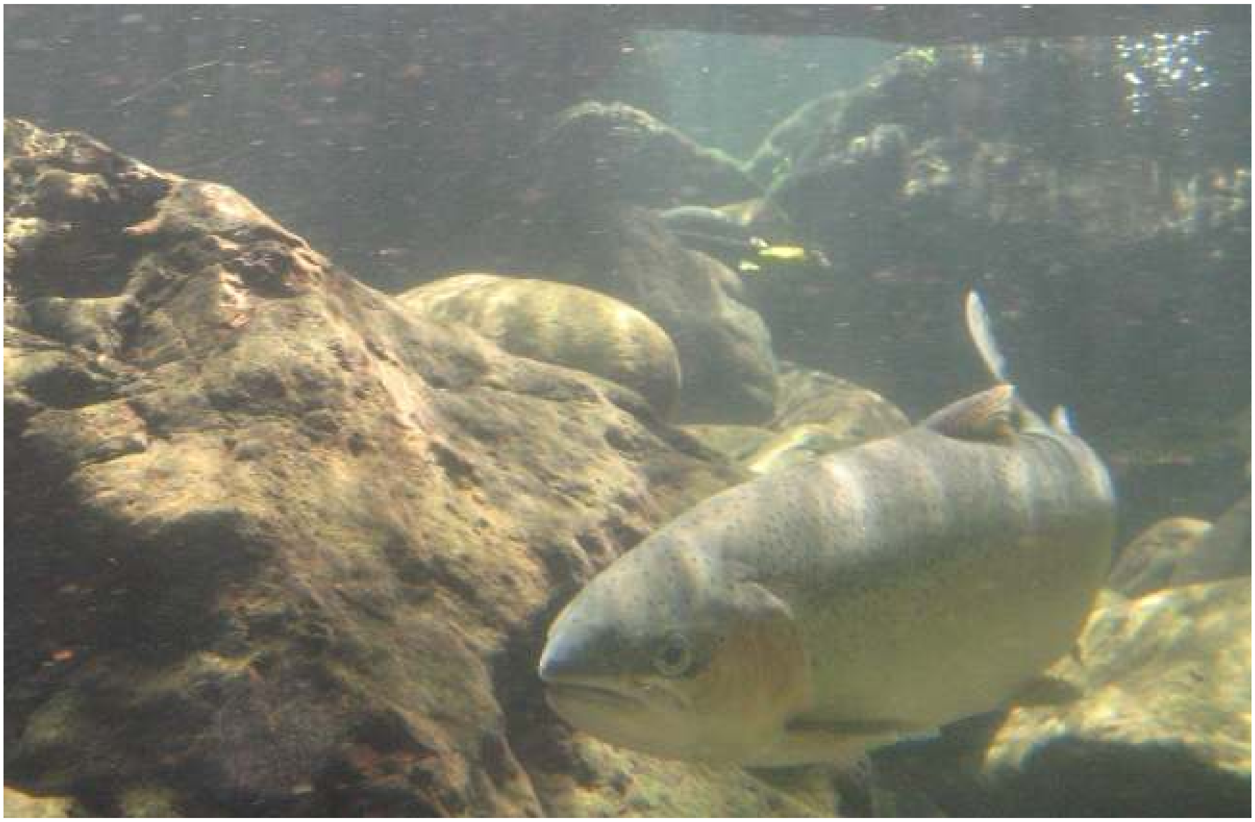
Mad River Summer Steelhead Report
2013



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Summary

On July 15 and July 16, 2013, personnel from the Mad River Alliance (MRA), National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS), Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), Green Diamond Resource Company (GDRC), CalTrout and several volunteers performed snorkel survey counts of summer-run steelhead in the Mad River. This was the first time since 2008 that a Mad River summer-run steelhead survey was performed. The survey was reinitiated in large part due to the efforts of the non-profit group Mad River Alliance, which brought the state and federal agencies together to restart the monitoring effort. Teams of snorkelers covered approximately 54 river miles within the 73 mile section of river from the R. W. Matthews Dam downstream to the bridge at the Highway 299. Snorkelers counted a total of 280 adult (≥ 16 inches) and 28 half-pounder (< 16 inches) summer-run steelhead.

Introduction

Steelhead in the Mad River are part of the Northern California (NC) steelhead distinct population segment (DPS), listed as Threatened under the U.S. Endangered Species Act (ESA). Summer-run steelhead in the Mad River are one of ten functionally independent summer-run steelhead populations in the NC Steelhead DPS (Spence et al. 2008). They are an important component of the overall DPS viability because the criteria established by Spence et al. (2008) requires the persistence of major life-history types (i.e., summer-run vs. winter-run steelhead) in order to have a viable DPS. Spence et al. (2008) did not establish numeric population viability thresholds for summer-run steelhead in the NC steelhead DPS. However, at the time, the limited available data provided no evidence that the summer-run steelhead population in the Mad River was viable (Spence et al 2008). Steelhead in the Mad River have lost substantial habitat due to dams, water diversions, development, and habitat modifications. An estimated 36% of potential steelhead habitat lies above R. W. Matthews Dam, though a partial barrier well downstream of this dam limits use of the upper watershed by summer-steelhead in some years (Spence et al. 2008).

Spence et al. (2008) reviewed the Mad River summer-run steelhead snorkel survey data available at the time of their review. They found that the data did not meet the minimum requirements to formally assess viability using their criteria, mainly because the data series was shorter than 4 generations. However, the data provided some indication of population status. From 1994 to 2002 (Table 1), when several reaches of the Mad River downstream of Deer Creek were consistently surveyed, geometric mean abundance was about 250 fish and the population had declined throughout the period (Spence et al. 2008). Based on those data, they concluded that the population was at least at moderate risk of extinction. Because 1) the summer-run steelhead population is a critical component of the viability of Mad River steelhead and the NC steelhead DPS as a whole 2) available data indicate the summer-run steelhead population is at least at a moderate risk of extinction and 3) no data is available to formally assess the status of the population or track the trend of the population over time, it is imperative for fisheries agencies to restart a consistent summer-run steelhead monitoring effort on the Mad River.

Table 1. Snorkel survey results for the Mad River from 1980 to 2013. Differing levels of effort and varying spatial and temporal coverage between years complicate interpretation of the data.

Year	Miles Surveyed	Adults			Half pounders		
		Live	Dead	Total	Live	Dead	Total
1980[p]	17.9	0	0	0	0	0	0
1981[p]	17.5	2	0	2	0	0	0
1982[p]	32.4	167	0	167	0	0	0
1983[p]	22.8	31	0	31	0	0	0
1984[p]	14.1	111	0	111	0	0	0
1985[p]	14.8	52	0	52	0	0	0
1986[p]	7.8	10	0	10	0	0	0
1987[p]	20.2	18	0	18	0	0	0
1988[p]	10.6	60	0	60	0	0	0
1989[p]	10.6	20	0	20	0	0	0
1990[p]	10.6	33	0	33	0	0	0
1991[p]	14.7	59	0	59	0	0	0
1992[p]	10.6	34	0	34	0	0	0
1993[p]	10.6	48	0	48	0	0	0
1994[p]	51.6	305	0	305	166	0	166
1995[p]	66.6	541	1	542	10	0	10
1996[p]	60.7	427	1	428	19	0	19
1997[p]	66.6	292	5	297	12	0	12
1998[p]	57.0	191	0	191	20	0	20
1999[p]	46.4	82	0	82	15	0	15
2000[p]	53.5	170	0	170	62	0	62
2001[p]	12.5	194	0	194	583	0	583
2002[p]	19.7	185	0	185	80	0	80
2003[p]	18.7	483	0	483	5	0	5
2004[p]	5.8	209	0	209	9	0	9
2005[p]	5.6	211	0	211	10	0	10
2006			No survey				
2007			No survey				
2008[p]	5.1	110	0	110	20	0	20
2009			No survey				
2010			No survey				
2011			No survey				
2012			No survey				
2013	50.0	280	2	282	28	0	28

[p] = Provisional data

2013 Snorkel Survey

Personnel from the non-profit MRA initiated efforts to restart the Mad River summer-run steelhead surveys, which had been performed once since 2005 (Table 1). There were several goals held in common by the participating entities for the 2013 survey, including 1) renaming and standardizing reaches (Table 2), 2) surveying the entire river from R. W. Matthews Dam to the HWY 299 bridge, and 3) gaining private property access to reaches of the river that had not been surveyed in several years. In past years, the upper reaches of the river were surveyed by the U.S. Forest Service, and the lower reaches by GRDC and CDFW. Private land ownership in the Mad River basin and changing ownership of private lands made access to the entire river challenging, contributing the differing levels of effort between years. Upper and lower reaches of the river were numbered starting with 1, so that reach names were duplicated. In addition, reach starting locations and ending locations frequently shifted between years. Consistent sampling of GDRC reaches (old GRDC reaches 1-8) did occur from 1994 to 2002-the data reviewed by Spence et al. (2008).

In several meetings preceding the dives, personnel renamed the reaches alphabetically starting with reach A, directly downstream of R. W. Matthews Dam (Table 2), and discussed logistics and safety concerns. On July 15, 16, and 18, 2013, snorkelers surveyed reaches H-P, and performed spot checks of pools in reaches B and C and surveyed 3 miles of reach C. Reach A and reaches D-G were not surveyed. Approximately 54 river miles were surveyed, and 19 river miles were not surveyed. Snorkelers counted a total of 280 adult (≥ 16 inches) summer-run steelhead and 28 half pounder (< 16 inches) summer-run steelhead. One summer-run steelhead was observed in Reach B, with the majority of summer-run steelhead in Reach H.

Importantly, all 215 adult summer-run steelhead in Reach H were observed downstream of the Humbug Creek barrier, approximately 1 mile before the end of this reach. Between the put-in for reach H (Deer Creek) downstream to the Humbug Creek barrier (about 3.2 river miles), zero adult summer-run steelhead were counted. Given the results in Reach H, it is unlikely that many summer-run steelhead migrated upstream of the Humbug Creek barrier prior to the 2013 summer-run steelhead survey. Therefore, personnel likely surveyed the majority of habitat in the Mad River in 2013 where summer-run steelhead were present.

Table 2. New reach break downs for the 2013 Mad River summer-run steelhead surveys.

Reach	From	To	Length (miles)
A	Dam	Mad River campground	3.6
B	Mad River campground	Lamb Creek	4
C	Lamb Creek	Nelson Flat (Rattlesnake Bridge)	5.4
D	Nelson Flat (Rattlesnake Bridge)	Anderson Ford	4.4
E	Anderson Ford	Wildcat Creek	3.6
F	Wildcat Creek	Olsen Crossing	2.6
G	Olsen Crossing	Deer Creek	4.6
H	Deer Creek	Access downstream of Humbug Creek	4.2
I	Access downstream of Humbug Creek	Jack Shaw road (take out at old swinging bridge)	4.0
J	Jack Shaw road (put in at old swinging bridge)	Goodman Prairie (GRDC property)	6.2
K	Goodman Prairie (GRDC property)	Church Camp	3.5
L	Church Camp	Butler Valley Ranch	5.0
M	Butler Valley Ranch	4510 Road Crossing	4.1
N	4510 Road Crossing	4090 Road Crossing	5.0
O	4090 Road Crossing	Mad River Hatchery	4.7
P	Mad River Hatchery	North Bank Road	7.5
		Total	72.5

Snorkel Survey Data Considerations

A comprehensive census of all habitat units in a river is the most accurate way to inventory fish populations (Dollof et al. 1993), greatly reducing error in estimating fish abundance (Hankin 1984; Hankin and Reeves 1988). In performing a snorkel survey of a river where all of the habitat is surveyed (census), error in estimating fish abundance arises from observer error (divers counting more or less fish than are actually present) and catchability (proportion of the fish population actually observed and counted by the snorkelers; Som 2013), known as “second stage variance” (Hankin 1984). While Hankin and Reeves (1988) provide an approach for analyzing snorkel data that is calibrated using a more accurate survey technique, calibrating summer-run steelhead snorkel counts is not practical with a method like electrofishing depletion. Because observer error and catchability are not quantified for these surveys, the snorkel counts are not truly estimates, but should more appropriately be considered an index, or thought of as “relative abundance” (Som 2013). Rigorous statistical testing is generally not appropriate for such data. However, questions like “are there more fish in reach x versus reach z,” could be answered. If surveys are done with consistent effort over the course of several years, inference could reliably be made on trends over time, because one could assume that observer error and catchability are generally consistent between years within the same river.

When all of the reaches are not surveyed (a census of the habitat is not performed), there is additional error that arises from a sampling of the habitat units, called first stage variance, which could be quantified if some type of sampling scheme was employed (Hankin and Reeves 1988; Dolloff et al. 1993). When there are many days or weeks that lapse between reaches, fish could move between reaches of the river, introducing yet more error. Unfortunately, when there is no census of the habitat and no sampling scheme implemented to select which reaches to survey, weeks lapse between reaches of the river surveyed, experience of snorkelers varies widely, all of these sources of error get added to observer error and catchability, which are virtually inescapable. When any of these occur, the data cannot be reliably used as a measure of relative abundance because results between years cannot be compared. Again, inconsistency in sampling significantly reduces the usefulness of this data, which is already made tenuous because observer error and catchability are not quantified.

Snorkel surveys of adult steelhead and spring-run Chinook salmon are in many cases the only practical method that can be used to monitor these populations of salmonids. The survey method is cost effective, and when done appropriately, can result in a very useful index of population size that could be tracked over time to monitor trends in these populations. If not done properly, the utility of the data is compromised. NMFS will only consider the information as “anecdotal” in ESA status reviews and updates because it will not meet the data requirements to quantify population viability metrics (Spence et al. 2008). In addition, monitoring the Mad River summer-run steelhead population into the future and developing linkages between water temperature, snowpack, and climate change will be impossible without consistent spatial and temporal coverage and consistent annual effort.

Recommendations

It is imperative for all future efforts to: 1) survey standardized reaches of river so that all agencies agree and understand that reach Z is from point X to point Y, 2) survey the entire river from R.W. Mathews Dam to the HWY 299 bridge until an upper limit to the surveys can be agreed upon by the fisheries management agencies, 3) survey all of the reaches within a few days 4) rely only on trained professionals for the more difficult reaches 5) produce an annual report detailing the survey for that year and 6) maintain a database and/or spreadsheet of the results for at least 4 generations (12 years), in order to meet the minimum data requirements to formally assess population viability (Spence et al. 2008).

References

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