

Nā Wai 'Ekolu: Stream outreach education and bioassessment in the Ala Wai Watershed

'Iolani School and University of Hawai'i at Mānoa

Email / Phone / Schedule : cory@hawaii.edu / 808 218 5301 / [Google Calendar](#)

With volatile pandemic case-counts, we intend to only conduct in-person lessons if K-12 schools / classes remain open. Our program coordinators are fully vaccinated and will be masked during classroom visits and outdoor activities involved. If further requirements are required by your administration, please let us know how to better ensure student safety. All participants are also required to follow governmental and school restrictions. All scheduled in-person lessons, including field trips, will revert to distance learning as needed or by request.

As a stream outreach and restoration project, to educate the public about Hawai'i's native unique freshwater species and the effect of human influence on their populations, a collaborative effort was established between the University of Hawai'i at Mānoa and 'Iolani School. Together, classroom curriculum and field protocols were developed for use in K-12 public and private schools in the Ala Wai Watershed area, emphasizing environmental awareness through four sequential freshwater stream and watershed lessons (Figure 1).

Lesson 1 begins with a classroom lecture that introduces participants to native / non – native stream animals and how they are indicators of stream health. Participants are then able to view videos and photos of native / non-native animals from their watershed, as well as engage in hands-on activities. The entire lesson ranges between **30 to 60 minutes** and depends on the age of participants or the length of time allotted for a class period (Figure 1).

		Whats in a Number? (Grades K-2)	
		Exploring the Possible! (Grades 3 to 5)	
		Find Your Soapbox! (Grade 6 to 8)	
		Biodiversity Index to Assess Stream Health (Grade 9 to 12)	
		Visual Habitat Assessment (Grade 4+)	
Lesson 1	Lesson 2	Lesson 3	Lesson 4

Figure 1. Four sequential lessons offered to K-12 public and private schools from UH Mānoa / 'Iolani partnership

For **Lesson 2**, students learn how to work together to capture stream animals in a standardized method called pa'ēpa'ē. After being assigned to specific teams, where various seines, A-framed nets ('Ōpae nets), and PVC pipes are used to herd and trap animals in a predetermined length of a modeled stream (Figure 1). Participants familiarize themselves with the appropriate field equipment for their team, as well as the roles of other teams, in preparation for field application. A detailed briefing about safety protocols, expected behavior, and appropriate attire, as well as a strong ethics statement about euthanasia of invasive species is also given at this time. The lesson requires **45 minutes per class** and will require more time if multiple classes participate, in rotation. Virtual, interactive review activities are encouraged for homework or before the field trip:

[Kahoots!](#) [Thinglinks](#) [Virtual Field Trips](#) [StoryMap](#) [Native / Invasive Review Video](#)

After rehearsing their field methods, participants are taken to a nearby stream site for field application, as **Lesson 3a**. The stream biodiversity survey requires at least **45 minutes per replicate**, and performing the survey twice is strongly encouraged if time permits. Once captured, animals are identified to species, counted and measured. If the animal is native, they are released after being recorded / measured, but if invasive, the animal will be removed from the study site (Figure 1). Data from the activity is then used to score the stream site using the [Hawaiian Stream Index of Biological Integrity](#) (HS-IBI) and then stored in an [online database](#) maintained by 'Iolani School.

If multiple classes are involved in the program, please make sure to have both adult supervision and activities for them. For grades 4 and above, we often suggest students participate in a [visual assessment activity](#) (**Lesson 3b, < 45 minutes**). Students can [score](#) the health of stream habitats by comparing illustrations to predetermined sections of our study area. Alternative activities also include recess, lunch, or art activity if there is accommodating space near the study site (e.g. city parks). The field activity concludes with a summary about what animals are found and what they tell us about the health of the stream / habitat. After the activity, invasive species are euthanized in their bucket using an organic clove oil solution and composted.

For **Lesson 4 (asynchronous, variable time)**, a [data exploration science curriculum](#) has been designed to fit the next generation science standards in four modules. A workshop detailing how to use the curriculum will be held on Nov. 9th (4:30pm - 6:00pm). Please register for the event [here](#).

[K-2: What's In a Number?](#) *Students explore and visualize numbers, deepening their number sense, more fully understanding their impact on stream health via invasive species removal.*

[3-5: Exploring the Possible!](#) *Long-term effects of invasive species removal and their contribution to the health of the watershed.*

[6-8: Find Your Soapbox!](#) *Analyze, interpret, and use data to support an argument.*

[9-12: Calculating a Biodiversity Index to Assess Stream Health](#) - score metrics w/animal data

SAFETY AND OTHER CONCERNS

As far as safety/health of students, no one is "required" to go into the stream. Leptospirosis is present in at least some amounts in almost all streams in Hawai'i. We can do our best to prevent anyone from becoming ill by not letting anyone into the stream that have open cuts. No one will be swimming, submerging the head, or intentionally getting wet above the knee. Students will be reminded to not splash excessively and horseplay is not acceptable in this activity. No students will ever be rushed while walking in the water. They should not open their mouths unless absolutely necessary (for communication, etc.) and to prevent water from splashing into it. If students choose to touch fish shown to them, they will be given antibacterial hand wipes and/or hand sanitizer when no bathroom / sinks are present at the study site. If parents do not want their children touching stream animals, please let the instructor know before the activity. In the event that any general first aid is needed; we will have basic first aid kits on hand. In the case of more serious injury, we will call 911 immediately. We have never had to call 911, had any serious injuries, or students that have contracted leptospirosis, after going on over 300 field trips over the past 5 years. Although, a handful of students have gotten scratches, bee stings, and wet higher than the knee (if slipping and falling on their butt).

If weather forecast and radar predicts heavy rain for the day of the field trip, and if real-time stream gages indicate problematic stream heights, the activity will be cancelled and/or postponed to a later date, when stream heights and weather are safer. Restrooms may not be near some of our study sites; teachers will remind students to use the bathroom before arriving on-site and will also be responsible for escorting student participants to an appropriate location in the case of an emergency.

We do have limited felt-bottomed footwear (which grip wet rocks well) and gloves for students that do not have their own. If a student has their own, please bring them! An old pair of socks can also be used to cover rubber-soled shoes. Students can also participate in other parts of the activity that do not require getting wet, like counting fish or carrying nets and buckets.

During any field activity, supervision/chaperone requirements are as follows:

- a minimum of 1 adult to 4 students is required for grades K-5,
- 1 adult to 5 students for grades 6-8, and
- 1 adult to 6 students for grades 9-12.

Group rotation sizes can be as small as 12 students, or as large as 40 students at one time, and will vary by age of students and study site. If your school requires a lifeguard or first responder to be present during the field activity, your school/instructor will be responsible for paying for their services and communication with them.

Nā Wai 'Ekolu will inform your instructor of the field trip location, listed on the map below:

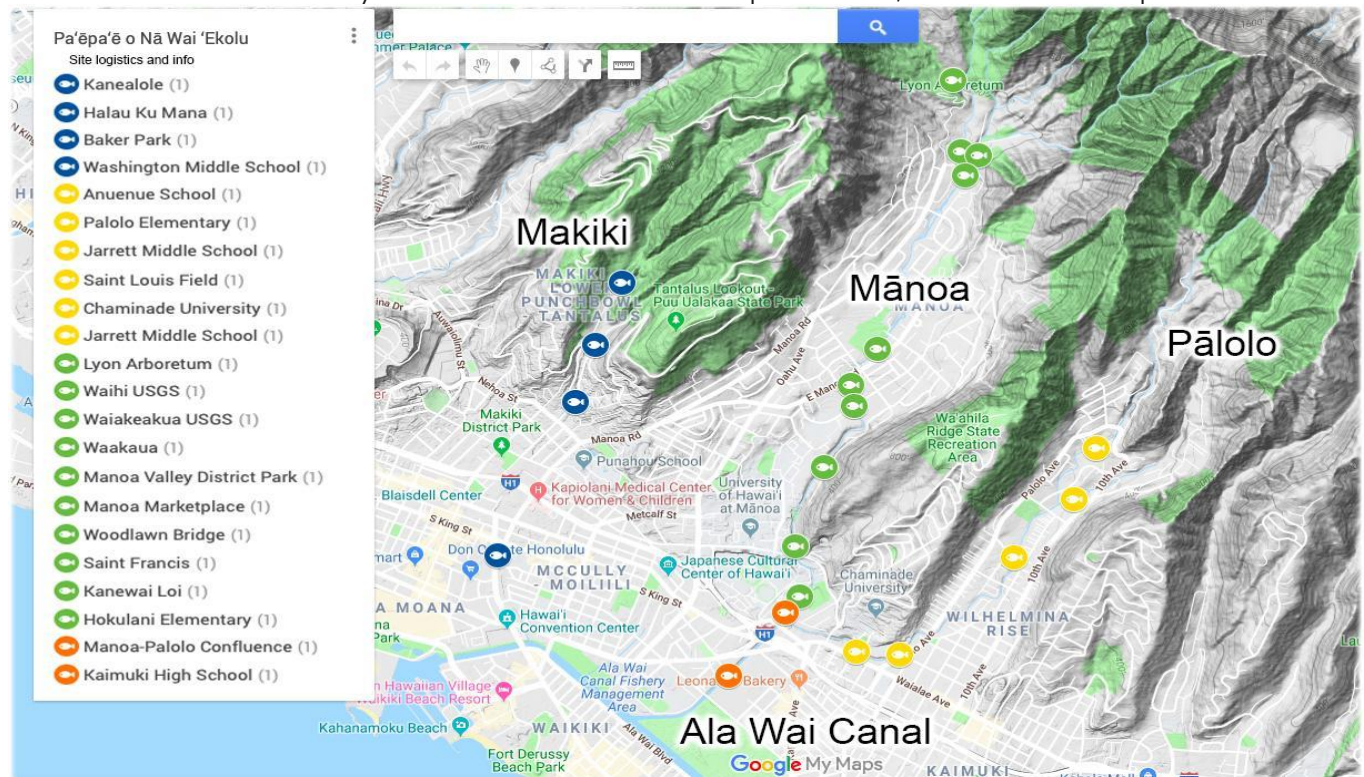


Figure 2. Pa‘ēpa‘ē o Nā Wai ‘Ekolu Study Sites in Mānoa, Pālolo, and Makiki; Ala Wai Watershed. More information about each study site, logistics, nearest street address, parking, etc found [here](#).

ALOHA ‘ĀINA STREAM CLEANUPS

'Iolani School has generously funded our project for 6 years at no cost to participants to build a community of schools that care for the Ala Wai Watershed. Although our program is free, we only ask that participants give back through our semi-annual aloha 'āina stream cleanups. To assist in event planning, please save the date for a workshop scheduled for Feb. 9 (4:30 PM – 6:00 PM) at 'Iolani School. Please register for the event [here](#).