Mauka to Makai Curriculum: 7 E Unit Plan:
Lures to Catch Invasives
Nā Makau a e hopu ana i nā iʻa ʻaʻole Maoli

Teacher(s) Kauwila Sheldon
School: Kahuku High & Intermediate School
Grades: 8th-12th grade Subjects: Hawaiian Language I & II
Time: 7:11 pm at Samoa Amelika

Photos of Taʻape and Roi:  

Toʻau:  Talapia 

Standard: Relating Cultural Products to Perspectives (CUL PROD PERS)- Learners use the language to investigate, explain, and reflect on the relationship between the products and perspectives of the cultures studied.

World Language Goal: Connections Learners connect with other disciplines and acquire information and diverse perspectives in order to use the language to function in academic and career-related situations

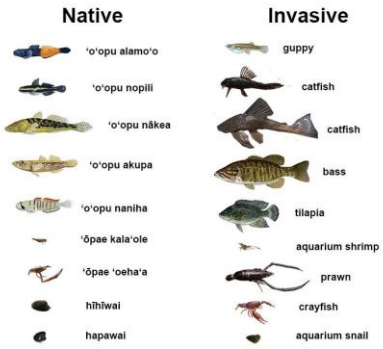
NGSS Standards:
Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Cultural Connections: Learners build, reinforce, and expand their knowledge of other disciplines while using the language to develop critical thinking and to solve problems creatively.
Na Hopena Aʻo: HĀ learning outcomes emphasize the competencies that include application and creation of knowledge along with the development of important skills and dispositions

1. Strengthened Sense of Responsibility: I willingly carry my responsibility for self, family, community, and the larger society. The goal is to design a Mākau (lure) to catch invasives. Hiki iaʻu ke maopopo i koʻu kuleana i ke kai. I can understand my responsibility to the ocean.

2. Strengthened Sense of Total Well-being: I learn about and practice a healthy lifestyle. I am able to meet the demands of school and life while contributing to the well-being of family, ʻāina, community, and world. Hiki iaʻu ke maopopo i ka mea nui i ke ola o ke kai. I can understand that life in the ocean is important.
3. Strengthened Sense of Hawaiʻi: I am enriched by the uniqueness of this prized place. Hiki iaʻu ke maopopo e

mālama mai iā Hawai‘i nei. I can understand in taking care of Hawai‘i.

To the Teacher: Connections to Place and Culture(s): Invasives in Hawaiian waters are taape and Roi
https://sanctuaries.noaa.gov/science/sentinel-site-program/papahanaumokuakea/invasive-species.html



Native & Invasives in streams. From Kahawai

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In this unit students will share what they know about i‘a Maoli and i‘a ‘Ōpala. They will design a lure (makau) to catch any of these i‘a ‘Ōpala during our Makai event for our Mauka to Makai curriculum.

Lesson Plan 1: Biological and Cultural Contexts of Biomimicry Design

Lesson Focus: Hawaiian language key vocabulary

1. Native Fish: Ka i‘a maoli 2.lure: ka mākau 3. fishing: ka lawai‘a ana 4.fishermen: ka lawai‘a
5. Invasive Fish: Ka i‘a ‘ōpala 6.ke kīkomo: Pole fishing in shallow sea 7. ka pākā: to fish with hook and line but no pole 8.ka laulele: net fishing with small nets 9.ka lamalama: torch fishing at night 10.ka pana i‘a: speargun 11.ka hāhāmau: to catch fish with the hands 12,ke kāholoholo: skittering fish 13.ka pākali: to decoy fish by doling out bait little by little
14.Ke kūpalu: To attract fish by chumming 15.ka ‘auhuhu: a shrubby legume used for poisoning fish
16.ka 17.pāhola: to stupefy fish by dragging with ‘auhuhu 18.ke aupula: fishing with a pula stick to drive fish into the net
19.ke kakaka: deep sea fishing with weighted line 20.ke kūkaula: deep sea fishing with hook and line, fishing line at 80 fathoms deep 21.ke koe: to pull a stick with hooks through the water to impale fish 22. ka i‘a loko: fish raised in ponds
23.Ke kāpeku: to splash the feet in the water to scare the fish.
Full Moon phrases are good to catch fish like during Hoku and Mahealani. Kulu can mean to fall so on that full moon just need to be extra careful that you aren‘t doing the falling but the invasive fish is falling into your upena.
24.loko kuapā: coastal fishpond with a seawall of coral or rubble
25.Loko Pu‘uone: Isolated shore fishpond 26. Loko Wai: Inland fresh water fishpond/natural lake or spring
27.Loko 28. I‘a Kalo-Inland fishpond utilizing taro plots 29. Tilapia: Tilapia

Total Time Required:

- **1-2 Weeks**

Standards: (See standards above)

Lesson Objectives: World Language Standards: Cultural Connections
Students will be able to:

- Recognize the three invasive fish wai and kai
- Create and design a lure according to the invasive fish that you want to catch.
- Combine ideas into a small group and place design using the CAD provided by the teacher

Tools and Materials

Tools and Materials	Quantity Needed
Notebook, pencil	30
Notes: Fishpond articles https://www.civilbeat.org/2022/07/hawaiian-fishponds-are-rebounding-in-the-face-of-rising-seas-and-invasive-species/	Lap top Mouse CAD programs: Tinker Cad Link Lure Design Video
https://www.theguardian.com/us-news/2022/aug/17/hawaii-fish-ponds-native-hawaiian-restoration	Information about Akia plant
https://www.mauireefs.org/invasive-roi-hawaii-done/	
Bamboo fishing poles	
Akia plants	

Special Notes on Materials: For the CADS they will share

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Lesson Procedures:

DAY 1:

1. Students will interview a fisherman in their community. *I am finding out that invasive fish like Toau, Ta‘ape, and Rois are not being caught by pole fishermen. “They do not bite because they are fat on lots of

shrimp and other fish," says one fisherman from Haleiwa. He also mentions that they hide in between rocks by the Haleiwa Harbor. I will explain about iʻa ʻōpala and iʻa maoli.

2. See Questions Interview questions

3. Students have about two and a half weeks to interview a family member or neighbor.

4. Students will share in a small group what they learned.

5. Students watch a video of the teacherʻs interview with a fisherman.

DAY 2:

Students will be in pairs and read an article about invasives and natives. Then they will get into smaller groups according to their common articles and write down what they found out about the invasive fish, the name of the invasive, where they live, their habitat, what they eat and what size they are.

2. Students will share what they found and learned about their invasive fish.

3. Students will learn 15-30 new vocabulary words and complete a haʻawina about those 15-30 new vocabulary words for 2 weeks.

DAY 3:

1. Students will be assigned in small groups and will start designing their lure for our Laie or Kahana huakaʻi.
2. First, they need to research the size and shape of their lure, and sketch it.
3. Start their CAD process.
4. Use the 3D Printer to print their lures.

DAY 4:

1. We will test out creating the lures using the materials we were given to make the gel or jelly-like shrimp or fish.
2. We will test out creating the lures using a Jello recipe.

DAY 5:

1. During our Makai event, we will test out our fishing poles and lures to fish for invasives at Hukilau, Laie or Huilua at Kahana. We will fish outside the fishpond and ask for permission first.

Student Resources: (See the YouTube videos and information above)

Student documents, e.g., observation sheets, reflective journals, assessments, and other assignments. Include assessment rubrics or keys as needed.

Lesson Plan 2: Using Engineering design, CAD & 3D Printing for Biomimicry solutions

Lesson Focus: Designing the makau for their invasive fish and researching where they are found in Koʻolauloa. We might not find them at our huakaʻi.

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Total Time Required:

- # hours Day 2

Standards

Lesson Objectives:

Students will be able to:

- Identify a iʻa Maoli and a iʻa ʻōpala
- learn how to design the fish
- How to use the CAD.

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Equipment and Materials

Tools and Materials	Quantity Needed
1. Note book	
2.Pencils	
3.lap top	
4.CAD progran	
5.15 mouse	

Special Notes on Materials:

Lesson Procedures:

1. **Sketch the size and shape of the lures**
2. **Test out and experiment with the CAD.**
3. **Discuss and engage with your small group to agree on the shape.**
4. Print using the 3D printer

Student Resources:

Student documents e.g., observation sheets, reflective journals, assessments, and other assignments. Include assessment rubrics or keys as needed.

Lesson Plan 3: Researching/evaluating/updating biomimicry product: Does it solve the problem?

Lesson Focus: (See Day 2, Day 3 and Day 4 above)

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Total Time Required:

1• # hours

Standards

Lesson Objectives:
Students will be able to:

- Look at tide charts and Hawaiian Moon calendar.
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Tools and Materials

Tools and Materials	Quantity Needed

Special Notes on Materials:

Lesson Procedures:

1.
2.
3.
4.

Student Resources:

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