Annual Report of Activities

Interagency Fish Passage Steering Committee

October 2010

McCloud River near McCloud Dam

McCloud River, initial habitat evaluation

Mossbrae Falls on Sacramento River

Head of Sacramento River arm of Shasta Lake

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Chapter 1 – Background

1.1 Background

On June 4, 2009, the NMFS issued its Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (NMFS BiOp). The NMFS BiOp (Action NF 1, page 661) included the requirement that Reclamation create the Interagency Fish Passage Steering Committee (IFPSC). The IFPSC's role is to provide oversight and technical, management, and policy direction for a Fish Passage Program. The RPA includes development of a Fish Passage Program to evaluate reintroduction of listed species upstream of Shasta, Folsom, and New Melones dams. Because the duration of the consultation covers more than two decades NMFS anticipates that long-term future events, including increased water demand and climate change, will increase the frequency of temperature related mortality. Substantial areas of higher elevation habitat exist above these dams and could provide a refuge for cold water fish in the face of climate change.

1.2 Membership

The IFPSC consists of representatives from Reclamation, NMFS, FWS, CDFG, DWR, Forest Service, and an academic member.

U. S. Bureau of Reclamation (Reclamation)
Mike Chotkowski (lead)
John Hannon (alternate)
National Marine Fisheries Service (NMFS)
Jeff McLain (lead)
Garwin Yip (alternate)
U. S. Fish and Wildlife Service (FWS)
Jim Smith (lead)
Donnie Ratcliff (alternate)
California Department of Fish and Game (CDFG)
Alice Low (lead)
George Heise (alternate)
Department of Water Resources (DWR)
Leslie Pierce (lead)
Randy Beckwith (alternate)
U.S. Forest Service (USFS)
Mike Chapel (lead)
Academic Member
Lisa Thompson (UC Davis)

Chapter 2 – Summary of First Meeting

The IFPSC first met on July 16, 2010. NMFS reviewed the fish passage RPA actions with emphasis on the near term actions. The Fish Passage Program Action includes elements designed to proceed in phases (Table 1). The near-term goal is to increase the geographic distribution and abundance of listed species. The long-term goal is to increase abundance, productivity, and spatial distribution, and to improve the life history and genetic diversity of the target species.

Reclamation has requested funding for FY 2012 to work on the Fish Passage Program but has no dedicated funding in FY 2011. Until then the agencies are being asked to provide what support they are able to provide within existing budgets and staffing.

The team discussed the tradeoff involved in utilizing listed fish from the populations below dams and transporting them upstream with the possibility that the offspring from those transported upstream may experience reduced survival compared with what could be realized if they spawned below the dam. Ideally Reclamation would like to determine the relationship between the proportion of the population moved or numbers of fish moved upstream and the expected adult returns to downstream habitats and to upstream habitats (Figure 1).

DWR is compiling a white paper that will document the technologies that are being used or planned for upstream, through reservoir, and downstream fish passage at large dams throughout the world (mainly Northwest USA). The paper is scheduled to be released this fall and will be useful for the pilot plan.

The IFPSC decided to create two subgroups to work on the near term actions. The subgroups are: 1) a habitat subgroup to work on the upstream habitat assessments and 2) a fish passage plan subgroup to develop the pilot plan. The habitat subgroup has been created with representatives from Reclamation, FWS, DWR, and USFS. The group has drafted an outline of its vision of the habitat evaluation task for the steering committee to review (see chapter 4). Members are assembling existing information from the tributaries to the reservoirs including: water temperatures, hydrographs, upstream dam operations, stream habitat survey data, fish barriers, access to the river/land ownership/contacts, and fish population data. Table 2 shows the amount of mainstem habitat area that needs to be assessed and Figures 2 and 3 show maps of the habitat area upstream of Shasta and Folsom dams. A subset of the habitat team conducted an initial reconnaissance mission to the Shasta tributaries in October 2010 (see chapter 3).

The fish passage pilot plan subgroup has not been assembled.

The RPA's Fish Passage Program (starting on page 659) consists of the following components broken down into Near-term fish passage actions and Long-term fish passage actions:

Near-Term Fish Passage Actions as listed in the RPA

- NF1. Formation of the Interagency Fish Passage Steering Committee
- NF2. Evaluation of Habitat Above Dams
- NF3. Development of Fish Passage Pilot Plan
- NF4. Implementation of Pilot Reintroduction Program
    - NF4.1. Adult Fish Collection and Handling Facilities
    - NF4.2. Adult Fish Release Sites above Dams and Juvenile Fish Sites Below Dams
    - NF 4.3. Capture, Trapping, and Relocation of Adults
    - NF4.4. Interim Downstream fish Passage through Reservoirs and Dams
    - NF4.5. Juvenile Fish collection Prototype
    - NF4.6. Pilot Program Effectiveness Monitoring and Evaluation
    - NF4.7. Stanislaus River Fish Passage Assessment
- NF5. Comprehensive Fish Passage Report

Long-Term Fish Passage Actions

- LF1. Long-term Funding and Support for the Interagency Fish Passage Steering Committee.
- Long-term fish passage program
    - LF2.1. Construction and Maintenance of Adult and Juvenile Fish Passage Facilities
    - LF2.2. Development of Supplementation and Management Plan
    - LF2.3. Construction and Maintenance of Long-term Adult and Juvenile Release Locations and Facilities
    - LF2.4. Development of Fish Passage Monitoring and Evaluation Plan
    - LF2.3. Construction and Maintenance of Long-term Adult and Juvenile Release Locations and Facilities
    - LF2.4. Development of Fish Passage Monitoring and Evaluation Plan

Table 1. Due dates listed in the RPA for each of the actions. Due dates are listed chronologically.

Due Date	Action
2010 - 2011	NF2. Evaluate spawning and rearing habitat upstream of dams
12/31/2010	NF 4.5. Juvenile collection prototype preferred location(s) and design(s) identified (Sacramento and American rivers)
1/31/2011	NF 3. Three year plan for fish passage pilot program - revise and update annually by Jan 15
3/31/2011	NF 4.7. Develop a plan to obtain info needed to evaluate fish passage options on the Stanislaus River

4/30/2011	NF 4.4. Interim downstream passage measures that require environmental review evaluated.
1/31/2012	NF2. Complete fish passage upstream habitat evaluations
2012 - 2015	NF 4. Begin to implement pilot reintroduction program NF 4.6. Effectiveness monitoring and evaluation
3/31/2012	NF 4.1, NF 4.2, NF 4.3 Sacramento River and American River adult collection and release facilities and juvenile release facilities operational; implement adult upstream passage
2012	NF 4.4. Interim downstream passage carried out
9/30/2013	NF 4.5. Juvenile collection prototype built upstream of Shasta
12/31/2015	NF 4.6. Final monitoring summary report of 5-year pilot effort
12/31/2016	NF 4.5. Two years of biological and physical evaluations of upstream collector completed and final report with recommendations for head of reservoir facilities completed
12/31/2016	NF 4.7. Stanislaus report on assessments of upstream passage and proposed options
12/31/2016	LF2. Long term Fish Passage Plan submitted to NMFS
12/31/2018	NF 5. Comprehensive Fish Passage Report with preliminary feasibility determinations
1/31/2020	LF2. Implement long term fish passage program by now, if deemed feasible and desirable
2020	LF 2.1. Long term fish passage facilities constructed LF 2.2. Supplementation and management plan developed LF 2.3. Long term fish passage monitoring and evaluaton plan developed. Annual reports due September 30.

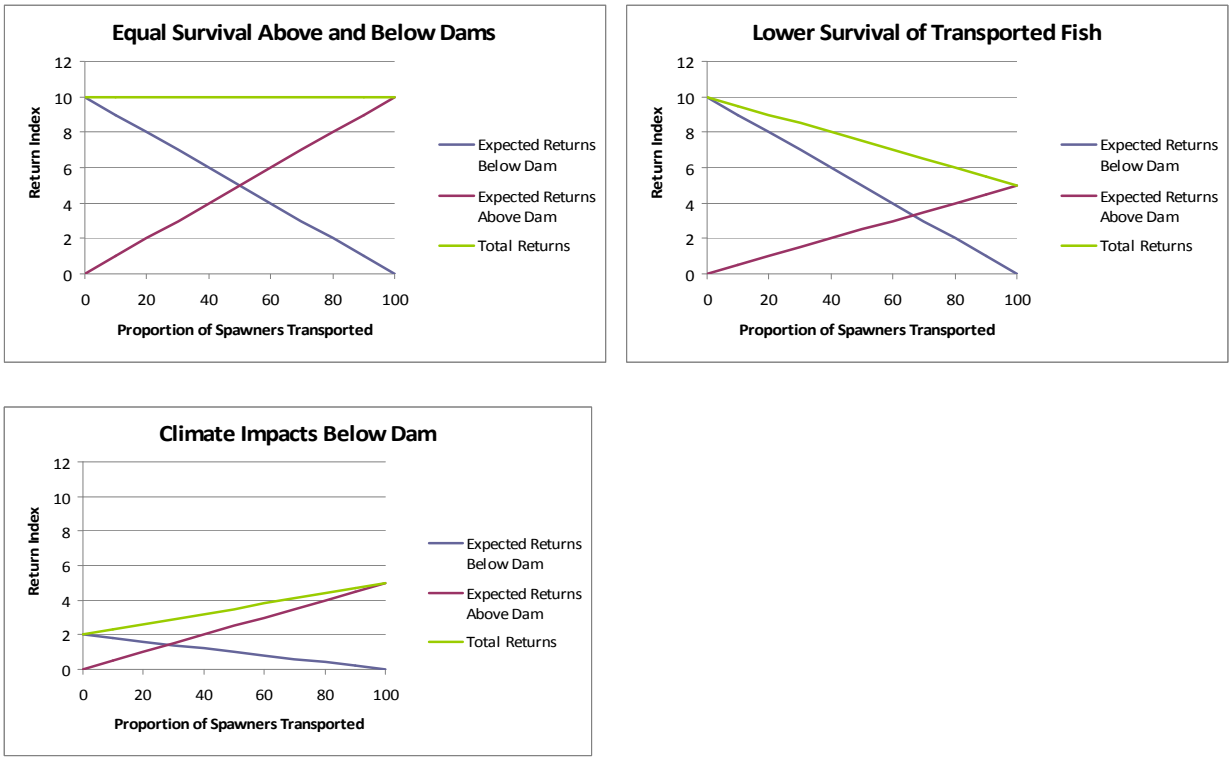


Figure 1. Hypothetical scenarios displaying tradeoff in passing listed fish upstream.

OTHER DISCUSSION TOPICS:

- Proposal from upstream stakeholders to bring in gametes from New Zealand that originally came from Sacramento River winter Chinook.
- The Yuba River reintroduction can feed information into this process.
- Define the purpose for evaluating habitat
- One or two technical habitat evaluation teams…starting out with one for consistency.
- Need to consider VSP parameters of abundance productivity, spatial structure, and diversity
- Some form of identification will be necessary if upstream and downstream populations are to be kept separate
- Move hatchery or naturally produced fish?
- There is/has been Chinook stocking in the reservoirs for fishing.

Table 2. Estimated upstream mainstem habitat area that needs to be assessed (not including tributary habitat)

Reservoir	**River Mainstem**	**Full pool elevation**	**Stream miles from full pool to first definite known barrier**	**Elevation at base of barrier**	**Average gradient**	**Lake miles from dam to trib**
Shasta	Sacramento	1,067’	37.4	3,100’	1.03%	21
Shasta	McCloud	1,067’	23.3	2,440’	1.12%	22.5
Shasta	Pit	1,067’	1.75*	~1,072’	0.05%	29
Folsom	American North/Middle	466’	5.6 to confluence	540’ @ confluence	0.25%	15
Folsom	North Fork American	540’ @ confluence	2.1	580’	0.36%	15
Folsom	Middle Fork American	540’ @ confluence	23.75	1,100’	0.41%	15
Folsom	South Fork American	466’	19.6	970’	0.49%	10

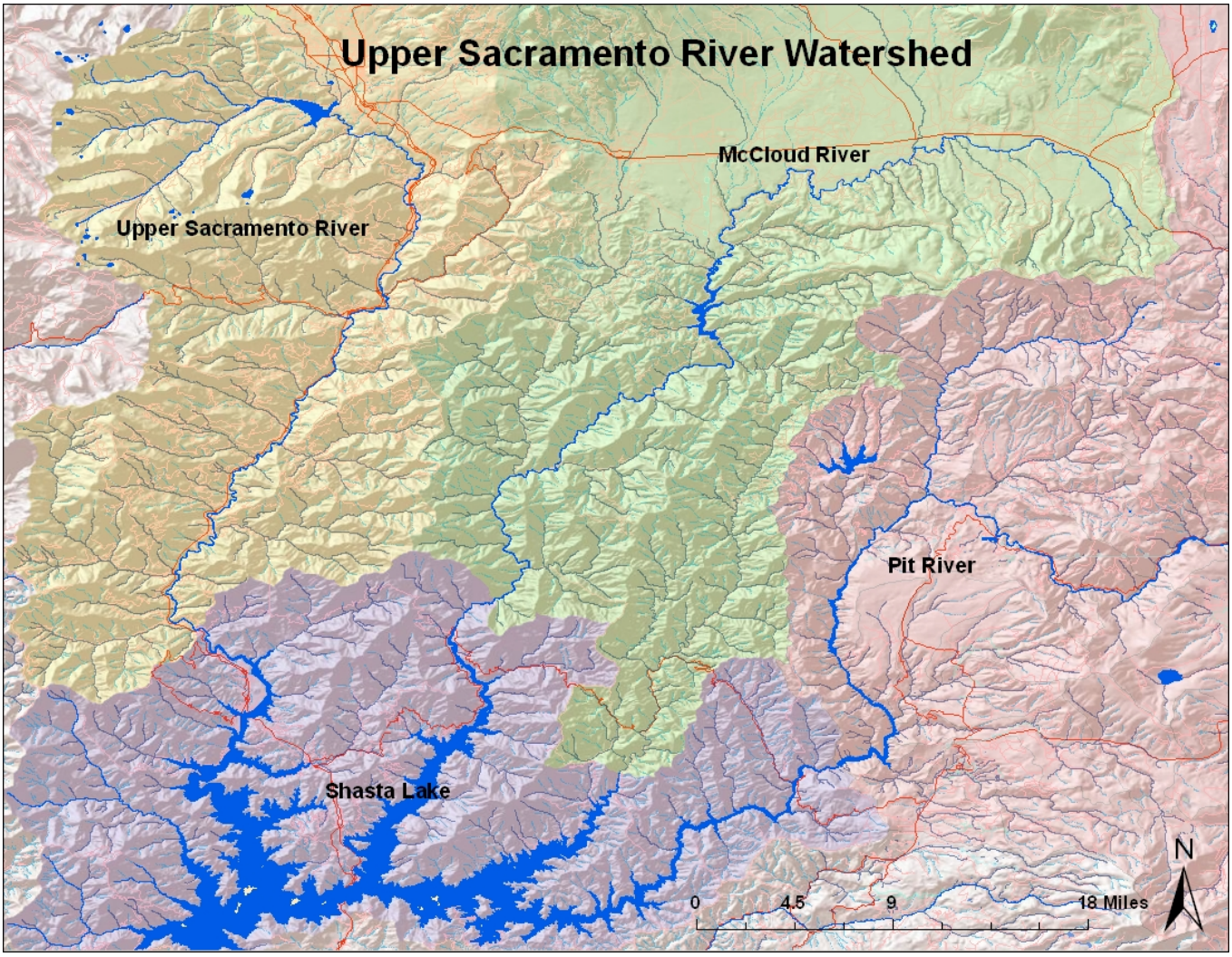


Figure 2. Sacramento River watershed upstream of Shasta Lake.
Upper Sacramento River – Shasta Lake to Lake Siskiyou Dam at 3,100' elevation = ~37.4 miles
McCloud River – Shasta Lake to Lake McCloud Dam at 2,440' elevation = ~23.3 miles
Pit River – first dam (not high) at top of lake pool, second dam another 1.75 miles upstream

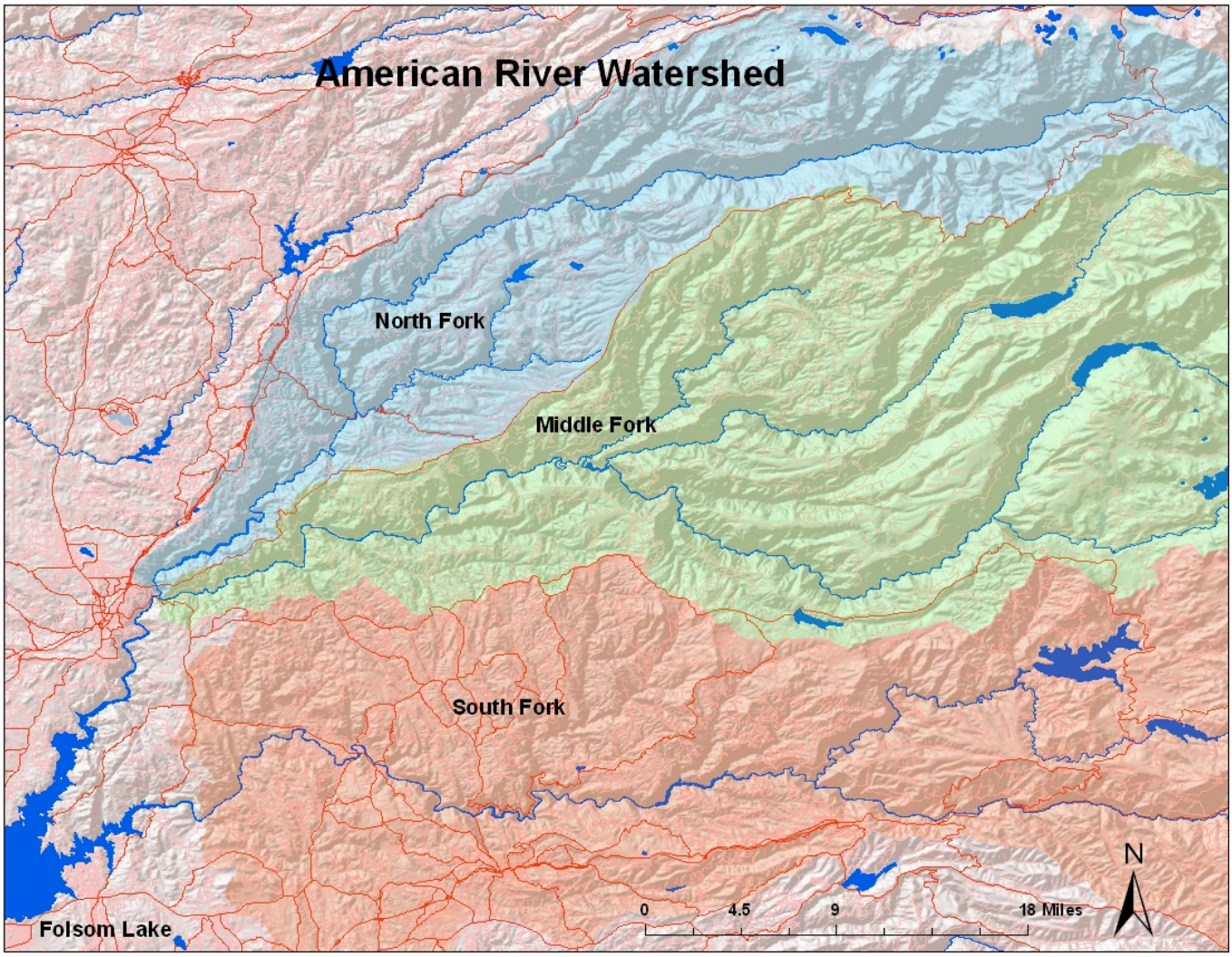


Figure 3. American River watershed upstream of Folsom Lake.

Folsom Lake to Middle Fork/North Fork confluence = 5.6 miles

North Fork – confluence with Middle Fork up to Lake Clementine Dam = 2.1 miles

Middle Fork – confluence with North Fork up to first dam @ 1,100' elevation = ~23.75 miles

South Fork – Folsom Lake up to first dam @970' elevation = ~19.6 miles

Chapter 3 – Upstream Habitat Assessment draft tasks

The steering committee designated a habitat group to begin work on assessing the habitat upstream of the dams to determine suitability for a reintroduction program. The habitat group

was asked to define their task. The following is the initial draft outline of tasks for the habitat group.

CVP Fish Passage Program Upstream Habitat Assessments – RPA Action NF2

Objective from the RPA: To quantify and characterize the location, amount, suitability, and functionality of existing and/or potential spawning and rearing habitat for listed species above dams operated by Reclamation.

Goal: Determine whether sufficient habitat exists upstream of Shasta and Folsom dams for a reasonable number of the target species to reproduce. A minimum number is set at 1,000 adults (500 pairs) in a major tributary based on literature indicating 500 as a minimum viable population size. The BiOp identifies that the target species above Shasta are winter-run and spring-run Chinook and that the target species above Folsom is steelhead. The determination of the productivity of the habitat will be made by releasing test fish (likely fall Chinook) into the habitat and monitoring juvenile production.

We will compile existing data and identify data needs in order to accomplish the following tasks:

1. Determine accessibility of potential upstream habitat with regard to people being able to get there to conduct habitat assessments and monitor fish habitat use.
2. Determine extent of anadromous access upstream of the reservoirs.
    a. Check for adult migratory barriers. Delineate on a map the stream reaches likely to be accessible to Chinook and steelhead.
        i. First priority is on mainstem habitat.
        ii. Second priority is on large tributaries likely capable of supporting Chinook and steelhead reproduction.
3. Determine whether sufficient spawning and rearing habitat exists for a reasonable number of Chinook and steelhead to reproduce successfully.
    a. Spatially quantify the amount of spawning habitat (eg. by river mile) to roughly estimate spawner capacity.
    b. Locate and delineate on a map where significant adult holding, spawning and rearing habitat patches exist.
4. Determine river reaches with temperature regimes suitable for target species/run spawning, egg incubation, and rearing.
    a. Identify temperature requirements for the target species in these habitats.
    b. Identify new temperature monitoring locations for those tributaries where sufficient stations do not exist and install temperature monitors at those sites.
5. Evaluate the hydrograph of each river to determine suitability for target species spawning and rearing with regard to:
    a. Baseline flows
    b. Flow fluctuations
    c. Flow peaks
    d. Upstream dam operations
6. Determine the top priority tributary stream in each watershed (ie. American River and Sacramento River) to begin a pilot program with adult (and/or juvenile) test fish releases.
7. Identify potential areas for adult releases.
8. Identify potential sites/options for collecting emigrating juveniles.
    a. Within tributaries

b. At head of lake
c. At dam

Attachment – Draft Summary of Initial Reconnaissance of Habitat Upstream of Shasta Lake

Upstream Habitat Assessment Group Reconnaissance Trip to Shasta Lake Tributaries (McCloud and Sacramento rivers) October 5-8, 2010

Matt Brown (FWS), Jess Newton (FWS), and John Hannon (USBR) with assistance from Greg Gotham (USBR) made an initial trip to check access and get a feel for the habitat present in the major tributaries to Shasta Lake. The following are observations and initial impressions of the areas covered. Based on this cursory observational survey of a small portion of the accessible habitat, the Sacramento River appears to offer greater opportunity (compared to the McCloud) for a Chinook salmon reintroduction. The Sacramento has an overall slightly lower gradient, smaller substrates, greater likely rearing habitat opportunity, and a longer accessible mainstem reach accessing higher elevation areas (although water temperature data in the upper Sacramento is yet to be obtained). The Sacramento is highly accessible, although the railroad and roads paralleling the river could constitute some habitat quality challenges. The McCloud is harder to access but contains high quality riparian habitat. Both rivers need to be more thoroughly assessed and habitat quantified to reach any conclusions regarding upstream habitat suitability for a reintroduction program.

10-5-2010

Lower McCloud River

Walked in from fishing lodge near the confluence with Shasta Lake on private property upstream of the Gilman road bridge over the McCloud.

We covered first 4.7 miles up from the high water line with another half mile of river clearly visible upstream from the end of the reach walked. Drove in first mile on private land (permission required) and hiked the trail adjacent to the river the rest of the way up. The reach contains mostly large cobble and boulder substrate, too large for spawning. Water temperatures in the area would likely be high for winter Chinook spawning (Figures 4, 5, and 6). Some limited nearshore rearing habitat is present with a small amount of area for overbank flow during high water. The most significant patch of spawning gravel noted was a river spanning patch of spawning gravel with space for at least 30 Chinook redds at the top of reach walked. The patch occurs at a 90 degree bend in the river. Estimate space for ~200 total Chinook redds within the reach walked.

Little large wood is present in the channel, likely due to the contained and high energy nature of most of the reach. The reach is generally well contained by steep sideslopes with a mature forest riparian area.

MSS Flow gauge near the mouth: Flow = 370 cfs, water temp 53-54F

10-6-2010

McCloud River below McCloud Dam

Flow at Ah-Di-Nah = 220cfs

Kayaked from put in below the lake (Ash Camp) down to the Nature Conservancy Preserve entrance. Steep section between dam and Ah-Di-Nah flow gauge (2.4 miles between walking bridge at put-in and the flow gauge). We had to portage around steep sections (about five places). The channel is predominantly bedrock controlled with fairly steep sideslopes. One patch of river- spanning spawning gravel was observed. There are sparse patches of spawning gravel spaced periodically down the channel, but spawning sized gravel is generally lacking. The channel appears to be marginal Chinook spawning and rearing habitat. The reach downstream of the flow gauge is flatter gradient but still predominantly boulder and cobble substrate. The reach covered between the Ash Camp and a spur road at the parking for the Nature Conservancy preserve is 3.8 miles (1.4 miles in the lower gradient section from the flow gauge to the spur road). Estimate space for roughly 100 Chinook redds interspersed in small patches in this reach. Little lwd is present in the active channel. Large timber along banks; fairly pristine looking riparian area. The moderate gradient contained channel appears to transport lwd down to the lake from what we can ascertain so far. The are small backwater eddy areas that could be used by rearing juveniles but the rearing habitat is limited. Floodplain habitat is pretty much absent. There appear to be adequate areas for holding adult Chinook and steelhead. A walking trail lies on the slope above the river on the north bank probably the entire reach through here; used predominantly by anglers.

The reach between the walking bridge and McCloud Dam is one mile long. We made only cursory observations of this reach from the road above. It appears similar to the habitat we covered….mostly cobble/boulder substrate and a well-contained channel. The water in this reach is somewhat turbid and glacial silt colored (but still clear enough to snorkel), apparently from glacial sediment laden runoff from a tributary upstream of McCloud Dam. The turbidity seemed to subside by the time the water reaches the lower five miles of river above Shasta Lake.

10-7-2010

Upper Sac flow = 255 cfs at the Delta gauge (at confluence of river and reservoir) – flow too low for kayaks

Upper Sacramento River near Mt. Shasta City.

Walked 1.7 miles of the river from a public access (state land) south of Mount Shasta city running through the Cantara Loop of the railroad track. The gradient is fairly low in this reach with patches of what appears to be spawning sized gravel spanning the channel. The majority of the channel is cobble substrate with boulders and bedrock in areas. There are small areas of floodplain. We still need to determine dam operations. Habitat appears suitable for Chinook and steelhead spawning with some small areas of rearing habitat and sufficient holding pools present.

Mossbrae Falls area

Walked a 1.7 mile reach at Mossbrae Falls on the north side of Dunsmuir (about two miles downstream of the previously described reach). Spawning gravels and holding pools are present. Rearing habitat is present but limited. Mossbrae Falls are spring fed and may be a year round source of cold water. Temperature loggers should be installed upstream and downstream of the area if temperature data is not found for this reach. There is an approximately half mile reach of the river here with springs entering from along the east bank. The railroad parallels the river and contains sections of unstable sideslopes that likely deposit fill material into the river.

Central Dunsmuir area

A popular put and take trout fishery exists here according to anglers at the site under the I-5 bridge. One holding pool in a reach of predominantly shallow cobble/boulder run (the river is too shallow to kayak at this flow) appears to hold a high abundance of rainbow trout based on observed angler success under the I-5 bridge.

South Dunsmuir and Soda Creek Area

The river runs wide and shallow through much of the reach with spawning gravel more abundant downstream of Soda Creek. Much of the reach is composed of cobble substrate. Soda Creek is a small flat floodplain channel type stream entering from the east. Juvenile fish habitat is good but Soda Creek is likely a bit small for adult Chinook. It's more of a nice coho type stream. Temperature loggers should be placed in Soda Creek. Private land limits access upstream of the mouth.

10-8-2010

Sacramento River confluence with Shasta Lake

Boated in from the Antlers boat ramp to the current lake water line and walked upstream 1.25 mile to the bend upstream of the railroad bridge. The wetted channel width was about 40 meters and the high water line channel width about 95 meters at the old railroad bridge piers. The old railroad piers could offer an opportunity for anchoring a juvenile collector in the channel but debris management would

probably be problematic in the flowing stream channel reach. An abandoned boat ramp 0.8 miles upstream from Antlers boat rental marina could offer an opportunity for an in-lake juvenile collector close to the tributary mouth. Recreational use in the area appears to be fairly high so access through the site could be an issue. The high water channel width is about 170 meters and the wetted width currently is about 90 meters. The lake channel width is fairly consistent out to the confluence with the next arm from the east. A narrow section 200 meters wide at Sugarloaf is just upstream from the confluence with the next tributary from the east (six miles downstream of the current lake/river confluence and 6.8 miles downstream of the railroad bridge. The inundated area widens substantially downstream (south) of there. Stream water temperatures at the confluence with Shasta Lake reach greater than 70F during summer (Figure 7).

McCloud River confluence with Shasta Lake

Boated up the McCloud Arm from the Bailey Cove boat ramp. The current lake level is 13 miles up the arm from the Bailey Cove ramp and 0.4 miles downstream of the Gilman Road bridge. The wetted channel width at the mouth is 36 meters and high water channel width at the mouth is 80 meters. Channel width is 61m at a narrow spot downstream of the bridge and wetted width is 27m. Gradient at the mouth is slightly higher than in the Sacramento river arm making a juvenile collector in the river likely even more challenging. Similar to the Sacramento River juvenile collector would have debris issues in the flowing channel. This arm also receives fairly high recreational boating use. An area with a 115 m wide channel is at 2 miles downstream of the Gilman Road bridge. This could be a potential head of lake collector site. The McCloud arm is about 14 miles long upstream of the confluence with the Pit River. It appears that much of the historic spawning habitat in the McCloud Arm is now under the lake (Figure 8). Shasta Reservoir inflows during winter and spring (peak emigration time periods for spring-run and winter-run can be large (Figure 9). Capturing juveniles, many of which would likely be fry-sized fish, during high flow periods will be a challenge. The value of the lake habitat for juvenile rearing and the potential for in-lake survival and collection of juveniles away from stream mouths should be considered.

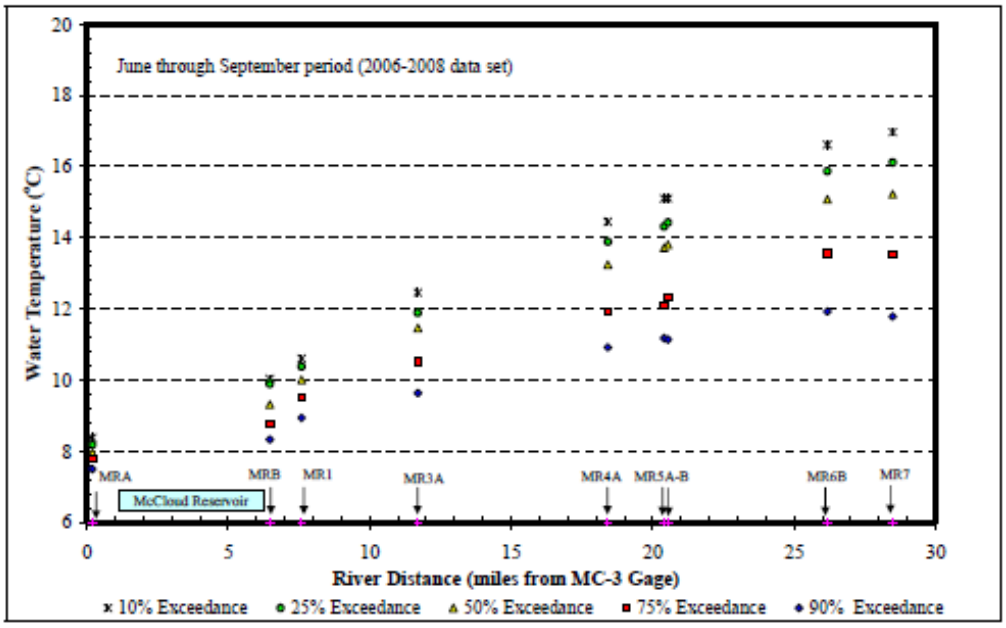


Figure 4. Water temperature frequency distribution at McCloud River stations, June-September 2006-2008. It appears that approximately 10 miles of the mainstem below McCloud Dam may provide water temperatures suitable for winter Chinook egg incubation. Chart from PG&E.

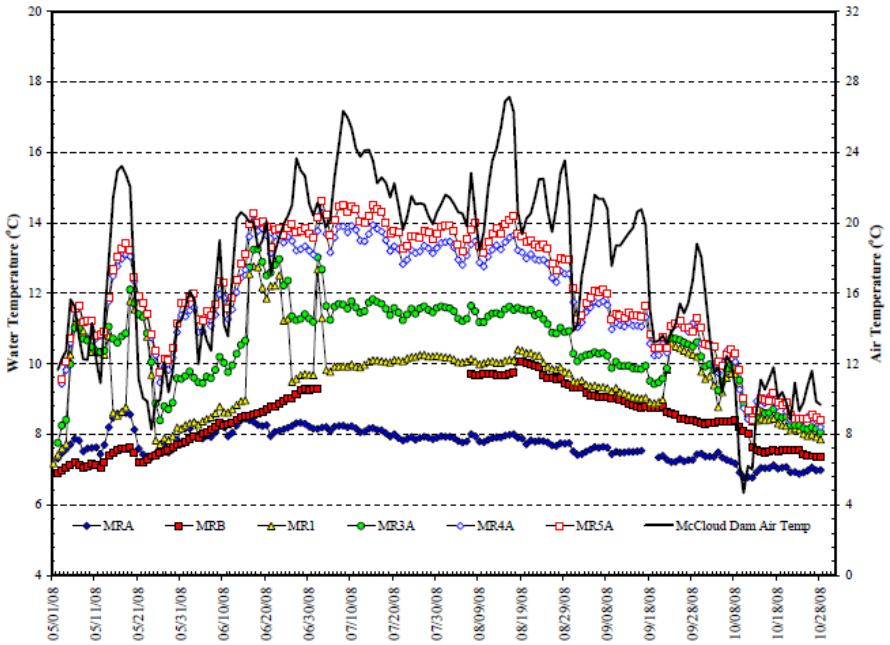


Figure 5. McCloud River water temperatures during 2008. Chart from PG&E.

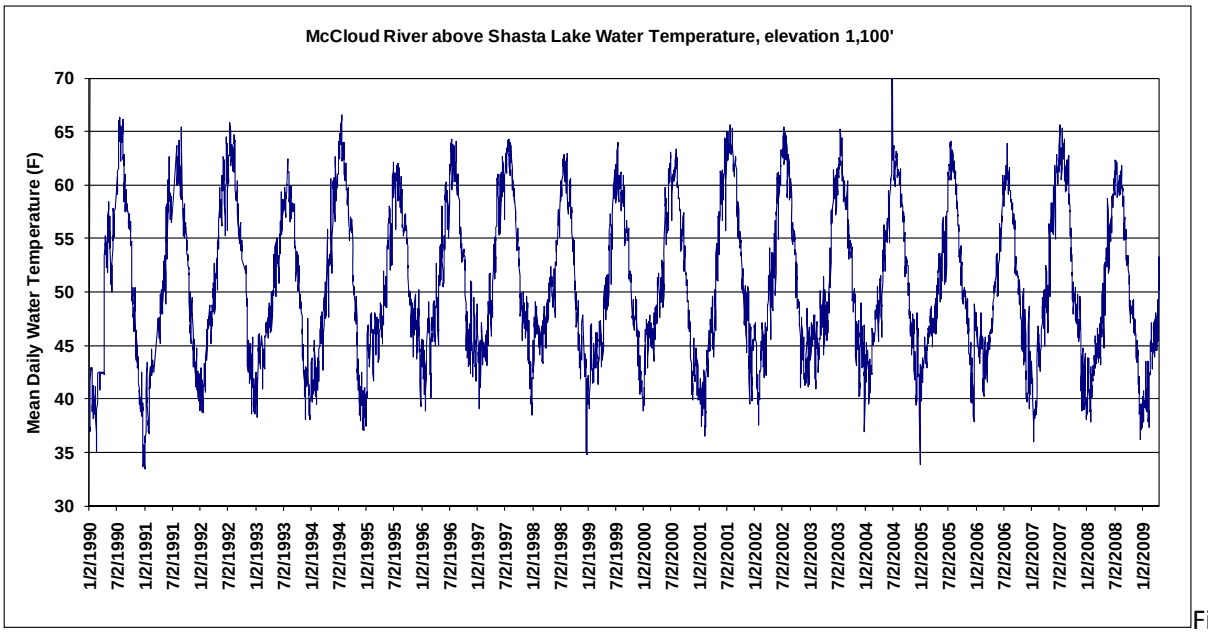


Figure 6. McCloud River above Shasta Lake at elevation 1,100’ water temperature, 1990-2009.

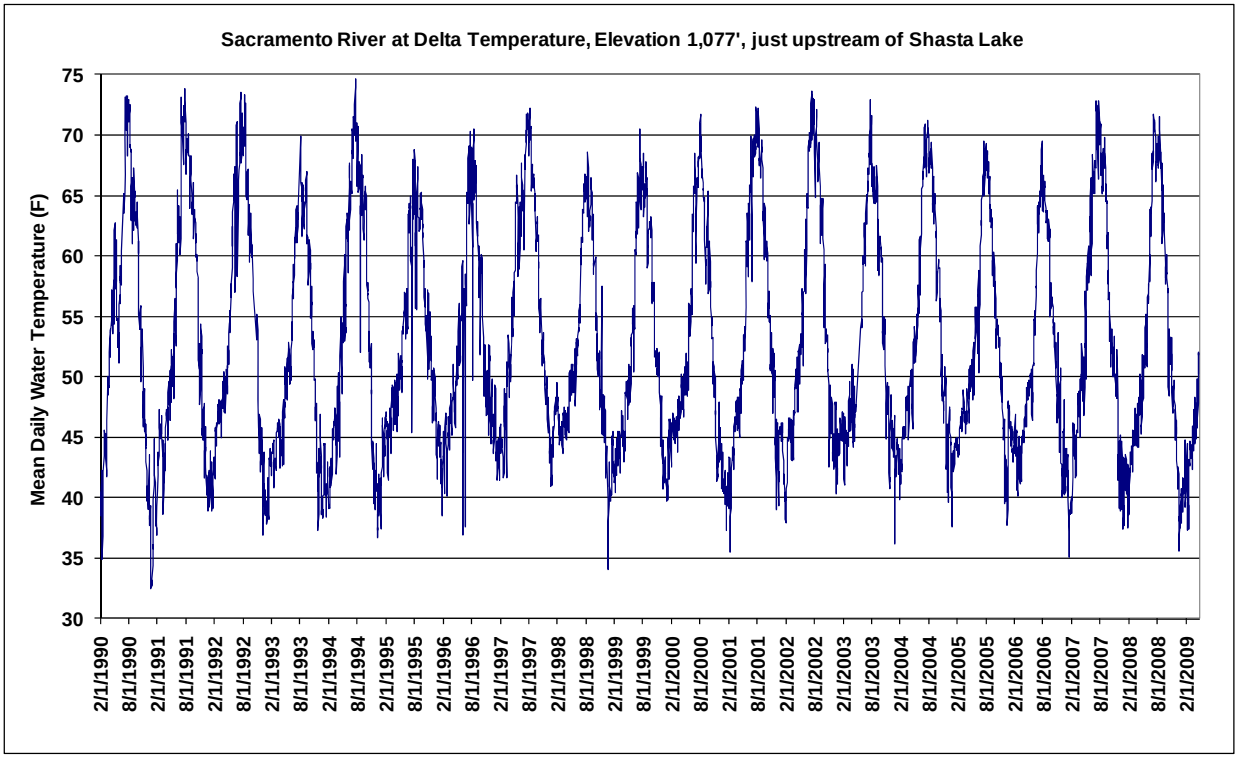


Figure 7. Sacramento River above Shasta Lake at elevation 1,077’ water temperature, 1990-2009.

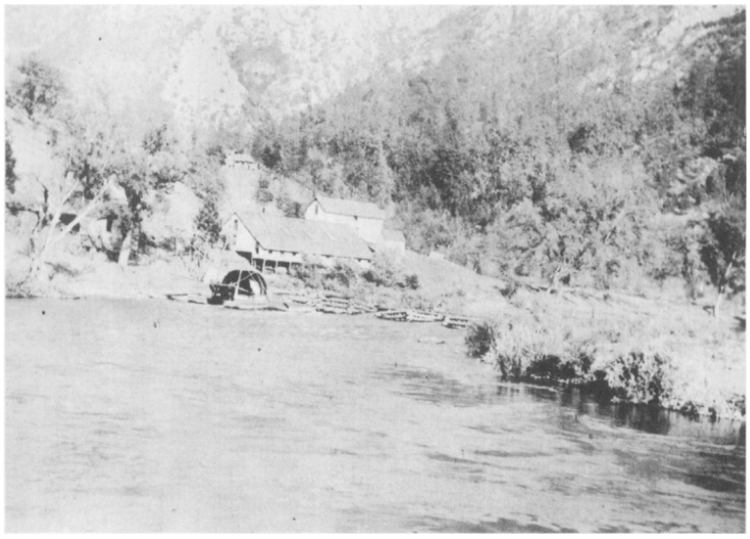
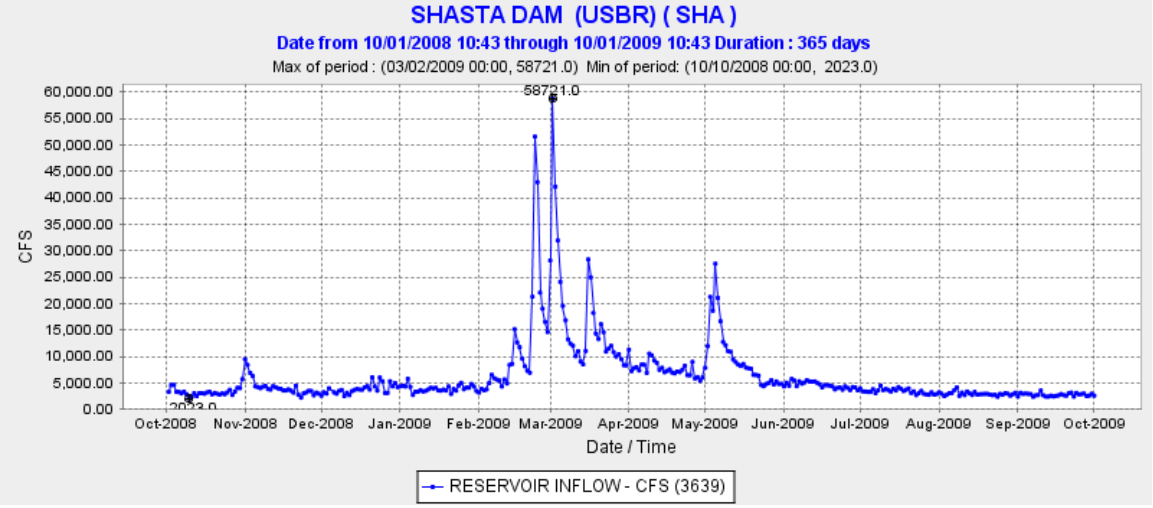
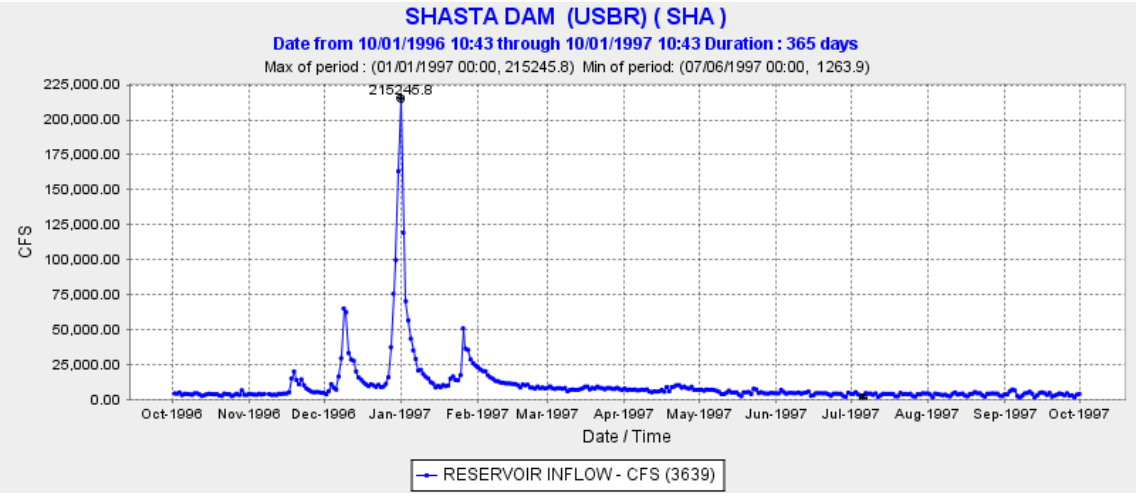


FIGURE 2. Baird Hatchery as reconstructed after the flood of 1881. Current wheel in foreground.

Figure 8. Baird Hatchery on the McCloud River, near confluence with the Pit River, now under Shasta Lake, 12 miles down-lake from Gilman Road Bridge on McCloud River. This area is reported to historically have had a high concentration of adult Chinook salmon.





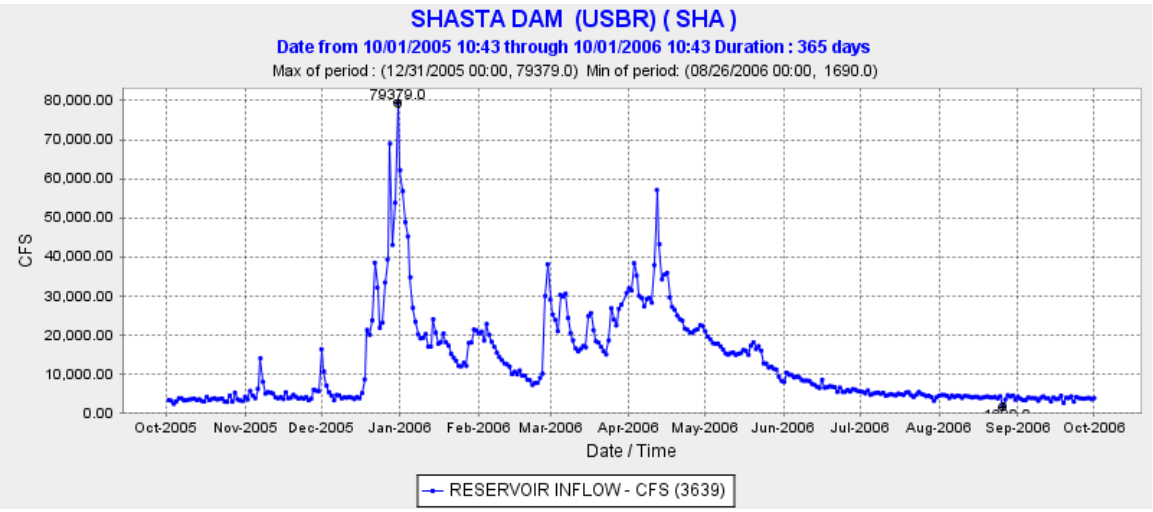


Figure 9. Recent maximum mean daily inflows into Shasta Reservoir.