

ERRATA AND CORRECTIONS

FOR

***ENTIAT TRIBUTARY ASSESSMENT,
CHELAN COUNTY, WASHINGTON (JANUARY 2009)***

***TECHNICAL APPENDICES, ENTIAT TRIBUTARY ASSESSMENT
CHELAN COUNTY, WASHINGTON (JANUARY 2009)***

***ENTIAT TRIBUTARY ASSESSMENT MAP ATLAS
(JANUARY 2009)***

U.S. BUREAU OF RECLAMATION

TECHNICAL SERVICE CENTER, DENVER, CO

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Note: In most instances, corrections have been formatted (font type, size, and width) so at the reader's option, they may be cut-and-pasted over the sections they update.

Entiat Tributary Assessment, Chelan County, Washington

1) p. 9, Table 2, Reach 1D and 1E description, change “Tressel” to “trestle”

to now read:

1D	4.3–6.3	Just below Entiat River Road Bridge to trestle bridge	0.011	low	confined	Holocene terraces
1E	6.3–6.9	trestle bridge to Entiat Fish National Hatchery	0.012	moderate	moderately confined	Holocene terraces

2) p. 13, Figure 4. Change caption to now read:

Figure 4. Location of sixteen geomorphic reach types between Entiat RM 0–26 defined by relative level of potential habitat complexity and active floodplain confinement. Reach 1A is not considered a reach type because it is heavily influenced by the backwater from Rocky Reach Dam on the Columbia River and has characteristics that are more similar to a lake environment than a river environment.

3) p. 15, section 3.1, at the end of the second paragraph, add following sentence:

The Yakama Indian Nation does not support the validity of Mullan et al (1992) (personal communication from L. Carlson to P. Archibald, 3-3-2009). The paragraph should now read:

The *Entiat Ecosystem Diagnosis and Treatment (EDT) Watershed Analysis* (Mobrاند 2003) estimated historical (pre-settlement) spring Chinook salmon average annual abundance of 2,557 adults with an environmental capacity of 2,789 adults. EDT modeling of Entiat steelhead was begun but not completed; hence, no historic abundance estimates for this species are available. Mullan et al. (1992) estimated pre-development optimum escapements for “maximum sustainable yield” (MSY) for wild Entiat River steelhead as 417 adults on the basis of estimated smolt production from the Entiat River. It should be noted that the Yakama Nation does not support the validity of Mullan et al. (1992) (personal communication from L. Carlson to P. Archibald; March 3, 2009).

4) p. 25, change caption to read:

Figure 7. Stream bank erosion example in Reach 3A (RM 21.1-22.7).

5) p. 55, §6.2, first paragraph, add these words — VS-2 contains. The paragraph now reads:

VS-2 contains two reaches that are confined by alluvial fans (2B and 2D), and two reaches that are unconfined with wide, active floodplains (2A and 2C). Historical channel movement in the unconfined floodplain reaches is moderate to high, indicating that floodplain areas are accessible to the river and that there may be many opportunities for additional suitable off-channel habitat. The low slope of these reaches and amount of large woody debris suggests that the degree of channel complexity is high and should provide for a variety of habitat within the active channel as well. Several human or restoration features are worthy to note. Restoration features in Reach 2A at RM 16.4 and 17.4 block channel migration through the active floodplain; the benefits of the project and the habitat created should be weighed against the limit to natural processes when considering the maintenance of this project.

6) p. 59, section 7.3.2., change citation to read

(USCRB 2007)

7) p. 76, section 7.3.4, second sentence, add “are” where shown in following sentence.....and 3E that are high energy The paragraph now reads:

Habitat limiting factors exist in the majority of the reaches between RM 0–26. The exceptions are reaches 3C and 3E that are high energy transport reaches and primarily operate as migration corridors. Six reaches were identified in Subsection 7.3.1 as having the greatest impacts; these are 1A, 1B, and 1C (RM 0–4.3), 1E (RM 6.3–6.9), 2C (RM 18.1–20.9), and 3A (RM 21.1–22.7). Five reaches were categorized as High complexity reaches that have the greatest natural potential for creating channel complexity including off-channel habitat, refuge, cover and spawning; these are 2A (RM 16.1–17.9), 2C (RM 18.1–20.9), 3A (RM 21.1–22.7), 3D (RM 24–25), and 3F (RM 25.6–26).

8) p.78, second bullet point , correct resourced managers should be resource managers. The point should now read:

- More rigorous work should be performed in reaches 1E, 2A, 2C, and 3A to refine the cause-and-effect relationships between human features and channel morphology and resulting habitat where channel and floodplain restoration projects are proposed. Linkages between existing human features that impact channel function should be identified to help resource managers determine whether potential restoration projects can be designed independently or need to be linked together in longer river segments to create improved channel and floodplain function.

9) p. 79, Section 7.4.2 – add this new bullet point at the end of bullet list:

- Extensive redd count data exist, but the relationship between adult escapement and N(e) — number of effective spawners — is poorly understood. Further work on this relationship may prove valuable and should continue in other forums such as the UCRTT Monitoring and Data Management Committee that are identifying other data gaps.

Technical Appendices, Entiat Tributary Assessment, Chelan County, Washington

10) p. A-3 – 1976 - Spring Chinook annual releases ended with the 2006 year class (did not continue to present day). See page H-5 last sentence

to now read:

1976 Spring Chinook annual releases ended with the 2006 year class (did not continue to present day).

11) p. A-11 – 1872 —replace the word after “temporarily ...”

to now read:

1872 Earthquake two miles upstream of confluence that temporarily dammed the Columbia and then sent a rush of water when the dam broke; this event would likely have eroded any historical delta deposition from the Entiat at the confluence with the Columbia

12) p. B-1, section 2.2 - bottom of page – out-of-service gage was located somewhere downstream of RM 0.8 and was inundated by Rocky Reach reservoir – it was NOT at RM 1.4. The paragraph now reads:

Within the Entiat River drainage basin, there are currently three operating USGS real-time surface-water stations (**Error! Reference source not found.**). The Keystone gage (12452990) is located at river mile (RM) 1.4 and has a drainage area of 416 mi². For the period 1996–2007, the instantaneous annual peaks are available at this gage along with the mean daily discharges. At RM 18, the “Entiat River near Ardenvoir, WA” gage (12452800) has been operating since 1958; it has a drainage area of 203 mi² and 47 years of annual peak data and mean daily discharge data. “Mad River at Ardenvoir, WA” gage (12452890) has been operating since 2002; it has a drainage area of 92 mi² and six years of annual peak data and mean daily discharge data. Prior to these three gages, there is an out-of-service gage that was also located on the Entiat River located somewhere downstream of RM 0.8 and was inundated by Rocky Reach reservoir. The “Entiat River near Entiat, WA” gage (12453000), also known locally

13) p. C-3, second paragraph [Section 3 continued] – “correct number of pools” replace with “potential pool frequency”. The paragraph should now read:

The Chelan Conservation District (1998) performed a geomorphic inventory, along with riparian and fish habitat inventories, in which they classified the channels according to Rosgen’s (1996) classification scheme and counted the potential pool frequency in each reach from RM 0–20. Alternatives are listed for the correct number of pools according to the Rosgen stream classification. This report cites changes in sinuosity historically although there is no quantitative data given and also indicates that RM 0-20 have a high potential for severe erosion.

14) p. C-8 section 5.1.4 — “Tressel” bridge – should be “trestle” bridge

15) p. C-9, section 5.1.5 — “Tressel” bridge – should be “trestle” bridge

16) p. C-10, section 5.2.2 – last sentence ...”a large pine tree” – should be a “large Douglas-fir” tree. The paragraph should now read:

Reach 2B extends along the length of the oldest and highest portion of Stormy Creek alluvial fan. Through this reach, the channel is a predominantly single-thread entrenched meandering channel whose bends are controlled by the Stormy Creek alluvial fan and a combination of colluvium and steep fan complexes on the opposite side of the river. These features create near right angle bends in the river, where deposition of large sand bars upstream of these hard points appear to be a consistent feature throughout the years of historical aerial photography. Alluvial fan deposits are the dominant feature through this reach. During high flows of 2008, a large Douglas-fir tree toppled from the left bank of the Stormy Creek alluvial fan, blocking the active channel.

17) p. C-23 — replace “C horizon” with “C/C2 horizon” and modify sentence to now read:

Charcoal samples from a depth of 94 cm in the C3 horizon (representing the top of the oxbow environment) and 56-68 cm in the C/C2 horizon range from 1130 ± 20 BP (1,090-960 Cal BP) to 1700 ± 20 BP (1700-1540 Cal BP), respectively, and indicate that the deposits in this stream bank provide a record of at least 1,000 years of alluvial sedimentation (Puseman and Varney 2009).

18) p. C-23 – add to end of paragraph: The sample from a depth of 94 cm is used as an age estimate for the deposit because it is more likely that the tree grew nearby and fell into the developing oxbow and therefore did not have a long residence time in the river system prior to deposition. It is likely that the charcoal sample from 56-68 cm in the C/C2 horizon (1700-1540 Cal BP) was transported and deposited as part of the stratigraphy, and thus represents a maximum age for the deposit.

19) p. C-46, Figure C-19 caption should be Reach 3A instead of 3C, to now read:

Figure C-1. Example of bank erosion of the Qa3 unit by undercutting in Reach 3A.

20) p. C-50, section 9.5, first paragraph – delete the last sentence and insert “Debris flows associated with several storm events during the historical period have been an important source of sediment to the channel.” The paragraph should now read:

Tributaries deliver sediment to the Entiat River through debris flows, hyperconcentrated flows or predominantly clear water flows. These sediment sources are typically active during high intensity rainstorm events and thus typically happen during the summer months. They provide a rapid pulse of sediment to the main channel that may plug or temporarily alter the stage of the mainstem discharge. These deposits in the main channel may alter the course of the main channel for longer time periods, forcing the channel to the opposite bank until higher flows during the spring can transport some of the larger material downstream. Debris flows associated with several storm events during the historical period have been an important source of sediment to the channel.

21) p. C-64, Attachment A, change “tressel” to “trestle”

22) p. E-14, replace the existing third sentence with this one: "Preferential velocities are shown to be exceeded rapidly and at relatively low flows, indicating a small amount and brief occurrence of preferential habitat for steelhead in the Bridge-to-Bridge Reach."

The entire paragraph should now be:

In-stream velocities were determined for a range of flows at each cross-section using the hydraulic modeling results to see how they matched up with the preferential curves. The results from this analysis at the cross-sections making up the Bridge-to-Bridge Reach (RM 3.2–4.6) are shown in **Error! Reference source not found.** Preferential velocities are shown to be exceeded rapidly and at relatively low flows, indicating a small amount and brief occurrence of preferential habitat for steelhead in the Bridge-to-Bridge Reach. The entire set of velocity curves from the limits of this study showed comparable results.

23) p. G-8 – first paragraph, midpoint – “insipient” – should be incipient

24) p. H-5 – section 3.2 – first paragraph – (BOF 1036) should be (BOF 1936)

ENTIAT TRIBUTARY ASSESSMENT MAP ATLAS

Map 08, Reach Types – Reach 1A should not be shown as a reach type; light-yellow “high floodplain” delineation should be removed as well as light-blue colored mapping in Valley Segment 1.

[from Correction 2 above: **Reach 1-A is not considered a reach type because it is heavily influenced by the backwater from Rocky Reach Dam on the Columbia River and has characteristics that are more similar to a lake environment than a river environment.]**