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## STATUS AND DISTRIBUTION OF THE FISH CREEK SPRINGS TUI CHUB, *GILA BICOLOR EUCHILA*

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**ABSTRACT.**—The Fish Creek Springs tui chub, *Gila bicolor euchila*, is present in large numbers throughout its native habitat in spite of extensive man-caused habitat disturbance. This subspecies occurs further downstream in Fish Creek than previously reported.

The Fish Creek Springs tui chub *Gila bicolor euchila* was described by Hubbs and Miller (1972) as an endemic subspecies restricted to the springs and outflows of Fish Creek Springs in southeastern Eureka County, Nevada, in R.53E., T. 16N., S. 8 and 9 (USGS Bellevue Peak Quadrangle 1956). Subsequently, Hardy (1979a, b) found this subspecies in only one spring and failed to find any in the outflows. In 1983 (Federal Register 1984), the fish was reported from three springs, but not from the outflows, and was proposed for listing as "threatened" with critical habitat designated under 50 Code of Federal Regulations Part 17.

### METHODS AND MATERIALS

Parts of the present habitat of *G. b. euchila* were sampled on 9–10 July 1984 and 26–27 June 1985. Unbaited 6-mm wire mesh, Gee-type minnow traps were used. Catch and total-length data are presented in Table 1. Some physical and chemical characteristics of this system are reported in Table 2. Temperature was measured with a standard mercury bulb thermometer, and pH was measured with a Hach High Range pH test Cube No. 12519-00. Conductivity was measured with a Lab-Line Lectro MHO-Meter, Model MC-1, Mark IV and is reported in Micromhos/cm. In 1985 dissolved oxygen was measured with a Hach Portable Dissolved Oxygen Meter.

### RESULTS

The Fish Creek Springs system is composed of two isolated northern spring-pools

and a number of other springs connected by channelized outflows (Fig. 1, Sites 13–14). In 1938, and at least until 1956, the two northern springs were connected by outflow to the remainder of the system (Hubbs et al. 1974). The combined outflows form Fish Creek, which passes just south of Fish Creek Ranch and terminates in a reservoir about 1 km east of Nevada State Route 20.

Man-caused modification of this system has occurred frequently in the past. For example, Hubbs et al. (1974) report that in 1938 Fish Creek was dry where it crossed Nevada State Route 20 because of water consumption on Fish Creek Ranch.

Prior to our 1984 survey, a dragline had been used to clear Fish Creek throughout sections 9 and 10. In 1984 the westernmost spring (map reference 1) was little more than a muddy swale with a diameter of about 15 m and an area of dense rushes (*Juncus* sp.) in the middle. Water, however, continued to flow from this spring into an outflow stream about 300 m long (map reference 2) into the main body of the aquatic system. By 1985 the spring-pool had been cleaned of emergent aquatic vegetation and deepened and was, essentially, an open body of water. By 1985 heavy equipment had been used to dredge almost all the spring-pools and their outflow channels. Emergent aquatic vegetation was reduced throughout the system by about 75% compared to 1984. Dredged material was placed in piles alongside most of the spring-pools and outflows.

*Gila bicolor euchila* presently occurs in large numbers in most components of this system (Table 1). In addition, it was found in

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TABLE 1. Catch and total length (TL) data for *Gila bicolor euchila* from Fish Creek Springs, 1984-1985. Numbers in parentheses represent the number of fish measured.

Map #	Trap-hours	Fish caught	Catch per trap-hour	$\bar{x}$ Total [(N) = fish measured] length—mm	Total length range—mm
1984					
2	15	64	4.3	(64) 50.4	31- 64
3	4	1	0.3	105.0	—
5	2	76	38	(50) 46.3	32- 78
6	1	30	30	(30) 63.0	44- 78
9	1	28	28	(28) 54.5	38- 68
10	1	19	19	(17) 54.9	43- 74
13	9	120	13.3	(75) 64.0	38-113
14	3	0	0	0	0
15	14	8	.6	(8) 74.3	40-122
16	10	4	.4	(4) 61.8	45- 84
1985					
2	6	86	14.3	(50) 59.9	41- 77
5	2	126	63.0	(50) 64.9 <sup>1</sup>	46-122 <sup>1</sup>
6	2	106	53.0	"	"
13	17.5	277	15.8	(100) 77.3	33-118

<sup>1</sup>Sites 5 and 6 combined.

TABLE 2. Physical and chemical characteristics of the Fish Creek Springs system, 1984-1985.

Map #	Area type	Temperature C	pH	Conductivity micromhos	Dissolved oxygen ppm
1984					
2	outflow-stream	—	8.0	505	—
3	spring-pool	22	7.5	500	—
4	spring-pool	—	—	550	—
5	spring-pool	—	7.0	—	—
9	spring-pool	—	7.0	530	—
10	outflow-stream	—	7.5	540	—
13	spring-pool	21.5	8.0	570	—
14	spring-pool	26.0	8.0	594	—
15	canal	11.0	8.5	420	—
1985					
2	outflow-stream	23.8	8.0	618	15.4
5	spring-pool	17.2	7.0	617	6.3
13	spring-pool	16.2	7.6	557	8.5

the outflow of Fish Creek Springs in the southern portion of section 10 closely adjacent to the Fish Creek Ranch headquarters. This is beyond the range reported for this subspecies by Hubbs et al. (1974) and in the Federal Register (1984). In 1984 this subspecies was also taken in section 12 at the intersection of the outflow with Nevada State Route 20. Fish were also seen but not captured about 50 m downstream from this intersection in 1985. This area is about 4.8 km east of the previous

easternmost record for this subspecies (Federal Register 1984). Visual inspection of the remainder of Fish Creek down to and including the reservoir revealed no fish.

In 1984 a total of 350 fish were captured from 10 trap sites beginning in section 8 and terminating in section 12. Of the fish captured, 276 were measured (Table 1). In 1985, 595 fish were captured from four sites, and 200 of these fish were measured (Table 1). Thousands of fish ranging from about 5 mm

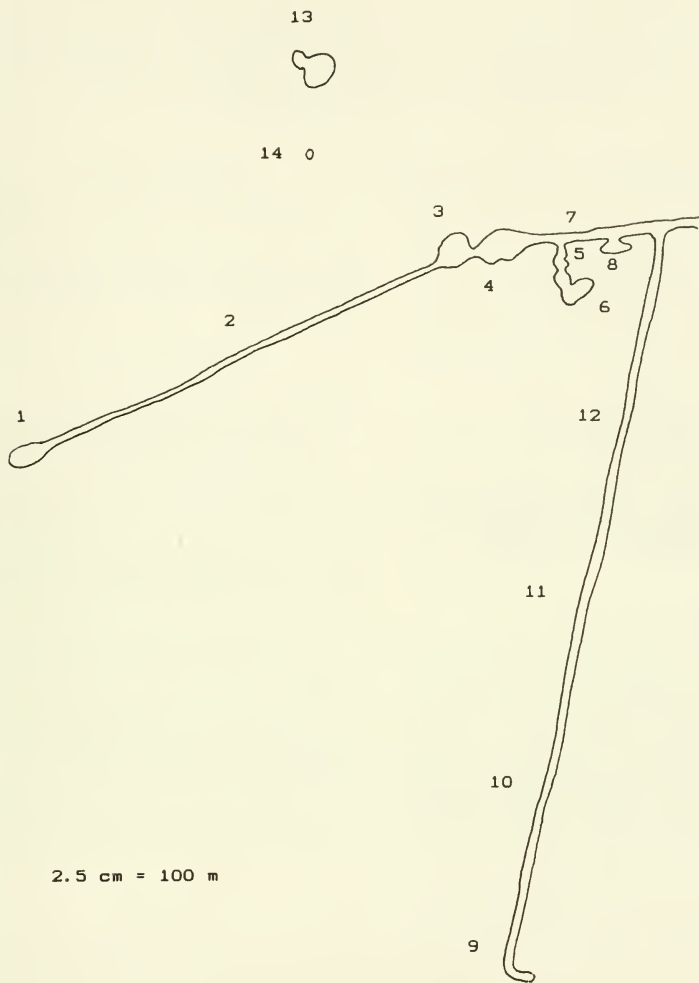


Fig. 1. General configuration of Fish Creek Springs and outflow. Numbers indicate the location of various components of the system within section 8. Sampling site 15 is in section 10, and sampling site 16 is in section 12; neither are shown here. Elevation of the westernmost spring (site 1) is 6,040 ft. It and the northernmost spring (site 13) joined near site 3 on the Bellevue Peak Quadrangle (1956) in 1938.

(TL) to more than about 150 mm were seen during visual inspections of the spring system in both 1984 and 1985. No other fish species were seen or trapped in either 1984 or 1985; however, Hubbs et al. (1974) report that rancher Isador Sara planted both rainbow

trout (*Salmo gairdneri*) and brook trout (*Salvelinus fontinalis*) as early as about 1934, and Pat Coffin (Nevada Department of Wildlife, personal communication) reports that rainbow trout (*Salmo gairdneri*) are planted in the springs each spring. The Fed-

eral Register (1986) states that 7,000 "catchable-sized" brown trout, *Salmo trutta*, were planted in Fish Creek Springs in 1973, 1976-1978, and 1981 and notes that the increase in tui chub numbers "corresponds with the cessation of brown trout stocking in the springheads".

Trap results and length measurement data for map reference areas 2, 3, 6, 10, 13, 15, and 16 (1984) and 2, 5, 6, and 13 (1985) are presented in Table 1. Catch per trap-hour ranged from .3 to 38 in 1984 and 14.3 to 63.0 in 1985. The total length (TL) range from all sites in which fish were taken in 1984 was from 31 mm to 122 mm ( $\bar{x}$  = 54.8) and in 1985 from 33 to 122 mm ( $\bar{x}$  = 69.8). Catch per trap-hour was greater at all the sites sampled in 1985 than at the same sites sampled in 1984.

Table 2 presents some of the physical and chemical characteristics of the areas referred to in Figure 1. Water temperature ranged from 11 to 26 C, pH from 7.0 to 8.5, conductivity from 420 to 680 micromhos, and dissolved oxygen from 6.3 to 15.4 ppm.

#### SUMMARY

The aquatic system at Fish Creek Springs is composed of a number of springs and their outflows. Human modification of the site includes dredging of the spring-pools and their outflow channels, cattle grazing, and introductions of trout. Even with extensive modification of the natural system, *Gila bicolor eucbila* is present in large numbers in most components of the system. The presence of

these fish in sections 10 and 12 extends the range of this subspecies about 4.8 km east of localities previously reported. Fish numbers appear to have increased following 1981 when *Salmo trutta* was last planted in the Fish Creek Springs system.

#### ACKNOWLEDGMENTS

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