

ATTACHMENT A

1. Mainstream and Tributaries

Watershed Conservancies

Problem Statement: The upper Sacramento River watershed and its tributaries have been cumulatively impacted by past and present land use practices. An assessment of the watersheds is needed to better understand the cumulative impacts and how they have impacted watershed processes. The assessments should identify methods for protection and rehabilitation of aquatic, riparian and upslope habitats. Watershed assessment and rehabilitation can be facilitated through a cooperative process that includes local landowners and other interested parties, particularly in watersheds that have mixed ownerships and land use practices that require consideration of the landowner's economic needs. Management plans should be developed cooperatively with local interests for each of the streams which currently support spring run or have a high potential for spring run restoration to facilitate local efforts to protect and restore these streams while respecting the varied uses of those lands. Projects to protect and restore aquatic habitats can then be developed cooperatively to facilitate implementation.

Scope of Work: Proposals are being solicited for development of watershed plans for streams or rivers that support spring run chinook salmon spawning including: Deer, Mill, Butte, Battle, Antelope, Clear, and Big Chico creeks, as well as the upper Sacramento River. The plans should be developed with involvement from local landowners and other interested parties. They should emphasize development of measures and programs to address important factors such as riparian habitat, water quality, fish passage problems, and monitoring of the results of those projects. Proposals can also include educational outreach efforts. Specific tasks which should be included are:

1. Initiate or continue a cooperative process that includes local landowners and other interested parties;
2. Identify important factors (e.g., riparian habitat, water quality, water quantity, and adult and juvenile passage) affecting spring run chinook aquatic habitats, especially on private lands;
3. Recommend a package of projects and programs that can effectively address the important factors (e.g., protection/restoration of riparian habitat); and
4. Describe a monitoring program to evaluate current conditions and to evaluate results from such projects and programs.

Deliverables:

1. Draft and final document containing a management plan(s) for specific stream/river,
2. Assessment of current condition of the watershed,
3. Letters of support from local landowners and other interested parties,
4. Recommended package of projects and programs,
5. Estimated costs for recommended projects/programs,
6. Proposed funding scheme.
7. Monitoring Plan.

Time Frame: Generally, watershed plans should be prepared in one year or less.

2. Delta**Interdisciplinary Evaluation of Wetland Sites in the Delta**

Problem Statement: Wetlands and shallow water habitats developed in the Delta that are not isolated from the open water of the Delta or from the flow of the Sacramento, San Joaquin, or Mokelumne Rivers have been shown in some cases to provide rearing habitat for spring run chinook salmon. These areas also can provide benefits for other aquatic and terrestrial species. However, there is limited information to assess the potential benefits of these types of habitats for salmon and other fishes and to guide future habitat restoration efforts. Additional information is needed to better understand how existing wetlands and shallow water habitats, including both those actively restored and those restored unintentionally, function.

Scope of Work: Applications are being sought for an interdisciplinary evaluation of existing wetlands in the Delta using a team that includes fishery biologists, wetlands specialists, hydrologists, etc. The intent is to identify a representative range of wetlands sites. These sites would be characterized by recording information on physical attributes such as water depths, exposure to boat wakes, vegetation types, percent of submerged cover, and substrate as well as information regarding the physical changes in the area over time. Then, evaluate their utilization by juvenile salmon and other fish species including predators. Finally, assess their functions for salmon primarily, but also for other native fishes. This should include assessment of habitat quality for salmon and other species by evaluating size and condition of fish using the site, food availability, and predation rates. Information should also be collected on other aquatic species including sensitive species. The desired outcome would be to identify common characteristics of wetlands benefiting juvenile salmon in the Delta to guide future wetlands development efforts. Studies should include assessment of the methodology for sampling that includes an assessment of gear efficiency.

Deliverables:

1. Detailed study plan,
2. Mapping showing the sites evaluated,
3. A report detailing the investigation, and
4. Recommendations for future wetlands restoration efforts including physical descriptions of the type of habitats to focus restoration on, locations that would be best suited for restoration, and a discussion of how other factors, such as human influences and sediment transport, could impact those restoration efforts.

Time Frame: Generally, it is expected that this type of evaluation will take approximately two years.

3. **Delta and Sacramento
Habitat Evaluation of the Yolo Bypass**

Problem Statement: There is some evidence that large numbers of juvenile salmon either move or are diverted into the Yolo bypass during high flood flows. These fish either continue to reside in the bypass until they are stranded or move out of the Bypass before the waters recede. There is some evidence that while the Bypass is flooded, juvenile salmon found there, have experienced higher growth rates and have a high condition factor. However, it is not clear what the overall net effect is of passing through or residing in the Yolo Bypass on juvenile salmon growth, condition factors and on overall survival. It is also unclear what types of modifications could improve the success of juveniles who pass through or reside in the Bypass. An evaluation is needed to determine the relative benefits of the existing rearing habitat, the magnitude of stranding of juvenile salmon and other species of interest, and what actions could be taken to reduce this stranding and improve the quality of the rearing habitat.

Scope of Work: Applications are being sought to address the following issues:

1. Estimation of the number of juvenile salmon that are entrained into the Yolo Bypass during different water year types based on historical information on timing of downstream migration and a description of historic frequency, duration, volume, and proportion of flow diverted into the Bypass as well as field evaluations,
2. Evaluation of the current rearing habitat in the Bypass including field sampling to identify areas where juvenile salmon are present, to determine the condition of the fish relative to juveniles in the mainstream Sacramento, and to characterize the physical and hydrological attributes of habitats that support juveniles,
3. Estimation of the ultimate success of juveniles moving into the Bypass through evaluation of stranding and of number of juveniles who move downstream out of the Bypass,

4. Development of reconnaissance level recommendations for modifications to the Bypass to eliminate negative impacts and create restoration opportunities to achieve the best results for salmon populations. Recommendations could include measures designed to minimize stranding of juveniles, minimize diversion of adult salmon into the Bypass, and maximize survival and production of juvenile salmon at the existing levels of entrainment into the Bypass. Depending on the net benefits of the Bypass to juvenile production, recommendations could be developed for measures designed to increase overall salmon habitat in the Bypass and to increase the frequency that habitat is available to the juvenile salmon through modification of weirs and reestablishment of perennial flows or to reduce the entrainment of juvenile salmon into the Bypass.

Deliverables:

1. A detailed study plan,
2. Quarterly reports,
3. Draft and final document containing assessment of the Bypass and management recommendations.

Time Frame: Generally, it is expected that this type of evaluation will take approximately two to three years depending on water type year.

4. **Delta and Sacramento
Stranding in the Deep Water Ship Channel**

Problem Statement: Adult salmon can move into the Deep Water Ship Channel and can be stranded because they cannot move upstream through the channel. Juvenile fish can also be diverted into the DWSC at the upstream end if the locks are opened to allow adults to pass upstream. Facilities or operations may need to be modified to either prevent adult salmon from entering the DWSC or to allow them to move upstream out of the DWSC while protecting juvenile fish from being entrained.

Scope of Work: Applications are being solicited to design and construct facilities or for development of an operations plan to either prevent or reduce stranding of adult salmon into the DWSC while avoiding entrainment of emigrating juvenile salmon.

Deliverables: Draft and final report including options analysis, preferred alternative, and recommending further actions.

Time Frame: Generally, it is expected that this evaluation will take four months.

5. **Delta
Delta Habitat Restoration Projects**

Problem Statement: Juvenile spring run salmon as well as other races of salmon appear

to have low survival as they move through the Delta. Their survival rate appears to be lower if they move through the Delta Cross Channel into the central Delta. Factors which are assumed to decrease their survival include predation, water quality, water temperature, lack of appropriate habitat, and entrainment. It is assumed that additional high quality salmon rearing habitat in the northern end of the Delta, adjacent to the San Joaquin mainstem, and along the Mokelumne River would increase their survival rates. Additional shallow water and tidal wetlands should be constructed and monitored to assess their quality as salmon rearing habitat and benefits they provide for other sensitive species.

Scope of Work: Proposals are being solicited for habitat restoration projects in the Delta. Projects should include a diversity of habitat types and water depths, suitably complex structural habitat, and should be designed to not unduly increase predation on juvenile salmon. Projects should be located in an area which provides maximum benefits for salmon migrating out of the Sacramento River such as areas along or adjacent to the Sacramento River or in some areas of the Mokelumne River. Projects should be designed to minimize adverse human impacts on the site, to provide habitat values over time, and provide benefits for other sensitive aquatic and terrestrial species wherever possible. The project should include a description of habitat restoration techniques to be used, success criteria to be used to evaluate the project, details regarding monitoring of the project following construction, and a description of how long-term operations and maintenance will be provided, including how title to the land is to be held.

Deliverables: Deliverables include:

1. Draft and final project development plans and progress reports during project development,
2. Documentation of project completion showing that the restoration has been completed, that the project area is conserved and that the appropriate mechanisms for long term maintenance and operation are in place,
3. Regular monitoring reports according to the project development plan.

Time Frame: Projects can be developed over multiple years if necessary.

6. **Delta Identification of Juvenile Salmon**

Problem Statement: The fishery agencies presently employ size criteria to racially discriminate between juvenile chinook salmon in the Sacramento River and in the Delta. Use of size criteria can be an imprecise tool because of annual variations in time of egg deposition, egg development and hatching, and juvenile growth rates between races which may cause a varying overlap in size between races. Restoration and management of the four races of Central Valley chinook salmon are dependent on understanding each races' unique life history and behavior. Real-time monitoring as well as adaptive

management of water export facilities are dependent on the ability to accurately discriminate between the four races of salmon.

Scope of Work: Applications are being solicited to develop tools to improve the ability to racially identify juvenile chinook salmon.

Deliverables: Information should be included regarding error rates expected for the proposed tools.

7. Delta

Evaluation of the Success of Life History Strategies of Juvenile Salmon In the Delta

Problem Statement: Juvenile chinook salmon, including juvenile spring run salmon, move downstream out of their natal streams both as fry and as smolting or smolted fish. The fish which move downstream as pre-smolted fish must continue rearing in the lower Sacramento River and delta to complete smolting and survive the transition to salt water. Little is known about the distribution and abundance of juvenile salmon habitats in the Delta, the temporal use of these habitats by juvenile salmon, and the relative success, in terms of survival to adulthood, of salmon that utilize the Delta as rearing habitat as part of their life history. Yet, such information should serve as the criteria for habitat restoration and other management activities in the delta aimed at enhancing the natural production of chinook salmon.

Scope of Work: Proposals are being solicited to (i) inventory delta habitat available to juvenile salmon; (ii) determine the seasonal presence/absence of juvenile salmon in a representative subset of inventoried habitats; (iii) determine the growth, condition, and development of juvenile salmon in habitats in which they are found; and (iv) apply or develop a methodology that attempts to distinguish the life histories of individual salmon. The habitat inventory and mapping task should use criteria which most specifically describe the habitat in terms of its structure and function and its utility for salmon rearing. Monitoring of habitat use should include a concurrent assessment of environmental conditions with emphasis on primary factors that influence juvenile salmon growth and development. The proposal should specify a method for estimating or indexing juvenile salmon abundance or density in each habitat unit. Growth and development assessments should be conducted on an individual fish basis to the extent possible. The proposal should suggest a method to assess individual salmon life histories with emphasis on the timing and extent of rearing in the natal tributary, mainstem river, and the delta. This method should include the potential for discriminating salmon stocks and races. Ultimate analyses should be directed assessing when and to what extent delta rearing is associated with survival to adulthood in salmon.

Deliverables:

1. A detailed study plan,

2. Quarterly reports,
3. Draft and final reports including habitat management recommendations.

8. **Delta**
Unscreened Diversions in Suisun Marsh

Problem Statement: Category III has previously committed \$450,000 for fish screening efforts in Suisun Marsh to reduce entrainment of juvenile salmon. Because this is an area where entrainment is likely impacting spring run chinook, additional projects to address entrainment in this area would be considered.

Scope of Work: A detailed scope of work has not been developed. Applications should include specific measures to address the problem statement.

9. **Mainstem**
Stream Corridor Mapping

Problem Statement: Mapping of existing riparian habitat along stream corridors including the Sacramento River and its tributaries will provide information that will guide efforts to protect and restore key areas.

Scope of Work: Complete mapping of riparian habitats on the valley floor portions of Glenn, Colusa, Sutter, Yolo, and Sacramento Counties consistent with existing mapping completed under the Upper Sacramento River Stream Corridor Protection Program. Riparian vegetation maps will be produced using false color areal photography flown at a scale of 1" = 1000'. Classification of riparian vegetation types will be based on those developed within the California Department of Fish and Games' Natural Diversity Data Base. Final maps will be registered to local mapping efforts and available in ArcInfo file format.

Deliverables: Hard copy of overlays and base maps. All information will also be made available in ArcInfo format.

Time Frame: It is anticipated that this project should be complete in twelve months.

10. **Mainstem**
Develop Innovative Measures to Address Fish Screening Issues

Problem Statement: To encourage additional progress on resolution of entrainment issues on the Sacramento River, the current efforts to inventory unscreened diversions should be completed, the biological priorities to guide screening efforts should be established, and improved screen designs should be encouraged.

Scope of Work: A number of ideas were developed at the workshop to help meet the goals of completing the inventory of diversions, identifying biological priorities, and improving and disseminating information on screen designs. Ideas included design competitions for screening small diversions, convening a fish screen symposium, and development of a classification system based on type and location of diversion to help set biological priorities. Rather than specifying exactly what the scope of work should be to address these goals, interested parties should review the workshop report and the ideas included there, and submit applications that clearly show how the proposed tasks can address the problem statement.

11. **Tributaries and Mainstem
Genetic Integrity of Spring Run Salmon in the Feather, Yuba and Sacramento Rivers**

Problem Statement: It is unknown whether the genetic integrity of various spring run chinook populations has been compromised due to a variety of causes including hatchery practices, past stocking programs, and incomplete segregation of adult spawning fall and spring run populations. If fisheries management goals are to be developed for individual runs of chinook salmon, it is important to determine if runs have blended in different spawning areas and to determine the genetic structure and parentage of spring run chinook salmon populations to determine the degree of genetic uniqueness and variability. Such a determination will help direct spring run chinook salmon population recovery efforts and develop relative priorities for restoration actions and to manage and restore Central Valley chinook salmon overall, while preserving important evolutionary components (stocks) of the population.

Scope of Work: An evaluation of the genetic structure, parentage, and variability of individual spring-run chinook salmon populations relative to one another and to other chinook salmon stocks within the upper Sacramento River and its tributaries from the Feather River to Keswick Dam and focusing on the Feather, Yuba, and Sacramento rivers.

Deliverables:

1. Detailed study plan
2. Quarterly reports
3. Draft and final reports

12. **Tributaries and Mainstem
Options Analysis at Ward's Landing/Butte Creek**

Problem Statement: Adult spring run chinook salmon returning to spawn in Butte Creek must either migrate through the Sutter Bypass which has a number of dams and diversion structures that delay passage, or they must migrate into Butte Creek at Ward's Landing

which has water control structures that can also delay passage. If adult salmon passage at Ward's Landing can be improved, it would reduce delays to upstream migration.

Scope of Work: An analysis of the feasibility of various options including structural or operational modifications to the existing water control structures at Ward's Landing.

13. **Tributaries - Big Chico Creek**
Water Control Structure at Lindo Channel on Big Chico Creek

Problem Statement: The existing water control structure at Lindo Channel needs to be reconstructed.

14. **Tributaries - Deer and Mill Creeks**
Spill Contingency Plan for Highway 32

Problem Statement: Toxic spills on Highway 32 could potentially harm spring run chinook salmon in Deer and Mill Creeks.

15. **Tributaries**
Fish Passage and Screening Projects

Problem Statement: At a number of locations in the system, adult salmon must move upstream past dams to reach their spawning grounds. Juvenile salmon must later move back downstream over the dams and past diversions on their outmigration to the ocean. At several locations, additional measures are needed to assure safe migration up- and down-stream through fish screens, fish ladders, modifications of existing structures, barrier removal, development of alternative water supplies, and through other means that could meet the goal of improving fish passage.

Scope of Work: Applications are being sought for projects to address these issues at several locations summarized below. It is expected the projects would proceed through a feasibility and options analysis phase, a design phase, and a construction phase. In some cases, the projects are anticipated to start at the feasibility and options analysis phase. In other cases, it is expected that applications will be for work beginning at the design level. In all cases, applications should reflect any work done to date and all future work needed to complete the project including identification of appropriate contingencies. Where the application is prepared by a party other than the owner and/or operator of the facility, it should indicate if the owner/operator currently support the project or how this support is to be obtained. For each project, a very rough estimate of the total cost is included for informational purposes. For feasibility level analysis, this estimate does not include subsequent phases of project development.

Location	Expected Level of Development
Eagle Canyon Diversion on Battle Creek Fish Screen and Ladder	Design
Fish Screens and Ladders for other diversions on Battle Creek	Feasibility and Options Analysis
Fish Passage on Antelope Creek	Feasibility and Options Analysis
Iron Canyon Fish Ladder on Big Chico Creek	Design/Construction
Fish Screens and Ladders on Adams, Gorrill and Durham Mutual Dams on Butte Creek	Design/Construction
Fish Passage at Saeltzer Dam on Clear Creek	Design/Construction

Deliverables: Document in sufficient detail to proceed next development stage or to construction.

16. **Tributaries**
Battle Creek Restoration

Problem Statement: Battle Creek represents a significant opportunity to restore salmon habitat, if issues associated with the water supply for Coleman Hatchery can be resolved, habitat can be protected, suitable flows provided, spawning gravels restored in the North

Fork, and fish passage provided for adults and juveniles. Fish passage issues are included in item 16.

Scope of Work: Proposals are being solicited that will develop and implement a watershed plan for Battle Creek that will restore the diversity of natural runs of salmon and steelhead to the stream. The plan should outline the sequence of steps needed to restore the sections of Battle Creek as the restored populations grow and require additional habitat.

Specific tasks to be accomplished through a cooperative process that includes landowners and other involved parties include:

1. Integrating the operation of Coleman National Fish Hatchery with the restoration of the diverse natural runs of salmon and steelhead in the stream. An analysis should be included of the disease risks to all the hatcheries that take their water supply from Battle Creek and alternatives methods of managing the risk to

acceptable levels. An operation plan is needed for the fish barrier at Coleman Hatchery that partially blocks the natural runs of anadromous fish migrating up from the Sacramento River.

2. Facilitating the development of an equitable long-term agreement to increase the minimum instream flow releases below hydroelectric diversions.
3. Management objectives for public lands in the watershed.
4. Further development of the educational outreach program.
5. Monitoring of water temperature, disease organisms, gravel conditions, and riparian habitat.

17. **Toxics**
State of Knowledge Review

Problem Statement: Two subgroups at the spring run chinook technical workshop addressed the question of whether toxics are a significant factor influencing native salmon species, such as spring run chinook. Both identified a number of important uncertainties; both recommended that proposals be solicited for a project to address this issue.

Much information already exists concerning contaminants in surface waters of the Sacramento and San Joaquin Rivers and the Delta. However, less is known about concentrations in small Central Valley tributaries that provide salmon spawning and rearing habitat. Sources of toxic substances include runoff and irrigation return flows from agricultural lands, urban runoff, abandoned mines, and municipal wastewater effluent. Substances of concern include agricultural and urban pesticides and metals. The degree to which salmon are currently being exposed to aquatic contaminants is poorly understood.

Recent data show that Sacramento River water has tested toxic to fathead minnows about half the time over the last several years. The contaminant(s) causing toxicity are currently unknown. Likewise, it is uncertain whether the substance(s) toxic to fathead minnows were present at concentrations that would adversely affect salmon.

Proposals are being solicited for a study to objectively evaluate hypotheses concerning effects of toxics on salmon native to the San Joaquin and Sacramento rivers. The hypotheses chosen for analysis should encompass all relevant toxics-related effects (e.g., embryo developmental abnormalities, changes in behavior, tissue growth, mortality), salmon life stages, as well as toxicity to primary food organisms for salmon. For each hypothesis, the study should summarize both what is known and key unknowns. Options for effectively addressing the most critical unknowns should be formulated. For each

option, a synopsis of recommended projects / programs is to be provided, along with preliminary cost estimates. It is anticipated that one of the options will be ambient toxicity testing for native salmon species.

The main focus of the proposed project is to be on current toxicity conditions, and not a historical review of the role that toxic substances may have played as a factor influencing salmon populations. It is expected that - with the aid of the Steering Committee (see below) - efforts will be made to take advantage of, and to avoid duplicating, related work already underway by other groups (e.g., CALFED, IEP, EPA, USGS, California Water Quality Control Board, Central Valley Region).

Scope of Work: The CALFED Restoration coordinator will form a multi-stakeholder Steering Committee to guide this project. The Steering Committee will authorize the final scope of work, assist the contractor in accessing reports and data, and review the draft and final reports.

The following list of tasks is offered as an example of how the project could be structured:

- For salmon present in the Sacramento and San Joaquin Rivers, compile existing information on where the salmon are located at various life stages, which life forms are particularly vulnerable to toxics, and what food organisms are important at each life stage. This information is important for judging potential exposure of salmonids to toxics.
- Obtain and synthesize existing information pertaining to types, amounts, geographic distribution, and timing of delivery for toxic substances to which salmonids may be exposed. There are at least two main methods of estimating potential dosage: (i) through information concerning instream concentrations of toxic substances, and (ii) identifying sources, amounts, and timing of discharge for both pesticides and metals. This information is important for evaluating the potential toxics dosage to salmonids.
- Obtain and consolidate all available and relevant information pertaining to responses of salmonids (and related fish species) and their principle prey items to the types and concentrations of toxics of concern in the Sacramento and San Joaquin Rivers. This task will involve securing data from previous Central Valley testing, augmented with a thorough review of the scientific literature.
- Synthesize information on salmon life stages, data on pesticides and metals, and sensitivity of salmonids and their prey to toxics. These data should be used to explore the validity of hypotheses concerning effects of toxics on salmon native to the San Joaquin and Sacramento rivers. For each hypothesis, summarize what is known and identify critical unknowns.

- Develop a set of options for effectively addressing the most critical unknowns. For each option, a synopsis of recommended projects / programs is to be provided, along with preliminary cost estimates.
- Prepare a draft report incorporating results from the tasks listed above.
- It is anticipated that ambient toxicity testing using native salmon species will be a very important future activity. Thus, the draft report should also contain a preliminary design for an ambient toxicity testing program using native species. The testing program design should contain sufficient detail to allow examination by a peer review panel, and to permit preparation of cost estimates. Where possible and appropriate, this testing program should be designed to coordinate with, and build upon, related work being undertaken by other groups.
- The Steering Committee will be responsible for identifying and convening an independent peer review committee to evaluate the draft report. The contractor will then prepare a Final Report, responding to the Steering Committee's comments.

Deliverables: The project will produce (i) a Draft Report, (ii) a Final Report, and (iii) a presentation package covering highlights and recommendations from the report.

Time Frame: The project is expected to be completed six months following the contract award date.