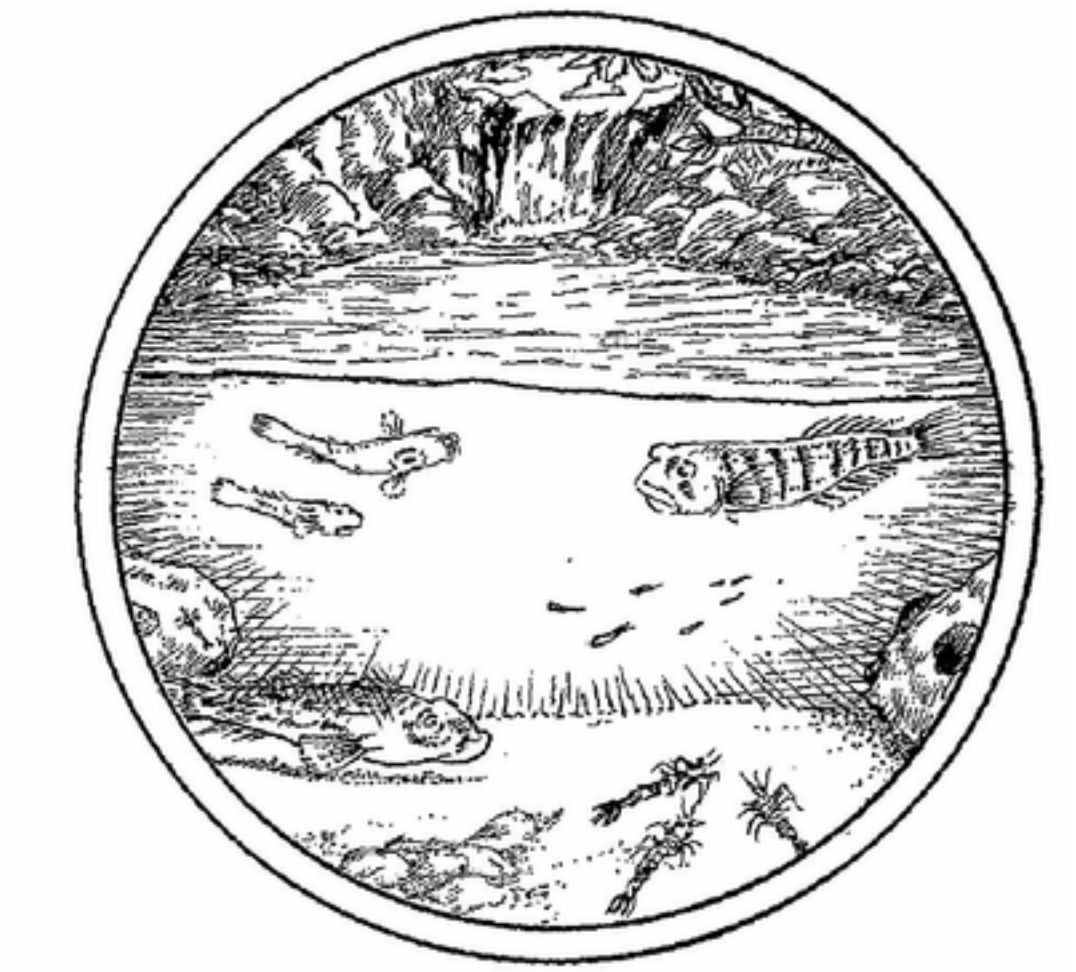
Aloha ʻĀina

Grade 5 - Stream Life



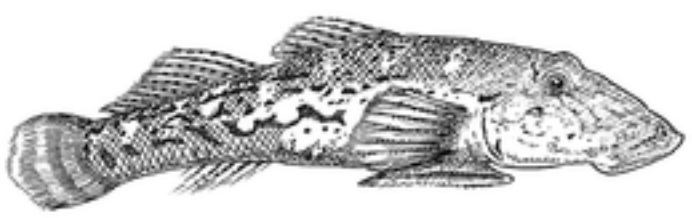
Ka iʻa hāhā i kahawai
The fish groped for in the streams
The *ʻoʻopu*, often caught by groping under rocks and hollow
places in a stream
(*Mary Kawena Pukui, ʻŌlelo Noʻeau No. 1329*)

Value emphasized in this unit: *Lōkahi* (Harmony, Balance)
How is *lōkahi* (balance, harmony) among native stream plants and animals
affected by human activities and what can we do
to care for the stream community?

STREAM LIFE

Ka iʻa a ka wai nui i lawe mai ai.
The fish borne along by the flood. (*Mary Kawena Pukui, ʻŌlelo Noʻeau No. 1323*)

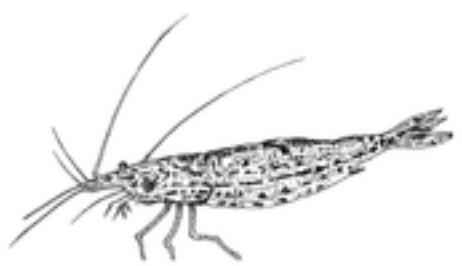
This was said about the *ʻoʻopu,* which was often carried to the lowlands in freshets.



ʻOʻopu Nākea

Most of our native freshwater animals are found nowhere else on Earth (Yamamoto and Tagawa, 2000). Native stream animals in the Islands include fishes, crustaceans and mollusks that all have marine ancestors. Today, most of these organisms maintain that ancestral tie to the sea.

Periods of heavy rainfall when large volumes of fresh water quickly rush to the sea are an important time in the life cycles of native stream animals. These short-duration, high volume flows called "freshets," provide an environmental cue to our native stream animals for breeding and migration to the sea (Yamamoto and Tagawa, 2000). The native stream animals have diadromous or amphidromous life cycles, which means that the newly hatched larvae are washed out to the ocean where they grow as part of the marine plankton. The young stream animals remain at sea for several months and then make their way back to a stream where they mature into adults.



ʻŌpae Kalaʻole

HOW ARE CHANGES TO STREAMS AFFECTING STREAM LIFE?

Many, if not most, of the 366 perennial streams in the main Hawaiian Islands have been altered in some way, and fewer than 14 percent of the streams are physically pristine or biologically intact (Stone and Stone, 1989). According to the U.S. Geological Survey, "the surface-water resources of Hawaiʻi have significant cultural, aesthetic, ecologic, and economic importance. In Hawaiʻi, surface-water resources are developed for both off-stream uses (for example, drinking water, agriculture, and industrial uses) and in-stream uses (for example, maintenance of habitat and ecosystems, recreational activities, aesthetic values, maintenance of water quality, conveyance of irrigation and domestic water supplies, and protection of traditional and customary Hawaiian rights" (Oki, 2004).

Channelization

In modern times some of the lower portions of our streams have been lined with concrete to help protect against flooding. However, this method of lining the streams discourages the survival of native stream life. Due to the concrete and the clearing of streamside vegetation, the temperature of the water in the streams becomes too warm for many native stream animals to thrive. Channelized streams prevent some species of our native *ʻoʻopu* (gobies) and *ʻōpae* (shrimp, prawns) from completing their life cycle. The animals need rocks or rough surfaces on which to latch as they climb back up the streams to higher elevations. Some species of *ʻoʻopu* can even climb high, fast-moving waterfalls. The *ʻoʻopu alamoʻo* has been found above waterfalls that are 400 feet high (Yamamoto and Tagawa, 2000).

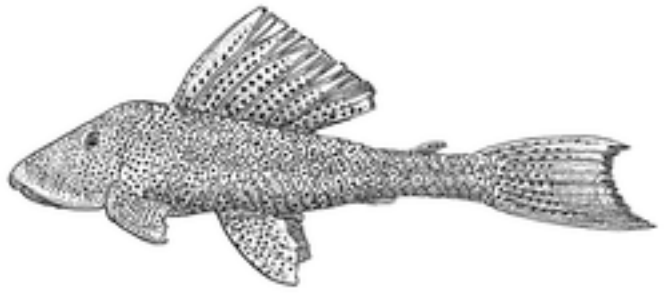
Diversion

From early times in Hawaiʻi, *wai* (water) has been diverted from streams into *ʻauwai* (ditches) to flow through *loʻi* (taro ponds) and then the water is again diverted back into the streams. However, many of our streams today have been diverted for other types of agricultural development or filled in due to urbanization. Today, very few streams are what we would call "pristine" or untouched. It is very critical today and for future generations that we *mālama* (care for) our streams so that we can maintain *lōkahi* (balance, harmony) among native stream plants and animals.

Huʻea i kai na pihaʻā moe wai o uka.
Washed down to the sea are the stones
and debris of the upland stream beds.
(*Mary Kawena Pukui, ʻŌlelo Noʻeau No. 1120*)

Most streams in Hawaiʻi today are polluted to some extent by bacteria, chemicals, trash, silt and other debris that have entered the streams as runoff. Almost all are suspect for containing a bacterium of the genus *Leptospira* that comes from the urine of cattle, pigs, horses, dogs, rodents, and wild animals. Nowadays, our government posts signs near streams to advise persons of safety precautions before entering the streams to prevent the possibility of getting Leptospirosis.

Alien Species



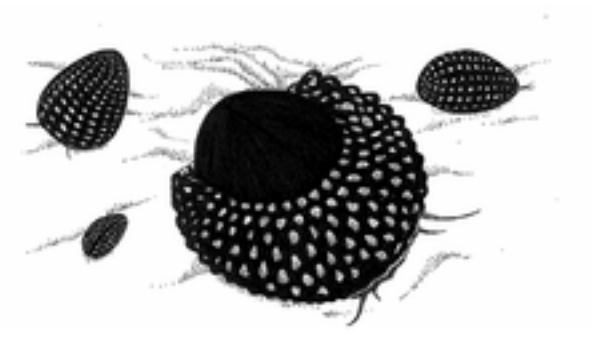
Armored Catfish

We have also altered streams by introducing alien species. People who no longer want to keep their aquarium fish have released alien species into streams. While they may believe they

are being kind by releasing the fish and aquarium plants into the streams, in reality, much more harm is done than good. The released aquarium animals and plants then compete with our native fishes and plants, and sometimes displace them all together. We all should remember that to save our streams and native stream life, we should always return unwanted aquarium plants and animals to the pet stores.

LEARNING FROM OUR *KŪPUNA*

Since early times in Hawaiʻi and even today, people consider stream animals important for cultural practices and food. According to a resident of Keʻanae, Maui, collecting food from the streams was and is a job for the women only, and each family had a certain portion of the stream from which they could gather stream life. The boundaries were not physically marked, but described and passed down from generation to generation through the female *kūpuna*. The people living in Keʻanae and Wailua Nui on Maui still practice this custom.



Hīhīwai, Wī or
Grainy Snail

He pō hīhīwai.
A night for the *hīhīwai.*
(*Mary Kawena Pukui, ʻŌlelo Noʻeau No. 903*)

On starry nights the *hīhīwai* (freshwater shellfish) climb upon the rocks. During the day they are concealed in the rocks from predators such as the *ʻūlili* bird. So *hīhīwai* are easier to spot and gather at night. Even the young fronds of the native fern *hōʻiʻo* (called *pohole* on Maui) that grows along streams are still gathered and eaten. Special methods are used to collect the animals and ferns, and only enough for a meal is taken.

INVESTIGATING STREAM LIFE

The essential question addressed in this unit is: How is *lōkahi* (balance, harmony) among native stream plants and animals affected by human activities and what can we do to care for the stream community? During the course of the unit, students will delve into a scientific investigation that addresses this essential question.

In the first lesson, **Water Words**, students view a video, read sections of a book, and play a word game to build vocabulary they will use in this unit. They work with sand models to help them interpret a map of streams in their *ahupuaʻa.*

The second lesson, **Stream *Lōkahi*,** introduces students to stream life and the role that different organisms play in a stream food chain. Students play a game to reinforce how energy flows through the food chain.

Students take on the role of scientific investigators for the remainder of the unit. In **Stream Patterns**, the third lesson, they read a summary of a local stream study and look at patterns in the data. They make predictions and develop and test hypotheses about the connections between land use, stream characteristics, and stream life. They collect data at a channelized urban stream site and compare this to data they gather at a stream in a forested valley.

When they return from the field, students utilize science and math skills to analyze and interpret their findings. This fourth lesson, **Stream Science**, also addresses oral presentation skills as students share their findings with one another and practice group presentations for the final activity.

The culminating activity, ***Mālama* Our Streams**, provides students with an opportunity to conduct a service project to help care for a stream. Students conduct a *hōʻike* (exhibit) to present what they have learned in the unit to others in the community as a way of sharing what we all can do to *mālama* our streams.

References

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