Water as a Habitat: Episode 5
What's Lurking in the Waters?

Module 2: A Lionfish Population Investigation
Teacher Guide: Exponential Growth and Decay

Lionfish Distribution Map. Photo Credit USGS Nonindigenous Aquatic Species Database. Dec 2010

Module 2 Overview:
Use exponential growth and decay functions to model lionfish populations.

Focus: Interpret presented information and use the data to write exponential functions for populations. Convert to a geometric sequence. Graph exponential functions and use the function to make predictions.

Make reasonable inferences in a mathematical and logical context.

Mathematical Standards: MAFS.912.F-BF.1.2, 1,2; MAFS.912.F-IF3.7; MAFS.912.F-LE.1.2, 1.3, 1.4

Provided Materials: Teacher Guide, Student Handout, and Answer Key

Necessary Materials: Calculator

Module 2 Lesson Notes:

In this module, students will be asked to interpret the scenario and extract the proper information in order to write, graph, and use exponential growth and decay functions. Students will also be asked to make the connection between exponential growth and geometric sequences.

Module 2 Glossary:

1. **Average rate of change** – the slope of the secant line between two points; found using $\frac{\Delta y}{\Delta x}$.
2. **Explicit formula** – formula that defines a sequence as a function of n.
3. **Exponential function** – exponential functions are written in the form $= a(b)^x$, where $a \neq 0$ and $b > 0$.
   If $b > 1$, then the model indicates exponential growth. If $0 < b < 1$, the model indicates exponential decay.
4. **Geometric sequence** – sequence of numbers that is found by multiplying the previous term by a non-zero constant.
5. **Mid-interval value** – median between two numbers, found using $\frac{x+y}{2}$.
6. **Recursive formula** - formula that defines a sequence in terms of the previous term.

Definitions adapted from:

Buchanan, L., Fensom, J, Kemp, E., LaRondie P., Stevens, & Stevens, J. (2012). *Mathematics Standard Level*. Oxford, NY: Oxford Press.