FINAL
ENVIRONMENTAL ASSESSMENT

ESTABLISHMENT OF A WINTER-RUN CHINOOK SALMON SUPPLEMENTAL SPAWNING AND REARING FACILITY USING SACRAMENTO RIVER WATER

Prepared by

U.S. Department of the Interior
Fish and Wildlife Service
Coleman National Fish Hatchery
Anderson, California
and
Bureau of Reclamation
Mid-Pacific Region
Northern California Area Office
Shasta Lake, California 96019-8400

November 21, 1997

United States Department of the Interior
FINDING OF NO SIGNIFICANT IMPACT
ESTABLISHMENT OF A WINTER-RUN CHINOOK SALMON
SUPPLEMENTAL SPAWNING AND REARING FACILITY USING
SACRAMENTO RIVER WATER

In accordance with the National Environmental Policy Act of 1969, as amended, and based on the following, the Bureau of Reclamation (Reclamation) and the Fish and Wildlife Service (Service) have determined that construction and operation of a winter-run chinook salmon spawning/rearing facility on the right-bank of the Sacramento River at Shasta Dam to conduct a supplemental propagation program previously approved by the National Marine Fisheries Service (NMFS) would not result in a significant impact on the human environment. An environmental impact statement therefore is not required for use of this site.

The purpose of the proposed action is to implement supplemental propagation and captive broodstock recommendations in Goal IV of the Winter-run Recovery Plan while ensuring successful imprinting of the artificially spawned winter-run chinook salmon on mainstem Sacramento River water so they will return to the natural spawning grounds on the mainstem to spawn. To accomplish this purpose, there is a need for use of water from the mainstem of the Sacramento River to replace propagation activities, using water from Battle Creek, formerly conducted by the Service at its Coleman National Fish Hatchery.

The project will consist of the construction and operation of a facility at Shasta Dam for an interim winter-run spawning/rearing program and the allied Captive Broodstock program. Winter-run propagation will be conducted in accordance with NMFS's Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) entitled Enhancement ***Permit for Artificial Propagation*** and Captive Broodstock Programs, dated January 31, 1997. The Enhancement Permit, which covered the decision to build and operate a supplemental rearing facility, has a life of five years, and is renewable at the discretion of NMFS.

This FONSI for site selection, to implement the previously approved rearing program, is based on the analysis contained in an EA for this proposal prepared by Reclamation and the Service staff, and which supports the following findings:

1. Construction and operation of the facility at the selected site would be not affect any federally-listed threatened or endangered species in any manner not covered by NMFS's EA and FONSI for the supplemental rearing program.

2. The project will not permanently affect existing riparian vegetation. Sensitive areas and endangered species habitat, such as elderberry plants will be flagged and avoided if present.

3. Impacts to socio-economic aspects of the environment, including both cultural resources and Indian Trust Assets, would be absent.

FINDING OF NO SIGNIFICANT IMPACT
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(Continued)

4. Construction specifications protect water quality, and there would be no demonstrable impacts or other potential areas of concern such as geology and hydrology, dam operations, noise, air quality, land use, and recreation.

5. There would be no disproportionate adverse impacts on any economic or ethnic groups.

6. Power costs would differ very little between alternatives with the preferred alternative costing $800-$1600/year less to operate at power costs of $0.02/kWh and $0.04/kWh respectively.

7. There would be no impact on downstream water users, whether rural or urban.

8. The site on the right bank at Shasta Dam site, and its left bank counterpart, would be the most effective sites fulfilling the project purpose, but the right bank site offers fewer funding problems and has a more reliable water supply.

Approve:

Regional Director, U.S. Bureau of Reclamation, Mid-Pacific Region — **Date** 2/4/98

Regional Director, U.S. Fish and Wildlife Service, Region 1 — **Date** 1/29/98

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INTRODUCTION

The State of California Fish and Game Commission listed the winter-run chinook salmon ***(Oncorhynchus tshawytscha) as*** a State endangered species in May 1989 (Cu. Code ***of Regs.,*** Title XIV, Section 670.5). National Marine Fisheries Service (NMFS) followed with an emergency Federal listing in August 1989 (54 ***Federal Register*** {FR} 32086), and a formal listing as threatened in November 1990 (55 FR 46515). Despite this listing, numbers of winter-run chinook continued to decline and the Federal listing status was changed to endangered in February 1994. Numbers returning to spawn declined from an estimated 50,000 fish in the early 1950's to an estimated low of 191 returning adults in the early 1990's.

Efforts designed to benefit winter-run chinook were outlined in a 1988 "Cooperative Agreement" which included a ***Ten-Point Plan to Benefit Sacramento River winter-run Chinook Salmon*** developed by a task group comprised of NMFS, U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (Service), and California Department of Fish and Game (DFG) (USBR 1988). These measures included the 1989 development of a supplemental propagation program at the Service's Coleman National Fish Hatchery (CNFH) on Battle Creek, a tributary to the Sacramento River. This supplemental propagation program was also identified as a "Recommended Action" for Goal IV of ***Recommendations for the Recovery of the Sacramento River Winter-Run Chinook Salmon*** prepared by the Winter-run Chinook Recovery Team, incorporated into NMFS ***Proposed Recovery Plan for the Sacramento River Winter-run chinook Salmon*** (NMFS 1997a).

The supplemental propagation program, which was implemented at CNFH in 1989, entailed the trapping of wild adult winter-run chinook, spawning these adults in an artificial environment, and rearing the progeny for release back into the natural environment. This supplementation program, and the allied Winter-run Chinook Salmon Captive Broodstock Program were undertaken as special interim measures to conserve and enhance recovery of the endangered winter-run chinook salmon. The Captive Broodstock Program which was implemented at Bodega Marine Laboratory and Steinhart Aquarium, raises multiple generations of winter-run chinook in captivity to ensure conservation of genetic material and was specifically designed to augment natural production and prevent the extinction of a species (winter-run chinook) while avoiding adverse genetic consequences.

The specific objective of the supplemental propagation program was to increase the survival of eggs and juveniles as compared to their natural spawning cohorts, leading to greater numbers

of spawning adults. The first portion of this goal (increased survival of eggs and juveniles) was achieved. However, the juvenile fish being reared at CNFH imprinted on Battle Creek water and, as adults, returned there instead of co-mingling with the naturally spawned adults in the mainstem of the Sacramento River. Supplementation of the natural spawning population thus has not yet been achieved, and will only be achieved when artificially propagated adults commingle and successfully spawn with their stream-spawned cohorts on natural spawning grounds in the mainstem Sacramento River. The supplemental propagation program was suspended in 1996 pending resolution of the imprinting problem and questions concerning the genetic integrity of the adults used in the program. It was the consensus of the biologists involved that a solution to this problem would require a means to ensure juvenile salmon imprint on Sacramento River water rather than Battle Creek water, and a preference was expressed for a rearing facility located on the mainstem as far upstream as feasible.

The objectives of the Captive Broodstock Program, implemented by the Winter-Run Chinook Captive Breeding Committee and the supplemental rearing program, are complementary. The Captive Breeding Committee, comprised of representatives from the Service, NMFS, Reclamation, DFG, Department of Water Resources, commercial and sport fishing groups, University of California, and Steinhart Aquarium, proposed and implemented a program in which a subsample of each mating of fish in the supplemental propagation program is placed into a "Captive Broodstock Program" to further protect the population from catastrophic loss of a year class. The goals of the Captive Broodstock Program are to provide:

1) An "insurance policy" against extinction and loss of genetic material;

2) A source of gametes (eggs and sperm) for the CNFH propagation program;

3) A source to supplement naturally spawning cohorts (members of the same year class);

4) "Time" until habitat conditions improve;

5) A gamete source for experimental and research purposes, and;

6) A potential tool to assist in the recovery of the species.

The supplemental propagation and Captive Broodstock programs are closely allied; genetic material for the Captive Broodstock Program is obtained from fish used in the supplemental propagation program to prevent severe in-breeding. For this reason, the Captive Broodstock Program cannot exist without the supplemental propagation program as a source of gametes. Both are conducted in a manner consistent with all conditions and requirements outlined in Federal Endangered Species Act Section 10 propagation permits issued by NMFS and the ***Winter-run Chinook Salmon Captive Broodstock Act,*** which provide for the continuation of the transfer of a portion of each year's winter chinook salmon production to the Captive

Broodstock Program to protect against the run's extinction. Additionally, the programs have adhered to any and all conditions outlined in the California Endangered Species Act memorandum of understanding for the propagation and Captive Broodstock programs entered by the Service with DFG. Both the Winter-Run Chinook Salmon Captive Broodstock Program and the hatchery propagation program are covered under ***Endangered Species Act,*** Section 10, Permit #1,027 issued by NMFS in January 1997 (NMFS,1997b).

As a result of the close linkage of the two programs and the Service's self-imposed moratorium on the capture of wild winter-run chinook due to the imprinting problem and the questions concerning the genetic integrity of the adults used in the program, the Captive Brood Stock Program has been placed in jeopardy. Immediate action is required to prevent collapse of both programs and the potential loss or degradation of this species genetic integrity.

This Environmental Assessment (EA) addresses options for implementation of a supplemental spawning and rearing facility for winter-run chinook salmon approved by NMFS in their EA and Finding of No Significant Impact (FONSI) entitled ***Enhancement Permit for Artificial Propagation and Captive Broodstock Programs,*** dated January 31, 1997. This EA replaces an earlier draft EA entitled ***A Proposal to Acquire, Develop and Operate a Fish Hatchery for Artificial Propagation of the Endangered Winter Chinook Salmon on the mainstem of the Upper Sacramento River. The*** decision on how to implement the program and where to build any required facilities will be made jointly by the Service and Reclamation following consultation with NMFS and the DFG. If the decision were to require a new facility, Reclamation would build the facility and the Service would operate it.

PURPOSE AND NEED FOR THE ACTION

The purpose of the proposed action is to successfully carry out recommendations of Goal IV of the Winter-run Recovery Plan (NMFS 1997a) by establishing a site for an interim spawning/rearing facility which uses water from the mainstem Sacramento River to ensure the juveniles imprint on Sacramento River water, not the water from a tributary.

This action is needed because attempts to implement the recommendations of Goal IV at CNFH resulted in a return of adults to Coleman rather than the mainstem, implying that imprinting occurs so early that a way must be found for the fish to imprint on water from the mainstem to meet Goal IV.

This action is needed to maintain the Captive Broodstock and supplemental propagation programs to accelerate the recovery of winter-run chinook and to help ensure the survival and conservation of this endangered species. This need is urgent, since the two-year moratorium has left the natural spawning population largely un-supplemented for that period, and the Captive Broodstock Program has persisted without infusion of fresh gametes into the genetic "bank" jeopardizing the program's overall effectiveness and success. Unless new genetic material is obtained in the next breeding cycle (early 1998), the existence of the Captive

Broodstock Program will be in jeopardy and with it the remaining supplementation of the natural spawning population. (Progeny of captive by captive crosses at Bodega Marine Laboratory have been released into the wild during the suspension of operations at CNFH).

PROPOSED ACTION AND THE ACTION ALTERNATIVES

Alternatives Subjected to Screening and Analysis

Initial analysis of alternatives to resolve the imprinting problem addressed a number of different imprinting strategies. These included:

- Earlier release of winter-run juveniles reared at CNFH;
- Artificial imprinting with chemical attractants;
- Piping of Sacramento River water to CNFH;
- No Action (i.e. discontinuation of the propagation program);
- Facility on mainstem Sacramento River at Keswick Dam;
- Facility on mainstem Sacramento River at Buckhom Hatchery;
- Facility on mainstem Sacramento River at Shasta Dam.

Development of a mainstem Sacramento River facility or discontinuation of the propagation program were considered the only viable alternatives. In-depth analyses were then conducted on the three mainstem sites (Shasta, Buckhom, and Keswick). Analyses considered the development and operation of a facility with the capacity to rear approximately 250,000 eggs and fry, 200,000 juvenile fish and 1,000 captive broodstock. Initial capacities may be less, but with incremental annual increases the final goals would be reached. Facility operation for winter-run chinook at any of these three sites would require prior testing with a surrogate chinook stock and approval by NMFS.

Alternatives Eliminated from Further Consideration

The Service and Reclamation screened the seven alternatives in consultation with NMFS and DFG. The alternatives eliminated from further consideration due to cost concerns and doubts regarding their effectiveness were:

- Earlier releases of juveniles reared at CNFH These would likely lead to excessive mortality and Battle Creek imprinting problems would not be eliminated; did not satisfy recommendations of biologists; inconsistent with Purpose and Need;

- **Artificial imprinting with chemical attractants.** This technique has been used in smaller applications, but the very large volume of chemicals needed for use in the Sacramento River and uncertain outcome resulting in an inappropriate risk to an endangered species eliminated this option from further analysis;

- **Piping** of Sacramento River Water to CNFH This alternative was evaluated and removed from further consideration due to questions regarding cost, private land easements, and overall feasibility. This option would have required a fish screen at the point of diversion, pumps, and at least 3 miles of 12inch pipe (straight-line, not actual, distance) with appropriate redundancy in the system. The estimated cost would be on the order of $750,000-$1,000,000 installed, exclusive of right of way costs. This option would also lack assurance that the fish would be attracted up stream to the habitat between Keswick Dam and the point of diversion for the pipeline.

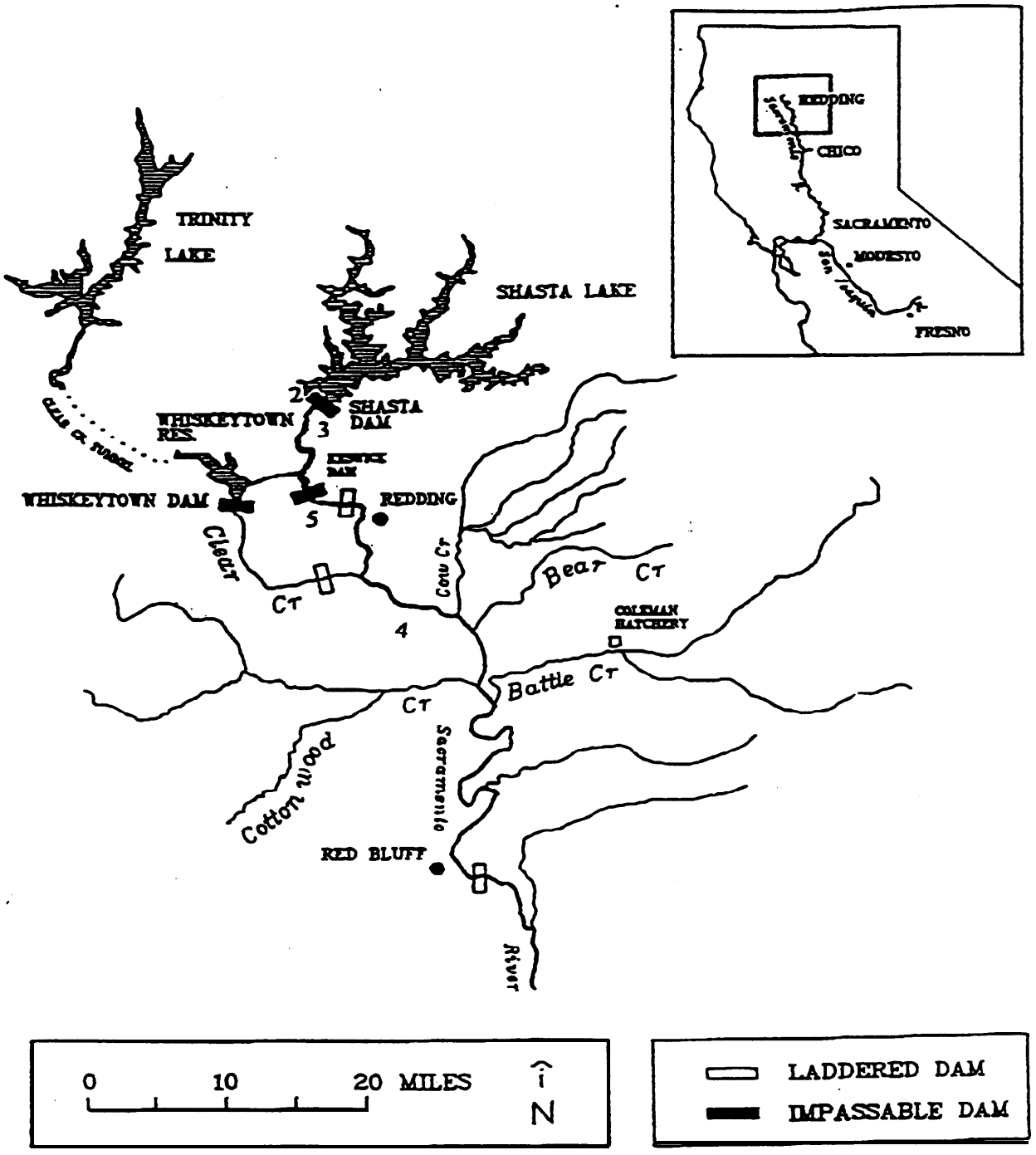
Alternative 1: No-Action Alternative

The No-Action Alternative would not fulfill the purpose and need of the proposed project. The program is currently suspended and continuation of this suspension will equate to a cessation of all winter-run chinook salmon supplementation efforts. Because of the reliance on the supplemental propagation program as a source of gametes, this alternative would also force an abandonment of the Captive Broodstock Program. All facilities specially constructed at the Bodega Marine Laboratory would have to be dismantled or converted to other uses, resulting in a loss of value of invested funds and the investment in the development of the of the expertise represented by the Bodega Marine Laboratory program team. This would prevent full implementation of the recommendations of the Winter-run Recovery Team outlined in *Recommend&ions for the Recovery of the Sacramento River Winter-Run Chinook Salmon, the Ten-Point Plan to Benefit Sacramento River Winter-Run Chinook Salmon,* and would not meet the requirements of P.L. 103-292, the Winter-Run Chinook Salmon Captive Broodstock Act.

Alternative 2: Proposed Action - Winter-run Rearing Facility on the Right Bank at Shasta **Dam**

Alternative 2 would fulfill the purpose and need of the proposed project. It would enable implementation of supplemental propagation of winter-run chinook salmon under Goal IV of the Winter-run Recovery Plan through imprinting juveniles on mainstem Sacramento River water, be compatible with the continuation of the Captive Broodstock Program in its present form, and would facilitate the development of a freshwater component of this program.

Alternative 2 would require the construction of an entirely new rearing facility (no infrastructure is in place) at a 0.4 acre Reclamation-owned site approximately 0.5 miles below Shasta Dam (See Figure 1). The proposed site is flat, fenced, unused parking space located



2- Alternative 2 - Facility on right-bank of Sacramentd River at Shasta Dam
3-- Alternative 3 - Facility on left-bank of Sacramento River at Shasta Dam
4- Alternative 4 - Facility on mainstem Sacramento River at Buckhorn Hatchery
5- Alternative 5 - Facility on mainstem Sacramento River at Keswick Dam

Figure 1. Locations of alternative sites for establishment of a winter-run chinook supplementation facility.

within the security perimeter for Shasta Dam. Additional flat ground, in active use as a parking lot, is available adjacent to this site should it be needed. It is adjacent to the Sacramento River, but outside the floodplain.

The construction costs would be higher than those projected for the Alternative 3, but would be partially offset by lower operations and maintenance (O&M) costs over the 15-20 year (5-7 salmon generations) minimum life of the project assumed for purposes of this EA. Actual durations may be longer, perhaps for the life of the Shasta Dam, even though the program the facility is to serve is intended to be an interim or temporary program that will be terminated when the population recovers to a designated level for a designated time (currently 13,000 spawners for 10 years). It is possible, but at this time unlikely, that the facility will be used for a shorter period. Assuming, as a financial worst case, a 20 year life expectancy gives lifetime power costs for the right bank alternative that is about $16,000 less than the cost of the left bank option, if one uses $0.02/kWh power cost as a basis of comparison. The loss of power production would be 610,000 kWh/year assuming an average use of 1,000 gpm (i.e. 2.23 cfs), a lake elevation of 1,030 feet and 90% efficiency of the turbines and generators in Shasta Dam. The cost of pumping would be roughly equivalent to $13,000/year.

The water supply for the proposed rearing facility would be Sacramento River water taken from the penstocks at the 850 foot level. Sufficient head is available to distribute water to the site and no pumps would be required. Water would be delivered by steel or PVC pipe to air equilibration columns in the compound, and from there to a manifold system for distribution to individual incubation and rearing units. Water quality would be the same among the two Shasta alternatives, but the reliability would be increased slightly under the Preferred Alternative because no pumps or in-river facilities would be required. Water flows can be easily controlled by valves.

The spawning/rearing building for the proposed rearing facility would be a 2700 ft^2 insulated, steel building. This building would house a small office, egg and fry incubation units, forty 30-inch diameter circular tanks for early rearing, a 800 ft^3 walk-in feed storage freezer (100 ft^2 footprint), storage space, and all appurtenant electrical wiring and plumbing. Existing offices would be used for staff.

No water treatment/sterilization by ozonation would be required at the Shasta Dam site. Although fish are abundant in Shasta Lake, consultation with a Service pathologist (J.S. Foott, PhD, California-Nevada Fish Health Center, pers. comm.) revealed that little threat from pathogens is evident. Chinook salmon are routinely stocked into Shasta Lake, but these fish must be quarantined and certified disease-free prior to their release. Water temperatures are presently controlled for the benefit of winter-run chinook salmon at Shasta Dam and would be satisfactory in virtually all years, avoiding the need for chillers. Gas equilibration through use

Table 1. Estimated construction / development costs for establishing the winter-run chinook propagation and captive brood stock programs at the right bank site at Shasta Dam.

Item	Qty	Unit cost	Total cost
Property acquisition	1	$ 0	$ 0
Water Supply			
Piping (from penstocks 2 and 4 to head tank)	all		150,000
Piping (head tank to all points)	all	30,000	30,000
Water head tank with footing	1	25,000	25,000
Packed towers	2	7,500	15,000
Effluent, drain (in slab and field)	all		20,000
Electrical (lights, panels, etc; labor)	all		25,000
Electric power line	1	15,000	15,000
Alarm system	1	5,000	5,000
Hatchery Building (30 x 90 ft, insulated)			
Concrete Pad (incl. rebar)	3,000 ft^2	10	30,000
hauling	120 yd^3	62	8,000
Steel building, incl. office partition,	2,700 ft^2	25	67,500
Erect building	1	35,000	35,000
Septic system	1	15,000	15,000
Tank support structures	all		8,000
Egg tray stack	12	1,000	12,000
Carbon filter	1	5,000	5,000
Gratings, ladders, walks	all	10,000	10,000
Existing office and wet lab (3 souls, min.)	1	0	0
Living Qtrs. (1,200 ft^2), with water, power, septic	1	65,000	65,000
Circular tanks, fry (30 in dia.)	60	300	18,000
Rectangular tanks, juvenile grow-out (3ft x 16ft)	30	2,400	72,000
Circular tanks, capt. brood stock (12 ft dia.)	20	2,500	50,000
Gravel pad, outdoor circ. tanks	1,000 yd^3	10	10,000
hauling	1,000 yd^3	4	4,000
grader (in/out + work)	all		8,000
Walk-in freezer	1		15,000
Vehicle/equipment	all		30,000
Engineering / Contracting	all		40,000
Site prep / construction labor	all		30,000
Subtotal			$817,500
Contingency (20%)			163,500
Total			$981,000

Table 2. Projected Fiscal Year 1998 operations and maintenance costs for a winter-run chinook propagation facility. Estimates in this table are generated specifically for a facility on the left-bank at Shasta Dam, to include the pumping costs common to all alternatives other than the preferred (right-bank Shasta) alternative, but would be approximately the same for other alternatives, except the "No-Action" Alternative. Some services, supplies, etc. may be provided on an "in-kind" basis from other sources. Also, some initial start-up operations and maintenance costs may be provided by the Service and / or Reclamation.

Salaries 1/	**$110,000**
Transportation 2/	**3,000**
Utilities 3/	**20,000**
Contractual service 4/	**6,000**
Fish feed and supplies 5/	**17,000**
Equipment 6/	**ll,ooo**
Maintenance 7/	**ll,ooo**
Total	**$178,000**

1/ Salaries include actual salary, benefits and training for one full-time fishery biologist, one full-time fish culturist, and one temporary **(8** month) fish culturist.

2Transportation includes gasoline and associated maintenance costs for one pick-up truck.

3Utilities includes phone and electricity at the Project Power rate of $O.O2/kWh These are only costs to produce power, loss of foregone power "sales" would be higher. About $13,000 of the estimated costs would be for pumping.

• Contractual services includes postage metering, trash removal, and various service and maintenance contracts.

5Fish feed and supplies includes purchase of fish food and prophylactic drugs and chemicals.

6Equipment includes various items necessary for hatchery operations and need to be purchased on a recurring basis.

7Maintenance includes costs associated with performing preventive maintenance and non-scheduled repairs to equipment and facilities.

of a packed column equilibration chamber would be necessary to avoid supersaturation conditions and associated "gas bubble disease"; monitoring of gas saturation levels and fish would occur on a routine basis.

Twenty 30-inch circular tanks would be moved from the CNFH and an additional twenty would be purchased. All other rearing containers would be purchased new and require new plumbing and site preparation.

Alternative 3: Winter-run Rearing Facility on the Left Bank at Shasta Dam

Like the Preferred Alternative, Alternative 3 would fulfill the purpose and need of the proposed project. It would enable implementation of supplemental propagation of winter-run chinook salmon under Goal IV of the Winter-run Recovery Plan through imprinting juveniles on mainstem Sacramento River water, be compatible with the continuation of the Captive Broodstock Program in its present form, and would facilitate the development of a freshwater component of this program.

The site would be on the left (east) bank approximately 0.5 miles below Shasta Dam on land owned by Reclamation (Figure 1). This approximately 20,000 ft^2 site, currently used for storage, is relatively flat, fenced and located within the security perimeter for Shasta Dam. Projected construction and O&M costs are outlined in Table (3) and Table (2), respectively.

The water supply for the proposed rearing facility would be Sacramento River water pumped from the Shasta Dam tailrace through a dual pumping system with two 3,000 gallon per minute (gpm) pumps. Each pump would have the capacity to supply the needs of the rearing facility independently which is needed in event of pump failure. Water would be delivered by steel or PVC pipe to air equilibration columns in the compound, and from there to a manifold system for distribution to individual incubation and rearing units. Since the needed water flows would be variable, ranging from as little as 30 gpm at the start to as much as 3,000 gpm in peak use periods, provisions would be needed to avoid excess pumping while maintaining pumping capacity. This would probably mean use of special valves to allow excess water to be dumped prior to lifting it fully from the river.

The spawning/rearing building for the proposed rearing facility would be a 2700 ft^2 insulated, steel building. This building would house a small office, egg and fry incubation units, forty 30-inch diameter circular tanks for early rearing, a 800 ft^3 (100 ft^2 footprint) walk-in feed storage freezer, storage space, and all appurtenant electrical wiring and plumbing. Existing offices would be used for staff.

No water treatment/sterilization by ozonation would be required at the Shasta Dam site. Although fish are abundant in Shasta Lake, consultation with a Service pathologist (J.S. Foott,

Table 3. Estimated construction / development costs for establishing the winter-run chinook propagation and captive brood stock programs at the left bank site at Shasta Dam.

Item	Qty	Unit cost	Total cost
Property acquisition	1	$ 0	$ 0
Water Supply			
Intake	1	35,000	35,000
Submersible pumps	2	15,000	30,000
Packed towers	2	7,500	15,000
Water head tank with footing	1	25,000	25,000
Piping	all		30,000
Effluent, draii	all	-	20,000
Electrical	all	-	40,000
Alarm system	1	5,000	5,000
Hatchery Building (30 x 90 ft, insulated)			
Concrete Pad (incl. rebar)	3,000 ft^2	10	30,000
hauling	120 yd^3	62	8,000
Steel building, incl. office partition,	2,700 ft^2	25	67,500
Erect building	1	35,000	35,000
Septic system	1	15,000	15,000
Tank support structures	all		8,000
Egg tray stack	12	1,000	12,000
Carbon filter	1	5,000	5,000
Gratings, ladders, walks	all	10,000	10,000
Office, wet lab (3 souls, min.)	1	0	0
Living Qtrs. (1 ,200 ft^2) with water, power, septic	1	65,000	65,000
Circular tanks, fry (30 in dia.)	60	300	18,000
Rectangular tanks, juvenile grow-out	30	2,400	72,000
Circular tanks, capt. brood stock (12 ft dia.)	20	2,500	50,000
Gravel pad, outdoor circ. tanks	1,000 yd^3	10	10,000
hauling	1,000 yd^3	4	4,000
grader (in/out + work)	all		8,000
Walk-in freezer	1	-	15,000
Vehicle/equipment	all	-	30,000
Engineering / Contracting	all	-	40,000
Site prep / construction labor	all	-	30,000
Subtotal			$732,500
Contingency (20%)			146,500
Total			$879,000

PhD, California-Nevada Fish Health Center, pers.comm.) revealed that little threat from pathogens is evident. Chinook salmon are routinely stocked into Shasta Lake, but these fish must be quarantined and certified disease-free prior to their release. Water temperatures are presently controlled for the benefit of winter-run chinook salmon at Shasta Dam and would be satisfactory in virtually all years, avoiding the need for chillers. Gas equilibration through use of a packed column equilibration chamber would be necessary to avoid supersaturation conditions and associated "gas bubble disease"; monitoring of gas saturation levels and fish would occur on a routine basis.

Twenty 30-inch circular tanks would be moved from the Coleman NFH and an additional twenty would be purchased. All other rearing containers would be purchased new and require new plumbing and site preparation.

Alternative 4: Acquisition, Rehabilitation and Operation of Buckhorn Fish Hatchery

Alternative 4 would at least partially fulfill the purpose and need of the proposed project. It would enable implementation of supplemental propagation of winter-run chinook salmon under Goal IV of the Winter-run Recovery Plan through imprinting juveniles on mainstem Sacramento River water, be compatible with the continuation of the Captive Broodstock Program in its present form, and would allow the development of a freshwater component of this program. However, the site is below much of the spawning habitat of the winter-run chinook which therefore may result in under utilization of all available habitat.

This alternative would require the purchase, rehabilitation, and operation of the abandoned Buckhom Hatchery, near Anderson, California, for winter-run chinook propagation. This hatchery was built in the 1960's and operated privately for approximately twelve years. Much of its original fish culture infrastructure is in place, but would require significant rehabilitation. The property consists of approximately thirty-nine acres of level land east of Highway 273 on Eastside Rd. at approximately river mile 286 (Figure 1). The site is fenced, but presently has no security perimeter. Acquisition of the Buckhom Hatchery would require either a lease-to-purchase agreement or a purchase agreement. A compilation of estimated acquisition, rehabilitation, and operation costs is outlined in Table 4. O&M costs would be approximately the same as for Alternative 3 (see Table 3).

The primary water source for the Buckhom Hatchery would be Sacramento River water with a well water back-up. River intake rehabilitation would require fish screening to meet NMFS and DFG criteria, installation of two electric pumps, and new plumbing.

A building with fish culture infrastructure is located at the Buckhom Hatchery although considerable rehabilitation would be required. This would include construction of a small office, rehabilitation of the existing freezer, rehabilitation of the existing plumbing and electrical wiring, and increase of existing egg /fry incubation and early juvenile rearing capacity.

Table 4. Estimated construction / development costs for establishment of the winter-run chinook propagation and captive brood stock programs at the Buckhom Hatchery site.

Item	Qty	Unit cost	Total cost
Property acquisition (1)	1	$370,000	$ 370,000
Water Supply			
Intake	1	23,000	23,000
Submersible pumps	2	15,000	30,000
Back-up wells (rebab)	2	15,000	30,000
Chiller (incubation only; 150 gpm)	1	3,000	3,000
Piping	all		30,000
Effluent, drain	all		3,000
Electrical	all		40,000
Standby power	1	50,000	50,000
Ozone generator	1	55,000	55,000
sand filter	1	50,000	50,000
Alarm system	1	10,000	10,000
Hatchery Building	rehabilitate	5,000	5,000
Office (3 souls, min.)	1	15,000	15,000
Living Qtrs. (1200ftl) with water, power, septic	1	65,000	65,000
Circular tanks, fry (30 in dia.)	60	300	18,000
Rectangular tanks, juvenile grow-out	30	2,400	72,000
Circular tanks, capt. brood stock (12 ft dia.)	20	2,500	50,000
Gravel pad, outdoor circ. tanks	1,000 yd'	10	10,000
haul	1,000 yd^3	4	4,000
grader (in/out + work)	all		8,000
Walk-in freezer	rehabilitate		5,000
Vehicle/equipment	all		30,000
Site prep / construction labor	all		35,000
Engineering/construct. mgmt. (10%, except prop.)	all		64,100
Subtotal			$1,075,100
Contingency (20%)			215,020
Total			$1,290,120

1) **Asking price for the property is $370,000. A federal appraisal** places **"fair market value" at $550,000, which would be the required purchase price if the** property is **acquired by a federal agency. A one-year lease cost of $190,000 could be applied to the purchase price if the property is acquired.**

Water treatment/sterilization by ozonation would be prudent because approximately eighty percent of the Sacramento River salmonid runs spawn above the river intake, providing a considerable source of pathogens. Moreover, the well-water would require mechanical chilling because temperatures are above the lethal limit for egg incubation and early fry rearing A back-up power generation capability would be required to operate pumps and chillers in the event of power failure. Although some concrete rearing units currently in-place may eventually be rehabilitated, additional fiberglass rearing units would need to be purchased. Costs associated with rehabilitating existing facilities would likely be comparable to the purchase of equal capacity fiberglass rearing units.

The principal biological concern with the Buckhom site is the location of the Sacramento River water-supply intake which is down stream of approximately 80% of the winter-run chinook's available in stream spawning habitat. Although straying to other portions of available habitat will occur, adult hatchery-origin winter-run chinook may concentrate near the Buckhom intake which would limit infusion of this gene pool into the wild spawning population. The risk associated with this concern is likely very low, but never the less the water supply should be located up stream from principal spawning habitat.

In addition, several potential problems and concerns have been identified which are peculiar to this alternative and are minor factors in weighing its relative merits. Although some of these concerns might also be considered "environmental consequences", such as potential for fish straying into other systems, the consequences are mostly internal to the proposed action (do not affect the environment outside the physical limits of the action). For this reason, and because of their relevance to alternative selection and the low probabilities of occurrence of adverse effects, these problems and concerns are presented here:

- **Lethal winter-run chinook egg and early fry incubation** temperatures of Sacramento River **water during drought conditions**. **Sacramento River** temperature modeling reveals temperatures at Clear Creek exceeding those temperatures identified as the lethal limit during severe drought conditions which occur, on average, 17 out of 56 years. Risk associated with this concern is minimal due to the ability to mechanically chill the water and probable minimum exposure time to high temperatures.

- **Risk of mortality** due to toxic effects of heavy metal contact resulting from Iron Mountain **Mine** waste embankment (Spring Creek Dam) failure. Spill of heavy metal laden water from Spring Creek Dam occurs during periods of high runoff resulting from winter storm events. Although significant dilution occurs, repeated exposure could pose a minor threat to fish health. A failure of Spring Creek Debris Dam would send a large pulse of re-suspended toxic sediments into Keswick Pool. Such an event would contaminate the rearing facility water supply, and would result in loss of all production on site. However, probability of such an event occurring is low.

- **Straying of hatchery-origin winter-run chinook into Clear Creek**. Due to operation

parameters of the Central valley Project, a portion of the Sacramento River flow may be comprised of Clear Creek water which includes water diverted from the Trinity River (a different geographic drainage area). If the hatchery propagation program is using Sacramento River water for operations, there may be increased risk (although minimal) of imprinting problems and consequent increased straying into Clear Creek.

Alternative 5: Construction and Operation of a Rearing Facility at Keswick Dam

This alternative would partially fulfill the purpose and need of the proposed project. It would enable implementation of supplemental propagation of winter-run chinook salmon under Goal IV of the Winter-run Recovery Plan through imprinting juveniles on Sacramento River water, but the only site available near the base of Keswick Dam is too small to accommodate one-third of the total captive broodstock population (about 333 fish per year class, or about 1,000 fish total) as would be required to evenly spread the stock among the mainstem, Bodega Marine Lab and Steinhart Aquarium facilities. This alternative therefore would not fully accommodate the mainstem portion of the winter-run program.

This alternative would require construction of an entirely new incubation/rearing facility (no hatchery infrastructure is in place) about l/2 mile downstream of the base of Keswick Dam (Figure 1). The available site is within a fenced compound adjacent to a Quonset hut at the spawning gravel augmentation site (the point on the west bank where spawning gravel intended to augment natural spawning areas is dumped into the Sacramento River for natural distribution downstream). The site is owned by Reclamation and is presently used for a minor amount of equipment and material storage. A fenced area (outside the security perimeter) approximately 80' x 250' (about 20,000 ft^2) is available for use, but would require relocation of Reclamation's existing equipment and material storage. Reclamation would also need to relocate its water quality monitoring team and the new chemistry laboratory planned to support this effort. Aside from the cyclone fence, the area is not secure. Compilations of estimated construction costs are given in Table 5. O&M costs would be approximately the same as for Alternative 3 (see Table 2). Costs of relocation of equipment have not been estimated, but clearly would not be prohibitive.

Water for the proposed rearing facility would be obtained from the Sacramento River immediately upstream of the point used to introduce supplemental spawning gravel (see above). The intake would require fish screens meeting NMFS salmonid fry criteria and redundant pumping capacity. A water intake structure would be installed in the river with pilings securing the pipe and providing some protection against debris (low risk, due to the close proximity of Keswick Dam). The fish screens (dual drum screens mounted parallel to river flow with a separate pump and internal spray bar apparatus for cleaning) would be the same as those proposed for the Buckhom Site alternative. Water would be delivered by steel pipe to air equilibration columns in the compound, and from there to a manifold system for distribution to individual rearing units.

Table 5. Estimated construction / development costs for establishing the winter-run chinook propagation program at the Keswick Dam site.

Item	Qty	Unit cost	Total cost
Property acquisition	1	$ 0	$ 0
water Supply			
Intake	1	25,000	25,000
Submersible pumps	2	15,000	30,000
Back-up wells (rehab)	0	0	0
Chiller (incubation only; 150 gpm)	0	0	0
Piping	all		30,000
Effluent, drain	all	-	10,000
Electrical	all	-	40,000
standby power	0	0	0
Ozone generator (1)	0	0	0
Alarm system	1	5000	5,000
Hatchery Building (30 x 90 ft. insulated)			
concrete Pad (incl. rebar)	3,000 ft^2	10	30,000
hauling	120 yd'	62	8,000
Steel building, incl. office partition	2,700 ft^2	25	67,500
Erect building	1	35,000	35,000
Septic system	1	15,000	15,000
Tank support structures	all		4,000
Egg tray stack	12	1,000	12,000
Carbon filter	1	5,000	5,000
Gratings, ladders, walks	all	5,000	5,000
office, wet lab (3 souls, min.)	1	15,000	15,000
Living Qtrs. (1200ft^2) with water, power, septic	1	65,000	65,000
Circular tanks, fry (30 in dia.)	60	300	18,000
Rectangular tanks, juvenile grow-out	30	2,400	72,000
Circular tanks, capt. brood stock (12 ft dia.)	0	0	0
Gravel pad, outdoor rectangular tanks0	500 yd^3	10	5,000
hauling	500 yd^3	4	2,000
grader (in/out + work)	all	-	2,000
Walk-in freezer	1	--	15,000
Vehicle/equipment	all	-	30,000
Site prep / construction labor	all	-	27,000
Engineering / Contracting (10%)	all	-	57,250
subtotal			$629,750
Contingency (20 %)			125,950
Total			

1) Although there is significant disease risk at this site due to the presence of adult anadromous fish and a limited number of carcasses above the water supply intake, ozonation was deemed not to be cost effective. If ozonation is deemed required in the future, $73,272 ($55,000 capital cost plus $6,060 in engineering and management, and $12,212 in contingency costs) must be added, bringing the total site cost to $828,972.

Spawning/rearing building for the proposed site would be a 2700 ft^2 insulated steel building on a concrete slab. This building would contain a small office cubicle, egg and sac-fry incubation units, forty 30-in dia. circular tanks for rearing early life-stage juvenile chinook, a 800 ft^3 (100 ft^2 footprint) walk-in feed storage freezer, storage space, and all appurtenant electrical and plumbing systems. Limited space for expansion of early rearing capacity would be available.

Water treatment would not be required, even though fish are abundant in Shasta Lake and Keswick Pool above this site. Consultation with a Service pathologist (J.S. Foott, PhD, California-Nevada Fish Health Center, pers. comm.) revealed that little threat from pathogens would be present. Although chinook salmon are routinely stocked in Shasta Lake, these fish must be quarantined and certified disease-free prior to their release. Since only a limited number of anadromous fish carcasses would typically be present upstream of this site, it is presently felt that water treatment through ozonation will not be cost-effective. However, lack of treatment increases the risk of disease problems, and it is possible that ozonation would be deemed necessary at some future time, adding a cost risk element to this site. Water temperatures would be satisfactory in nearly all years, avoiding the need for chillers. Gas equilibration through use of a packed column equilibration chamber will be necessary to avoid supersaturation conditions and associated "gas bubble disease"; monitoring of gas saturation levels and fish would occur on a routine basis.

Rearing would occur in forty 30-in dia. circular tanks housed in the hatchery building (see above). After tagging, extended rearing would take place outdoors in thirty 16ft by 3ft rectangular tanks or the equivalent, supported on a level gravel pad.

Back-up power is in place at Keswick Dam and would be tapped into for the facility to mitigate against power loss. Mobile office space for a minimum of three personnel and mobile home style living quarters for one on-site Service employee would be provided.

Several potential problems and concerns have been identified which are peculiar to this alternative and are factors in weighing its relative merits. Consequences are entirely internal to the proposed action (do not affect the environment outside the physical limits of the action). For this reason, and because of their primary relevance to alternative selection, these problems and concerns are presented here:

- **Risk of mortality due to toxic effects of heavy metal contact** resulting from Iron Mountain **Mine waste embankment (Spring Creek Debris Dam) failure.** Spills of heavy metal laden water from Spring Creek Debris Dam, which is just upstream of Keswick Dam, occur during periods of high runoff from winter storm events. Although some dilution of heavy metals occurs, the risks would be higher than at Buckhorn. Repeated exposure to such toxicants could pose a minor threat to fish health. A failure of the Spring Creek Dam would send a large pulse of re-suspended toxic sediments into Keswick Pool. Such an event would contaminate the rearing facility water supply and would result in loss of all production on site, even though probability of such an "event" occurring is extremely low.

- **Risk of disease** outbreak due to the presence of some adult anadromous fish and some **carcasses upstream** of the water supply intake. Although only a comparatively few adult anadromous fish will routinely be present upstream of the water supply, because it would be within roughly a half-mile of Keswick Dam, this still represents an elevation of fish health risk for this site, unless ozonation or the equivalent is provided. Since ozonation at this site has been deemed not cost-effective for purposes of this alternatives analysis, this increased risk must be considered. If ozonation were provided, costs of development and operation of a facility at this site would increase accordingly (see cost estimates).

- **Incompatibility with retention** of a small portion of **the production** of certain family groups **on-site as part** of the Captive Broodstock Program. This site has insufficient space to accommodate grow-out facilities for a fresh water portion of the Captive Broodstock Program. This means that all broodstock would be located at the Bodega Marine Laboratory during period when Steinhart Aquarium is being remodeled (increasing risk of loss of the entire captive broodstock population to a catastrophic environmental "event"). This is considered a major shortcoming of the Keswick site, given the inherent uncertainty of institutional plans, even though it currently appears as if Steinhart Aquarium operations may be uninterrupted.

CRITERIA FOR EVALUATION OF ALTERNATIVES

The differences among the potential sites for a mainstem winter-run chinook salmon rearing facility require development of a set of evaluation criteria to support the selection of a "preferred alternative" site. Accordingly, evaluation criteria were developed to reflect how completely each alternative would accomplish the stated project purpose and need, how well it would mesh into other aspects of the overall winter-run supplementation and Captive Broodstock programs, and how well it could respond to various concerns related to implementation and operation. In most cases, criteria call for a qualitative assessment of alternative performance; in some cases, such as cost, quantitative information can be applied to the decision-making process.

1. Project Purpose and Need

Each alternative was judged according to how completely it could satisfy the stated project purpose and need: to solve the imprinting problem by relocating the winter-run incubation and rearing facility to a mainstem Sacramento River site and to integrate the incubation/rearing/supplementation activities into the Captive Broodstock Program.

Imprinting problem solved This criterion directly addresses the issue of unwanted straying of returning adult propagated winter-run chinook salmon propagated at the supplemental rearing facility to areas remote from their natural mainstem spawning grounds in the upper Sacramento River, especially tributary streams. The Service and other agencies(NMFS, DFG,

Reclamation) agree that imprinting of juvenile fish on mainstem Sacramento River water upstream of the majority of the natural spawning grounds will solve this problem.

Continuation of supplementation with no further interruption This criterion addresses the urgency of completing a mainstem facility in time to subject test fish to the water supply for at least 30 days prior to introducing winter-run and still meet supplementation needs for 1998. This means the new facility must be operational by the end of January 1998.

Continuation of the Captive Broodstock Program with no further interruption. This criterion addresses the urgency of completing a mainstem facility so that a small proportion of gametes from each winter-run family group can be retained in the Captive Broodstock Program as a genetic reserve to prevent the extinction of the species. Without the rearing facility to use most of the gametes for supplementation of naturally spawning adult fish, the Captive Broodstock Program would have to be terminated.

2. ***Integration with Captive Broodstock Program***

It is desirable to establish the Captive Broodstock Program at more than one site to mitigate against catastrophic loss of the "genetic reserve" in the event of an unanticipated environmental "event" or system failure at any one location. It is also desirable to retain a portion of the captive broodstock in fresh water to address certain problems associated with the transition of captive smolts to full strength seawater and other technical issues. This could be accomplished elsewhere, and aspects of this work may be best accomplished elsewhere, in close proximity to research laboratories, but the direct integration of a mainstem rearing facility into the ongoing and closely associated Captive Broodstock Program presents an opportunity for simplifying logistics associated with transport of adults and gametes.

3. Cost

Detailed cost analyses have been conducted for each of the alternatives (except for the "No Action" alternative). These cost analyses provide a basis for alternative evaluation and for pursuit of funding sources, which will likely consider cost-effectiveness as an important consideration.

4. Unforeseen delays / cost items

Each of the alternatives has a different potential for being delayed by unforeseen administrative or technical feasibility problems and for incurring unforeseen significant costs. This criterion addresses this potential qualitatively, and is a reflection of "best judgement" based on experience.

5. ***Addresses*** additional concerns

Straying potential to Clear Creek or other upper mainstem tributaries

There is a slight risk that returning adult winter-run chinook propagated at the supplemental rearing facility will stray into Clear Creek if these fish are imprinted on mainstem water with a Clear Creek component. However, this is risk is slight and is not a universal concern among fishery experts.

Fish health risk

There is a fish health risk associated with the use of water exposed to anadromous fish carcasses or other fish pathogen sources. This risk is amplified if temperatures are greater than optimum, and is mitigated by treatment of the water supply, e.g. through ozonation. Elevated temperature itself can pose some fish health risk, depending on the amount and duration of the increase.

Drought year mainstem water temperature

Effectiveness of the "Temperature Control Device" at Shasta Dam is reduced in drought years, resulting in an upstream displacement of the zone of preferred water temperature for winter-run chinook salmon. Temperature modeling indicates that in some years, the downstream boundary of this zone is significantly upstream of the Anderson/Cottonwood area. A mainstem supplementation and captive brood stock facility in this area would have to incorporate chillers, slightly increasing survival and fish health risks, especially in the event of power failure.

Risk of a catastrophic environmental "event"

Although unlikely, catastrophic "events" may threaten a mainstem rearing facility, if suitable precautions cannot be taken. For example, failure of the embankment retaining Iron Mountain Mine waste would send a toxic plume down the Sacramento River, threatening any downstream water supply. A backup water supply (e.g. wells) would at least partially offset this risk. Time to act to mitigate the effects of an environmental "event" would also serve to mitigate this risk.

Interference with Central Valley Project (CVP) or other operations

This criterion addresses the concern that a **mainstem** rearing facility should not interfere with ongoing CVP operations, e.g. at Shasta Dam, or other operations. The magnitude of any potential interference would depend on site and water supply characteristics and the "adaptability" of the rearing facility to ongoing operations and related activities.

Facilitate/interfere with future anadromous fish program development

It is important to consider the degree to which an alternative site might facilitate or interfere with potential expansion of the winter-run propagation, Captive Broodstock, genetics research or other programs intended to hasten recovery of this important fish stock should they prove necessary. Although these potentials are not part of the purpose and need for a mainstem winter-run rearing facility to avoid straying, it is felt that some consideration of potential to address possible future needs in the alternatives analysis is appropriate. Potential for adaptation to potential future needs is a desirable but not essential

Each of these evaluation criteria was applied to each of the alternatives selected for analysis. It is important, however, to recognize that not all criteria should be accorded equal weight. For example, the criterion, "facilitation / interference with future anadromous fish program development" should be accorded very low weight (e.g. "tie-breaker" weight) unless selection of an alternative forecloses an important existing or recognized future program element. Conversely, criteria directly associated with satisfying the stated "project Purpose and Need" should be accorded very high weight. Relatively high weight should be accorded to the criteria related to consistency with the existing Captive Broodstock Program and integration of a freshwater component of this program; relatively high weight should also be given to the potential for unforeseen delays and cost overruns, given the overall urgency of maintaining program continuity. Cost should be accorded relatively high weight, given current budgetary constraints, but the incremental benefits associated with alternatives incorporating a portion of the winter-run Captive Broodstock Program are important. The results of the analyses used to arrive at a preferred alternative are displayed in the "Alternatives Evaluation Matrix" (Table 6).

Table 6 – Alternative evaluation matrix; Results of application of evaluation criteria to analyzed alternatives. Most criteria call for qualitative application of criteria. Costs were developed through a detailed analysis using local vendors' / contractors' estimates where appropriate.

CRITERION	NO ACTION	BUCKHORN	KESWICK	SHASTA Right Bank	SHASTA Left Bank
Imprinting problem solved	No	**Partial**	**Yes**	**Yes**	**Yes**
Continue supplementation	No	Yes	Yes	Yes	Yes
Continue broodstock program	No	Yes	**Incomplete**	**Yes**	**Yes**
Program integration facilitated	No	Yes	No	Yes	Yes
Construction Cost (approx.)	**n/a**	$1,290,120	$755,700	**$981,000**	$879,000
Annual 0 & M Cost (approx.)	**n/a**	**$178,000***	$178,000	**$177,200****	**$178,000**
Unforseen delays, costs risk	**n/a**	**Moderate**	**Moderate/low**	Low	LOW
Straying problem (Clear Creek, etc.)	Solved	**Slight risk**	**Slight risk**	Solved	Solved
Fish health risk	No	**Moderate**	**Moderate**	very Low	very Low
Mainstem temp. (drought years)	**n/a**	**Moderate**	LOW	LOW	LOW
Environmental "event" risk	**High**	**Moderate/Low**	**Moderate**	LOW	LOW
Interference with CVP operations	No	No	LOW	LOW	LOW
Risk to future program development	**Very high**	Low	**High**	**Moderate**	**Moderate**

* The O&M cost estimates are subject to considerable uncertainty at this time, particularly for Buckhorn where ozonation of the water would be required for disease control. (An independently generated cost estimates for this site was $80,000 higher). The true cost would be between 178,000 and $191,OOO/year if the ozone costs were equal to those estimated for ozonation operations at CNFH.
** Lost power sales are counted as an O&M cost for purposes of this comparison.

SELECTION OF THE PREFERRED ALTERNATIVE

Alternative 1 - No-Action Alternative

This alternative did not satisfy the stated purpose and need of the proposed project. This alternative is also inconsistent with the recommendations of the Sacramento River Winter-run Chinook Salmon Recovery Team for supplementation of naturally spawning wild winter-run chinook salmon and the Environmental Assessment and FONSI and Section 10 ***Enhancement Pemit for Artificial Propagation and Captive Broodstock Program*** issued to the Service by National Marine Fisheries Service(NMFS ***1997b).*** In addition, this alternative would require the abandonment of the existing Captive Broodstock Program for winter-run chinook salmon and associated infrastructure and facilities at Bodega Marine Laboratory, increasing risk of extinction of an endangered species. For these reasons, and since feasible alternatives have been found to exist, this alternative was rejected.

Alternative 2: Preferred Alternative - Facility on the Right Bank at Shasta Dam

This alternative is consistent with the recommendations of the Sacramento River Winter-run Chinook Salmon Recovery Team for supplementation of naturally spawning wild winter-run chinook salmon and the Environmental Assessment and FONSI and Section 10 ***Enhancement Permit for Artificial Propagation and Captive Broodstock Programs*** issued to the Service by National Marine Fisheries Service. This alternative would result in imprinting of propagated winter-run chinook salmon on mainstem Sacramento River water and would solve the problem of hatchery-origin adults returning to Battle Creek, and would also avoid the increased potential for straying into Clear Creek associated with Alternative 4. This alternative would allow site development for the desired incorporation of a portion of the Captive Broodstock Program. Fish health risks and risks of loss to environmental "events" are low for this alternative. Temperature control at this site is very good, even in most drought years. Risks of unforseen delays and cost overruns are low, as is the risk of interference with CVP and other operations. The use of the penstocks as a water source slightly reduces the risks of interruptions of water delivery relative to the use of pumps, as in Alternative 3. The cost associated with this alternative is low, especially considering the cost synergies and other winter-run program benefits involved in incorporation of a portion of the Captive Broodstock Program into site development. The front loading of costs, which lowers O&M costs, further increases the security of long term funding for the project. For these reasons, this alternative was selected as the "Preferred Alternative".

Alternative 3: Facility on the Left Bank at Shasta Dam

This alternative would have the same advantages and disadvantages as the right bank site apart from the differences in the manner in which water would be obtained and implications that has for allocation of life time costs of the facility between construction and O&M. This alternative

would have lower construction costs, but higher O&M costs. Therefore, the funding would be less secure in an era of ever tightening budgets, a tightening which is especially true for O&M. Moreover, the operations would be somewhat more complex given the use of pumps rather than diversions from the penstocks. For these reasons, this alternative was not selected as the "Preferred Alternative".

Alternative 4 - Acquisition, Rehabilitation and Operation of the Buckhorn Fish Hatchery

This alternative is consistent with the recommendations of the Sacramento River Winter-run Chinook Salmon Recovery Team for supplementation of naturally spawning wild winter-run chinook salmon and the Environmental Assessment and FONSI and Section 10 ***Enhuncernent Permit for Artificial Propagation and Captive Brood Stock Programs*** issued to the Service by NMFS. This alternative would result in imprinting of propagated winter-run chinook salmon on mainstem Sacramento River water and would likely solve the problem adults returning to Battle Creek. However, this alternative is inconsistent with the Service's recommendation that a mainstem site be located upstream of the principal spawning habitat for winter-run chinook and there is some risk of straying of returning adults into Clear Creek, which is undesirable. Since real property would have to be acquired, since development of the site involves in-river work permits and fish screen design approvals (both of which could be fast-tracked), and since the development and rehabilitation of the site involves installation and "shakedown" of equipment such as chillers and an ozonation facility, there is a moderate risk of unforseen delays and cost overruns. There is a modest risk to fish health associated with this alternative due to the combination of occasionally elevated water temperatures and the location of the site downstream of the majority of anadromous fish spawning grounds (ozonation notwithstanding), and a moderate-to-low risk associated with an environmental "event". Project costs associated with this alternative are approximately twice those associated with other feasible alternatives. For these reasons, this alternative was not selected as the "Preferred Alternative".

Alternative 5 - Construction and Operation of a Facility at Keswick Dam

This alternative would satisfy only part of the stated project purpose and need. Although minimally consistent with the recommendations of the Sacramento River Winter-run Chinook Salmon Recovery Team for supplementation of naturally spawning wild winter-run chinook salmon and the Environmental Assessment and FONSI and ***Enhancement Permitfor Artificial Propagation and Captive Broodstock Programs*** issued to the Service by NMFS, this alternative would not permit the desired incorporation of a portion of the Captive Brood Stock Program into site development. Fish health risks associated with this site are moderate, unless ozonation is provided (deemed not cost effective for this alternatives analysis); periodic exposure to (diluted) heavy metals from spills over the Spring Creek Debris Dam would be unavoidable. Temperature problems and potential for straying of returning adults into Clear Creek or other upper mainstem tributaries are avoided by this alternative. The occurrence of a major environmental "event" such as the failure of the Spring Creek Debris Dam, would result

in the loss of the entire production on site; no feasible contingency has been identified. For these reasons, and since another feasible alternative is available at a comparable cost with significantly greater benefits, this alternative was not selected as the "Preferred Alternative".

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Geology and Hydrology

The Shasta and Keswick sites are located on relatively small flat areas in steep walled canyons and are underlain by bedrock at shallow depths. Presumably these flat areas were created by cut and fill activity during the construction of the respective dams. Each is bordered on the stream side by precipitous bluffs. Groundwater can be assumed to be minimal or nonexistent at theses sites.

The Buckhom site is located on a broad alluvial plain bordering the Sacramento River after it has exited the low mountains forming the northern boundary of the Central Valley. The underlying unconsolidated sediments are relatively deep and contain an extensive shallow groundwater table, although it is probable that the groundwater in portions of the site is actually part of the underflow of the Sacramento River.

All water use would be non-consumptive. None of the alternatives would remove more than approximately 7 cubic feet per second (cfs) from the Sacramento River at peak diversion rates, which would be less than 0.15% of the 5,000 cfs flow typical of the lower flows encountered during the year. All of this flow would be returned to the river proximal to its point of removal. No effects on land forms would be expected with such a small change in flows.

Water Quality

The water quality at each of the sites is good, although water supplies at the Shasta and Keswick sites would have to be treated to remove excess gases because of the recency of their passage through the power plants of the respective dams. The water at the Shasta sites would be free of heavy metal contamination from Iron Mountain Mine, but the Keswick and Buckhom sites would be at risk of contamination in the event of an uncontrolled discharge.

Temporary turbidity increases in the vicinity of the construction site could be expected during installation of the water intake structures in the river under each of the action alternatives, but the extent of these increases should be less than that associated with operations recently permitted, such as the two bridge construction projects in Redding or the various spawning gravel injection programs on the Sacramento River. A Section 10 permit from the Army Corps of Engineers and a 1601 streambed alteration agreement with the DFG would likely be required for the Keswick, Buckhom, and Shasta left-bank sites, but would not be required for the Shasta right-bank site. A State discharge permit or a waiver would probably be needed

from the Regional Water Quality Control Board.

Upland and Riparian Vegetation

There is no upland vegetation on the Keswick and Shasta sites and the riparian vegetation near the Shasta and Keswick site consist of a narrow band of willows, with some oleanders on rocky outcrops. At least minimal riparian vegetation is present at all sites, but elderberries are absent at the Shasta sites. The riparian zone at the Buckhom site is better developed with mature stands of oaks, cottonwoods, and alders. The rest of the property has been extensive modified, being devoted to the now inactive hatchery.

Use of the Keswick or Buckhom sites would require site-specific inspection during the design phase to ensure impacts to habitat of the Federally-listed valley longhorn elderberry beetle habitat are avoided. However, this can be easily accomplished given the potential for adjusting the exact placement of the intakes at this site. There would be no impacts to the riparian zone for installation of water diversion structures at either Shasta site, minimal at Keswick where the riparian zone is barely present, and more substantial but still relatively localized and temporary at the Buckhom site.

Fisheries and Wildlife

Fish and wildlife resources at the Shasta and Keswick sites are limited to transient animals on the uplands, which are currently graveled or parking lots, the species of the riparian zone, and the species of the adjacent mainstem. The species of greatest concern are the riparian species, such as the chinook salmon runs near Keswick and the resident trout near Shasta. Fish and wildlife resources are more abundant at the Buckhom site but would have similar species composition, with a dominance of riparian and riverine species.

Given the absence of good wildlife habitat at these sites, the fish and wildlife impacts would be limited to aquatic and riparian habitats. All sites are disturbed and are presently paved or graded and used for lay-down areas or equipment storage (Shasta and Keswick) or "mothballed" industrial/commercial purposes (Buckhorn: mothballed private hatchery). The impacts of extremely limited construction in the riparian and aquatic areas (water intake) would be highly localized at all sites, greatly limiting the potential for impact. Fish screens meeting NMFS fry criteria (0.3 fps approach velocity) to prevent post-construction impacts (impingement/entrainment of salmon fry and other fishes) would be installed at the Buckhom and Keswick sites to prevent impacts to salmon, but would be unnecessary at the Shasta sites because anadromous fish are not present due to blockage at Keswick Dam. Moreover, screens would not be required for the native fish in Keswick Pool (H. Rectenwald, CDFG, pers. comm.). In addition, the size and production capacity of the facility is too small to require a National Pollution Discharge Elimination System permit, although a State permits may still be needed (Ann Manji, California Regional Water Quality Control Board, pers. comm.). Should use of malachite, which is not presently planned, be desired in the future as part of the

spawning and rearing operations, further permits would be needed.

Threatened or Endangered Species

A variety of threatened or endangered species, or species of special concern, occur or could occur in the general vicinity of the proposed sites, but few of these have habitats that would be modified by the proposed action or its alternatives. The federally-listed species that use the Sacramento River or its banks in this area are the winter-run chinook salmon, the bald eagle, and the valley elderberry longhorn beetle. The steelhead, which is the subject of current listing activities and the late-fall run chinook which is species of concern under State law and the spring-run chinook which a candidate for listing under State law may also be present.

Winter-run chinook salmon *(Oncorhynchus* tshawytscha), Federally Endangered, State Endangered -- The winter-run, one of four runs of chinook salmon in the Sacramento river, formerly spawned upstream of Shasta Dam and now spawns in the mainstem of the Sacramento River below Keswick Dam. Adult migration peaks in the winter months, but extends from February into the summer with incubation of eggs occurring between April and August. Fry and juvenile rearing occurs from July through October, and the juveniles emigrate between October and March. The programs to be conducted at the proposed facility by intent will affect the winter-run chinook salmon, but these affects have been covered by the previously referenced EA and FONSI prepared by the NMFS. No affect other than these previously analyzed benefits would occur at the Shasta site. It is above all of the winter-run spawning grounds and activities at that site would not affect in-stream activities. Operations at the Keswick and Buckhom sites would be upstream of virtually all and 20-30% of the spawning activity respectively, and construction might temporarily affect water quality and noise levels but the effects of the facility would be so localized and of such low intensity that no in-stream construction impacts on winter-run would be anticipated. Moreover, the construction activities would be highly localized and would be confined to the most favorable part of the year. Use of approved fish screens to prevent either impingement or entrainment of juveniles during diversion of water, would prevent operational impacts.

Bald eagle (Haliaeetus *leucocephalus),* Federally Threatened -- The bald eagle is a fish and carrion eating bird that preferentially nests in large conifers near large water bodies and breeds in the winter and early spring. No nests are known to be near any of the proposed sites, although nearby Shasta Lake has the State's largest breeding population of bald eagles, with seventeen nests. Because the proposed actions would not adversely affect fish populations nor disturb potential nesting or roosting habitat, there would be no effect on bald eagles.

Valley elderberry longhorn beetle *(Desmocerus californicus),* Federal Threatened -- The valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)* was declared a threatened subspecies by the Service in 1980. Elderberries *(Sambucus* spp.) are the obligate host plant for valley elderberry longhorn beetle larvae. Adult valley elderberry longhorn beetles lay their eggs on elderberry stems, cracks in bark, or at the base of leaf petioles. The eggs hatch and

the larvae bore into the pith where they feed for one or two years. Adults emerge from stems or trunks ranging from one to 8 inch's diameter, but more commonly form 1.5 to 3 inch diameter stems. Several emergence holes usually occur on a tree from ground level to 10 feet in height. Adult beetles feed on elderberry flowers and have been collected on elderberry foliage. Collection dates for the ***D. c. californicus*** subspecies adults range from February to October, but are commonly between March and May. Although no elderberry bushes have been currently identified at any of the proposed sites, this plant is known to be in the area. Prior to construction of the proposed project, Reclamation or Service personnel would conduct a site survey to identify and flag any elderberry bushes for avoidance during construction activity. Construction activity would then be altered to ensure no damage to individual plants. Therefore project would not affect existing plants or their future offspring, and hence would not affect the beetle.

Steelhead trout ***(Oncorhynchus mykiss),*** Federal Candidate -- Steelhead, which are under consideration for listing as an endangered species in the Central Valley, have one of the more complex life histories of the salmonid species. They typically migrate to marine waters after spending one to two years in freshwater, and then, in many streams, typically return one to three years later to spawn as three to five year olds. (This is not yet well documented for the Central Valley).They are capable of migrating back to the ocean and returning to fresh water to spawn again, but rarely repeat spawning migrations more than once. Spawning in the Central Valley typically occurs from late December into April, and the eggs then incubate for 1 S-4 months. Juveniles then rear in fresh water for one to four years and migrate to the ocean as smolts. The proposed action (Preferred Alternative) would not affect steelhead because the activity would be confined to the reach of the Sacramento River upstream of Keswick Dam and hence upstream of the reach accessable to steelhead.

No effects are expected on the species of special concern to the State, which includes winter-run chinook salmon, for the reasons outlined above. The construction activity would be highly localized with little effect on turbidity, the water intakes would be properly screened, and the peak spawning and incubation periods would be avoided. There would be no opportunity for effect with implementation of the Preferred Alternative.

CVP Operations

Minimal impacts on CVP operations are expected. There will be small losses of power production because the water passing through the turbines will be slightly reduced but the losses would be less than those currently experienced due to leaky seals and valves. Given the variations in flows required throughout the year, the power loss is likely to be on the order of 160 hp. On an annual basis as much as $20,000 per year of revenue might be lost due to diversion of otherwise marketable power to facility operations (assuming $O.O2/kWh), but the approximately 1,600 acre feet of water involved each year would not be lost for purposes of irrigation as that water would simply be included in the computations of the total released for irrigation and river temperature control purposes.

Noise and Air Quality

Each of the sites is an industrial facility within a rural setting and the noise levels are generally low and air quality is typically high. The major noise sources are those associated with the dams, where the sounds of falling water during spillway releases and routine construction equipment are the principal noise sources. The Buckhom site is currently quiet apart from ambient rural noises.

Temporary construction noises would be created, but noise levels would be low during operation. The remote locations of the sites would preclude adverse effects on residences or other noise-sensitive land-uses.

Land Use and Recreation

The current land uses at the sites are essentially rural since the facilities, though themselves industrial, are in rural settings. Space for riverine recreation is abundant near each of the sites, but it consists primarily of boat based activity because the water is cold year round near each of these sites, and is virtually absent near the Shasta and Keswick sites.

The width of the river and the smallness of the construction zone would preclude adverse affects on recreation through obstruction of waterways and the noise associated with construction would be temporary even in at the Buckhom site which has the greatest nearby fishing and boating activity.

Cultural Resources/Indian Trust Assets

Both the Keswick and Shasta sites are on flat landfilled areas created as staging grounds for construction of the respective dams. They therefore contain no archeological or historical resources. The Buckhom site was surveyed by the Service's Cultural Resource Team on March 3-4, 1997 following completion of background research. The California State historic Preservation Officer concurred that the requirements of National Historic Preservation Act had been satisfied by this survey. No Indian Trust Assets are present at either site.

Given the absence of these resources, the proposed action would not affect any cultural resources or Indian Trust Assets.

Environmental Justice

The proposed sites are either Federal land remote from residential areas (Shasta and Keswick) or unoccupied rural lands subject to purchase by the Service from a willing seller. Therefore, no minority and low-income populations and communities would be disproportionately affected.

Growth-Inducing Impacts

The project will serve simply to foster the recovery of an endangered species which, by law, is not subject to fishing. Moreover, its use would be discontinued should the species be delisted. Thus it supports very little economic activity and has no potential for inducing further growth. Therefore the project would not affect human settlement or markedly increase use of any of the proposed sites, so no growth-inducing impacts are expected.

Cumulative Impacts

The principal impact of this program would be positive as has been described by NMFS's EA and FONSI. This project alone would have little affect on the salmon, but it would expedite the recovery that should result from measures mandated by the Biological ***Opinion for the Operation of the Federal Central Valley Project and the California State Water Project,*** dated 2/12/93, such as the temperature control program, the operational changes at the Red Bluff Diversion Dam. These actions, in combination with other actions required by the Central Valley Project Improvement Act (CVPIA), are expected to lead to a partial restoration of the salmonid populations in the Central Valley. The cumulative impacts of these Congressionally mandated CVPIA actions are being assessed in a Programmatic Environmental Impact Statement being prepared by the Bureau of Reclamation and the Service.

Concern has been expressed historically over the potential interaction of propagated fish with wild fish, especially with regard to reduction in the "genetic effective population size". This concern has been carefully and aggressively addressed by the Service's 1993 Biological Assessment and 1996 Section 10 permit Application, which are cited by NMFS in their EA and FONSI entitled ***Environmental Assessment a National Marine Fisheries Service Action to Issue an Enhancement Permit for Artificial Propagation and Captive Broodstock Programs to the US Fish and Wildlife Service Under Section 10 of the Endangered Species Act*** and in conditions of Permit No. 1,027 (January, 1997). Existing protective measures have also been implemented by NMFS and by the Service to guard against potential adverse genetic influences. Data analyzed from actual propagation efforts in 199 l- 1993 indicate that the supplemental propagation program has not reduced the overall effective population size, and may have marginally increased this desirable parameter in 1992 above what it would have been had all winter-run spawning occurred in the river (Hedrick, et al. 1995).

RELATED PROGRAMS, EIS's

The most closely related program, discussed in the body of this EA, is the winter-run chinook Salmon Captive Broodstock Program, a part of which will be integrated into the winter-run supplemental propagation site. This proposed action would be carried out as a means of meeting portions of Goal IV of "Recommendations for the Recovery of the Sacramento River Winter-Run Chinook Salmon" prepared by the Winter-Run Chinook Recovery Team, and is consistent with the ***NMFS Proposed Recovery Plan for the Sacramento River Winter-run***

Chinook ***Salmon*** (August, 1997). Other related programs include those promulgated under the ***Central Vallsy Project Improvement Act*** (CVPIA; P.L. 101-575) such as the Anadromous Fish Restoration Program (AFRP). In addition, USFWS has instituted a re-evaluation of CNFH, which will include winter-run supplemental propagation activities, among other things.

CONSULTATION AND COORDINATION

This proposed project was planned by the Service in consultation with DFG, Reclamation, NMFS, DWR, and interested members of the Central Valley Project Improvement Act (Restoration Fund) Round Table following the distribution of an earlier draft that focused on the acquisition of the Buckhom hatchery. That earlier draft was mailed to the representatives from the aforementioned project consultants and coordinators and a number of private groups and individuals. A list of threatened or endangered species that might occur in the proposed project area was obtained from the FWS on January 3, 1997. Consultation with NMFS concerning anadromous fishes has in effect been an on-going process discussed in detail in the Introduction to this EA, with specific coverage of the programs implemented in part by the proposed action being contained in the Endangered Species Act , Section 10, permit #1,027, issued in January 1997.

ENVIRONMENTAL COMMITMENTS

A site survey by Service or Reclamation staff would be conducted for the Valley Elderberry Longhorn Beetle ***(Desmocerus californicus*** Although no elderberry bushes have been currently identified at the proposed or alternative sites, this plant is known to be in the area. Prior to construction of the proposed project, Service or Reclamation personnel would conduct a site survey to identify and flag any elderberry bushes for avoidance during construction activity. Construction activity would then be altered to ensure no damage to individual plants and thus no effect on the Valley Elderberry Longhorn Beetle.

REFERENCES

Hedrick, P.W.; D. Hedgecock; and S. Hammelberg. 1995. Effective population size in winter-run chinook salmon. Conservation Biology. 9:615-624.

National Marine Fisheries Service, 1993. Biological Opinion for the operation of the Federal Central Valley Project and the California State Water Project. National Marine Fisheries Service, Southwest Region, Long Beach, California.

National Marine Fisheries Service. 1997a. Proposed recovery plan for the Sacramento River winter-run chinook salmon. National Marine Fisheries Service, Southwest Region, Long Beach, California.

National Marine Fisheries Service. 1997b. Environmental Assessment for National Marine Fisheries Service issuance of an enhancement permit to the U.S. Fish and Wildlife Service under Section 10 (a)(l)(A) of the Endangered Species Act. National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Maryland.

U. S. Bureau of Reclamation. 1988. Cooperative Agreement among California Department of Fish and Game, U. S. Bureau of Reclamation, National Marine Fisheries Service, and U.S. Fish and Wildlife Service to implement actions to benefit winter-run chinook salmon in the Sacramento River Basin. U.S. Bureau of Reclamation, Mid-Pacific Regional Office, Sacramento, California.

LETTERS OF COMMENT AND RESPONSES

Ann Manji, Environmental Specialist, California Regional Water Quality Control Board

1. Advice appreciated. **A** Section 10 permit would not be required under the preferred alternative because no obstruction would be placed in the river, although a permit might be required for one or more of the other alternatives.

2. **No** immediate need for permits is anticipated because we do not plan to use malachite or other chemicals that would require permits during the initial operation of the facility. However, the Service would contact the Regional Water Quality Control Board concerning waste discharge requirements under Section 13260 to ensure we are in compliance.

Richard Elliott, Regional Manager, California Department of Fish and Game

1. Change in terminology made.

2. Mention of the waste discharge requirment has been added to the section on water quality.

Edward Roman, Senior Power Contracts Specialist, SMUD

1. The title has been changed to delete any reference to time, but the intent is unchanged. This is to be a "temporary" or "interim " facility that operates until the species has recovered sufficiently or become extinct.

2. References to water and power users have been added.

3. Thank you. The typo has been corrected.

4. A rough cost estimate has been added to the discussion on page 8.

5. The text was reworded to remove emphasis for the loss of prior monetary investment because the decisive factor is the loss of the program and the expertise accumulated, not the expenditures themselves.

6. Areal data have been added to the text.

7. Cost data have been added as a new Table 1.

8. Discusssions of the impacts of loss of power production from the diversion of 1,600 af water/year out of the penstocks have been added to the **EA** and FONSI.

9. Yes. That is done in the Shasta left bank alternative.

10. The text associated with Table 2 has been amended to make it clear that the Shasta right

bank alternative will have no pumping costs and therefore has a lower O&M cost.

11. The discussion has been modified to give some costs data for both rates. The cost to the taxpayer is indeed the market rate whether the energy cost occurs as a pumping cost or as a loss of power generation. We chose to use the "project power" rate, which is our cost of power production for comparison purposes simply because that cost is more stable than market rates which vary in response to many factors. The essential element is to use consistent data and we simply used the rate which was easiest to define. At this time, the true cost of the power consumed or not generated can be obtained by doubling the values given.

12. The text has been amended to clarify the relatively minor role of this consideration. At either the Keswick or the Shasta left bank sites, only storage yards with construction materials and mobile equipment would need to be relocated. No large pieces of fixed equipment such as transformers would be involved at either site altough use or expansion of existing buildings might be impacted at Keswick.

Nannette Engelbrite, Electrical Engineer, Western Area Power Administration

1. Yes, this replaces the earlier draft EA and that is now mentioned in the text

2. It will be a joint decision. As with Coleman National Fish Hatchery, Reclamation will build the facility and at this time anticipates ultimately paying for its O&M, but the Service will operate it.

3. Mention has been made that the NMFS and DFG have been consulted and their input will be taken into account in the decision. However, neither of them is formally a part of this decision. NMFS, however, was responsible for the decision to permit the programs this facility will serve, so NMFS has made the decision of whether to take conduct these programs, Reclamation and Service will simply decide on where to conduct them.

4. The Section has been rewritten. The need is to supplement the spawning of the winter-run using water that will cause them to imprint on, and return to, suitable habitat. The purpose is find a suitable means/site for filling that need.

5. Clarification added.

6. Comment noted. Thank you.

Kristin Arkush, Bodega Marine Laboratory

1. We have attempted to catch all inconsistencies.

2. Correction made.

3. Text altered.

4. Again, we have attempted to be consistent in the revision.

5. The text has been modified to indicate that supplementation has been reduced not wholly stopped.

6. Typo has been removed.

7. Corrections made.

8. Text altered.

9. Arithmetic has been rechecked and corrections made. Note we have used a consistent 20% contingency rather than the inadvertant mix of 10% and 15% used before. Conclusions are unchanged by this as the effects don't affect the relative costs among alternatives.

10. Correction made.

11. The statement has been modified.

12. The statement has been modified.

13. The text has been amended to reflect the potential for freshwater studies to be conducted at other locations.

14. The text has been modified to reflect that the simplified logistics are a function of fish transport. As in the section mentioned in the prior comment, the EA touched on matters under the purview of the Captive Broodstock Committee, about which the experts disagree, that are not critical to the subject of this EA. The text therefore has been amended to avoid mention of them.

15-19. The typos have been corrected.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

4 15 Knollcrest Drive
Redding, CA 96002
Phone (9 16) 224-4845
FAX (224) 224-4857

Cd/EPA

Pete Wilson. Govenor

10 September 1997

Mr. Daniel Free
US Fish and Wildlife Service
Coleman National Fish Hatchery
24411 Coleman Fish Hatchery Road
Anderson, CA 96007

DRAFT ENVIRONMENTAL ASSESSMENT, INTERIM WINTER-RUN CHINOOK SALMON **SUPPLEMENTAL SPAWNING AND** REARING FACILITY, REDDING, SHASTA COUNTY

We have reviewed the draft Environmental Assessment for the subject project and have the following comments:

If a Section 10 US Army Corps permit is required for any portion of the project, the project proponent will also have to apply for a Section 401 Water Quality Certification from the State Water Resources Control Board. To apply for certification the proponent must submit a project description along with a five hundred dollar ($500) application fee to the Redding Regional Board office.

The size of the proposed facility is below the threshold (20,000 pounds of cold water fish species reared annually) requiring regulation under a National Pollution Discharge Elimination System (NPDES) permit as a concentrated aquatic animal production facility. However, the Regional Board still has the authority to regulate discharges from the proposed facility under waste discharge requirements pursuant **to the** California Water Code (CWC). Section 13260 of the CWC requires any person proposing to discharge waste which could affect the quality of waters of the state to submit a report of the discharge to the appropriate Regional Board. The Regional Board then determines whether or not issuance of waste discharge requirements is appropriate. To facilitate this process, a Form 200 is enclosed for your reference. Of particular importance in evaluating the subject discharge is the type and amount of chemical additives (for disease prevention, growth enhancement, etc.) which could become part of the facility's waste stream.

If you have any questions, please contact me at (9 16) 224-4788 or the address above.

Ann L. Manji
Environmental Specialist

cc: Bureau of Reclamation, Shasta Dam, City of Shasta Lake

STATE OF CALIFORNIA-THE RESOURCES AGENCY PETE WILSON, Govenor

DEPARTMENT OF FISH AND GAME
601 LOCUST STREET
REDOING. CA 96001
(916) 225-2300

September 1 I, 1997

Mr. Thomas Nelson, Hatchery Manager
Coleman National Fish Hatchery
24411 Coleman Fish Hatchery Road
Anderson, California 96007

Dear Mr. Nelson:

The Department of Fish and Game (Department) concurs with the proposed action and the expanded environmental analysis presented in the draft environmental assessment for 'Establishment of an Interim Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility Using Sacramento River WateP. The proposed facility at Shasta Dam is needed to attain the goal of supplementing the natural population of winter-run chinook on the Sacramento River.

We believe that the water source at the Shasta Dam site (penstock or tailrace water) provides the best and most reliable water supply for the safe rearing of artificially propagated winter-run chinook salmon. The location of the facility should also ensure the successful imprinting of juvenile winter-run chinook salmon reared and subsequently released in the upper Sacramento River. The proposed facility is consistent with the supplemental propagation and captive broodstock recommendations found in the National Marine Fisheries Service proposed recovery plan for the Sacramento River winter-run chinook salmon.

The Department continues to be actively involved in the winter-run chinook salmon captive broodstock program and will continue to participate in meetings concerning the supplemental spawning and rearing facility for winter-run chinook salmon at Shasta Dam.

Attached for consideration during preparation of the final document are two minor clarifications. If there are any questions regarding our comments, please contact Environmental Specialist Hany Rectenwald at (916) 225-2368.

Sincere-

Richard L. Elliott FOR
Regional Manager

Attachment

CC: Mr. Harry Rectenwald
Department of Fish and Game
Redding, California

ATTACHMENT FOR DRAFT ENVIRONMENTAL ANALYSIS

(1) Page 27, Paragraph 1, Sentence 1: California In-Water Work Permit should be a streambed alteration agreement with the Department of Fish and Game. This is an agreement (not a permit) that can be expedited through a 3O-day process. The Section 10 US Army Corps of Engineers (Corps) permit is a discretionary permit that can only be expedited by the Corps and the reviewing agencies of which the Department of Fish and Game is one of many. The proposed action using the penstock as the water source is outside of the jurisdiction of the Corps. The installation of the pumps in the tailrace may come under one of the many nationwide permits that constitute an expedited process.

(2) Page 27, Paragraph 4, Sentence 3: Further explanation is needed. Although, a national permit will not be required, the project still requires coordination with and action by the Central Valley Regional Water Quality Control Board (CVRWQCB). **The projected fish production** and chemical usage (no malachite) at the facility will be below the level that requires a National Pollutant Discharge Permit (20,000 pounds of fish annually). However, the facility will need to apply for a State Waste Discharge Requirement from the CVRWQCB and may receive either a permit or permit waiver at the discretion of the CVRWQCB.

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
f? 0. Box 15830, Sacramento CA 95852-1830, (916) 452-3211
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

PC 97-2 11

September 11, 1997

Mr. Daniel Free
U.S. Fish and Wildlife Service
Coleman National Fish Hatchery
24411 Coleman Fish Hatchery Road
Anderson, California 96007

Subject: **Draft Environmental** *Assessment* - **Interim Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility Using Sacramento River Water**

Dear Mr. Free:

As the single largest Preference Power Customer of the Central Valley Project (CVP) and a large contributor to the Central Valley Project Improvement Act (CVPIA) Restoration Fund, SMUD has a direct interest in the how the CVPIA Restoration Fund moneys are used to further the goals of the CVPIA, and in any project(s) that will require the use of additional **project** power. To this end, SMUD offers the following comments on the draft Environmental Assessment (EA) for the Interim Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility Using Sacramento River Water to assist the U.S. Fish & Wildlife Service (Service) in balancing the interests of the various stakeholders.

Title of the EA

(1) The term "Interim" is used as part of the title, yet the document states that the facilities are expected to have 15-20 year life. Use of "Interim" may be therefore inappropriate.

(2) In the draft "Finding of No Significant Impact (FONSI)", a list of six items are presented on which the FONSI is based in part. It is noteworthy that no statement is made as to the presence or absence of impacts to the CVP Water and Power Customers. SMSJD encourages that an appropriate statement referencing the impacts to the CVP Water and Power Customers be included.

Purpose and Need for the Action (page 6)

(3) **The** last sentence of this section references the ". ..next breeding cycle (early 1988) . .." It is assumed that the intended date is 1998.

Proposed Action and the Action Alternatives
Subsection: Alternatives Eliminated from Further Consideration
Under the part describing the Pining of Sacramento River Water to CNFH (page 7)
It would be helpful, if the EA provided the length, diameter, and estimated cost of the pipeline system required under this scenario.

Subsection: Alternative 1: No-Action Alternative (page 7)
(5) At the end of the fourth sentence in this subsection, the following words are used "...resulting in a loss of value of sunk funds." The use of this type of argument lacks substance. It would be helpful to state, in the EA, the quantity of lost value. Without such information, the justification of additional "ratchet spending" to support previous "sunk costs" is very weak.

Subsection: Alternative 2: Proposed Action - Winter-Run Rearing Facility on the Right Bank at Shasta Dam
Pane 8 - Second Paragraph
(6) What is the size of the proposed (Reclamation-owned) site? The last sentence of this paragraph states that the "[t]he construction costs [for Alternative 2] would be higher than those projected for Alternative 3, but would be offset by the lower operations and maintenance (O&M) costs over the 15-20 year expected life of the project; giving equivalent lifetime costs for the two alternatives." (7) Since the EA does not provided a breakdown of costs for either the construction or the O&M requirements for Alternative 2 (as was provided for Alternative 3), such a statement can only be taken on faith. SMUD strongly recommends that the cost breakdown for Alternate 3 be provided in the EA, allowing a side-by-side comparison of both construction and O&M costs.

Page 8 - Third Paragraph
(8) What is the impact to the power production at Shasta Power Plant if "[t]he water supply for the proposed rearing facility [is] Sacramento River water taken from the penstocks at the 850 foot level? (9) Could the supply water be taken from the end of the tailrace, after it passes through the power-generation turbiies?

Page 12 - Table 2
(10) The second sentence at the top of page 12 states "[e]stimates in this table [for Alternate 3] are generated specifically for **a** facility at Shasta Dam, but would be approximately the same for other alternatives..." This statement is in conflict with the statement on page 8 (see Page 8 - Second Paragraph above), which implies that the O&M costs for Alternate 2 are lower than those for Alternate 3. What are the estimate O&M costs for Alternate 2? Footnote No. 3 to Table 2, states that "[u]tilities includes phone and electricity at the Project Power rate of $0.02/k These are only costs to produce power[;] loss of foregone power 'sales' would be higher. About $13,000 of (11) the original costs would be for pumping." It is important to actually state in the EA an estimated dollar impact to the Power Customers; today's Dow Jones California-Oregon Border Electricity Price Index for Firm On-Peak power is $43.45/MWh or more than $0.04/kWh. Hence, though the EA does recognize that the loss of foregone power 'sales' would be higher, today's replacement power cost is more than twice what is shown for the project power rate. Therefore, it is important to state in the EA a dollar impact value, to the Power Customers, that will result from lost

generation due to bypassed water, or the actual Project Power requirements for pumping and other proposed facility loads.

Alternate 5 - Construction and Operation of a Facility at Keswick Dam (page 16)
Approximately halfway through the second paragraph, the EA states ". . . but would require that the existing equipment and material storage be relocated by Reclamation." The EA should state the environmental impacts, if any, that will result from the relocation of the existing equipment and material. The costs to relocate equipment and manpower should also be shown.

Overall, given the above comments and the need for the EA to address them, SMUD supports the proposed facilities. However, having the complete cost breakdown information for Alternative 2 and the estimate dollar impact to the Power Customers, would ensure that the Proposed Action is the correct choice.

SMUD appreciates the opportunity to provide these comments on the Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility and encourages the U.S. Fish & Wildlife Service to continue to work with all interested Stakeholders, to reach a solution in the near-term that will provide not only an effective way to operate the Coleman National Fish Hatchery and this supplemental unit, but one that will ultimately provide an opportunity for the development of natural anadromous fish habitats and populations, in a cost-efficient way.

Please contact me if you have any questions pursuant to this letter. I can be reached at phone number (916) 7324667, or e-mail address eroman@smud.org.

Sincerely,

Edward J. Roman

Edward J. Roman"
Senior Power Contracts Specialist

cc: Nannette Engelbrite, WAPA
Barry Moxtimeyer, R.W. Beck
Hari Modi, NCPA
Jeff Phipps

September **11, 1997**

Mr. Buford Holt
U.S. Bureau of Reclamation
North Area Office
Shasta Dam, CA

1

Dear Mr. Holt:

The following are comments prepared by the Western Area Power Administration (Western) on the Environmental Assessment (EA) entitled Establishment of an Interim Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility Using Sacramento River Water. Western would like to commend both the U.S. Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (Service) on a well-written and concise document. The context of our comments are mostly editorial and we feel their inclusion in the final environmental document will only strengthen the final EA.

1. Should the "first" environmental assessment prepared for the Acquisition Rehabilitation and Operation of Buckhorn Fish Hatchery be discussed? What happened to it? Was it rescinded? Does this EA replace it?

2. What are the roles of the Service and Reclamation? What agency is the decision maker? Which has the major Federal action? Which is the lead? Both? We believe a few lines discussing what the decision is and which agency is implementing the decision would be helpful.

3. Does the California Department of Fish and Game and/or the National Marine Fisheries Service play roles in either the decision process or the implementation of the fmal decision? If so, please add a few sentences outlining their respective roles. Are there any additional agencies that may play a role in the decision process or the implementation of the decision?

4. Purpose and Need For The Action We believe you may have these reversed. The need is defined as the 'problem" or the why. The purpose is the what or how. In other words, the need is to solve the problem of not being able to have a successful imprinting program for the winter-run chinook salmon. The purpose is to find a site for a temporary rearing facility that uses Sacramento River water.

5. The map on page 9 should have a legend that specifically tells the reader that Number **1** is the location of the No-Action Alternative, Number 2 is the Facility located on the Right of Side of Shasta, etc.

6. The criteria for Evaluation of Alternatives are a vital part of defining the important issues for the decision maker such that an informed decision can be made. The criteria developed are suscint and well thought out. Western would like to suggest that both agencies continue this method of evaluation in future environmental documents.

Western appreciates the opportunity to comment on the EA prepared for this important project. Should you have any questions regarding our comments, please do not hesitate to call. I may be reached at (916) 353-4534.

Sincerely,

signed by

P. Nannette Engelbrite
ElectricalEngineer

Draft environmental assessment: "Establishment of an Interim Winter-Run Chinook Salmon Supplemental Spawning and Rearing Facility Using Sacramento River Water"

Comments:

1. Throughout the text, need to be consistent in use of capitalization with "winter-run chinook salmon" - often presented as "winter-run Chinook salmon". The former is correct.

2. Please use UC Bodega Marine Laboratory (not "Bodega Bay Marine Laboratories").

3. Page 5, line 31: How can the captive broodstock and supplementation programs comply with current and FUTURE permits? Perhaps best to eliminate the word "future".

4. Page 6, line 7: broodstock or brood stock? Need to be consistent throughout document.

5. Page 6, line 17: The statement, "left the natural spawning population unsupplemented for that period" is not true. Captive by captive crosses made at BML and reared at CNFH were released in early 1997 and will likely be released following the recent spawning season at BML.

6. Page 15, line 10: Delete the word "include".

7. Page 15: The four underlined statements should all be followed by a period, not a semi-colon.

8. Page 16, line 10: Delete "as desire".

9. Table 4, item (1) at the bottom: Not clear how you reach the total of $442,070. If you use the subtotal of $376,070 + $61,060 = $457,130 + 10% contingency of that ($43,713), the total is $480,843. Or, if you add $413,680 + $61,060, the total is $474,740.

10. Page 18, line 24: Delete the word "include".

11. Page 19, line 14: Unclear on "lack of freshwater component". BML has fresh water capability (all spawning fish and fertilized eggs reared in fresh water).

12. Page 19, line 16: "There is also no opportunity to expand the facilities to accommodate any expansion of the winter-run program or any new programs implemented pursuant to potential listing of other stocks of anadromous fish..." (detailed further on page 22). I think it is very dangerous to make a case for the use of a winter-run chinook salmon hatchery/rearing facility as a rearing station for other stocks, and might negatively impact the chances of securing funds to support the satellite facility for its original, intended purpose.

13. Page 20, line 17: "It is also desirable to retain a portion of the captive broodstock in fresh water...". If this is true, why did the Technical Subcommittee reject my proposal to rear captive by captive fish in fresh water to determine the potential benefits of removing salt water residence (and the losses associated with failure to smolt)? Specifically, Scott Hamelberg had concerns with

this issue.

14. Page 20, line 22: "Logistics associated with handling various family groups and genetics experiments would be greatly improved". How? Genetic experimentation is going on at BML currently, with no formal participation by the supplementation program. How would increased holding capacity at a satellite facility enhance this work?

15. Page 26, line 1: Delete the "d" in "and". Should read, "...associated with AN environmental event".

16. Page 27, line 7: "Riparian vegetation at, but...." This is not a sentence.

17. Page 27, line 16: Should read ".. primary chinook salmon spawning stream...", not "salmon chinook".

18. Page 28, line 31: "Adults emerge from stems or trucks..." Perhaps you mean "trunks"?

19. Page 29, line 11: Should read, "...confined to AN area...".