

**2003 Spring Spawning Surveys**  
For Rainbow/Steelhead Trout  
Entiat Ranger District

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**Objective:** To expand local knowledge of spring-spawning steelhead numbers, timing, and locations and establish steelhead spawning index reaches.

**Methods:** Forest Service Fishery Biologists Phil Archibald and Emily Johnson conducted the 2003 spring spawning surveys on the lower Mad River (RM 1-7) and Roaring Creek (RM 1-2), see attached table for specific dates and locations. Biologists from the USFWS Mid-Columbia Fisheries Resource Office (FRO) initiated more extensive spawning ground surveys of the Entiat River this year. Data collected included date, time, weather conditions, water temperature, fish observed, redd identification by type (definite, probable, possible), and other relevant observations such as redd dimensions and water velocities. All redd and fish dimensions were estimated as were surface water velocities over redds. Redds were enumerated sequentially for each stream in the order encountered.

Preliminary surveys were initiated in late-February. Preliminary surveys consist of weekly spot-checks of easily-accessible known spawning locations. More extensive surveys were initiated after first spawning activity was observed (March 25, 2003) and continued on April 2, 8, 22 and May 1. Spring spawning surveys were targeted for mid-April, a time period which has previously been observed to be the most likely steelhead spawning window in the Entiat/Mad Rivers. The mid-April to early-May spawning window comports well with steelhead spawning observed in the Icicle River, Nason Creek, and Wenatchee River (Murdoch and Viola 2003).

Surveys were conducted by biologists walking along the top of streambanks or from adjacent roads/trails or by wading sections of streams that were not visible from other vantage points. Most of the lower Mad River is easily surveyed from the adjacent County Road and Mad River Trail. This year, for the first time, we attempted to revisit each redd several times throughout the spawning season to document the development of each redd through the stages of new-and-bright to complete-and-fading to obscured. This procedure is consistent with the procedure recommended by WDFW biologist A. Viola and being utilized by the FRO on the Entiat River.

**Results:** During the survey period (3/25-5/1/03), Mad River water temperature averaged 42.5°F (range 36.4-50.9°F) as recorded by a datalogger at Mad RM 2.0. Steelhead spawning progressed upstream as water temperatures increased. Streamflow at Entiat RM 18 gradually increased during the spawning period, from 165 cfs (3/24/03) to 538 cfs (5/5/03). Four freshets occurred during the spawning period when streamflow at Entiat RM 18 fluctuated between 100 and 500 cfs (Figure 1). Spring flow volume this year fluctuated closely around the USGS 44-year mean during the steelhead spawning season (Figure 1). Overall flow conditions were low and clear with good visibility on all days of surveying. FS biologists Archibald and Johnson measured Mad River streamflow of 72 cfs at the Instream Flow Study transect 3 (Mad RM 1.3) on April 8. ENTRIX (2003) predicted 100 percent of the channel width of this transect would meet or exceed steelhead passage and spawning criteria at a flow of 75 cfs.

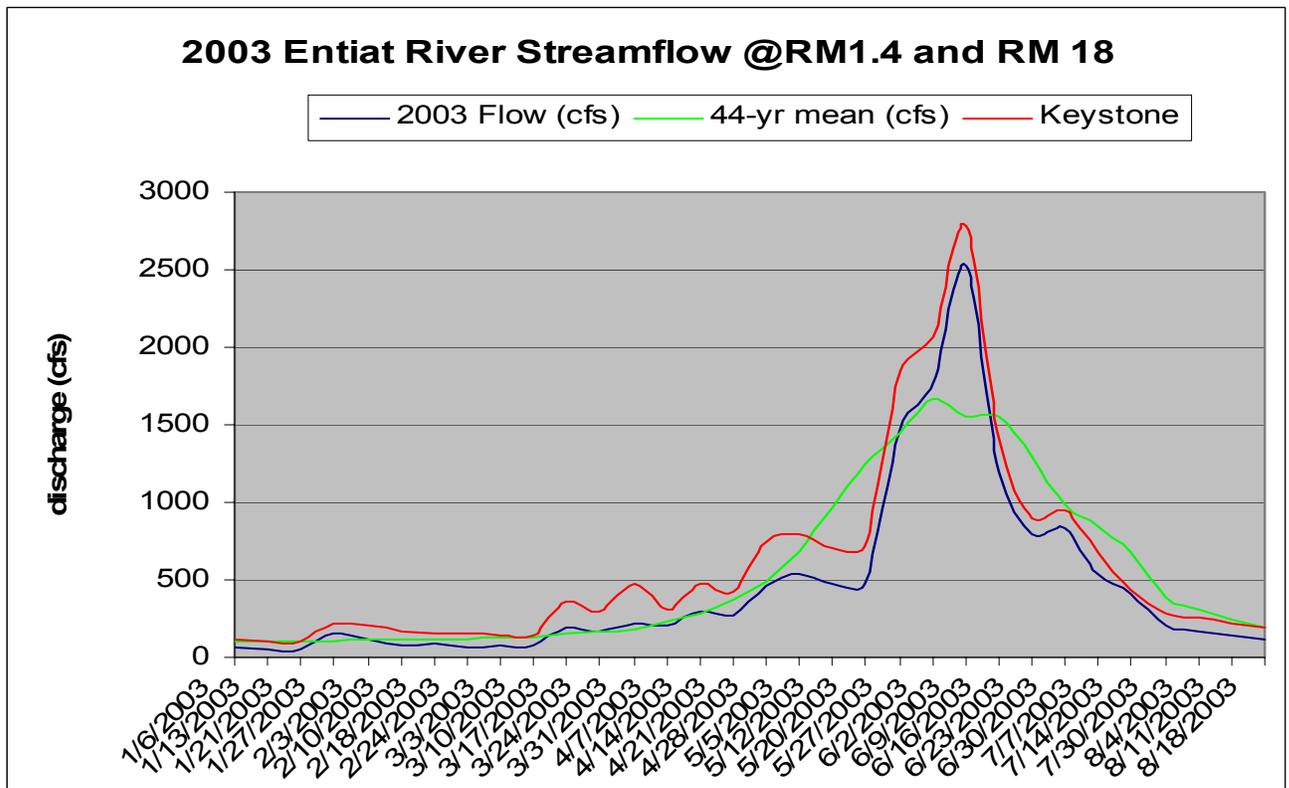


Figure 1. Entiat River discharge at USGS Ardenvoir gage, 2003.

A total of 44 steelhead redds were identified in the Mad River between rivermiles 1 and 7.2, consisting of 38 definite redds (30 percent with spawners present) and 6 probable redds (see Table 1 and attachment 1 for specifics). Twelve adult steelhead (16 to 28 inches estimated total length) were observed on or near redds in the Mad River. Two rainbow/steelhead redds and one 20-inch adult steelhead were observed in Roaring Creek at approximately RM 1.5 on April 10.

**Table 1.** Steelhead/Rainbow trout redd counts on the Mad River, 1997 through 2003.

Year	1997	1998	1999	2000	2001	2002	2003
Definite Redds	8		0	3	15	14	38
Probable Redds	Not distinguished		3	5	2	3	6
RM surveyed	1 to 3	No survey	1 to 4	1 to 10	1 to 10	1 to 7	1 to 7

**Discussion and Conclusions:** It is widely acknowledged among fishery biologists that spring spawning surveys can be unpredictable and difficult to replicate due to snow conditions, poor visibility due to turbidity, and rising stream flows. Salmonid spawning timing can also vary widely through the months of March through June depending on flow, temperature, and weather conditions. Regardless of these drawbacks, we continued spring spawning surveys in the Entiat Subbasin this year with good success.

The results of our spawning ground surveys likely represent the majority of steelhead spawning in the Mad River. The definite redds observed at Mad River mile 1.3 and RMs 5.1-7.2 were at locations where steelhead redds have been seen in previous years. The 2003 red count represents

a 159 percent increase over the 2002 redd count. This is likely due in part to the increased ocean survival that has been evidenced by escapement increases of all Mid-Columbia River anadromous fishes over the last several years and increased effort (in time and space) of spawning ground surveys on the Mad River which have benefitted from the knowledge gained since 1997. Spawning peaked during the expected time period, early April, in the Mad River (Figure 2).

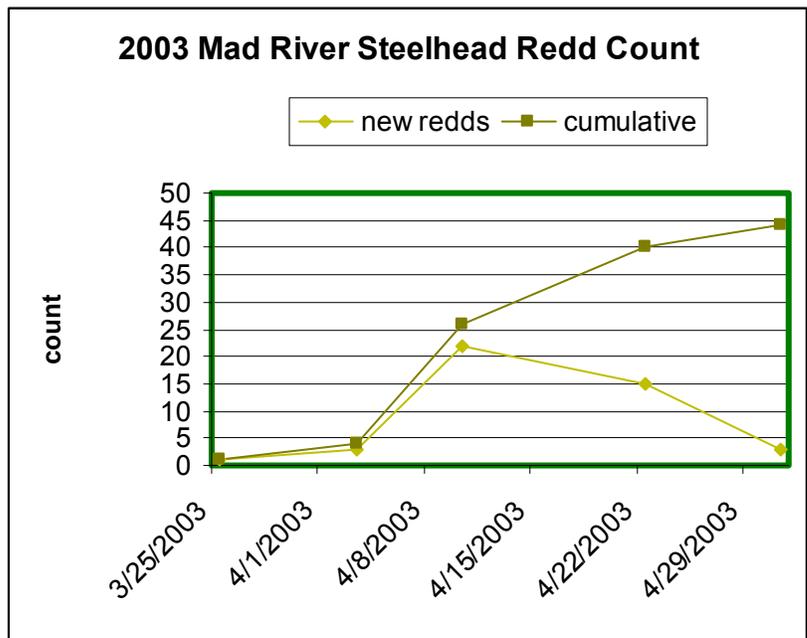


Figure 2. Mad River steelhead redd chronology, 2003.

For the years 2000-2002 we compared our ground-survey redd locations to the telemetry detected locations of radio-tagged steelhead in the Entiat and Mad Rivers reported by English et al. (2001). Our 2000-2002 ground surveys documented steelhead redds at all of the stationary (>1 month) detection locations during the observed spawning period each year (early-March through late-April) except for the Entiat River near Crum Canyon site, which has not been surveyed.

**Recommendations:** With respect to the 8/11/97 ESA endangered listing of Upper Columbia River steelhead, more and better information on this species is needed for quality Biological Assessments. It is recommended that spring spawning surveys be continued. Based on the results and knowledge gained during the past five years of steelhead spawning surveys we recommend establishing an index reach on the Mad River between rivermiles 1 and 7. This Mad River index reach will be our primary focus in the future. We will continue to seek assistance from WDFW and USFWS MCRFRO to expand survey areas (Entiat River) and increase survey frequency and continue implementation of a standardized survey protocol.

The 2003 survey costs totaled \$3600. This total includes: 8 days GS-11 surveying and reporting (\$2120); 8 days GS-9 surveying and water temperature monitoring (\$1280); and 350 miles of travel (\$200).

**References:**

- English K.K., C. Sliwinski, B. Nass, and J.R. Stevenson. 2001. Assessment of Adult Steelhead Migration through the Mid-Columbia River using Radio-Telemetry Techniques, 1999-2000. Report prepared by LGL Limited for PUD No. 2 of Grant County, PUD No. 1 of Chelan County, and PUD No. 1 of Douglas County. 48 p + appendices.
- ENTRIX. 2003. Draft Flow Study Report, Entiat Watershed Planning Unit. CD available from Chelan County Conservation District, Yakima Street, Wenatchee, WA 98801.
- Murdoch, A. and A. Viola. 2003. 2002 Wenatchee River Basin Steelhead Spawning Ground Surveys. WDFW Fish Program, Science Division, Mid-Columbia Field Office, Rock Island Evaluation, 610 N. Mission St., Suite B8, Wenatchee, WA 98801.