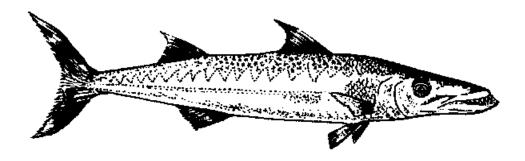
# Hawaiian Fishpond Plant and Animal Identification Guide

### Fish Identification Guide:



kākū; great barracuda

**Indigenous** 

Indo-Pacific and Atlantic

(Sphyraena barracuda)

Eats: smaller fish

Eaten by: humans, ulua

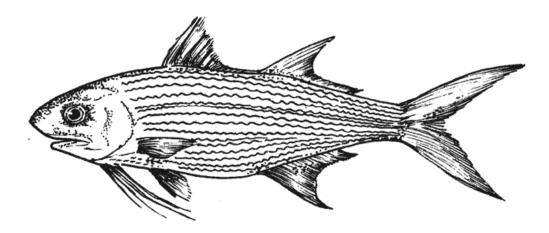
**Description:** silvery, long, round in cross-section, with a pointed, protruding lower jaw, two dorsal fins spaced widely apart; has a large forked tail; often has small black blotches irregularly placed on the lower side; grows to almost 6 ft.

**Habitat:** occurs alone or in small groups, often found in shallow water close to shore; gets into fishponds where it feeds on other fish

**Did you know?** In Puna on the island of Hawai'i, the kākū is said to have bumped against canoes, usually at night when there were lights shining from the boats. Since olden times, mahi'ai (fishers) have had a special relationship with the kākū. The mahi'ai tamed certain large kākū called 'ōpelu mama by handfeeding them. Then they trained the tamed kākū to help catch 'ōpelu. The fisher summoned his kākū by pounding in rhythm on the bottom of the canoe. His fish would swim up from the deep and follow the canoe to a school of 'ōpelu. Then fishermen lowered a large circular net and fed the 'ōpelu with cooked, grated squash. The kākū would circle the school of fish and drive them into a tight

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ball and then the net would be raised full of fish. The fishermen would toss the 'ōpelu mama a fish as a reward. This way of fishing is still practiced on Maui.



moi; threadifinIndigenous(Polydactylus sexfilis)Indo-Pacific

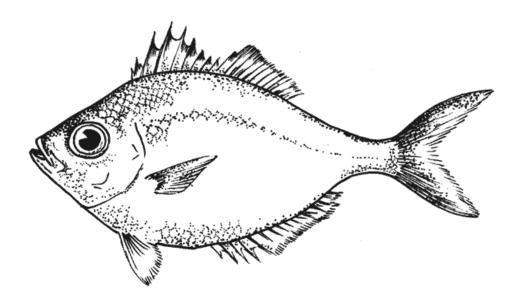
**Eats:** small fish, shrimp, crabs

Eaten by: humans, kākū ulua

**Description:** silver in color; has six threadlike rays on the pectoral fins; a bulbous snout; underslung mouth; distinctive sweptback fins and a deeply forked tail; grows to about 12 in. Adults are called moi; juveniles are called moi li'i.

**Habitat:** Adult moi are commonly found along rugged coastal shorelines with strong wave action; juveniles are found over calmer, nearshore areas with sandy bottoms; does not swim at the surface.

**Did you know?** In olden days, large schools of moi were said to foretell disaster of chiefs. Moi are delicious to eat; they were highly prized by the ali'i (chiefs) and kapu to commoners. Schools of young moi (moi li'i) can be spotted close to shore from mid—August through October. 'Ehu moi refers to foam of sea where moi are found. Fishers call this fish the wily moi because it is difficult to catch.



3holehole; Hawaiian flagtail

Endemic

(Kuhlia sandvicensis)

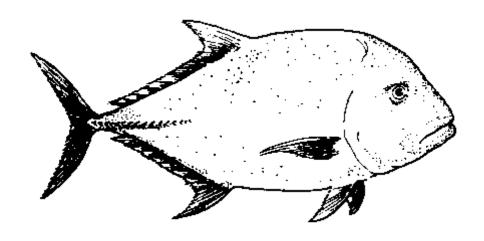
Eats: small fish, small crabs and shrimp, insect larvae

Eaten by: humans, larger carnivorous fish, ulua, kākū, eels

**Description:** bright silvery with bluish color on back, but changes color to match habitat; large scales and large eyes; 6–10 in. long

**Habitat:** juveniles in lower reaches of streams; adults in brackish water, tidal pools, and holes along the outer edges of the reef

**Did you know?** Aholehole means "sparkling" in Hawaiian. In the adult stage, it is called ahole. Hawaiians placed 3holehole under house posts on the east side to keep away a kahuna who might predict trouble for the family. Hawaiians also placed offerings of a white 'ama'ama or 3holehole along with a red weke or kumu under the entrance of a new hale (home) to strip evil away. "Hole" in āhole means "to strip away." According to one story, a chiefess in Hilo yearned for 3holehole from Wai'akolea in distant Puna. A runner delivered the fish to her wrapped in limu kala from the fishpond, and the fish was still breathing!



ulua aukea; pāpio; giant trevally

**Indigenous** 

(Caranx ignobilis)

Indo-Pacific

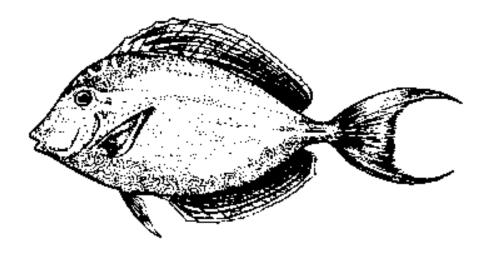
Eats: smaller fish, and forages on the bottom for crustaceans and other invertebrates

Eaten by: humans

**Description:** silvery on the sides and undersides and bluish or greenish on the back with deeply forked tails. The narrow place at the base of the tail is reinforced by specially strengthened scales called scutes; grows to over 5 ft. with a weight of up to 200 pounds.

**Habitat:** schools of ulua frequently patrol reefs; young fish (less than 4 in.) swim in protected bays and ponds.

**Did you know?** There is a Hawaiian proverb spoken in admiration of a warrior who does not give up without a struggle. 'A'ohe ia e loa'a aku, he ulua kāpapa no ka moana. (He cannot be caught for he is an ulua fish of the deep ocean.) The ulua's color pattern, like that of many marine animals, is dark on top and light below. This counter-shading camouflages it in open water. In the Hawaiian name, ulua aukea, "kea" means white. In old Hawai'i, this prized fish could be substituted for a human in a ceremony calling for a human sacrifice. This may have been because the word ulua refers to "man" or "sweetheart" in love songs. Hawaiian women were forbidden to eat ulua.



### pualu; yellowfin surgeonfish

**Indigenous** 

(Acanthurus xanthopterus)

East Africa to the Americas

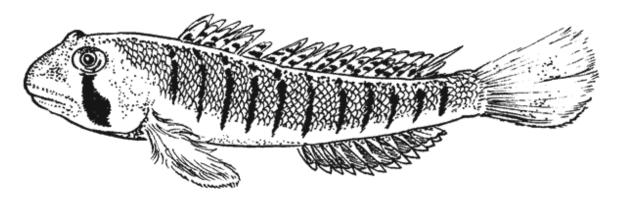
Eats: phytoplankton and zooplankton (when young), limu growing on sandy bottoms

Eaten by: larger carnivorous fish

**Description**: oval, compressed (thin) body; purplish gray with yellow and blue banded dorsal (back) and anal fins; has a black caudal (tail) spine and two knifelike spines or scalpels at the base of the tail; grows to 22 in.

Habitat: shallow waters with sandy bottoms

**Did you know?** The yellow pectoral fins are important for identification of the pualu since it can alter its body color to almost black with a white ring around the tail. The pualu uses the two knifelike spines at the base of its tail to defend itself and to help capture prey.



'o'opu naniha; goby

**Endemic** 

(Stenogobius hawaiiensis)

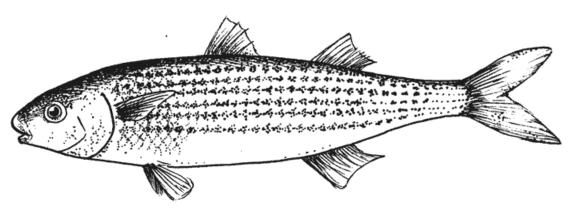
Eats: limu, worms, shrimp, small crabs, zooplankton, insect larvae

Eaten by: humans, ulua, moi, kākū, pūhi

**Description**: yellow-brown with black stripe extending down below eyes; 4 - 5 in long; both sexes display black bars on bodies and red border on edge of dorsal fins during courtship; has suction disc, but does not climb beyond lower reaches of streams.

**Habitat**: stream bottom in lower reaches of streams

**Did you know?** This 'o'opu feeds by thrusting its snout into the sediments of the stream bottom. If you see a stream bottom with many tiny craters, this is a clue that naniha has been feeding there. In olden times, fishers gave offerings to the 'o'opu fish god named Holu. If they did not provide offerings, such as a black pig, a white chicken, root of the black awa, dark coconut, or red fish, it was believed that the 'o'opu would not be fat or plentiful.



'ama'ama; striped mullet

**Indigenous** 

(Mugil cephalus)

Pacific

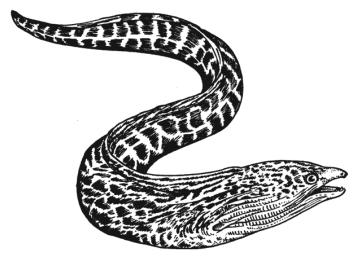
**Eats:** phytoplankton, diatoms and detritus; feeds primarily off the bottom, taking in sand and filtering out the organic material through its gills

Eaten by: humans, kākū, moi, ulua

**Description:** silvery or gray with long body that is round or oval in cross section; has characteristic blue spot at the base of the pectoral fin; has blunt snout, a flattened head and large scales and two widely separated dorsal fins; lacks teeth of any distinction; can grow to 18 in.

Habitat: shallow, often brackish coastal waters, easily raised in fishponds

**Did you know?** Mature 'ama'ama are called 'anae. 'Anae go to the open ocean to spawn from December – February. Wai'anae is literally "mullet water." Hawaiians referred to 'ama'ama as "pua'a kai" (sea pig) and used them when a pig was not available for ritual offerings.



pūhi-lau-milo; undulated moray eel

Indigenous

(Gymnothorax undulates)

East Africa to the Americas

**Eats**: smaller fish, shrimp, crabs

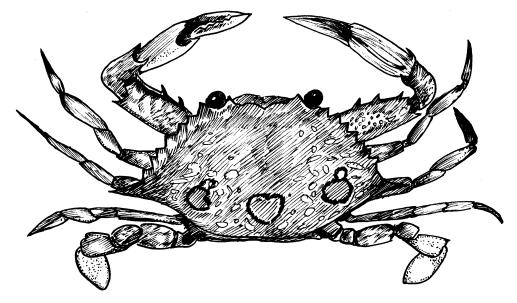
Eaten by: ulua

**Description**: 3 – 5 ft. long muscular body has tough slippery, skin without scales; has narrow jaws full of long sharp teeth, including a row down the center of the mouth; top of head is sometimes greenish-yellow; body color varies from dark brown with light speckles and irregular vertical net-like markings to the reverse, almost white with irregular brown blotches; larvae are long, clear and ribbonlike.

Habitat: lives in crevices and holes, and in spaces between the rocks in walled-fishponds

**Did you know?** You should not attempt to play with or feed this pūhi; it can hurt you! It has a strong sense of smell and is more active at night. This predator can also survive on only one meal for a long time. The Hawaiian name means leaf of the milo tree. Why do you think it has that name? Hawaiians caught this pūhi using nets, spears and hooks. It is an 'aumakua (personal god) for some families.

## Invertebrate Identification Guide



kūhonu; white crab; haole crab; blood-spotted swimming crab (Portunus sanguinolentus) **Indigenous** Indo-Pacific

Eats: dead or dying fish, small shrimp, worms

Eaten by: pūhi, kākū, ulua, moi

**Description:** has strong sideways-pointing spine on each side of the carapace, which is the hard shield covering part of the body; carapace is marked with three red spots; can attain up to 7 in. across the carapace and an 'arm-spread' of 18 in.

**Habitat:** sandy, muddy areas from the shorelines to depths of 100 ft. This species is protected by law and can only be gathered if the carapace is at least 4 in. wide.

Did you know? The Hawaiian name of this crab, kūhonu, means "turtle back."



aloalo; white mantis shrimp

**Indigenous** 

(Oratosquilla calumnia)

Indo-Pacific

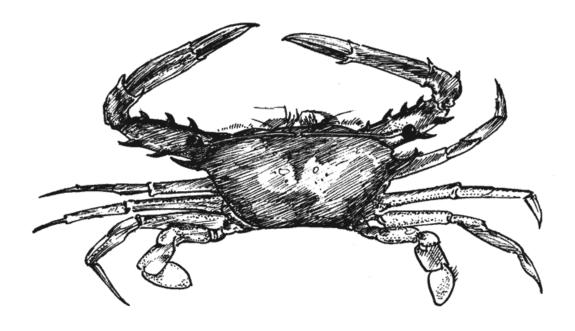
Eats: soft-bodied worms, shrimp, small fish, crabs, snails

Eaten by: humans, puffer fish, ulua, moray eels

**Description:** *dangerous* bottom-dwellers; light transparent gray, tan, or reddish brown with dark marks on the appendages on either side of the tail; has eight pairs of legs, the last three are used for walking; grows to 6 - 8 in.

Habitat: lives in muddy, sometimes brackish water areas in U-shape burrows

**Did you know?** You should not attempt to catch this shrimp with bare hands! They are aggressive carnivores that smash or spear their prey. Their pincers are folded up under their body and when they use them to strike prey, it's one of the fastest movements known in the animal kingdom!



mo'ala; long-eyed swimming crab

**Indigenous** 

(Podophthalmus vigil)

Indo-Pacific

**Eats:** dead or dying fish, small shrimp, worms

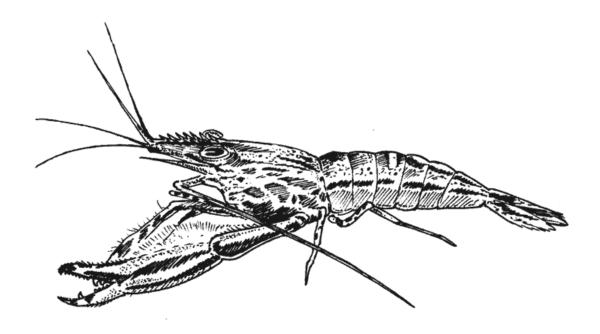
Eaten by: pūhi, kākū, ulua, moi

**Description:** the eyestalks of this crab are amazingly long and can either be held direct or folded back into grooves along the front of the carapace. Individuals are brown to pinkish in color; grows to about 5 in. (carapace width).

**Habitat**: lives on soft muddy bottoms and can tolerate brackishwater conditions

**Did you know?** The Latin species name of this crab means "watchful." These crabs are seldom seen by divers and snorkelers because of their habitat.

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## 'opae'oeha'a; freshwater prawn

**Endemic** 

(Macrobrachium grandimanus)

Eats: detritus; small pieces of plant and animal matter

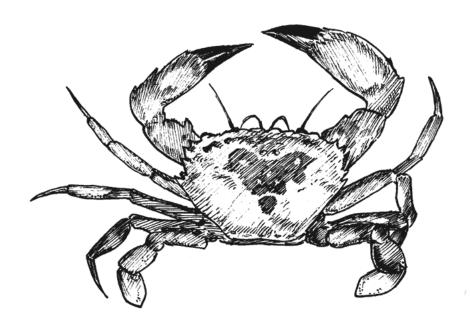
Eaten by: humans, moi, pāpio

Description: light to dark brown; one pincer is larger than the other; has distinctive

striped pattern; 3 in. long

Habitat: lower reaches of streams and estuaries

**Did you know?** The Hawaiian name 'oeha'a means "to walk crookedly" which describes the uneven gait of this native prawn as it walks with its one large and one small claw. The female 'ōpae carries her eggs attached to modified swimmerets under her tail. When the eggs hatch about 3 to 4 weeks later, the tiny larvae go downstream, out to sea. They develop further in the ocean and then make their way back up to a stream where they spend their adult lives.



## papa'i; blue pincher crab

**Indigenous** 

(Thalamita crenata)

Indo-Pacific

**Eats:** limu, mangrove detritus; small pieces of plant and animal matter, snails; eats more in quantity and more animal matter at spring tide, low tide, and during daytime

Eaten by: humans, pāpio, pūhi, moi

**Description:** gray-to greenish-brown, sometimes pink body; white-tipped claws have a broad black band; upper segment of pincers are blue; grows to a carapace width of 5 in.

Habitat: sandy, muddy areas in brackish and salt water

**Did you know?** Unlike most swimming crabs, the blue pincher crab forages for prey more actively during the daytime. Scientists have found that, just like people, the blue pincher crabs may use landmarks to find their way home. When these crabs are removed from their home hole, they rely on their memory and knowledge of the space around them to find their way home! These crabs also have a more flexible way of orienting themselves than other crabs.

## **Bird Identification Guide**



## 'auku'u; black-crowned night heron

**Indigenous** 

(Nycticorax nycticorax hoactli

Americas, Africa, Eurasia and the Pacific

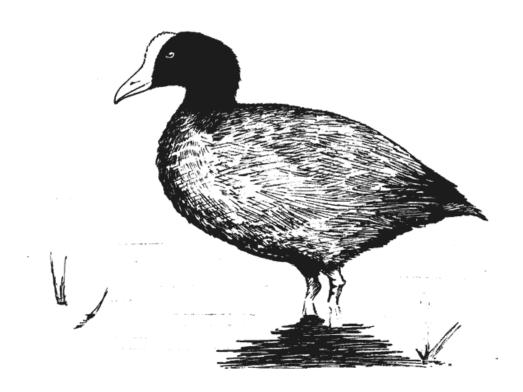
Eats: small fish, shrimp, larvae of aquatic insects, and young chicks of other water birds

**Eaten by:** when young, injured or sick, this bird might be eaten by dogs, cats and mongoose

**Description:** has a glossy greenish black coloring on its back, feathers and on the top of the head; the under parts are white; neck, wings, and legs are all long; looks hunched over with its head usually tucked down to its shoulders. Adults are 23 – 26 in. tall with a wingspan of 43 – 45 in. wide.

**Habitat:** marshes, ponds, streams, lagoons, swamps, exposed reefs, and tide pools; also frequents aquaculture sites. It lives on all the main islands except Lāna'i. The call of the night heron is a hoarse "quok."

**Did you know?** Hawaiians call someone who spies on others, "Auku'u kia'i loko" (Heron who watches the [fish in the] pond). The 'auku'u are very intelligent birds with very sharp eyesight, which allows them to escape from predators. They are nocturnal as indicated by the name night heron. At aquaculture sites, they know when it's pauhana. They can be seen flying onto pond fields and shrimp farms when the workers drive away.



'Alae ke'oke'o; Hawaiian coot

**Endemic** 

(Fulica Americana alai)

Endangered

Eats: submerged aquatic plants, limu alolo, small fish and insects

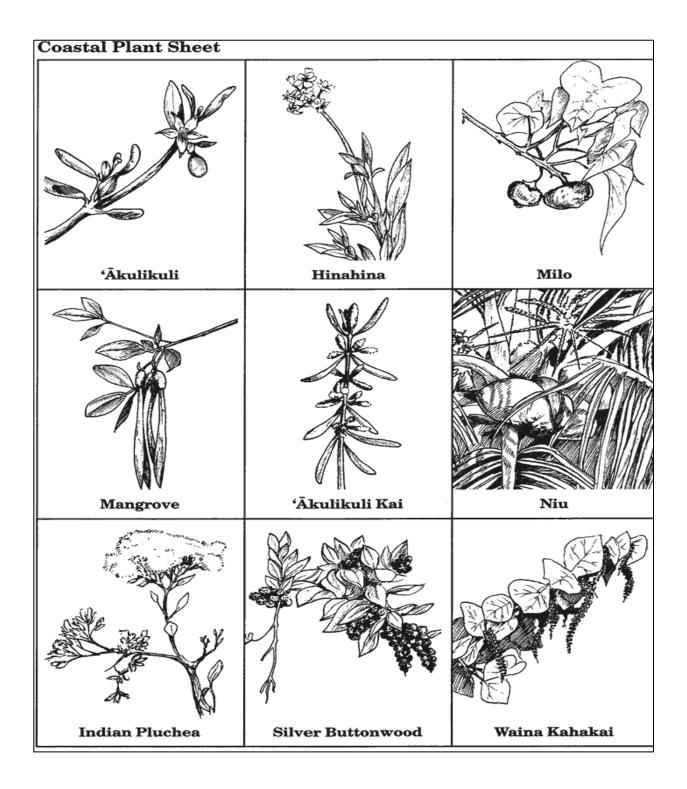
**Eaten by**: dogs and cats; mongooses and 'auku'u; (chicks are also eaten by rats)

**Description**: black bird with white rump and white frontal shield; dark legs with lobed toes; pointed, chicken-like light colored bill

Habitat: saltwater and freshwater ponds and open marshes where it can dive for food

**Did you know?** These endangered waterbirds build their nests among the grasses around a pond where predators can attack! Be sure to keep your dogs on a leash if you walk near a pond where birds could be nesting. According to Hawaiian legend, the sacred 'alae are children to the goddess Hina.

## Coastal Plant Identification Guide



#### 1. 'Ākulikuli (indigenous) (Sesuvium portulacastrum)

This plant grows along the ground, trailing its branches and fleshy stems. It bears a purple flower. The fleshy parts are edible and can be eaten raw or cooked as greens.

# 2. Hinahina (indigenous) (Heliotropium anomalum var. argenteaum)

The hinahina has grayish silvery leaves and white flowers, which are sometimes used in lei making. If the kōkoʻolau (beggar ticks) plant was not available, early Hawaiians would brew the leaves of the hinahina to produce a tonic tea.

# 3. Milo (Polynesian introduced) (Thespesia populnea)

Milo seeds provide a laxative, and the young leaves can be cooked or eaten raw. The dry globular fruits are not eaten at all. The yellowish flowers will wilt as the day progresses, shriveling and turning to a purplish pink color.

# 4. Mangrove (alien) (Rhizophora mangle)

Mangrove was introduced to the Islands in 1902. Their aerial roots trap sediments, which hold together and extend the land area. However, these plants are choking traditional Hawaiian fishponds. The bark and shoots can be used to produce dye.

#### Ákulikuli Kai (alien) (Batis Maritima L.)

The pickleweed is a small woody plant with fleshy leaves. It is edible and can be used in salads. Pickleweed is known to have medicinal value. In the Caribbean, it is used to make soaps and glass products.

# 6. Niu (Polynesian introduced) (Cocos nucifera)

The coconut palm sometimes reaches heights of 100 feet. It has many uses; the coconut fruit is used as a food source and the fronds are used to make baskets. In old Hawai'i, women were forbidden to eat the milk and meat of the niu.

# 7. Indian Pluchea (alien) (Pluchea indica)

This plant was recently introduced to Hawai'i. It is a native of southern Asia. Indian pluchea can be found near coastal areas; look for the pink or purple flowers clustered at the branch ends.

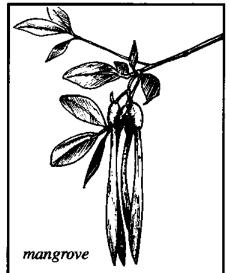
# 8. Silver Buttonwood (alien) (Conocarpus erecta sericeus)

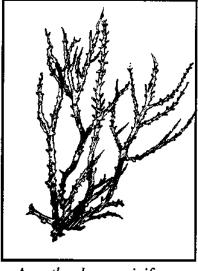
This plant grows in or near salt or brackish water and is tolerant of full sun, sandy or alkaline soils. The velvety leaves have silver hairs. The red-brown cone-like fruits are not edible. The wood is excellent for making charcoal and for smoking fish and meat.

# 9. Waina Kahakai (alien) (Coccoloba uvifera)

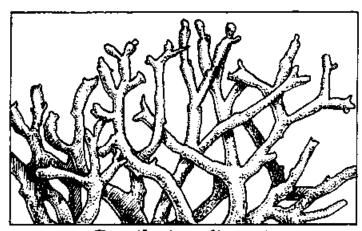
The sea grape is known as the "autograph" tree because marks on new leaves produce white lines. The fruit is made into jelly and alcoholic drinks. The root is used medicinally to cure dysentery. The bark is used as medicine to soothe soar throats.

# Invasive Species Identification Guide





Acanthophora spicifera



Gracilaria salicornia