Proposal to Complete a Feasibility Study for the Kopta Slough Flood Damage Reduction and Habitat Restoration Project

Project Goals and Elements

The Kopta Slough Flood Damage Reduction and Habitat Restoration Project (the Project) is located on the Sacramento River in Tehama County between River Mile 218 and 223. The Tehama County Highway A9 Bridge (Woodson Bridge) bisects the lower portion of the Project area (see attached maps). The goals of the Project are listed below:

1) provide flood damage reduction benefits through reduced bank erosion to protect public resources

2) provide advance mitigation credits for projects on State-maintained Central Valley Flood Control facilities (DWR Flood Control Projects) for mixed riparian forest habitat, including habitat for valley elderberry longhorn beetle (VELB)

3) provide ecosystem benefits (along 5,600 feet of river channel bank and over 700 acres of floodplain) through the restoration of natural fluvial and floodplain processes and mitigate for the loss of shaded riverine aquatic (SRA) habitat from DWR Flood Control Projects

4) establish long term public ownership of the Kopta Slough property to protect public trust resources and expand recreational opportunities for the people of the State of California on a portion of the Project area, including camping, hiking, picnicking, and equestrian use

These goals would be accomplished through the implementation of the Project elements described on page 2. These elements would be assessed in a feasibility study prepared by the Department of Water Resources' (DWR), Northern District (ND) staff. The results of the feasibility study would be used to decide whether or not to proceed with the Project. The decision criteria would include the cost/benefit ratio, the significance of non-monetary benefits, and the determination of the Project beneficiaries and how much each beneficiary would contribute to implementing the project. The study would include the assessment of impacts related to the following: flood management; geomorphology; threatened, endangered and sensitive species; sensitive habitats; ecological function; existing infrastructure; land use; cultural resources; and recreation. The study would assess project alternatives and costs. The recommended alternative would be based on the decision criteria. The feasibility study would cost $333,325 to complete (see attached budget). DWR's portion of the cost would be $275,325. Tehama County and California State Parks (State Parks) are each providing $25,000 in cost share funding for the study ($50,000 total), while the Sacramento River Conservation Area Forum (SRCAF) is providing $8,000 of in-kind services for their cost share.

The feasibility study would build upon the work already completed by the United States Army Corps of Engineers (ACOE) for this project. Results from the ACOE's reconnaissance level analyses are shown in Tables 1 and 2 to help demonstrate several of the alternatives to be considered and the initial cost estimate associated with each.

The elements of the Project include the following:

1) protect the west abutment of Woodson Bridge and the City of Corning sewer outfall

2) transfer the 708-acre Kopta Slough property from the California State Controller's Environmental Trust to the State of California for management by State Parks. This element would include expansion of the Woodsen Bridge State Recreation Area (Recreation Area) to the west side of the Sacramento River, thus increasing public recreational opportunities and facilitating management of the adjacent 176-acre mitigation area by State Parks.

3) remove unnecessary revetment along 5,600 feet of the riverbank at the Kopta Slough property to restore fluvial and floodplain processes and mitigate for the loss of SRA habitat from DWR Flood Control Projects

4) reduce the riverbank erosion rate on the east bank of the Recreation Area to preserve heritage oak trees and developed camping, picnicking, and recreational facilities

5) restore 176 acres of mixed riparian forest habitat on the Kopta Slough property as mitigation for DWR flood control projects

Under the first element, the Woodson Bridge abutment and land downstream from the bridge adjoining the City of Corning sewer outfall would be protected from erosion. A total of 2,600 feet of bank protection would be needed, 1,900 feet of bank protection to stabilize the Woodson Bridge abutment and 700 feet of bank protection to protect the City of Corning sewer outfall. Several options were analyzed during the 2003-04 ACOE reconnaissance study; the options analyzed are presented in Table 1 with costs based on 2004 estimates.

Table 1. Options for bank protection at Woodson Bridge and City of Corning sewer outfall

Protection Option	Woodson Bridge Western Abutment		City of Corning Sewer Line Outfall	
	Volume (yd^3)	Cost	Volume (yd^3)	Cost
1. Bank Rock	9,820	$1,275,100	2,600	$357,300
2. Low Berm / Rock**	13,900	$1,725,950	5,350	$661,200
3. Spur Dikes / Bendway Weirs	5,035	$746,400	1,770	$265,600

**preferred alternative in 2003-04

Under the second element, State Parks (after acquiring title) would incorporate the Kopta Slough property into the existing Recreation Area (see attached map). State Parks would develop a recreation management plan for the area that would describe recreation uses and opportunities for the property. The property would include mitigation areas and habitats of high conservation value; therefore, the extent and type of recreation uses would have to be designed such that they do not conflict with the ecological objectives to be defined for these areas.

Under the third element, different alternatives for the removal of revetment along the east bank of the Kopta Slough property would be analyzed for their cost/benefit through the feasibility study. In concept, removal of this revetment would restore natural channel processes, and it would promote the process of forest succession that would lead to the regeneration of a diverse mosaic of forest types on the floodplain.

Restoration of these elements would increase aquatic habitat diversity through the creation of channel features such as side channels, mid channel bars, and in-channel large woody debris (LWD). Removal of revetment would also enhance the quality of SRA habitat by increasing exposed root structure and LWD along the bank. As such, this element would be used to provide advanced SRA mitigation for future DWR flood control projects. The amount of SRA mitigation credit would need to be determined later since some components of SRA habitat already exist along the revetted bank, and some temporary damage to the existing habitat (i.e. removal of trees to excavate revetment) could occur. Temporary damage to SRA habitat would be subsequently replaced with higher quality SRA as described above.

Alternatives to be considered for this element include no revetment removal, partial revetment removal, notching the revetment at intervals along its length, and full removal of the revetment. These alternatives were identified in the 2003-04 ACOE reconnaissance study with their quantities of rock that could be removed and their associated costs (Table 2). Costs are based on 2004 estimates.

Table 2. Options for rock removal at Kopta Slough

Vertical Removal Option	Options for Kopta Slough Rock Removal			
	Partial Length (2,910 ft)	Full Length (5,660 ft)	Notching Partial Length (1,500 ft)	Notching Full Length (2,500 ft)
1. Partial Vertical (1.48 yd3/Ln ft)	4,306 yd3 $279,900	8,377 yd3 $544,500	2,220 yd3 $144,300	3,700 yd3 $240,500
2. Full Vertical (2.8 yd3/Ln ft)**	8,148 yd3 $529,600	15,848 yd3 $1,030,120	4,200 yd3 $273,000	7,000 yd3 $455,000

** preferred alternative

Under the fourth element, no physical structures are proposed to protect the east riverbank of the Recreation Area. Rather, reducing erosion on the Recreation Area would be an important objective to achieve as part of the removal of revetment from the east side of the Kopta Slough property (west riverbank). Along with the removal of revetment, the feasibility of constructing a pilot channel to facilitate re-establishment of the river's historical channel alignment through Kopta Slough would be investigated. Re-establishment of this alignment could substantially reduce the erosive forces that are impacting the Recreation Area. Erosion is causing the loss of park property and valuable heritage oaks at this site; and it has been exacerbated by the stabilization of the opposite upstream bank along the Kopta Slough property. The Palisades Demonstration Bank Protection Project (Palisades project) was constructed at this site to stop erosion in 1986; however, ninety percent of the Palisades Project failed, and all but 10 percent of the Palisades were later removed in 1997.

Under the fifth element, 176 acres of mixed riparian forest would be restored on land within the Kopta Slough property that is currently supporting field crop agriculture. This would provide advance mitigation credits for DWR Flood Control Projects within the region, including mitigation credits for valley elderberry longhorn beetle (VELB).

Discussion

DWR's Long Term Involvement in the Project

DWR's involvement in the Palisades Project started with its planning and construction in 1986. Instituted by the Reclamation Board, DWR implemented the Palisades Project in coordination with the ACOE as part of the Sacramento Bank Protection Project: Chico Landing to Red Bluff. The Palisades Project was intended as a more environmentally benign way to reduce erosion of the Recreation Area. After the Project was damaged by the 1997 flood and deemed a serious public hazard, ND staff managed the effort to remove almost all of the Palisades Project. This effort by ND staff also included the development and analysis of eight alternatives to address long-term solutions for erosion along the recreation area, all of which are detailed in the "Woodson Bridge State Recreation Area Long-Term Solutions Study Working Draft" (Long-Term Solutions Study).

Accomplishment of State Plan of Flood Control Objectives

The multiple objectives of the Project support those identified for the State Plan of Flood Control (Senate Bill 17). The restoration and transfer of ownership elements of the Project provide a prudent solution to mitigation needs for DWR's flood management programs, and DWR's obligation to implement actions that promote natural dynamic hydrologic and geomorphic process under the State Plan of Flood Control. The Project

would also support the State Plan of Flood Control objectives by increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and SRA habitats. The removal of unnecessary and damaging revetment would also accomplish the objective of minimizing flood management system operation and maintenance requirements.

Restoration projects completed within the last ten years that restored floodplain, geomorphic, and hydrologic function within the Central Valley have cost between $1.5 and $4 million to construct per mile of river channel/floodplain restored, depending on the level of earth moving and re-vegetation that was needed. The Project is well within this cost range. There is also the benefit of having advanced mitigation of at least 176 acres, which could be worth between $7.0 and $8.8 million[1].

Value to Stakeholders

The monetary and planning support for the Project feasibility study comes from Tehama County, State Parks, The Nature Conservancy, and SRCAF. Broad public and further resource agency support, (including the Department of Fish and Game (DFG) and the United States Fish and Wildlife Service) was expressed during the initial ACOE study of the Project and no irreconcilable issues were identified at that time or since. Accomplishment of all five of the project's goals has been recognized as very important for sustaining support for the Project.

Feasibility Study Scope of Work

General Scope

The initial planning step for the Project would be to complete a feasibility study. The results of the feasibility study would be used to decide whether to proceed with the Project. The decision criteria would include the cost/benefit ratio, the significance of non-monetary benefits, the identification of the Project beneficiaries, and the extent for which each beneficiary would contribute to implementing the Project. The study would include assessment of impacts related to the following: flood management; geomorphology; threatened, endangered, and sensitive species; ecological function; sensitive habitats; existing infrastructure; land use; cultural resources; and recreation. The study would also assess project alternatives and costs with the preferred alternative being based on the decision criteria. The feasibility study would build upon the work already completed by the ACOE for the Project.

The components of the study are outlined for each study task below. The budget for each task is outlined in Attachment A.

[1] To purchase an acre of mitigation from a mitigation bank can cost between $40,000 and $50,000 per acre for riparian forest. The cost of Shaded Riverine Aquatic Habitat would be about three or four times this cost.

Task 1. Project Management

Project management by ND staff would include coordinating study tasks, managing contracts and budgets, monitoring progress, and ensuring that timelines are met. The Project manager would meet periodically with the ND Water Management Branch Chief, the ND Chief, and Division of Flood Management's (DFM) program manger to assess if the direction of the Project is in alignment with the needs of decision makers. This task would also include working with SRCAF to coordinate and facilitate the Project partner meetings. The Project manager would also receive input from SRCAF's technical advisory committee (TAC) and provide materials and presentations for public outreach. Furthermore, the Project manager would coordinate with ACOE to facilitate the exchange of study information and to assess and report on the needs of the ACOE for de-authorizing the Sacramento Bank Protection Project revetment within the study area.

Deliverables: Regular communication and correspondence with DFM's program manager and ND regarding the feasibility study's progress, budget, and findings. A summary of input and participation from Project partners would be completed. A section on process for ACOE's de-authorization of revetment would be developed for the final report.

Task 2. Public Outreach

Under the public outreach task, SRCAF would provide in-kind cost share. SRCAF would facilitate coordination, collaboration, and communication among governmental agencies, partners, citizens, and local watershed groups. They would provide education and outreach activities that would inform the public on the concepts and issues associated with the project. The SRCAF watershed coordinator would ensure appropriate outreach to local stakeholders by coordinating public information meetings, responding to stakeholder concerns, providing updates at SRCAF TAC meetings and Board of Director meetings, and attending Tehama County Board of Supervisors meetings. Additionally, the SRCAF watershed coordinator would continue to work with the Tehama County Resource Conservation District and the Deer Creek Watershed Conservancy to ensure that all projects within this watershed, or affecting it, are coordinated.

Deliverables: SRCAF would provide meeting agendas and meeting notes for Project partner meetings, public meetings, and TAC meetings and

would provide a summary of outreach activities to be included in the final report.

Task 3. Conceptual Alternatives Write-Up

ND staff would develop the conceptual alternative descriptions, tables, and figures for use by the Project's team and consultant for analysis and inclusion in the feasibility study. Information for each alternative would come from the ACOE's reconnaissance study and DWR's Long-Term Solutions Study.

Deliverables: Conceptual alternatives write-up

Task 4. Environmental Analysis and Feasibility

Biological Resources

In the feasibility report, ND staff would describe the existing condition and ecological value of aquatic and terrestrial habitats along with the wildlife, fish, and plant species that occur, or have the potential to occur, in the Project area. To determine the likelihood for species to occur within the Project area, ND staff would conduct reconnaissance level surveys for special status species. Surveys would be carried out for bald eagle, Swanson's hawk, yellow billed cuckoo, bank swallow, elderberry, and sensitive plants. The extent of invasive plant species would also be characterized. The collected data would be captured on field forms and a Global Positioning System (GPS) for later transfer to the Project's Geographic Information System (GIS), which is described in Task 5. Lists would be generated for those species documented during field surveys, and any special-status plant or animal populations and occurrences would be mapped.

ND staff would assess the positive and negative impacts to sensitive species from each alternative along with the effort needed to comply with environmental guidelines, regulations and laws, and the relative cost for compliance under each alternative. Mitigation or avoidance measures needed for each alternative would also be described and relative cost would be estimated.

As part of this task, ND staff would also assess the ecological benefits from each alternative. Water depths, flood regime, sediment deposition, scour rates, elevation above the river, and substrate types would all determine the habitat potential. Therefore, the hydraulic modeling and geomorphologic analyses would provide important characterization of the physical parameters that are needed to assess the development and

sustainability of particular habitat types, including those types needed for advanced mitigation. The cost needed to establish habitats for mitigation would be assessed as well, along with an assessment of the net benefit to SRA habitat for each alternative.

Deliverables: Species occurrence records and GIS data. Fisheries, wildlife, plant, and ecological impact feasibility report sections.

Cultural Resources

The cultural resources task would be completed by the Division of Environmental Services. Cultural resources studies for the proposed project would involve a review of records maintained at the Regional Information Center of the California Historic Resources Information System, and a search of the sacred lands' files at the Native American Heritage Commission. Native Americans who are knowledgeable about the Project area would also be contacted for pertinent information. Following the records search, a pedestrian survey would be conducted of the Project area. Any cultural resources identified as the result of the inventory would be recorded and photographed. A report would be included in the feasibility study to document the survey and the results of the effort.

Recreation

Under the recreation task, ND staff would describe the recreational opportunities with and without the Project alternatives and the beneficial and negative impacts to and from recreational use. ND staff would also assess impacts from management of the area for recreation to habitats that would be managed for mitigation purposes.

Deliverables: Recreation section for feasibility study.

Task 5. GIS Development

GIS support for the Project would be provided under this task, including the creation of a project GIS (project level GIS database), and map support for presentations and the feasibility report. To develop the Project GIS, ND staff would collect and review existing biological data from DWR, CDFG, USFWS, other public agencies, and adjacent landowners that are relevant to the Project area. A GIS database would be created to maintain and update this information as needed. Furthermore, topographic and bathymetric data would also be incorporated into the Project GIS along with modeling results. The Project GIS would include historical channel meander and predicted meander as a result of project alternatives.

The Project GIS would be used to aid the feasibility analysis, organize and store spatial project information, and to create project maps for presentations and the feasibility report.

Deliverables: Project GIS and Project maps for report and presentations

Task 6. Geomorphic Assessment

River Movement and Feasibility Chapter

ND staff would provide an analysis of existing river migration monitoring performed since 1988, and the results of Dr. Larson's river migration modeling. This task would include a discussion of existing rates of migration projected with each alternative and with no project.

Erodibility Assessment and Feasibility Chapter

ND staff would acquire and review existing soil boring and test pit data performed by ACOE. There would be no new data acquisition. ND staff would assess the likelihood of channel cutoff through the area of historic (1896-1923) channel with and without assistance. This task would also include an assessment of bank stability of the right bank with the relocated channel in place and a discussion of options for rip-rap removal under each alternative (full, partial, notched, etc).

Deliverable: Assessment of river migration and erodibility sections for feasibility report. ACOE boring and test pit data.

Task 7. Engineering Analysis and Feasibility

The engineering analysis would consist of developing a two-dimensional hydraulic model, analyzing project alternatives and costs, and preparing an engineering analysis report. A combination of consultant services, and ND staff review and coordination would be used to complete this task. The consultant services would be administered by ND staff.

Consultant Services

A consultant services contract would be used to complete the engineering analysis study. The final study report would be incorporated as an appendix to the feasibility report. ND staff would develop the scope of work and contract for the Project. To conduct the analysis, the consultant would develop a two-dimensional hydraulic model using the existing topographic information from the Sacramento and San Joaquin River Basins Comprehensive Study, and by using the current channel conditions and overbank condition to be defined by updated bathymetric and land surveys as described in the next section. ND staff would work with the consultant to refine project alternatives to be analyzed. The consultant

would analyze the effects and cost of actions including bank protection, complete or partial removal of existing revetment, and pilot channel development. With ND staff guidance and review, the consultant would complete a final report that would be included as an appendix to the feasibility report.

Deliverables: see sections below

Bathymetric and Land Surveys and Mapping

ND staff would combine existing triangular irregular networks (TIN) from previous studies along the Sacramento River and Deer Creek into one TIN for the study area. The combined TIN would then be updated to represent the current topography of the study area. The main focus of the work would revolve around areas that have changed since the existing TINs were created. ND staff anticipates this being the in-channel and top of bank portions of the TIN. The overbank areas of the TIN would be checked for accuracy.

ND staff would conduct the survey using Real-Time Kinematic (RTK) Global Positioning System (GPS) technology and conventional survey equipment. The GPS survey instruments would be a Trimble 4000SSI receiver at the primary control point and Trimble 4700 receivers as the rovers. These survey-grade receivers provide centimeter level accuracy in both the horizontal and vertical positioning. During the bathymetric process, the RTK GPS supplies the horizontal and vertical position of the bathymetric GPS antenna. The conventional survey equipment would be a survey control quality Geodimeter 600 series total station.

The bathymetric soundings would be acquired with a Knudsen Engineering Limited 320B/P survey-grade echo sounder and transducer. This type of echo sounder is an acoustic echo ranging device; the depths are calculated by measuring the time it takes for a pulse of ultrasound to be transmitted downward from the transducer, reflect off the bottom, and return to the transducer.

The combined TIN would be updated from the points collected in the field and visually checked for anomalies or errors. The final product would be a TIN that would produce maps at 1 inch = 50 feet with a 2-foot contour interval. All of the field work and office processing would be conducted by, or under the direction of, a Licensed Land Surveyor.

Deliverables: The final TIN of the study area would be provided in DXF format on a CD. The 2-foot contour map of the study area would also be provided on the CD in AutoCAD and DXF format. The contour map and TIN would be incorporated into the Project GIS.

Coordinate and Review Hydraulic Modeling

The consultant would develop a two-dimensional hydraulic model using the ACOE's RMA-2V program. The two-dimensional model would provide velocity, depth, and shear stress data at each point within the finite element network. Model runs would consist of evaluating existing conditions and project alternatives for the following conditions: the calibration flow; the bankfull discharge (i.e. a 2- to 3-year flow event); the 10-year discharge; and the 100-year discharge. ND staff would review the model runs, input parameters and assumptions, and output to ensure representation of current conditions and to provide feedback on the refinement of project alternatives.

Deliverables: The consultant would develop and provide to DWR a calibrated hydraulic model with existing and project alternative model runs. Full documentation model documentation would be provided. Plots of velocity, depth, and shear stress would be incorporated in the Project GIS.

Develop and Review Project Alternatives and Costs

The Project alternatives as defined above in Task 3 would be further refined by the consultant with guidance from ND staff. The consultant would develop the costs associated with the refined conceptual project designs. The results would be reviewed by ND staff.

Deliverables: The consultant would develop and provide preliminary designs and costs for each alternative.

Coordinate and Review Consultant's Report

ND staff would coordinate the consultant's services to produce an engineering analysis report that would be included as an appendix to the feasibility report. The engineering analysis report would include model documentation, determination of input parameters, calibration, existing conditions and alternative hydraulic modeling results, refined conceptual designs of bank protection and revetment removal, and costs by alternative and conceptual design. The information development for this engineering analysis report would be added to the feasibility report.

Deliverables: The consultant would prepare an engineering analysis report for use by DWR that includes refined conceptual designs and accurate cost estimates for each alternative.

Task 8. Final Feasibility Report Preparation

Recommendations and Conclusions

ND staff would analyze and summarize the results of the environmental, geological, and engineering investigations to make recommendations and conclusions within the feasibility study. The summary would include a matrix indicating the cost and impact to physical, biological, cultural, recreational resources, and stakeholder interests for each alternative. The recommended alternative would be the one that best balances cost with the level of benefit and that does not have issues associated with it that are immitigable or irreconcilable.

Deliverables: Recommendations and conclusions section of feasibility report

Prepare final DWR report for Publication

ND staff would review the report for consistency and quality of analysis; and they would provide edits in preparation for submittal to the Publication Unit within DWR's Division of Planning and Local Assistance (DPLA).

Deliverables: Administrative draft of feasibility report with recommendations and conclusions

DWR Publications

DLPA's Publications Unit would provide final grammatical and formatting edits, review for consistency, and suggest rewrites to the document. DPLA's Publications Unit would also create a CD with the consultants report for inclusion in the feasibility report and create a PDF for website distribution. DPLA's Publications Unit would submit the report to DWR's Executive Branch for review. The final document would be produced as a district report. It would be available in hard-copy format for a limited time, otherwise, distribution would occur electronically through PDF files on CD as requested, or for download from ND staff and SRCAF's websites.

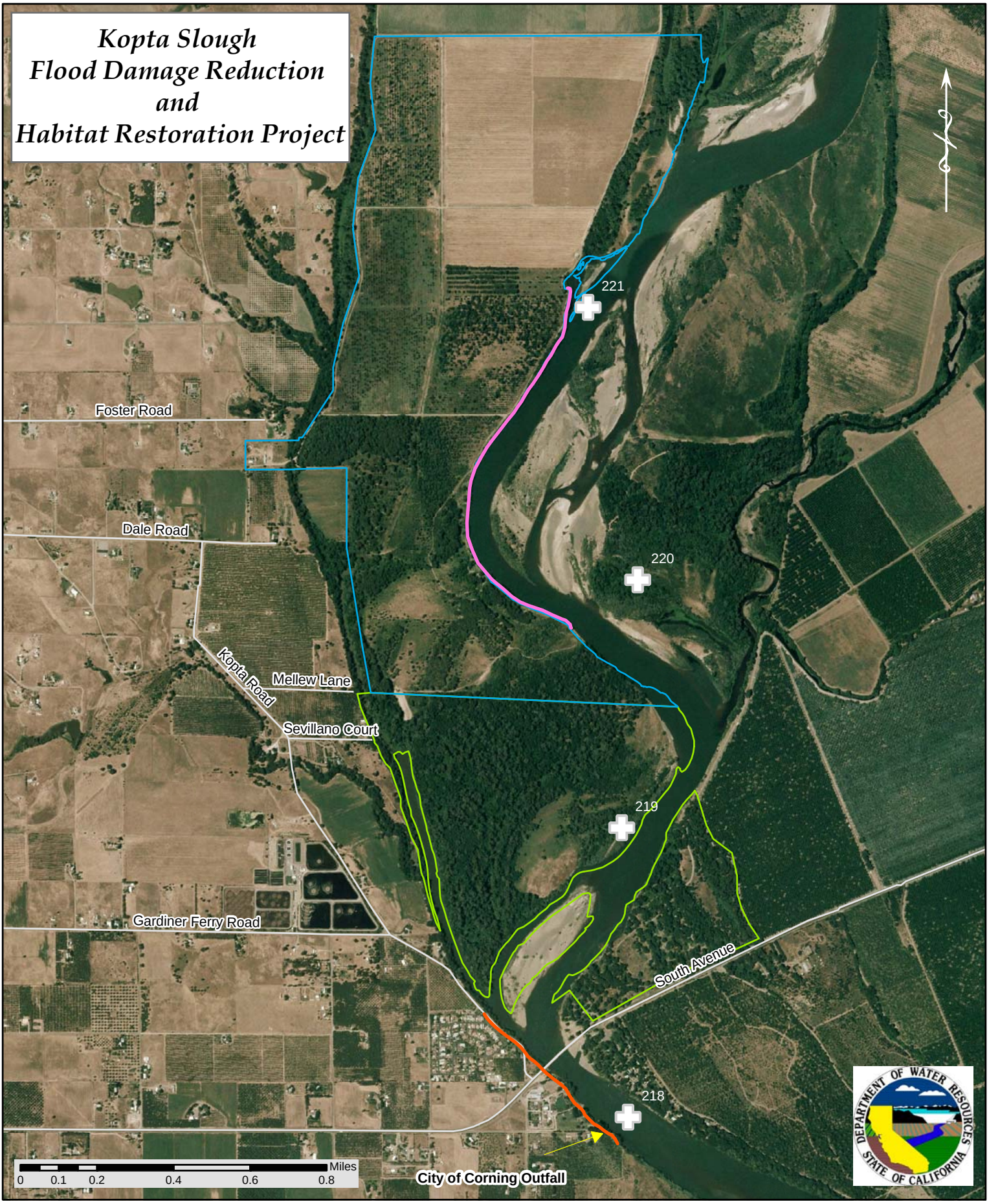
Deliverables: Final feasibility report with recommendations and conclusions available for distribution to public

Attachment A

Kopta Slough Flood Damage Reduction and Habitat Restoration Project Feasibility Study
Budget by Task

FEASIBILITY STUDY TASKS	*Entity*	*Hours*	*Labor Rate*	*Labor Cost*	*Exp*	*Total*	*Schedule for FY 08 & 09*
Task 1 – Project Management							
1.1 – Project Coordination	**DWR**	56	95	$ 5,320		$ 5,320	
1.2 – Budget Management	**DWR**	80	95	$ 7,600		$ 7,600	
1.3 – SRCAF TAC and Public Meetings	**DWR**	56	95	$ 5,320		$ 5,320	**Mar-Jan**
1.4 – ACOE Coordination and Assess De-authorization Process	**DWR**	35	95	$ 3,325		$ 3,325	
Subtotal		***227***				***$ 21,565***	
Task 2 – Public Outreach	**SRCAF***			$ 7,000	$ 1,000	$ 8,000	**Mar-Jan**
Subtotal						***$ 8,000***	
Task 3 – Conceptual Alternatives Write-Up	**DWR**	40	95	$ 3,800		$ 3,800	**Apr-May**
Subtotal		***40***				***$ 3,800***	
Task 4 – Environmental Analysis & Feasibility							
4.1 – Biological Reconnaissance Surveys	**DWR**	176	95	$ 14,080	$ 1,000	$ 15,080	
4.2 – Cultural Resources Record Search and Consultation	**DWR**	24	95	$ 1,920		$ 1,920	**Mar-Jun**
4.3 – Wildlife, Plant, Fisheries, Cultural Resources, Ecological, and Recreation Feasibility Chapters	**DWR**	250	95	$ 22,500		$ 22,500	**Apr-Dec**
Subtotal		***450***				***$ 39,500***	
Task 5 – GIS							
5.1 – Survey Support	**DWR**	44	95	$ 4,180		$ 4,180	
5.2 – Existing Condition	**DWR**	24	95	$ 2,280		$ 2,280	**Apr-Dec**
5.3 – Report Map Production	**DWR**	40	95	$ 3,800		$ 3,800	
Subtotal		***108***				***$ 10,260***	
Task 6 – Geomorphic Assessment							
6.1 – River Movement and Feasibility Section	**DWR**	108	125	$ 13,500	$ 500	$ 14,000	**Apr-Dec**
6.2 – Erodibility Assessment and Feasibility Section	**DWR**	124	125	$ 15,500	$ 500	$ 16,000	
Subtotal		***232***				***$ 30,000***	
Task 7 – Engineering Analysis & Feasibility							
7.1 – Administration of Consultant Service Contract	**DWR**	20	147	$ 2,940		$ 2,940	**Apr-Jan**
7.2 – Consultant Services for Hydraulic Modeling, Alternative Analysis, and Final Engineering Report	**Consultant**	600	150	$ 90,000		$ 90,000	**May-Jan**
7.3 – Bathymetric and Land Surveys	**DWR**	240	142	$ 34,080	$ 2,000	$ 36,080	**May-Sep**
7.4 – Mapping	**DWR**	120	142	$ 17,040	$ 1,000	$ 18,040	
7.5 – Coordinate and Review Hydraulic Modeling	**DWR**	80	147	$ 11,760	$ 3,000	$ 14,760	
7.6 – Analysis of Project Alternatives and Costs	**DWR**	120	147	$ 17,640		$ 17,640	**Jun-Jan**
7.7 – Coordinate and Review Consultant's Report	**DWR**	120	147	$ 17,640		$ 17,640	
Subtotal		***1300***				***$ 197,100***	
Task 8 – Final Feasibility Report Preparation							
8.1 – Recommendations & Conclusions							
8.1.1 – Engineering	**DWR**	20	147	$ 2,940		$ 2,940	**Nov-Dec**
8.1.2 – Environmental	**DWR**	20	95	$ 1,900		$ 1,900	
8.2 – Prepare final DWR report for Publication							
8.2.1 – Engineering	**DWR**	40	147	$ 5,880		$ 5,880	**Dec**
8.2.2 – Environmental	**DWR**	20	95	$ 1,900		$ 1,900	
8.3 – DWR Publications	**DWR**	120	79	$ 9,480	$1,000	$ 10,480	**Jan**
Subtotal		***220***				***$ 23,100***	
Total Feasibility Study Cost						**$ 333,325**	
Cost Share (In kind cost share and contracts to DWR or Consultant)							
Tehama County						$ 25,000	
California State Parks						$ 25,000	
Sacramento River Conservation Area Forum						$ 8,000	
Subtotal						***$ 58,000***	
Total Cost to DWR DFM						**$ 275,325**	

*** Sacramento River Conservation Area Forum**


Kopta Slough
Flood Damage Reduction
and
Habitat Restoration Project
221
220
219
218
Foster Road
Dale Road
Kopta Road
Mellew Lane
Sevillano Court
Gardiner Ferry Road
South Avenue
City of Corning Outfall
0 0.1 0.2 0.4 0.6 0.8 Miles
DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA
California Department of Parks and Recreation Land
Kopta Slough Property
River Mile Markers
Proposed Erosion Protection
Roads
Proposed Rock Removal