PROGRESS REPORTS

2007

FISH DIVISION

Oregon Department of Fish and Wildlife

Hutton Spring Tui Chub and Foskett Spring Speckled Dace Investigations

ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT
OREGON

PROJECT TITLE: Hutton Spring Tui Chub and Foskett Spring Speckled Dace Investigations

PROJECT NUMBERS: Contract 134206M085

PROJECT PERIOD: 7 August 2006 - 31 December 2007

Prepared by: Paul D. Scheerer
Steven E. Jacobs

Oregon Department of Fish and Wildlife
3406 Cherry Drive NE
Salem, Oregon 97303

This project was financed with funds administered by the U.S. Fish and Wildlife Service.

CONTENTS

Page

INTRODUCTION

Several morphologically diverse, allopatric populations of tui chub inhabit the five endorheic basins of south-central Oregon (Bills 1977; Harris 2000). The Hutton tui chub (*Gila bicolor* ssp.) is represented by a single population that inhabits Hutton Spring on the southwest side of Alkali Lake in Lake County, Oregon (Figure 1). The Alkali Lake basin reached its maximum depth of approximately 83 meters covering 2,301 square kilometers from 46,000 to 32,000 years ago. During this time period there was a connection between the Alkali basin and Fort Rock basin (Silver and Summer Lakes) to the west (Bills 1977). Currently, Alkali Lake desiccates annually. Morphometric and meristic data supports classification of Hutton Spring tui chub as a distinct subspecies (Bills 1977). Recent mitochondrial DNA analysis (Harris 2000) suggests a grouping of the Hutton Springs tui chub with populations of tui chub from the Abert and Summer Lake basins in Oregon. Additional genetic, morphometric, and meristic data are needed to further address this question (Harris 2000; Dr. Douglas Markle, pers. comm.).

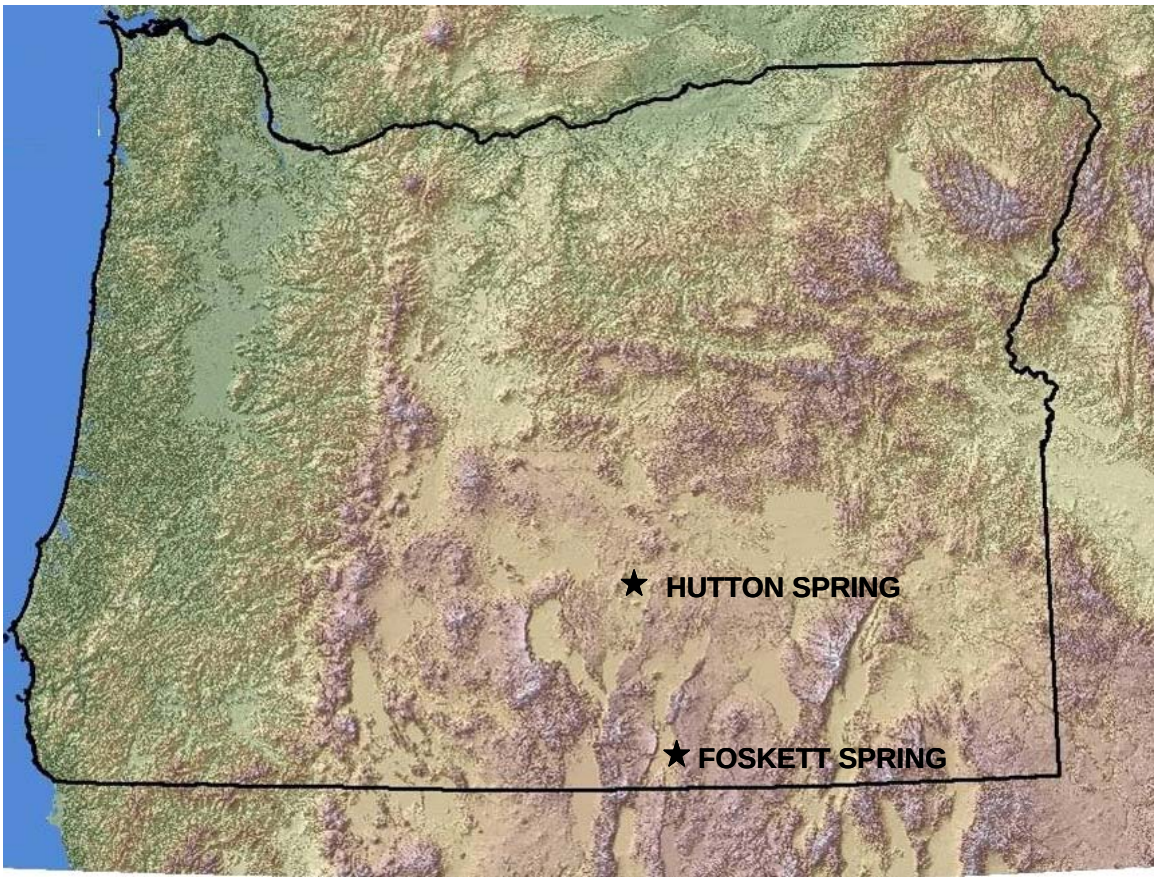

Figure 1. Map showing the locations of Hutton Spring and Foskett Spring, Oregon.

The Hutton tui chub was listed as threatened under the federal Endangered Species Act in 1985 (U.S. Fish and Wildlife Service 1985). Hutton Spring is located on private land and the habitat is in good condition, primarily due to conscientious long-term land stewardship by the landowner. The habitat is currently fenced from cattle grazing

and is in stable condition (U.S. Fish and Wildlife Service 1997; Scheerer and Jacobs 2005; present study). Hutton Spring has been diked and has a pool approximately 11 meters long, 3 meters wide, and 2 meters deep and is surrounded by rushes. A nearby spring, 3/8 Mile Spring, which also supports a population of Hutton tui chub was rediscovered in 2007. Thirty years prior, Bills (1977) first noted the existence of this population of tui chub. This spring was not located between 1977 and 2007 and the existence of this second population was in question for several decades (U.S. Fish and Wildlife Service 1997). Prior data describing the abundance of the Hutton Springs tui chub population are limited. Bills (1977) visually estimated less than 300 Hutton Spring tui chub in Hutton Spring and approximately 150 tui chub in 3/8 Mile Spring. In 2005, The Oregon Department of Fish and Wildlife (ODFW) estimated 809 fish (95% CI: 703-932) at Hutton Spring.

Speckled dace (*Rhinichthys osculus*) are geographically widespread throughout the western United States and occur in many isolated subbasins and interior drainages in south-central Oregon. The Foskett Spring speckled dace (*R. osculus* ssp.) is represented by a single population that inhabits Foskett Spring on the west side of Coleman Lake in Lake County, Oregon and was listed as threatened under the federal Endangered Species Act in 1985 (U.S. Fish and Wildlife Service 1985). The Foskett speckled dace became isolated in Foskett Spring at the end of the Pluvial period (~9,000-10,000 years ago). Foskett Spring is a natural spring that rises from a springhead pool, flows through a narrow spring brook into a series of shallow marshes, and then disappears into the soil of the normally dry Coleman Lake. A second population in Dace Spring, located approximately 0.8 kilometer south of Foskett Spring, was established from an introduction of 100 fish from Foskett Spring in 1979-1980 (Williams et al. 1990); however recent surveys have failed to document their continued existence at this location. In 1987, the U.S. Bureau of Land Management (BLM) acquired, through exchange, the 65 hectare parcel of land containing Foskett and Dace Springs. Both sites were fenced to exclude livestock.

Data describing the abundance of the Foskett speckled dace population are limited. Bond (1974) estimated, by visual approximation, the population in Foskett Spring at 1,500 to 2,000 fish. In 1986, a visual estimate of more than 300 dace representing three size classes was reported in Dace Spring (Williams et al. 1990). In 1997, mark-recapture population estimates were obtained from both Foskett and Dace springs (Dambacher et al. 1997). The Foskett Spring estimate was 27,787 fish (95% confidence intervals: 14,057-41,516). The majority of the fish (97%) were found in the downstream open water pool located outside the cattle exclosure. In 2005, ODFW estimated 3,147 dace (95% CI: 2,535-3,905) at Foskett Spring. Abundance estimates were similar in 1997 and 2005 in all of the sections of the spring complex, except for the large reduction in abundance in the area outside the cattle exclosure (Scheerer and Jacobs 2005). In 1997, only 19 fish were estimated to occur in Dace Spring (Dambacher et al. 1997). All were found in a concrete trough that was installed east of the spring. In addition, only large fish were collected from Dace Spring, suggesting minimal recent recruitment had occurred. Access back to the spring from the trough was thought to be limited (U.S. Fish and Wildlife Service 1997) and may have reduced the ability of dace to return to the spring to spawn. No dace have been collected from Dace Spring in recent years (A. Munhall, personal communication; this study).

The Recovery Plan for the threatened and rare native fishes of the Warner Basin and Alkali Subbasin states that these two taxa will probably not be delisted in the near

future because of their extremely isolated ranges and potential for degradation of these habitats from localized events (USFWS 1997). The primary recovery objective for these two taxa is the long-term persistence through preservation of their native ecosystems. The plan further states that the conservation and long term sustainability of these species will be met when: 1) long-term protection of their respective habitats, including spring source aquifers, springpools and outflow channels, and surrounding lands is assured; 2) long-term habitat management guidelines are developed and implemented to ensure the continued persistence of important habitat features and guidelines include monitoring of current habitat and investigation for and evaluation of new spring habitats; and 3) research into life-history, genetics, population trends, habitat use and preference, and other important parameters is conducted to assist in further developing or refining criteria 1) and 2), above. Actions needed to meet these criteria include protecting fish populations and habitats, conserving genetic diversity of fish populations, ensuring adequate water supplies are available, monitoring of listed fish populations and habitat conditions, and evaluating long-term effects of climatic trends on recovery of these fish populations.

The purpose of this investigation was to determine the status of populations of federally listed Hutton Spring tui chub and Foskett Spring speckled dace and their habitats. This report updates a monitoring program initiated in 2005 by ODFW (Scheerer and Jacobs 2005) by providing results of monitoring obtained in 2007.

METHODS

The ODFW's Native Fish Investigations Project used baited minnow traps to obtain mark-recapture population estimates of Hutton tui chub and Foskett speckled dace. We fished traps overnight at Hutton Spring and during the day (4-5 hours) at Foskett Spring. We marked all fish captured with a partial caudal fin clip and returned them to the water. Fish were returned to the approximate location where they were captured. The following night (or day), we again fished the traps and recorded the total number of marked and unmarked fish captured. We estimated population abundance using single-sample mark-recapture procedures (Ricker 1975). We calculated 95% confidence intervals using a Poisson approximation (Ricker 1975). Traps were fished at locations that included the variety of habitat types present at each location. We measured total length (TL) on a sample of approximately 125 fish from each location.

We recorded physical habitat parameters at each location. The open water area (m^2) and vegetated surface area (m^2) of each spring location was measured using a laser range finder (+/- 0.5 m). Water depth was measured using a graduated depth staff (+/- 0.01 meter). Water temperature (^oC) was recorded using a Hobo® recording thermometer at 5-hour intervals starting in late-August 2005. We used a Global Positioning System (GPS) to record site locations (UTM coordinates). Each site was photographed.

RESULTS

Hutton Spring Tui Chub

The tui chub population estimate obtained in Hutton Spring on 26 July 2007 was 959 fish (95% CI: 735-1,231), similar to the 2005 estimate of 809 fish (95% CI: 703-932) (Table 1). The 2007 estimate includes tui chub ranging from 40-137 mm TL. The tui

chub population estimate obtained in 3/8 Mile Spring on 26 July 2007 was 87 fish (95% CI: 65-116). Length-frequency analysis of the Hutton Spring population suggests a broad age composition with a pronounced peak at ~ 70 mm, which was nearly identical to the 2005 length-frequency distribution (Figure 2). The length frequency histogram for 3/8 Mile Spring was represented by fewer small fish (<80 mm TL) than in Hutton Spring and a peak at ~100 mm TL (Figure 3). This suggests a lack of recruitment in recent years in 3/8 Mile Spring.

Table 1. Mark-recapture population estimates for Hutton Spring tui chub, 2005 and 2007, and 3/8 Mile Spring tui chub, 2007.

Hutton Spring

		95% Confidence limits	
Year	Estimate	lower	upper
2005	809	703	932
2007	959	735	1,251

3/8 Mile Spring

		95% Confidence limits	
Year	Estimate	lower	upper
2007	87	65	116

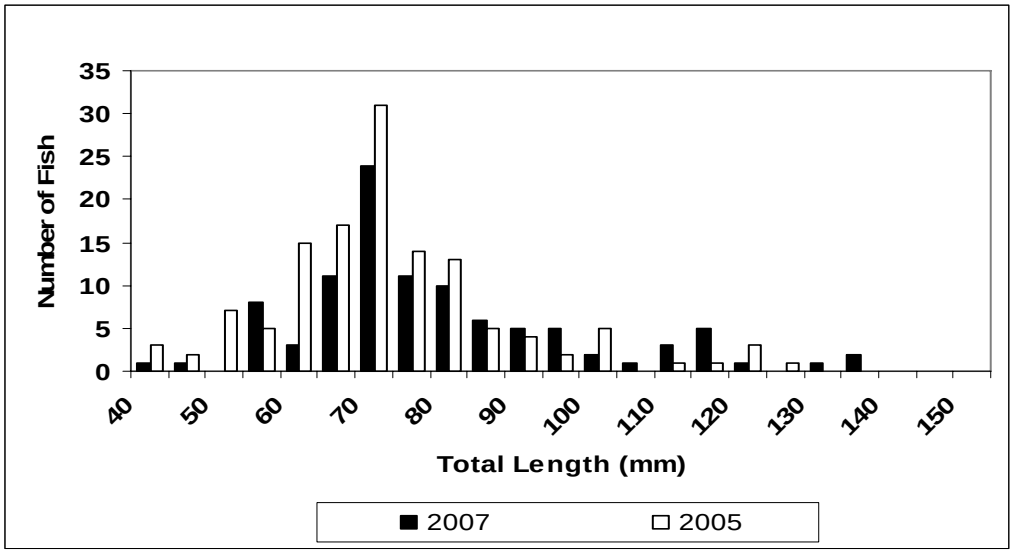

Figure 2. Length-frequency histograms for Hutton Spring tui chub, 2005 and 2007.

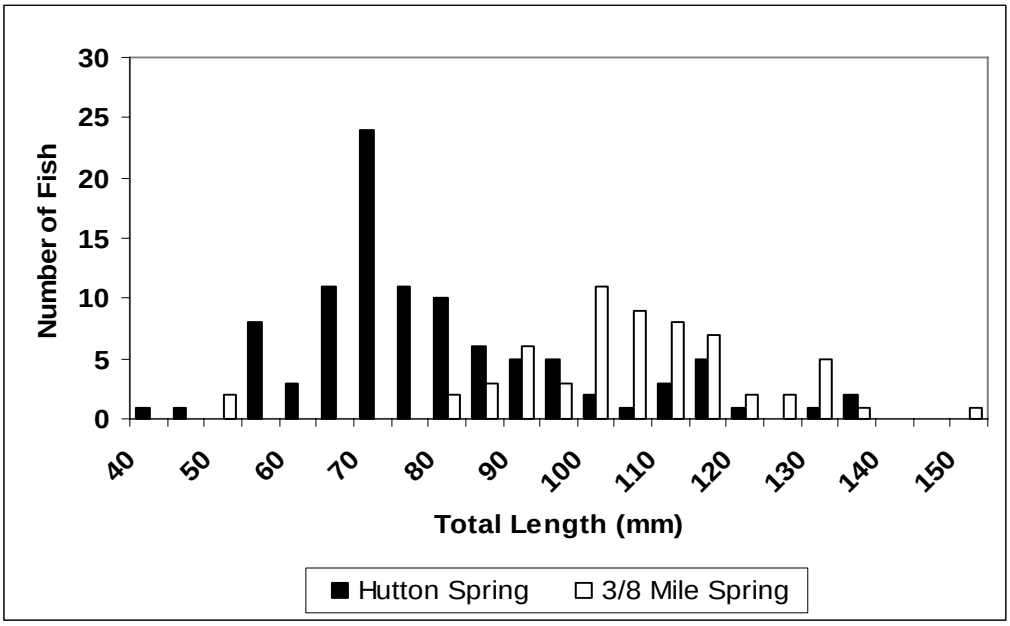

Figure 3. Length-frequency histograms for Hutton Spring and 3/8 Mile Spring tui chub, July 2007.

The total open water habitat at Hutton Spring was ~36 m^2. The spring pool was surrounded by bullrush (*Scirpus* sp.). The total habitat available for chub, including the vegetated perimeter of the spring pool was ~100 m^2. The total extent of the surrounding bullrush marsh was ~330 m^2. Water depth of the spring pool averaged 1.2 m with a maximum depth of 2.1 m. A staff inserted into the silt stopped at a layer of hardpan at 3.3 m. The 3/8 Mile Spring was small (~2 m^2) with an average water depth of 0.35 m. This spring pool is considerably smaller than when it was first described 30 years ago by Bills (1977). In 1977, the spring measured 3.3 meters in diameter (~9 m^2) and was ~0.7 meters deep. The spring has apparently filled in with sediment and aquatic vegetation over the years.

The spring temperatures measured in Hutton Spring from June 2005 through May 2007 averaged 14.3°C (range 8.2-16.8°C), with daily fluctuations less than 1°C (Figure 4).

Foskett Spring Speckled Dace

The speckled dace population estimate obtained in Foskett Spring on 15 August 2007 was 2,879 fish (95% CI: 2,319-3,573), which was similar to the 2005 estimate of 3,147 fish (95% CI: 2,535-3,905 fish (Table 2). Approximately half ($\hat{N}$ = 1,418) of the population was located in the spring pool, one quarter of the population was located in the spring brook ($\hat{N}$ = 711), and smaller proportions (9% and 15%) were located in the tule marsh ($\hat{N}$ = 273) and cattail marsh ($\hat{N}$ = 422) respectively. In 2005 and 2007, the abundance was significantly lower than in 1997.

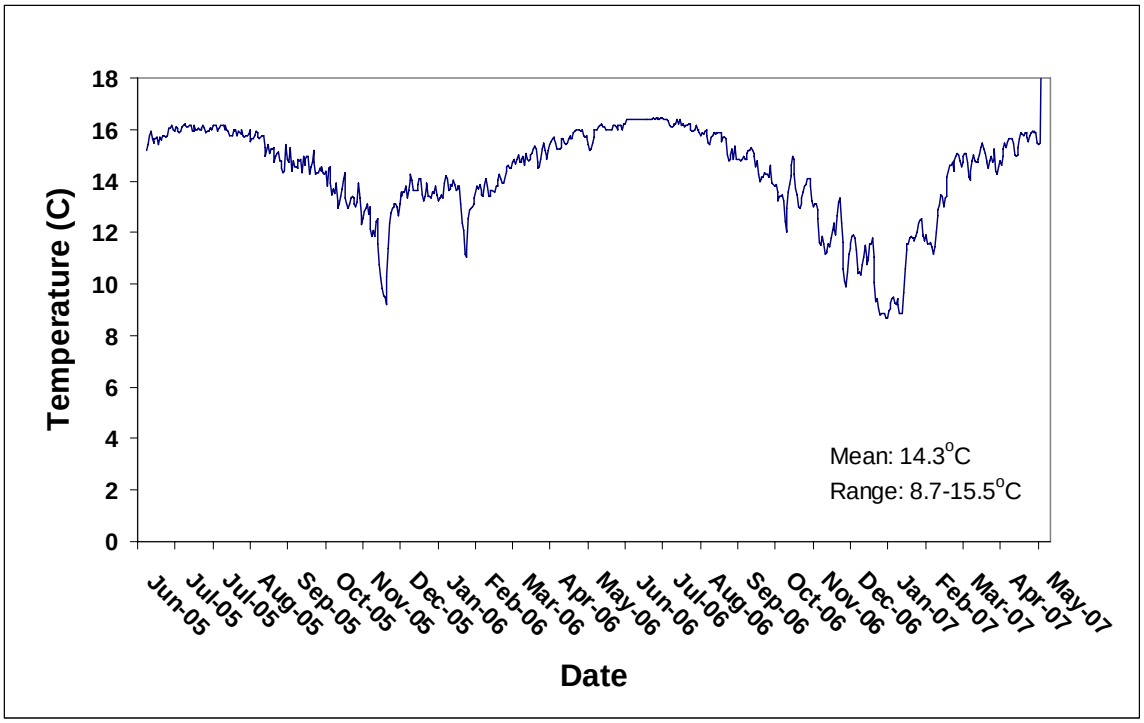

Figure 4. Mean daily water temperatures measured at Hutton Spring, 2005-2007.

Table 2. Mark-recapture population estimate details for Foskett Spring speckled dace, 2005 and 2007.

2005	95% Confidence limits		2007	95% Confidence limits	
Estimate	lower	upper	Estimate	lower	upper
Entire Site					
3147	2535	3905	2984	2403	3702
Spring Pool					
1627	1157	2281	1418	1003	1997
Spring brook (rock dam to rock bridge)					
100	41	200	38	18	73
Spring brook (rock bridge to tule marsh)					
636	423	951	711	459	1092
Tule Marsh to fence					
425	283	636	273	146	488
Cattail Marsh outside fence					
353	156	695	422	275	641

Compared to 1997, the number of dace in the cattail marsh was substantially smaller in 2005 and 2007 (26,881, 353, and 422 fish, respectively). The lower population abundance estimated in 2005 and 2007 is probably a result of the reduction in open water habitat in the cattail marsh in recent years (average depth <0.05 m) compared to 1997 (Scheerer and Jacobs 2005; Dambacher et al. 1997).

The 2007 abundance estimate includes dace ranging from 18-73 mm TL. Length-frequency analysis suggests the presence of multiple age-classes, with two apparent peaks (Figure 5). A larger proportion of small fish (<35 mm) was found in 2007 compared to 2005, possibly indicating a recent spike in recruitment (Figure 5).

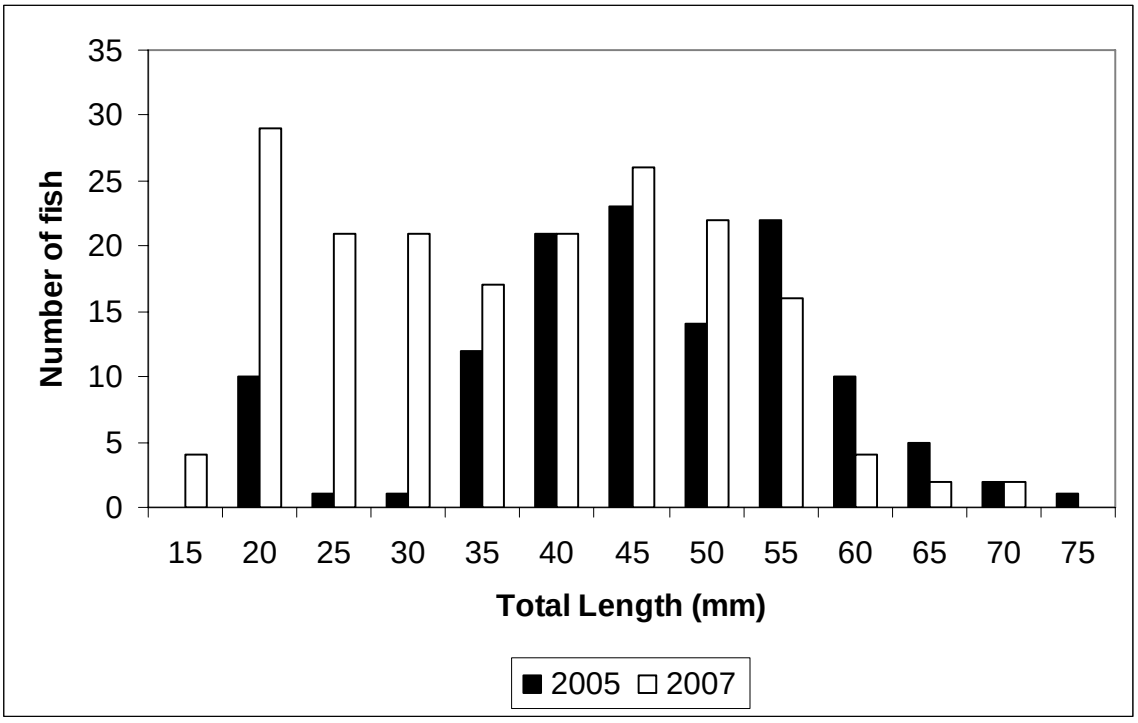

Figure 5. Length-frequency histogram for Foskett Spring speckled dace, 2005 and 2007.

The spring temperatures measured in Foskett Spring from 8 June 2005 through 14 August 2007 averaged 18.3°C (range 18.2-18.7°C). Daily fluctuations were less than 0.4°C. Vegetation surrounding the spring, spring brook, and marshes includes *Scirpus* sp., *Juncas* sp., *Mimulus* sp., saltgrass, thistle, Kentucky bluegrass, and nettles.

DISCUSSION

Populations of the federally listed Hutton tui chub and Foskett speckled dace were monitored in 2007 and both appear to be healthy and near carrying capacity. Examination of length-frequency data suggests that multiple age-classes were present in both populations. Presence of young-of-the-year fish at both locations provides

evidence of recent recruitment. Both spring locations are fenced to exclude cattle and no exotic fish species were found to be present. The fish appeared to be in good condition with no obvious external parasites.

Habitat, although limited, was in good condition. Encroachment by aquatic macrophytes may be limiting population abundance at both sites. The decline in abundance of Foskett speckled dace since 1997 is probably due to the reduction in open water habitat. Exclusion of cattle improves water quality, yet may be responsible for the reduction of open water habitats at these locations. If increasing the carrying capacity of these species is a goal, then restoration efforts to increase open water habitats at these springs is advised. The re-discovery of the tui chub population in 3/8 Mile Spring reduces the risk of catastrophic loss of Hutton tui chub if one of the springs were to dry up or to be illegally stocked with non-native fishes. The reduction in the open water area of 3/8 Mile Spring since it was last described in 1977 suggests that this population may soon be lost, unless habitat restoration efforts are made to increase the area of open water habitat at this location. Planned restoration of Dace Springs, combined with the introduction of Foskett speckled dace at this location, could reduce the risk of extinction and aid in recovery of this species.

Future monitoring of these fish populations and their spring habitats, including monitoring of proposed restoration and introduction sites, to track fluctuations in abundance and the quantity and quality of available habitat should be part of a long-term management plan for these fishes. Ideally, population estimates should be obtained and habitat conditions should be evaluated every two to three years. We recommend that future investigations also include the collection of key life history information for these spring fishes (population age structure, age and size at maturity, longevity, and spawning timing/duration).

ACKNOWLEDGEMENTS

We are grateful to Stacy Remples and Alan Munhall for assistance with the field work.

LITERATURE CITED

Bills, F. T. 1977. Taxonomic status of isolated populations of tui chub referred to *Gila bicolor oregonensis* (Snyder). Masters thesis. Oregon State University, Corvallis, Oregon.

Dambacher, J. M., A. G. Talabere, D. L. Hill, and D. F. Markle. 1997. Foskett speckled dace investigations. Fish Research Progress Report. Oregon Department of Fish and Wildlife and Oregon State University.

Harris, P.M. 2000. Systematic studies of the genus *Siphateles* (Ostariophysi: Cyprinidae) from Western North America. Doctoral thesis. Oregon State University, Corvallis, Oregon.

Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191, Ottawa, Ontario.

Scheerer, P. D., and S. E. Jacobs. 2005. Hutton Spring tui chub and Foskett Spring speckled dace investigations. Fish Research Progress Report, Contract E-2-37. Oregon Department of Fish and Wildlife. 11 pp.

U.S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; determination of threatened status for Hutton Tui chub and Foskett speckled dace. U.S. Federal Register 50:12302-12306.

U.S. Fish and Wildlife Service. 1997. Draft recovery plan for the threatened and rare native fishes of the Warner basin and Alkali subbasin. U.S. Fish and Wildlife Service, Portland, Oregon.

Williams, J. E., M. A. Stern, A. V. Munhall, and G. A. Anderson. 1990. Conservation status of the threatened fishes in Warner basin, Oregon. Great Basin Naturalist 50:243-248.

3406 Cherry Ave. NE
Salem, Oregon 97303