

MINUTE ITEM
This Calendar Item No. 26
was approved as Minute Item
No. 26 by the State Lands
Commission by a vote of 2
to 0 at its 6/30/87
meeting.

CALENDAR ITEM

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06/30/87
W 23987 PRC 7098
Louie

S 2, 5

GENERAL PERMIT - PUBLIC AGENCY USE

APPLICANT: State Reclamation Board
1416 Ninth Street
Sacramento, CA 95814

AREA, TYPE LAND AND LOCATION:
12 parcels of tide and submerged land in
Sutter, Steamboat, and Miner sloughs in
Sacramento, Yolo, and Solano counties.

LAND USE: Placement and maintenance of riprap for levee
protection.

TERMS OF PROPOSED PERMIT:
Initial period: 25 years beginning July 1,
1987.

CONSIDERATION: The public use and benefit; with the State
reserving the right at any time to set a
monetary rental if the Commission finds such
action to be in the State's best interest.

BASIS FOR CONSIDERATION:
Pursuant to 2 Cal. Adm. Code 2003.

APPLICANT STATUS:
Applicant is permittee of upland.

STATUTORY AND OTHER REFERENCES:
A. P.R.C.: Div. 6, Parts 1 and 2; Div. 13.
B. Cal. Adm. Code: Title 2, Div. 3; Title 14,
Div. 6.

AB 894: N/A.

(ADDED 06/25/87)

-1-

CALENDAR PAGE	213
MINUTE PAGE	2159

CALENDAR ITEM NO. 26 (CONT'D)

OTHER PERTINENT INFORMATION:

1. The State Reclamation Board proposes to place riprap on State lands located in Sutter, Steamboat, and Miner sloughs for the purpose of levee protection. The project is a portion of the Sacramento River Bank Protection Project Unit 41A. In addition to these slough sites, Unit 41A includes additional sites in the Sacramento River which are in a reach subject to lease PRC 6697 (although their use under that lease is contested between us). The sites on the sloughs will be the subject of a new lease between the State Lands Commission and the Reclamation Board.
2. The proposed lease conforms to the Lyons/Fogerty decision.
3. An EIR was prepared and adopted for this project by the State Reclamation Board. The State Lands Commission's staff has reviewed such document and believes that it complies with the requirements of the CEQA.
4. This activity involves lands identified as possessing significant environmental values pursuant to P.R.C. 6370, et seq. Based upon the staff's consultation with the persons nominating such lands and through the CEQA review process, it is the staff's opinion that the project, as proposed, is consistent with its use classification.

APPROVALS OBTAINED:

United States Army Corps of Engineers.

EXHIBITS:

- A. Land Description.
- B. Location Map.
- C. Final EIR Executive Summary
- D. CEQA Findings

(ADDED 06/25/87)

-2-

CALENDAR PAGE	213.1
MINUTE PAGE	2160.

CALENDAR ITEM NO. 26 (CONT'D)

IT IS RECOMMENDED THAT THE COMMISSION:

1. FIND THAT AN EIR WAS PREPARED AND ADOPTED FOR THIS PROJECT BY THE STATE RECLAMATION BOARD AND THAT THE COMMISSION HAS REVIEWED AND CONSIDERED THE INFORMATION CONTAINED THEREIN.
2. ADOPT THE FINDINGS IN CONNECTION WITH THE PROJECT HERETO ATTACHED AS EXHIBIT "D" IN COMPLIANCE WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (P.R.C. SECTION 21000 ET SEQ.) AND THE STATE EIR GUIDELINES.
3. FIND THAT THIS ACTIVITY IS CONSISTENT WITH THE USE CLASSIFICATION DESIGNATED FOR THE LAND PURSUANT TO P.R.C. 6370, ET SEQ.
4. AUTHORIZE ISSUANCE TO THE STATE RECLAMATION BOARD OF A 25-YEAR GENERAL PERMIT - PUBLIC AGENCY USE BEGINNING JULY 1, 1987; IN CONSIDERATION OF THE PUBLIC BENEFIT, WITH THE STATE RESERVING THE RIGHT AT ANY TIME TO SET A MONETARY RENTAL IF THE COMMISSION FINDS SUCH ACTION TO BE IN THE STATE'S BEST INTEREST; FOR THE PROJECT AS MODIFIED AND APPROVED BY THE STATE RECLAMATION BOARD ON APRIL 17, 1987, SPECIFICALLY PLACEMENT AND MAINTENANCE OF RIPRAP ON THE LAND DESCRIBED ON EXHIBIT "A" ATTACHED AND BY REFERENCE MADE A PART HEREOF.

(ADDED 06/25/87)

-3-

CALENDAR PAGE	219.2
MINUTE PAGE	2161

EXHIBIT "A"

LAND DESCRIPTION

W 23987

All that tide and submerged land lying immediately beneath riprap placed for bank protection in Sutter Slough, Site Mile 22.5 Right, 22.9 Left, 25.0 Left, 25.4 Left, 25.5 Right, 26.0 Right, 27.5 Right, 28.0 Left; Steamboat Slough, Site Mile 21.1 Right, 22.9 Right; and Miner Slough, Site Mile 1.2 Left, 6.8 Right; in Sacramento, Yolo and Solano Counties as shown on Department of the Army Sacramento District, Corps of Engineers Plans for Bank Protection - Contract 41A, Spec. No 8054, File No. 50-4-5777, dated April 21, 1987, and on file with the State Lands Commission.

END OF DESCRIPTION

**PREPARED JUNE 11, 1987 BY BOUNDARY SERVICES UNIT, M. L. SHAFER,
SUPERVISOR.**

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CALENDAR PAGE

215.3

MINUTE PAGE

2162

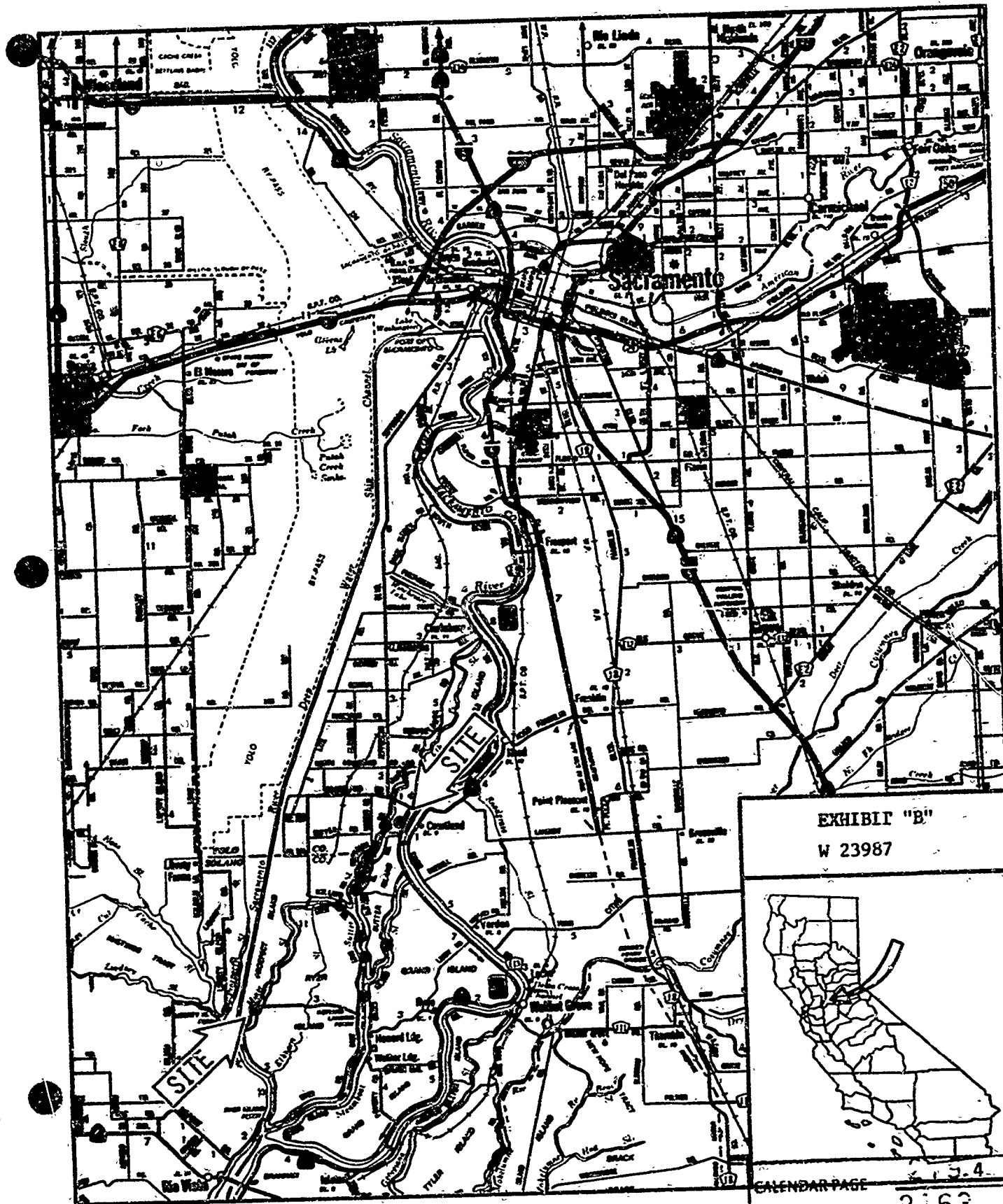


EXHIBIT "B"

W 23987



CALENDAR PAGE 2-4

MINUTE PAGE

2:63

EXHIBIT C

SUMMARY

The proposed project consists of placing 12,586 linear feet of rock riprap bank protection at 15 sites located on Sutter, Miner, and Steamboat Sloughs, and on the Sacramento River from just above Rio Vista to near Courtland. The work involves removal of most vegetation, grading of the slope to the desired profile, and the placement of rock from a trench at the channel bottom to a point 8 - 12 feet below the levee crown. The sloughs are narrow, relatively deep, and hydraulically active and, like the lower Sacramento River, are affected by tides and wavewash from a variety of sources. The mean summer water level in the river and sloughs is above the level of surrounding lands and progressive erosion therefore is considered especially critical. The anticipated loss of vegetation on roughly 7 to 8 acres of levee slope is a significant environmental impact of the project. This impact is magnified by the linear distribution of the vegetation at the water's edge which has ecological value for both terrestrial and aquatic species. The project would also result in significant impacts on perceived scenic values. The proposed mitigation addresses not only the net loss of terrestrial and aquatic habitats but their linear properties and esthetic impacts. Consultation with the U. S. Fish and Wildlife Service (FWS) in coordination with the U. S. Army Corps of Engineers will result in an agreement on a proposed mitigation strategy for 7.4 acres of terrestrial habitat loss and 2.1 acres of aquatic habitat loss. A total of 9.2 acres of berm will be replanted including 7,800 feet at the water's edge to address these losses. Three acres of the revegetation will occur on construction sites while 6.5 acres will occur on previously rock berms in the project area. Several alternatives were considered in addition to the proposed rock riprap: low rock berms, permeable and impermeable jetties, biotechnical slope protection and other bank coverings. Yet, from a flood control perspective, low rock berms are the only substitute which offer acceptable protection. However, considerable concern remains for this design in terms of erosion above the rock level during sustained high flows. The rock riprap alternative is preferred because it offers the highest level of protection.

EXHIBIT D

IMPACT: Loss of woody riparian habitat.

FINDING: Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the final EIR.

FACTS SUPPORTING FINDING:

The proposed project would require the removal of most existing vegetation at each site, grading of the slope and placement of rock riprap on the prepared slope. This work will result in the elimination of 7.4 acres of woody riparian habitat, a significant adverse impact. The Final EIR describes a mitigation plan, attached hereto and incorporated by reference, which would compensate for the loss of the riparian habitat. This mitigation plan was incorporated into the project by the Lead Agency, the State Reclamation Board, on April 17, 1987, at the time of project approval and EIR certification, 1987. The project as approved by the Board and now before the Commission thus includes measures which would avoid significant adverse impacts on the environment due to loss of riparian habitat.

IMPACT: Loss of shaded aquatic habitat and aquatic ecosystem productivity.

FINDING: Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the final EIR.

FACTS SUPPORTING FINDING:

The proposed project will result in significant adverse impacts on the aquatic ecosystem by removing shoreline vegetation, destroying submerged habitat, and changing nearshore water currents, temperatures, and clarity. An estimated 2.1 acres of aquatic habitat which is presently heavily shaded will be eliminated. The Final EIR describes a mitigation plan, attached hereto and incorporated by reference, which would compensate for the loss of aquatic habitat. As stated previously, this plan has been incorporated into the project as approved by the Reclamation Board.

IMPACT: Loss of aesthetic/recreation values due to loss of natural shoreline vegetation.

FINDING: Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the final EIR.

FACTS SUPPORTING FINDING:

Because the project will cause the elimination of natural terrestrial and aquatic habitats, the aesthetic quality of the waterways for boaters, anglers, or other recreational users will be significantly diminished. The loss in scenic values will be mitigated by the measures outlined in the Final EIR which are designed to compensate for loss in riparian and aquatic habitats discussed above. These measures, attached hereto and incorporated by reference, have been incorporated into the project as previously approved by the Reclamation Board.

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CALENDAR PAGE	219.7
MINUTE PAGE	2166

MITIGATION

Mitigation actions must be considered in a long-term context. In recent years, the impact of rock bank protection on fish and wildlife resources has been widely recognized. The loss of the linear vegetation corridor at the water's edge is considered especially critical. Phase I of the Sacramento River Bank Protection Project was constructed without mitigation measures included in the project plans; however, a recent congressional action, the Water Resources Development Act of 1986, approved a Corps report recommending mitigating fish and wildlife losses. Though estimates of actual losses incurred with Phase I have yet to be refined, Congress has authorized an expenditure of \$1.4 million for mitigation. Congress has adopted the Corps' report on this matter and authorized the expenditure; funding has yet to be appropriated. Recognizing that bank protection necessarily incurs losses to fish and wildlife, Phase II bank protection has been constructed with mitigation measures included as a condition of construction. Under an agreement between the Corps and FWS, about 10 percent of the total construction cost of the project have been allocated for mitigation. Actions taken have included the protection of berms with rock revetment to encourage regeneration of riparian vegetation, the acquisition of conservation easements, revegetation of the easements and upper levee slopes at the construction site, and purchase of riparian tracts off site.

A detailed evaluation of mitigation actions taken in the past was undertaken by FWS. In a report published in January 1987 ("Evaluation of Environmental Measures and Wildlife Values of Sacramento River Bank Protection Sites, Units 27 - 36 of Phase II, Part I", U. S. Fish and Wildlife Service, for the U. S. Army Corps of Engineers, January, 1987), it was determined that rock-ing of levee berms did not ensure regeneration of vegetation and habitat improvement and that maintenance practices after the placement of revetment had prevented the natural regeneration which would otherwise have occurred. Deficiencies with the mitigation easement acquisition program were also identified. Only 12 percent of the funds utilized for land acquisition went to the actual cost of the land while the remainder was spent on overhead, especially prolonged negotiations with unwilling sellers. This policy was changed in 1984 to make the program more cost effective. Purchase of riparian tracts offsite where valuable vegetation exists has generally been successful in preserving that vegetation. In a report published in March 1987 ("Evaluation of Primary Environmental Mitigation Measures Implemented for the Sacramento River Chico Landing to Red Bluff Bank Protection Project, U. S. Fish and Wildlife Service for the U. S. Army Corps of Engineers, March 1987), revegetation mitigation efforts were found to be largely unsuccessful in the Chico Landing to Red Bluff reach due to lack of horticultural maintenance, primarily watering, and land use conflicts.

Despite the serious problems noted above, State and Federal agencies view the mitigation concepts as valid and have committed to resolving the problems which have been identified. The agencies involved have agreed to evaluate environmental mitigation measures on a regular basis, undertake efforts to clarify written requirements concerning vegetation management and disseminate information to and solicit cooperation from maintaining agencies. This effort is now in the planning stage and will be undertaken in the summer of this year. The program will be directed at the entire Sacramento River Bank Protection Project area including Unit 41A.

The mitigation concepts which were considered for the Unit 41A project are the conservation easement, revegetation of berms at construction sites or previously rocked sites, purchase and rehabilitation of offsite lands, or various combinations of these techniques. The conservation easement is acquired either adjacent to the construction site or nearby. It entails the purchase of an easement from private property owners where natural vegetation is retained, is allowed to regenerate, or can be planted and conflicting uses are prevented. Depending on its location, the conservation easement may or may not fully compensate the loss of the valuable linear aspect and edge effect. In any event, this type of mitigation in the Unit 41A project area is limited by the fact that the levees border the channels leaving only small berms, if any, available for the easement form of mitigation. The remaining unrocked watersides of levees are subject to erosion and any future bank protection would make them unsuitable for mitigation easements. Cultivated fields and orchards border the landward side of the levees making the availability of willing sellers for conservation easements there unlikely. This is important because The Reclamation Board has depended on willing sellers for conservation easements since 1984 and has chosen not to use the State's power of eminent domain to obtain these easements.

A better opportunity for mitigating losses in the project area may exist through revegetation of certain previously rocked berms. This could address the loss of vegetation which, because of its linear distribution, is highly valued for terrestrial species. Although mudbank features can not be duplicated, impacts to aquatic species can be mitigated to a less than significant level only if vegetation is located at the water's edge. Several sites in the project area appear to have potential for revegetation having been constructed with a levee setback and low berms. The shoreline was then rocked to the top of the berm. In a few areas on Sutter and Miner Sloughs, alders have successfully established themselves at the top of the rock indicating that conditions are good for establishing vegetation. In the project area, a good example of a setback levee with a rocked berm is on Miner Slough, left bank, from its diversion from Sutter Slough to below the Ryer Avenue Bridge, a distance of about 2 miles. This levee and berm currently receive routine and thorough maintenance by Reclamation District 501. Maintenance practices include annual burning and herbicide treatments

which, if changed, would allow establishment of vegetation suitable for habitat mitigation. An additional area with a setback levee and berm is the Sacramento River left bank between Isleton and Walnut Grove (River Miles 19 - 26) where two of the Unit 41A sites are located (19.2 Left and 19.7 Left). Some of the rocky berms in this reach have extensive riparian vegetation while other areas are covered primarily by grasses. Berms and levees in the area have been under a maintenance regimen which has allowed regeneration of riparian species on the berms. The areas within this reach lacking in vegetation appear suitable for a revegetation effort which would aid in establishing the continuous linear band of vegetation on the water's edge desired by State and Federal agencies.

Another approach to mitigation involves assessing off-site possibilities in the Delta in a more regional context. Within a short distance (10 to 20 miles), there are a number of privately owned sunken islands, marginally productive agricultural tracts and other areas subject to frequent inundation which might be considered for either mitigation easements or purchase in fee. A special advantage to the acquisition of these areas could be that they could be developed to benefit aquatic species. In addition, there are publicly owned lands with mitigation potential which include excavation sites previously used for construction and, conversely, spoil sites for excess channel dredge material. (The Reclamation Board's 1,500-acre spoil site on the outskirts of Rio Vista might be considered. Staff for The Reclamation Board has indicated that habitat development here may be particularly suitable, in that vegetation could serve both to mitigate habitat loss and to ameliorate the nuisance of blowing dust which periodically impacts neighboring properties in the path of prevailing winds.) Lands suitable for mitigation, or portions of them, can be acquired, if not already owned, and held as a "mitigation land bank" wherein a property is owned in fee, leased for productive uses, and, as needed, developed for mitigation purposes. Acquisition of marginal lands for mitigation, either by easement or purchase, independent of additional environmental enhancement measures, of course, does not address the net loss of riparian habitat. Neither can the acquisition of already existing prime habitat fully mitigate for losses of other existing habitats. The net loss of habitat values must be mitigated by creation of new riparian habitat to replace that which is lost. Under a mitigation land bank program, a net loss can be avoided as new wildlife habitat is created through revegetation as needed for mitigation while remaining portions are used or leased for agricultural production or other suitable activity.

Another land acquisition technique for partial mitigation might involve the exchange of privately held land found to be particularly suitable for mitigation in exchange for excess excavation material from ongoing channel dredging which might be used for elevating and stabilizing presently subsided lowlands. Wildlife personnel have suggested that valuable wildlife habitat exists in the interior of many Delta islands along drainage canals and

pumping facilities and that conservation easements allowing the perpetuation of this vegetation would constitute a significant benefit to Delta wildlife. One problem with this strategy is the maintenance of drainage ditches for channel capacity conflicting with the preservation of their vegetation for wildlife. Another problem involves the expense of transporting dredge material. Because of high transportation costs, parcels close to dredge sites would be attractive and those farther away would be less suitable.

It is usually necessary to quantify habitat losses in order to successfully mitigate for them regardless of the mitigation method chosen. The most widely accepted means of accomplishing this is the Habitat Evaluation Procedure (HEP) developed by FWS. This technical and analytical procedure has been performed for bank protection sites on the upper reaches of the Sacramento River where a complex and diverse riparian ecosystem exists including numerous species of concern. For the Unit 41A area, FWS has performed a somewhat less detailed quantitative analysis under a planning aid agreement with the Corps. Their assessment of impacts coincides very closely with those presented in this report. Judgments concerning high, intermediate, and low habitat values generally coincided for each site. In this report, these vegetation types are, in ascending order of value, herbaceous, immature surrogate riparian/herbaceous, and mixed woody surrogate riparian. These classifications can be useful in identifying losses of vegetation types which are indicative of habitat values.

The mixed woody surrogate riparian habitat is the most highly valued of the three types found having mature trees and other vegetation concentrated at the water's edge where a complex intersection occurs benefiting both terrestrial and aquatic species. Some 3,678 linear feet of Unit 41A levees were found to be of this vegetation type. The highly valued shoreline vegetation and much of that remaining up the slope will be removed during project construction. The mitigation for this loss will necessarily reflect both terrestrial and aquatic impacts: land which can ultimately support habitat of equal value must be acquired and developed. The immature surrogate riparian/herbaceous vegetation type has potential to develop its species diversity and complexity over time through successional processes. Some 5,732 linear feet of Unit 41A levees were found to be of this type. Much of the vegetation will be removed leaving only a few scattered trees and herbaceous plants in the upper levee slope. The interruption of the successional processes constitutes an important long-term setback for vegetation which in time may have developed into a prime habitat. Compensation for this loss, given the long-term implications must be comparable to that of the higher quality category. The herbaceous vegetation type, of which some 3,116 linear feet are found at project sites, is usually found on poor sandy soils where successional habitat development is limited. The impact of bank protection on these sites is not significant and no mitigation is required.

The U. S. Fish and Wildlife Service provided quantitative data on habitat losses as stated above (see Figure 6). Analyses in the form of a Planning Aid Letter to the Corps of Engineers (February 24, 1987 letter - see Appendix D) estimated that 7.4 acres of terrestrial habitat and 2.1 acres of heavily shaded aquatic habitat will be lost as a result of the project. The losses of mixed woody surrogate riparian and immature surrogate riparian/herbaceous vegetation type (FWS termed "woody riverine riparian") were assigned a Resource Category 2 designation by the FWS as were the heavily shaded aquatic losses. According to federal policy, there must be no net loss of resources assigned this category.

Several options were presented by the FWS as mitigation for the projected losses (see FWS Planning Aid letters, Appendix D). Their preferred approach was selected by an interagency team representing the Corps, FWS, and Reclamation Board staff. The mitigation program developed involves revegetating berms after construction on those sites where adequate berms exist and revegetating previously rocked berms in the vicinity of the project sites where habitat development was deemed valuable. The FWS, using simplified HEP procedures, determined that 9.2 acres of berm including 6,273 feet of the water's edge must be revegetated (see Appendix 4 of FWS February 24, 1987 letter, Appendix D). A total of 9.5 acres was selected including 3.0 acres on eight construction sites and 6.5 acres on previously rocked berms in the general project area. Approximately 7,800 feet of waterside low berm plantings are included to address the specified requirement for 6,273 feet of such plantings to mitigate for aquatic habitat loss (see Figure 7).

The revegetation work will be undertaken under a contract administered by the Corps. The Corps will select and enter into a contract with a reputable contractor experienced with native plant revegetation. The placement of rock revetment will occur in the summer and fall of 1987 and revegetation installation will occur during the following planting season, October - November 1988. The mitigation program will be funded under the regular bank protection project. The revegetation contract will include a three-year maintenance agreement and will have a provision for annual inspections and plant replacements. Species selected include a variety of riparian species identified in the Corps "Riparian Planting Design Manual for the Sacramento River Chico Landing to Collinsville", May 1986. After the three-year establishment period, no special maintenance of the revegetation project areas should be required. The maintaining agencies responsible for the project levees where rock revetment and mitigation plantings are installed have been informed of the program and agree to support its objectives.

FIGURE 6
SOURCE: U. S. Fish and Wildlife Service

Summary of habitat impacts, by site, for Unit 41A of the Sacramento River Bank Protection Project.

SITE ^{a/}	HABITAT TO BE IMPACTED ^{b/}			OVERALL HABITAT VALUES ^{c/}	
	Waterside Length(Ft)	Woody Riparian/ Dense Horsetail Removed(Acres) ^{d/}	Heavily-Shaded Aquatic Removed(Acres)	Present	After Construc- tion
SS28.0L	100	0.03	<.01	L+	L
27.5R	750	0.57	0.13	H-	M-
26.0R	900	0.65	0.17	M+	L
25.5R	320	0.12	0.07	M	L
25.4L	320	0.15	0.07	M	L
25.0L	825	0.49	0.22	H-	L
22.9L	1,500	0.71	0.34	H+	M
22.5R	<u>1,415</u>	<u>0.93</u>	<u>0.17</u>	M+	L
Subtotals	6,130	3.65	1.17		
BS22.9R	675	0.48	0.13	H-	L+
21.2R	<u>850</u>	<u>0.45</u>	<u>0.23</u>	H-	L
Subtotals	1,525	0.93	0.36		
MS6.8R	1,360	0.78	0.20	M+	L
1.2L	<u>525</u>	<u>0.31</u>	<u>0.06</u>	M	L
Subtotals	1,885	1.09	0.26		
SR23.2R	287	(0.20)	0	L	L
19.7L	2,300	1.24	0.16	M	L
19.2L	<u>660</u>	<u>0.45</u>	<u>0.11</u>	H	L
Subtotals	3,247	1.69	0.27	H=6 M=7 L=2	H=0 M=2 L=13
TOTALS	12,787	7.36 ^{e/}	2.06 ^{f/}		

- a/ SS=Sutter Slough; BS=Steamboat Slough; MS=Miner Slough; SR=Sacramento River.
- b/ As determined from the Corps' construction drawings and 1986 aerial photographs.
- c/ Relative overall value of the bank protection work site to riparian wildlife species, as estimated using the procedures of DeHaven and Michny ("Evaluation of Environmental Measures and Wildlife Values of Sacramento River Bank Protection Project Sites, Units 27-36 of Phase II, Part I." USFWS Report prepared for Sacramento District, U.S. Army Corps of Engineers. January 1987. 58 pp.
- d/ Site SR 23.2R=dense horsetail riparian habitat; all other sites=woody riverine riparian habitat.
- e/ Total for woody riverine riparian habitat only, with site SR 23.2R excluded.
- f/ These are considered to be relatively conservative estimates of acreage, since the average width of all aquatic areas with overhanging vegetative canopy was assumed to be only 10.5 feet, although in many instances, the actual width was substantially greater than this.

Figure 7 - UNIT 41A MITIGATION SITES

Onsite Revegetation Sites - Estimated Revegetation Area

<u>Locations</u>	<u>Site Dimensions</u>	<u>Acres</u>
Sutter Slough 22.5 R	16' x 400'	0.1
Sutter Slough 22.9 L	Spot planting 1,500'	0.3
Sutter Slough 26.0 R	Spot planting 500'	0.3
Sutter Slough 27.5 R	20' x 400'	0.2
Miner Slough 6-8 R	15' x 400'	0.1
Sacramento River 19.2 L*	30' x 660'	0.5
Sacramento River 19.7 L*	25' x 2,300'	1.3
Steamboat Slough 21.1 R	15' x 600'	0.2
Estimated Onsite Total =		3.0

Offsite Revegetation Sites

Sutter Slough 27.0 R	Spot planting 500'	0.2
Miner Slough 7.0 - 7.5 L*	25' x 3,700'	2.0
Sacramento River 20.7 L	30' x 1,000'	1.0
Sacramento River 22.5 L	25' x 1,000'	0.5
Sacramento River 23 - 25 L*		
Site A	30' x 500'	0.3
Site B	40' x 200'	0.2
Site C	15' x 150'	0.1
Site D	25' x 300'	0.2
Sacramento River 17.5 R	25' x 3,700'	2.0
Estimated Offsite Total =		6.5
ESTIMATED TOTAL ACREAGE =		9.5

*Sites to mitigate aquatic habitat losses.

APPENDIX D

FWS Planning Aid Letters to Corps
February 24 and March 9, 1987

CALENDAR PAGE	213.15
MINUTE PAGE	2174



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, California 95828

February 24, 1987

Colonel Wayne J. Scholl
District Engineer
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Subject: CE-Sacramento River Bank Protection Project, Unit 41A.
Specification No. 8054

Dear Colonel Scholl:

This letter presents our comments on Specification No. 8054 for Unit 41A of the Sacramento River Bank Protection Project. These comments were prepared under the authority and provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

PROJECT DESCRIPTION

The Sacramento River Bank Protection Project is a continuing construction project authorized by the 1960 Flood Control Act to provide protection for the 977 miles of existing levees of the Sacramento River Flood Control Project (Authorized by the Flood Control Act of 1917). In Phase I of the Sacramento River Bank Protection Project, which was completed in 1975, a total of 430,000 linear feet of bank protection work was completed. Phase II, approved by Congress in 1974, allowed an additional 405,000 linear feet of protection work; slightly more than half of this amount has now been completed.

The Phase II work area extends along about 194 miles of the Sacramento River from River Mile (RM) 0.0 near Collinsville (Solano County) to RM 194.0 about 5 miles southwest of Chico (Butte County). Several large sloughs (Elk, Georgiana, Miner, Steamboat, and Sutter) downstream of Sacramento, as well as limited portions of the lower Bear River in Yuba County and Elder Creek in Tehama County, are also authorized as bank protection areas.

Unit 41A of the project entails construction at a total of 15 sites located along the Sacramento River and three adjacent sloughs; all 15 of the sites are located downstream from the City of Sacramento. Three of the sites are on the Sacramento River a few miles upstream from Isleton (RM 19.2 to RM 23.2), two sites are on Miner Slough (RM 1.2 and RM 6.8), two sites are on

Steamboat Slough (RM 22.5 to RM 23.0). The total waterside length of the 15 work sites is about 12,800 linear feet, or 2.42 miles.

Bank protection work at the Unit 41A sites will be similar to previous units of the project. The necessary stabilization and protection of each site is to be achieved by mechanically sloping the river bank or berm and covering it with stone revetment. The uniform slope which is desired will generally be attained by both excavating and filling. When filling is done, rock fill will be used below the water line and compacted soil will be used above the water line against the bank or levee.

GUIDELINES FOR FISH AND WILDLIFE ANALYSES

The guidelines for our analyses of this particular unit of the project are basically the same as those described previously for other recent units of the project. Our recommendations are based on the Fish and Wildlife Service's Mitigation Policy as published in the Federal Register of January 23, 1981 (Vol. 46:15). As you are aware, the Mitigation Policy provides internal guidance for establishing and standardizing compensation analyses for projects under our purview. Under the Mitigation Policy, each distinct wildlife habitat affected by a project is assigned one of four Resource Categories to ensure that any compensation we recommend for the habitat is consistent with the fish and wildlife values involved. The Resource Categories cover a broad range of habitat values from those considered to be unique and irreplaceable to those believed to be of relatively low value to wildlife resources. As described below, we have designated a Resource Category for each of the three basic habitat types -- woody riverine riparian, heavily-shaded riverine aquatic and dense horsetail riparian -- to be impacted by the Unit 41A construction.

Woody riverine riparian has also been termed riparian forest and riparian woodland. The trees typical of woody riverine riparian sites of Unit 41A are primarily alders, willows, cottonwoods and oaks (in that order), although a few other species such as sycamores, ashes, and locusts are also present. The understory of the woody riverine riparian type is typically composed of various mixtures of young trees, blackberries, poison oak, wild grape, and various grasses, sedges, and other herbaceous growth.

The evaluation species selected to determine the Resource Category for the woody riverine riparian habitat to be impacted by Unit 41A were raptorial birds, herons and egrets, songbirds, and woodpeckers. These species were selected because of their high interest and value to the public, particularly for such activities as "bird-watching", and because they are believed to represent in a broader perspective, the general ecological "health" of the area.

For raptors, including the red-tailed hawk and Swainson's hawk, woody riverine riparian habitat often provides the only remaining natural nesting areas available; in addition, the mature trees in particular provide the

high perching areas that many raptors require for resting and hunting. Woody riverine riparian areas are also the primary nesting habitat and communal roosting habitat of several heron and egret species; woody vegetation which overhangs the waterways also provides important feeding sites for some heron species such as the green-backed heron. A wide range of songbirds are supported by woody riverine riparian habitat because of the many ecological niches provided for feeding, nesting, and resting in the various elevations of the tall trees, in the smaller trees and shrubby undergrowth, in the varied ground cover of the forest floor, and in the dead trees and snags. Moreover, several species of woodpeckers are also highly dependent on the dead trees and snags as nesting and feeding areas. Overall, the woody riverine riparian habitat is easily one of the most important wildlife habitats of the Sacramento-San Joaquin Delta and Central Valley. This type of habitat was once extensive over the various floodplains of rivers and tributaries of the Central Valley and the outer margins of the Delta. However, these stands and the riparian forests which existed along some of the Delta's natural levees have now been largely eliminated. Today, less than 2 percent of the original (historical extent) riparian forest remains along the Sacramento River between Collinsville, in the Delta, and Red Bluff. Because of the high value of woody riverine riparian habitat and its relative scarcity within the Delta-Central Valley biotic community, we have assigned this habitat to Resource Category 2. Our mitigation goal relative to Unit 41a will be no net loss of in-kind habitat value.

The second habitat type to be impacted by the construction of Unit 41A is heavily-shaded riverine aquatic. This aquatic habitat occurs along the edges of waterways with significant overhanging woody vegetation. Usually, 10 feet or more (horizontally) of vegetation overhangs the water, providing a dense vegetative canopy (i.e., 100 percent canopy cover at least 3 ft. in vertical thickness) close to (i.e., within 3 ft.) the water's surface such that it provides complete shade during a significant portion of each daylight cycle. Other important characteristics of this habitat are the presence in the heavily-shaded water of (1) exposed roots of the woody plants, and (2) fallen logs, branches, leaves, and other woody plant material. Also, the banks of this aquatic habitat type are often uneven with many depressions, cavities, and crevices.

The evaluation species chosen for determining the Resource Category for heavily-shaded riverine aquatic were sunfish (Centrarchidae family), channel catfish, and furbearing aquatic mammals (beaver and muskrat). Sunfish and the channel catfish were selected because of their very high importance to anglers in the Delta and Central Valley; the furbearers were chosen partly for their limited economic value, but more importantly, for their ability to indicate the general ecological health of the overall aquatic community.

For sunfish and the channel catfish, heavily-shaded riverine aquatic habitat is highly important in providing essential spawning cover; however,

other benefits are also provided, including escape cover for rearing of young, shade for moderating water temperatures, and food--both directly (from insect drop from the overhanging vegetation) and indirectly (from organisms inhabiting the fallen organic matter). For aquatic furbearers, heavily-shaded riverine aquatic areas often provide the only remaining habitat within the riverine areas of the Delta and Central Valley. In the area where the construction from Unit 41A will occur, heavily-shaded riverine aquatic habitat is becoming scarce overall, primarily because of past project construction activities (last 15-20 years). Because this habitat type is becoming scarce and of high value for the evaluation species, it is assigned to Resource Category 2. Our mitigation goal will be no net loss of in-kind habitat value.

The third primary habitat type to be impacted by Unit 41A construction is dense horsetail riparian. Horsetail (Equisetum spp.) is a herbaceous, somewhat fire-resistant plant having an unusually high silica content and relatively low overall values to wildlife. The particular evaluation species selected for the dense horsetail riparian type were small mammals and songbirds. This habitat type provides cover and some food for shrews, voles, mice and other small mammals; at certain times a few species of seed-eating songbirds also utilize horsetail seeds for food. Overall, dense horsetail riparian is a rather common habitat type found along the levees of the Delta, especially where annual burning is done as part of levee maintenance activities. Therefore, for the Unit 41A analysis, dense horsetail riparian habitat has been placed into Resource Category 4, with a mitigation planning goal to minimize any loss of habitat value.

We also want to reiterate two other recent general planning goals the Fish and Wildlife Service and the Corps of Engineers have mutually developed and agreed to with respect to Phase II of this project. First, in lieu of a Habitat Evaluation Procedures analysis for each new unit of construction, it is recognized that a quicker, less-accurate approach to impact analyses may be acceptable, and that in such abbreviated analyses, the following general guideline will be used: approximately 10 percent of all construction costs of the Project shall be available for environmental measures. The second mutually agreed upon goal is that both agencies shall strive to maintain where practical the existing linear distribution (in terms of both acreage and value) of woody riparian habitat along the Sacramento River. In the lower Sacramento River and Delta, where Unit 41A is located, maintenance of a woody riparian corridor is particularly critical because of its limited abundance. The continued survival of some wildlife species, including the State-listed (threatened) Swainson's hawk depends on the maintenance of what woody riparian habitat remains there now.

PRESENT HABITAT CONDITIONS OF UNIT 41A SITES

Each of the 15 proposed construction sites for Unit 41A was visually examined from both the Corps' aerial photographs (July 1986; as provided

CALENDAR PAGE	215.19
MINUTE PAGE	2178

with the construction drawings) and from the ground (January 15-16, 1987). Then, based on the overall present estimated values of each site to the various evaluation species, each site was assigned an overall index value of either high (H), moderate (M), or low (L). These indexes were assigned following the general procedures used in our recent evaluation of previous Sacramento River Bank Protection Project mitigation (completed for the Corps' Sacramento District; see "Evaluation of Environmental Measures and Wildlife Values of Sacramento River Bank Protection Project Sites, Units 27-36 of Phase II, Part I." 55 pp. dated January 1987). In general, the larger the acreage of each site, and the more woody riverine riparian habitat or heavily-shaded riverine aquatic habitat present, the higher the index that was assigned. In some instances, if the overall existing habitat of a site appeared to be somewhere between two index categories (e.g., between L and M or between M and H), a "+" or "-" sign was used in conjunction with the index value to better describe the existing habitat condition.

The indexes to overall present habitat condition which were assigned to the 15 sites are given in Appendix 1. The site on the Sacramento River at RM 23.2 R was given the lowest (L) overall rating. This was the only site with primarily a dense horsetail cover type. At the other extreme, the site given the highest index rating (H+) was RM 22.9L along Sutter Slough; this 1,500 foot long area presently has a remnant berm averaging 15 to 30 feet in width, and it contains about 200 moderate-to-large trees (primarily alders). The sites having the largest total existing areas of woody riverine riparian habitat were (in descending order) RMs Sacramento River 19.7L, Sutter Slough 22.5R, Miner Slough 6.8R, Sutter Slough 22.9L, Sutter Slough 26.0R, and Sutter Slough 27.5R. The sites having the largest total areas of heavily-shaded riverine aquatic habitat (also in descending order) were Sutter Slough 22.9L, Steamboat Slough 21.1R, Sutter Slough 25.0L, and Miner Slough 6.8R. On an overall basis, six of the 15 sites were high in existing fish and wildlife values, seven were moderate, and only two presently had low values.

IMPACTS OF UNIT 41A CONSTRUCTION

From review of the engineering drawings and aerial photographs for this unit of construction, together with our on-site inspections made January 15-16, 1987, we estimated the acreages to be impacted for the various habitat types. Results indicate that about 7.4 acres of woody riverine riparian habitat will be removed (Appendix 1) and converted to primarily bare ground. This figure includes a loss of about 3.7 acres along Sutter Slough, 1.1 acres along Miner Slough, 0.9 acre along Steamboat Slough, and 1.7 acres along the Sacramento River. At two sites (RMs Sutter Slough 28.0L and Sacramento River 23.2R), no significant trees exist now. At the other 13 sites, significant numbers of trees do exist and most of them will be removed during construction. At 10 of the 13 sites, a minimum of from 12 to 75 trees will be removed from each site; fewer than 10 trees will be removed at each of the other three sites. A quantification of the relative

numbers of other woody plants (i.e., small trees and shrubs) to be removed during construction was not feasible, due to time constraints.

The total amount (i.e., water surface area) of heavily-shaded riverine aquatic habitat to be removed (i.e., converted to open-water aquatic) during construction is estimated to be 2.1 acres (Appendix 1). The loss of this habitat type will be largest on Sutter Slough (1.2 acres lost), followed by Steamboat Slough (0.4 acre), the Sacramento River (0.3 acre), and Miner Slough (0.3 acre). The individual sites with the largest and smallest surface area losses of shaded riverine aquatic habitat will be Sutter Slough 22.9L (0.4 acre) and Sutter Slough 28.0L (<0.01 acre), respectively; the 13 other work sites will lose from about 0.1 to 0.2 acre each of this aquatic type.

The only other habitat loss of concern will be the estimated 0.2 acre of dense horsetail riparian at site Sacramento River 23.2R (Appendix 1); which will be converted primarily to bare ground.

Based on the construction information provided, we were also able to estimate the probable overall post-construction habitat value of each site (Appendix 1) using the indexing procedure referenced earlier. Accordingly, we estimate that 13 of the sites will have low overall habitat values following construction. The two sites of moderate post-construction value (i.e., RMs Sutter Slough 27.5R and Sutter Slough 22.9L), and another site (Steamboat Slough 22.9R) L+ in overall habitat value (post-construction) will not be reduced as low in habitat value as they might otherwise have been (i.e., to L or L-). This is because significant trees will be avoided during construction and left standing. (Additional discussion of "impact avoidance" follows below.)

MITIGATION ALREADY PLANNED

The Corps of Engineers' plan includes three general kinds of mitigation for the Unit 41A construction: rock fill, select clearing, and specific tree avoidance. Rock fill will be utilized at all 15 of the sites; therefore, we will assume that, as with other recent bank protection work completed downstream from Sacramento, 20 percent of total costs for rock fill will be considered as "environmental" costs for protecting the erodable berm areas (i.e., without rock fill protection, some berms would slowly be lost to erosion). Ten of the construction sites have berms, although they are relatively narrow remnants, ranging from only about 13 to 30 feet in average width (Appendix 2). We estimate that following construction, these ten sites will have about 3.6 acres of total berm area remaining. The use of rock fill as an environmental measure for protecting berms was evaluated recently in our mitigation report (referenced earlier in this letter) for Units 27-38 of the Sacramento River Bank Protection Project and will not be discussed further here.

Select clearing of vegetation within the "Select Clearing" zone along the upper waterside levee slopes of the construction sites is another kind of mitigation planned. Unfortunately, the potential of this approach for preserving existing woody riparian growth is relatively small for this particular unit of the Sacramento River Bank Protection Project. Very little woody vegetation exists within any of the Select Clearing zones. Even with maximum vegetation avoidance, which based on our past observations is unlikely, a total of only about 0.5 acre of woody vegetation would be left standing in the Select Clearing zones at seven of the construction sites (Appendix 2). At the eight other sites, there is essentially no woody growth present within the Select Clearing zones. Nevertheless, in calculating the total acreages of each habitat to be impacted during Unit 41A construction (see above section), we have optimistically assumed that all or most of the vegetation which could be retained in the Select Clearing zones will in fact be retained.

Specific tree avoidance is the third general kind of mitigation planned. As mentioned earlier, three of the sites (RMs Sutter Slough 22.9L, Sutter Slough 27.5R, and Steamboat Slough 22.9R) will have noticeably higher overall post-construction habitat values than they would otherwise have had, due to the avoidance of specific trees during construction. The total number of trees to be avoided at these three sites is about 129 (Appendix 2). At six of the other sites, about 33 total additional trees will be avoided. We commend the Corps' decision to avoid impacting such a large number of trees. However, we noted that the trees specified for avoidance on the engineering drawings were frequently either difficult to locate on the ground or appeared to be misidentified as to species. In addition, the engineering drawings that we received generally did not provide adequate legends; symbols for "trees to be saved" and "trees to be removed" were quite similar (i.e., the same type of symbol, except with thinner lines). These deficiencies could increase contractor error, thereby making compliance (with the specific tree avoidance specifications) difficult. Nevertheless, we have assumed that all of the trees marked for retention on the drawings will, in fact, be avoided during the construction.

Our measurements indicate that the specific tree avoidance plan should result in retention of about 1.0 acre of woody riverine riparian habitat and up to about 0.05 acre of heavily-shaded riverine aquatic habitat which would have otherwise been lost during construction.

Although the avoidance of a few specific trees may not always greatly increase a particular construction site's immediate overall post-construction habitat value (compared to if all trees were removed during construction), individual trees can meet some limited habitat needs of some wildlife species. And more importantly, we believe that such tree avoidance, especially where multiple trees are involved, can greatly enhance the natural revegetation process following the construction activity.

and wildlife habitat values of upland habitat which will gradually be created following construction. Therefore, we have no specific compensation recommendations for this particular habitat loss.

We view the losses of the woody riverine riparian and heavily-shaded riverine aquatic habitats (both Resource Category 2) as much more serious. Specific, in-kind compensation must be provided for both of these habitat losses. The alternative compensation plans which we provide later in this section are based on the criteria presented earlier under the section Guidelines for Fish and Wildlife Service Analyses. For each of these two Resource Category 2 habitats, Plan 1 is our preferred plan and the only plan that we believe is capable of providing full compensation for the habitat values lost as a result of the construction.

Our preferred alternative plans for compensation involve intensive replanting efforts. We realize that revegetation via replanting has yet to be demonstrated as a visible compensation procedure by the Corps. However, the Corps has recently gained considerable new procedural guidance for riparian replanting as a result of the completion of its Riparian Planting Design Manual. There are also many successful examples of riparian replanting by other agencies and projects from which to draw guidance. The O'Neil Forebay State Wildlife Area (for the joint State Water Project/Central Valley Project San Luis Unit) replanting project is one such successful example. In addition to drawing from the Corps' Riparian Planting Design Manual and the experiences of other successful replanting efforts, the Corps can also help ensure the success of the recommended replanting by adhering to appropriate specifications within replanting contracts. For example, the contractor(s) should be required to maintain the new plantings for several years (preferably at least 3) and to provide annual progress reports to the Corps and Fish Wildlife Service on maintenance activities and relative plant survival. If mortalities of plants exceed certain limits, replacement plantings should be required. At the termination of the contract period, specified plant densities or numbers of plants must have been achieved at each replanted site.

Another prerequisite to replanting is the implementation of adequate protection for each recommended replanting site. Protection may be via purchase in fee, purchase of a formal "environmental" easement, or development of a specific land protection agreement with the appropriate landowner/reclamation district. We believe that the latter approach has significant potential and should be pursued as an alternative to the more "generic" Right 8 easement which is typically sought. If the Right 8 easement approach is selected, however, the easement statement itself should be modified as recommended in our recent report (referenced

earlier). In addition, all areas purchased in fee or protected by easements or other agreements should be prominently marked. At a minimum, conspicuous signs are needed at all four corners and at not less than 300 foot intervals along boundary lines. Finally, consideration should be given to having the State Wildlife Conservation Board conduct all purchasing, or of transferring all compensation areas to them for management (with rights necessary to fulfill flood control objectives retained by the Reclamation Board). In lieu of transferring title, other means (satisfactory to the Fish Wildlife Service and California Department of Fish and Game) should be implemented to ensure the protection of wildlife habitat values on the compensation lands.

If carefully followed, we believe that the guidelines for replanting just discussed can, and will, result in the ultimate success of the replanting efforts recommended in the preferred alternative plans which follow:

I. Replacement of Woody Riverine Riparian Habitat

Plan 1. -- With this plan, our preferred alternative, 8.6 acres of woody riverine riparian habitat would be redeveloped by replanting a number of low-value, non-woody riverine areas. This replanting would provide full compensation for the 7.4 acres of this habitat which the Unit 41A construction will remove. For a discussion of how the 8.6-acre compensation need was derived, refer to Appendix 3.

The sites recommended for replanting are listed in Appendix 4. Nine sites from 0.1 to 1.3 acres in size are berm areas from the Unit 41A construction. Four sites from about 0.2 to 2.0 acres in size are berm areas from previous (nearby) construction units of the Sacramento River Bank Protection Project. These 13 berm areas will provide a total of 6.8 acres of the required compensation acreage. The additional 1.8 acres needed for replanting should be obtained from not less than two more riverine berm areas (presently without woody vegetation) elsewhere in the Sacramento-San Joaquin Delta or along the Sacramento River downstream of Sacramento. Due to time constraints on our analyses for Unit 41A, we have been, as yet, unable to identify more precisely the locations for these additional 1.8 acres.

Appendix 4 also describes in general, for each site, the woody plant types we recommend for planting and the final plant densities which should be achieved. These general recommendations are based on the actual or probable vegetative condition and composition of each site before any Sacramento River Bank Protection Project work was completed. The Corps' Riparian Planting Design Manual should be utilized to develop more specific replanting criteria as necessary, based on the soil, moisture conditions, and other factors particular to each site.

Plan 2. -- The second alternative is to provide only "environmental" protection (from excessive levee maintenance practices) for each site

indicated in Plan 1, using an easement or other agreement approved by Fish and Wildlife Service and California Department of Fish and Game. The protection provided must be sufficient so that the maximum allowable natural regeneration of woody plant growth will occur. Replanting is not included in this plan. The total acreage required for compensation in this manner is 15.6 acres. This figure was derived the same way as the compensation requirement for Plan 1, except that two additional assumptions were made: (1) instead of full habitat values being achieved (following the construction) in 20 years, 32.5 years would be required; and (2) based on past experience with Right 8 easements (as indicated in our recent Sacramento River Bank Protection Project mitigation evaluation referenced earlier) the proposed "environmental" protection would probably at best be only about 50 percent effective. Because only 8.8 acres of specific areas are identified in Appendix 4, 8.8 acres of the mitigation would be needed at as yet, unidentified bars sites of the Sacramento River Bank Protection Project (preferably downstream from Sacramento) or in other nearby areas of the Delta. To achieve the goal of maintaining linearity in habitat distribution, this 8.8 acres should be divided among at least four sites. Also, it is assumed that all sites making up the 8.8 acres would have little or no existing woody plant growth at present.

Plan 3. -- The third alternative involves the purchase (by fee title or easement) of one or more existing agricultural row crop areas and converting them to riparian forest habitat, either by providing complete "environmental" protection to perpetuate natural successional regrowth (estimated to require 32.5 years) or by replanting (estimated to require 20 years). No specific sites have, as yet, been selected for this plan. However, the site criteria have been identified as follows: (1) they must be less than 3 miles from a unit 41A construction site; (2) they must be located along the edges of Delta agricultural islands in areas where, in general, the existing woody riparian growth is now sparse; (3) they must be adjacent (on the landward side) to levees along riverine systems; and (4) they must have moist soil conditions, particularly if the "natural regrowth" option is to be pursued.

From our perspective, this plan is not the most desirable alternative. It would fail to fully duplicate in-kind the woody riverine riparian habitat which is being removed. Moreover, the relative "clumpiness" of the new habitat would result in less habitat value per unit area -- because of greatly reduced "edge" -- than the existing, much more linearly distributed habitat which the construction will remove. As an example, if we assume that the existing woody habitat to be removed at the sites on the average is 10,000 feet long and 32 feet wide, then the amount of edge available equals 20,064 feet. If compensation for the same size of impact area (7.4 acres) is placed within a generally circular-shaped area, then the amount of edge drops to just 2,010 feet, about a ten-fold decrease. Assuming further that the 10-fold drop in edge results in at least a 5-fold reduction of habitat values (a reasonable assumption, but not a precise estimate), compensation which is clumped in circularly-shaped plots may

require up to 5 times as much acreage as the linearly-distributed habitat being removed.

Based on the above guidelines and the general procedure of Appendix 1, the estimated compensation needs under two of the numerous possible scenarios following this plan are as follows: (1) Replanting -- 43 acres needed (about 8.6 acres at each of five sites); and (2) Natural Revegetation (with 100 percent "success") -- 52 acres needed (about 10.4 acres at each of five sites. Of course, the total acreage needed would decrease if more sites or more linearly-shaped sites were selected and would proportionately increase if fewer circularly-shaped sites (further reducing edge) were utilized. In any event, we reiterate that this plan would not provide full compensation because specific in-kind replacement would not be achieved.

Plan 4. -- Another alternative is that of replanting following a combination of the schemes given in Plans 1 and 3. The overall acreage required for compensation with this approach will vary widely, depending on how many of the specific berm areas identified in Appendix 4 are replanted and how much existing row-crop acreage is converted. The berm areas in Appendix 4 are presented in their relative order of preference (with the most preferred for replanting given first), and should be chosen in this order for inclusion in this plan. With any given acreage of berm area that is selected for replanting, the acreage of row crops necessary for conversion to woodland can also be determined, using the basic relationships already presented. We consider Plan 4 to be the next-to-least desirable alternative for the same reason Plan 3 was considered undesirable (in-kind replacement is not achieved).

II. Replacement of Heavily-Shaded Riverine Aquatic Habitat

Plan 1a. -- Revegetation guidelines applicable to the Sacramento River Bank Protection Project do not permit trees to be replanted in the revetted slopes. Therefore, replanting of in-water and waterside trees at locations where they are actually removed during construction will not be possible. One realistic alternative, and our preferred plan, is the replanting of a single row of trees (probably alders) along the outside (waterside) edges of existing, mainly unvegetated berms, especially low-berms. A preferred area for such planting exists along the south bank of Miner Slough, roughly between RMs 6.9 and 7.6 where significant low-berms occur. If additional areas are required, they should be selected within 3 miles of one of the Unit 41a construction sites. The total length of low-berms that must be replanted in this manner is 4,705 feet, assuming that either Plan 1 or Plan 2 (or combination thereof) is implemented to replace the woody riverine riparian habitat being removed. If neither Plan 1 nor Plan 2 is implemented, then the replanting requirement would be increased to 6,273 linear feet. For a brief summary of how these compensation requirements were calculated, refer to Appendix 3. Note also that this plan, while it is our preferred option for replacing the lost aquatic habitat, probably cannot provide full in-kind replacement of the lost aquatic habitat values.

The problem is that the lost habitat values associated with in-water and waterside trees which are removed cannot be fully duplicated by trees growing on a berm area several feet away from the water's edge.

Plan 2a. -- A second alternative involves the planting of artificially-built low-berms in riverine areas where berms do not presently exist. The artificial low-berms would be constructed using relatively small rock following the general design used for the low-berms which were built along the upstream portions of Steamboat Slough during earlier units of the Sacramento River Bank Protection Project. However, to minimize costs, the low-berms would be very narrow -- only about 5 to 10 feet in width. To achieve better stability, the low-berms could be enclosed with wire mesh. A possible variation of this approach would be to construct narrow gabions a few feet offshore from the berm or levee slope. Planting of the low-berms or gabions would then proceed as recommended under Plan 1a. Assuming the surfaces of the low-berms or gabions were built very near the mean water level, the replanted trees would eventually provide about twice and three times as much habitat replacement values, respectively as trees which would be planted on the higher berms as specified under Plan 1a. Thus, only about 2,400 linear feet of artificial low-berms or 1,800 linear feet of gabions would have to be built and planted in this manner (assuming that Plan 1 or 2 is also implemented). Although Plan 2a would be relatively expensive if used as the only compensation approach, it may be realistic for meeting at least a portion of the total compensation requirement for the loss of heavily-shaded riverine aquatic habitat.

Plan 3a. -- A third alternative is to replace the loss of aquatic habitat values by installing various artificial shade/cover/food-producing structures and devices alongside denuded berm areas. One option is the tethering of large, dead trees to the bank at the approximate mean water level. Another possibility is to embed dead trees within in-water rock deflectors such as has been done on the Newaukum River, Washington bank protection project (see Wildlife Resource Notes, Vol. 4(1):5-7, CE/Wash., D.C.). The number of trees and rock deflectors required for compensation is difficult to predict; however, it seems reasonable to assume that at least 2,400 linear feet (i.e., the same as with low-berms under Plan 2a) would be needed. A third option could be to install cylindrical, perforated, heavy metal containers in the riprap at regular intervals near the mean water level. The containers would be filled with soil, planted with relatively small (when mature) woody plants such as button willows, and then recovered with riprap. This technique would have the advantage of limited interference with engineering needs. A variation to achieve the same goal would be to place mats interwoven with willow cuttings under the riprap at selected locations. Any approaches using artificial structures could be costly, may interfere with flood control functions, and are not likely to provide for the full replacement of lost aquatic habitat values. However, field testing of these approaches on a limited scale is certainly appropriate to determine their feasibility in mitigation planning for the Sacramento River Bank Protection Project.

CONCLUSIONS AND SPECIFIC RECOMMENDATIONS

We are extremely concerned about the losses of 7.4 acres of woody riverine habitat and 2.1 acres of heavily-shaded river aquatic habitat which will occur as a result of construction of Unit 41A. We have designated these habitats as Resource Category 2, with mitigation goals of no net loss of in-kind habitat values. We also have developed with your staff an overall goal with respect to the Sacramento River Bank Protection Project of maintaining the existing linear distribution (in terms of both acreage and value) of woody riparian habitat along the Sacramento River.

We recommend that compensation for the Unit 41A habitat losses be provided through implementation of Plans 1 and 1a. These plans are based on replanting of vegetation. As discussed earlier, each site selected for replanting should be protected by easement or other agreement and conspicuous signs. Replanting specifications should be developed both from our recommendations and the Corps' Riparian Planting Design Manual. Contractors who complete the replanting should be required to meet certain specifications as discussed earlier. Regular follow-up inspections of replanted areas should be conducted by Corps of Engineers, Fish and Wildlife Service and California Department of Fish and Game.

Should implementation of Plans 1 and 1a be impractical for any reason, our next most-preferred plans are listed in their relative order of desirability under each habitat type within the preceding section. If only a portion of any plan can be implemented, the remainder of the compensation requirements for that habitat should be achieved using one or more of the other plans. The total acreage of compensation needed under a multiple-plan scenario can be determined using the relative compensation ratios presented within the individual plans.

In addition, we have four related and concluding recommendations. These are:

1. The Corps' of Engineers inform in writing (before the start of construction) each Unit 41A contractor who is involved with construction at sites where trees are to be retained of the numbers, species, and general locations of such trees.
2. If the artificial structures described in Plan 3a are not otherwise implemented as part of the compensation scenario for this construction, at least five examples of the "tethered log" concept and two examples of the "deflector/log" concept be built within the construction area to serve as initial demonstration and test units. The "metal container", "willow matting", and "gabion" (see Plan 2a) concepts should also be further examined and field-tested, if appropriate. These various concepts may be needed for achieving full compensation at future bank protection units.

3. The "upright log-in-berm" concept (see the recommendations in our January 1987 mitigation report for Units 27-36 of the Sacramento River Bank Protection Project) also be implemented at one of the Unit 41A sites for demonstration and future evaluation. A site with a relatively wide berm and with large trees being removed (e.g., Sutter Slough 27.5R or Sacramento River 19.2L) should be utilized. At least five such logs should be erected at equal spacings along the berm.
4. Following implementation of the compensation for Unit 41A, annual multi-agency field inspections be arranged to evaluate overall mitigation success.

We appreciate the opportunity to provide comments on Unit 41A of this project. Will you please inform us in writing as soon as practical of the specific compensation plan that you intend to implement for this unit of construction? If you have any questions or comments regarding this letter, please contact Mr. Richard DeHaven or Mr. Frank Michny of my staff at (916) 978-4613.

Sincerely,

Fred T. Nakaji

Fred T. Nakaji
Acting Field Supervisor

- cc: (with 5 attachments):
- Reg. Dir., AFWE, FWS, Portland, OR
 - SESO, FWS, Sacramento, CA
 - Dir., CDFG, Sacramento
 - Reg. Mgr., CDFG, Reg. II, Rancho Cordova
 - NMFS, Santa Rosa
 - State Reclamation Board, Sacramento
 - DWR (Attn: Jim King), Sacramento
 - State Lands Commission (Attn: Dianne Jacobs), Sacramento
 - Friends of the River, Sacramento
 - Defenders of Wildlife (Attn: Richard Spotts), Sacramento

CALENDAR PAGE	213.29
MINUTE PAGE	2188

Appendix 1. Summary of habitat impacts, by site, for Unit 41A of the Sacramento River Bank Protection Project.

<u>SITE</u> ^{a/}	<u>HABITAT TO BE IMPACTED</u> ^{b/}			<u>OVERALL HABITAT VALUES</u> ^{c/}	
	Waterside Length(Ft)	Woody Riparian/ Dense Horsetail Removed(Acres) ^{d/}	Heavily-Shaded Aquatic Removed(Acres)	Present	After Construc- tion
SS28.0L	100	0.03	<.01	L+	L
27.5R	750	0.57	0.13	H-	M-
26.0R	900	0.65	0.17	M+	L
25.5R	320	0.12	0.07	M	L
25.4L	320	0.15	0.07	M	L
25.0L	825	0.49	0.22	H-	L
22.9L	1,300	0.71	0.34	H+	M
22.5R	1,415	0.93	0.17	M+	L
Subtotals	6,130	3.65	1.17		
BS22.9R	675	0.48	0.13	H-	L+
21.2R	850	0.45	0.23	H-	L
Subtotals	1,525	0.93	0.36		
MS6.8R	1,360	0.78	0.20	M+	L
1.2L	- 525	0.31	0.06	M	L
Subtotals	1,885	1.09	0.26		
SR23.2R	287	(0.20)	0	L	L
19.7L	2,300	1.24	0.16	M	L
19.2L	- 660	0.45	0.11	H	L
Subtotals	3,247	1.69	0.27	H=6 M=7 L=2	H=0 M=2 L=13
TOTALS	12,787	7.36^{e/}	2.06^{f/}		

- ^{a/} SS=Sutter Slough; BS=Steamboat Slough; MS=Miner Slough; SR=Sacramento River.
- ^{b/} As determined from the Corps' construction drawings and 1986 aerial photographs.
- ^{c/} Relative overall value of the bank protection work site to riparian wildlife species, as estimated using the procedures of DeHaven and Michny ("Evaluation of Environmental Measures and Wildlife Values of Sacramento River Bank Protection Project Sites, Units 27-36 of Phase II, Part I." USFWS Report prepared for Sacramento District, U.S. Army Corps of Engineers. January 1987. 58 pp.
- ^{d/} Site SR 23.2R=dense horsetail riparian habitat; all other sites=woody riverine riparian habitat.
- ^{e/} Total for woody riverine riparian habitat only, with site SR 23.2R excluded.
- ^{f/} These are considered to be relatively conservative estimates of acreage, since the average width of all aquatic areas with overhanging vegetative canopy was assumed to be only 12.5 feet, although in many instances, the actual width was substantially greater than this.

Appendix 2. Summary of mitigation already included, by site, for Unit 41A of the Sacramento River Bank Protection Project (based on Corp's engineering drawings).

<u>SITE</u> ^{a/}	ROCK FILL UTILIZED?	"SELECT CLEARING" ZONE-POTENTIAL TO SAVE WOODY GROWTH? (Acres) ^{b/}	SPECIFIC TREES TO BE LEFT STANDING? (Number-Kind)
SS28.0L	Yes	No	Yes: 1-oak
27.5R	Yes (25) ^{c/}	No	Yes: 22-mixed
26.0R	Yes (20)	Yes (0.05)	Yes: 5-alder
25.5R	Yes (14)	Yes (0.06)	No
25.4L	Yes	No	Yes: 1-willow
25.0L	Yes	Yes (0.02)	Yes: 2-willow, oak
22.9L	Yes (15)	Yes (0.01)	Yes: 10-oak, willow
22.5R	Yes (16)	Yes (0.07)	No
BS22.9R	Yes	No	Yes: 3-ask, oak
21.1R	Yes (15)	No	No
MS6.8R	Yes (15)	Yes (0.16)	No
1.2L	Yes (13)	No	No
SR23.2R	Yes	--	--
19.7L	Yes (25)	Yes (0.11)	Yes: 23-alder, oak
19.2L	Yes (30)	No	Yes: 1-oak
	TOTALS	(0.48)	162-mixed

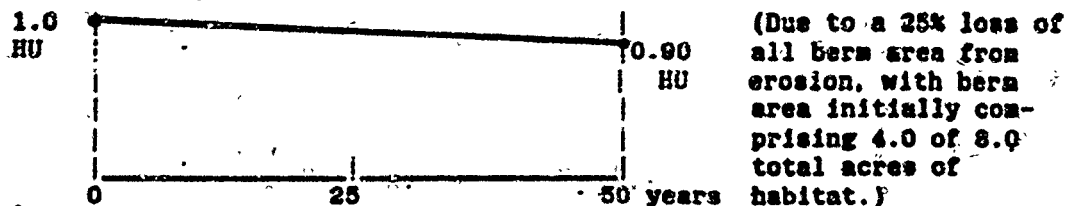
a/ SS-Sutter Slough; BS-Steamboat Slough; MS-Miner Slough; SR-Sacramento River.

b/ Acreage figures are optimum, assuming that all woody vegetation that could be retained is retained; in practice, this rarely occurs.

c/ Figures in parentheses indicate the average width, in feet, of any berm which is present along the work site.

Appendix 3. Summary of the HEP concept used to derive the compensation requirements (acres for replanting) for the woody riverine riparian habitat of Unit 41A of the Sacramento River Bank Protection Project -- Plan 1 only.

A. Relative Habitat Units (HUs), without construction:



$$\begin{aligned} \text{Relative AAHUs} &= (1.0 \times 50) - 1/2 (50 \times 0.1) \\ &= (50 - 2.5) \\ &= 47.5 \div 50 \text{ years} = \underline{0.95 \text{ Relative AAHUs}} \end{aligned}$$

B. HUs with construction, followed by onsite replanting and site protection:



$$\begin{aligned} \text{Relative AAHUs} &= (1.0 \times 30) + 1/2 (1.0 \times 20) \\ &= 30 + 10 = 40.0 \\ &= 40.0 \div 50 \text{ years} = \underline{0.80 \text{ Relative AAHUs}} \end{aligned}$$

C. Replanting Needs:

$$\frac{0.95}{0.80} = 1.2 = \text{ratio factor}$$

$$7.4 \times 1.2 = 8.9 \text{ total acres need.}$$

LESS CREDITS FOR VEGETATION (TREE) "AVOIDANCE":)
SS27.5R - 0.57 acres) Adjusted Compensation
SS22.9L = 0.71 acres) Needed = 8.9 - 0.3 = 8.6 acres
-LESS 1.28 x 0.2 = 0.3 acres credit)

Appendix 3 (Continued)

The compensation requirement with plan 1 was developed using the concept of HEP (Habitat Evaluation Procedures), but not an actual HEP analysis. The assumptions and procedures used were as follows (refer also to parts A, B, and C on the first page of this appendix). First, we assumed that in the absence of the specified bank protection work, over the next 50 years there would be no net change in habitat values per unit of habitat area at the 15 sites, but that the total area of habitat existing on the berm areas would decline by about 25 percent due to gradual erosion. Therefore, since the berm areas of the sites presently make up about 4 of the 8 total acres of existing habitat, at the end of 50 years each initial 1.0 habitat unit (HU) would have been reduced to about 0.90 HU (See Part A above). It follows then that the relative average annual habitat units (AAHUs) (i.e., for each initial 1.0 HU) over 50 years in the absence of the proposed construction is 0.95 (i.e., $47.5 \div 50$ years).

Our second assumption was that with the construction, followed by an aggressive, well-controlled replanting program, the average habitat conditions existing now on the 15 sites could be fully duplicated in about 20 years (with a linear increase from zero value over that time), and that from year 20 to 50, the total habitat values (and acreages) of the replanted areas would then remain constant (See Part B above). Therefore, over a 50-year project life, the relative AAHUs (i.e., for each initial 1.0 HU) is 0.80 (i.e., $40.0 \div 50$ years).

The next step was dividing 0.95 by 0.80 (relative AAHUs without - by relative AAHUs with construction) to determine the mitigation need factor -- 1.2 -- for each 1.0 acre of habitat destroyed. The unadjusted overall compensation need is therefore 8.9 acres (7.4 acres destroyed x 1.2). However, we then adjusted this figure downward somewhat (See Part C above) to reflect the significant tree avoidance efforts to be made at two sites which will result in an increase in their overall post-construction habitat values. To do this, we assumed a 1.0:1.0 acre replanted/destroyed ratio would be sufficient for these two sites and accordingly subtracted 0.3 acre (the 1.28 total acres of these two sites x 0.2) from the unadjusted (8.9-acre) compensation total. The net compensation requirement for Plan 1 was therefore determined to be 8.6 acres.

Appendix 4. Summary of recommended replanting efforts on bank protection sites with berms for mitigating for habitat losses associated with Unit 41A of the Sacramento River Bank Protection Project, in order of preference.

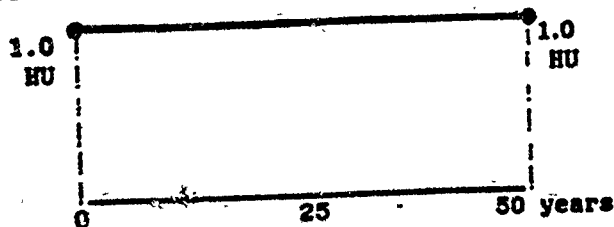
SITE ^{a/}	UNIT	Acres	Part or All of Berm?	REPLANTING RECOMMENDED	
				General Species ^{b,c/}	Ultimate (5-yr) Woody Density (Plant/Acre)
SS27.5R	41A	0.2	All (25 x 325-ft)	AL,WL,OK,SH	250
SR19.7L	41A	1.3	All (25 x 2,300-ft)	AL,SH,VN	500
SR19.2L	41A	0.5	All (30 x 660-ft)	AL,OK,SH	250
SR21.0L	33	0.7	All (30 x 1,025-ft)	Mixed trees,SH,VN	500
SS27.0R	31	0.2	All (17 x 620-ft)	Mixed trees,VN	200
MS7.6L	36	0.2	All (40 x 250-ft)	Mixed trees,SH,VN	300
MS6.5-7.6L	--	2.0	Part (Variable Areas)	Large mixed trees	150
SS26.0R	41A	0.3	All (20 x 600-ft)	AL,OK,VN	200
SS22.9L	41A	0.5	All (22 x 1,500-ft)	Mixed trees,SH	200
SS22.5L	41A	0.3	All (16 x 700-ft)	Mixed trees,SH	200
BS21.1R	41A	0.3	Part (15 x 850-ft)	AH,CT,SY,VN,SH	300
MS6.8R	41A	0.1	Part (15 x 400-ft)	AL,VN	250
MS1.2L	41A	0.2	Part (13 x 325-ft)	AL,SH	200
	Subtotal	6.8			
		1.8	= Additional berm areas (at least two elsewhere on SRBPP or Sacramento-San Joaquin Delta (Replant according to Riparian Planting Design Manual).		
	Total	8.6			

- a/ SS=Sutter Slough; BS=Steamboat Slough; MS=Miner Slough; SR=Sacramento River.
- b/ AL=Alder; WL=Willow; OK=Oak; AH=Ash; CT=Cottonwood; SY=Sycamore; SH=Shrubs; VN=Vines.
- c/ More specific planting guidelines, including species selections and planting densities to achieve the recommended 3-year interval densities, should be developed using the Corps' "Riparian Planting Design Manual for the Sacramento River, Chico Landing to Collinsville." prepared by Aqua Resources Incorporated, May 1986.

Appendix 2.

Summary of the HEP concept used to derive the compensation requirements (linear feet for replanting) for the heavily-shaded riverine aquatic habitat of Unit 41A of the Sacramento River Bank Protection Project -- Plan 1a only.

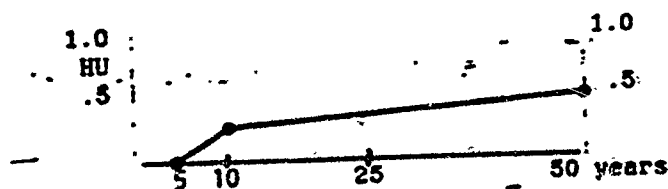
A. Relative Habitat Units (HUs), without construction:



(While berm and levee erosion would be causing trees to be lost and shaded area to be reduced, new and existing vegetation would be growing larger, thereby producing more shade. Thus, no net change would occur in habitat value over 50 years.)

$$\begin{aligned} \text{Relative AAHUs} &= 1.0 \times 5.0 = 50 \\ &= 50 - 50 \text{ years} \\ &= 1.0 \text{ Relative AAHUs} \end{aligned}$$

B. HUs with construction:



(After 5 years, some limited regrowth and value of woody vegetation will occur through the revetment alongside the water, thereby providing some small and gradually increasing aquatic shading benefits. However, this vegetation will be severely limited in extent by levee maintenance practices.)

$$\begin{aligned} \text{Relative AAHUs} &= 10 + 5 = 15.625 \\ &= 15.625 - 50 \text{ years} \\ &= 0.3 \text{ Relative AAHUs} \end{aligned}$$

C. Therefore, for each 1.0 habitat unit (HU) needed for compensation, 0.3 will be provided by the sites with construction and 0.7 additional will be needed. Since replanting provides 0.8 HU (See Appendix 3 "B" relationship), only 1.8 acres need to be replanted to compensate for the 2.1 acres lost (i.e., 0.7 = 87.5% of 0.8, and 1.8 = 87.5% of 2.1). Finally, by assuming that in 20 years, the planted waterside vegetation will average 12 1/2 ft in over-water width, it is determined that 6.273 feet of linear area must be replanted (i.e., 78,408 sq. ft. - 12.5 = 6,273). This analysis assumes a single row of trees-probably alders - would be planted along the waterside edges of berm and low-berm areas.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, California 95825

March 9, 1987

Colonel Wayne J. Scholl
District Engineer
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Subject: CE-Sacramento River Bank Protection Project, Unit 41A,
Specification No. 8054

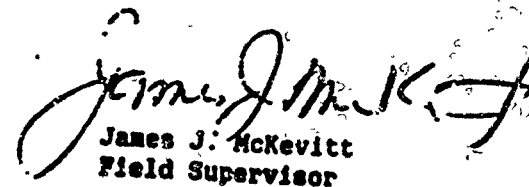
Dear Colonel Scholl:

In our letter of February 24, 1987, we provided comments on the Corps' proposed construction of Unit 41A of the Sacramento River Bank Protection Project. In that letter, we identified several specific bank protection areas where replanting of woody vegetation could be implemented for fish and wildlife mitigation under Plans 1 and 1a, the plans we prefer. However, a portion of the total area needed for full mitigation under each of these plans was not specifically identified. We are now able to specifically identify two more potential mitigation areas. They are as follows:

1. The area along the Sacramento River at River Mile 17.3R. This is a prior bank protection construction site from Unit 28 of the project. It is 3,300-foot-long, contains a small berm over about half of its length, and was protected earlier by a 10.3-acre "Right 8" easement. Although nearly 12 years have elapsed since completion of construction, there is no natural revegetation of woody growth occurring. Part of this area could be replanted under Plan 1, and limited portions may also be suitable for replanting under Plan 1a. Before any replanting is done, protection of the area would have to be assured as described in our February 24, 1987 letter.
2. The area along the southern portion of the Sacramento Deep Water Ship Channel. Although it would not exactly meet our criteria for replanting areas, we would not object if up to about 10 percent of the total mitigation required under either Plan 1 or Plan 1a were to be located here. However, only areas that are now barren of woody vegetation should be replanted, and all of our other guidelines for replanting should also be implemented.

For any further discussions of these supplemental recommendations for Unit 41A, please contact Mr. Richard DeHaven or Mr. Frank Michny of my staff at (916) 976-4613.

Sincerely,


James J. McKeivitt
Field Supervisor

cc: Reg. Dir., APNE, FWS, Portland, OR
SESD, FWS, Sacramento, CA
Dir. CDFG, Sacramento
Reg. Mgr., CDFG, Reg. II, Rancho Cordova
NMFS, Santa Rosa
State Reclamation Board, Sacramento
DWR (Attn: Jim King), Sacramento
State Lands Commission (Attn: Dianne Jacobs), Sacramento
Friends of the River, Sacramento
Defenders of Wildlife (Attn: Richard Spotts), Sacramento

CALENDAR PAGE	213.37
MINUTE PAGE	2196