

Courtesy Mike Yamamoto



## Freshwater Fishes

### 'O'opu nōpili *Sicyopterus stimpsoni*

**SPECIES STATUS:**  
IUCN Red List – Near Threatened  
Endemic

**SPECIES INFORMATION:** Both male and female 'o'opu nōpili (*Sicyopterus stimpsoni*) vary in color based on age and activity and display elaborate courtship rituals. They feed at a lower trophic level than *Lentipes concolor*. Of all the Hawaiian gobies, 'o'opu nōpili post-larvae often migrate into estuaries in large schools and are most often found in schools at stream mouths. They do not recruit back to the same stream where they were born. Spawning occurs between August and March and eggs are deposited in crevices under rocks and pebbles. Nests are laid in territories defended by males. Eggs hatch within two to three days and larvae are washed out to sea, spending approximately five months as oceanic plankton. Recruitment of post-larvae or hinana occurs year round but is most prevalent in the spring. Post-larvae can be found in schools just after recruitment. After recruitment 'o'opu nōpili remain in estuaries for at least 48 hours before they begin migrating upstream. During this time, they undergo a significant metamorphosis. Their snouts enlarge and lengthen and their heads increase in size. Their upper lip also enlarges and their mouths move to a sub-terminal position. This metamorphosis allows the 'o'opu nōpili to climb waterfalls using its suction cup and lips. Prior to this metamorphosis, the post-larvae are omnivorous, but after the metamorphosis the sub-terminal mouth is better suited to scraping algae from rocks with a unique feeding behavior.

**DISTRIBUTION:** Historically, 'o'opu nōpili were found in streams on all of the Main Hawaiian Islands. Today, they also are located on all main islands, primarily in the middle reaches of streams, although they can be found in the lower reaches. On O'ahu they commonly are found in unaltered streams such as Kaluanui, Kahana, and Waimea. Upstream distribution is limited by instream obstructions. Individual distribution within accessible stream reaches is determined based on displays of aggression during migration and establishment of territories. 'O'opu nōpili develop aggressive signaling colors at different rates. Those that develop them early establish territories first. These 'o'opu nōpili displace other non-colored 'o'opu nōpili further upstream. Post-larvae are found in oceanic waters, but little is known of its oceanic distribution.

**ABUNDANCE:** Abundant where present on all main islands except for O'ahu where its numbers are greatly reduced from historical times.

**LOCATION AND CONDITION OF KEY HABITAT:** 'O'opu nōpili do best in the middle reaches of streams utilizing areas with high stream velocities such as riffles and runs. Areas that are undisturbed, with high water quality and high discharge rates, are key to their survival. The majority of already degraded habitat is located on O'ahu, although 58 percent of the 366

perennial streams in the State have been altered in some way. Additionally, 'o'opu nōpili have been used as an "indicator species" to signify high water quality in streams and the possible presence of 'o'opu 'alamo'o, which is rarer than the 'o'opu nōpili. For specific information on stream biota, the Division of Aquatic Resources of the Department of Land and Natural Resources has a database of surveyed streams. Oceanic waters are important to the survival of post-larvae, but little is known of its oceanic distribution or habitat requirements.

#### **THREATS:**

- Habitat degradation results from water diversion, stream channelization, dams, pollution, and the introduction of exotic species and parasites. Water diversions, stream channelization, and dams result in habitat degradation through altered stream flows that lead to: the destruction of key water characteristics such as freshets, riffles and runs; higher water temperatures; and lower dissolved oxygen levels. The reduced water flows from water diversions and dams also can limit larvae from reaching the ocean and recruiting back into streams. Channelization leads to a decrease in riparian vegetation that causes a loss of shelter and erosion control;
- Non-point source water pollution such as nutrients, sedimentation, and chemicals may threaten 'o'opu nōpili; however, the consequence of these pollutants is relatively unknown and needs to be further studied;
- Exotic species such as tilapia are another important threat to 'o'opu nōpili. Historical introductions of game fish and more recent unwanted exotic fish from the aquarium trade are both problems. These exotic fishes prey on native fish species, out compete native fishes for food, and spread parasites and diseases.

**CONSERVATION ACTIONS:** The goals of conservation actions are to not only protect current populations, but to also establish further populations to reduce the risk of extinction. Past actions to restore fish populations have consisted of a ban on gill, drag, draw, and seine netting; stream clean-up efforts, and public outreach. In addition to common statewide and island conservation actions, specific actions include:

- Improve altered or diverted streams;
  - Modify or remove gratings or diversions to allow for instream passage of fish;
  - Restore riparian vegetation to help decrease instream heating and reduce sediment loads;
  - Remove alien species;
  - Create pools in frequently dewatered stretches to provide safe usable habitat between flows.
- Collaborate with the Commission on Water Resources Management and the Land Board to ensure adequate Instream Flow and biological integrity of riparian areas
- Work to clean streams with significant pollution;
- Continue developing GIS database and making it web-accessible;
- Use science-based management of recreational fishing;
- Increase education and outreach efforts, particularly on issues of water pollution and how to deal with unwanted aquarium pets;
- Continue on-going partnerships focused on environmental and fisheries education and conservation and expand partnerships.

**MONITORING:**

- Establish survey schedule to determine population size and distribution;
- Monitor number of returning hinana.

**RESEARCH PRIORITIES:**

- Determine effects of pollution on population;
- Better understand the role of estuaries in species ecology;
- Continue research efforts on marine life stage;
- Initiate research to study source-sink population structure;
- Research impacts and methodologies to deal with alien species;
- Continue researching effects of stream channelization and diversion.

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