largest challenges have to do with the fact that lionfish occupy a wide range of marine habitats and they are able to swim to different locations. It is difficult, therefore, to get an accurate count of the population.*

Methods

Why did the scientists identify a specific area to study? *Students will have individual answers to this question. They should, however, realize that a specific area had to be defined. Without this definition, sightings from anywhere might be included. The Gulf of Mexico is a large area, and the scientists had to define a manageable area from which to collect their data.*

The scientists wanted to compare information from citizen scientists with information collected by marine scientists' ongoing survey efforts. Which of the five data sources were provided by citizen scientists? *Students should identify online databases and the spearfisher questionnaire as being provided by citizen scientists. The stationary camera and ROV were ongoing data collection efforts sponsored by organizations without input from citizens.*

Findings

Observe table 1. What is the general trend in lionfish sightings shown by this table? *Students should note that an increase in lionfish sightings was evident for every source.*

Which source of lionfish sightings provided the most information? Why do you think this source might have provided the most information? *Licensed spearfishers. Why do you think this source might have provided the most information? Students will have individual answers to this question. They should guess, however, that the spearfishers were experienced at diving and observing fish, and they participated in a large number of dives and were therefore in the area a lot. In addition, spearfishers could move around and observe in areas that might not be observed by cameras or ROVs.*

Observe figure 9 on page 47. What patterns do you observe in the sighting locations by the source of the sighting? *Students will have individual answers to this question. They should, however, notice that the stationary cameras were located in the southwest and southeast of the study area. They should observe that most of the spearfisher sightings and the ROV video sightings were close to 30° N latitude and 88° W longitude. Students may also observe that the USGS-NAS database sightings were in a crescent shape, from the southwest corner of the study area, close to the Gulf shoreline, and then in a southeastern direction toward the southeastern part of the study area.*

What does this map tell you about lionfish location in the study area? *Students will have individual answers to this question. Students may need help understanding the limitations of the data collection effort and that they should exercise caution in interpreting the results. However, they should observe that most of the lionfish appear to be located between 85° W and*

Citizen Science • Reflection Section Answer Guide

Lion in Wait (continued)

88° W longitude, and between 29° N latitude and the Gulf shoreline.

What does the map on page 47 tell you about lionfish location in the study area? *Students may have individual answers to this question. Students may notice that there are clusters of lionfish sightings in particular locations, or they may notice that more sightings are found closer to the shoreline. Students may also notice that lionfish are spread out over the study area (Gulf of Mexico).*

Discussion

The scientists said that citizen scientists could be an early warning system for the movement of other nonnative species into new ecosystems. Name at least two other situations in which citizen scientists might provide information before scientists could collect it. *Students will have individual answers to this question. Examples include reports of flooded streams and roadways, reports of hurricane and wind damage, reports of migrating animals, counting and reporting a*

sighting of just about any native or nonnative plant or animal, and astronomical sightings.

How might the popularity and improvement of mobile apps enable citizen scientists to be more effective at contributing to scientific knowledge? *Students will have individual answers to this question. They should note, for example, that mobile apps will allow citizen scientists to report in real time when they have observed something, increasing the accuracy of the report. Mobile apps will allow more people to act as citizen scientists, because people carry their mobile devices with them. Mobile apps will increase the quantity of data collected. An individual's exact location can be recorded because mobile devices are GIS-equipped. As mobile apps improve reporting will be easier and better tailored to the kind of information desired by scientists.*