

FILE COPY



United States Department of the Interior



FISH AND WILDLIFE SERVICE

1655 Heindon Road  
Arcata, California, 95521

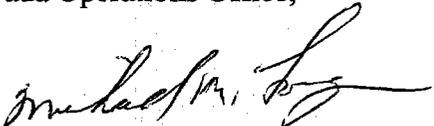
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:  
AFWO

AUG 17 2004

**Memorandum**

**TO:** Fisheries Supervisor, California/Nevada Operations Office,  
Sacramento, California

**FROM:** Field Supervisor, Arcata, California 

**SUBJECT:** Fall flow monitoring plan 2004 - Recommendation to the Trinity Management Council

**Background**

During an August 2, 2004 conference call, the Trinity Management Council (Council) asked two actions of the Bureau of Reclamation (Bureau): 1) Proactively release 36,300 acre-feet of water similar to action taken in fall 2003; and 2) Acquire 13,700 acre-feet of water for a reserve emergency action. The Council asked that a technical group be formed to recommend a monitoring plan to the Council that incorporates adaptive management considerations and to estimate the costs of implementing those monitoring activities. The Council stated that it has the responsibility to weigh the monitoring recommendations developed and find the funding to conduct them if necessary. The U.S. Fish and Wildlife Service (Service) took the lead to coordinate development of this monitoring plan.

In response, technical representatives of the Service, the Bureau, US Forest Service, Yurok Tribe, Hoopa Valley Tribe, NOAA Fisheries, and California Department of Fish and Game (CDFG) met in Arcata, California on August 4, and again on August 9, to develop a monitoring plan per the request of the Council. The group's effort in developing a monitoring plan centered on the following primary tasks: 1) Identify *existing* monitoring efforts that lend themselves to evaluating response to proactive and emergency actions; 2) Identify *additional* monitoring that would be needed to draw inferences of various responses to the proactive and emergency actions; and 3) Identify criteria and the monitoring required to determine if the emergency action is necessary.

## The approach

The management actions requested of the Bureau by the Council are intended to reduce the likelihood of a fish die-off through influencing primary mechanisms identified as critical factors that lead to the lower Klamath River fish die-off in 2002. These mechanisms form the basis of most of the monitoring needs identified by the technical committee.

A proactive release is intended to reduce die-off risk through the following mechanisms:

- Manipulate water temperatures in lower Klamath to maintain conditions conducive to migration (water temps less than 22 degree C)
- Reduce temperature-related stress to fish so they are more physiologically capable of resisting disease
- Increase volume of water in the lower Klamath River to dilute the ever-present disease pathogens *Ichthyophthirius multifiliis* (ICH), and *Flavobacterium columnare* (columnaris).
- Relieve other potential barriers to migration such as depth/velocity that may be present in the lower Klamath River at low flows

An emergency release would be made any time conditions appear to be leading to an adult fish die-off. The intent would be to reduce die-off risk or the magnitude of an imminent die-off through the following means:

- Re-cool or further cool water temps to reduce thermal barriers to migration and decrease temperature-related stress
- Provide additional water volume (to provide for dilution of pathogens and possibly improve physical passage conditions at key riffles)
- Cue fish movement

The following three criteria are recommended for determining the need for an emergency release. If any of the criteria are met an emergency flow release should be made.

1. The Observed Mortality of Large Numbers of Fish – For example, observations of 50-100 dead adult salmon in a 20-kilometer index reach of the lower Klamath River. Coordination with the Service's California/Nevada Fish Health Center (FHC) would attempt to confirm the cause of death.
2. A high incidence of severe infections of *Ichthyophthirius multifiliis* (Ich) detected in pathology monitoring from a random sample of at least 20 fish. A severe infection is defined as 15 percent or more of adults have 30 or more parasites/gill as confirmed by the FHC.
3. Flow, Temperature, and Migratory Behavior – This criterion is composed of both biological and physical parameters, all of which should be met prior to initiating augmented flows:
  - Flows of less than 2,750 cfs at the Terwer gage.
  - Mean daily water temperatures above 22 degrees centigrade as measured at the Terwer gage.
  - Observation of adult salmonids not moving upriver and holding in the lower Klamath as determined by tracking of representative radio-tagged fish, weekly observation of refuge/holding areas, or other reliable indicators.

The technical committee recognized that while fall flow augmentation from Lewiston Dam may have localized positive effects on certain environmental conditions and reduce die-off risk in the lower Klamath River, it could also potentially have unintended consequences for biota in the Klamath and Trinity Rivers. The committee produced a list of potential effects of augmented fall flows from Lewiston Dam, developed hypothesis based on perceived mechanisms for each of those effects, and identified monitoring tools that could potentially be used to test those hypothesis. These are summarized in Attachment 1.

### **Synthesis of data and report of results**

Synthesis of data and reporting the results of the monitoring efforts to serve the needs of adaptive management and to inform managers of the need for emergency management action require two very different time scales. The physical and biological responses to augmented fall flows would have utility for adaptive management if managers consider fall flow conditions for future years, so reporting requirements for adaptive management purposes has immediacy on the order of months or more. However, if managers intend to respond to the need for an emergency action, data synthesis and reporting of key critical condition need to be as real-time as possible. Review of real-time or weekly data regarding critical elements identified as criteria for implementing emergency action should be as simple as possible, and a process needs to be in place to expedite information transfer and decision making.

To contribute to our knowledge of physical and biological response to these flows, there should be an integrated synthesis of information that will be gathered by multiple participating agencies and from diverse resources disciplines. Many of the monitoring activities identified by this committee as potentially useful for evaluating response to augmented flows were initiated for other purposes. The participating agencies involved in many cases have reporting responsibilities independent of evaluating the effects of augmented flows, and each has their own deliverables and timelines. Data sharing, quality control, analysis, interpretation and review should be undertaken by all entities involved. Analysis would also be strengthened by including review of these coincidental monitoring efforts (fisheries, hatchery run timing, water quality, etc) from previous years.

### **Actions required of the Trinity Management Council**

The Council should review the attached spreadsheet and decide as soon as possible if any of the unfunded monitoring identified by the technical group should be initiated, and approve participating entities to conduct those monitoring efforts that the Council can commit to funding. Mobilization for some of these efforts needs to occur immediately in order to collect data before any potential pulse of water is delivered and detect a subsequent response. Additionally, some of the monitoring efforts need to be enhanced or implemented to determine if an emergency release will be necessary. The monitoring committee ranked the projects and provided cost estimates for those that are unfunded to aid TMC with funding priority decisions (Attachment 1). These projects are briefly listed below:

#### **High Priority**

- Beacon transmitters for radio tag study (\$5,000)
- Direct observation of fish densities/holding (No cost estimate)
- Increased pathology monitoring in lower Klamath (\$20,000)

### Moderate Priority

- Water Quality grab samples in the estuary (\$11,000)
- Increased pathology monitoring in Trinity River (\$20,000)
- Stranding survey (\$4,000)
- Genetic sampling of in-river spawners (\$25,000)
- Genetic sampling at hatchery (\$25,000)
- Photo-documentation of riparian (\$3,000)

### Low Priority

- Sonic tags (\$50,000)
- Blood chemistry work (no cost estimate)
- Hydraulic measurements using ADCP (\$6,000)
- Use of pathogen filters (No cost estimate)
- Validation data collection for 2-D model (No cost estimate)
- Snorkel surveys of Trinity tributaries (\$8,000)

For the purposes of monitoring critical elements to determine if criteria are met for an emergency release: (1) a single person needs to be identified as the central point of data compilation and (2) a process for decision making among managers must be established. If criteria are met, decisions will have to be made quickly in light of various constraints to ramping releases up (public safety notification, ramping rates, etc.) and the time that it takes water released from Lewiston to reach the lower Klamath River.

### Attachment



Potential effect of augmented fall water releases from Lewiston Dam	Hypothesis (H <sub>A</sub> )	Monitoring	Emergency	Adaptive	Ongoing?	Notes	Notes on additional costs	Additional costs	Recommendation a = Highly recommended b = Moderate c = Low priority given expense, time constraints, or usefulness
Manipulate water temperatures in lower Klamath to approach/achieve conditions believed not to impede migration (water temps less than 22 degree C)	Will decrease water temps in lower Klamath	WQ network	y	y	Extensive network of temperature recorders and multi-parameter probes exists upstream of the estuary.	Good coverage with existing network. See spreadsheet from USFWS	Existing	\$0	a
		WQ Estuary	n	y	Not ongoing. Water Board may assist. \$2,600 for 1 set of 13 grab samples. 4 sets = \$10,600	Could possibly replicate estuary WQ transects that once were conducted by YT. YT does not have the staff to conduct this monitoring.	Estimate - almost entirely lab costs	\$11,000	b
Reduce max and min temperature related stress to fish so they are more physiologically capable of resisting disease	Will decrease water temps in lower Klamath	Radio tag	y	y	Josh Strange - existing monitoring probably sufficient for Chinook with push to tag up to 35 fish week of 8/16	14 stations throughout Klamath/Trinity. Approx 85 tags remain available and nearly reaching saturation of available codes so additional tags may exceed current capability to track. Will attempt to tag 35 individuals next week before pulse arrives. Compare movement to temperature	Crude estimate. Beacon transmitters for the stations will strengthen the data for this project	\$5,000	a
		Fisheries	y	y	Tribal and creel, estuary to Hoopa Valley	Creel in TK started 8/6/04. YT fishery largely concentrated in estuary with smaller concentration near Weitchpec and sparsely scattered in between. Hoopa Creel to commence Week of 16 August. Hoopa Net harvest continuously monitored since April '04.	Existing	\$0	a
	If appropriate threshold reached, thermal barrier to movement will be removed	Sonic	y	y	N	Expensive. Roughly \$35K just for set-up and data process for one station and one month by vendor, plus the station needs to be manned 24 hr by a crew we provide.	Crude estimate	\$50,000	c
		Direct observation	y	y	N	Bank, snorkel, or photo. Could indicate daytime movement in a few select locations that lend themselves to observation of a rifle from a high vantage point, snorkel, and maybe photo. Probably limited usefulness.	Crude estimate	\$10,000	a
	Fish will be more physiologically capable of resisting disease	WQ network	y	y	Extensive network of temperature recorders and multi-parameter probes exists upstream of the estuary.	Previously described	See above		a
		WQ Estuary	n	y	N	Previously described	See above		b
	Fish will be more physiologically capable of resisting disease	Blood Chemistry	n	y	N	Limited use per Scott Foot. Blood chemistry would be difficult to use for this purpose. CANV EHC would have to be on site. And results would be confused by stress of capture, sex, sexual maturity.	Not estimated		c

Potential effect of augmented fall water releases from Lewisiston Dam	Hypothesis (H <sub>A</sub> )	Monitoring	Emergency	Adaptive	Ongoing?	Notes	Notes on additional costs	Additional costs	Recommendation a = Highly recommended b = Moderate c = Low priority given expense, time constraints, or usefulness
Increase volume and velocities of water in the lower Klamath River to dilute the ever-present disease pathogens <i>Ichthyophthirius multifiliis</i> (ICH), and <i>Flavobacterium columnaris</i> (columnaris)	Water velocities and volumes will increase	USGS gage	y	y	USGS	Real-time discharge at Terwer, Hoopa USFWS could deploy rapidly in multiple habitats through the lower Klamath Scott Foot - Bacterial filters (columnaris) get overwhelmed with all the other bacteria present in the river so are not effective. No known filter for ICH. Scott has tried looking for ICH in infected hatchery raceways and it's very difficult to find among all the other stuff so we are unlikely to have success describing pathogen density of the substrate oriented life stage of ICH. Jerry Bartholomew may have had some luck with filters for C. shasta	Existing	\$0	a
		ADCP measurements	n	y	N		Crude estimate For additional station or additional active tracking	\$6,000	c
Relieve other potential barriers to migration such as depth/velocity that may be present in select location of the lower Klamath River at low flows	Pathogen density in environment will be reduced	Pathogen Filter	n	y	N	May need to supplement with an additional station at "critical riffle" or with additional active tracking. Josh's crew currently "actively" tracks downstream of Blue Creek 5 days/week. Compare movement to flow USFWS currently constructing two-dimensional hydraulic model. Needs validation data. Could empirically measure depth/velocity at critical riffle(s), especially at base flow??? Check with Dave. Resample Pecwan riffle?	Not estimated	\$5,000	c
		Radio tag	y	y	Josh Strange		Crude estimate. For additional station or additional active tracking	\$5,000	a
Provide cue for migration of Trinity Chinook into Trinity River	Chinook in the lower Klamath will migrate in response to pulse of Trinity Water	2-D model	n	y	?	Previously described	See above		b
		Radio tag	n	y	Josh Strange - existing monitoring probably sufficient	Previously described	See above		a
		Sonic	y	y	N	Previously described	See above		c
		Radio tag	y	y	Existing	Previously described	See above		a
Residence times in lower River will be reduced	Fisheries	Existing	n	y	Existing	Existing efforts will characterize timing, weekly cpue, in comparison to prior years, which may be useful to compare to radio tracking data	Existing	\$0	a
		Direct observation	n	y	N	Probably of little use. Characterization of densities very difficult to do quantitatively, and will be near impossible to tell if fish are migrating in and moving on just as quickly.	Not estimated		a
Improve DO in lower Klamath	DO will go up (though may initially decline in response to liberated algae)	WQ network	n	y	Existing	Good coverage with existing network. See spreadsheet from USFWS	Existing	\$0	a

Potential effect of augmented fall water releases from Lewiston Dam	Hypothesis (H <sub>A</sub> )	Monitoring	Emergency	Adaptive	Ongoing?	Notes	Notes on additional costs	Additional costs	Recommendation a = Highly recommended b = Moderate c = Low priority given expense, time constraints, or usefulness	
Will reduce the incidence and severity of ICH and <i>columnaris</i>	Will reduce the incidence and severity of ICH and <i>columnaris</i>	Pathology - Lower Klamath	y	y	Ongoing pathology monitoring with some supplementation (extra targeted fishing effort, especially in Klamath near Weitchpec to increase sample size)	Weekly fish health sampling by reach. May need to supplement with additional fishing in the Weitchpec area to get sufficient sample size (30 freshly caught fish per week at a minimum for internal sample)	Costs are to supplement fishing effort and increase sample size in the Klamath near Weitchpec of fish examined for incidence/severity of infection.	\$20,000	a	
			n	y	Ongoing pathology monitoring with some supplementation (extra targeted fishing effort at Hoopa Valley to increase sample size for relative ICH incidence and severity)	Weekly fish health sampling by reach. May need to supplement with additional fishing in the Weitchpec area to get sufficient sample size (30 freshly caught fish per week at a minimum for internal sample)	Costs are to supplement ongoing harvest monitoring in Hoopa Valley to increase sample size of fish examined for incidence/severity of infection.	\$20,000	b	
May induce premature migration of Klamath fish	Klamath River fish will be drawn upstream away from thermal refugia prematurely	Radio tag	n	y	Existing	Existing monitoring includes station one mile downstream of Weitchpec, one at Bluff Creek, Horse Limbo, one more will go in at Klamath/Trinity confluence	See above		a	
			Fisheries	n	y	Existing	Karuk Tribe Ishi Pish fishery	Existing	\$0	a
			Sonic	y	y	N	Previously described	See above		c
			Direct observation	y	y	N	Previously described	See above		c
May induce premature migration upstream of Trinity tributary fish	Trinity tributary fish may enter their tributary prematurely	Tributary adult dives	n	y	N	Re-snoeked lower reaches of South Fork, New River, and North Fork. Compare to dives that have been or will be conducted late this summer	Crude estimate	\$8,000	c	
Water quality differences between the Klamath and Trinity may lead Klamath fish to migrate up the Trinity	Klamath fish will migrate up the Trinity	CWT recovery	n	y	Existing	Existing Trinity fishery monitoring carcass survey, and hatchery	Existing	\$0	a	
May strand juvenile fish in the upper Trinity River	Pulse of water will flood juvenile habitats that will then be colonized and later isolated when flows are ramped down	Stranding Survey	n	y	N	Conduct qualitative electrofishing and direct observation in locations previously known to strand juvenile fish through the range of receding flows	Crude estimate	\$4,000	b	



Potential effect of augmented fall water releases from Lewiston Dam	Hypothesis (H <sub>A</sub> )	Monitoring	Emergency	Adaptive	Ongoing?	Notes	Notes on additional costs	Additional costs	Recommendation a = Highly recommended b = Moderate c = Low priority given expense, time constraints, or usefulness
Pulse may influence non-target fish or life-histories	Juvenile fish will be dispersed by pulse	Rotary traps	n	y	Existing	Traps at Junction City, Willow Creek	Existing	\$0	b
The riparian and bearn community of the upper Trinity may be influenced	Sediment may be deposited in young riparian and accelerate bearn formation	Photo-document riparian	n	y	N	Photo document pre and post flow to look for deposition, degradation or increased vigor of plants. Bars and low-water margins, bank rehab sites.	2-3 days of work before and after event	\$3,000	b
	Mortality of one and two-year old seedlings may be induced by inundation	Photo-document riparian	n	y	N	Previously described	See above		b
	Growth of one and two-year old seedlings may be induced by inundation	Photo-document riparian	n	y	N	Previously described	See above		b