TRINITY RIVER RESTORATION PROGRAM
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Technical Work Group Summary
June 2012

Updates have been prepared by the Trinity River Restoration Program technical workgroup coordinators at the request of the Trinity Management Council and the Trinity Adaptive Management Working Group. The quarterly Technical Work Group Summaries will also be posted at: http://www.trrp.net/?page_id=1762 (update of webpage in progress).

Work Group: Flow **Coordinator:** Tim Hayden

- The flow work group is assessing the implications of constant base flows.
- A draft Water Year 2011 flow implementation report is being revised.
- Fall flow sub-workgroup developed recommendations to help avert a fish die-off in the Lower Klamath(hand out).

Work Group: Temperature **Coordinator:** Rod Wittler

- The Lewiston reservoir special study is on track for a September 2012 completion. The study is being managed by Dr Shelly McGinnis of Reclamation's Mid-Pacific Region Division of Planning in consultation with the TRRP temperature work group. The study will investigate structural and/or operational alternatives and provide recommendations for improving the transmission of cold water through Lewiston reservoir. The special study surpasses the analysis needed for and Appraisal Study. A future Initial Alternatives Information Report (IAIR) and then a Feasibility Study may build on this study.
- Trinity reservoir carryover storage analysis to determine the optimal range of end-of-September carryover storage volume for Trinity Reservoir is also on track for a September 2012 completion. The analysis is being conducted by experts from Reclamation's Technical Services Center in consultation with the TRRP temperature work group.

Work Group: Interdisciplinary **Coordinator:** Ernie Clarke / DJ Bandrowski

- The IDT has provided input on the FY13 preliminary science workplan which is now undergoing external review (see Science Update).
- The IDT is developing answers to the "TRRP Big Questions" based on current knowledge.

Work Group: Design **Coordinator:** DJ Bandrowski

- Final Civil Designs have been completed for 2012 Channel Rehabilitation Projects including: Upper Junction City (UJC) and Lower Steiner Flat (LSF) construction is planned to start July 1 for both projects
- Revegetation Designs are in progress for UJC/LSF Rehab Sites, and Indian Creek Bank Naturalization Project projects, completion planned for July 1.
- Bucktail Bridge Cost Benefit Analysis underway, completion planned for Aug 1
- 2013 planning and design considerations being evaluated in coordination with the upcoming results of the Phase I Review
- Next Design Team meeting planned for July30-Aug1. Peter Wilcock and Corp of Engineers Team will be providing workshop on the "Stream Project" – an Alternative Analysis Decision Framework for design comparisons.

Work Group: Fish **Coordinator:** Joe Polos

The Fish WG last met on May 10 in Weaverville. The primary topics of discussion were: (1) Fish Related Performance Measures, (2) SF Trinity Spring Chinook Limiting Factor Analysis, (3) Juvenile Salmonid Outmigration Timing in Relation Spring/Summer Flow Management, and (4) Adult Salmonid Monitoring Review.

- Authors of the current performance measure documents will be asked when they will have data available to update their documents.
- Josh Smith of the Watershed Research and Training Center presented the draft SF Trinity Spring Chinook salmon Limiting Factor Analysis report. This report was developed by a subgroup of the Fish WG. The draft report is currently under review by the Fish WG and will be revised following receipt of comments which were due on June 4.
- The Flow WG requested that the Fish WG determine what analyses are needed to evaluate flow releases that are made to provide thermal benefits to outmigrating salmonids, specifically the 2,000 cfs bench. A draft scope of work for the outmigrant timing and flow analysis will be developed by mid-June.
- The Fish WG discussed the recommendations contained in the TRRP Adult Salmonid Monitoring Review with project proponents identifying how they were addressing the recommendations. The WG will develop a comprehensive plan on how the various recommendations will be addressed and then provide this document to Mike Bradford, the primary reviewer, for review and input.

Work Group: Physical **Coordinator:** Andrea Hilton

- Guiding and reviewing products from the USGS system-wide geomorphic assessment.
- Refining, updating and augmenting the physical performance measures developed last year. Developing three new measures related to: 1) channel migration, 2) large woody debris and 3) fine sediment storage.
- Summarizing the literature regarding pool types and expectations of pool evolution in the Trinity River.
- Completing the pool scour / fill study from fiscal year 2011.

Work Group: Wildlife and Riparian **Coordinator:** Andrew Jensen

- Worked with John Bair on his development of input for the Flow Workgroup.
- Commented on and reviewed the recently completed riparian and riverine bird monitoring investigation plan by Klamath Bird Observatory (KBO).
- Working on Riparian PITA's 1 and 2
- Reviewing and commenting on Upper Junction City and Lower Steiner Flat Replanting Design.
- Discussions pertaining to replanting on Private Lands – Modes of Long-term Protection and Mitigation Credit
- Field Investigations 1) Indian Creek Bank Naturalization

Work Group: Watershed **Coordinator:** Kent Steffens

- Watershed implementation contract for Mainstem Sediment Reduction, Conner Creek and Sidney Gulch feasibility studies, LiDAR surveys, and Lower East Weaver Creek are still moving through the federal contracting process and anticipated award has slipped from June to July.
- Watershed Assessment contract is moving through federal contracting process. Currently still in the review process, with anticipated GSA advertisement in July.

Work Group: Data Team **Coordinator:** Eric Peterson

- Revised TRRP Data Management and Utility Plan in accordance with discussion and comments by the IDT.
- Completed final version of the TRRP Data Management and Utility Plan (http://odp.trrp.net/Data/Documents/Details.aspx?document=1510)
- The team was assembled for a specific purpose and never formalized into a regular TRRP Work Group. The specific purpose has been achieved. The team is now being dissolved, although it could be reassembled in the future if more needs are identified.

MEMORANDUM

TO:	BRIAN PERSON, RECLAMATION NORTHERN CALIFORNIA AREA MANAGER
FROM:	FALL FLOW SUBGROUP
SUBJECT:	2012 FALL FLOW RELEASE RECCOMENDATION
CC:	TRRP FLOW WORKGROUP MEMBERS
	ERNEST CLARKE, TRRP SCIENCE COORDINATOR
	ROBIN SCHROCK, TRRP EXECUTIVE DIRECTOR
DATE:	MAY 31, 2012

Background

In September 2002, a significant fish kill occurred in the lower Klamath River. Though estimates vary, the US Fish and Wildlife Service reported that over 34,000 adult fish died, comprised primarily of fall-run Chinook Salmon. Carcasses were observed between September 18 and October 1, 2002 within the lower 36 river miles, extending from the estuary upstream to Coon Creek Falls. Several efforts and evaluations have occurred in the past to reduce the likelihood of another fish kill, including releases of water from Lewiston Dam on the Trinity River in 2003 and 2004, as well as development of criteria for releasing supplemental flows during the fall-run Chinook salmon migration season (Clarke 2010; Hayden 2012).

The 2012 Klamath Basin fall-run Chinook escapement is projected to be significantly larger than any other year on record. The Pacific Fishery Management Council's Salmon Technical Team indicates that over 380,000 adult fall-run Chinook salmon will return to the Klamath River; nearly 2.4 times the run size associated with the 2002 fish kill and over 50% greater than the highest recorded run size in 1995 (Table 2; Appendix D). The record breaking prediction does not include two year old fall-run Chinook salmon, spring-run Chinook salmon, coho salmon, or steelhead that will return to the Klamath Basin in 2012. Given the prediction of a record breaking run size, the fall flow subgroup (subgroup) was faced with considerable uncertainty in the decision making process because there were no prior years with a similar run size that could be used to estimate the probability of fish kill occurring in 2012.

While there were substantial improvements in hydrologic conditions in the Klamath Basin during the spring of 2012, advanced hydrologic predictions by the California Nevada River Forecast Center indicate that below average discharge in the lower Klamath River can be expected during the Chinook salmon migration season. Importantly, large run size combined with low river discharge were thought to be contributing factors in the 2002 fish kill (Guillen 2003; Belchik et al. 2004; Turek et al. 2004). Below average stream discharge has been associated with ich outbreaks in other fish populations (John 1964; Maceda-Veiga et al. 2009).

Over the course of several meetings during the spring of 2012, the subgroup, comprised of TRRP staff, TRRP partners and Reclamation's Klamath Basin Area Office jointly developed 1) preventative flow release criteria designed to minimize the risk of a fish disease outbreak and subsequent fish kill, and 2) emergency flow release criteria designed to reduce the severity of a fish kill. The subgroup evaluated the 2012 hydrologic conditions, predicted fall-run Chinook salmon run size, relevant scientific literature, and previous fall flow release recommendations and assessments to develop criteria for both preventative and emergency flow releases in 2012. The subgroup reached consensus on the recommendations described in more detail below.

Recommendation for preventative fall flow releases

Utilizing the best available information, the subgroup developed preventative flow release criteria designed to reduce the risk of an outbreak of *Ichthyophthirius multifiliis* (ich) in order to reduce the probability a fall-run Chinook salmon fish kill in the lower Klamath River (Table 1).

Table 1. Summary of 2012 preventative fall flow release criteria and management actions.

Preventative fall flow release criteria	Management action
Flows projected to be above 3,200 cfs in the Klamath River (RKM 13) during the primary adult fall-run Chinook salmon migration season (August 15-Sept 21)	No preventative fall flow release
Flows projected to be below 3,200 cfs at Klamath River (RKM 13) during the migration season	Increase base flows to at least 3,200 cfs during primary fall Chinook salmon migration season (August 15-Sept 21). If water temperature exceeds 23°C after September 21, maintain at least 3,200 cfs until (1) September 30 or (2) water temperature recedes below 23°C.

We recommend maintaining flows in the lower Klamath River (U.S. Geological Survey Site #11530500; Klamath near Klamath gauge) of at least 3,200 cfs from August 15, 2012 to September 21, 2012 with ramping of flows occurring before and after these dates (Figure 1; Appendix A). Reduction of flows below 3,200 cfs after September 21, 2012 would commence based on water temperatures remaining below the adult Chinook salmon migration threshold of 23°C for the last week in September (Strange 2010a). We also recommend timing a pulse flow (to achieve at least 4,400 cfs at the KNK gage) to arrive concurrently to the lower Klamath River with the already scheduled cultural flow releases from Iron Gate Dam (to achieve 2,800 cfs at Orleans gage on September 2, 2012). At a later date when there is more certainty regarding water availability, policy guidance, and likely accretion flows, additional release schedules could be developed specifically for Lewiston and Iron Gate dams. Due to our conceptual model of how an ich outbreak would occur in the lower Klamath River, the source of water is unimportant for maintaining the effectiveness of these preventive flows. However, there is the potential for unintended negative consequences due to unseasonably high flow releases from basin dams (Iron Gate and Lewiston; see Additional Considerations below). Such potential consequences would be reduced if the magnitude of flow releases from a given dam in one sub-basin were reduced by concurrent flow releases from the dam in the other sub-basin. The volume of water required to supplement flows in the lower Klamath River to achieve the hydrograph in Figure 1 given the advanced hydrologic predictions currently available is approximately 48,000 acre feet in addition to the base flows and ceremonial releases currently planned at Lewiston and Iron Gate dams (Appendix A).

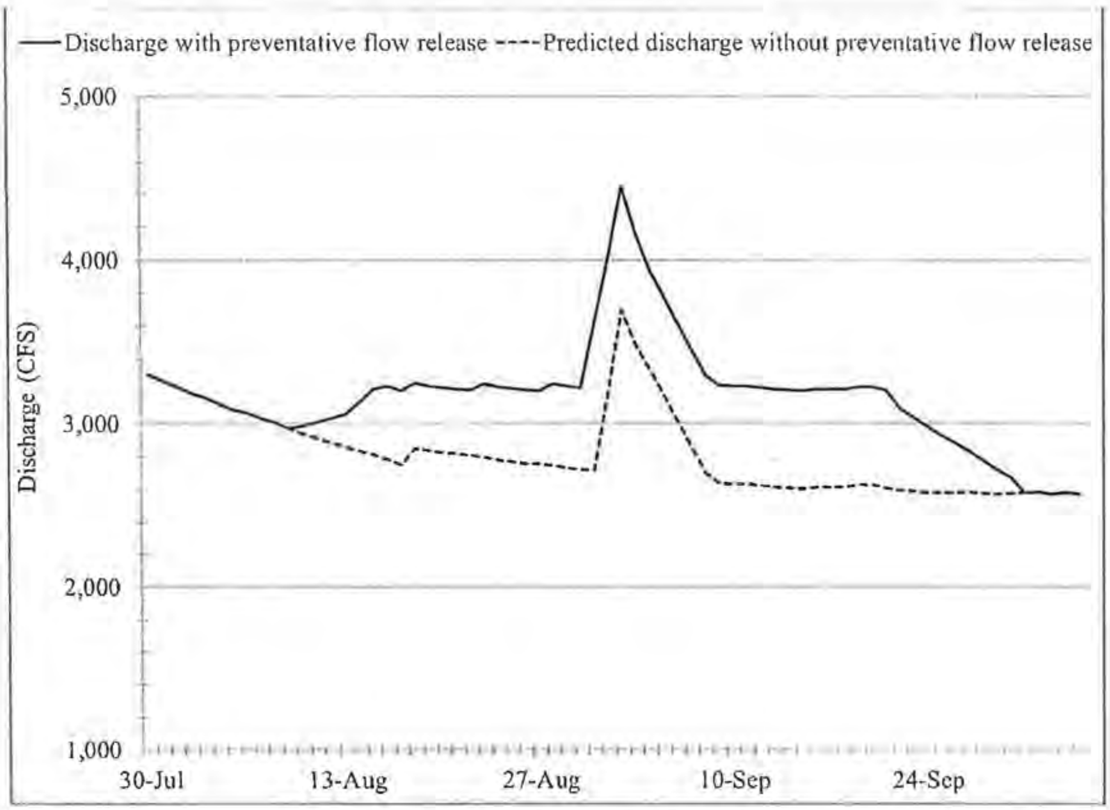

Figure 1. Recommended hydrograph (solid line) for the U.S. Geological Survey Site #11530500 (Klamath River near Klamath, California) during the 2012 fall-run Chinook salmon migration period. Predicted flows (dashed line) for the same location based on advanced hydrologic predictions by the California Nevada River Forecast Center.

The subgroup reviewed the information in previous assessments of fall flow releases provided in Strange (2010b) and Hayden (2012). While Strange (2010b) and Hayden (2012) recommended flows of at least 2,800 cfs during years of run sizes greater than 170,000 adult fall-run Chinook salmon, the recommendations were made in the context of what was then the maximum number of fall-run Chinook salmon which occurred in 1995 (Table 2). The record breaking run size predicted for 2012 was never contemplated by Strange (2010b) or Hayden (2012). Accordingly, the subgroup decided it was appropriate to reexamine the previous recommendations and develop new recommendations as needed to reduce the probability of a fish kill occurring in 2012.

Gaging records for the lower Klamath River indicate that the long term average discharge for both August and September is approximately 3,200 cfs, with the 50% exceedance during those months of approximately 3,000 cfs (Appendix B). The subgroup compared other large fall-run Chinook salmon run sizes to discharge in the lower Klamath River to gain an understanding of the hydrologic conditions in years with large runs (Table 2). The information indicated that average discharge during years with large fall-run Chinook salmon run sizes (≥170,000) was over 3,000 cfs in the lower Klamath River and under these conditions no significant pre-spawn mortality was recorded for fall-run Chinook salmon.

Table 2. Average discharge in cfs for July, August, and September in the lower Klamath River for various above average fall-run Chinook salmon run size levels.

Adult Run Size Category	July	August	September	Adult Chinook salmon run size or mean run size
Fish Kill - 2002	3,187	2,327	1,993	160,800
Largest Run – 1995	7,352	4,156	3,604	222,800
Mean of runs greater than the 2002 run	4,589	3,184	3,236	199,000
Mean of runs above the estuary greater than the 2002 run	4,495	3,098	3,175	174,000

The subgroup chose a discharge of at least 3,200 cfs for lower Klamath River during the fall-run Chinook salmon migration period because long term gaging records indicated this is approximately the average discharge, a higher level of discharge is thought to lead to lower a probability of an ich outbreak as described in more detail by Strange (2010b), and due to the precautionary approach taken by the subgroup given the considerable uncertainty of a fish kill occurring with the unprecedented fall-run Chinook salmon run size predicted for 2012.

The purpose of higher base flows is not necessarily to reduce water temperatures or to provide migration cues but to achieve the associated increased water velocities and higher turnover rates of water in holding areas, which should reduce the ability of ich to find and attach to a host fish during its free swimming infectious stage (known as a "theront"). Sufficiently high water velocities and turnover rates should be maintained throughout the primary fall Chinook salmon migration season in order to reduce the probability of an ich outbreak (Strange 2010b). In addition, the higher base flows would help to reduce the overall density of adult fall-run Chinook salmon, and thereby reduce the probability that the theronts would be successful in finding a host. The peak flow recommended by the subgroup to coincide with the cultural releases scheduled to occur in the lower Klamath River is intended to further disrupt the ability of ich theronts to find a host and flush any ich theronts that may be present in the lower Klamath River at the peak of the fall-run Chinook salmon migration season into the estuary and ocean where higher salinities would kill the organisms. For example, Jessop (1995) suggested that high discharge may flush the infective stages of ich downstream.

Recommendation for emergency fall flow releases

Utilizing the best available information, the subgroup developed new criteria and management actions for emergency flow releases for 2012 designed to reduce the number of fish killed in the unlikely event of an imminent, unexpected fish disease outbreak. We adopted the response outlined by Clarke (2010) to double preexisting flows, regardless of whether or not a preventative flow release was carried out, for seven days in the event that the criteria for an emergency fall flow release were met or exceeded (Table 3).

Table 3. Summary of 2012 emergency fall flow release criteria and management actions.

Emergency fall flow release criteria	**Management action**
1. 15% of adult salmonids with 30 or more ich parasites per gill as confirmed by Fish Health Center Or 2. Observed mortality of > 50 dead adult salmonids in a 20 km index reach in 24 hr coupled with confirmed presence of ich by USFWS Fish Health Center.	Recommend immediate Emergency Fall Flow release with a 7 day duration pulsed spike to double pre-existing flows in the Lower Klamath River up to 6400 cfs.

The duration of the 7 day (total duration with ramping) peaked flow release was determined by the life cycle of ich, which takes 7 days to complete at 20°C (Strange 2010b). The subgroup decided to limit the magnitude of the emergency flow release to 6,400 cfs because flows of this magnitude in August are rare (<5% exceedance probability, Appendix B), and because the group felt that this flow level should be sufficient to interrupt an imminent fish kill and significantly reduce total mortality rates. Discharge of 6,400 cfs during the adult fall-run Chinook salmon migration period is not without precedent in the gaging records: discharge in five years (1913, 1952, 1953, 1958, 1983) during August has been greater than 6,400 cfs as measured at the KNK gage. A variety of monitoring efforts are planned that will be integral to determining the need for an emergency fall flow release in 2012 and provide valuable data with which to assess the effectiveness of the recommended preventative release strategy (Appendix C).

Additional Considerations

While modest increases from river discharge in the Klamath Basin from summer rainstorms are not uncommon during the adult fall-run Chinook salmon migration period, these rain events are typically short in duration and occur with limited frequency. The sustained release of a substantial volume of water from one or both Klamath Basin dams, as recommended above, would mark a departure from the natural flow regime (Poff et al. 1997; Lytle and Poff 2004) of the Klamath and Trinity rivers because the duration of the elevated flows is unnatural. Modification of flow can be expected to have cascading effects on the ecological integrity of rivers and the organisms that depend on them (Poff et al. 1997). Below, we outline a list of potential negative ecological and operational consequences, some less likely than others, from the release water during the late summer and fall months in order to inform decision makers. These considerations are largely informed by specialists working on the Trinity River. In addition, there are likely other negative ecological effects that are currently unknown, as well as beneficial effects that are unknown. Importantly, the subgroup expects that the potential negative consequences of the unseasonably elevated flows would be reduced if the magnitude of flow releases from a dam in one river were reduced by concurrent flow releases from the dam in the other river. Despite these potential consequences, we still recommend implementing the preventative flow release described above, recognizing that efforts have been made to reduce these consequences (e.g. restricting the duration of the preventative flow prescription and capping emergency flow rates to 6,400 cfs at KNK gauge). The subgroup also recommends that monitoring efforts be structured to gain knowledge regarding the ecological response to these "unnatural" flows to evaluate the potential consequences.

Potential negative ecological consequences of releasing water from Lewiston Dam:

- Unseasonably high flows could trigger premature migration of juvenile lamprey (Stutsman 2005).
- Maintaining high flows after the second week in September, followed by reductions in flows to 450 cfs could cause up to 20% of Chinook salmon redds in the upper Trinity River to be dewatered.
- High flows in September could cause increased hybridization of spring-run and fall-run Chinook salmon if early migration of fall-run Chinook salmon occurred.
- Negative effects to amphibians and reptiles.

Potential negative operational consequences of releasing water from Lewiston Dam:

- Any flows over 1,800 cfs at the USGS Hoopa gage (approximately 1,400 cfs at Lewiston) would make the operation of the Willow Creek adult salmon weir impossible; loss of Chinook salmon, coho salmon, and steelhead monitoring data would occur. Loss of fall-run Chinook salmon monitoring data would have wide ranging consequences and 2012 run size may not be able to be estimated. Fishery allocations, minimum escapement requirements, and analyses of management rely on this estimate.
- Any flows over 600 cfs at Lewiston Dam will put mechanical channel rehabilitation site implementation in jeopardy of proceeding during 2012 and will cost the TRRP time and money. Over two years of work in designs, environmental compliance, realty actions, stakeholder negotiations, etc. have been invested to allow implementation this year.

- Any flows over 700-900 cfs at Lewiston Dam would impact the ability to operate the Junction City adult salmon weir.
- Any flows over 900 cfs at Lewiston Dam would make the operation of the Junction City adult salmon weir impossible, causing a loss of spring-run Chinook salmon monitoring data.
- Any flows over 1,500 cfs at the Hoopa gage (approximately 1,100 cfs at Lewiston) will make the operation of the Willow Creek adult salmon weir challenging, fall-run Chinook salmon, coho salmon, and steelhead monitoring data could be compromised.
- Flows of 1,200 cfs or greater would cause loss of redd/carcass survey data.
- Flows greater than 450 cfs for a prolonged period will potentially compromise systemic juvenile habitat assessment.

Klamath experts have been asked to provide comparable information to decision makers on the negative ecological and operational consequences of releasing water from Iron Gate Dam to reduce the likelihood of a fish kill in the lower Klamath River.

References

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Appendices

A. Reccomended flow schedule for the lower Klamath River (U.S. Geological Survey Site #11530500).

B. Exceedance table for the lower Klamath River.

C. Planned monitoring components for Klamath Basin adult fall-run chinook salmon migration 2012

D. Additional 2012 chinook salmon run size information: memo from Joe Polos to Robin Schrock, February 24, 2011

E. List of participants

Appendix A: Reccomended flow schedule for the lower Klamath River (U.S. Geological Survey Site #11530500)

Appendix Table A1. Reccomended flow schedule for the lower Klamath River (U.S. Geological Survey Site #11530500).

Date	50% flow forecast river flow without dam releases (from CNRFC)	IGD Flows	Lewiston Flows	Flow estimate at KNK with no supplemental flows	Supplemental Flows	Flow estimate at KNK with supplemental flows
7/30/2012	1972	880	450	3302	0	3302
7/31/2012	1932	880	450	3262	0	3262
8/1/2012	1894	880	450	3224	0	3224
8/2/2012	1859	880	450	3189	0	3189
8/3/2012	1830	880	450	3160	0	3160
8/4/2012	1792	880	450	3122	0	3122
8/5/2012	1756	880	450	3086	0	3086
8/6/2012	1735	880	450	3065	0	3065
8/7/2012	1701	880	450	3031	0	3031
8/8/2012	1677	880	450	3007	0	3007
8/9/2012	1642	880	450	2972	0	2972
8/10/2012	1608	880	450	2938	50	2988
8/11/2012	1581	880	450	2911	100	3011
8/12/2012	1553	880	450	2883	150	3033
8/13/2012	1527	880	450	2857	200	3057
8/14/2012	1503	880	450	2833	300	3133
8/15/2012	1483	880	450	2813	400	3213
8/16/2012	1451	1000	450	2781	450	3231
8/17/2012	1422	1000	450	2752	450	3202
8/18/2012	1398	1000	450	2848	400	3248
8/19/2012	1383	1000	450	2833	400	3233
8/20/2012	1373	1000	450	2823	400	3223
8/21/2012	1364	1000	450	2814	400	3214
8/22/2012	1358	1000	450	2808	400	3208
8/23/2012	1345	1000	450	2795	450	3245
8/24/2012	1327	1000	450	2777	450	3227
8/25/2012	1317	1000	450	2767	450	3217
8/26/2012	1306	1000	450	2756	450	3206
8/27/2012	1302	1000	450	2752	450	3202
8/28/2012	1296	1000	450	2746	500	3246
8/29/2012	1282	1000	450	2732	500	3232
8/30/2012	1272	1475	450	2722	500	3222

Date	50% flow forecast river flow without dam releases (from CNRFC)	IGD Flows	Lewiston Flows	Flow estimate at KNK with no supplemental flows	Supple mental Flows	Flow estimate at KNK with supplemental flows
8/31/2012	1268	2000	450	2718	900	3618
9/1/2012	1260	1800	450	3185	825	4010
9/2/2012	1249	1650	450	3699	750	4449
9/3/2012	1237	1500	450	3487	675	4162
9/4/2012	1230	1350	450	3330	600	3930
9/5/2012	1224	1200	450	3174	600	3774
9/6/2012	1212	1050	450	3012	600	3612
9/7/2012	1204	1000	450	2854	600	3454
9/8/2012	1196	1000	450	2696	600	3296
9/9/2012	1188	1000	450	2638	600	3238
9/10/2012	1183	1000	450	2633	600	3233
9/11/2012	1179	1000	450	2629	600	3229
9/12/2012	1172	1000	450	2622	600	3222
9/13/2012	1164	1000	450	2614	600	3214
9/14/2012	1160	1000	450	2610	600	3210
9/15/2012	1155	1000	450	2605	600	3205
9/16/2012	1161	1000	450	2611	600	3211
9/17/2012	1163	1000	450	2613	600	3213
9/18/2012	1162	1000	450	2612	600	3212
9/19/2012	1176	1000	450	2626	600	3226
9/20/2012	1179	1000	450	2629	600	3229
9/21/2012	1156	1000	450	2606	600	3206
9/22/2012	1144	1000	450	2594	500	3094
9/23/2012	1139	1000	450	2589	450	3039
9/24/2012	1131	1000	450	2581	400	2981
9/25/2012	1128	1000	450	2578	350	2928
9/26/2012	1130	1000	450	2580	300	2880
9/27/2012	1133	1000	450	2583	250	2833
9/28/2012	1127	1000	450	2577	200	2777
9/29/2012	1119	1000	450	2569	150	2719
9/30/2012	1124	1000	450	2574	100	2674
10/1/2012	1129	1000	450	2579	0	2579
10/2/2012	1134	1000	450	2584	0	2584
10/3/2012	1121	1000	450	2571	0	2571
10/4/2012	1129	1000	450	2579	0	2579
10/5/2012	1122	1000	450	2572	0	2572
Acre feet:					48,510	

Appendix B: Exceedance table for the lower Klamath River

Appendix Table B2. Exceedance table based on monthly average flows, not daily flows, for the Lower Klamath River (U.S. Geological Survey Site #11530500) using years 1911-2011.

Exceedence	July	August	September
0.05	9,664	4,872	4,890
0.10	8,959	4,399	4,258
0.15	7,795	4,326	4,120
0.20	7,369	4,136	3,943
0.25	6,701	3,703	3,788
0.30	6,423	3,550	3,605
0.35	5,497	3,458	3,430
0.40	5,120	3,271	3,355
0.45	4,755	3,158	3,169
0.50	4,408	2,972	3,030
0.55	4,261	2,944	2,923
0.60	4,080	2,896	2,846
0.65	3,907	2,854	2,750
0.70	3,775	2,783	2,685
0.75	3,564	2,658	2,594
0.80	3,306	2,559	2,535
0.85	3,226	2,368	2,500
0.90	2,949	2,193	2,446
0.95	2,501	1,873	2,003

Appendix C: Planned monitoring components for Klamath Basin Adult Fall Chinook Salmon Migration 2012

1. Adult Chinook Salmon Pathology Monitoring (Yurok Tribe)
   - Mid-August through Mid-October 2012
   - Fish will be captured with gill nets from Techtah Creek rkm 38 to Blue Creek rkm 26
   - Goal of 30 adult fish sampled per week
   - External examination of skin and gills for indication of columnaris and ich infections along with digital imaging and video recordings of ich inside gill arches.
   - Conducted every year since 2003
   - USFWS Pathologist Scott Foott on call
   - Further training for field crews in 2012 with CANFHC

2. Harvest Monitoring/Adult Salmon Abundance
   - Yurok Tribal harvest as weekly summaries by area for catch-per-unit-effort
   - CDFG weekly summaries of creel surveys of sport catches
   - Summer snorkel surveys of thermal refugia associated with the mouth of Blue Creek (YTFP)
   - DIDSONS could be added to aid in monitoring abundance of fish
   - Weir summaries from CDFG

3. Water Temperature and Flow
   - USGS site 11530500 Klamath River near Klamath, CA: http://waterdata.usgs.gov/ca/nwis/uv/?site_no=11530500&PARAmeter_cd=00065,00060
   - Yurok Tribal Environmental Program real time monitoring: http://exchange.yuroktribe.nsn.us/lrgsclient/stations/stations.html
   - California Nevada River Forecast Center advanced hydrologic prediction for USGS site 11530500 Klamath River near Klamath, CA http://www.cnrfc.noaa.gov/espTrace.php?id=KLMC1

4. Coordination and Response
   - Klamath Fish Health Assessment Team (KFHAT) Web Portal: http://www.kbmp.net/collaboration/kfhat

Appendix D: Memo from Joe Polos to Robin Schrock, February 24, 2011

February 24, 2011

To: Robin Schrock (TRRP ED), Ernie Clarke (TRRP SC), and Tim Hayden (TRRP Flow WG coordinator)
From: Joe Polos, TRRP Fish Work Subgroup Coordinator
Subject: Projected Klamath River Fall Chinook Salmon Inriver Run Size for 2012

During the February 8, 2012, TRRP Fish Work Subgroup meeting there was an update on the 2011 Klamath River fall Chinook salmon run (KRFC), particularly the large jack (age 2) return (Table 1). The numbers of age 2, age 3 and age 4 fish returning in one year are used to predict the population size in the ocean the following year. Additionally, during the discussion of water year 2012 planning, the efforts of the fall flow subgroup were discussed. The TRRP Flow WG has developed criteria for implementing fall flow measures and is currently updating this information.

The Fish Work Subgroup wanted to alert the TMC and the TRRP Flow Work Subgroup of the potential large KRFC inriver run in 2012, in addition to concerns with the dry conditions occurring in the Klamath Basin. In northern California, the current snow water equivalent is 35% of average for mid-February, just slightly greater than the lowest year on record (1976-1977; Figure 1). The KFRC inriver run (hatchery and natural fish combined) may be as large as approximately 350,000 adults in 2012 (Table 2). In addition to this, there will be a jack component (age 2 fish) to the inriver run in 2012 of which there is no preseason estimate. In 2002, the year of the fish kill, the adult KRFC inriver run was 161,000 fish (Figure 2) and the total inriver run (jacks and adults) was 170,000 fish..

This information pertaining to the estimated inriver KRFC run this fall is **very preliminary** and there may be large changes as data continue to be analyzed. Additionally, there is large variability in the accuracy of these projections, especially for the age 3 component, but it should be expected that there will be a large return in 2012. Any updated information developed as the Pacific Fishery Management Council (PFMC) proceeds with its fishery management planning in the coming months will be provided. These estimates were derived by applying seasonal mortality and harvest impact factors (Attachment A) which will not produce the same values that will be modeled in the PFMC stock assessment process.

Additionally, a cursory look at the relationship between Klamath Basin spring Chinook inriver run size and fall Chinook inriver run size was conducted (Attachment B). This analysis will be updated when the recent spring Chinook salmon "megatable" is available. While this is a strong relationship, there is greater variability at larger populations sizes and the fall Chinook inriver run is beyond the range of the dataset used to develop the relationship. With these caveats in mind, the projected inriver size of adult spring Chinook salmon in 2012 is 84,500 fish.
The Fish Work Subgroup will also provide other pertinent information that may be developed over the next several months.

Summary:

A large Klamath River fall Chinook salmon inriver run is expected in 2012, approximately 350,000 adults, and the dry hydrologic conditions occurring in the Klamath Basin raise concerns over the potential for a fish-kill. Additionally, there may also be a large spring Chinook salmon inriver run. The TRRP Flow WG has been developing documents to assist in implementing a fall flow effort, if needed, in addition to their efforts in in evaluating conditions pertaining to the need for a fall flow. While the data on Klamath fall Chinook salmon inriver run size are **very preliminary**, we feel that they are suitable to inform the TRRP that a very large inriver run in 2012 should be anticipated. Additionally, while there is still time in the water year for more precipitation, it is likely than below average hydrologic conditions will occur this water year and TRRP should plan accordingly.

Table 1. Klamath Basin fall Chinook salmon age specific estimates of the 2011 inriver return (estimates include both hatchery and natural fish). [1]

Age	2011 return
2	85,840
3	59,776
4	41,243
5	1,986
Total Adults	103,005

1. Age specific population estimates for the 2011 return from KRTT 2011 Klamath Basin Age Composition Report, Feb 2012.

Table 2. **Preliminary** Klamath Basin fall Chinook salmon age specific adult inriver run prediction for 2012 assuming full fishing in ocean fisheries (harvest rate = 0.16 on age 4 Klamath River fall Chinook salmon). No estimates are made for jacks (age 2 fish). See Attachment A for explanation of how estimates were derived.

Age	Inriver run (1000s)
3	302.7
4	47.0
5	2.5
Total	**352.2**

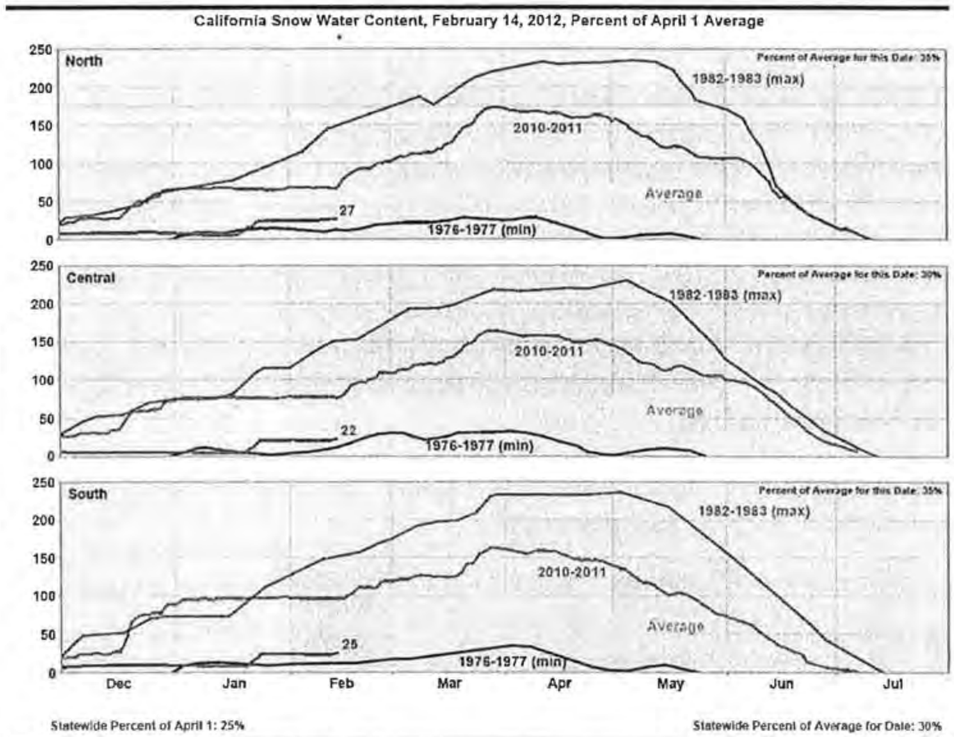


Figure 1. Current state wide California snow water content (blue line) along with extremes and average for the period of record.

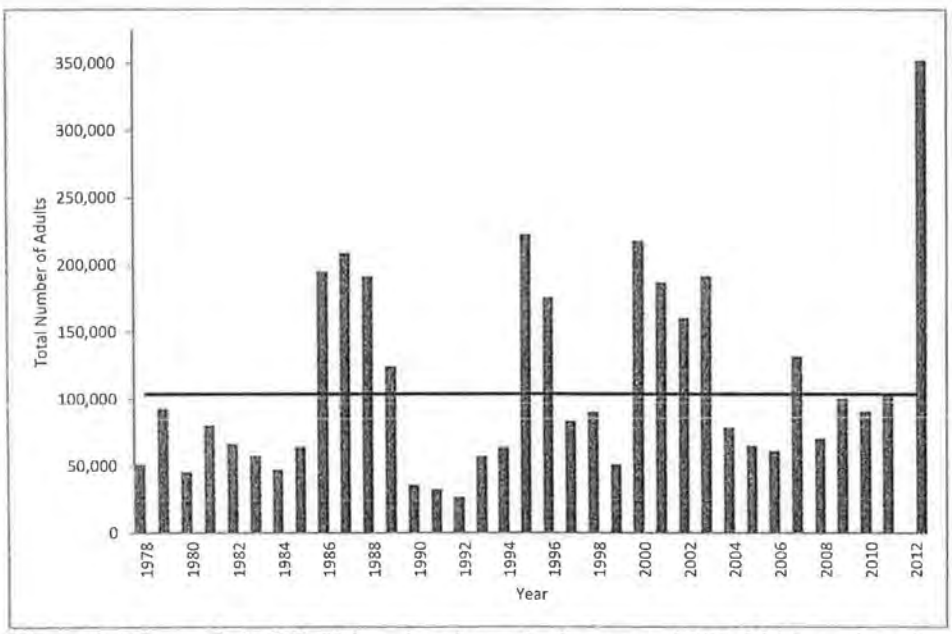


Figure 2. Klamath River adult fall Chinook salmon inriver run, 1978-2011, and projected 2012 inriver run. Horizontal red line is 1978-2011 mean.

Attachment A. Derivation of Klamath Basin fall Chinook salmon inriver run for 2012. The 2012 adult Klamath River fall Chinook salmon (KRFC) inriver run was estimated using the sibling regression models (zero-intercept) to estimate the ocean population (Table A1, KRTT 2011). Overwinter survival, ocean impact parameters and age-specific maturity rates (PFMC and NMFS 2007) were used to estimate the 2012 inriver run (Table A2). The harvest rate of 0.16 for age 4 KRFC was used in this analysis which is the maximum allowed under the Endangered Species Act to protect Coastal California fall Chinook salmon populations. All population estimates are for hatchery and natural fish combined. The following equations were used to generate age-specific populations estimates:

1. Number of age (*i*) KRFC in the ocean in the fall (Sept 1) of year (*t-1*)=
   $N(O_{Sept1})_{i,t-1} = N(R)_{i-1,t-1} * B_{i,}$, where B_i slope parameter of the zero intercept regression model for age(i-1) to age *i* fish between inriver return, $N(R)_{i-1,t}$, and siblings remaining in the ocean.

2. Number of age *i* KRFC in the ocean the following spring (May 1) of year *t* =
   $N(O_{May\ 1})_{i,t} = N(O_{Sept\ 1})_{i,t-1} * S_{i,}$, where S_i is the age specific overwinter survival.

3. Number of age *i* KRFC contacted by ocean fisheries in year *t*:
   $N(C)_{i,t} = N(O_{May\ 1})_{i,t} * V_i * HR_{(t)}$, where V_i is the age specific vulnerability and $HR_{(t)}$ is the ocean harvest rate of age 4 KRFC in year *t*.

4. Number of age *i* KRFC landings in year *t* =
   $N(L)_{i,t} = N(C)_{i,t} * \%L_i$, where $\%L_i$ is the percentage of legal sized fish of age *i*.

5. Number of age *i* KRFC shaker mortalities of undersized fish in year *t* =
   $N(S)_{i,t} = N(C)_{i,t} * (1-\%L_i) * SM$, where SM is the shaker mortality rate.

6. Number of age *i* KRFC suffering mortality due to contact with fishing gear in year *t* =
   $N(D)_{i,t} = N(C)_{i,t} * DO$, where DO is the drop-off mortality rate.

7. Number of age *i* KRFC ocean fishery impacts in year *t* =
   $N(OI)_{i,t} = N(L)_{i,t} + N(S)_{i,t} + N(D)_{i,t}$.

8. Number of age *i* KRFC in the ocean on August 31 following ocean fishery impacts =
   $N(O_{Aug31})_{i,t} = N\ (O_{May\ 1})_{i,t} - N(OI)_{i,t}$

9. Number of age *i* KRFC fish returning to the river in the fall (Sept 1) of year *t* =
   $N(R_{Sept1})_{i,t} = N\ (O_{Aug31})_{i,t} * MR_i$,where MR_i is the age specific maturity rate.

References

KRTT. 2011. Ocean Abundance Projections and Prospective Harvest Levels for Klamath River Fall Chinook, 2011 Season

PFMC and NMFS. 2007. Final environmental assessment for Pacific Coast salmon plan amendment 15: An initiative to provide de minimis ocean fishing opportunity for Klamath River fall Chinook. Pacific Fishery Management Council, Portland, Oregon.

Table A1. Klamath River fall Chinook salmon age specific estimates of the 2011 inriver return and corresponding estimates of fish remaining in the ocean in the fall (August 31) of 2011 from each respective brood year.

Age	Regression Slope Parameter (zero intercept model) [1]	2011 inriver return (1000s) [2]	Ocean 2011 estimate (Sept 1) (1000s) [3]
$2_{inriver}$ to 3_{ocean}	18.2920	85.84	1570.2
$3_{inriver}$ to 4_{ocean}	1.3330	59.776	79.7
$4_{inriver}$ to 5_{ocean}	0.1120	41.243	4.6
$5_{inriver}$	N/A	1.986	N/A

1. Source of slope parameters: KRTT. 2011 and do not reflect any refinement that may occur through analyses that will occur in developing the 2012 stock projection.
2. Source: KRTT. 2012.
3. Ocean population estimated by multiplying the number of fish retuning to the river by the age specific regression slope parameter.

Table A2. Klamath fall Chinook salmon ocean and inriver population estimates for 2012. All calculation based on assumed age 4 harvest rate of 0.16 which is the maximum rate allowed in ocean fisheries due to ESA constraints for Coastal California fall Chinook salmon populations.

Max Ocean HR = 0.16															
Age	2011 Ocean estimate (Sept 1) (1000s)	Survival[1]	2012 Ocean Population in May (1000s)[2]	Vulnerability[1]	%legal[1]	Contacts (1000s)	Landings (1,000)	Shaker mortality[1]	Shaker impacts (1000s)	Drop-off Rate[1]	Drop-off impacts (1000s)	Ocean Impact (1000s)	Ocean popn after fishing impact (1000s)	Maturity Rate[3]	Inriver run (1000s)
3	1570.2	0.5	785.1	0.25	0.8	31.4	25.1	0.26	1.6	0.05	1.6	28.3	756.8	0.4	302.7
4	79.7	0.8	63.7	1	0.95	10.2	9.7	0.26	0.1	0.05	0.5	10.3	53.4	0.88	47.0
5	4.6	0.8	3.7	2	1	1.2	1.2	0.26	0.0	0.05	0.1	1.2	2.5	1	2.5
Total	1,654.5		852.5				36.0		1.8		2.1	39.9	812.6		**352.2**

1. Source: PFMC and NMFS (2007). Final environmental assessment for Pacific Coast salmon plan amendment 15: An initiative to provide de minimis ocean fishing opportunity for Klamath River fall Chinook. Pacific Fishery Management Council, Portland, Oregon.
2. Age specific ocean populations in May were estimated by multiplying the 2011 ocean population by the annual age-specific survival .
3. Personal Communication: Michael O'Farrell. NOAA-Fisheries Santa Cruz.

Attachment B. Relationship between Klamath Basin Spring Chinook salmon inriver run based on Klamath Basin fall Chinook salmon inriver run for 2012.

A cursory analysis of the relationship between the adult Klamath Basin spring and fall Chinook salmon inriver runsize was conducted to provide additional information concerning the potential inriver run in 2012. Total inriver run data from the spring Chinook salmon "megatable" and the fall Chinook salmon "megatable" were used for this analysis. Although data are not complete for all harvest and escapement components of the run for the spring Chinook salmon data, these data are probably sufficient to provide a general indicator of the potential magnitude of the adult spring Chinook salmon inriver run. Data from 1981-2005 were used in this analysis, except for 1983 and 1995 when the Junction City weir was not operated. The data from these two years were excluded because the natural escapement above Junction City is a major portion of the run in most years.

The relationship between the adult spring Chinook and adult fall Chinook run is strong ($r^2 = 0.71$) but the relationship indicates there is greater variability at larger run sizes (Figure B1). An additional complicating factor in using this relationship to predict the 2012 adult spring Chinook salmon inriver run is that the 2012 fall Chinook inriver run prediction (352,200) is beyond the range of the dataset used to develop the regression equation. With these caveats in mind, the projected inriver size of adult spring Chinook salmon in 2012 is 84,500 fish.

The primary utility of this information is that, in addition to a larger fall Chinook salmon run, it should be expected that there will also be a large spring Chinook salmon run entering the Klamath Basin in 2012. This information will be updated when additional information becomes available.

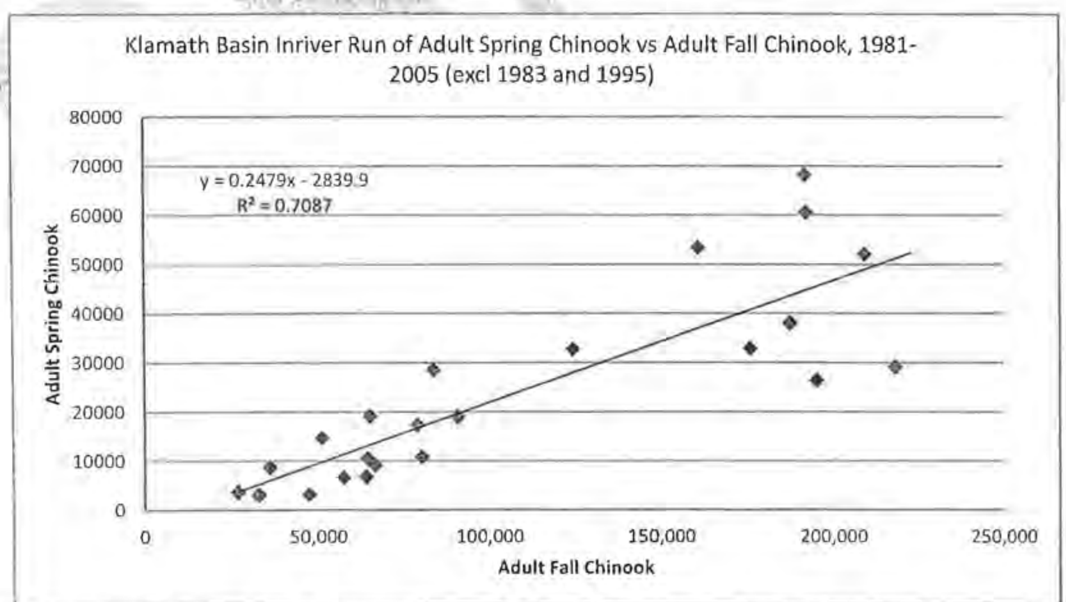


Figure B1. Relationship between the inriver run of adult spring Chinook salmon and adult fall Chinook salmon in the Klamath Basin.

Appendix E. List of Participants

Don Reck-BOR
Keith Schultz-BOR
George Kautsky-HVTF
Mike Orcutt-HVTF
Josh Strange-YTFP
Mike Belchik-YTFP
Tim Hayde-YTFP
Nina Hemphill-TRRP
Ernie Clarke-TRRP
Robin Schrock-TRRP
Seth Naman-NMFS
Joe Polos-USFWS
Bill Brock-USFS
Eric Wiseman-USFS

TRRP Implementation Update

Prepared for: Trinity Management Council (TMC)

By: DJ Bandrowski

Date: June, 2012

Design and Implementation Activities:

- Final Civil Designs have been completed for 2012 Channel Rehabilitation Projects including: Upper Junction City (UJC) and Lower Steiner Flat (LSF), construction is planned to start July 1 for both projects.
- Final environmental compliance documents for the 2012 mainstem projects are being finalized by TRRP Weaverville Office in coordination with partner regulatory agencies
- Final construction contracts, landowner agreements, and BLM Right-of-Ways are in final stages for the 2012 project sites.
- Revegetation Designs are in progress for UJC/LSF Channel Rehab Projects, and Indian Creek Bank Naturalization Project, planned final completion is scheduled for July.
- Watershed implementation projects are planned for award in July timeframe with initiation late summer/fall.

Planning

- Phase I Review being conducted by TRRP Scientific Advisory Board (SAB) - See separate document.
- Next Design Team meeting planned for July30-Aug1. Peter Wilcock and Corp of Engineers Team will be providing workshop on the "Stream Project" – an Alternative Analysis Decision Framework for design comparisons. This workshop will be open for all workgroups.
- 2013 planning and design considerations being evaluated in coordination with the upcoming results of the Phase I Review. Design Team will be discussing this at the next meeting in July.
- Coordinating with Dept of Water Resources and Trinity County on new FEMA 100 year floodplain study, planned for roll-out in fall of 2012.
- Realty coordination and Rights-of-Entry access documents are underway for summer/fall monitoring activities
- Bureau of Reclamation archeologists are conducting 40 mile planning and analysis study for to facilitate future Phase II implementation projects.

Infrastructure Improvements:

- Well-Grant program has been very successful this fiscal year with 22 new applicants. TRRP office has been very engaged in coordination activities assisting landowners with various steps of the Well-Grant program process including: water rights, environmental permits, facilitating with regulatory agencies, etc.
- Bucktail Bridge Cost Benefit Analysis underway by CH2M HILL in coordination with Design Team and Trinity County Department of Transportation (TCDOT). Cost-Benefit Analysis and preliminary designs are approximately 50% complete with a planned finalization scheduled for August timeframe.

Status of the Trinity River Restoration Program's Phase 1 Review

John Buffington, Chris Jordan, Mike Merigliano, James Peterson, and Clair Stalnaker

June 21, 2012

The Phase 1 Review has progressed to a point where we can report our progress, problems, and what lies ahead. The review, which is better characterized as a study, began in October 2011with a scope of work that outlined the major steps and timeline. This was revised four times, with the last revision on March 30. The Program provided a support contractor to help us with data collection, preparation, analysis, and modeling, and we are now in the midst of analyses. Progress to March 30 was conveyed to the Program and its partners by David Bandrowski around April 2 and included a revised scope of work, summary of Calls (i.e., scopes of work) 1 through 9 to the support contractor, and our treatment of review comments from the TRRP and partners. Here, we provide an update since that time.

The three main steps of the review are:

1) formulating potential questions, hypotheses, and associated analyses;
2) cataloguing of available data, refining hypotheses, and structuring the data to facilitate analyses;
3) conducting the analyses, interpreting the results, and making recommendations.

Other important steps are supporting the development of a decision-support system, and an external review of our Phase 1 report.

Much of the data collected by the TRRP Weaverville staff was available in January, the US Fish and Wildlife Service provided the newest fish habitat data in February, and the US Geological Survey's geomorphic mapping data became available at the end of April, with a revision in May. There is a considerable amount of available data; the Weaverville office's data up to January alone totaled to 4663 gigabytes; TRRP partners, and the Weaverville staff have added to that in the intervening months. The latest riparian vegetation and associated bed movement data and reporting were provide in mid-May. We have no data for wildlife investigations yet, and may not get them in time (Ernie Clarke, personal communication, June 2012).

Structuring of the available data into a framework that is tied to a spatial reference to the river began in early April. We call this structure "the data frame". The Program has used a similar framework for sampling and some analysis, referred to as a 'GRTS panel' (TRRP and ESSA 2009, Pickard 2011). The program's GRTS sampling frame, or list of potential sampling units to choose form, consists of 400-meter line segments drawn down the center of the main channel. For the SAB analysis, these segments were split into 200-meter segments to better-capture spatial variability. As requested in Call 9, the first version of the data frame was provided by the support contractor in on April 20, and our analysis began shortly thereafter. Four revisions followed, with the latest on June 1. While working with the May 16th version, a spatial reference error was discovered that required correction of several sub-sets of the data frame. The June 1 version of the data frame is being corrected by the support contractor, and the SAB has asked the support contractor to conduct quality control as well. Correction of the data frame is part of Call 10, to be approved soon. The data frame will be valuable asset for the Program partners and must be as error-free as possible.

The project and feature scale analysis of the channel rehabilitation projects continues from Call 9 into Call 10. The scope of this analysis changed as we adjusted to new information pertaining to the on-going US Fish and Wildlife Service's efforts on quantifying habitat, because we did not want to duplicate that

Mike - Schedules >

effort. A key link for estimating total river habitat is to develop a flow-to-habitat relationship, so habitat in reaches that have no direct habitat observations can be estimated. This has been a difficult task for the Service and we have some candidate models that we want to try.

The report is taking shape. The support contractor provided a 144-page draft on June 1 that has as much information as possible at that time, and we will be adding to it as analyses are done.

Data gaps and time constraints prevent some preferred analyses. For example, lowered flood plains (usually to around the 6000 cfs stage) have high construction costs, and we wanted to assess how much habitat they provide at high flows. Because there are no direct field observations, this would require hydrodynamic modeling that requires more time than is available. Another objective for the lowered flood plains is to allow channel migration and natural shaping of the cannel. We plan to assess this planimetrically (e.g., changes shown on aerial photography), but detailed changes in topography require working with digital terrain models (DTM), the database for which is currently limited. Consequently, it is more efficient to look for such changes in plan-view (aerial photography) and follow up with the available DTMs if changes have occurred. The pool-filling and adult-holding habitat assessments could have been part of our review, but some Program staff are using DTMs to assess the former, and there are data gaps (cover, velocity) that compromise the latter. The Progam proposed doing an adult holding assessment in 2011 that would have provided the required data, but it was not funded. *

Administrative tasks have taken more of our time than we anticipated. Science is an iterative, open-ended process, and contracting steps tend to be linear and closed, so using a traditional contracting scheme, even the flexible one that we have, has been difficult and has not been as productive as anticipated. The first 7 calls to the support contractor were relatively straight forward and were accomplished efficiently with little administrative time required of the SAB. Calls 9 and 10, which deal with more substantial analysis and data preparation, have taken a considerable amount of time to prepare and the accomplishment of some of the tasks have not been fully acceptable or completed. The time required and number of drafts per call pertaining to the SAB has increased over time, as the following table shows. The model of the support contractor doing the "heavy lifting" of the review has not been fully realized; the SAB has spent more time than expected directing the development of the analysis framework for the review, and will spend considerable time this summer conducting many of the analyses ourselves.

Call	Date started	Date approved	Number of drafts	Date tasks were accomplished
8	12/7/2011	12/19/2011	4	2/29/2012
9	3/2/2012	3/20/2012	9	Partially complete
10	3/29/2012	6/20/2012	41 (and counting)	

The question "Are the projects working?" is simple to ask, but not easy to answer. From a built-habitat perspective, the monitoring data answers it adequately, but an original objective of the Program was to use channel rehabilitation projects as a catalyst for flow- and gravel-driven habitat creation along the rest of the river. This aspect motivated the inclusion of a system-wide scale to our review, not only to assess how much habitat is being created along non-constructed reaches, but to document the extent that projects influence channel process beyond their borders. There are many complicating factors that could obscure the projects' geomorphic signal, but it is worth investigation and is central to the TRRP mission.

High-level indicators such as fish production and stock recruitment dynamics along the upper Trinity River and nearby rivers can inform us on the holistic effectiveness of the restoration, which includes the whole gamut of actions such as prescribed dam releases, gravel augmentation, temperature control, and channel rehabilitation projects. The support contractors suggested this strategy and are making progress.

We appreciate the urgency of the Phase 1 review and SAB recommendations. Because of the unanticipated delay we are considering a two-part report, with the first one containing all we can muster by the time new project plans need to start, and the second augmenting the first by assisting development of a decision-support system to facilitate adaptive management. The external review has been delayed so that panel members have our best effort in front of them.

Finally, it is worth noting that our task is substantially more than a "review", in that we must first synthesize and analyze available data before we can begin to assess the effectiveness of the Phase 1 projects. This is a tall order that is made even more challenging by the short time line that we've been given. We appreciate your patience and the assistance that has been provided to date.

Scope of Work and Evaluation Criteria for the Trinity River Restoration Program's Phase I Channel Rehabilitation Project Review

March 30, 2012 Draft

John Buffington, Chris Jordan, Michael Merigliano, Jim Peterson, and Clair Stalnaker
Science Advisory Board

BACKGROUND

The Trinity River Restoration Program (TRRP) aims to improve the Trinity River's salmonid fishery by using managed flow releases, coarse sediment augmentation, fine sediment control, channel rehabilitation, and temperature control. Details on the goals, objectives, and history are found in several foundational documents listed or summarized in the TRRP's Integrated Assessment Plan, or IAP (Trinity River Restoration Program, ESSA Technologies Ltd. 2009). The foundational strategy is summarized as follows from the Trinity River Flow Evaluation Report (TRFER, USFWS & Hoopa Valley Tribe, 1999; p. 230):

"A dynamic alluvial channel morphology cannot be accomplished solely by prescribing releases. Mechanically removing riparian berms, minimally reshaping the existing channel in selected reaches, introducing coarse bed material above Rush Creek, and reducing or preventing sand input from tributaries also will be necessary."

"The riparian berm cannot be removed by TRD dam releases: therefore, habitat rehabilitation must be preceded by a one-time sequence of mechanical removal at strategic locations. Subsequent long-term habitat creation and maintenance must be accomplished by flow and sediment management prescriptions rather than mechanical means."

Channel rehabilitation along the Trinity River has involved local reshaping of the channel boundary, floodplain, and terraces, as well as addition of gravel and large woody debris (LWD). Pre-TRRP channel rehabilitation began with the "feathered edge" projects of the early 1990's, which were evaluated by Gallagher (1995, 1999). Since establishing the TRRP in 2000, implementation has emphasized notably larger projects, and in total these constitute about half of the 44 planned projects proposed in the TRFER. The Science Advisory Board (SAB) has been charged with overseeing a comprehensive evaluation of the first half of these projects (Phase I). This document describes the review process and scope of work proposed by the SAB. Emphasis is to be placed on learning from past management actions, understanding ecosystem processes, development of guidance for hypothesis testing, and advancing adaptive management by the TRRP.

REVIEW PROCESS

The review would involve four major components:

I. Compilation by TRRP of information and status for each of the rehabilitation projects completed during Phase I, as well as any system scale data. Compile a matrix of data collected for each project, including project objectives, as-built information, hypothesized channel/habitat response, pre- and post-project data collection and analyses, and critical evaluation of project outcome(s) relative to stated objectives, hypotheses, and TRRP mission.

II. Initial analysis of data provided by the TRRP to evaluate the efficacy of channel rehabilitation on three scales: design features (e.g., side channels), projects on an individual and combined basis, projects that emphasizes consideration of alternative designs, developing hypotheses, evaluation and testing, would be delivered to the TMC, TAMWG and TRRP partners. This should provide a sound scientific basis for adaptive management by the TRRP.

EVALUATION CRITERIA

Evaluation will be based on fish habitat capacity using two perspectives: fluvial-driven geomorphic processes, and design-objectives. The first reflects the dominant paradigm of the flow evaluation study (USFWS & Hoopa Valley Tribe, 1999) while the second reflects an engineered, built-habitat approach.

Approaches for project design have varied over time, so the evolution of the design process and implementation will be part of the evaluation. For example, some projects anticipated that high flows would create and maintain channel complexity and associated resource values such as rearing habitat. Other projects had complexity and habitat attributes built-in. More recently the placement of LWD is included in project designs. These differences in design reflect not only the geomorphic setting, but also the evolution of the thought process over time and differing views among project partners regarding design philosophy. Consequently, site-specific analyses and evaluation will be required. Actual fish use and annual production is the ultimate evaluation of efficacy, but this is complicated by spatial patterns of other variables such as temperature, the hatchery, spawning, and predation within the upper 40 miles, and conditions beyond the Trinity Restoration Project reach. Reasonable approximations may be made with modeling efforts recently developed in the northwestern U.S. (e.g., Blair et al., 2009) and can be presented in demonstration mode when significant gaps in information prevent detailed simulations. While each rehabilitation project may be unique in design and implementation, the compilation of information organized along the following themes will allow rapid assessment and choice of appropriate analyses associated with different implementation strategies and their implications for creating more complex fish habitat (e.g., Pitlick and Streeter, 1988; Pitlick et al., 1999).

An important aspect of this review is to provide a template for hypothesis testing and adaptive learning by providing examples, analytical approaches and tools for future use.

ECOSYSTEM PROCESS THEMES

Three themes, in the context of ecosystem processes, will be addressed in evaluating Phase I projects: fluvial response, fish habitat response, and riparian response, examined over time and space. Data and analyses relevant to each theme will be synthesized by the contractor in collaboration with the SAB and presented to partners, stakeholders, as represented by the Trinity Adaptive Management Working Group (TAMWG), and the panel. Emphasis is to be placed on summarizing rehabilitation site objectives, designs, and assessments in terms of the physical setting of the site and the advancement of overall TRRP goals as stated in the DOI ROD and TRFER. Emphasis will be on stated hypotheses and evaluation of approaches used for hypothesis testing, predicting response, and assessing project outcome.

1. Fluvial response and processes contributing to channel complexity/dynamics at project sites and in adjacent upstream/downstream reaches:

    a) Geomorphic context: Determine the geomorphic setting of each site (i.e., local process domain (Montgomery, 1999), network structure and proximity to tributaries, etc.) and the presence or absence of confining features, such as vegetated berms, terraces, and bedrock control.

    b) Basin history and anthropogenic constraints: Identify major natural and anthropogenic disturbances that influenced the site prior to rehabilitation (e.g., mining, wildfire, flow regulation), and identify current anthropogenic constraints (e.g., legal maximum water surface elevations, houses and other structures, landowner issues, maximum possible reservoir releases, logistical time constraints).

3. Riparian vegetation response:

   a) Describe vegetation- related channel narrowing as defined by the lowest (streamward) extent of woody riparian vegetation at convenient time intervals (say 3 years) since project completion.

   b) Estimate expected equilibrium channel widths based on 1) hydraulics and sediment transport associated with expected flow regimes and sediment supplies (e.g., Hoopa Valley Tribe, et al. 2011; Eaton, 2006) and 2) the change in channel narrowing rate as defined by vegetation (e.g., willow) establishment since construction.

   c) Quantify the survivorship of planted and seed-origin woody riparian plants on channel rehabilitation sites and any other sampled areas, and relate these to the shape of the appropriate hydrographs, seed dispersal timing, planting techniques, and planting stock (species, source, and treatment).

   d) Compare existing and expected species composition and structure of natural regeneration and planted stands and assess their wildlife (e.g., land birds) habitat value.

   e) Describe any large wood recruitment associated with rehabilitation site actions.

The above themes provide a framework to produce a data matrix and catalog of information about the Phase I rehabilitation projects, identify missing data, and suggest various types of analyses that might be used for more efficient design, implementation, and evaluation of Phase II rehabilitation projects. Due to expected gaps in information, some of these analyses and simulations may only consist of demonstrations useful for future evaluations. This information will be compared across rehabilitation sites to evaluate site-specific performance of different project designs and to develop an understanding of the cumulative function and effect of the projects on the Trinity River. The evaluations are specifically aimed toward assessment of the efficacy of the approaches used for Phase I projects along with specific recommendations for improved approaches for modeling and directing fluvial processes. Analyses will emphasize prediction and evaluation of channel response and increase of suitable quantity and quality of fish habitats throughout the system during Phase II.

TASKS

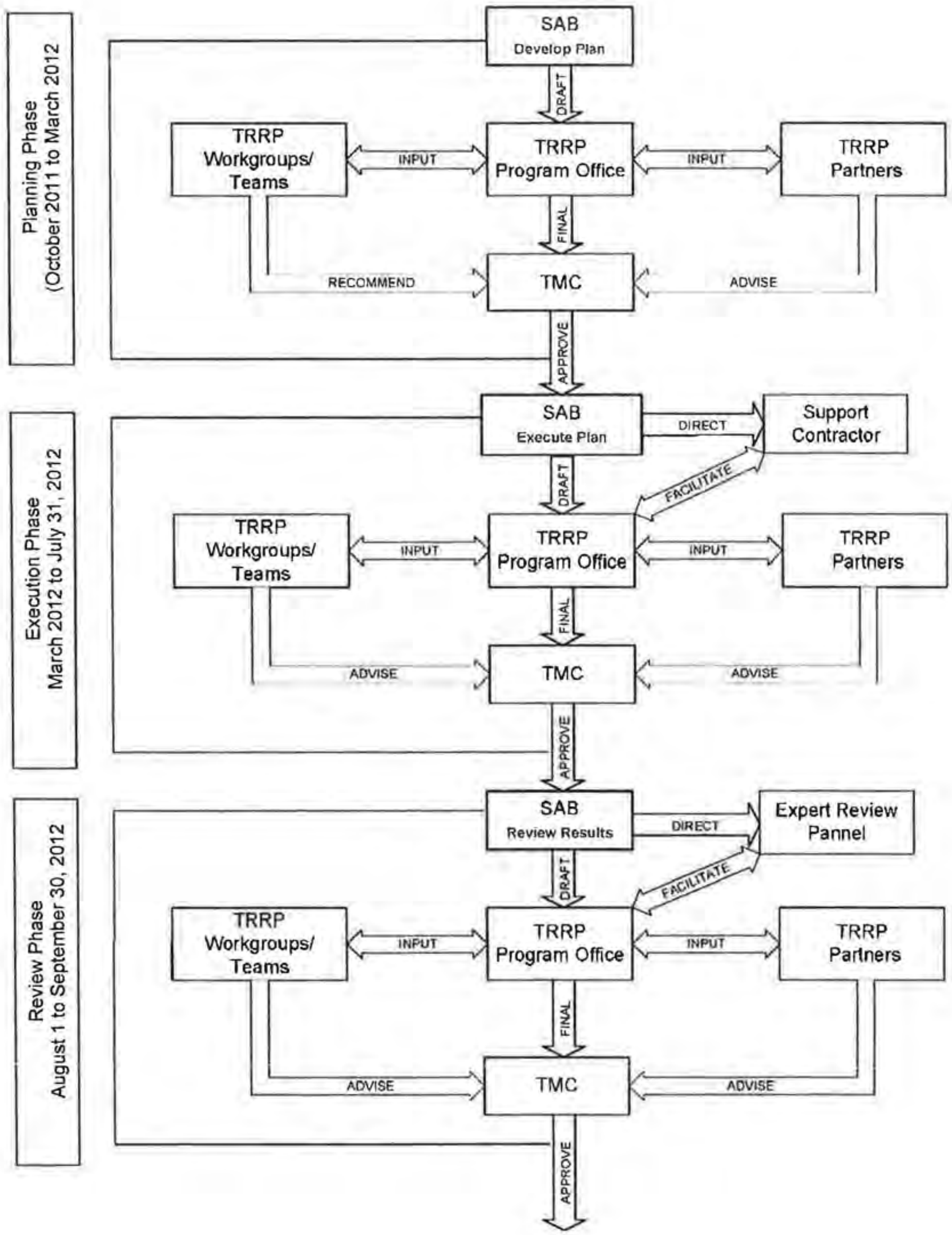
The review process is further detailed below through a series of tasks. Elaboration of tasks will reflect modifications and approval of the initial thematic and analytical approaches outlined above, as well as partner input during the review process. Data availability and the time line imposed for conducting this review will limit the analyses and tasks that can be accomplished. Hence, we envision first-order (i.e., basic) analyses and assessments, rather than detailed evaluations that would require more time and effort than has been allotted. Proposed tasks, analyses, and time lines are subject to change as the review process unfolds.

Task 1. Review of foundational and selected background documents.

The foundational documents were:

1. Record of Decision (DOI 2000)
2. Trinity River Flow Evaluation Final Report (USFWS and HVT 1999)
3. Conceptual Models and Hypotheses for the TRRP (2009)
4. Integrated Assessment Plan (2009)
5. Trinity River Mainstem Fishery Restoration EIS/EIR – selected sections (2009)
6. Implementation Plan for the Preferred Alternative of the TREIS/EIR – Appendix C (2000)
7. Trinity River Channel Design Guide (2011)

Time line for primary tasks



Milestones

1) The interim report (Task 5) is distributed to TRRP and partners on July 1 for review (Task 6). Two weeks for partner review (comments due July 15) and two weeks for adjustments by the SAB and Anchor QEA/Stillwater Sciences
2) Interim report goes to the panel (Task 7, August 1 to September 30).
3) Final report preparation (Task 9) completed by October 31.
4) Public presentation of Phase I review findings November 1 (approximately)

United States Department of Agriculture

Forest Service
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Washington, D.C. 20250

NRCS
Natural Resources
Conservation Service
P.O. Box 2890
Washington, D.C. 20013

FILE CODE: FS 6140

DATE: MAY 02 2012

SUBJECT: Two Chiefs' Partnership Awards Announcement

TO: Regional Foresters, Station Directors, Area Director, IITF Director, Deputy Chiefs, and WO Directors

We are pleased to announce the 2011 *Two Chiefs' Partnership Award* recipients. These awards recognize exemplary employees and projects from the Forest Service (FS), Natural Resources Conservation Service (NRCS), State Forestry Agencies, and Conservation Districts who have worked collaboratively to support conservation and forest stewardship.

The awards highlight and acknowledge existing partnerships and projects that are occurring across the country. Award recipients for 2011 include an individual who is passionate about restoring the Trinity River System, two individuals who used targeted agreements to deliver more conservation practices in Virginia, a group partnership that is actively restoring longleaf pine to its historical range on Tribal lands in Texas, a partnership that has educated over 900 people about the Southern Forest Futures project and invasive species, a collaborative that reduced the Sudden Oak Death disease in the Redwood Valley of California, and a partnership that connected Forest Service and privately owned lands to enhance fish and wildlife management near the White Mountain National Forest. The winners engaged in creative and diverse landscape-scale partnerships to support conservation and forest stewardship around the country.

Individual Award Winners:

Cynthia Tarwater, Trinity County Resource Conservation District

Cynthia is the Watershed Restoration Project Implementation Coordinator for the Trinity County Resource Conservation District. She has a passion for restoration of the Trinity River System. As the Project Coordinator, Cynthia's responsibilities include actively seeking funds and assisting with planning and implementing a watershed restoration program through the sediment impaired Trinity River Basin including the South Fork Trinity River Watershed, one of the most unstable and erosion-prone landscapes in Northern California, where restoration work requires substantial technical knowledge and expertise.

Over the past 15 years, the partnership has focused on road decommissioning and road drainage improvements. Cynthia works closely with FS to assess and prioritize watershed restoration needs. Her dedication to land restoration includes some of the following achievements: securing over $5 million in outside partner funding to match $2.5 million in Federal funding, decommissioning over 300 stream crossings, removing over 250,000 cubic yards of sediment from the channel system, and saving money on road maintenance by improving drainage on over 300 miles of road. The success of the restoration program is due in great part to Cynthia's expertise, attention to detail, and personal dedication.

Carl Garrison, Virginia State Forester, and John Bricker, Virginia State Conservationist

The strong leadership of State Forester Carl Garrison and State Conservationist John Bricker enabled the Virginia Department of Forestry (VDOF) and Virginia NRCS to expand their partnership beyond traditional boundaries using "targeted" agreements to deliver more conservation practices without adding additional staff. The two agencies have increased the development of forest management plans, trained more than 300 natural resource professionals, and tripled the number of technical assistance providers in just one year. NRCS and VDOF increased direct technical assistance to landowners to support Farm Bill programs. The VDOF staff promoted the Environmental Quality Incentives Program, Wildlife Habitat Incentive Program (WHIP), and the Conservation Stewardship Program, developed forestry management plans, and worked closely with landowners to instill forestry practices. Virginia became one of the first states to sign an agreement between VDOF, NRCS, and the Virginia Tree Farm Committee, acknowledging the equivalence of Forest Stewardship, Tree Farm, and Conservation Activity Plans. These efforts have benefited several organizations and agencies, including the Department of Agriculture Farm Service Agency, Virginia Cooperative Extension, Chesapeake Bay Foundation, Virginia Soil and Water Conservation Districts, Virginia Department of Game and Inland Fisheries, and Virginia Department of Conservation and Recreation.

Group Award Winners:

Texas Conservation Collaborative

This is a partnership among the Alabama-Coushatta Tribe of Texas, NRCS, Texas Forest Service, and Polk-San Jacinto Soil and Water Conservation District to restore longleaf pine to its historical range. The Alabama-Coushatta Tribe of Texas has enrolled 400 acres into NRCS' longleaf pine landscape initiative through WHIP. This is the first time the Tribe has signed a contract with NRCS as part of a Farm Bill program. The Tribe's history dates to the 1700's, when they settled in East Texas' Big Thicket. Longleaf pine trees are a treasured cultural resource used for centuries in making handmade baskets from the needles. Leaders of the Tribe recognized the need to create a sustainable supply of the needles and approached the NRCS to help them accomplish this goal. This successful partnership benefits the estimated 1,150 Tribal members and future generations, along with the land's wildlife habitat and aesthetic and recreational values. Partners have developed and implemented a conservation plan focused on restoration and enhancement of this diverse ecosystem. Site preparation has begun, and tree planting is scheduled for 2012. A successful multi-media outreach effort includes featured stories in newspapers and partner publications. A video featuring this project has reached numerous outlets, including RFD-TV's Voices of Agriculture. This partnership was also featured at the 2011 Intertribal Agriculture Council and Indian Nations Conservation Alliance Symposium.

Forestry Webinars

The FS Southern Research Station (SRS) and the FS Southern Region (Southern Region) worked with Southern Regional Extension Forestry, North Carolina State University, Texas AgriLife Extension Service, NRCS, and North Carolina A&T State University to produce five webinars in fiscal year 2011 through the Forestry and Natural Resources Webinar portal. SRS and the Southern Region invited NRCS and North Carolina A&T State University to join the partnership to provide leadership in reaching underserved audiences. In collaboration with SRS scientists, Southern Region natural resource specialists and university scientists teamed to deliver two webinars about the Southern Forest Futures Project and three webinars about invasive plants.

Over 900 people including policymakers, scientists, managers, county officials, private and nongovernmental resource specialists, investment specialists, master gardeners, and landowners-participated in webinars, potentially impacting approximately 49 million acres. Responding participants indicated the total economic value of the webinars equaled $531,924. Live and archived webinars enable participants to save travel dollars and fuel costs. This also equates to a reduction of carbon emissions. For designated webinars, eligible participants earned continuing education credits through the Society of American Foresters (SAF) and the International Society for Arboriculture (ISA). SAF credits have been awarded to 437 people, and 30 people have earned ISA credits.

Redwood Valley Collaborative

Over the past 12 months, an FS, NRCS, and CAL FIRE collaboration has treated 314 acres infested with Sudden Oak Death in the Redwood Valley, Humboldt County. For a decade, this disease has ravaged areas of northern California, killing over 5 million trees. The partnership resulted in a reduction of the disease on lands at Green Diamond Resource Company and twelve small landowner parcels. It reduced the risk of infection in the following adjacent high value areas: Redwood National and State Parks, Bureau of Land Management, Yurok and Hoopa Valley Indian Reservations, and Del Norte County. Eradication efforts here were especially important because the area is far from any other infestations. The large area, remote location, and multiple ownerships made the project particularly challenging.

FS and NRCS each contributed $200,000 through the Cooperative Forestry Assistance Act and Cooperative Conservation Partnership Initiative, which was matched by University of California Cooperative Extension (UCCE) and North Coast Land Conservancy. Green Diamond treated its own land. CAL FIRE, NRCS, and the Forest Service developed the biological and cultural evaluations and treatment recommendations. CAL FIRE and Department of Corrections provided labor from two Conservation Camps and Able Forestry handled the in-camp logging. Hoopa Reservation staff marked trees. UCCE led the communication and coordination effort that engaged the affected landowners and stakeholders. UCCE also provided project level administrative and financial oversight. Infected material was taken to nearby biomass power plants to create electricity, which supported maintaining biomass infrastructure.

New Hampshire Conservation Leaders

New Hampshire conservation leaders joined forces in 2011 to enhance fish and wildlife habitat on private and Federal lands in the Upper Ammonoosuc and Israel River watersheds of Northen New Hampshire. The unique collaboration between the Forest Service and NRCS expands the New Hampshire conservation footprint by connecting the White Mountain Forest lands and privately owned lands for fish and wildlife habitat management. Tom Wagner, Supervisor of the White Mountain National Forest, and Rick Ellsmore, New Hampshire NRCS State Conservationist, collaborated to pursue landscape-level habitat improvements on Federal and private lands in Coos County. NRCS, in cooperation with Brad Simpkins, Acting State Forester, and Darrel Covell, Forestry and Wildlife Program Leader with New Hampshire Cooperative Extension, began to focus Farm Bill resources on private lands to restore and enhance a large and important mass of critical fish and wildlife habitat.

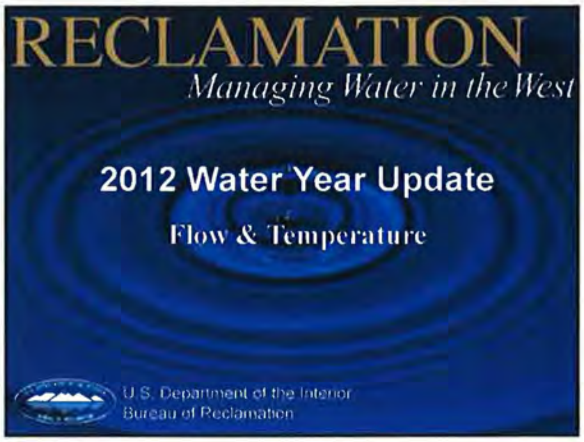
Key forestry agreements with the U.S. Fish and Wildlife Service, The Nature Conservancy, New Hampshire Fish and Game, Trout Unlimited, Wildlife Management Institute, Society for Protection of New Hampshire Forests, and New Hampshire Conservation Districts energized the project. The New Hampshire project controlled invasive species, improved dense softwood and aspen-birch habitat, decommissioned logging roads, constructed fish-friendly stream crossings, and reduced soil erosion and sedimentation. The Forest Service, NRCS, and other partners are continue to work together to protect important forest tracts in other key New Hampshire and multi-state watersheds.

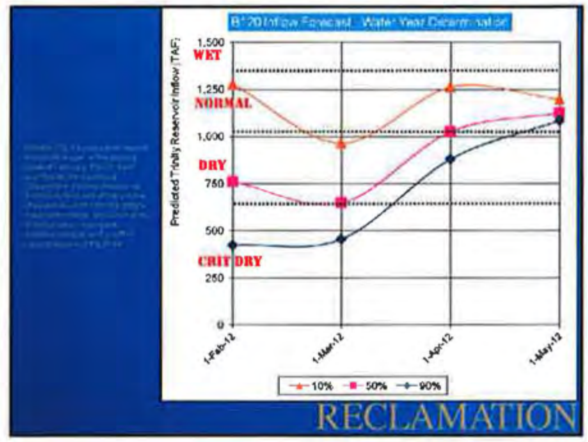
Presentation of Awards:

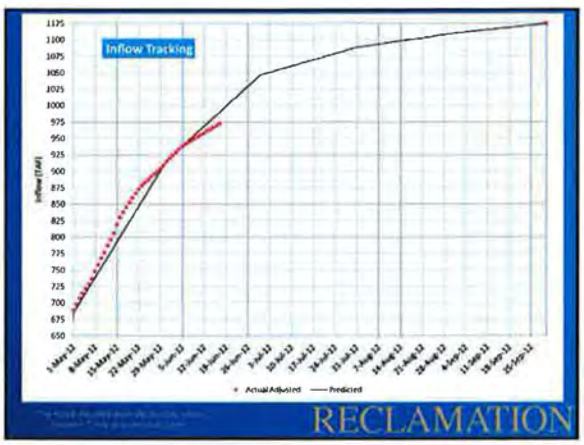
Forest Service and NRCS leaders, at an appropriate regional or state venue, will jointly present these awards. Please join us in congratulating the award winners.

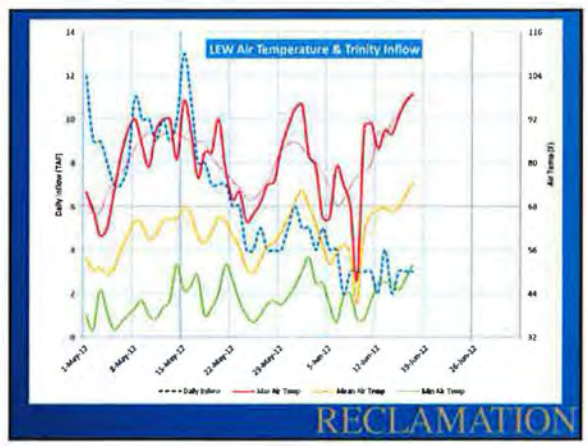
Thomas L. Tidwell
Chief
Forest Service

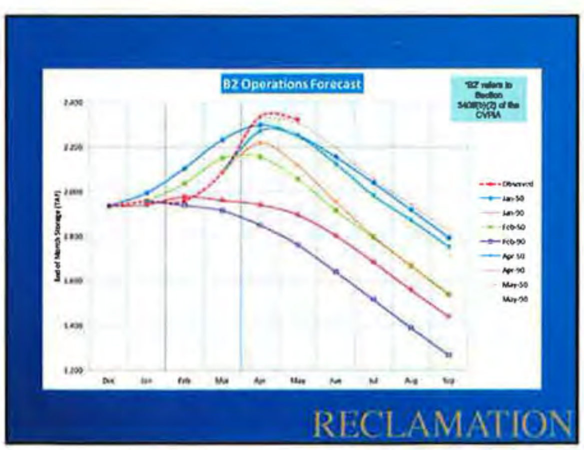
Dave White
Chief
Natural Resources Conservation Service

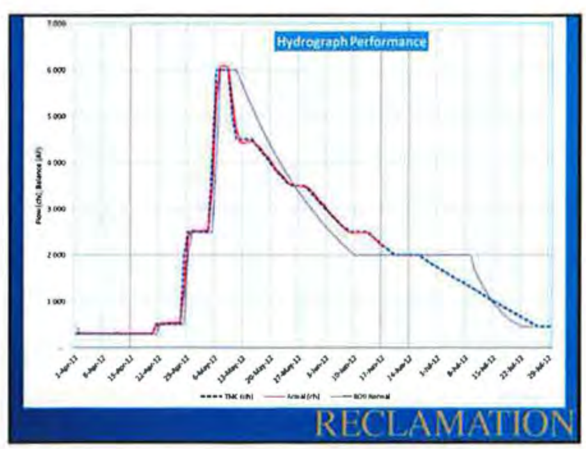

RECLAMATION
Managing Water in the West
2012 Water Year Update
Flow & Temperature
U.S. Department of the Interior
Bureau of Reclamation

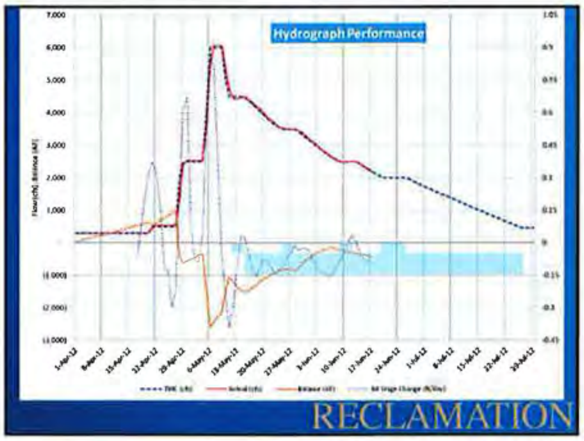

Predicted Trinity Reservoir Inflow (TAF)
WET
NORMAL
DRY
CRIT DRY
1,500
1,250
1,000
750
500
250
0
1-Feb-12
1-Mar-12
1-Apr-12
1-May-12
10%
50%
90%
RECLAMATION

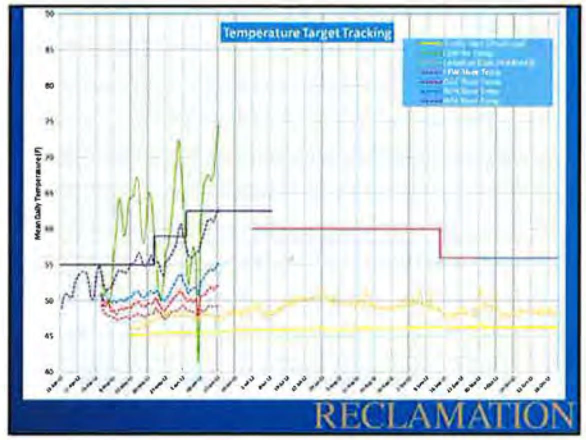

Inflow Tracking
Inflow (TAF)
Actual Adjusted
Predicted
RECLAMATION


LEW Air Temperature & Trinity Inflow
Daily Inflow (TAF)
Air Temp (F)
Daily Inflow
Max Air Temp
Mean Air Temp
Min Air Temp
RECLAMATION


B2 Operations Forecast
'B2' refers to Section 3406(b)(2) of the CVPIA
End of Month Storage (TAF)
Observed
Jan-50
Jan-90
Feb-50
Feb-90
Apr-50
Apr-90
May-50
May-90
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
RECLAMATION


Hydrograph Performance
RECLAMATION





Trinity River Temperature Objectives

Source	Target Reach	Dates	Target
		All Years	
WR 90-5	• Lewiston to Douglas City	• July 1 to September 14	< 60° F
Basin Plan for the North Coast Region (Regional Water Quality Control Board, 1994)	• Lewiston to Douglas City	• September 15 – 30	< 56° F
	• Lewiston to confluence with the North Fork Trinity River	• October 1 to Dec. 31	< 56° F
Spring-Time Objectives of the Record of Decision for the Trinity River EIS/EIR (USFWS et al., 2000)	Lewiston to Weitchpec	Normal & Wetter WY	Optimal
		• April 15 to May 22	< 55° F
		• May 23 to June 4	< 59° F
		• June 5 to July 9	< 62.5° F
		Dry & Critically Dry WY	Marginal
		• April 15 to May 22	< 59° F
		• May 23 to June 4	< 62.5° F
		• June 5 to July 9	< 68° F

WR 90-5

RECLAMATION

2013 Schedule Recommendation

- TAMWG – Any day between March 28 & April 3, 2013 – Preferred date: April 1, 2013 (No foolin'!)
- TMC – Two days after the TAMWG meeting, between March 30 & April 5, 2013 – Preferred date: April 3, 2013
- The TMC should also schedule a contingency conference call on or about April 12 to finalize any changes to the proposed flow schedule if necessary

RECLAMATION