

China Lake and the

Tui Chub

Conducting a Census and Managing the Habitat of an Endangered Fish

In addition to the installation's primary mission of direct fleet support, Naval Air Weapons Station (NAWS) China Lake has been monitoring the endangered Mohave tui chub fish and managing its habitat. To that end, approximately \$40,000 and 300 man-hours are spent every year.

The chub (*Gila bicolor mohavensis*) was included on the federal list of endangered species in 1970 and on California's endangered species list in

1971. According to the United States Fish and Wildlife Service (USFWS), NAWS China Lake is one of four locations in North America with a genetically pure chub population. In fact, although there has been no critical habitat designation for the fish, China Lake's chub population numbers approximately 6,000 and may be the largest pure population in existence.

The USFWS and California Department of Fish and Game (CADFG) introduced 400 chub to NAWS China Lake's Lark Seep in 1971 after human-implemented modifications to the fish's natural habitat,

which included the Mojave River from the San Bernardino Mountains to its terminus at Soda Dry Lake, resulted in the species' decline. NAWS China Lake Biologist Steve Pennix said the introduction of the chub into Lark Seep was not intended to be permanent—chubs were only supposed to be kept there while the agencies looked for other sites. However, once the fish was released into the seep, there was no way to remove them all, and no effort to remove them was undertaken.

By the time of the chub's arrival, Lark Seep had expanded in volume dramatically as a result of the increased activity of the nearby Wastewater Treatment Facility (WWTF). The WWTF was constructed in the early 1950s to support nearby percolation and evaporation ponds, resulting in the artificial elevation of the groundwater table. To prevent subgrade structure flooding of nearby NAWS China Lake buildings, channels were constructed off Lark

Dozens of Mohave tui chub swim in the waters around Lark Seep, located on Naval Air Weapons Station (NAWS) China Lake. This endangered fish was first introduced into the waters on NAWS China Lake in 1971.

A biologist with Naval Air Weapons Station (NAWS) China Lake's Environmental Planning and Management Department inspects a Mohave tui chub near Lark Seep on the base. It is believed that NAWS China Lake has the largest population of the endangered fish at 6,000.



Seep in the 1970s in order to convey the high groundwater away from the facilities out onto the China Lake playa, thereby forming the artificial G-1 seep. This system of seeps and channels is now the habitat of the chub.

Because of the encroachment of cattail and tamarisk, the water level and, thus, the fish's habitat, began to shrink in 1990. Another contributor to the decreased water level has been base downsizing and the loss of housing, which has resulted in a decrease in the quantity of water treated at the WWTF. In addition, natural predators such as bullfrogs, catfish, koi and snapping turtles prey on the chub.

NAWS China Lake Environmental Planning and Management Department (EPMD) developed a Mohave tui chub management plan that includes conducting a chub census and managing its habitat. In order to monitor the fish's population fluctuation and migration patterns, and as a safer alternative to fin clipping, natural resources personnel at NAWS China Lake began using Visible Implant fluorescent Elastomer (VIE). Fin clipping, a standard method for marking fish that involves cropping a specific fin, has some limited potential for increased fish mortality and infection, unpredictable fin regeneration, and confusion regarding natural fin loss. VIE is essentially a liquid dye which is injected into the jaw line of the fish by a hand applicator. The dye soon cures into a pliable, bio-compatible solid whose color is then used to

identify previously marked fish. By using different colors, biologists can identify from which channel of Lark Seep the fish came and whether migration is taking place between channels. A single dye injection is designed to last the life of the fish.

But monitoring the chub's population, like that of any other fish's population, is a difficult task, especially because population numbers fluctuate in cycles.

"Due to the complexities of the habitat and channel ecosystem, there is no really good handle on population trends of the chub," Pennix said.

However, personnel make sure that the fish's relative numbers don't get dangerously low.

Chub habitat management includes the monitoring of water quality, and even the removal of cattail and tamarisk. In order to accomplish plant removal and retain the viability of the ecosystem, the removal is limited to two miles of the channel system. To protect the chub population, the fish are scared away immediately prior to the onset of removal work.

In efforts designed to increase chub numbers, NAWS China Lake EPMD is exploring the potential of transferring

chub eggs and rearing juveniles to other off-station habitats, as well as the potential for a cooperative, interagency effort to relocate chub adults to other habitats. Additional options could include clearing and deepening the channels and the Lark Seep itself. Of course, any maintenance conducted on the channel system has to be done with the chub in mind.

Although nurturing the chub doesn't directly benefit NAWS China Lake's main mission, the installation avoids both civil and criminal liabilities by meeting requirements spelled out in the Endangered Species Act (ESA).

"We work hard to protect, enhance and maintain natural resources while not compromising the ability of the station to meet the requirements of its mission," Pennix said. 

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