

# ACTION PLAN

## UPDATED FALL FLOW SCHEDULE

### INTRODUCTION

On March 18, 2003 the Department of the Interior (DOI) submitted a document to Judge Oliver Wanger entitled "*Recommendations for Averting Another Adult Salmonid Die-off*" (March 18<sup>th</sup> Plan). The March 18<sup>th</sup> Plan recommended multiple pulses of 2,000 cfs with base flow conditions in between to stimulate migration of Trinity River fall run chinook from the lower Klamath River into the Trinity River. Action triggers initially proposed in the March 18<sup>th</sup> Plan included run size, river discharge, and water temperature. The March 18<sup>th</sup> Plan also included a provision to convene a Technical Group in July 2003 to reassess necessary actions to avert the potential of another die-off of adult migrating salmon in the Trinity River.

On June 26, 2003 the Trinity Management Council (TMC) endorsed a DOI supported approach to update the March 18<sup>th</sup> Plan that included improved stakeholder input and the development of a final Action Plan (June 26<sup>th</sup> Memo). The Trinity River Restoration Program (TRRP) is coordinating this effort with participating agencies, tribal governments and various stakeholders. The final Action Plan described in this letter was developed by technical representatives of the TRRP and TMC member organizations during a workshop on July 23<sup>rd</sup> and 24<sup>th</sup>, 2003. Constraints imposed on the development of the Action Plan included:

- Management actions limited to the Trinity River only.
- Management action limited to 50,000 acre-feet.
- Plan was an emergency action for fall 2003 only.
- Maximum ramp up and ramp down rates for releases from Lewiston Dam not to exceed criteria established in the Trinity River Mainstem Fishery Restoration Environmental Impact Statement / Report (EIS) dated October 2000.
- Evaluations of the causative factors for the 2002 fish die-off are not yet complete.

Diseases implicated in last years die-off are rapidly transmitted and ubiquitous in the river system, which necessitates a management plan that is orchestrated well in advance of any conditions that may result in another fish die-off.

This Action Plan remains consistent with the goal of the March 18<sup>th</sup> Plan by taking a proactive approach to avoid conditions that could result in another significant die-off of adult Trinity River fish in the Lower Klamath River in the fall of 2003. The Action Plan does revise the recommended action and initiation triggers proposed in the March 18<sup>th</sup> Plan, and includes a monitoring/evaluation plan to determine the effectiveness of any action taken

## BACKGROUND

No final report on causal factors leading to the fish die-off of 2002 is currently available. The best available information is in the draft report entitled "*September 2002 Klamath River Fish Kill: Preliminary Analysis of Contributing Factors*" from the California Department of Fish and Game dated January 2003. Crowded conditions, warm water temperatures, and presence of the disease pathogens (i.e., ICH and Columnaris) are thought to have been the major factors causing the epidemic. Analysis of previous years data show that water temperatures were not unusually warm in 2002 and that low levels of mortality from these pathogens is common, suggesting that these pathogens are ubiquitous in the lower Klamath River system. The only noted difference in 2002 was that there was a large run of returning fall-run chinook (160,000, DFG Mega Table) coupled with unusually low discharge in the lower Klamath (2,100 cfs at Terwer. It is surmised that the large run size coupled with low flow conditions increased fish densities locally in places of thermal refuge and below some riffles. Crowding was noted below Ah Pah and Pecwan riffles prior to the die-off (David Hope, Tim Hayden pers. comm.).

### EXPECTED FALL 2003 RIVER CONDITIONS

#### *Flow*

The flow conditions expected for the fall of 2003 are shown in Table 1. Fall flows in 2003 are expected to be similar to conditions seen in 2001. The major difference between 2002 conditions and flows expected in 2003 are releases from Iron Gate Dam are approximately 400 cfs greater. The effects of the action recommended in this Action Plan were not included in developing the expected fall flow conditions for 2003.

**Table 1- Expected 2003 Fall Flow Conditions under Normal Operations**

| Location                | Sept. 2001 Monthly Average Flow (cfs)<br>[a] | Sept. 2002 Monthly Average Flow (cfs)<br>[a] | Expected Sept. 2003 Monthly Average Flow (cfs) |
|-------------------------|--|--|--|
| Iron Gate Dam           | 1,026  | 760 [b]                                      | 1,168 [c]                                      |
| Lewiston Dam            | 450  | 450  | 450 [d]  |
| Tributary Accretion [e] | 1,125  | 919  | 1,022 [f]                                      |
| Klamath River at Terwer | 2,601  | 2,129  | 2,640 [g]                                      |

Notes:

- a) Source: California Department of Fish and Game "*September 2002 Klamath River Fish Kill: Preliminary Analysis of Contributing Factors*" dated January 2003.
- b) Does not reflect flows after September 26, 2002.

- c) Source: Klamath Project 2003 Operations Plan dated 4/10/2003
- d) Normal operational summer baseflow releases. Does not include additional management actions proposed in this Action Plan.
- e) Calculated by subtracting releases from Iron Gate and Lewiston Dams from Klamath River flow at Terwer.
- f) Calculated as the average monthly tributary accretion for September from 2001 and 2002
- g) Klamath River flow at Terwer under currently scheduled operations for 2003. Does not include additional management actions proposed in this Action Plan.

### *Temperature*

Water temperatures of the lower Klamath River are largely influenced by meteorological conditions, which are stochastic in nature. As such, the expected range of thermal conditions of the lower Klamath River in August and September cannot be definitively identified at this time nor accurately predicted. Historic thermal regimes of this region of the Klamath River are perhaps the best representation of the expected range of thermal conditions that may occur this year with consideration to the potential for extremely warm or cool thermal regimes occurring.

No real-time water temperature data is available in the lower Klamath River. However, the U.S. Fish and Wildlife Service and the Yurok Tribe maintain temperature probes that could be manually downloaded should the need exist. A time delay of approximately 1 day exists to obtain water temperature data from these probes.

### *Run Size*

The estimated run size for 2003 is 113,000. Good ocean conditions and the size of the spring run returns indicate that the actual fall run return size may be greater than the estimated amount (Loren Everest, USFS, personal communication 7/23/2003). The annual estimates have a wide confidence interval. Consequently, there is a chance that this year's run size will be similar to the run size of 2002. Trinity fish average about 40% of the run (Wade Sinnnen, DFG).

## **ACTION PLAN**

The Action Plan serves as the revision to the March 18<sup>th</sup> Plan. The Action Plan contains both a Proactive Release and a potential Emergency Response. The Proactive Release is a preemptive action designed to avoid conditions in 2003 that federal scientists believe contributed to the 2002 die-off. However, these scientists recognize that knowledge about precise causative factors is limited and some uncertainty still exists. Therefore, the Emergency Action has also been included as part of the Action Plan to be implemented if conditions warrant.

### **FINAL DECISION CRITERIA FOR ENVIRONMENTAL TRIGGERS**

#### *Proactive Release Triggers*

The trigger for the proactive release portion of the Action Plan pending TMC direction.

#### *Emergency Response Triggers*

Independent of other scheduled management actions, an emergency response to an emerging disease threat can be triggered any time in August and September. The primary disease trigger

would be an estimated doubling over a 3 to 7 day time period of either the incidence (proportion of fish infected) or severity (number of parasites per gill) of *Ichthyophthirius multifiliis* (Ich), above background levels as determined by real-time disease monitoring and data analysis. The 3 to 7 day time period is based on the lifecycle of this parasite, at water temperatures common to the river, and its ability for rapid amplification of infection in high density fish populations. There are no data on normal background levels of Ich infection for salmonids in the lower Klamath River, so the presence of this endemic pathogen is not sufficient grounds for a management action.

Additional real time monitoring for the incidence of the columnaris bacterial pathogen in the sampled adult population will be conducted. Although columnaris is commonly detected in sick Klamath River basin adult salmonids during warm water periods, it has not been linked to the 2002 fish die-off to the same degree as the Ich pathogen. Thus, incidence of the columnaris pathogen alone will not serve as a trigger for an Emergency Response.

## **RELEASE SCHEDULES**

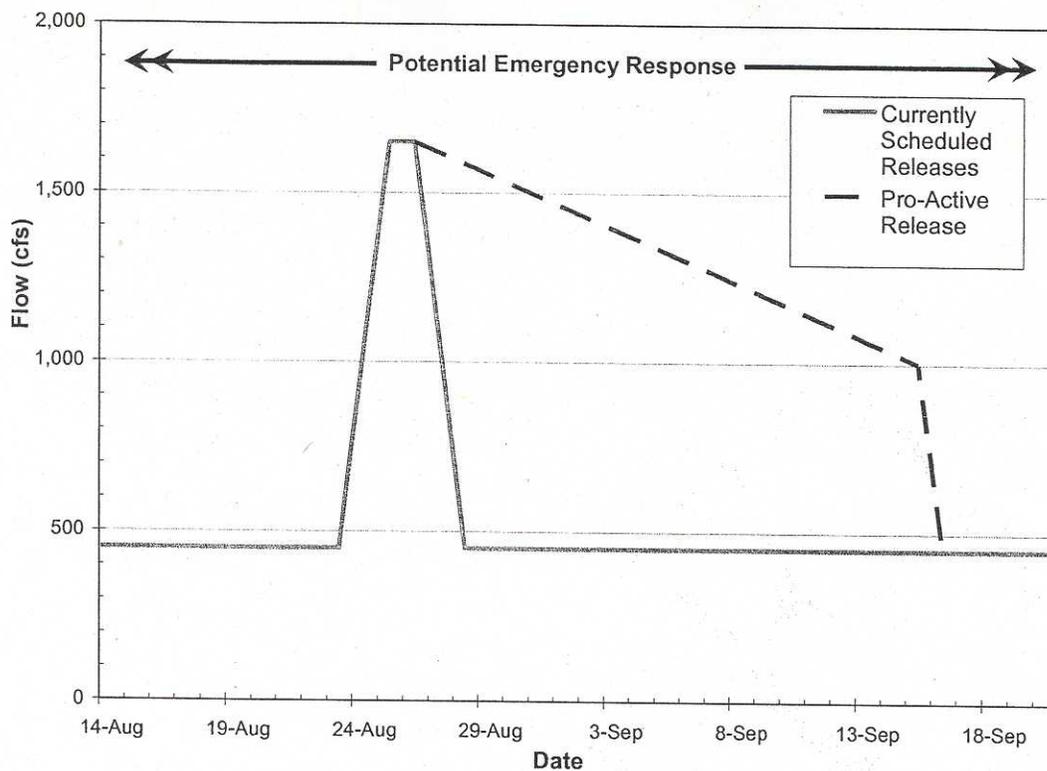
### **PROACTIVE RELEASE**

#### *Objectives*

The proactive release provides conditions known to be adequate for chinook migration, reduces crowding and allows Trinity River fish to initiate migration naturally. In addition, the schedule minimizes ramp-down rates from the boat dance flows to reduce juvenile stranding.

#### *Description*

Initiation of this action is August 27<sup>th</sup> following releases for the Boat Dance. From the Boat Dance peak flow of 1,650 cfs on August 26, 2003 initiate a constant ramp down rate to 1,000 cfs on September 15<sup>th</sup>. Then ramp down to the summer baseflow of 450 cfs at maximum ramp down rates specified in the EIS. The daily flow schedule for the Proactive Release is shown in Figure 1. Boat Dance flows are not included in this action.



**Figure 1 – Daily Flow Schedule for Proactive Release**

*Rational of the Release Hydrograph*

1. The hydrograph lies within the natural range of historic unimpaired hydrology for the Trinity River.
2. The hydrograph accommodates needs of riparian vegetation and wildlife (amphibians, reptiles, birds).
3. The hydrograph reserves adequate volume of water for emergency response to potential disease outbreak.
4. Timing of the hydrograph corresponds with coded wire tag data that indicates the peak abundance of Trinity River hatchery fall chinook have entered the estuary between middle of August and the middle of September. Ends in the middle of September prior to spawning initiation of spring run chinook in the upper Trinity River.
5. The hydrograph is considerate of scheduled ceremonial flows for the Hoopa Valley Tribe White Deer Skin Boat Dance. This maximizes benefits of the scheduled ceremonial flows and prevents an erratically shaped hydrograph. Lewiston releases above 1,000 cfs will likely maintain suitable passage conditions in the Lower Klamath River in combination with 'below average' water year releases from Iron Gate Dam.
6. Slow ramp down to 1,000 cfs elevates flows and maintains thermal mass of cool water to maximize secondary cooling effects.

*Benefits*

1. Reduces potential crowding by facilitating passage and increasing wetted area for fish use.
2. Reduces ability of water borne pathogens to spread among fish.

3. Results in expected water cooling of ~ 1 degree centigrade in Lower Klamath River.
4. Increases flows in Lower Klamath River above levels observed during 2002 fish die-off.
5. Delays implementation until late August, thus reducing premature migration cues for Klamath River fish (as compared to March 18<sup>th</sup> Plan)
6. Retains enough water to conduct an Emergency Response should conditions warrant (see below).
7. Results in efficient use of water by integrating with scheduled ceremonial flows for Hoopa Valley Tribe White Deer Skin Boat Dance.
8. Avian, wildlife, and riparian resources should be relatively unaffected by a 1,650 cfs flow and associated ramp down from August 15 to September 15. Foothill yellow-legged frog tadpoles would likely benefit by holding off until late August to allow final stages of metamorphosis of tadpoles and by the addition of additional water into pools that are currently drying up; although some tadpoles might be washed away. Current egg mass mortality is ~ 20% to date.
9. Enhances white water boating opportunities.
10. Reduces impacts to flat water recreation in Trinity Lake by reducing overall volume of water used and deferring most of the release until after Labor Day.

#### *Uncertainties*

1. May trigger a premature run of Klamath River adult fish.
2. May affect smolt migratory behavior and coho rearing.
3. May delay in-stream construction activities for bridge / restoration efforts planned for the summer construction period in 2003.
4. Should produce minimal short term impacts to anglers and tribal fisheries.
5. River dredging activities might be impacted.
6. Will require notification of relevant public safety issues by early August combined with signage at public access points.
7. Will reduced ability to operate counting / marking at weirs.
8. Will reduced the potential for hydropower generation.

### **EMERGENCY RESPONSE**

#### *Objectives*

The objective of an emergency action is to minimize loss of fish if a die-off is detected. Minimum response time of an emergency release from Lewiston Dam to effect Trinity River fish in the Lower Klamath River  $\geq 1$  week due to time associated with: (a) sampling, (b) pathology monitoring and determination, (c) administrative approval, and (d) travel time of water released. Once a potential disease outbreak is detected, an emergency response action may not begin to take effect prior to the onset of fish mortality due to the quick regeneration and infection rates of the pathogen (Ich). However, we believe it is the only option to minimize loss if a die-off begins.

#### *Description*

The Emergency Response is initiated based on results of the Real-time Monitoring of Disease incidence in fish sampled in the Lower Klamath. The minimum emergency response should be to conduct a 5 day release of 2,000 cfs from Lewiston Dam for an approximate total volume of

17,000 acre-feet above base flows, but could be extended to use the full 50,000 acre-feet allocation. Once initiated, continued implementation of the Emergency Response would be re-evaluated on a daily basis. Maximum allowable ramp up and ramp down rates specified in the EIS would be followed.

#### *Rational of the Release Hydrograph*

1. A 2,000 cfs release is the largest flow possible without increasing the stranding potential of juvenile fish in the upper Trinity River.
2. Attempts to provide the greatest improvement in fish passage and temperature conditions, and minimize fish crowding in the Lower Klamath.
3. Greater duration of increased dispersion potential, migration distance, and thermal cooling.
4. Increased flows may reduce ability of water borne pathogens to spread among fish.
5. Increases flows in Lower Klamath River above levels observed during the 2002 fish die-off.
6. Retains enough water to conduct the Proactive Release.

#### *Benefits*

The Proactive Release contains the flexibility to conduct an emergency response should conditions warrant.

#### *Uncertainties:*

1. Duration is shorter than migration travel time of 2 to 3 weeks from estuary to Willow Creek (pers. comm., Wade Sinnen, DFG). Thus, not all Trinity River adult fish may be capable of evacuating die-off areas observed in 2002.
2. Potential effects on Klamath River fish migration are unknown.
3. Incurs unbudgeted costs for monitoring and sampling effort.
4. Detecting and predicting increased potential of disease outbreak is difficult.
5. Effects on smolt migratory behavior and coho rearing are unknown.
6. May delay in-stream construction activities for bridge / restoration efforts planned for summer construction period in 2003.
7. May have short term impacts to anglers and tribal fisheries.
8. River dredging activities may need to be temporarily suspended.
9. Will require notification of relevant public safety issues by early August combined with signage at public access points.
10. Will prevent operation of counting / marking weirs.
11. Considered an "unnatural" event that may have negative unintended consequences.
12. Requires coordinated action with Klamath River operations.
13. Requires a coordinated effort with a clear and short decision pathway to maximally reduce overall response time.

#### *Real-Time Disease Monitoring*

Real-time disease monitoring will be conducted to determine if any Emergency Response triggers have been met. A minimum of 30 adult Chinook salmon gills will be collected per week above the estuary and below the confluence of the Klamath and Trinity rivers. Sampling

will be conducted by personnel of the Yurok Tribal Fisheries program and the Arcata Office of the U.S. Fish and Wildlife Service as part of the Yurok Tribe net harvest monitoring program. These two agencies will perform the majority of the fish collection specimen examination. Training for disease monitoring will begin the week of the 5 August or 12 August 2003.

Real-time disease monitoring will begin in mid-August and continue through the end of September. Samples of from two to 30 adult salmon will occur per week. On-site examination of specimens will be conducted to determine the incidence of columnaris, and both incidence and severity (number of parasites per gill sample) of any Ich infection. One archive and one quality assurance sample will be collected and given to the U.S. Fish and Wildlife Service, Fish Health Center, Anderson, California. Results of the data analysis will be coordinated by the Fish Health Center and disseminated through the Arcata Office of the U.S. Fish and Wildlife Service for distribution to a central decision maker, who is yet to be determined.

### **DRAFT MONITORING AND EVALUATION PLAN**

A technical memorandum will be prepared to evaluate the physical and biological effects associated with the Action Plan, should it be implemented. Evaluation will rely heavily on existing monitoring activities including weir sampling, carcass and redd surveys, water temperature, water quality, and adult chinook radio tracking, as well as additional information from the real-time disease monitoring (discussed above). The two most significant elements in determining "success" of the proposed flow management action are response of adult salmonids to: (1) flow (migration) and (2) level of pre-spawn mortality in separate watersheds of the Trinity River basin (Scott Foott, pers. comm.), as such, these two measures will be emphasized in the study designs listed below and in the evaluation of actions implemented.

#### **Weir Sampling**

Weir sampling for the Trinity River includes the following components: (1) Junction City and Willow Creek weirs operated cooperatively by the California Department of Fish and Game (CDFG) and the Hoopa Valley Tribe (HVT). The purpose of monitoring will be to estimate run and harvest sizes for spring and fall chinook, coho, and fall steelhead. Temporary structures will be deployed in the river for the purpose of trapping and tagging fish to estimate the size of populations by use of "mark-recapture" methods. Trinity River Hatchery will serve as the primary recovery point for tagged fish. Run-size estimates, run time, total harvest, hatchery composition of the run, and age structure of fall chinook (from scales) will be determined. Information will be disseminated by use of written weekly trapping updates, quarterly reports, an annual report, and management agency fall chinook stock assessment (megatable, abundance predictor, harvest management, etc). Because of flow modifications, personnel of the CDFG and HVT will not be able to fish weirs at higher than "normal" flows. Flows higher than 750 cfs will prevent sampling at the Junction City weir, whereas at the Willow Creek weir sampling will be prevented when flows are higher than 1000 cfs.

#### ***Carcass and Redd Surveys (CDFG, USFS, FWS)***

Carcass and redd surveys for the Trinity River will be conducted to identify the location and aerial extent of redds, and to collect information on carcasses, including hatchery straying, pre-

spawn mortality, spaghetti tag counts and identification at weirs, and length of run time, etc. Personnel from CDFG, U.S. Forest Service, and USFWS will raft sections of the river from Lewiston Dam to Cedar Flat. Redds will be counted, flagged, and any carcasses collected will be examined by cutting in half to avoid recounting. Information gathered from this activity will include timing and location of redd construction, natural and hatchery composition of chinook, pre-spawn mortality rates, and spring-fall chinook separation timing. Information will be disseminated through quarterly and annual reports to the TRRP, and real time updates to interested parties. No flow modifications are anticipated; however, redd enumeration and carcass recovery will be hindered at flows greater than 700 cfs. Other activities performed by CDFG include hatchery recovery, coded-wire tag evaluation, and coho marking, however these activities will not be impacted by proposed higher flows in the Trinity. Note: Because of the State of California's budget crises, the CDFG may lose personnel, which could potentially limit our ability to perform our projects in their traditional manner.

#### *Water Temperature Monitoring*

Hourly temperature monitoring will be conducted by the Yurok Tribal Fisheries Program at the: (1) Lower Trinity River at Willow Creek trap site, (2) Lower Trinity River at Weitchpec, (3) Lower Klamath at Martins Ferry, (4) Lower Klamath at Moores Rock, (5) Lower Klamath at U/S Blue Creek, (6) Lower Klamath at Blue Creek Hole, and (7) at Lower Klamath at Terwer.

#### *Water Quality Monitoring*

Water quality monitoring will be conducted by the Yurok Tribal Fisheries Program at the Hydrolabs operated at the: (1) Klamath River upstream Blue Creek, (2) Klamath River at Terwer, (3) Blue Creek Hole, (4) Klamath River upstream Tully Creek, (5) Lower Trinity at Weitchpec, (6) Klamath River upstream Trinity River, and (7) Klamath River upstream Aikens Creek

#### *Grab Samples*

Grab samples will be conducted by personnel of the U.S. Geological Survey and the Yurok Tribe EPA on a monthly basis at the Terwer weir, Tully Creek, Lower Trinity River, Klamath u/s Trinity through October, which will include the following sample attributes: (1) BOD, (2) nitrate, (3) ammonia, (4) TKN, (5) phosphates, (6) Ortho phosphates, (7) total organic carbon, and (8) dissolved solids.

#### *Adult Fall Chinook Radio Tracking*

The Yurok Tribal Fisheries Program and USFWS will tag and track adult fall chinook salmon in the Lower Klamath Estuary and at Blue Creek Hole using: (1) 50 temperature sensitive radio tags, (2) 5 fish per week tagged in estuary, (3) 30 temperature sensitive radio tags at Blue Hole, and (4) 50 will also be tagged with temperature archival tags. The USFWS will map critical riffles in the Lower Klamath River, and tag and track adult fall chinook salmon in the Lower Klamath Estuary and at Blue Creek Hole in order to evaluate the: (1) 30 more tagged at Blue Hole, (2) Radio receivers are located at: Highway 101, Blue Creek, Weitchpec, Slayyer, Horse Linto, Bluff and Wooly creeks, and Shasta Scott rivers. If time and manpower permits, the

Yurok Tribal Fisheries Program will conduct direct observations in the Lower Trinity River (from Smokers Falls to mouth of Trinity River) to assess: (1) entry timing, (2) relative abundance, (3) species composition, and (3) general health and conditioning of adult salmonids as a response to recommended fall flows.