



## NĀ WAI 'EKOLU

Subject(s): Science, Mathematics, STEM

Grades: 3-5

### STAGE 1 - DESIRED RESULTS

#### Unit Title: Exploring the Possible

**Established Goals:** Using data collected by the students on their stream field trip and by other schools previously, students will understand and articulate the long-term effects of invasive species removal and their contribution to the health of the watershed

#### **Understandings:** *Students will understand that...*

- Different conditions and variables can affect the kind of data that is collected.
- Data can be extrapolated and interpreted.
- Personal and collective behavior can change the health of the streams in our watershed.

#### **Essential Questions:**

- What are the patterns in the information we collect and how are they useful?
- How can mathematics be used to provide models that help us interpret data and make predictions?
- In what ways can data be expressed so that its accurate meaning is concisely presented to a specific audience?  
(From jaymctighe.com)

#### Students will know:

- The native and invasive stream species of Hawai'i
- What a variable is
- The difference between fact and opinion

#### Students will be able to:

- Interpret a set of data collected in the same location over time and in different locations in the same time period.
- Use this data to present an argument/opinion

### STAGE 2 - ASSESSMENT EVIDENCE

#### **Performance Tasks:**

- Worksheet to help interpret and analyze data
- Proposed campaign to educate the public about the current state of the streams in this watershed and the importance of restoring their health.

#### **Other Evidence:**

- Change over time representation

- Written/oral reflection

### STAGE 3 - LEARNING PLAN

#### Summary of Learning Activities:

1. Using a pre-selected set of data (\*\*NEED DATA\*\*), and the data collected on the students' time in the stream, explore the variables that may have accounted for differences in data. Look at the same stream or location but on a different date. Look at data collected on the same date but in different locations. Look at data from different dates and different locations in the Ala Wai Watershed.
2. Complete worksheet.
3. Large group discussion: What conclusions can be drawn from this analysis of the data? Which species can survive and why? Which cannot survive and why?

#### Application of Change Over Time

4. Pairs: Discuss and sketch the condition of an area of the stream that you visited. Then brainstorm what this location will look like in 5 years; or 10 years. Describe the changes and explain how the changes will impact the native species and stream. Share with entire class, add ideas from peers.

#### Service Learning

5. Small Groups: Develop a campaign to educate the public about the importance of restoring our streams. Use data and the analysis of that data to support your campaign. Driving Question: How might we change people's behavior to support the health of the watershed?
6. Small Groups: ENGINEERING AND DESIGN CHALLENGE--Design a prototype that would help to control or catch the invasive species, protect the native species in the stream, or some part of the campaign to educate the public
7. EXTENSION: While in the stream, students take note (written or visual documentation) of human choice/actions that are affecting the habitat of native species. In the classroom, discuss human interaction with the environment. Next infer how this human interaction has affected the health of the stream. If this the effects of human interaction continues, illustrate and describe the impact on the native species and streams.

### STAGE 4 - CONTENT STANDARDS

#### NGSS:

3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.\*

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

ESS2.E: Biogeology

ETS1.B: Designing Solutions to Engineering Problems

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**NCTM:**

3.NBT Use place value understanding and properties of operations to perform multi-digit arithmetic

3.NF Develop understanding of fractions as numbers.

4.MD.A.1 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

4.NBT.A.3 Use place to round multi-digit numbers to any place.

5.OA.A Write and interpret numerical expressions

5.NBT Understand the place value system

5.MD.B Represent and interpret data

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.7 Look for and make use of structure

Adapted from Understanding by Design, Unit Design Planning Template (Wiggins/McTighe 2005)