

## **Meeting Notes – Baker River Basin Native Char Consultation Fish Passage Technical Working Group (FPTWG)**

**Project:** Baker River Project  
FERC No. 2150

**Written By:** Nathanael Overman, PSE

**Meeting Date:** January, 19 2010 (Tue.), 9:00 am – 12:30 pm

**Location:** USFWS Office, Lacey, WA

**Attendees:** Doug Bruland, PSE                      Phil Hilgert, R2  
Jeff Chan, USFWS                      LouEllyn Jones, USFWS  
Haley Edwards, PSE                      Nathanael Overman, PSE  
Cary Feldmann, PSE                      Maureen “Mo” Small, WDFW  
Denise Hawkins, USFWS                      Nick Verretto, PSE

**Purpose:** Review 2009 genetic analysis of tissue samples and discuss implications for a fishway between Lake Shannon and Baker Lake.

Generally following the agenda (attachment 1), the group reviewed a summary of char captures and handling in 2009, results of the WDFW genetic analysis of Baker basin char, and implications for fishway options to establish connectivity between Lake Shannon and Baker Lake.

Phil opened the meeting by reviewing the 2009 Baker basin bull trout captures (Table 1) and discussing the results of the 2009 char snorkel surveys in the Baker River/tributaries (Table 2) and Sulphur Creek (Table 3). Lower counts in Sulphur Creek were thought to have resulted from new personnel conducting the survey rather than representing actual population changes. High numbers of woody debris in Sulphur Creek make char observations difficult and an effort will be made to help the survey crew incorporate more effective methods of observation such as the use of flashlights during future surveys.

### **WDFW Genetic Analysis Summary**

Tissue samples from char captured in the Baker River basin were analyzed by WDFW to evaluate potential genetic differences. Mo discussed these results and explained the figures and tables included in the final report (12/10/09).

### **Methods**

- Bull trout tissue samples were collected from 2002 to 2009 and sent to the WDFW genetics lab for analysis in both 2008 and 2009. Samples consisted of 297 adults or sub-adults and 176 juveniles collected throughout the Baker Basin at the following locations: the Upper Baker (UB) River and tributaries, UB FSC and Gulper, tailrace below UB dam, Sulphur Creek, Lower Baker Gulper, and the adult trap (Table 4).
- Bull trout were genotyped at 16 microsatellite DNA loci (standardized among labs researching bull trout) to identify their genetic origins. Of the 473 samples submitted for analysis, 418 had at least seven loci in their genotype which provided enough genetic data to analyze in the study (Table 4).
- Several statistical analyses were used to estimate the level of genetic distinction among individuals and populations. In the GeneClass analysis, relative likelihood values were calculated for each bull trout to estimate the likelihood that individuals originated in one of four baseline collections: Sulphur Creek, Upper Baker, Illabot Creek, and Sauk River. A likelihood value of 90% was used as a threshold for making positive genetic assignments to these baseline collections. In the STRUCTURE analysis, individual genotypes were partitioned into clusters of genetic similarity. By sorting fish into hypothetical clusters representing genetically unique populations, this allowed tests to be conducted to evaluate multiple distinct populations in the Baker Basin.

#### **Results (summary bullets from WDFW report)**

- We found five brook trout that had been collected in the downstream fish passage facility (Lower Baker Gulper), and no interspecific hybrids.
- Juvenile samples from Sulphur Creek and Upper Baker River represent separate populations and can be used as a Baker River Basin bull trout genetic baseline.
- Based on analyses of juvenile, sub-adult and adult samples from the Upper Baker River and the adult trap in the Lower Baker River, there appears to be more than one bull trout population in the Upper Baker basin.
- Adult bull trout collected at the Lower Baker River trap for transport into the Upper Baker reservoir come from within the Baker River basin and from outside the basin.
- Most sub-adult fish collected in the Upper Baker downstream fish passage facility (Upper Baker Gulper and FSC) had ancestry in the Baker River basin and three had ancestry in the Sauk population.
- Sauk-ancestry juvenile fish collected in the Upper Baker FSC indicate that Sauk fish transported in the trap and haul operation have reproduced in the Upper Baker basin.
- The Baker River basin bull trout populations continue to express migratory behavior.

Denise noted that the results indicate there are at least two Upper Baker bull trout populations. Additional populations in the Baker Lake watershed might be identified if additional tributaries are sampled; however, it was agreed that identifying additional Baker Lake bull trout populations would have little bearing on transport protocols. Fish from each Baker Lake population would sort themselves out upon transport and release into Baker Lake.



Nathanael reviewed a figure depicting GeneClass assignments for juvenile and adult bull trout at each collection facility or sampling location (Figure 1). It was noted that bull trout sampled in the Upper Baker River and its tributaries were almost exclusively of Upper Baker origin, and similarly, relatively few fish with origins outside of Sulphur Creek were captured in Sulphur Creek.

Prior to 2009, approximately equal numbers of out-of-basin and in-basin bull trout were captured in the adult trap, hauled upstream, and released into Baker Lake. During 2009, bull trout captured in the adult trap were released back into the Skagit River and only bull trout entering the trap a second time were hauled upstream and released into Baker Lake. Tissue samples were analyzed from 13 bull trout captured in the adult trap in 2009 (through Aug 7). Genetic analysis indicated 8 were of Upper Baker origin, 2 of Sulphur Creek origin, 2 of Illabot Creek origin, and 1 of Sauk River origin. Four of these bull trout were recaptured: 2 of Upper Baker origin and 2 of Sulphur Creek origin. Phil suggested that continuing the 2009 adult trap protocol through 2010 was needed to evaluate the success of using repeat captures to separate out-of-basin from in-basin fish.

The group discussed the goals of establishing connectivity between Lake Shannon and Baker Lake. Jeff mentioned that the goals have evolved somewhat as more has been learned about Baker bull trout, and emphasized that the current goal for establishing connectivity should primarily be to get the majority of Baker Lake bull trout found in other areas back into Baker Lake to preserve their reproductive potential. It was noted that Upper Baker bull trout may be rearing in Lake Shannon but not reproducing.

The group discussed the implications of the genetic results for the type of fishway that would meet the goal of returning Baker Lake fish back into Baker Lake. Specifically, the pros and cons of constructing a weir on Sulphur Creek, constructing a fish trap located near the base of Upper Baker Dam, and angling for bull trout were discussed. It was noted that a weir on Sulphur Creek would be highly effective at capturing bull trout, but Sulphur Creek fish would be exposed to handling stress if tissue samples were taken from every fish and then fish were held for 24 hours while genetic analysis was being conducted. It was further noted that the Sulphur Creek population appears to be relatively healthy; a weir could inhibit natural migratory movements and have unforeseen adverse effects on the Sulphur Creek population. Conversely, a fish trap at the base of Upper Baker Dam would likely catch a higher percentage of fish of Upper Baker origin, but the effectiveness of a trap for capturing adult bull trout would likely be low. A third option, angling for bull trout, was discussed. Angling could be more productive than a trap for capturing fish, and could cover spring, summer and fall periods. Adult bull trout can be easily captured by angling at the Lake Shannon gulper, but Phil suggested that angling in the late summer and fall near the Upper Baker tailrace would more likely capture bull trout of Upper Baker origin exhibiting upstream migratory behavior. Jeff commented that an appropriate short-term solution for a fishway might be to actively collect and transport bull trout (e.g., via angling), whereas long-term, relying on PIT-tagging all bull trout encountered at the fish passage facilities may be sufficient. Regardless of the type of fishway, Denise and Mo indicated that segregating Baker Lake, Lake Shannon, and out-of-basin bull trout populations would be beneficial.

## **Additional Comments**

Public education signage (Article 410) will be underway in 2010; Haley will contact the USFS and the USFWS information and education staff for recommendations.

A follow-up meeting was scheduled for February 26 from 9-11 am in Lacey.

### Tentative Agenda Items

- 1) Confirm handling protocols for 2010. During 2009, all bull trout encountered at the PSE Baker fish passage facilities were PIT-tagged and genetic samples collected and analyzed. Bull trout captured in the adult trap were released back into the Skagit River and only bull trout entering the adult trap a second time were hauled upstream and released into Baker Lake. Tentative recommendation is to continue these protocols through 2010.
- 2) Confirm PSE's response to Article 104: Connectivity. Tentative recommendation is to angle for bull trout in Lake Shannon and transport and release Baker Lake origin fish back into Baker Lake. If angling is confirmed as the approach for 2010, the level of effort and other details will need to be worked out
- 3) Jeff mentioned that Jon-Paul Shannahan was interested in sampling bull trout for diet analysis, and suggested that this be discussed at the next meeting.

**Attachment 1.**

## **BAKER RIVER BASIN NATIVE CHAR CONSULTATION**

**Fish Passage Technical Working Group (FPTWG)**

**9:30 am – 12:30 pm**  
**Tuesday, January 19, 2010**  
**Room 133, USFWS Office,**  
**Lacey, Washington**

### ***DRAFT AGENDA***

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*Objective: Review results of 2009 activities and future implementation of articles and prescriptions.*

- 1. Brief Review of Project Features and Current Bull Trout Handling/Study Efforts**
- 2. Summarize January through December 2009 Activity**
  - Lower Baker adult trap
  - Construction of new Lower Baker adult trap
  - Upper Baker floating surface collector, bull trout capture and transport
  - Lower Baker Gulper, bull trout capture and transport
  - Sulphur Creek and Upper Baker River snorkel surveys
  - Baker Basin bull trout juvenile and subadult tissue samples
- 3. Results of WDFW Genetic Analysis**
- 4. Review Decision Process for License Article 103 (Upstream Fish Passage Facility)**
  - Tissue samples analyzed from 13 bull trout entering adult trap June thru August 7, 2009
    - 8 Upper Baker                      2 Illabot Creek
    - 2 Sulphur Creek      1 Sauk River
  - 4 bull trout re-entered trap (2 Upper Baker, 2 Sulphur Creek)
- 5. Review Decision Process for License Article 104 (Connectivity)**
  - Review License Article and current schedule
- 6. Review Status of License Article 410 (Threatened, Endangered and Sensitive Species Plan, Recreational Fishing)**
- 7. Proposed 2010 Activities**
  - Capture and transport of bull trout at Baker Project facilities
  - Bull trout handling protocols
  - Sulphur Creek and Upper Baker River snorkel surveys
  - Upper Baker FSC bull trout captures
  - Additional response to license articles and prescriptions
- 8. Recap Decisions and Outstanding Action Items**



**Table 1.-Adult (>300 mm), sub-adult (151-300 mm), and juvenile (≤150 mm) bull trout captured in 2009 in the lower Baker adult trap, the lower Baker gulper, the upper Baker FSC, or angler-caught near the upper Baker FSC net transition structure (UB NTS). Length was not recorded for six bull trout.**

Capture location	Month	Adult	Sub-adult	Juvenile	No data	Total
LB Adult trap	June	6			1	7
	July	6	1			7
	August	5				5
	September	4*			1	5
	October	3				3
	November	1				1
	December	2				2
	<b>Total</b>	<b>27</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>30</b>
LB Gulper	May			1		1
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>
UB FSC	February			1		1
	March			1		1
	April	2	1	5	1	9
	May	4	3	8	2	17
	June		1	2	1	4
	July		2	1		3
	<b>Total</b>	<b>6</b>	<b>7</b>	<b>18</b>	<b>4</b>	<b>35</b>
UB NTS	April	2				2
Angler-caught	May	14				14
	June	5				5
	<b>Total</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>21</b>

\*Includes one adult bull trout from the adult trap that had not been added to the version presented at the meeting.

**Table 2.-Adult native char counts observed during snorkel surveys of the upper Baker River during periods of 2000-2001, 2003-2006 and 2009 by survey reach, with mean counts per river mile. Surveys were conducted by NPS, SRSC, PSE and/or R2 personnel.**

Survey Year	Date	Reach 1 <sup>1</sup> (1.2 miles)	Reach 2 <sup>1</sup> (1.8 miles)	Reach 3 <sup>1</sup> (1.8 miles)	Reach 4 <sup>1</sup> (2.1 miles)	Mean Count per RM
<b>2000</b>	October 31	6 <sup>2</sup>	11	—	—	5.7
	November 14	0 <sup>2</sup>	6	—	—	2.0
	November 28	3 <sup>2</sup>	1	—	—	1.3
<b>2001</b>	September 27-28	6	25	17	—	10.0
	October 3-4	7	45	33	—	17.7
	October 15-17	1	28	22	11	9.0
<b>2003</b>	September 29-October 2	1	1	1	5	1.2
	October 3-4	0	35	4	0	5.7
<b>2004</b>	August 12	4	9	—	—	4.3
	September 7	8	21	16	—	9.4
	September 23	2	9	8	—	4.0
	October 12	1	3	3	—	1.5
	November 11	0	2	4	—	1.3
<b>2005</b>	August 11	—	2	7	—	2.5
	August 23	—	7	10	—	4.7
	September 8	—	35	12	—	13.1
	September 22	—	78	7	—	23.6
	October 25	—	1	2	—	0.8
<b>2006</b>	September 21	3	—	—	—	3.0
	September 28	2	—	—	—	2.0
	October 5	5	—	—	—	5.0
	October 12-13	4	31	8	—	14.3
<b>2009</b>	September 17	—	5	15	—	5.6
	October 15	—	7	17	—	6.7
	November 12	—	2	9	—	2.5

- Reach was not surveyed

<sup>1</sup> Reach 1 extends from the Baker River footbridge downstream to Baker Lake. The lower terminus of Reach 1 is the upper Baker Lake delta at normal full pool at the base of the jetty upstream of Channel Creek (Baker River RM 20.0). Surveys conducted after mid-October often continued downstream beyond this point.

Reach 2 extends from the Sulphide Creek confluence downstream to the Baker River footbridge.

Reach 3 extends from the Crystal Creek confluence downstream to just above the Sulphide Creek confluence.

Reach 4 extends from the Bald Eagle Creek confluence downstream to just above the Crystal Creek confluence.

<sup>2</sup> Surveys of Reach 1 in 2000 were incomplete.

**Table 3.-Adult native char counts observed during snorkel surveys of Sulphur Creek during 2003-2006 and 2009.**

Survey Year	Date	Reach 1 <sup>1</sup> (0.4 mile)	Reach 2 <sup>1</sup> (0.3 mile)	Reach 3 <sup>1</sup> (0.1 mile)	Reach 4 <sup>1</sup> (0.2 mile)	Mean Count per RM <sup>2</sup>
<b>2009</b>	September 10	0	0	0	0	0
	September 16	0	0	0	0	0
	September 25	0	0	0	0	0
	October 9	1	0	0	0	1.3
	October 29	0	0	1	0	1.3
	November 5	1	0	0	0	1.3
	November 12	0	1	0	0	1.3
	November 25	0	1	0	0	1.3

Year	Number of Surveys	Number of Bull Trout Observed
<b>2003</b>	1	6
<b>2004</b>	8	28
<b>2005</b>	16	57
<b>2006</b>	11	26
<b>2009</b>	8	5

<sup>1</sup> Reach 1 extends from the confluence of the left side spring (looking downstream) to Lake Shannon. Reach 2 extends from a left side tributary downstream to the spring. Reach 3 extends from an 8-foot falls to the left side tributary. Reach 4 extends from the 21-foot falls to the 8-foot falls.

<sup>2</sup> Reach 4 was not included in fish per river mile calculations.





**Table 4.-Numbers of bull trout tissue samples analyzed (2008 and 2009), and of those samples, the numbers that had at least seven loci in their genotype which provided enough genetic data to include in the study.**

Region	Location	Adult and sub-adult		Juvenile	
		Analyzed	≥7 Loci	Analyzed	≥7 Loci
Lower Baker River	LB Adult trap	117	115	-	-
Lake Shannon Sub-basin	LB Gulper	21	19	-	-
	UB Tailrace	13	12	-	-
	Sulphur Cr	-	-	38	32
Baker Lake Sub-basin	UB Gulper	44	25	-	-
	UB FSC	102	100	41	41
Upper Baker Sub-basin	UB River/Tribs	-	-	97	74
<b>Total</b>		<b>297</b>	<b>271</b>	<b>176</b>	<b>147</b>

**Figure 1.- GeneClass assignments for juvenile and adult bull trout throughout the Baker Basin.**

