

Meeting Notes

2012 Annual Upper Sacramento River Monitoring Project Work Team

Date: March 22, 2012

Location: Red Bluff Fish and Wildlife Office

Facilitator: Sarah Giovannetti, Red Bluff Fish and Wildlife Office

Notes: Mike Schraml, Red Bluff Fish and Wildlife Office



Participants:

First	Last	Affiliation	First	Last	Affiliation
Naseem	Alston	NOAA	Doug	Killam	CDFG
Tricia	Bratcher	CDFG	Tom	Kisanuki	USBR
Kurtis	Brown	USFWS	Aric	Lester	DWR
Matt	Brown	USFWS	Laura	Mahoney	USFWS
Robert	Chase	USBR	Chris	Mckibbin	CDFG
David	Colby	USFWS	Tracy	McReynolds	CDFG (phone)
Richard	Corwin	USBR	Ethan	Mora	UC Davis
Eric	Danner	NMFS (phone)	Jonathan	Nelson	CDFG
Gary	Diridoni	BLM	Kevin	Niemela	USFWS
Jim	Earley	USFWS	Bruce	Oppenheim	NMFS (phone)
George	Edwards	CDFG	Bill	Poytress	USFWS
Ryan	Fortier	CDFG	Colin	Purdy	CDFG
Sarah	Giovannetti	USFWS	Mike	Schraml	USFWS
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Josh	Gruber	USFWS	Joe	Silveira	USFWS
Rob	Irwin	SRCAF	Jim	Smith	USFWS
Andrew	Jensen	CDFG	Mike	Thomas	UC Davis
Joe	Johnson	CDFG	Doug	Threloff	USFWS
Matt	Johnson	CDFG			

Participant Updates:

Bruce Oppenheim (NMFS) summarized incidental take and salvage at the Delta Pumps. An estimated 1,200 winter-run Chinook were taken at the pumps during the observation period (October 1-March 18). This number is less than 0.5 percent of the take limit, which is based the number of juvenile winter-run entering the delta. The estimate was low this year due to the low adult escapement in 2011. There were few natural steelhead (< 40), and no juvenile or sub-adult green sturgeon observed at the pumps.

Jim Earley (USFWS) summarized juvenile salmonid rotary screw trapping on Clear Creek. Two rotary screw traps are operated to estimate fall, spring, and late-fall Chinook, and steelhead juvenile outmigration. The upper rotary screw trap monitors spring run outmigration and was in operation from November 1 through mid-February. It will be set again during pulse flows in May and June. The returning adult spring run population was low in 2011, and based on the rotary screw trap data, the juvenile estimate was 4,600. The lower rotary screw trap monitors fall run and late-fall Chinook and steelhead juvenile outmigration. The catch thus far is significantly higher than last, and 638,138 have been handled at the trap. This is the highest number of fish handled, since the trap has been in

operation. Other years had higher numbers of estimated rotary screw trap catch. The trap will continue to operate through June.

Matt Brown (USFWS) summarized studies on Battle and Clear Creeks.

Battle Creek: We are continuing to monitor adult spring run Chinook and steelhead at the Coleman National Fish Hatchery barrier weir. Redd count snorkel surveys also continue. The tributary monitoring team continues to estimate the out migration of Chinook by operating a rotary screw trap above the barrier weir. Aerial thermal imaging has been conducted on Battle Creek and unknown cold spring thermal refuges have been discovered. The sediment study conducted after the Wildcat dam removal revealed that the sediment that was trapped behind the dam did not have a large negative impact on the creek below the old dam site. The snorkel surveys of the north fork revealed spring run Chinook redds in habitat opened up by the Wildcat dam removal. Snorkel surveys indicated that reducing stream flows would dewater spring Chinook redds in the North Fork. PG&E voluntarily released more water to protect these redds. The restoration project is working as intended.

Clear Creek: Otolith and genetics studies on adult spring run Chinook on Clear Creek suggested that these fish were not strays from the Feather River Hatchery but returners reared in Clear Creek and phenotypically spring run fish and not winter run hybrids. A water chemistry study has been started on Clear Creek to analyze for ⁸⁷Strontium/⁸⁶Strontium and Strontium/Calcium ratios. Samples have also been collected from the Sacramento River from Keswick Dam to the Red Bluff Diversion Dam to fill some holes in the historical data set. The study was initiated because of the large gradient in the otolith microchemistry results from adult spring run Chinook and juvenile steelhead from Clear Creek. Clear Creek has a seasonal input of water from the Trinity River. It also has springs with unusual geochemistry and most of the spring run Chinook spawn upstream of these springs and the fall run below them. Understanding the seasonal fluctuations of the creek's water ratios could give a better understanding of the otolith microchemistry results. The otolith study did confirm that none of the returning Chinook had reared in Mill, Deer, or Butte Creeks and did rear in Clear Creek. The cooler water temperatures on Clear Creek may have delayed the peak out migration by one month. This year saw continued monitoring of steelhead and late fall Chinook redds using kayak surveys and snorkel surveys for spring run Chinook.

Kurt Brown (USFWS – CNFH) presented the preliminary numbers for the Coleman National Fish Hatchery. Coleman handled 42,000 brood year 2011 fall run Chinook. Of those, 1,445 were two year old females and 23,070 were jacks. Spawning has produced 16,000,000 eyed eggs with an average eye-up of 92%. Tagging started on March 12 with the first 5 raceways completed to date. The first release will be April 19-20 with 16 raceways being released. Coleman handled 2,784 Brood year 2012 late fall Chinook. Eleven natural late falls were passed upstream of the barrier weir. Coleman received 53 late falls from Keswick dam for crosses with hatchery origin fish. So far, 2,120 steelhead have entered Coleman with 214 being of natural origin and passed upstream. There are still steelhead in stacks and one to be inventoried. Water temperatures have averaged about 3 degrees Fahrenheit cooler this year affecting egg development.

Robert Chase (USBR) updated the numbers of fish entrained at the Red Bluff Pumps. There were a total of 3,195 fish entrained from Jan 2011 thru Feb 2012. A total of 535 salmonids were entrained; 508 fall run Chinook, 9 late fall Chinook, 11 winter run Chinook, 1 spring run Chinook and 6 steelhead. The majority of the total fish caught were Sacramento suckers. The new pumping plant construction appears to be on time for operation. The Red Bluff Diversion Dam (RBDD) is currently intended to stay in place however with gates fully in their upright position allowing the river to pass through naturally. As of March 21, no acoustic tagged green sturgeon were detected on Reclamation's receivers. Other known

holding areas were also scanned utilizing side scan sonar. No adults were observed from Hamilton City upstream to RBDD.

Gary Diridoni (BLM) reported the BLM has placed 8 in stream structures into Clear Creek at the lower end of the restoration site. The in stream structures are Grey pine (*Pinus sabiniana*) anchored approximately parallel to the flow. BLM's 2011 acquisitions along the Sacramento River were: (Gover Acquisition) 426 acres of the northern portion of Bloody Island, which includes frontage on Sacramento and Battle Creek, and two river front residential parcels totaling 11 acres (Lee and Williamson). On these two parcels, 4 houses, power lines, power poles, and associated roads have been removed. Within this acquisition area, BLM has acquired only one parcel where a house was retained, typically they are removed. It currently serves as a maintenance worker residence. BLM now owns 19 river front miles.

Joe Johnson (CDFG) reported that the Feather River Hatcher (CDFG) has partnered with the Salmon Trollers to barge 100,000 fall run Chinook smolts from the Sacramento River to the Golden Gate Bridge for a release. The starting point will be on the Sacramento River as close to the confluence with the Feather River as possible (the boat has a fairly deep draft and may not make it too far upstream). To compare release strategies, there will be two other accompanying releases of 100,000 fish each. One will be an in-river release at the point of the barge pickup and the other group will be trucked to the bay and released where the barged fish are released. The project will be very similar to those on the Columbia River. All fish will be tagged with coded wire tags. The goal is to maintain high survival rates for juveniles but also allow fish to acclimate to changing river conditions and imprint on water during downstream transport. Additionally, this study will examine the feasibility of barging salmon in California's Central Valley. There will be a Vaki at the Durham fish ladder on Butte Creek hopefully this summer. Butte Creek had an escapement of 4,800 spring run Chinook.

Laura Mahoney and Kevin Niemela (USFWS) reported that the Service's Hatchery Evaluation Program is radio tagging adult winter Chinook salmon in the upper Sacramento River. Adult winter Chinook are collected at the Keswick Dam Fish Trap during the trapping of broodstock for the supplementation program. Tags are gastrically inserted; tagged fish are identifiable by an antenna protruding from the mouth. The release location for tagged fish has been the posse grounds boat ramp, which is typical fishes trapped at the Keswick Trap that are not used as hatchery broodstock. Sixteen winter run Chinook have been tagged to date, and six more will be tagged over the next week or two for a total of 22. This research is designed to study the pre- and post-spawning movements and distribution of winter Chinook, particularly hatchery-origin fish, which have been under-represented on the carcass survey for at least the recent two years. Results to date: most tagged fishes have been observed moving about the river in the proximity of the release location; however, a couple of the fish have moved upriver and two fish have moved down river. The Service's Hatchery Evaluation Program conducted a carcass survey for fall Chinook salmon on Cottonwood Creek and the Sacramento River from Balls Ferry downstream to Los Molinos. The survey looked at the proportion of hatchery versus natural fish spawning in those areas. A report of this monitoring effort will be available soon. The USFWS, NMFS, UC Davis, and others have initiated a new project using micro JSAT acoustic tags to track the movements of emigrating juvenile Chinook salmon. 2012 will serve as a pilot effort for this multi-year research project. A total of approximately 300 (incorrectly stated as 250 at the meeting) fall Chinook smolts (90/pound) from the Coleman NFH will have micro JSAT tags surgically implanted. Tagged fish will be embedded into the two Coleman National Fish Hatchery releases of fall Chinook in 2012. The primary goal of this study will be to estimate reach-specific rates of survival as these fish emigrate through the Sacramento River, Delta, and Bay. Monitoring will occur with receivers placed at approximately 7 sites in the Sacramento River and 3-4 additional sites in the Bay and Delta. The JSAT study will be expanded beginning in 2013 to include tagging of juvenile winter Chinook from the Livingston Stone NFH, Spring Chinook from

Mill/Deer/Antelope Creek, and juvenile Chinook from the Feather River Hatchery and more extensive monitoring arrays, particularly in the Delta.

George Edwards (CDFG) reported that he and two aids will survey Paynes Creek for fish passage barriers, both natural and man-made, unscreened diversions, etc. (George updated (6-18-2012 when reviewing the meeting notes) that he may not be looking at Paynes Creek this year due to priority changes toward the San Joaquin and Delta).

Rob Irwin (SRCAF) reports that the **Sacramento River Conservation Area Forum** has set up a library to documents, maps, and images of the Sacramento River. The web page is:
http://www.sacramentoriver.org/srcaf/library/library_portal.php

Joe Silveira (USFWS – Sacramento NWR) (USFWS– Sacramento River National Wildlife Refuge) provided an overview of the **Bank Swallow (BANS) breeding population on the middle Sacramento River (Red Bluff to Colusa) and an update on the Sacramento River NWR Restoration and Research.**

Bank Swallow (BANS) breeding population on the middle Sacramento River: Most of the State's BANS population occurs on the Sacramento River below the Keswick Dam and the Feather River below the Afterbay Outlet. However, the majority of birds and their habitat occur along 100 miles of the Sacramento River between Red Bluff (RM 243) and Colusa (RM 143) where well over 85% of the States BANS population occurs. The population has experienced a drastic 34 % decline from 2009 to 2010, but increased 9.8 percent in 2011. Yet, the three-year average shows steep declines for 2010 and 2011 (13.5 and 13.3 percent, respectively). Rocked or rip-rapped bank is the culprit– over 48% of the eroding banks has been rocked between Red Bluff and Colusa. Recent examples of these are River Mile 182 (DWR project) and River Mile 233.5 (private staged rock project). The 2011 survey made observation of bank collapse at colony sites, some with bank swallows perched in trees immediately adjacent to freshly "calved" banks. The long, late wet season, coupled with Shasta Reservoir near capacity may have resulted in combination of flow releases and tributary runoff, which caused bank erosion during nesting activities. The Bank Swallow Technical Advisory Committee continues to work on the draft conservation strategy for the Bank Swallow on the Sacramento River. They also continue to coordinate / advise ACE and DWR bank protection programs, population and habitat monitoring and research, and potentials for both short and long term habitat conservation.

Sacramento River NWR Restoration and Research: Joe summarized research and monitoring activities at several units of the Sacramento River National Wildlife Refuge (NWR). Researchers from Exeter University in the UK are dating landforms and slough deposits associated with Angel Slough at Llano Seco Rancho. Angel Slough is an intact remnant of the pre-meandering Sacramento River paleo-channel. Initial analysis suggests that system to be 5,000 years old. This research also implications for modeling climate change. Joe continues working with the USDA–Cooperative Soil Survey (Chico Soil Survey Office) and DWR Northern Region Office (Geology) and to characterize Bank Swallow Colony habitat (geology and soils) along the Sacramento River from Red Bluff to Princeton. The Army Corp of Engineers has funded the Refuge / CSU Chico to QA / QC pre-GIS Sacramento River Bank Swallow survey legacy data collected by the California Department of Fish & Game from 1986 through 1998. This data will complement the 1999 through 2008 data error-proofed / databased (complete with metadata) by Dawn Garcia and Colleen Hatfield (CSU Chico). This quality data will be available for CDFG programs (BIOS; NDDDB). Other investigations includes: large mammalian carnivores (San Francisco State U); carbon sequestration in a chrono-sequence of restoration sites (Santa Clara U / CSU Chico); Western Yellow-billed Cuckoo Survey (PRBO Conservation Science); microbe communities of nesting solitary bees (UC Davis); Western Yellow-billed Cuckoo prey availability (CSU Chico); western sycamore genetics / systematics (CSU Chico / TNC); native bee status / resurvey at floodplain restoration sites (UC Davis); Central Valley riparian land bird legacy sites resurvey (PRBO); and proposed long-term monitoring

(vegetation, birds, small mammals) at grazed and ungrazed refuge management units (TNC / Refuge / PRBO / UC Santa Cruz). Joe summarized restoration activities at several units of the Sacramento River NWR. River Partners began restoring 105 acres of riparian floodplain vegetation / habitats at the La BARRANCA Unit. Funding is provided by the Anadromous Fisheries Restoration Program (2009 orchard removal) and California Wildlife Conservation Board (2011 re-vegetation). The Nature Conservancy began restoring 280 acres grasslands, elderberry savanna/oak woodland, mixed riparian forest and cottonwood riparian forest on the Codora Unit. Vegetation will be planted in a way that will maintain flood flows and will protect the adjacent bridge and levee. TNC has also received funding from the WCB to restore 145 acres of floodplain habitats at the La BARRANCA Unit. Restoration activities such as orchard removal will begin this spring. The USFWS is working with River Partners and the Princeton-Cordora-Glenn and Provident Irrigation Districts (PCGID-PID) on project that includes 500 acres of floodplain restoration at the Llano Seco Riparian Sanctuary that will act as a non-structural flow split for the Sacramento River and Butte Basin. This project will also be designed to help sustain hydraulic conditions at the PCGID-PID Pumping Plant directly across the river at the northwestern end of the project. This involves both bank rock to maintain flows to the pump intakes and riprap removal upstream, which was installed for the flow split, but which is failing and non-functional. This project is in the environmental compliance phase. The USFWS is also in the environmental compliance phase of Chico M&T Ranch / Llano Seco Rancho Pumping Plant protection project. Alternatives for maintaining flows across fish-screened pump intakes are being evaluated.

Jim Smith (USFWS) reported that a 45 year monitoring activity will not be continued (happily). The Red Bluff Diversion Dam is not likely to go in this year or ever again so adult fish counting will no longer occur at the fish ladders. The replacement pumping plant and new fish screens are ready to go online this spring.

Andrew Jensen (CDFG) reported that he has taken over Mike Berry's previous position.

Doug Threlhoff (USFWS) reported that the USFWS's Comprehensive Assessment and Monitoring Program (CAMP) is creating a database and computer programming code that will standardize the storage, analysis, and reporting of juvenile Chinook salmon data that are or were collected with rotary screw traps in the Central Valley. The platform should be functional in a couple of months. The process of migrating historical RST data from the Stanislaus, Feather and Mokelumne Rivers to the CAMP database is nearly complete or well under way. The CAMP has no plan to disseminate raw data stored in the database, and the entities that collect the raw RST data will make the choice to release raw data. The platform will ultimately be used to create and report monthly and yearly tabular summaries of the production of salmon fry, parr, and smolts from various watersheds.

Tricia Bratcher (CDFG) updated the CVPIA funded projects in Shasta and Tehama Counties. The Cottonwood Creek sediment budget project will identify and establish index spots and fish habitat through geomorphology studies. A survey is being done to identify what and when a barrier is a barrier on Cow Creek. This project is funded by AFRP. Phase one of the lower Antelope Creek geomorphology study is complete. During phase two more flow and temperature data will be collected to try and improve fish passage. The two year pilot, redd dewatering project on the Upper Sacramento River watershed will use PSMFC employees. An acoustic tagging project of wild Chinook from Deer, Mill and Antelope creek will be paid for with ERP funds for one year. Two to four hundred fish will be tagged. Fish could be collected with a rotary screw trap, fyke net or during the Edwards Diversion fish rescue. Chinook of with fork lengths of 80 mm will be used. SWRCB mandated that a study be conducted to identify and prioritize flows on lower Butte Creek. This study will be funded by CDFG. Marc Guard will be the lead. Similar studies may be conducted on Mill and Deer Creeks and CDFG staff will likely be

involved. The large flow event on Clear Creek will be conducted 2013. What will be monitored? Matt Brown states it will be a channel maintenance flow and the changes in geomorphology (Graham Matthews) and riparian habitat (Point Reyes Bird Observatory) will be monitored before, during and after the event.

Matt Johnson (CDFG) updated the status of video stations on Clear, Deer and Mills Creeks. The video station on Lower Clear Creek is in the idea phase and will be in by April before the first pulse flow. It will monitor adult steelhead, fall and spring run Chinook. A video station is planned to be installed on Deer Creek by next fall to capture data on fall and spring run Chinook and steelhead on Deer Creek. The Mill Creek video Station has been operating continuously since fall of 2011. Our readers have reviewed data through March 7, 2012. We have observed a few winter run steelhead January through February but don't have a final count yet. The first spring Chinook was observed passing on March 4.

Doug Killam and Andrew Jensen (CDFG) updated the status of the natural fish barrier below the Eagle Canyon Dam on Battle Creek. It is a large rock about the size of a small school bus. In the early 90's a team from CDFG attempted to break the rock apart. They drilled into the rock and inserted a substance that expanded within the bore holes. The process fractured the rock but did not eliminate it as a barrier. The Department's Geologist, Mark Smelser, helped conduct a topographic survey of the site, and is currently in the process of preparing a report and recommendations for the removal of the boulder barrier. Preliminarily, he stated that there are possibly four boulders, and that they likely originated from the construction of the flume above. The barrier is comprised of four large boulders, in a tight and some what remote canyon. If the boulders are blown apart it may destabilize the rocks below the flume and/or the rubble could fill the pool below the sieve and create another barrier. The situation is being assessed and hopefully a plan will be developed and implemented before this season.

Naseem Alston (NOAA) updated the status of the Central Valley Recovery Plan: The Endangered Species Act mandates NOAA's Fisheries to develop recovery plans for federally listed NMFS species. The Central Valley Recovery Plan covers endangered Sacramento River winter-run Chinook salmon, threatened CV spring-run Chinook salmon and threatened California CV steelhead. The purpose of the Recovery Plan is to guide implementation of recovery of the species by resolving the threats and ensuring viable populations in the wild. A brief history of the development of the CV Recovery Plan: its foundation is from the Central Valley Technical Recovery Team. Workshops around the CV were conducted to determine threats, and a draft was put together then sent out to many co-managers for review, as well as a review by the Center for Independent Experts. The Plan underwent many changes after addressing comments, and another draft was developed and put out for public review. More workshops were conducted to reach more public and comments were received. Currently we are finalizing revisions based on public comments, and continuing coordination with some resource agencies (such as FWS and DFG). The final CV Recovery Plan is expected to be released before the end of this year. Once the plan has been finalized there will be some more detailed presentations held around the CV. Final note: it is expected that even after finalizing the CV Recovery Plan, as new science and information become available, or as population levels shift, the Plan will continue to be updated and revised as necessary.

Bill Poytress (USFWS) gave updates on the Red Bluff Diversion Dam (Sacramento River mainstem) rotary screw trap juvenile fish monitoring and green sturgeon egg and larval projects. The brood-year 2011 winter run Chinook out migrant numbers are the lowest since 1996; an estimated 840,000 have passed the traps. 2011 fall run Chinook are moving out at a slow and steady pace and the peak may be delayed because of cooler than average water temperatures. Thus far an estimated 3,000,000 have passed the traps, the lowest number in 16 years of monitoring. The 2011 RBDD RST juvenile green sturgeon catch

was the highest in 16 years with 3,700 larvae sampled. 2012 Egg mat sampling will continue from GCID to the mouth of Cow Creek. Summer larval surveys will be conducted to look for spawning above Jelly's Ferry. This fall sampling for juvenile green sturgeon out migration will be conducted. All the mainstem's annual and biweekly reports can be found at www.fws.gov/redbluff and click on the "Activities" links.

Sarah Giovannetti (USFWS) The dates for Interagency Ecological Program's 2012 Annual Workshop will be on April 18th through April 20th at the Lake Natoma Inn in Folsom, California. The salmon day will be on the 19th. Please visit their web page for more details: www.water.ca.gov/ieep/

Presentations:

Passage Abundance, Distribution, and Spawning of Green Sturgeon in the Lower Feather River, 2011. – Alicia Seesholtz, California Department of Water Resources

The purpose of this survey was to 1) determine if there are adult migration barriers; 2) estimate the annual abundance of adult green sturgeon; 3) determine if spawning occurs in the lower Feather River; and, 4) identify spatial and temporal distribution.

Two barriers were identified, Sunset Pumps Diversion Dam and Shanghai Bench. However Shanghai Bench recently breached. It still may be a velocity barrier but it is no longer a structural barrier. Velocity studies need to be conducted on the site. The deepest pool on the lower Feather is at the Thermalito Afterbay out flow; it is 45 feet deep.

A DIDSON system was used from a boat to detect holding and spawning sturgeon. Sturgeon could not be confidently identified to species level with the DIDSON. During the holding period (July 1 through November 3) the lower Feather River was surveyed once a month. The river was surveyed two days per week during spawning (February 22 through June 30). During the time period of April through June 30 egg mats were laid at the Thermalito Afterbay Outlet and at the Sunset Pumps. Eggs were collected only at the Thermalito Afterbay Outlet.

Two green and one white sturgeon were acoustically tagged with V-16 acoustic tags and pit tags. The first sturgeon (white) was tagged on July 1. The first green sturgeon was tagged at the end of July, and the second was tagged about three weeks later. The first green sturgeon left on September 6, the last on October 4. All green sturgeon migrated under stable flows. The white sturgeon migrated out on December 25; one week after flows had dropped. The Sunset Pumps weir is most likely a barrier at lower flows. The sturgeon were holding downstream of this structure at flows of 6,000 cfs. After a high flow of 12,000 cfs the sturgeon had disappeared.

The population estimate from this study was 20-25 sturgeon with most probably being green sturgeon.

The study was a success and documented the first known spawning of green sturgeon in the lower Feather River. Three to four females spawned from June 12 -19 at the Thermalito Afterbay outflow. It recorded the largest number of sturgeon ever in the Feather River. It confirmed the sturgeon do use the low flow channel and do over summer in the river. It also gained some insight into passage issues at the Sunset Pumps (the fish need greater than 6,000 cfs to move). Five Green sturgeon were found below Daguerre Dam on the Yuba River.

Several questions still need to be answered. Are the eggs collected at Thermalito Afterbay outflow viable? How often do they spawn? Exactly what flows are needed at the Sunset pumps and is Shanghai Bench still a barrier?

2011 Sturgeon Rescue Efforts: Movements, Effects, and Benefits of Rescue, 2011. – Mike Thomas, University of California at Davis

The purpose of this study was to 1) ascertain the sturgeon's post removal (rescue) survival; 2) monitor the movements and migration to spawning success of the fish, and; 3) determine entrainment effects on the population.

The weirs and bypasses along the Sacramento River are designed to take pressure off the levees and divert flood waters around population centers. When flows drop fishes become stranded below the weirs in the bypass areas.

In 2011 sturgeon were rescued after they had become entrained in the bypasses at the Tisdale Weir in Sutter County and the Fremont Weir in Yolo County along the Sacramento River. A total of 46 sturgeon, 142 Chinook, 12 steelhead and numerous striped bass were rescued. This study was a collaborative effort with Joe Johnson of the CDFG. CDFG biologists headed the block netting of the entrained fish.

Twenty five of the rescued and released sturgeon were green sturgeon (11 female and 13 male). All green sturgeon were sexually mature and three females exhibited atresia. All green and 12 white sturgeon were fitted with VEMCO V16 coded acoustic and reward tags. Receivers are in place from Sacramento to Redding along the Sacramento River. Irvine Finch river access (river kilometer 411.8) was determined to be the lowest point of spawning. If the fish reached this point they were deemed to have successfully migrated to spawning. Survival was defined as successful outmigration. Logistic regressions were run to determine why a fish did not successfully outmigrate. There was no relationship between explanatory variables (sex, handling time, size, etc.) and response (success to spawning grounds).

A Population Viability Analysis was run. From the analysis it was determined that on the average 38 sturgeon would be at risk of entrainment annually. Of those 15.4 females could be expected to be stranded in years with floods at Fremont and Tisdale.

Seventeen of the 24 tagged green sturgeon made it to the spawning area and 22 of the fish successfully out migrated.

The model predicts that, with sturgeon rescues the population will still decline 7 percent over the next fifty years. However, with no such rescue efforts the population could decline 33 percent over the same time span. Seventy one percent of the green sturgeon made to the spawning area. The viability of green sturgeon is significantly impacted by these strandings. During years with floods more water can move through the bypasses than does through the mainstem. With that water flow many fish will also be in the bypass system. 2011 was not an isolated event. There have been rescues in 2000, 2001, 2002 and 2006. Mechanisms for fish passage after high flows should be implemented at these barriers.

2011 Upper Sacramento River Basin Salmon Populations and Sacramento Mainstem Salmon Redd Information and Review, 2011. – Doug Killam, California Department of Fish and Game

The purpose of this presentation was to 1) give a summary of the escapement numbers in the upper Sacramento River basin, and; 2) to summarize the mainstem Redd dewatering data.

This is the first year that the Cormack-Jolly-Seber Model was used for escapement estimates on the mainstem Sacramento River and Clear Creek.

Sacramento River, mainstem, late fall run Chinook: 3,725 total salmon, 3,625 adults, 63 percent were natural. A total of 79 coded wire tags were recovered with 76 being from Coleman National Fish Hatchery (CNFH) and 3 from Mokelumne Fish Hatchery.

Sacramento River, mainstem, winter run Chinook: 824 total salmon, 637 adults, 90 percent were natural. A total of 21 coded wire tags were recovered all coming from Livingston Stone National Fish Hatchery.

Sacramento River, mainstem, fall run Chinook: 11,957 total salmon, 7,613 adults, 63 percent were natural. A total of 67 coded wire tags were recovered: 32 from Feather River Fish Hatchery, 32 from CNFH, two from Merced and one from Mokelumne.

Cow Creek, fall run Chinook: 1,541 total salmon, 23 percent were adults. A video station was used to survey escapement.

Beegum Creek, Chinook: 2 adult female salmon. These salmon are the furthest from the ocean of any California Salmon. 2010 had a high survival rate and there were a high number of juvenile yearlings in the creek.

Cottonwood Creek, fall run Chinook: 2011 was a positive year for the creek. 2,144 total salmon, with a 90% confidence interval of 2038-2250. 48 percent (1,030) of the fish were adults, 45 percent were natural. A total of 57 coded wire tags were recovered by USFWS-PSMFC carcass survey: 10 from Feather River Fish Hatchery and 47 from CNFH.

Battle Creek, fall run Chinook: is a video monitored creek and the video station was moved down stream a couple of miles, in August, to the old fish egg collection location. 54,895 total salmon. 46 percent of the fish were adults. 12,513 spawned in the creek and 42,388 were spawned in CNFH.

Mill Creek is a unique creek, in May and June when the weather is hot one would think the flow would be clear and warm. However, the rapid snow melt causes the creek to run fast and turbid. A video station with a DIDSON to supplement the video is used to monitor the creek. A total of 1,231 fall run and 366 spring run Chinook were observed. So far there has been a total of 33 steelhead to date.

Deer Creek, fall run Chinook: 622 total fish, the creek was surveyed by kayak for redd counts.

Clear Creek, fall run Chinook: carcass surveys were used to estimate escapement. Schaefer model estimates were around 6,300 and the Cormack-Jolly-Seber model estimated 4,841 with 4070 adults and 11.4% or 551 hatchery origin fish and confidence intervals of 4,596 to 5,106.

Redd Dewatering Survey on the mainstem Sacramento River: Hydrographs of the mainstem Sacramento River trend down from September 16 through December 15. It takes Chinook a minimum of three months to go through the cycle of spawning to emergence. During carcass surveys the team marked redds found in one to two feet of water (i.e. redds they felt were in danger of being dewatered). Twenty-two surveys were conducted and 83 redds were marked with metal disk tags that are used to mark carcasses. The survey spanned river miles 229-302, from Los Molinos to Keswick. A total of 25 redds were affected by the flow reductions; seven redds were totally dewatered, two were mostly dewatered, and for the rest, just the top of the tail spill was dewatered. The question that needs to be answered is "at what level of dewatering does mortality occur"? The objective of these studies is to stabilize flows during the spawning and emergence period and keep the flows constant. This year the rains arrived late and flows had to be reduced.

Middle River Rotary Screw Trap at Tisdale Weir, 2011. – *Colin Purdy, California Department of Fish and Game*

The purpose of this study is to 1) determine survival rates of salmonids emigrating from upper Sacramento River spawning habitat; 2) be an early emigration warning service to pumps, etc. downstream; 3) analyze the effect of bypasses on flow and assess the proportion of fish utilizing the Sutter bypass under different flows in the Sacramento; and 4) identify out-migrant cues at different locations in the river.

The OCAP Biological Opinion created the need for an additional juvenile out-migrant monitoring location to be operated between Knights Landing and Red Bluff diversion dam. The traps, located ½ mile above Tisdale Weir, have been operating continuously since 7/7/2010. There are 4 weirs on the Sacramento River between the Red Bluff Diversion Dam and Knights Landing. The 3Bs weir only spills at very high flows, 100,000 cfs. The Mouton Weir spills at 42,000 cfs and the Colusa weir at 33,000 cfs. Of the 4, the Tisdale weir spills most often and at the lowest flow; 23,000 cfs. The water from all four weirs flows into the Sutter Bypass. When the Tisdale weir spills many fish have the potential to bypass the Knights Landing rotary screw traps and consequently not get detected on their way out of the system. Real-time juvenile out-migrant data is crucial for DCC operations especially for listed species.

The RST operations ½ mile above Tisdale Weir use two eight- foot cone rotary screw traps attached side-by-side. The traps are secured by two anchor points. One anchor point is to a solid structure (i.e. large tree) on the river left bank. The other is a 40 pound river anchor connected to a long length of cable. The two anchor design allows for the traps to be moved laterally in the river channel with changes in river height and allows the trap be rotated by boat to off load massive debris that can accumulate on the traps during high flow events.

To date we've seen two emigration peaks on the mainstem Sacramento River both correlated with high flow events, one on 1/26-2/6 and the other 3/19-3/21. From 7/1/11-3/20/12 the trap captured a total of 6,681 unmarked Chinook salmon; 6,543 fall run, 66 spring run, 71 winter run and 1 late fall fish. From 7/1/10-3/22/11 the trap caught 4,858 total unmarked Chinook; 4,171 fall run, 407 spring run, 268 winter run and 12 late fall fish. For 7/1/11-3/30/12, winter run Chinook started out migrating in mid-October and were mostly out of the system by the end of January and moved out primarily with the first high flow event. Spring run Chinook started emigrating around 11/24 and moved out with the second high flow. The salmon move on the declining hydrograph.

Mark recapture studies are conducted to establish trap efficiencies. The juvenile fish are stained with Acrōs Organic Neutral Red Pure Stain (a high purity biological stain), and released one mile upstream of the traps. A minimum of one hundred fish are used, an ideal number is from 500 to 1,000. The fish are release by weekly time steps. They are released on five consecutive days with a 2 day break period.

Accomplishments during this last year include 1) increased coordination with the Knights Landing rotary screw trap project on data summary distribution and data analysis; 2) updated and streamlined data summaries distributed by e-mail that include catch per unit effort calculations based on cone revolutions. Goals for this coming year include 1) Provided water operators real-time coded wire tag reading of adipose fin clipped fish to better document rate and speed of downstream migration and; 2) establish more accurate trap efficiencies under different flows.

**Lower Sacramento River Juvenile Emigration Monitoring Program at Knights Landing, 2011. –
*Chris Mckibbin, California Department of Fish and Game***

The purpose of this study is to 1) understand the timing of juvenile emigration of listed salmonids, and; 2) understand their relative abundance; 3) to capture real-time fisheries catch and emigration data, and; 4) generate annual reports.

The rotary screw traps located below the town of Knights Landing, at Sacramento River mile 88 have been in operation since 1995. The traps are configured the same as the Tisdale traps. Because of the upstream weirs the traps fish in stable flows. The maximum flow is around 33,000-38,000 cfs. The river left trap fishes in the thalweg and the river right trap is closer to the bank. Because of this, the traps can catch different proportions of salmonid species. The trapping season runs from October until June. Each time the traps are cleared a variety of environmental and trap effort data is collected; turbidity, debris load, depth, water velocity, cone rotations per minute, rotations since last checked, etc. The traps are serviced by mobile laboratory pontoon boat. Contained aboard the vessel is all the laboratory and machine equipment necessary for identifying fish, analyzing turbidity samples and maintaining the traps.

All fish are identified to the species level and each species' fork length is measured to the nearest millimeter. Steelhead and salmon are weighed to the near gram. Catch is flow dependent and the first high flow usually carries out the largest number of emigrating fish. Fall run Chinook numbers have progressively declined during the past four years (2008-2011). During winter flows the traps catch an average of 4-6 fish per day. When the flows are more consistent, traps can capture an average of 25-30 per day.

Coleman National Fish Hatchery marks 25 percent of their fall run releases and 100 percent of their late fall fish. KL traps also sample Livingston Stone National Fish Hatchery winter-run fish which are 100% adipose fin clipped. Depending on catch, a potential of 20 adipose fin clipped, coded wire tagged fish are sacrificed per trap per day, for a maximum take of 40 salmon per day. Rarely there are this many adipose fin-clipped fish in a daily catch, so it is infrequent that this many fish are sacrificed.

The trap efficiency trials at Knights Landing are the conducted the same as at Tisdale except that the Knights Landing operation uses Bismark Brown Y to stain the fish, where Tisdale uses "Alizarin Red S".

24 Hour Sampling on the Clear Creek Rotary Screw Trap – What We Learned, 2011. – Jim Earley, United States Fish and Wildlife Service

The purpose of this study is to 1) identify diel temporal passage of juvenile Fall Chinook; 2) identify the environmental factors cueing movement, and; 3) determine if fish passage is proportional to flow.

The lower rotary screw trap on Clear Creek is located at river mile 1.7. It monitors the out migration of juvenile fall run Chinook salmon. Eight 24 hour sampling events were conducted from 12/15/11 to 3/15/12. The trap was cleared every hour on the hour during a 24 hour period starting 0700. At each pull a variety of environment data was captured. Local water temperatures can push or pull the peak out migration 1 to 2 weeks either way. This year's Clear Creek temperatures ranged cooler than average. Peak capture time for the 12/15, 12/19, 1/4 and 1/19 sampling events was between 2000-2100. The 2/16 event saw a peak capture time of 2300-0100. On 2/16 it was at 2100-2200. Finally on 3/1 and 3/15 it was at 2000-2200. The average maximum passage time was at 200. There was a smaller peak around 0300-0400. This is different than the results of several reference studies which suggested peak passage is between 0000 and 0800. This difference in time may also be due to the location where other trapping operations existed (i.e. further downstream in a system - which may catch fish later from an environmental or internal migration cue). Passage peaks were consistently between the times of

1900 and 2200, with 85 percent of all Chinook passing between 1900 and 0000. Daily distribution, on average, during the 24 hour interval sampling events did not change throughout the season. So far, from the preliminary analysis of the data, no obvious relationships between the movement of the Chinook and any environmental variable (except maybe time from sunset) can be determined. One goal of the study was to capture fish movement over an entire high flow event. The 3/15 sampling event coincided with a high flow event. Unfortunately the flows and debris load became as high as to make the trap unfishable. Some of the most important data was not obtained. The study will continue through the end of the trapping season and sample through the Clear Creek pulse flows, currently scheduled for late April and early May.

Future goals of this study are to 1) continue with the study and capture some complete data from high flow events, and 2) build a time step model to accurately identify fish passage numbers when high flows or other conditions do not allow for trap operation.

Next Year's meeting will be on March 14, 2013 at the Red Bluff Fish and Wildlife Office, coordinated by the Bureau of Reclamation (Tom Kisanuki).

Upper Sacramento River Monitoring Team Meeting
Thursday, March 22, 2012
Attendance List

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