

**IPM Action Plan and Annual Work Plan for
Exotic Fish
in Pinnacles National Monument**

Prepared by Amy L. Fesnock, wildlife biologist
September, 1998

Approved: Mary Carol O'Z 21 Dec, 1998
Superintendent Date

Concurred: Amy Fesnock 7 Dec 98
Park IPM Coordinator Date

Concurred: Louise J. Whoburn 12/7/98
Chief of Resource Management and Research Date

Concurred: Lisa Lee Smith 12/21/98
Park Safety Officer Date

A. Description and Identification

Pinnacles currently has two exotic fish targeted for removal. The green sunfish (*Lepomis cyanellus*) is a brownish fish with iridescent blue-green strip markings on the body and head. It has rounded pectoral fins, 8-9 anal rays, a dark opercular flap with a white edge, and general ranges between 15-20 cm in length. It can be mistaken for juvenile bluegill (*Lepomis macrochirus*). McGinnis (1984) provides a photograph of this species, an excellent identification reference. Mosquito fish (*Gambusia affinis*) is a small grey-green fish with no heavy spotting on fins or body. It has a small dorsal fin and a guppy-like body shape. It generally is 2.5 cm in length, but females can reach 6 cm. McGinnis (1984) has a line drawing of this fish.

The only native fish at Pinnacles is the threespine stickleback (*Gasterosteus aculeatus*), which must be maintained unharmed. This species is easy to differentiate from the two exotics. Three sharp spines are located on the back before the dorsal fin and a spine-like pelvic fin. It is usually green on the back with white and gold on the belly. Breeding males will have red bellies and blue sides. Sticklebacks range in size from 4-5 cm.

B. Biology and Range within the park

Green sunfish and mosquito fish are considered pest species because of their threat to red-legged frogs (*Rana aurora draytonii*), a federally listed threatened species. Both exotics feed on frog eggs and compete for aquatic invertebrates. Currently, both species are in Chalone Creek, from the northwest corner where the stream enters the park to the southeast corner where the stream exists the park. Green sunfish seem to be more prevalent northward of the Chalone Creek Bridge, while mosquito fish seem to be more prevalent in the South Wilderness area. Bear Creek appears to have exotic fish only at the confluence with Chalone Creek. The two waterfalls on Bear Creek seem to prevent dispersal up stream.

Green sunfish are extremely aggressive, staking out territory and defending it against intruders. Sunfish also have a high tolerance to warm water and low oxygen levels. It is able to produce large populations of young. Individuals can remain small in size in crowded living situations (McGinnis 1984). Mosquito fish were brought to California to control mosquitos. They were chosen for mosquito control because they are highly reproductive - 300 young per birth sequence and they can survive a variety of unfavorable water conditions. However, they do not feed solely on mosquito larvae, but rather on a wide range of invertebrates and alga. They compete with the native stickleback for these food sources (McGinnis 1984).

C. Action Thresholds

Considering the aggressive nature of green sunfish and their high reproductive rate, a sighting of one fish is the action threshold. Green sunfish are hide and wait predators, if one fish can be seen, there are more lurking in the shadows. Mosquito fish are not as aggressive and considered not as large a threat. Consequently, the action threshold for mosquito fish control is more than 5 pools occupied by greater than 20 fish.

D. Inspection and monitoring techniques

From March through July, biological technicians will walk stream corridors one time each month, visually inspecting the main stream course. If fish are seen, the location will be mapped with a Trimble GPS unit, and the number of individuals for each species will be recorded attached to the GPS data point. If the action threshold is met for either of the two species, control efforts will be implemented in late fall. The control action must be delayed due to constraints placed by US Fish and Wildlife related to the red-legged frog.

E. Non-chemical management

During the lowest water (late fall and early winter), the stream corridors will be surveyed. Upon finding pools of standing water, the pools will be searched for presence of fish and frogs. If frogs are not present, the pool will be electroshocked. The shocking stuns the fish and they float to the surface. The fish will be netted from the water, counted, and left on the ground far from standing water. If native fish are incidentally shocked, they will be returned to the pool. If frogs are present, the pools will be seined to remove fish. Shocking could potentially harm the frogs muscular system, which is why seining will be used instead. On future visits, if frogs are no longer present, the pool will be shocked. Pools will be revisited until they have completely dried or until the technician is confident that no fish remain (no fish shocked from a minimum of 3 visits). We have been in contact with U.S. Fish and Wildlife. They have approved this methodology and are not requiring formal consultation (phone call with Amelia Orton-Palmer, September 22, 1998.)

Due to the safety issues of using electricity with water, at least two people will be present during each survey, both of which will be trained in CPR. Sequoia/Kings Canyon NPs will be providing a training on the electroshocking equipment.

We are fairly certain that sunfish are coming into the park from private land north of the park. Efforts are being made to eradicate this source from the private land. We are hoping to cooperate with the land owner to establish fish in his stock ponds that cannot survive in our intermittent stream.

F. Chemical Management

Due to the impacts to native fish, aquatic invertebrates and a federally listed frogs species, no chemical control is proposed for this project.

G. Evaluation

With each visit to individual pools, we will document the amount of time spent shocking the pool and the number of fish removed, by species. We will consider this technique to be successful if when plotted, each visit has a fewer number of fish than the previous visit. We will consider a pool to be fish free if there are 3 consecutive visits with no fish removed. We will consider the project 100% successful, once the source population is eradicated.

H. Sources

Peter Moyle, phd in fisheries biology at U.C. Davis

Harold Warner, wildlife biologist, SEKI

McGinnis, S.M. 1984. Freshwater fishes of California. University of California Press, Berkeley.
316 pp.

I. Annual Work Plan

March: stream survey, if fish found, discontinue other monthly surveys, schedule removal in Fall.

April: stream survey, if fish found, discontinue other monthly surveys, schedule removal in Fall.

May: stream survey, if fish found, discontinue other monthly surveys, schedule removal in Fall.

June: stream survey, if fish found, discontinue other monthly surveys, schedule removal in Fall.

July: stream survey, if fish found, schedule removal in Fall.

September: stream survey with electroshocking

October: stream survey with electroshocking

November: stream survey with electroshocking

December: stream survey with electroshocking

January: Report writing and Evaluation