Summary Information

US Fish and Wildlife Service

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Amount sought: $2,282,630

Duration: 36 months

Lead investigator: Mr. Tom Kisanuki, USFWS/Red Bluff Fish and Wildlife Office

Short Description

Rotary−screw traps at Red Bluff Diversion Dam (RBDD) have provided estimates of abundance and outmigration timing of downstream migrating salmonids since 1994. The primary objective of this project is to obtain juvenile winter Chinook production indices and to correlate these indices with estimated escapement from adult counts at RBDD and the winter−run carcass survey.

Executive Summary

EXECUTIVE SUMMARY

Rotary−screw traps at Red Bluff Diversion Dam (RBDD) have provided estimates of abundance and outmigration timing of downstream migrating salmonids since 1994. The Dam, located at river kilometer 391 on the Sacramento River about 4 kilometers southeast of the city of Red Bluff, has proven to be an ideal site for winter−run monitoring for multiple reasons. First, the winter Chinook spawning grounds lie almost exclusively above the dam. Secondly, multiple traps can be attached to the dam and fished simultaneously within a transect across the river. Furthermore, the structures around RBDD control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile abundance within and between years, and for developing a time invariant trap efficiency model. The model and quantitative methodologies were developed to estimate numbers of outmigrants passing RBDD while decreasing the program's reliance on and need for experimental fish, thereby minimizing impacts on Threatened and Endangered species. These methodologies have been independently reviewed by biological statisticians. The primary objective of this project is to obtain juvenile winter Chinook production indices and to correlate these indices with estimated escapement from adult counts at RBDD and the winter−run carcass survey.

Winter−run were formally listed as endangered in 1994 in response to the continued decline and threats to the population. Since listing, numerous protective measures have been implemented in an attempt to protect winter−run, including managing water exports by the Central Valley Project (CVP) and State Water Project (SWP) from the Sacramento−San Joaquin Delta. The CVP and SWP are authorized by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) for incidental take of winter Chinook, not to exceed two percent of the estimated number of juveniles entering the Delta. Number of juveniles entering the Delta is based on a NOAA Fisheries juvenile production estimate (JPE). This estimate is derived from a production model that uses adult winter−run escapement as the primary variate. Historically, adult escapement was derived from estimated adult passage through fish ladders at RBDD. Since 1996, escapement estimates have been derived from the winter Chinook carcass survey.

In−river estimates of juvenile production (JPI), based on rotary−trap information, have been found to be correlated to JPE's in trend (r2 = 0.849); however, fish ladder JPE's were not supportive of JPI's with respect to the magnitude of fry−equivalent production values (P = 0.009, df = 5). Furthermore, it appears that fish ladder JPE's consistently underestimate juvenile production, relative to JPI's and carcass survey JPE's. Historically, rotary−screw trap JPI's and carcass survey JPE's have been strongly correlated. Data from 2002 and 2003 continue to support this finding. We have concluded that the JPE model produces a more robust estimate of juvenile winter Chinook production using carcass survey data rather than fish ladder data from RBDD.

The JPI’s when compared to JPE’s based on adult escapement, will allow resource managers to make decisions based on scientifically sound and less tenuous data. Further, the monitoring program gives insight towards the hypothesis that current and future implementation of Anadromous Fish Restoration Program, Central Valley Project Improvement Act, CALFED or other restoration program actions in the upper Sacramento River are resulting in a measurable and scientifically defensible increase in abundance of endangered winter Chinook salmon. This monitoring is therefore in direct support of CALFED ERP Goal 1 − recovery of at−risk species.

A. Project Description: Project Goals and Scope of Work

1. Problem, Goals and Objectives

The Sacramento River system is unique in the fact that it alone supports four seasonal runs of Chinook salmon *Oncorhynchus tshawytscha*. Named for the time the majority of adults enter freshwater on their spawning migration, these four runs include the fall, late-fall, winter, and spring Chinook salmon. Steelhead trout *Oncorhynchus mykiss* is another indigenous salmonid in the system. Populations of all four runs of Chinook salmon, and steelhead trout, have declined in the last 25 years. The most remarkable has been the winter-run Chinook which have declined from a high count of almost 118,000 in 1969 to a low of 189 in 1994.

Historically, winter run utilized spring-fed streams that provided coldwater flows for summertime spawning, incubation, and rearing (Yoshiyama et al. 1998). Most of their historical habitat occurred in the upper Sacramento River drainage where cold-water conditions prevailed year-round from glacier and snow melt from Mount Shasta and Mount Lassen, and from cold-water springs. During the early part of the 20th Century, numerous small dams were built in the upper Sacramento River and its tributaries which began reducing the reproductive potential of winter-run Chinook (NMFS 1996). With the construction of Shasta Dam on the Sacramento River in 1943, winter-run Chinook were blocked from reaching their historical spawning grounds on the Little Sacramento, Pit, McCloud, and Fall Rivers (Yoshiyama et al. 1998). Fortunately, water discharged from Shasta Lake after 1944 was sufficiently cool to allow for reproductive success in the Sacramento River in areas that had not historically supported winter-run production. Winter-run populations rebounded during the first two decades following completion of the dam because the continuous cold-water releases mimicked the necessary summertime flow conditions for winter-run production (Yoshiyama et al. 1998). However, winter-run populations started a steady and precipitous decline during the subsequent two decades, due in part, to the operations at Shasta Dam episodically supplying water with temperatures needed for successful egg incubation (NMFS 1997). Construction and operation of Red Bluff Diversion Dam (RBDD) in 1967 created another impediment to winter-run migration and survival in the main stem Sacramento River (Figure 1). Up to 40% of winter-run encountering the dam during gates-in operation were blocked, and those passing upstream were delayed on average 13 days (Vogel et al. 1988). Adults blocked by the dam were forced to spawn downstream in areas where water temperatures were frequently too high for successful egg incubation (NMFS 1997). Winter-run populations declined by almost 99% from 1966 to 1991 despite conservation measures to improve habitat and spawning conditions. Winter-run were formally listed as a threatened species in 1989 and reclassified as endangered in 1994 in response to the continued decline and continued threats to the population (NMFS 1997).

Since listing, numerous protective measures have been implemented in an attempt to protect winter Chinook, including managing water exports by the Central Valley Project (CVP) and State Water Project (SWP) from the Sacramento-San Joaquin Delta (Delta). The CVP and SWP are authorized by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) for incidental take of winter Chinook, not to exceed two percent of the estimated number of juveniles entering the Delta (CDFG 1996). The number of juveniles entering the Delta is based on a NOAA Fisheries production model. The model generates a juvenile production estimate (JPE) using estimated adult escapement as the primary variate. Historically, adult escapement was derived from estimated adult passage through fish ladders at RBDD (Diaz-

Soltero 1995, 1997; Lecky 1998, 1999, 2000). Since 1996, escapement estimates have been derived from the winter Chinook carcass survey (McInnis 2002).

In-river estimates of juvenile production, based on rotary-screw trap sampling at RBDD by the Red Bluff Fish and Wildlife Office (RBFWO) from 1995-1999, were found to be moderately correlated in trend to fish ladder JPE's (r^2 = 0.566, df = 4). Remarkably, the correlation was greatly improved (r^2 = 0.820, df = 5) with the addition of data from 2002 (Gaines and Poytress 2003). Data from 2003 was also supportive of this stronger relationship (Gaines and Poytress 2004), slightly improving r^2 from 0.820 to 0.849 (Figure 2a & b). However, fish ladder JPE's were not supportive of JPI's with respect to the magnitude of fry-equivalent production values (P = 0.009, df = 5). Furthermore, it appears that fish ladder JPE's consistently underestimate juvenile production, relative to JPI's and carcass survey JPE's (Table 1). Historically, rotary-screw trap JPI's and carcass survey JPE's have been strongly correlated. Moreover, significant differences in the magnitude of JPI's and carcass survey JPE's were not detected. Data from 2003 strongly support this finding. The reader should be cautioned that our conclusions are based on small sample sizes in both the carcass survey (N = 6) and fish ladder (N = 7) comparisons between JPI's and JPE's. We have concluded that the JPE model produces a more robust estimate of juvenile winter Chinook production using carcass survey data rather than fish ladder data from RBDD.

Many factors are expected to influence juvenile production on a year-to-year basis while others may be year specific depending on environmental and/or anthropogenic-induced conditions. At present, the JPE does not account for factors such as inter-year variations in survival to emergence, fry to pre-smolt/smolt survival (Botsford and Brittnacher 1998), fecundity (Healy and Heard 1983), environmental conditions (Bigelow 1996, Reiser and White 1988, Heming 1981); and losses due to pollution (Arkoosh 1998), degraded water quality (Bradford 1994), density dependent and/or independent factors, infectious disease (Arkoosh 1998), and behavioral patterns (e.g., adult straying and spawning in streams where temperatures become too high during egg incubation; Hallock and Fisher 1985). Resource managers will base decisions on less and more tenuous data without in-river indices monitoring the success or failure of juvenile winter-run production. Furthermore, additional investigations are needed to correlate in-river indices with estimated juvenile production to definitively demonstrate that the carcass survey is a satisfactory replacement for RBDD adult counts (NMFS 1997). Finally, juvenile salmonid abundance estimates from RBDD would also serve as a relative means to understand and monitor the effects of restoration activities conducted in the upper Sacramento River.

Rotary-screw trap sampling at RBDD has been conducted since 1994 to provide estimates of abundance and outmigration timing of downstream migrating salmonids. The Dam, located at river kilometer 391 on the Sacramento River about four kilometers southeast of the city of Red Bluff, CA, has proven to be an ideal site for juvenile winter Chinook monitoring for two primary reasons. First, the winter Chinook spawning grounds lie almost exclusively above the dam (Vogel and Marine 1991) and up to four, eight-foot diameter traps can be attached to the dam and sampled simultaneously within a transect across the river. The physical structure and operations of RBDD control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile abundance within and between years, and for developing a time invariant trap efficiency model. The model and quantitative methodologies were developed to estimate numbers of outmigrants passing RBDD while decreasing the program’s reliance on and need for experimental fish, thereby minimizing impacts on Threatened and Endangered species. These methodologies have been independently reviewed by biological statisticians. The primary objectives of this project are to (1) obtain juvenile winter Chinook production indices, (2) to correlate these indices with estimated escapement from adult counts at RBDD and the winter Chinook carcass survey, and (3) define seasonal and temporal patterns of abundance of winter Chinook passing RBDD.

2. Justification-Conceptual model

A conceptual model demonstrating the importance of this and other monitoring programs is included on page 25 (Figure 3). The model portrays the assumption that restoration actions for winter-run Chinook salmon such as those outlined and currently implemented through the Central Valley Project Improvement Act (CVPIA), Anadromous Fish Restoration Project (AFRP) and CALFED Ecosystem Restoration Programs (CALFED Programs) are designed to improve degraded habitat conditions that lead to a severely depressed winter-run salmon population. The attached conceptual model also notes the influence of the 1988 Cooperative Agreement signed between the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, NOAA Fisheries and California Department of Fish and Game to implement actions to benefit winter Chinook salmon in the Sacramento River basin. Likewise, the model portrays the Draft Recovery Plan for the Sacramento River Winter-run Chinook Salmon (NMFS 1997). Information gained from indexing juvenile winter-run production in the upper Sacramento River will contribute toward improved knowledge regarding winter Chinook salmon life-history and abundance. Furthermore, statistical comparisons between JPE's and JPI's will decrease the scientific uncertainty associated with setting incidental take limits for the CVP and SWP pumping facilities, and allow resource managers to make more informed decisions.

Implementation of restoration actions are designed to reduce stressors and restore and enhance habitat conditions. However, it is only through extensive field monitoring activities such as that outlined in this proposal that will allow for an informed adaptive management decision making process. Estimates of abundance derived from the juvenile monitoring program and other intensive surveys such as the Sacramento River winter-run Chinook salmon carcass survey are useful for monitoring the cumulative effects of recovery actions and in the future, long-term continuous survey data may be used for evaluating whether doubling goals or delisting criteria are achieved.

2. Justification Continued-Hypotheses being tested

The rotary-trap juvenile production index (JPI) has been and will be used to track NOAA Fisheries juvenile production estimate (JPE). Juvenile production estimates derived from effective spawner populations based on the RBDD adult ladder counts (RBDD JPE) and carcass survey (Carcass JPE) will be used for comparisons with in-river estimates of juvenile abundance. The hypotheses being tested are:

H_{o1} : RBDD JPE does not differ from in-river estimates of juvenile abundance (JPI)
H_{a1} : RBDD JPE differs from in-river estimates of juvenile abundance (JPI)

H_{o2} : Carcass JPE does not differ from in-river estimates of juvenile abundance (JPI)
H_{a2} : Carcass JPE differs from in-river estimates of juvenile abundance (JPI)

A paired *t*-test will be used for testing significant differences using years as replicates. We currently have seven data points with the RBDD JPE and six with the Carcass JPE. Within-year evaluations will be made by comparing the JPE with the JPI, and determining whether the JPE falls within the confidence intervals about the JPI.

Moreover, information collected from juvenile winter Chinook outmigrant monitoring provides a relative mean to assess the effect of restoration actions implemented by the AFRP, CVPIA and CALFED Programs. It is expected that restoration actions implemented by these programs will have a positive net effect on juvenile production. The JPI and associated confidence intervals from the Red Bluff program should be used for evaluating inter-year trends in juvenile winter-run abundance.

3. Previously Funded Monitoring

Juvenile winter Chinook monitoring activities at RBDD were funded by CALFED for a three-year period from October 2001 through September 2004 (Project # ERP-01-N44). An amendment to the original contract was submitted during December 2003 which allowed the field sampling program work to continue without loss of data continuity, from October 1, 2004 to June 30, 2005. A second amendment request to continue sampling from July 1, 2005 to June 30, 2006 was submitted to CALFED in October 2004 and is currently being reviewed. The second amendment request is to allow field sampling to continue without a loss of data continuity until the 2004 Monitoring and Evaluation Proposal Solicitation Package request can be addressed.

Presently, sampling is scheduled for year-round operations. Field sampling has been continuous, but was initially delayed while ten Fishery Biologists and Biological Science Technicians were hired to provide project management and to perform field sampling. Limited field sampling began in April 2002 and sampling effort increased as the project met full staffing levels. Once sufficient staff was hired, the project progressed as scheduled. At the time of this request submittal, we are currently in our third year of field sampling activities. Quarterly reports have been completed and are up to date. The first and second Progress Reports have been submitted to the National Fish and Wildlife Foundation (NFWF).

RBFWO personnel have presented the results of this project at the recent CALFED 2004 Science Conference, at numerous professional society meetings, and at numerous technical group meetings. In addition, principals of this project have submitted manuscripts for publication in peer-reviewed journals. We will also continue to work with CALFED staff to disseminate this important information at future meetings and professional conclaves.

Fishery management agencies understand the importance of this program's data contributions, and continue to support this program as a long-term monitoring operation. Water management agencies also use our real-time information for planning purposes (CALFED DAT/WOMT process) to allocate Environmental Water Account (EWA) and other assets to protect emigrating winter Chinook.

4. Proposed Approach and Scope of Work

Location and/or Geographic Boundaries of the Project.—The RBDD is located at river kilometer 391 on the Sacramento River about 4 kilometers southeast of the city of Red Bluff in Tehama County, CA. The dam was completed in 1964 and began operation in 1966 (Liston and Johnson 1992). The purpose of the dam is to divert water into the Tehama-Colusa and Corning Canal system, for agriculture and wildlife refuges. The dam consists of eleven moveable gates which can be raised or lowered to impound and divert river flows into the canal. For 20 years the dam gates remained closed year-round, until winter of 1986 when gates were raised during the non-irrigation season (September 15th to May 15th the following year) to improve upstream fish passage.

The spawning grounds for winter Chinook salmon occur almost exclusively upstream from RBDD and within the main stem Sacramento River (Vogel and Marine 1991). RBDD is an ideal rotary-screw trap location because multiple traps can be attached to the dam and fished simultaneously within a transect across the river. The structures around the dam control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile production between years.

Approach-Task 1

Rotary trapping.—Four 2.4-m diameter rotary-screw traps, attached directly to RBDD, will be used to index abundance of juvenile winter Chinook salmon out-migrating from the upper river. Rotary-traps will be fished in river margin (east and west river-margins) and mid-channel (east and west mid-channels) habitats. Traps will be positioned within these spatial zones unless sampling equipment fails, river depths become too shallow (i.e., < 1.2 m), or river hydrology restricts our ability to fish all traps (e.g., flood conditions or water velocity < 0.6 m/s). Rotary-traps will be fished continuously throughout 24-hour periods, except during high-flow events and periods of high winter-run Chinook abundance. During these periods, rotary-traps will be structurally modified to sample one-half their normal sampling capacity or random periods will be sampled by stratifying between day and night, and fishing one of four non-overlapping periods within each strata. Estimates will be extrapolated to periods not fished by dividing catch by the sample-period selection probability.

Data will be collected for each trap clearing and include: (1) length of time trap was fished, (2) water velocity immediately in front of cone at depth 61 cm, (3) number of cone rotations during the sampling period, (4) depth of cone submerged, (5) debris type and amount, (6) captured fish identification, enumeration and fork length and, (7) environmental conditions including water and air temperatures, and water turbidity. Run of Chinook salmon will be designated using length-at-date criteria developed by Greene[1] (1992). Water velocity will be measured using a General Oceanic® Model 2030 flow torpedo. Water samples will be taken to measure turbidity and will be analyzed in the laboratory using a Model 2100A Hach® Turbidimeter. Volumes of water sampled (or sieved) by rotary-traps will be estimated from the (1) area of the cone submerged, (2) average velocity of water entering the cone, and (3) duration of the sample. River discharge (Q) will be obtained from the California Data Exchange Center's Bend Bridge river gauge. The percent of water volume sampled ($\%Q$) passing RBDD will be estimated by the ratio of water volume sampled to total Q passing RBDD. All sample data collected from this project will be double error checked, using printed hard copies, as part of the quality control and quality assurance program.

Trap efficiency.—Fish will be marked with fluorescent spray dye (Phinney 1967) and/or bismark brown stain (Mundie and Traber 1983). Fish marked for trap efficiency trials will be held for 24 hours before being released 4 km upstream from RBDD. It will be assumed that negligible mark-induced mortality will occur following the 24-hour holding period (Gaines and Martin, in press). Several release strategies will be investigated including: (1) hatchery and wild

[1] Generated by Sheila Greene, California Department of Water Resources, Environmental Services Office, Sacramento (May 8, 1992) from a table developed by Frank Fisher, California Department of Fish and Game, Inland Fisheries Branch, Red Bluff (revised February 2, 1992). Fork lengths with overlapping run assignments are placed with the latter spawning run.

stock releases (Roper and Scarnecchia 1999); (2) diurnal (sunrise) and nocturnal (sunset) releases; (3) newly emerged (median length < 45mm), pre-smolt (45mm ≤ median length ≤ 80mm) and smolt-sized (median length > 80 mm) releases; (4) gates-in and gates-out releases; and, (5) locations of release (4 km vs. 2 km releases).

Passage Estimates.—Winter Chinook passage will be estimated using the trap efficiency method (Thedinga et al. 1994). Trap efficiency will be determined through use of a model developed to predict daily trap efficiency (T_d). The model was developed by conducting 54 mark-recapture trials at RBDD and using *%Q* as the primary variate (Martin et al. 2001, Gaines and Poytress 2003). We have since conducted 21 additional trials. Nine of these latter trials were conducted using winter Chinook salmon in hopes of further refining the model's predictive ability for winter Chinook JPI's. Trap efficiency estimates from trials were plotted against *%Q* to develop a simple least squares regression equation (eq. 5), whereby daily trap efficiencies could be predicted.

Daily passage (P_d).— The following procedures and formulae will be used to derive daily and weekly estimates of total numbers of winter Chinook salmon passing RBDD. We defined C_{di} as catch at trap i (i=1,…,t) on day d (d=1,…,n), and X_{di} as volume sampled at trap i (i=1,…t) on day d (d=1,…n). Daily salmonid catch and water volume sampled are expressed as:

1. $$C_d = \sum_{i=1}^{t} C_{di}$$

and,

2. $$X_d = \sum_{i=1}^{t} X_{di}$$

The *%Q* will be estimated from the ratio of water volume sampled (X_d) to river discharge (Q_d) on day *d*.

3. $$\%Q_d = \frac{X_d}{Q_d}$$

Total salmonid passage will be estimated on day d (d=1,…,n) by

4. $$P_d = \frac{C_d}{T_d}$$

where,

5. $$T_d = (0.007217)(\%Q) + 0.001009$$

and, T_d = predicted trap efficiency on day d.

Weekly passage ($\hat{P}$).— Population totals for numbers of Chinook salmon passing RBDD each week will be derived from $\hat{P}_d$ where there are N days within the week:

6. $$\hat{P} = \sum_{d=1}^{n} \hat{P}_d$$

Estimated variance.—

7. $$Var(\hat{P}) = (1-\frac{n}{N})\frac{N^2}{n}s^2_{\hat{P}_d} + \frac{N}{n}\left[\sum_{d=1}^{n} Var(\hat{P}_d) + 2\sum_{i\neq j}^{n} Cov(\hat{P}_i,\hat{P}_j)\right]$$

The first term in eq. 7 is associated with sampling of days within the week.

8. $$s^2_{\hat{P}_d} = \frac{\sum_{d=1}^{n}(\hat{P}_d - \hat{\bar{P}})}{n-1}$$

The second term in eq. 7 is associated with estimating $\hat{P}_d$ within the day.

9. $$Var(\hat{P}_d) = \frac{\hat{P}_d(1-\hat{T}_d)}{\hat{T}_d} + Var(\hat{T}_d)\frac{\hat{P}_d(1-\hat{T}_d)+\hat{P}_d\hat{T}_d}{\hat{T}_d^3}$$

where,

10. $Var(\hat{T}_d) =$ error variance of the trap efficiency model

The third term in eq. 7 is associated with estimating both $\hat{P}_i$ and $\hat{P}_j$ with the same trap efficiency model.

11. $$Cov(\hat{P}_i,\hat{P}_j) = \frac{Cov(\hat{T}_i,\hat{T}_j)\hat{P}_i\hat{P}_j}{\hat{T}_i\hat{T}_j}$$

where,

12. $$Cov(\hat{T}_i,\hat{T}_j) = Var(\hat{\alpha}) + Cov(\hat{\alpha},\hat{\beta}) + x_j Cov(\hat{\alpha},\hat{\beta}) + x_i x_j Var(\hat{\beta})$$

for some $\hat{T}_i = \hat{\alpha} + \hat{\beta}x_i$

Confidence intervals will be constructed around $\hat{P}$ using eq.13.

13. $$P \pm t_{(\alpha/2;n-1)}\sqrt{\text{var}(\hat{P})}$$

Weekly JPI's will be estimated by summing $\hat{P}$ across days.

14. $$JPI = \sum_{week=1}^{7} \hat{P}$$

Yearly rotary-trap JPI's for numbers of winter Chinook emigrating out of the upper river will be estimated by summing $\hat{P}$ and confidence intervals across weeks within a brood year (July through June the following year). The quantitative methodologies for producing JPI's, described above, have received independent reviews by Dr. John Skalski, Biological Statistician, School of Fisheries, University of Washington, and Dr. Lyman McDonald, Senior Biometrician, Western EcoSystems Technology, Cheyenne, Wyoming.

Standardization.—Winter Chinook fry (≤45 mm FL) and pre-smolt/smolt (>45 mm FL) passage will be estimated from JPI by size class. Data acquired by this project indicates that the ratio of fry to pre-smolt/smolts passing RBDD is variable among years. Therefore, we standardize juvenile production by estimating a fry-equivalent JPI for among-year comparisons. Fry-equivalent JPI's are estimated by the summation of fry JPI's and a weighted pre-smolt/smolt JPI (58% fry-to-presmolt/smolt survival; Hallock undated). Rotary-trap JPI's can then be directly compared to JPE's.

Hypotheses testing.—The rotary-trap JPI has been and will be used to track NOAA Fisheries JPE. Juvenile production estimates derived from effective spawner populations based on the RBDD adult counts (RBDD JPE) and carcass survey (Carcass JPE) will be used for comparisons with in-river estimates of juvenile abundance.

Hypotheses testing using a paired *t*-test will be performed to detect significant differences between JPI's and JPE's using years as replicates. We currently have seven data points with the RBDD JPE and six with the Carcass JPE. Within-year evaluations will be made by comparing the JPE with the JPI, and determining whether the JPE falls within the confidence intervals about the JPI.

5. Feasibility

Juvenile salmonid monitoring has been an activity of the U.S. Fish and Wildlife Service in Red Bluff since 1981. These activities have made significant contributions to our understanding of the life history of rearing salmon in the upper Sacramento River from Keswick Dam to Hamilton City. Rotary-trapping at RBDD has been nearly continuous since 1994. This study was identified within the Biological Opinion for the Pilot Pumping Plant on threatened (now endangered) winter Chinook (NMFS 1993). Rotary-trapping at RBDD has amassed a considerable baseline of information including refinement of experimental procedures. The feasibility of successfully implementing this project is based on the following points:

- The spawning grounds for winter Chinook salmon occur almost exclusively upstream from RBDD.
- Based on comparisons with adult escapement, the JPI is an exceptional method for evaluating year-class strengths in juvenile winter-run abundance and for supportive evidence of estimated escapement.
- Quantitative methodologies have been independently reviewed and supported by biological statisticians.
- Red Bluff Diversion Dam is an ideal sampling location for winter-run salmon because multiple traps can be attached to the dam and sampled simultaneously within a transect across the river.

- The rotary-trapping program has complied with ESA Section 10 take limits by implementing a scientifically sound sub-sampling design (see below). This same design and trapping location allows us to sample during high flow events when other rotary-trapping programs are unable to sample.
- The structures around RBDD control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile abundance within and between years, and for developing a time invariant efficiency model.
- Researchers and resource managers in the upper river have been limited in their ability to conduct mark/recapture experiments because of increased Federal and State protections afforded to Threatened and Endangered species. The trap efficiency model and quantitative methodology have been developed to estimate numbers of outmigrants passing RBDD while decreasing the program's reliance on and need for experimental fish, thereby minimizing impacts on T&E species.

Juvenile production indices have been scrutinized in the Central Valley because of the physical constraints of sampling rotary-traps at flood stage. The quantitative methodologies and sampling design of this program allow traps to routinely fish river flows in excess of 50,000 cfs and still obtain estimates of juvenile outmigration. Monitoring during storm events will be accomplished by stratifying between day and night, and sampling one of four non-overlapping periods within each strata. Catch during sub-sampled periods will be expanded to the entire strata and extrapolated by the predicted trapping efficiency derived from the trap efficiency model. Collection of data during high-flow and rising river flows are extremely challenging; without a good sub-sampling program in place, data on juvenile outmigration during these events would be difficult if not impossible to obtain.

Monitoring projects are under strict ESA take restrictions for listed species. We would exceed our take limits during high production years if sub-sampling methodologies were not developed for monitoring during high production years. Our previous Section 10 permit expired June 30, 2001 and covered take of up to 20,000 winter Chinook with 3% incidental trap mortality. The RBFWO has applied for additional Section 10 permits for coverage of all currently listed species encountered during juvenile trapping.

Continuation of the proposed project's hypotheses testing would be contingent upon data derived from the annual U.S. Fish and Wildlife Service/California Department of Fish and Game's upper Sacramento River winter Chinook carcass survey. This survey is currently a CALFED funded collaborative effort (Project# ERP-01-N46) that is seeking renewed funding through the CALFED amendment process and through the 2004 Monitoring and Evaluation Proposal Solicitation package.

6. Expected Outcomes and Products

The RBFWO will be responsible for daily summaries produced in a biweekly report format to be sent electronically to interested parties responsible for the management and operation of the Central Valley Project, State Water Project, and Delta operations. Biweekly reports will include length-frequency distributions and daily passage estimates for winter Chinook salmon, and include graphic displays of current and previous years' estimates of passage (Task 1- 9 Month Project). Year-round funding (Task 1 & Task 2 funding) would result in biweekly reports that include estimates of passage for all four runs of salmon plus steelhead trout with graphic displays of current and previous years' JPI's.

Real-time data summaries (biweekly reports) will also be posted on the Bay-Delta and Tributaries (BDAT) website on Friday of every other week. Senior-level staff from the program will also participate in weekly Data Assessment Team (DAT) conference calls. Semi-annual progress and budgetary reports will be produced, as requested. Annual reports will be submitted detailing the previous periods monitoring and will include comparisons of the JPI to NOAA Fisheries JPE (carcass survey and RBDD ladder counts). A final report will be submitted comparing in-river estimates of production with JPE (carcass survey and RBDD adult counts), and include management recommendations addressing whether the carcass survey is a satisfactory replacement for RBDD adult counts (NMFS 1997). Further, if Task 2 is funded in addition to Task 1 the final project report would include JPI's for all four runs of salmon, steelhead trout (*O. mykiss)* and relative abundance information for lamprey (*Lampetra spp.*) and green sturgeon (*Acipenser medirostris*).

7. Data Handling, Storage and Dissemination

Standard database structures used by the Interagency Ecological Program (IEP) real-time monitoring program will continue to be used to enter, store and retrieve juvenile monitoring data. Data will continue to be made available through the IEP website via weekly data export/posting and will be electronically entered on a day-to-day basis. Data will be double error checked, using printed hard copies, as part of the quality control and quality assurance program. Data will be disseminated through a variety of means including the IEP website, biweekly reports of daily passage via email and biweekly report posting to the BDAT website, through participation in Data Assessment Team (DAT) weekly conference calls, through semi-annual and annual reports in electronic and paper formats and by formal oral presentation at technical group meetings as well as local and regional conferences (e.g. American Fisheries Society Western Division and local chapter meetings, CALFED Bay-Delta Program Science conferences).

8. Public Involvement and Outreach

Public involvement and outreach for this proposal will be accomplished primarily through the production of annual reports and through formal oral and/or poster presentations of information acquired from monitoring activities.

Additionally, we coordinate field activities and research projects with students from the Sacramento River Discovery Center (SRDC) and local school districts. The SRDC is a local non-profit resource academy where high school and college students serve as interns. Numerous students have worked with biologists from this program as "Job Shadows" to observe daily work routines in the field of fisheries management. Further, some students have been employed intermittently (weekends primarily) in the Student Temporary Employment Program by the RBFWO as a result of our participation in this local program.

9. Work Schedule

Proposed work for Task 1 (9 Month Project) would include rotary-trapping from July through March of each year to sample 99.8% (based on seven years of sample data) of winter Chinook emigrating from the upper Sacramento River past RBDD. Sampling will be conducted seven days per week. Work for Task 2 (3 Month Project) would include rotary-trapping from April through June, seven days a week. Funding of Task 1 and Task 2 would result in year-round juvenile monitoring. Although not essential for meeting the primary objectives of this proposal, the funding of Task 1 & Task 2 would result in the project's ability to produce juvenile production indices for spring, fall, and late-fall runs of Chinook salmon and steelhead trout. Additionally, important emigration information regarding lamprey and green sturgeon would be collected.

Project Year	Task 1 (9 Month Project)	Task 2 (3 Month Project)
Year 1	1 July 2006 - 31 March 2007	1 April 2007 - 30 June 2007
Year 2	1 July 2007 - 31 March 2008	1 April 2008 - 30 June 2008
Year 3	1 July 2008 - 31 March 2009	1 April 2009 - 30 June 2009

The beginning and end dates proposed above for each task respectively are estimated based on the approval of a 12 month contract amendment (Project# ERP-01-N44) that has been submitted to CALFED and is currently under review. In the event that the 12 month contract amendment does not receive approval, the requested beginning date of funding for this proposal would be January 1, 2006 to initiate hiring actions. Sampling would then be able to commence by July 1, 2006, to coincide with the onset of brood-year 2006 juvenile winter Chinook emigration.

B. Applicability to CALFED Bay-Delta Program ERP Goals, the ERP Draft Stage 1 Implementation Plan, and CVPIA Priorities

1. ERP Goals and CVPIA Priorities

This proposal addresses scientific uncertainties associated with diversion effects of the State Water Project and Central Valley Project on winter-run Chinook salmon and fishery monitoring assessments. Juvenile indices for winter-run have been generated since 1995 documenting the success of juvenile production in the upper Sacramento River. The primary objective of this project is to obtain juvenile production indices (JPI's) for winter Chinook salmon to correlate with adult escapement estimates. These JPI's have been and will be used to track the NOAA Fisheries juvenile production estimate. Juvenile production estimates derived from effective spawner populations based on the RBDD adult ladder counts and the carcass surveys will be used for comparisons with in-river estimates of juvenile abundance. These JPI's when compared to JPE's based on adult escapement, will allow resource managers to make decisions based on scientifically sound and less tenuous data. Further, the monitoring program gives insight towards the hypothesis that current and future implementation of AFRP, CVPIA, CALFED or other restoration program actions in the upper Sacramento River are resulting in a measurable and scientifically defensible increase in abundance of endangered winter Chinook salmon. This monitoring is therefore in direct support of CALFED ERP Goal 1 - recovery of at-risk species.

2. Relationship to Other Ecosystem Restoration Actions, Monitoring Programs, or System-wide Ecosystem Benefits

The Ecosystem Restoration Program Plan (ERPP) of the CALFED Program contains elements designed to restore ecological health of the Bay-Delta system. Ecosystem monitoring is identified as a critical step of the ERPP process, providing essential feedback about how the biological system responds to restoration efforts and providing a means to adjust future actions through adaptive management. The success of restoration efforts must ultimately be evaluated through measurement of population-level responses. Ecosystem Restoration Strategic Goal 1 of the CALFED Bay-Delta program places highest priority on restoring populations of at-risk ESA-listed species, such as winter Chinook salmon, which strongly affect the operation of the State Water Project and Central Valley Project diversions in the south Delta.

The data collected by this project is provided to the Interagency Ecological Program (IEP), the Bay-Delta and Tributaries website (summarized data), and the Data Assessment Team (DAT) which in turn is utilized by various groups (e.g. the spring Chinook DAT group) in their real-time information assessments and decision making. Moreover, information collected during juvenile winter, late-fall, fall, spring, and steelhead outmigrant monitoring will be used to assess the effect of restoration actions implemented by the Anadromous Fish Restoration Program, Central Valley Project Improvement Act and, CALFED programs.

Additionally, this program intimately ties into other projects requesting funding through this PSP. While this project is largely aimed at developing estimates of juvenile winter-run production in the upper Sacramento River, data obtained from a carcass survey conducted by the U.S. Fish and Wildlife Service and the California Department of Fish and Game (CALFED funded Project# ERP-01-N46) will be used to correlate numbers of adult winter Chinook returns with juvenile production. This information will help refine the NOAA Fisheries juvenile production estimate used for managing water diversions in the south Delta.

The winter-run carcass survey was initially implemented to compare and augment ladder counts at RBDD. Management decisions have been and will continue to be made using estimated escapement from RBDD adult counts until it is conclusively shown that the carcass survey is a satisfactory replacement (NMFS 1997); juvenile monitoring at Red Bluff is an important component of this evaluation. In-river production indices have been shown to be highly correlated in both trend and magnitude to the winter-run carcass survey. These trends are evident for the six years that the carcass survey has occurred; however, additional years of study are needed before final and conclusive decisions are made.

Finally, data from this program has been used for a variety of management purposes including indicators of year-class strengths, genetic sampling, and triggers for remedial measures pertaining to flow, temperature, and entrainment.

3. Additional Information for Proposals Containing Land Acquisition

Not applicable.

C. Qualifications

Red Bluff Fish and Wildlife Office (RBFWO) was established in 1978 as part of the U.S. Fish and Wildlife Service's responsibility to facilitate restoration of Pacific salmonids. The construction and operation of dams and water diversion projects and the subsequent degradation and loss of habitat have been the primary contributors to the decline of most all anadromous fish stocks in the upper Sacramento River. Specific goals of the RBFWO are to: 1) stabilize or increase the runs of anadromous salmonids in the Sacramento River system, 2) improve the effectiveness of federal fish propagation facilities in California and Nevada, 3) protect and restore the productivity of natural habitats in the Sacramento River system, and 4) continue development of information and strategies for protecting the natural habitats of the Sacramento River system as migration routes, spawning areas, and nursery areas for anadromous salmonids. The staff consists of over 50 biologists and support personnel which have working experience in the upper Sacramento River.

Project Personnel and Qualifications

James G. Smith.—Mr. Smith serves as Project Leader for the RBFWO where he is responsible for the management of over 50 biologists and support staff. Mr. Smith received a B.S. degree in Fisheries Biology from Humboldt State University in 1975 and did post-graduate studies at HSU from 1976-79. He has worked as a professional biologist for over 20 years in Oregon, Washington and California. For the past seventeen years he has been personally involved with numerous fishery studies involving salmon including fish passage investigations at RBDD, monitoring downstream migrants of juvenile salmonids, hatchery evaluation efforts at Coleman National Fish Hatchery and Livingston Stone National Fish Hatchery, and salmon spawning gravel restoration evaluation activities. The office has responsibilities that include identifying and defining factors affecting the abundance and survival of anadromous salmonids produced in the Sacramento River Basin, California. Mr. Smith works on a daily basis with numerous federal, state, and private entities in developing actions and programs for restoring, conserving, and enhancing anadromous salmonids in the upper Sacramento River.

Tom T. Kisanuki .— Since 1999, Mr. Kisanuki has served as Deputy Project Leader of the RBFWO, providing technical and administrative support to Project Leader Jim Smith on various fisheries investigations at RBDD, and is the Program Manager for the Mainstem Juvenile Monitoring Program. Mr. Kisanuki received a B.S. degree in Wildlife and Fisheries Biology from University of California at Davis (1975), and a M.S degree in Natural Resources from Humboldt State University (1980). Mr. Kisanuki has previously worked for the U.S. Forest Service, and has 20 years of experience with the U.S. Fish and Wildlife Service. Mr. Kisanuki has extensive experience conducting and directing monitoring studies in the Klamath, Trinity, and Sacramento river systems.

William R. Poytress.—Mr. Poytress serves as the Assistant Program Manager and as a Supervisory Fishery Biologist on the Mainstem Juvenile Monitoring Program. He oversees and directs the activities of up to 9 Fishery Biologists and Biological Technicians. Mr. Poytress received a B.S. degree in Environmental Studies with an emphasis in Water Resource Management and Biology from San Jose State University in 1996. He has worked as a professional biologist for 8 years primarily in California and Oregon. Mr. Poytress has worked on juvenile Chinook monitoring projects with Federal, State, and private entities in the San Francisco Bay Delta Estuary, on the Sacramento, San Joaquin, American, and Mokelumne Rivers as well as Clear Creek and Battle Creek. Since funding was originally secured through CALFED (2001), Mr. Poytress has been intimately involved with program planning, implementation and oversight. He has developed the databases used to input, store, retrieve and disseminate all sample data collected on the project, co-authored two annual project reports, and made formal oral presentations of data derived from this project at a variety of technical meetings and professional society conferences.

D. Cost

1. Budget.—The budget for this proposal can be found on the PSP's website budget form and below (Table 2). The budget reflects two tasks for funding juvenile monitoring at RBDD. Task 1 (9 Month Project) is a request for funding to obtain juvenile winter Chinook production indices and to correlate these indices with estimated escapement from adult counts at RBDD and the winter Chinook carcass survey (primary objective). Task 2 (3 Month Project), is a request to fund an additional three months of field sampling to allow for year-round monitoring. Task 1 and Task 2 funding combined would enable the program to produce juvenile production indices for spring, fall, and late-fall Chinook and steelhead trout (*O. mykiss*). Additionally, the funding of Task 1 and Task 2 would allow the collection of data regarding relative abundance of lamprey (*Lampetra spp.)* and green sturgeon (*A. medirostris*).

Funding of Task 1 and Task 2 (year-round monitoring) would result in increased costs associated with benefits (Table 2). Hiring of personnel for year-round work would require that we provide a benefit package to field crew employees. Further, costs associated with salaries and benefits are adjusted 4% annually for inflation.

2. Cost Sharing.—Not applicable

3. Long-term funding strategy.— The RBFWO will seek internal and external sources of funding to enable continuation of the juvenile Chinook monitoring program at RBDD. The Fish and Wildlife Service recognizes the importance of this monitoring program and will work both within its own organization and with the scientific community in an effort to maintain support and leverage for any reasonable sources of funding.

E. Compliance with Standard Terms and Conditions

The U.S. Fish and Wildlife Service/Red Bluff Fish and Wildlife Office has successfully entered into 7 contracts with CALFED ERP in the last 4 years. All were funded by State agencies, and managed by either DWR or NFWF. Therefore, we are confident that we will be able to work through any contracting difficulties that may arise from the potential issues listed below.

Exhibit A. - "List of Attachments" , page 3 of 3 - in reference to Exhibit B - Attachment 3 - State Travel & Per Diem Expense Guidelines. Federal employees' travel reimbursements must be in accordance with Federal travel regulations.

Exhibit B - "Invoicing and Payment Provisions", on pages 1 of 5 through 5 of 5. The requirement for invoices in triplicate cannot be complied with, nor any special format that differs from the Federal form - DI-1080 Bill for Collection.

Exhibit C - 12. Travel. As indicated above, travel reimbursement for federal employees must be in accordance with Federal travel regulations.

Exhibit D - 11. Insurance. Federal govt. is self-insured. This clause should not be applicable.

Exhibit D - 13. Prevailing Wages and Labor Compliance. Federal agencies comply with Federal wage and labor laws. The "State Labor Code Section 1771" may or may not be in conflict with federal laws.

The U.S. Fish and Wildlife Service (Service) cannot agree to a standard clause requested for State funded projects. ERP PSP Attachment 3, Exhibit B -Invoicing and Payment provisions, Section 6 Performance Retention states: "The CDFG or CBDA may withhold, from the invoiced payment amount to the Grantee, an amount equal to ten percent (10%) of that payment. Payments prior to satisfactory completion of all work required by the agreement shall not exceed, in the aggregate, ninety percent (90%) of the total earned with the balance to be paid upon satisfactory completion of the agreement. The State shall retain from the Grantee's earnings for each period for which payment is made an amount equal to ten percent (10%) of such earnings, pending satisfactory completion and acceptance by the ERP Grant Manager of all deliverables and the completion of the agreement."

The Service's authorization to enter into agreements with non-Federal entities was changed in FY2000. Our FY2000 Appropriations bill authorized the Service to enter into contracts with State agencies when advance payment to the Service is not possible. In accordance with the requirements imposed by Congress in the FY2000 Appropriations bill and report language, the Service's Director must approve a project when advance payment is not possible and certify that payments will be made in full by the State within 90 days after the Service issues an invoice.

Specifically, the 10% retention clause cannot allow timely payments for the following reasons:

1. In our Federal Financial System (FFS) accounting program, a periodic invoice (either quarterly or biannually depending on the terms of the contract) is automatically issued from our finance center based on actual expenditures of the Service on a project. Invoices include a payment due date and when payment is not received in full by that due date, the system automatically shows the unpaid balance as delinquent. Depending on how delinquent the payment is, interest, penalty and administrative charges may also accrue. With 10% retention withheld on each invoice, the 10% retention amount then causes applicable invoice record in FFS to be partly delinquent and remain delinquent until the project or individual tasks identified in the contract are completed and the retention is released.

2. The Service's Finance Center must report to the Department of Treasury if the Service is owed funds by any entity. Therefore, when accounts remain delinquent due to the 10% retention of payments owed the Service, the delinquency continues to be reported to the Treasury.

The Service has previously entered into agreements with the State of California that do not contain the 10% retention clause.

F. Section F is absent from the PSP literature.

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H. Nonprofit Verification: Not applicable-Federal Agency.

Table 1.— Comparisons between juvenile production estimates (JPE) and rotary-trapping juvenile production indices (JPI). Fish ladder JPE and carcass survey JPE were derived from the estimated adult female escapement from fish ladder counts at Red Bluff Diversion Dam and the upper Sacramento winter Chinook carcass survey, respectively. From BY95 through BY99, assumptions used in the carcass survey JPE model were as follows: (1) 5% pre-spawning mortality, (2) 3,859 ova per female, (3) 0% loss due to high water temperature, and (4) 25% egg-to-fry survival. From BY00 through BY03, assumptions 1-3 were estimated from carcass survey data gathered on the spawning grounds, from Livingston Stone National Fish Hatchery and aerial redd surveys, respectively. The upper Sacramento River carcass survey began with the 1996 brood-year. Rotary-trapping was not conducted in 2000 or 2001.

	Rotary-trapping [a]			Carcass survey [b]		Fish ladder [c]	
		90% C.I.					
Brood-year	Fry-equivalent JPI	Lower	Upper	Fry-equivalent JPE	# female spawners	Fry-equivalent JPE	# female spawners
1995	1,816,984	1,658,967	2,465,169			764,082	4,673
1996	469,183	384,124	818,096	550,872	571	406,160	421
1997	2,205,163	1,876,018	3,555,314	1,386,346	1,437	297,143	308
1998	5,000,416	4,617,475	6,571,241	4,676,143	4,847	1,141,299	1,183
1999	1,366,161	1,052,620	2,652,305	1,568,684	1,626	411,948	427
2000	-			4,126,949	3,530	1,284,742	1,099
2001	-			5,386,672	4,607	1,451,158	1,241
2002	8,556,960	4,916,416	11,988,650	6,978,583	5,670	5,270,598	4,673
2003	[d] 6,536,854	4,422,527	8,651,195	6,182,038	8,133	3,327,968	2,752

[a] Fry-equivalent JPI generated by summing fry passage at RBDD with a weighted pre-smolt/smolt passage estimate. Pre-smolt/smolts were weighted by 1.7 (59% fry to pre-smolt/smolt survival; Hallock undated).

[b] Fry JPE based on carcass survey estimates and using estimated effective spawner population from Snider et al. (1997, 1998, and 1999, and Bruce Oppenheim, NOAA Fisheries, Pers. Comm.. 2000, 2001, 2002, 2003).

[c] Fry JPE obtained from Diaz-Soltero 1995 and 1997, Lecky 1998 and 1999, Bruce Oppenheim, NOAA Fisheries, Pers. Comm. 2000, 2001, 2002, 2003.

[d] BY03 fry-equivalent JPI for the period July 1 to December 31, 2003.

Table reproduced from Gaines and Poytress 2004.

Table 2.— Cost to perform Task 1 (9-month monitoring), Task 2 (3-month monitoring), and cumulative totals. The 3-month estimate was derived by computing the difference between a 9-month versus 12-month monitoring program.

Task 1 9 Month	Labor Cost	Benefits	Travel	Supplies & Expendables	Services & Consultants	Equipment	Lands	Other	Direct Total	Indirect Cost	9-Month Total
Year 1	381,419	60,597	3,180	9,200	4,725	32,500	0	0	491,621	83,576	575,197
Year 2	401,850	64,665	3,180	9,200	4,725	38,500	0	0	522,120	88,760	610,880
Year 3	419,561	68,200	3,180	9,200	4,725	4,000	0	0	508,866	86,507	595,373
Total:	1,202,830	193,462	9,540	27,600	14,175	75,000	0	0	1,522,607	258,843	1,781,450

Task 2 3 Month	Labor Cost	Benefits	Travel	Supplies & Expendables	Services & Consultants	Equipment	Lands	Other	Direct Total	Indirect Cost	3-Month Total
Year 1	71,865	53,144	0	1,750	0	500	0	0	127,259	21,634	148,893
Year 2	82,654	57,397	0	1,750	0	0	0	0	141,801	24,106	165,907
Year 3	95,552	61,997	0	1,750	0	0	0	0	159,299	27,081	186,380
Total:	250,071	172,538	0	5,250	0	500	0	0	428,359	72,821	501,180

Task 1 & 2 Cumulative	Labor Cost	Benefits	Travel	Supplies & Expendables	Services & Consultants	Equipment	Lands	Other	Direct Total	Indirect Cost	12-Month Total
Year 1	453,284	113,741	3,180	10,950	4,725	33,000	0	0	618,880	105,210	724,090
Year 2	484,504	122,062	3,180	10,950	4,725	38,500	0	0	663,921	112,867	776,788
Year 3	515,113	130,197	3,180	10,950	4,725	4,000	0	0	668,165	113,588	781,753
Total:	1,452,901	366,000	9,540	32,850	14,175	75,500	0	0	1,950,966	331,664	2,282,630

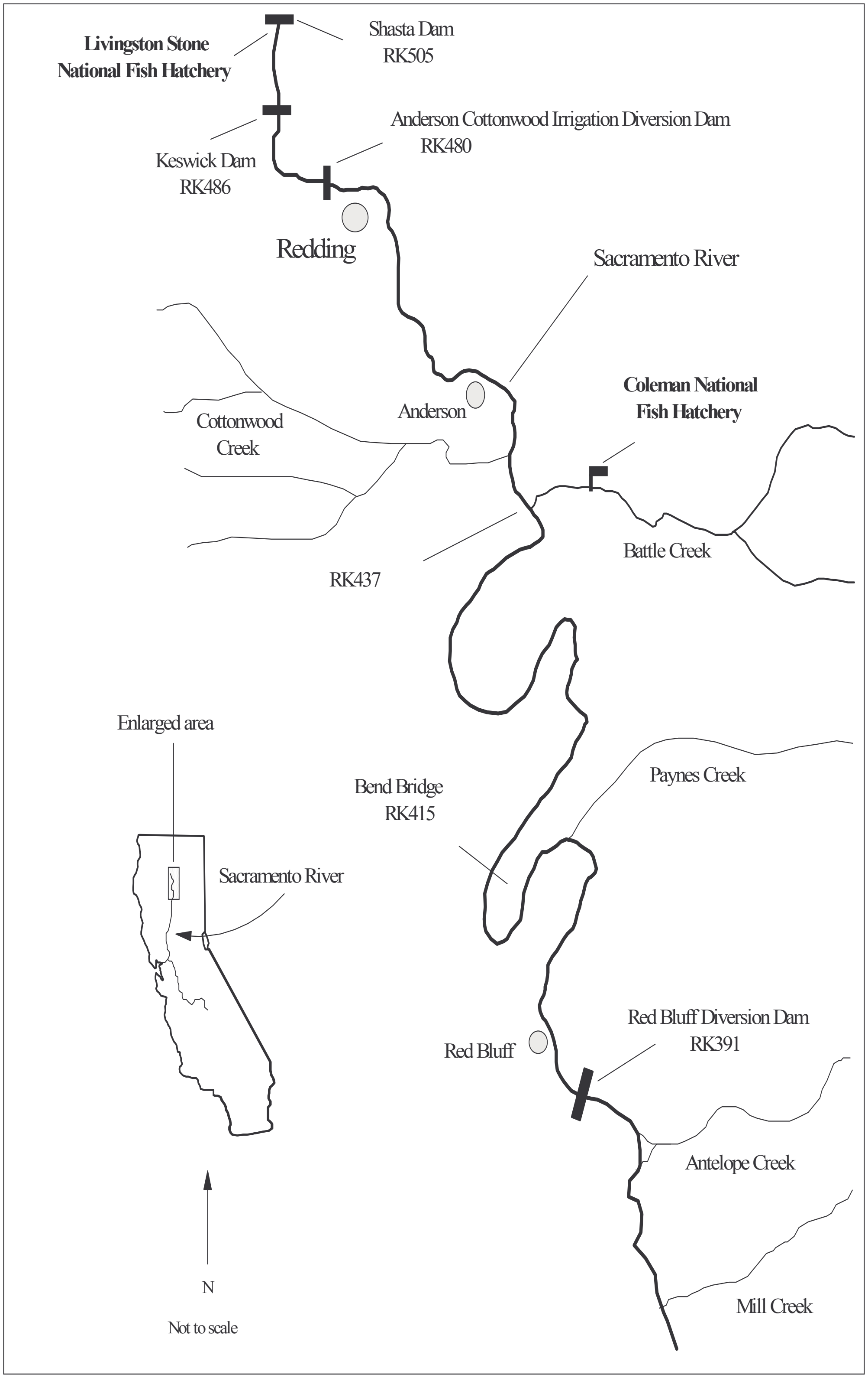


Figure 1. Location of Red Bluff Diversion Dam on the Sacramento River, CA, at river kilometer 391(RK391). Reproduced from Gaines and Poytress 2004.

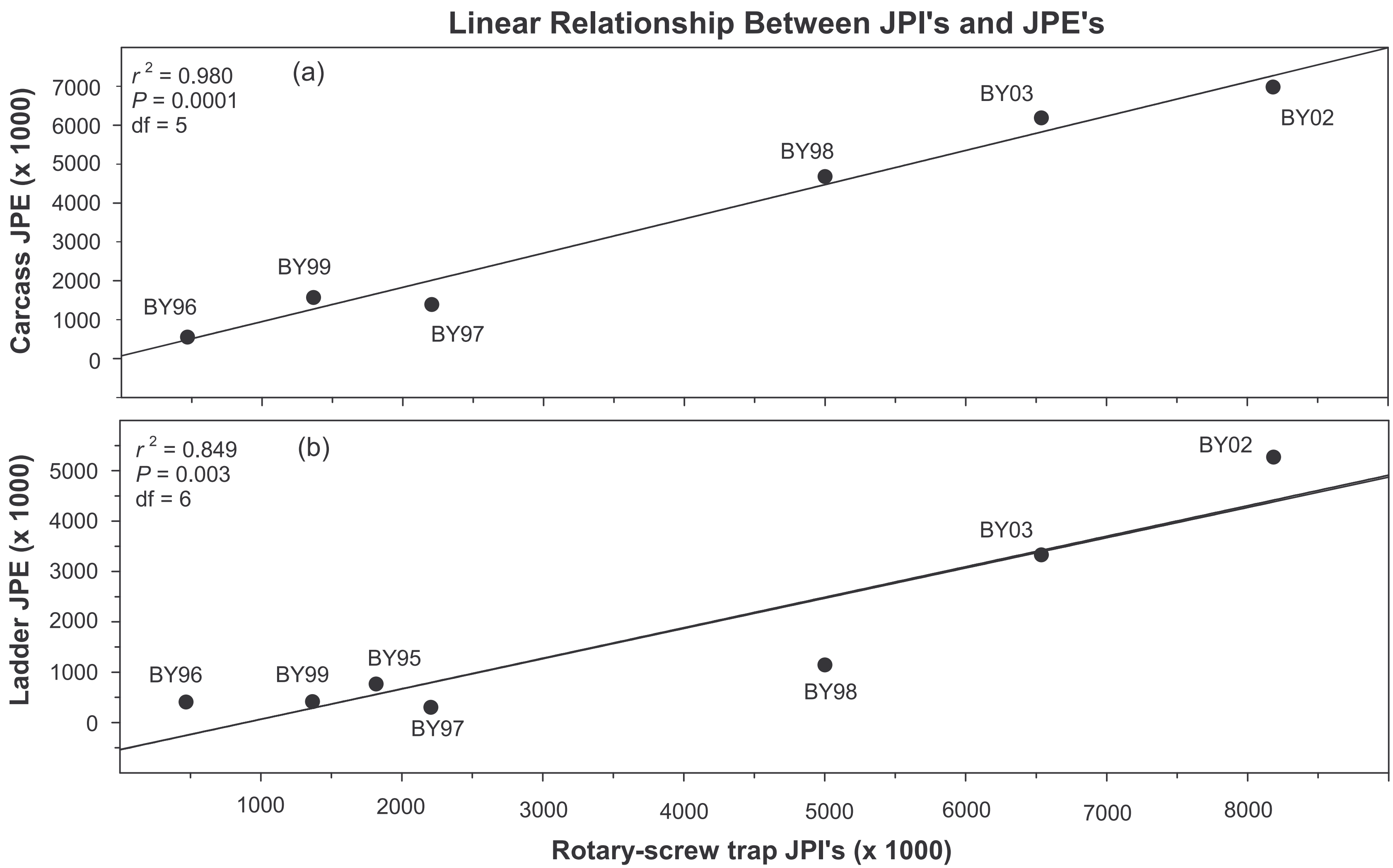
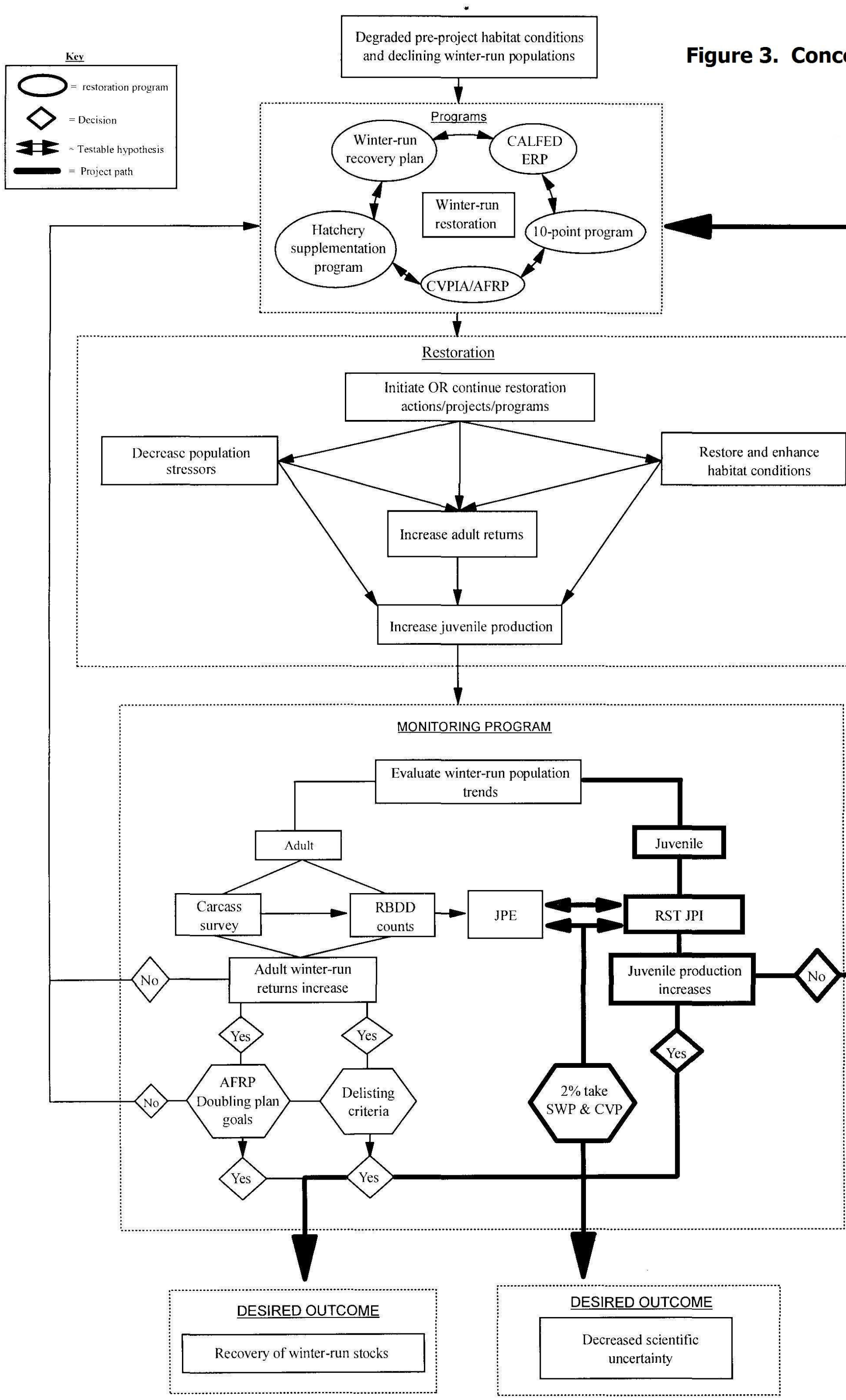


Figure 2. Linear relationship between rotary-screw trap juvenile production indices (JPI) and (a) carcass survey derived juvenile production estimates (JPE) and (b) RBDD ladder count derived JPE's. Reproduced from Gaines and Poytress 2004.

Figure 3. Conceptual Model



Tasks And Deliverables

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Task ID	Task Name	Start Month	End Month	Deliverables
1	Project Management	1	36	Semiannual and final reports. Periodic invoices.
1	9-Month Project	1	36	Conduct monitoring of juvenile Chinook salmon for 9 consecutive months, below the Red Bluff Diversion Dam. Provide all required, specified time-interval invoicing and reporting requirements. Provide final reports.
2	3-Month Project	1	36	Conduct monitoring of juvenile Chinook salmon for the remainder of each year (3 months-April, May, june), results in year-round monitoring of all runs of juvenile Chinook salmon, below the Red Bluff Diversion Dam. Provide all required, specified time-interval invoicing and reporting requirements. Provide final reports.

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Please refer to the overall project proposal (PDF) document for detailed information.

We have offered two Project options, identified as "Task 1", and "Task 2"- Task 1 conducts field sampling operations for 9 consecutive months of each year (July 1 - March 31). Task 1 can be funded separately from Task 2. Task 2 conducts field sampling operations during April, May and June and cannot be funded separately from Task 1. Funding of Task 1 and Task 2

results in year−round, continuous monitoring and targets all Chinook runs (fall, late−fall, winter, and spring) and steelhead trout. Furthermore, year−round monitoring would allow the project to acquire information regarding relative abundance for lamprey and green sturgeon (species of concern).

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$1,452,901	**$366,000**	**$9,540**	**$32,850**	**$14,175**	**$75,500**	**$0**	**$0**	**$1,950,966**	**$331,664**	**$2,282,630**

Do you have cost share partners already identified?
No.

If yes, list partners and amount contributed by each:

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?
No.

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of	Other Direct Costs	Direct Total	Indirect Costs	Total

							Way				
1: project management (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
1: 9−Month Project (12 months)	**381419**	**60597**	**3180**	**9200**	**4725**	**32500**	**0**	**0**	$491,621	**83576**	$575,197
2: 3−Month Project (12 months)	**71865**	**53144**	**0**	**1750**	**0**	**500**	**0**	**0**	$127,259	**21634**	$148,893
Totals	**$453,284**	**$113,741**	**$3,180**	**$10,950**	**$4,725**	**$33,000**	**$0**	**$0**	**$618,880**	**$105,210**	**$724,090**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
1: 9−Month Project (12 months)	**401850**	**64665**	**3180**	**9200**	**4725**	**38500**	**0**	**0**	$522,120	**88760**	$610,880
2: 3−Month Project (12 months)	**82654**	**57397**	**0**	**1750**	**0**	**0**	**0**	**0**	$141,801	**24106**	$165,907
Totals	**$484,504**	**$122,062**	**$3,180**	**$10,950**	**$4,725**	**$38,500**	**$0**	**$0**	**$663,921**	**$112,866**	**$776,787**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	0	0	0	0	0	0	0	0	$0	0	$0
1: 9−Month Project (12 months)	419561	68200	3180	9200	4725	4000	0	0	$508,866	86507	$595,373
2: 3−Month Project (12 months)	95552	61997	0	1750	0	0	0	0	$159,299	27081	$186,380
Totals	**$515,113**	**$130,197**	**$3,180**	**$10,950**	**$4,725**	**$4,000**	**$0**	**$0**	**$668,165**	**$113,588**	**$781,753**

Budget Justification

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Labor

TASK 1: 9−MONTH MONITORING, YEAR 1 1. Biological Technician GS−5/1. 1,560 hrs. $14.95/hr. 2. Biological Technician GS−5/1. 1,560 hrs. $14.95/hr. 3. Biological Technician GS−5/4. 695 hrs. $22.62/hr. 4. Fishery Biologist. GS−5/1. 1,560 hrs. $14.95/hr. 5. Fishery Biologist. GS−5/1. 1,560 hrs. $14.95/hr. 6. Fishery Biologist. GS−7/1. 1,560 hrs. $18.51/hr. 7. Fishery Biologist. GS−7/2. 2,080 hrs. $23.51/hr. 8. Fishery Biologist. GS−9/4. 2,080 hrs. $30.61/hr. 9. Fishery Biologist. GS−11/2. 2,080 hrs. $34.80/hr. 10. Other. 4,029 hrs. $23.80/hr.

TASK 1: 9−MONTH MONITORING, YEAR 2 1. Biological Technician GS−5/1. 1,560 hrs. $15.54/hr. 2. Biological Technician GS−5/1. 1,560 hrs. $15.54/hr. 3. Biological Technician GS−5/4. 695 hrs. $24.24/hr. 4. Fishery Biologist. GS−5/1. 1,560 hrs. $15.54/hr. 5. Fishery Biologist. GS−5/1. 1,560 hrs. $15.54/hr. 6. Fishery Biologist. GS−7/1. 1,560 hrs. $19.25/hr. 7. Fishery Biologist. GS−7/2. 2,080 hrs. $25.24/hr. 8. Fishery Biologist. GS−9/5. 2,080 hrs. $32.80/hr. 9. Fishery Biologist. GS−11/3. 2,080 hrs. $37.35/hr. 10. Other. 4,033 hrs. $24.75/hr.

TASK 1: 9−MONTH MONITORING, YEAR 3 1. Biological Technician GS−5/1. 1,560 hrs. $16.16/hr. 2. Biological Technician GS−5/1. 1,560 hrs. $16.16/hr. 3. Biological Technician GS−5/5. 695 hrs. $25.21/hr. 4. Fishery Biologist. GS−5/1. 1,560 hrs. $16.16/hr. 5. Fishery Biologist. GS−5/1. 1,560 hrs. $16.16/hr. 6. Fishery Biologist. GS−7/1. 2,080 hrs. $19.26/hr. 7. Fishery Biologist. GS−7/3. 2,080 hrs. $27.07/hr. 8. Fishery Biologist. GS−9/5. 2,080 hrs. $34.12/hr. 9. Fishery Biologist. GS−11/4. 2,080 hrs. $40.06/hr. 10. Other. 4,043 hrs. $25.74/hr.

TASK 1 &2 combined − 12 MONTH, YEAR−ROUND MONITORING, YEAR 1 1. Biological Technician GS−5/2. 2,080 hrs. $19.33/hr. 2. Biological Technician GS−5/2. 2,080 hrs. $19.33/hr. 3.

Biological Technician GS−5/2. 695 hrs. $19.33/hr. 4. Fishery Biologist. GS−5/2. 2,080 hrs. $22.62/hr. 5. Fishery Biologist. GS−5/2. 2,080 hrs. $19.33/hr. 6. Fishery Biologist. GS−7/2. 2,080 hrs. $23.46/hr. 7. Fishery Biologist. GS−7/2. 2,080 hrs. $23.46/hr. 8. Fishery Biologist. GS−9/4. 2,080 hrs. $30.61/hr. 9. Fishery Biologist. GS−11/2. 2,080 hrs. $34.80/hr. 10. Other Staff. 4,887 hrs. $23.80/hr.

TASK 1 &2 combined − 12 MONTH, YEAR−ROUND MONITORING, YEAR 2 1. Biological Technician GS−5/3. 2,080 hrs. $20.75/hr. 2. Biological Technician GS−5/3. 2,080 hrs. $20.75/hr. 3. Biological Technician GS−5/3. 695 hrs. $24.24/hr. 4. Fishery Biologist. GS−5/3. 2,080 hrs. $20.75/hr. 5. Fishery Biologist. GS−5/3. 2,080 hrs. $20.75/hr. 6. Fishery Biologist. GS−7/3. 2,080 hrs. $25.18/hr. 7. Fishery Biologist. GS−7/3. 2,080 hrs. $25.18/hr. 8. Fishery Biologist. GS−9/5. 2,080 hrs. $32.80/hr. 9. Fishery Biologist. GS−11/3. 2,080 hrs. $37.35/hr. 10. Other Staff. 4,974 hrs. $24.75/hr.

TASK 1 &2 combined − 12 MONTH, YEAR−ROUND MONITORING, YEAR 3 1. Biological Technician GS−5/4. 2,080 hrs. $22.25/hr. 2. Biological Technician GS−5/4. 2,080 hrs. $22.25/hr. 3. Biological Technician GS−5/4. 695 hrs. $25.21/hr. 4. Fishery Biologist. GS−5/4. 2,080 hrs. $22.25/hr. 5. Fishery Biologist. GS−5/4. 2,080 hrs. $22.25/hr. 6. Fishery Biologist. GS−7/4. 2,080 hrs. $27.01/hr. 7. Fishery Biologist. GS−7/4. 2,080 hrs. $27.01/hr. 8. Fishery Biologist. GS−9/5 2,080 hrs. $34.12/hr. 9. Fishery Biologist. GS−11/4. 2,080 hrs. $40.06/hr. 10. Other Staff. 5,051 hrs. $25.74/hr.

Benefits

TASK 1: 9−MONTH MONITORING (values rounded to 1 decimal) (2) Biological Technician GS−5/1 7.7% (1) Biological Technician GS−5/4 48.5% (2) Fishery Biologist GS−5/1 7.7% (1) Fishery Biologist GS−7/1 7.7% (1) Fishery Biologist GS−7/2 32.3% (1) Fishery Biologist GS−9/2 32.3% (1) Fishery Biologist GS−11/2 32.3%

TASK 1 &2 combined: 12−MONTH (YEAR−ROUND) MONITORING (values rounded to 1 decimal) (2) Biological Technician GS−5/2 34.7%

(1) Biological Technician GS−5/4 48.5% (2) Fishery Biologist GS−5/2 34.7% (1) Fishery Biologist GS−7/2 32.0% (1) Fishery Biologist GS−7/2 32.0% (1) Fishery Biologist GS−9/2 32.3% (1) Fishery Biologist GS−11/2 32.3%

Travel

TASK 1 − 9−MONTH MONITORING (Total Costs for 3 Yrs = $9,540)

YEAR 1 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

YEAR 2 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

YEAR 3 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

TASK 1 &2 combined − 12−MONTH MONITORING (Total Travel for 3 Years = $9,540) YEAR 1 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

YEAR 2 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

YEAR 3 Breakout: Travel expenses for Motorcraft Operator's Certification Course (MOCC) Lodging and Per Diem for 2 employees: $1,060

Travel expenses for attendance at annual CALFED Conference Lodging and Per Diem for 4 employees: $2,120

Supplies And Expendables

TASK 1: 9–MONTH MONITORING

Task 1–Year 1 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $3,750 –––––– Total: $9,200

Task 1–Year 2 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $3,750 –––––– Total: $9,200

Task 1–Year 3 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $3,750 –––––– Total: $9,200

TASK 1 &2 combined: 12–MONTH MONITORING

Task 1 &2–Year 1 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $5,500 –––––– Total: $10,950

Task 1 &2–Year 2 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $5,500 –––––– Total: $10,950

Task 1 &2–Year 3 Chemicals (MS–222, Bismark Brown): $1,500 Misc. Field Gear: $3,700 Misc. Office Supplies: $ 250 Vehicle &Boat Oil/Fuel: $5,500 –––––– Total: $10,950

Services And Consultants

TASK 1: 9−MONTH MONITORING

Task 1−Year 1 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 1 Totals: $4,725

Task 1−Year 2 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 2 Totals: $4,725

Task 1−Year 3 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 3 Totals: $4,725

TASK 1 &2 combined: 12−MONTH MONITORING

Task 1 &2−Year 1 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 1 Totals: $4,725

Task 1 &2−Year 2 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 2 Totals: $4,725

Task 1 &2−Year 3 Repair costs for welding, fabrication of rotary screw traps: $1,875 Swift−water Rescue Course fee for 2 employees: $ 600 Vehicle, boat, trailer, &equipment repair costs: $2,250 −−−−−− Year 3 Totals: $4,725

Equipment

TASK 1: 9−MONTH MONITORING

Task 1-Year 1 Rotary Screw Trap (1 replacement) and Misc. parts: $18,000 1 Replacement cone for Rotary Screw Trap: $ 8,000 Raw materials for trap repairs (aluminum &hardware): $ 1,500 Computers (2 replacements)and software: $ 5,000 ------- Year 1 Totals: $32,500

Task 1-Year 2 Replacement Cone (1) for Rotary Screw Trap: $ 8,000 Raw materials for trap repairs (aluminum &hardware): $ 1,500 Computers (2 replacements)and software: $ 5,000 Pickup Truck 3/4 ton 4WD (1 replacement): $24,000 ------- Year 2 Totals: $38,500

Task 1-Year 3 Raw materials for trap repairs (aluminum &hardware): $ 1,500 Computer (1 replacement)and software: $ 2,500 ------- Year 3 Totals: $ 4,000

TASK 1 &2 combined: 12-MONTH MONITORING

Task 1 &2-Year 1 Rotary Screw Trap (1 replacement) and Misc. parts: $18,000 1 Replacement cone for Rotary Screw Trap: $ 8,000 Raw materials for trap repairs (aluminum &hardware): $ 2,000 Computers (2 replacements)and software: $ 5,000 ------- Year 1 Totals: $33,000

Task 1 &2-Year 2 Replacement Cone (1) for Rotary Screw Trap: $ 8,000 Raw materials for trap repairs (aluminum &hardware): $ 1,500 Computers (2 replacements)and software: $ 5,000 Pickup Truck 3/4 ton 4WD (1 replacement): $24,000 ------- Year 2 Totals: $38,500

Task 1 &2-Year 3 Raw materials for trap repairs (aluminum &hardware): $ 1,500 Computer (1 replacement)and software: $ 2,500 ------- Year 3 Totals: $ 4,000

Lands And Rights Of Way

Not Applicable to Task 1

Not Applicable to Task 2

Other Direct Costs

None for Task 1

None for Task 2

Indirect Costs/Overhead

The U.S. Fish and Wildlife assesses a nation−wide indirect rate of 17% to reimbursable funds received through the California Bay−Delta Authority. The rate is applied as a percentage against the entire project costs (sum of labor, equipment, travel, supplies, etc). These mandatory indirect costs are not received by the Red Bluff Fish and Wildlife Office, but by our Regional and National level organization.

Comments

Please refer to PDF proposal for more details.

Environmental Compliance

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

CEQA Compliance

Which type of CEQA documentation do you anticipate?
X none
− negative declaration or mitigated negative declaration
− EIR
− categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information

gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded.
− Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.

Is the CEQA environmental impact assessment complete?

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
− none
− environmental assessment/FONSI
− EIS
X categorical exclusion

Identify the lead agency or agencies.

U.S. Fish and Wildlife Service

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.
Not applicable

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
scientific Collecting Permit	X	X	
CESA Compliance: 2081	–	–	
CESA Complance: NCCP	–	–	
1602	–	–	
CWA 401 Certification	–	–	
Bay Conservation And Development Commission Permit	–	–	
reclamation Board Approval	–	–	
Delta Protection Commission Notification	–	–	

state Lands Commission Lease Or Permit	–	–	
action Specific Implementation Plan	–	–	
other	–	–	

Federal Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
ESA Compliance Section 7 Consultation	–	–	
ESA Compliance Section 10 Permit	X	–	
Rivers And Harbors Act	–	–	
CWA 404	–	–	
other	–	–	

Permission To Access Property	Required?	Obtained?	Permit Number (If Applicable)
permission To Access City, County Or Other Local Agency Land Agency Name	–	–	
permission To Access State Land Agency Name	–	–	
permission To Access Federal Land Agency Name U.S. Bureau Of Reclamation, Red Bluff, CA	X	X	
permission To Access Private Land Landowner Name	–	–	

If you have comments about any of these questions, enter them here.

Rotary traps are secured to the Red Bluff Diversion Dam; permission has been obtained throught the local Red Bluff Division Office of the Bureau of Reclamation.

We have applied for a Research Permit, sec. 10(1(a)) through the National Oceanic and Atmospheric Administration (NOAA),

Fisheries, to enable us to sample and collect federally listed salmonids. The application for the permit was submitted to NOAA−Fisheries during December 2002.

Land Use

Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
– Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
– No.
– Yes.

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
– No.
X Yes.

Describe briefly the provisions made to secure this access.

Our boat is launched at the U.S. Forest Service's Sycamore Grove boat launch, which is open to the public. No special permission is required.

Our rotary traps are secured to the Red Bluff Diversion Dam, through prior permission with the local office of the Bureau of Reclamation.

Do the actions in the proposal involve physical changes in the current land use?
X No.

− Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No.
− Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		−
Farmland Of Statewide Importance		−
Unique Farmland		−
Farmland Of Local Importance		−

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No.
− Yes.

Is the land affected by the project currently under a Williamson Act contract?
X No.
− Yes.

Why is the land use proposed consistent with the contract's terms?

Describe any additional comments you have about the projects land use.