DISTRIBUTION AND STATUS OF NATIVE FISHES OF THE RAILROAD VALLEY SYSTEM, NEVADA

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ABSTRACT.

Two native fishes, *Crenichthys nevadae* and *Gila bicolor*, inhabit the Railroad Valley system, which is comprised of Little Fish Lake, Hot Creek, Sand Spring, and Railroad Valleys. *Crenichthys nevadae* is indicative of past connections with the Colorado River system, estimated to have occurred in the early Pleistocene. *Crenichthys nevadae* is restricted to two springs in the Duckwater area, five springs in the Lockes Ranch area, and two transplant sites. The presence of *Gila bicolor* is indicative of late Pleistocene connections with the Lahontan system. Several undescribed subspecies of *G. bicolor* in the Railroad Valley system occur in Duckwater Creek and two springs in northern Railroad Valley, several springs along the east-central edge of Railroad Valley, Twin Springs and several springs north of Twin Springs Ranch in Hot Creek Valley, several springs in Little Fish Lake Valley, and one transplant site.

The native fishes are faced with a variety of threats. One population of *C. nevadae* and two populations of *G. bicolor* have been significantly impacted by exotic fishes. Diversion and channelization of aquatic habitats, often accompanied by overgrazing by cattle, is a common problem in the valleys. Oil drilling in Railroad Valley and the proposed MX Missile System are potential threats due to interference with aquifers. Increased human activity associated with any development can be expected to have deleterious impacts on the native fishes and their habitats.

INTRODUCTION

The Railroad Basin, comprised of Little Fish Lake, Hot Creek, Sand Spring, and Railroad Valleys (Mifflin and Wheat 1979), is an endorheic basin of the Great Basin Province (Figure 1). To the north and northwest of Railroad Basin are Newark and Diamond Valleys, allied with the Lahontan system. The pluvial White River, a tributary of the Colorado River, lies to the east. An area of fishless basins borders Railroad Basin to the southeast, south and southwest (Hubbs et al. 1974). Pluvial Lake Railroad once covered much of the floor of Railroad Valley and was probably the largest lake lying betwen pluvial lakes Lahontan and Bonneville. Hubbs et al. (1974) regarded pluvial Lake Railroad as having connections with both the Lahontan and Colorado systems. In addition to hydrographic evidence, the existence of the native Railroad Basin fishes, *Crenichthys nevadae* and *Gila bicolor* subspp., supports the theory of multiple Pleistocene connections. Hubbs and Miller (1948) considered an early Pleistocene connection of Lake Railroad with the Colorado system the source of *Crenichthys* in Railroad Valley. This connection occurred when pluvial Russell River, the main tributary of pluvial Lake Railroad, was in some way joined with the precursor of the pluvial White River (Hubbs and Miller 1948). A later connection with the Lahontan system provided *Gila bicolor* access to Lake Railroad.

Perhaps a pre-Sangamon connection occurred when Lake Snyder[1] basin, which first discharged into Lake Newark, was captured by a former tributary of Lake Railroad (Hubbs et al. 1974). Because Lake Newark was tributary to the Humboldt River and hence a part of the Lahontan system, capture of Lake Snyder by Lake Railroad basin formed a connection with the Lahontan fauna.

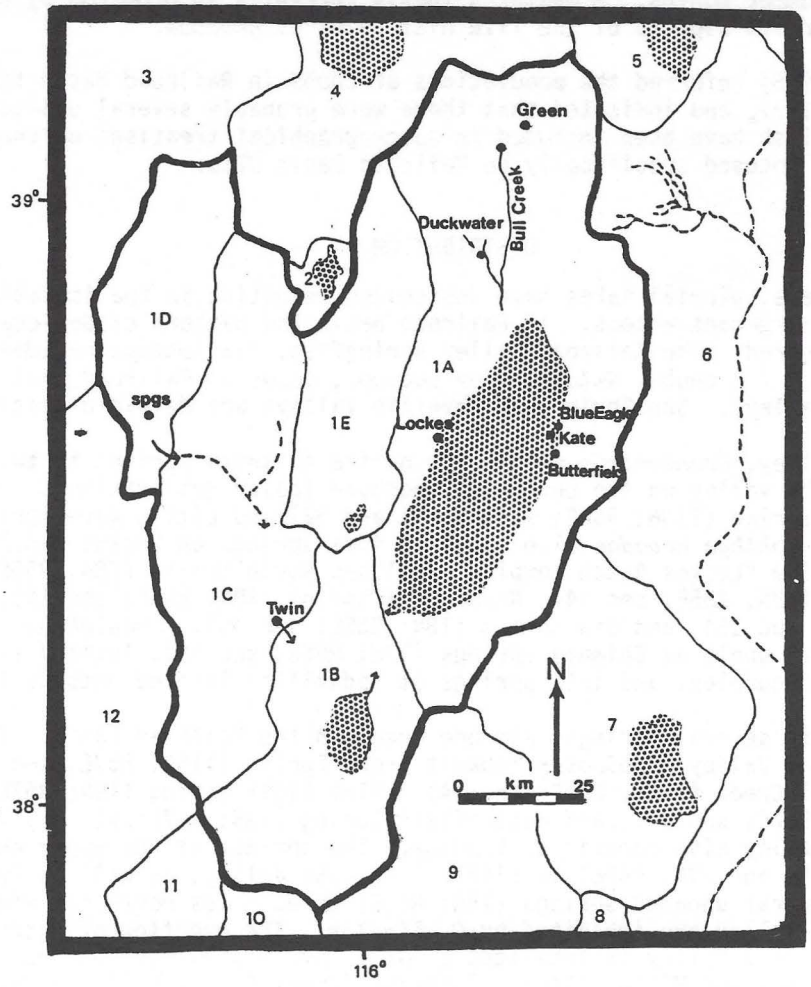

Figure 1. Map of Railroad and surrounding basins showing pluvial lakes (stippled areas) and selected aquatic habitats. The Railroad Basin includes: Railroad (1A), Reveille (1B), Hot Creek (1C), Little Fish Lake (1D), and Sand Spring (1E) Valleys. The following basins surround the Railroad Basin: basin containing pluvial Lake Snyder (2), Diamond (3), Newark (4), Jakes (5), pluvial White River drainage (6), Coal (7), Desert (8), Penoyer (9), Kawich (10), Gold Flat (11), and Ralston (12).

[1]Mifflin and Wheat (1979) named this Lake Corral without recognizing the name Lake Snyder applied by Hubbs et al. (1974).

Little research has been conducted on *C. nevadae* since its description by Hubbs (1932) as the type of a new genus. A report by Deacon et al. (1980) provided a four month environmental assessment of several aquatic habitats in Nevada, including a locality inhabited by *C. nevadae* and two localities inhabited by its only congener, *C. baileyi*. Their study focused on determination of population size, population structure, food habits and habitat preference during summer months. A master's thesis currently in progress by C.D. Williams will investigate various aspects of the life history of *C. nevadae*.

Hubbs and Miller (1948) referred the populations of chubs in Railroad Basin to *Siphateles obesus (= Gila bicolor)*, and indicated that there were probably several undescribed subspecies. These fish have been included in zoogeographical treatises on the Great Basin, but little work has focused specifically on Railroad Basin *Gila*.

DISTRIBUTION

Since the Pleistocene, pluvial lakes have desiccated resulting in the isolation of many fish populations in remnant waters. In Railroad Basin the pattern of desiccation and isolation also occurred. The Railroad Valley springfish, *Crenichthys nevadae*, is endemic to Railroad Valley. Tui chubs, *Gila bicolor* subspp., occur in Railroad, Hot Creek and Little Fish Lake Valleys. San Spring and Reveille Valleys are devoid of native fishes.

Within Railroad Valley, *Crenichthys nevadae* is native to seven springs in two areas. In the north end of the valley on the Duckwater Shoshone Indian Reservation *C. nevadae* inhabits Big Warm Spring (T13N; R56E; sec 29, 31 and 32) and Little Warm Spring (T12N; R56E; sec 5). *Crenichthys nevadae* also inhabits five springs on Lockes Ranch in central Railroad Valley. The "Lockes Ranch complex" includes North Spring (T8N; R55E; sec 14), Hay Corral Spring (T8N; R55E; sec 14), Reynolds 1 Spring (T8N; R55E; sec 15), Reynolds 2 Spring (T8N; R55E; sec 15), and Big Spring (T8N; R55E; sec 15). *Crenichthys nevadae* has been introduced into pools at Chimney Springs (T7N; R55E; sec 16), located six miles south of the Lockes Ranch complex, and into springs at Sodaville, located outside the basin.

Gila bicolor inhabit several springs, and one creek in the Railroad Basin. In the northeast arm of Railroad Valley *G. bicolor* inhabit Green Spring (T15N; R57E; sec 33) and the head spring of Bull Creek (T14N; R56E; sec 14). Blue Eagle Spring (T8N; R57E; sec 11), Kate Spring (T8N; R57E; sec 14), and Butterfield Spring (T8N; R57E; sec 27) in east-central Railroad Valley also contain *G. bicolor*. The springs at the upper end of Little Fish Lake (T8N; R49E and T9N; R49E) in Little Fish Lake Valley, as well as Twin Springs (T4N; R52E) and several unnamed springs (T4N; R51E) three miles north of Twin Springs Ranch in Hot Creek Valley are inhabited by *G. bicolor*. The overflow of Artesian Well #7 (T6N; R56E) in Railroad Valley is inhabited by *Gila*, presumably carried from Twin Springs by flood waters (Hubbs and Miller 1948). Duckwater Creek (T12N; R56E) in Railroad Valley is inhabited by *G. bicolor*. *Gila bicolor* from Twin Springs were introduced to Stone Cabin (=Willow Creek) Valley in the 1940's (Hubbs et al. 1974).

STATUS

The dynamic hydrographic history of the Great Basin has resulted in a depaperate ichthyofauna exhibiting a high degree of endemism. Possibly due to their adaptation to isolated systems, and a lack of many competitors, native southwestern fishes are very susceptible to alteration of their habitats. Fishes native to Railroad Valley face a variety of threats. Several exotic fishes have been introduced to Railroad Basin. Carp, *Cyprinus carpio*, and goldfish, *Carassius auratus*, have been introduced to Blue Eagle Spring. The tui chubs native to that spring system are no longer found in the spring pools, but are now restricted to the outflows of Blue Eagle Spring below artificial barriers. Carp are also reported in Duckwater Creek, and goldfish are reported from Kate Spring. Both localities are inhabited by the native tui chub. Guppies, *Poecilia reticulata*, have been introduced into Big Warm Spring. Since their introduction, the native springfish appears to have been competitively excluded from the headpool. Hardy (1980) erroneously reported mosquitofish, *Gambusia affinis*, from Big Warm Spring. Introduced trout have been reported in several waters in Railroad Basin, however these streams are not inhabited by native fish.

Cattle are grazed near many spring systems in Railroad Valley. Generally the cattle are not a problem as most springheads have been fenced to keep cattle away from the spring source. However, many of the spring outflows have been channelized and/or diverted for agricultural purposes. At Big Warm Spring the outflow system has been heavily channelized. Plans exist to divert the entire northern outflow creek into a pipeline for a nearby ranch. The outflows of most springs of the Lockes Ranch complex have been channelized. Kate Spring has been highly modified, and most other Railroad Basin springs inhabited by *Gila bicolor* have been impacted.

An oil field in central Railroad Valley is being exploited. The main western complex of oil wells is within seven miles of the springs at Lockes Ranch, and the main eastern complex of oil wells is near Blue Eagle Spring. Exploitation of an oil field near these spring systems could interfere with or contaminate spring aquifers. Surface disturbance near springs, as well as the myriad of problems associated with increased human activity in a sensitive environment, are a possiblity with increased development activity.

Perhaps the greatest potential threat is the MX Missle System. The draft environmental impact statement on the MX system stated that 70,000 to 130,000 acre feet of water will be required for construction, along with approximately 57,000 workers. A report by the U.S. Air Force (1979) stated that in Railroad Valley, structures associated with MX will be placed within one mile of aquatic systems. Shelter clusters are proposed near the springs at Lockes Ranch and the springs on the Duckwater Shoshone Indian Reservation. The potential deleterious impact to *Crenichthys nevadae* and the undescribed subspecies of *Gila bicolor* in Railroad Basin from the MX system is enormous.

LITERATURE CITED

Deacon, J.E., T.B. Hardy, J. Pollard, W. Taylor, J. Landye, J. Williams, C. Williams, P. Greger and M. Conrad. 1980. Environmental analysis of four aquatic habitats in east-central Nevada June-September, 1980. Interim Final Summary Report to HDR Sciences. (contract no. HDR/RPA15 Ext).

Hardy, T.B. 1980. The Inter-Basin area report - 1979. Proc. of the Desert Fishes Council. vol. 11:5-21.

Hubbs, C.L. 1932. Studies of the fishes of the Order Cyprinodontes. XII. A new genus related to *Empetrichthys*. Occ. Pap. Mus. Zool., Univ. Mich. no. 252:1-5.

Hubbs, C.L. and R.R. Miller. 1948. The zoological evidence: correlation between fish distribution and hydrographic history in the desert basins of western United States. Pages 17-166 In: The Great Basin with emphasis on glacial and postglacial times. Bull. Univ. Utah. Vol. 38.

Hubbs, C.L., R.R. Miller and L.C. Hubbs. 1974. Hydrographic history and relict fishes of the north-central Great Basin. Memoirs Cal. Acad. Sci. 7:1-259.

Mifflin, M.D. and M.M. Wheat. 1979. Pluvial lakes and estimated pluvial climates of Nevada. Nev. Bur. Mines Geol. Bull. 94. 57 pp.

U.S. Air Force. 1979. The MX system and the environment. 23 pp.