COUNTY OF MONTEREY
STATE OF CALIFORNIA

N E G A T I V E D E C L A R A T I O N

FILED
MAY 2 1996
BRUCE A. REEVES
MONTEREY COUNTY CLERK
DEPUTY
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POSTED 30 DAYS

RESPONSIBLE AGENCY: COUNTY OF MONTEREY DECISION-MAKING BODY: BOARD OF SUPERVISORS

PROJECT: MORO COJO SLOUGH MANAGEMENT AND ENHANCEMENT PLAN

ADDRESS: P.O. Box 1208
CITY/STATE/ZIP: , Salinas CA 93902

PLANNER: STEVEN MAKI TELEPHONE: (408) 755-5025

THIS PROPOSED PROJECT WILL NOT HAVE A SIGNIFICANT EFFECT ON THE ENVIRONMENT AS IT HAS BEEN FOUND:

(a) That said project will not have the potential to significantly degrade the quality of the environment.
(b) That said project will have no significant impact on long term environmental goals.
(c) That said project will have no significant cumulative effect upon the environment.
(d) That said project will not cause substantial adverse effects on human beings, either directly or indirectly.

PROJECT DESCRIPTION OF NATURE, PURPOSE AND BENEFICIARIES: Wetland Management and Enhancement Plan is a conceptual planning document to provide guidance and funding for future projects that will enhance existing freshwater habitats to increase habitat productivety and diversity, erosion control and water quality.

PROJECT LOCATION: Moro Cojo Slough, Moss Landing CA
TIME PERIOD PROVIDED FOR REVIEW
BEGINS: April 24, 1996 ENDS: May24, 1996

ADDRESS WHERE COPY OF APPLICATION AND INITIAL STUDY ARE AVAILABLE:

___ MONTEREY COUNTY PUBLIC WORKS DEPT.
___ PARKS & RECREATION DEPT.
___ LAFCO

XX MONTEREY COUNTY PLANNING & BUILDING INSPECTION DEPARTMENT
P.O. BOX 1208/COURTHOUSE, 240 CHURCH ST., SALINAS, CA 93902

TO BE FILED WITH COUNTY CLERK WHEN NO SIGNIFICANT EFFECT IS FOUND:
DATE FILED:

NEG.DEC.
REV.01/27/93

FILE REFERENCE #: PD 90-061
TYPE: Planning Program
APN: numerous

STATE OF CALIFORNIA

PETE WILSON, *Governor*

Governor's Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

May 22, 1996

STEVEN MAKI
MONTEREY COUNTY PLANNING/BUILDING INSP. DEPT.
PO BOX 1208
SALINAS, CA 93902

Subject: MORO COJO SLOUGH ENHANCEMENT AND MANAGEMENT PLAN SCH #: 96041068

Dear STEVEN MAKI:

The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call at (916) 445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

Antero A. Rivasplata

ANTERO A. RIVASPLATA
Chief, State Clearinghouse

Before the Board of Supervisors in and for the County of Monterey, State of California

Resolution No. 96-417	)
	)
RESOLUTION OF THE BOARD OF SUPERVISORS ADOPTING A NEGATIVE DECLARATION AND APPROVING THE MORO COHO SLOUGH MANAGEMENT AND ENHANCEMENT PLAN	)

WHEREAS, Recommended Action 2.3.4.2 of the North County Land Use Plan provides for the preparation of a comprehensive wetland management plan for the Moro Cojo Slough, and

WHEREAS, the California Coastal Commission granted a permit (#3-89-4) to the Monterey County Water Resources Agency to replace culverts and tidegates at Moss Landing Road to control tidal action within Moro Cojo Slough, and

WHEREAS, as a condition approving Coastal Development Permit #3-89-4, the Water Resources Agency agreed to prepare a wetland management plan pursuant to Recommended Action 2.3.4.2, and

WHEREAS, in 1993 the State Coastal Conservancy approved a grant request from the Board of Supervisors to fund the preparation of a management and enhancement plan for the Moro Cojo Slough, and

WHEREAS, the consulting firm of The Habitat Restoration Group was selected and contracted to prepare a management and enhancement plan for Moro Cojo Slough, and

WHEREAS, the Elkhorn Slough National Estuarine Research Reserve Advisory Committee (RAC) was selected to guide and review the preparation of management and enhancement plan for Moro Cojo Slough, and

WHEREAS, the RAC considered four plan alternatives and selected a preferred plan entitled Winter/Spring Fresh Conditions (Plan), and

WHEREAS, an Initial Study was prepared and circulated on the Plan which determined that the project would not have a significant effect on the environment, and that a Negative Declaration should be prepared, and

WHEREAS, no comments were received from Reviewing Agencies regarding the Initial Study and preparation of a Negative Declaration, and

WHEREAS, the North County Advisory Committee recommended approval of the Plan (6-0), and

WHEREAS, the Planning Commission considered the Plan on June 26, 1996 and recommended to the Board of Supervisors approval of the Plan (5-2-1-2); with modifications to Phase I to include the implementation of a pilot project on public lands and the timing of Phases II through IV would occur only after evaluation of the pilot project, and

WHEREAS, the Board of Supervisors considered the Planning Commission recommendation on October 22, 1996; with an additional recommendation agreed to by a group of property owners, interested parties and Supervisors Pennycook and Perkins, within whose Districts Moro Cojo Slough is located, that a modification to Phase I of the Implementation Component is needed which would:

> Provide for pilot projects on public, and/or non-profit agency owned lands in years 1 through 10 to test the effectiveness of the management actions and to evaluate any impacts they may have on adjacent agricultural activities; thereby offering modifications to correct any deficiencies to remaining management actions through the remaining phases.

NOW THEREFORE BE IT RESOLVED that based upon the foregoing recitals, the Board of Supervisors of the County of Monterey, State of California does hereby adopt a Negative Declaration and approve, as modified by the Planning Commission and as modified above the Moro Cojo Slough Wetland Management and Enhancement Plan as conceptually shown on the attached map.

NOW, THEREFORE, BE IT RESOLVED, THAT

PASSED AND ADOPTED on this 22nd day of October, 1996, upon motion of Supervisor Perkins, seconded by Supervisor Pennycook by the following vote, to-wit:

AYES: Supervisors Salinas, Pennycook, Perkins, Johnsen, Karas
NOES: None
ABSENT: None

I, ERNEST K. MORISHITA, Clerk of the Board of Supervisors of the County of Monterey, State of California, hereby certify that the foregoing is a true copy of an original order of said Board Supervisors duly made and entered in the minutes thereof at page — of Minute Book 69, on October 22, 1996

Dated: October 22, 1996

ERNEST K. MORISHITA, Clerk of the Board of Supervisors, County of Monterey, State of California.

By Pamela Silvas
Deputy

Reso9/30/93

Notice of Completion *Supplementary Document M*

Mail to: State Clearinghouse, 1400 Tenth Street, Sacramento, CA 95814 916/445-0613

See NOTE below

SCH # _____

Project Title: MORO COJO SLOUGH ENHANCEMENT AND MANAGEMENT PLAN

Lead Agency: Monterey County Planning and Bldg. Insp. Dept **Contact Person:** STEVEN MAKI

Street Address: P.O. Box 1208 **Phone:** 408-7506600

City: Salinas, CA **Zip:** 93902 **County:** Monterey

Project Location

County: Monterey **City/Nearest Community:** Moss Landing

Cross Streets: Hwy 1 and Moss Landing Rd. **Zip Code:** _____ **Total Acres:** 17 sq. miles

Assessor's Parcel No. numerous **Section:** _____ **Twp.** _____ **Range:** _____ **Base:** _____

Within 2 Miles: **State Hwy #:** 1 and 156 **Waterways** Elkhorn Slough, Pacific Ocean, Old Salinas Riv Chnl

Airports: no **Railways** Southern Pacific **Schools:** No. Monterey Co. High

Document Type

CEQA:
- ☐ NOP
- ☐ Early Cons
- ☒ Neg Dec
- ☐ Draft EIR
- ☐ Supplement/Subsequent
- ☐ EIR (Prior SCH No.) _____
- ☐ Other _____

NEPA:
- ☐ NOI
- ☐ EA
- ☐ Draft EIS
- ☐ FONSI

Other:
- ☐ Joint Document
- ☐ Final Document
- ☐ Other _____

Local Action Type

- ☐ General Plan Update
- ☐ General Plan Amendment
- ☐ General Plan Element
- ☐ Community Plan
- ☐ Specific Plan
- ☐ Master Plan
- ☐ Planned Unit Development
- ☐ Site Plan
- ☐ Rezone
- ☐ Prezone
- ☐ Use Permit
- ☐ Land Division (Subdivision, Parcel Map, Tract Map, etc.)
- ☐ Annexation
- ☐ Redevelopment
- ☐ Coastal Permit
- ☒ Other Wetland Enhancement and Management Plan

Development Type THERE IS NO DEVELOPMENT RESULTING FROM THIS WETLAND AND ENHANCEMENT PLAN

- ☐ Residential: *Units* _____ *Acres* _____
- ☐ Office: *Sq.ft.* _____ *Acres* _____ *Employees* _____
- ☐ Commercial: *Sq.ft.* _____ *Acres* _____ *Employees* _____
- ☐ Industrial: *Sq.ft.* _____ *Acres* _____ *Employees* _____
- ☐ Educational _____
- ☐ Recreational _____
- ☐ Water Facilities: *Type* _____ *MGD* _____
- ☐ Transportation: *Type* _____
- ☐ Mining: *Mineral* _____
- ☐ Power: *Type* _____ *Watts* _____
- ☐ Waste Treatment: *Type* _____
- ☐ Hazardous Waste: *Type* _____
- ☐ Other: _____

Project Issues Discussed in Document

- ☐ Aesthetic/Visual
- ☒ Agricultural Land
- ☐ Air Quality
- ☐ Archeological/Historical
- ☒ Coastal Zone
- ☒ Drainage/Absorption
- ☐ Economic/Jobs
- ☐ Fiscal
- ☒ Flood Plain/Flooding
- ☐ Forest Land/Fire Hazard
- ☐ Geologic/Seismic
- ☐ Minerals
- ☐ Noise
- ☐ Population/Housing Balance
- ☐ Public Services/Facilities
- ☐ Recreation/Parks
- ☐ Schools/Universities
- ☐ Septic Systems
- ☐ Sewer Capacity
- ☒ Soil Erosion/Compaction/Grading
- ☐ Solid Waste
- ☐ Toxic/Hazardous
- ☐ Traffic/Circulation
- ☒ Vegetation
- ☒ Water Quality
- ☐ Water Supply/Groundwater
- ☒ Wetland/Riparian
- ☒ Wildlife
- ☐ Growth Inducing
- ☒ Landuse
- ☐ Cumulative Effects
- ☐ Other _____

Present Land Use/Zoning/General Plan Use

Row crop agriculture, grazing/Coastal Agricultural Preservation/Agricultural Preservation Wetlands/Resource Conservation/Resource Conservation-Wetlands

Project Description The project is a conceptual planning document to be used to guide the development of small scale projects to enhance freshwater habitats which maximizes plant and species productivety and diversity, protection of sensitive habitats, reduce erosion and sedimentation and improve water quality. The Plan will enable the funding of future projects identified as consistent with an overall management plan for the area.

NOTE: Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. from a Notice of Preparation or previous draft document) please fill it in.

Revised October 1989

Reviewing Agencies Checklist

Supplementary Document N

KEY
S = Document sent by lead agency
X = Document sent by SCH
✓ = Suggested distribution

__S__ **Resources Agency**
____ Boating & Waterways
__S__ Coastal Commission
__S__ Coastal Conservancy
____ Colorado River Board
__S__ Conservation
__S__ Fish & Game
____ Forestry
____ Office of Historic Preservation
____ Parks & Recreation
____ Reclamation
____ S.F. Bay Conservation & Development Commission
____ Water Resources (DWR)

Business, Transportation & Housing
____ Aeronautics
____ California Highway Patrol
____ CALTRANS District #_____
____ Department of Transportation Planning (headquarters)
____ Housing & Community Development

__S__ **Food & Agriculture**

Health & Welfare
____ Health Services _____

State & Consumer Services
____ General Services
____ OLA (Schools)

Cal-EPA
____ Air Resources Board
____ APCD/AQMD
____ California Waste Management Board
____ SWRCB: Clean Water Grants
____ SWRCB: Delta Unit
__S__ SWRCB: Water Quality
____ SWRCB: Water Rights
__S__ Regional WQCB #_____ (San Luis Obispo)

Youth & Adult Corrections
____ Corrections

Independent Commissions & Offices
____ Energy Commission
____ Native American Heritage Commission
____ Public Utilities Commission
____ Santa Monica Mountains Conservancy
__S__ State Lands Commission
____ Tahoe Regional Planning Agency

____ Other _____

Public Review Period (to be filled in by lead agency)

Starting Date April 24, 1996 Ending Date May 24, 1996

Signature [signature] Date April 18, 1996

Lead Agency (Complete if applicable):
Consulting Firm: The Habitat Restoration Group
Address: P.O. Box 4006
City/State/Zip: Felton CA 95018
Contact: Kathleen Lyons
Phone: (408) 335 6809

Applicant: Monterey Co. Planning and Bldg. Insp.
Address: P.O. Box 1208
City/State/Zip: Salinas CA 93902
Phone: (408) 759 6600 Steven Maki
Senior Planner

For SCH Use Only:
Date Received at SCH _____
Date Review Starts _____
Date to Agencies _____
Date to SCH _____
Clearance Date _____
Notes:

Revised October 1989

INITIAL STUDY

PROJECT NAME: ***Moro Cojo Slough Management and Enhancement Plan***

File **PD #90-061**

MONTEREY COUNTY, CALIFORNIA

OWNER NAME: ***Monterey County Planning and Building Inspection Department***

Address: ***P.O. Box 1208, Salinas, CA 93902***

LOCATION: ***Moro Cojo Slough, North Monterey County***

STATEMENT OF DETERMINATION/PREPARATION

The following study was prepared by the planner whose signature appears below on behalf of the County of Monterey, State of California.

On the basis of this initial study and any attached or referenced information: **(Check One)**

The proposed project **WOULD NOT** have a significant effect on the environment (this includes mitigation measures to change the project to lower significant impacts), and a **NEGATIVE DECLARATION** should be prepared. ☒

The proposed project **MAY** have a significant impact on the environment, and an **ENVIRONMENTAL IMPACT REPORT** should be prepared. ☐

Date: April 18, 1996

Signed: Steven Maki **STEVEN MAKI**, project planner

NOTE: ADDITIONAL INFORMATION MAY BE ATTACHED AS AN APPENDIX REFERENCED BY TOPIC HEADING AND NUMBER. ALSO, SEE COMMENT SECTION AT END OF INITIAL STUDY.

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1. ENVIRONMENTAL SETTING:

Describe site size and topography, natural waterways, flora and fauna, existing land use, historical or cultural significance for both the immediate and surrounding site characteristics.

PLEASE SEE APPENDIX I (Chapter 1, Executive Summary)

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2. PROJECT DESCRIPTION:

Describe the type of project by use, physical shape, supporting infrastructure/public facilities. Describe how project will affect the environmental setting. Use quantitative analysis when possible. Attach an 8 1/2" x 11" site plan.

The Moro Cojo Slough Management and Enhancement Plan is a conceptual planning document that is intended for use as a guidance document to ultimately implement a preferred freshwater enhanced environment which maximizes habitat heterogeneity within the Moro Cojo watershed. It is based upon selected criteria developed by the Reserve Advisory Committee (RAC) to the Elkhorn Slough National Estuarine Research Reserve. The selected criteria include:

1) *retain both saltwater and freshwater habitats within the lower slough*
2) *maintain known habitat for rare and endangered species*
3) *maintain existing saltwater flow in the lower slough below the Southern Pacific Railroad bridge*
4) *utilize treated, reclaimed water to recharge aquifers*
5) *create freshwater conditions in the lower slough (east of Highway 1)*
6) *retain water in lower slough through the creation of impoundments*
7) *maximize freshwater in lower slough through increased run-off and use of reclaimed water*
8) *utilize eco-engineering*
9) *recognize the need for maintenance and monitoring*
10) *maximize buffers between wetlands and adjacent land uses*

Based upon these criteria and policies contained in the North County Land Use Plan, the RAC developed Goals and Objectives to guide the development of the Preferred Plan (see Appendix II)

Additional analysis, design and agreements with willing landowners will be required prior to implementation or construction of any recommended action.

FOR A DETAILED PROJECT DESCRIPTION, PLEASE SEE APPENDIX II (Chapter 2, Introduction and Chapter 10, Preferred Lower Watershed Plan)

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3. PROJECT CONSISTENCY WITH OTHER APPLICABLE LOCAL AND STATE PLANS AND MANDATED LAWS:

Use the list below to verify project related plans and their consistency or non-consistency with project implementation.

General Plan/Area Plans _

Specific Plans _

Water Quality Control Plan X consistent

Air Quality Management Plan _

Airport Land Use Plans _

Local Coastal Program - LUP X consistent

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4. ***PROJECTS THAT HAVE LITTLE OR NO POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL IMPACT:***

Some proposed applications that are not exempt from CEQA review may have little or no potential for adverse environmental impact related to most of the topics in the Environmental Checklist; and/or potential impacts may involve only a few limited subject areas. These types of projects are generally minor instep, located in a non-sensitive environment, and are easily identifiable and without public controversy. For these types of projects the following finding can be made using the project description, environmental setting, or other information as supporting evidence.

X ***CHECK HERE IF THIS SECTION IS NOT APPLICABLE:***

The project does not meet the criteria in this section. Complete the full Environmental Checklist (Sections 5 - 21) contained in the following pages.

FINDING: ***For the following topics (that are checked off and are also listed in the Environmental Checklist) there is no potential for significant environmental impact to occur from either construction, operation or maintenance of the proposed project.***

5. EARTH		11. ENERGY	X	17. UTILITIES	X
6. AIR	X	12. LAND USE	-	18. NOISE	X
7. WATER	-	13. POPULATION	X	19. HAZARDS	X
8. PLANTS	-	14. HOUSING	X	20. AESTHETICS	X
9. ANIMALS	-	15. TRANSPORTATION	X	21. CULTURAL RESOURCES	X
10. NATURAL RESOURCES	X	16. PUBLIC SERVICES	X		

Topics not checked above must be addressed further in the Environmental Checklist (Sections 5 - 21) on the following pages. For all projects, complete Sections 22 thru 25.

CONCLUSIONS/EVIDENCE TO SUPPORT FINDING ABOVE:

The Moro Cojo Management and Enhancement Plan contains no actions and/or programs that would affect the above checked topics. Evidence/the analysis contained in the following checklist based upon the Management and Enhancement Plan.

ENVIRONMENTAL CHECKLIST
ENVIRONMENTAL IMPACTS/NON-IMPACTS

NOTE:

- ***Summarize conclusions for each (EARTH, AIR, etc.) with supporting evidence: why there is the potential for (POT.), why there is (YES), or why there is not (NO) – a significant environmental impact. Use the space provided at the end of each section, or add an attachment with a clear reference.***
- ***Use information such as other reports, plans or studies as supporting evidence. Add persons/agencies contacted.***
- ***Include mitigation measures. Include a mitigation monitoring program as an appendix.***

5. EARTH: Will the proposal result in:	Significant Impact? NO	POT.	YES
5.1 Unstable earth conditions or in geologic substructures?	X		
5.2 Disruptions, displacements, compaction or overcovering of the soil?		X	
5.3 Change in topography or ground surface relief features?		X	
5.4 The destruction, covering, or modification of any unique geologic or physical features?	X		
5.5 Any increase in wind or water erosion of soils, either on- or off-site?	X		
5.6 Changes in the deposition or erosion of beach sands, or changes in siltation which may modify the channel of a river or stream, or the bed of the ocean or any bay, inlet or lake?		X	

5.7 Exposure of people and property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazard? ***X***

EARTH: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

5.1 No action or program is contained in the Preferred Plan that would result in unstable earth conditions or in geologic substructures. Source/Preferred Plan. Mitigation/None required.

5.2 and 5.3 Creation of freshwater impoundment areas and berms for erosion control on agricultural lands is recommended. Installation of erosion control measures requires slight changes in topography and may disrupt soil until stabilized. The over all environmental effect will be positive. Source/Preferred Plan. Mitigation/Sediment management plans for creation of freshwater impoundments and erosion control will be required as part of County Grading Permit. The freshwater impoundment areas and berms will slow erosion and enhance wetland areas and have a beneficial impact.

5.4 and 5.4 No action or program is contained in the Preferred Plan that would result in the destruction, covering, or modification of any unique geologic or physical features; nor cause any increase in wind or water erosion of soils, wither on, or off site. Source/Preferred Plan. Mitigation/None required.

5.6 Controlling soil erosion in the watershed and reducing sedimentation in wetlands is a major recommendation of the Preferred Plan. Source/Preferred Plan. Mitigation/None required. The recommendation will have a beneficial impact.

5.7 No action or program is contained in the Preferred Plan that would result in the exposure of people and property to geologic hazards. Source/Preferred Plan. Mitigation/None required.

6.	AIR: Will the proposal result in:	Significant Impact? NO	POT.	YES
6.1	Substantial air emissions or deterioration of ambient air quality?	X		
6.2	The creation of objectionable odors?	X		
6.3	Alteration of air movement, moisture, or temperature, or any change in climate, either locally or regionally?	X		

AIR: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

6.1, 6.2 and 6.3 No action or program contained in the Preferred Plan would result in any increase in air emissions or deterioration in ambient air quality, create objectionable odor or alternate air movement, moisture, or temperature, change in climate locally or regionally. Source/Preferred Plan contains no action or program which would result in any impact to air. Mitigation/None required.

7.	WATER: Will the proposal result in:	Significant Impact? NO	POT.	YES
7.1	Changes in currents, or the course of direction of water movements, in either marine or fresh waters?			X
7.2	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?			X
7.3	Alterations to the course or flow or flood patterns?			X
7.4	Change in the amount of surface water in any water body?			X
7.5	Discharge into surface waters, or in any alteration of surface quality, including but not limited to temperature, dissolved oxygen, or turbidity?			X
7.6	Alteration of the direction or rate of flow of ground waters?		X	
7.7	Change in the quantity of groundwaters, either through direct additions or through interception of an aquifer by cuts or excavations?		X	
7.8	Substantial reduction in the amount of water otherwise available for public water supplies?	X		
7.9	Exposure of people or property to water related hazards such as flooding or tidal waves?	X		

WATER: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

7.1 The Preferred Plan would increase freshwater elevations in several previously drained wetland channels creating a more productive and heterogeneous freshwater habitat. The Preferred Plan proposes the creation of winter/early spring freshwater impoundment areas within the marsh plain of the lower slough (below SPRR) and retainment of freshwater within the main slough upstream of SPRR. An "eco-dam" or flashboard dam would be installed at the confluence of Castroville Slough and Moro Cojo Slough to the south of the main slough; thus increasing elevations and adding to currents and the course of water movement. These actions will not result in any modification of the tide gates at Moss Landing Road or saltwater flow below SPRR. The freshwater impoundments are expected to enhance the existing grassland areas for waterfowl nesting and foraging (see page 10-1). For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Source/Preferred Plan.

Mitigation/None required, these recommendations will have a beneficial effect.

7.2 The Preferred Plan would change absorption rates and drainage patterns in the wetland areas. The possible creation of freshwater impoundments may result in partial or full inundation on approximately 375 acres below the 10-foot contour between the SPRR and Highway 1. These impoundments could have a beneficial impact on absorption rates and provide localized relief from saltwater intrusion which plagues the area. The installation of erosion control measures could change drainage patterns on farmland to reduce soil erosion and also could reduce the transport of pesticides, fertilizers and chemicals into the entire slough system. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Source/Preferred Plan. Mitigation/None required, these recommendations will have a beneficial effect.

7.3 As indicated in 7.2, approximately 375 acres below the 10-foot contour could result in partial or full inundation. Other agricultural lands may require protection from flooding. Inundation of the alkali grassland west of SPRR may cause a gradual conversion of the area to freshwater plant species. Freshwater impoundments east of SPRR may convert the brackishwater marsh areas to a more freshwater habitat. Source/Preferred Plan. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Mitigation/These areas will require purchase or conservation easements, or some other acquisition method from willing landowners prior to project implementation, (see Table 10-1). Also mitigations would include the construction of earthen berms at the 10-foot contour and management/upgrade of existing drainage pump systems. These actions would increase habitat values of the slough system.

7.4 As indicated above, the Preferred Plan could result in partial or full inundation of approximately 375 acres. Source/Preferred Plan. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Mitigation/None as the above analysis concludes potential inundation will have a beneficial effect.

7.5 As previously indicated the Preferred Plan recommends the use of agricultural berms at the 10-foot contour, and "eco-dams" of hay bales or a flashboard dam to impound water. These actions would reduce erosion, thus reducing sediments and turbidity. Source/Preferred Plan. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Mitigation/None required as these recommendations would have a beneficial impact.

7.6 and 7.7 As indicated above, the Preferred Plan could result in the partial or full inundation of approximately 375 acres below the 10-foot contour. These waters could conceivably infiltrate into the immediate upper groundwater aquifer resulting in a beneficial impact to existing saltwater intrusion problems in the immediate area. Source/Preferred Plan. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Mitigation/None required as this recommendation would have a beneficial impact.

7.8 The Preferred Plan contains no actions or programs that would cause a reduction in the amount of water otherwise available for public water supplies. Source/Preferred Plan. Mitigation/None required.

7.9 As indicated above, the Preferred Plan could partially or fully inundate approximately 375 acres below the 10-foot contour (all such lands are undeveloped). Partially or fully inundated lands are either habitat lands designated as "Resource Conservation", not in agricultural production; poor agricultural lands designated "Agricultural" not in

production, grazing lands designated "Agricultural" and agricultural lands in production (strawberries, artichokes, etc.) designated "Agricultural" (designations from the North County Land Use Plan). It is estimated that up to 60 acres of lands in agricultural production could be affected by inundation. No "people" or residential/commercial/industrial uses could be impacted by partial or full inundation of lands as proposed in the Preferred Plan. Source/Preferred Plan. For a more detailed analysis of Preferred Plan beneficial impacts see Appendix II, pp. 10-3 to 10-6. Mitigation/Any lands inundated would require acquisition, conservation easements, or some other acquisition method, or compensation to willing land owners prior to implementation of any specific project which would inundate lands in agricultural production.

8.	PLANT LIFE Will the proposal result in:	Significant Impact?		
		NO	POT.	YES
8.1	Change in the diversity of species, or number of any species of plants (including trees, shrubs, grass, crops and aquatic plants)?			X
8.2	Reduction of the numbers of any unique, rare or endangered species of plants?	X		
8.3	Introduction of a new species of plants into an area, or result in a barrier to the normal replenishment of existing species?	X		

PLANT LIFE: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

8.1 The Preferred Plan proposes creation of winter/early spring freshwater impoundment areas within the marsh plain of the lower slough (below SPRR) and southerly of the confluence of the Castroville and Moro Cojo Slough.. The creation of freshwater impoundments would inundate portions of the alkali grasslands in the lower slough and may cause a gradual conversion to freshwater plant species. The conversion of alkali grasslands to freshwater species is not considered a significant impact as it is not a species of concern, unique, rare or endangered. Areas of the upper slough (above SPRR) and south of the Moro Cojo Slough along the Castroville Slough would be subject to additional freshwater and may convert the brackish marsh areas to a more freshwater habitat. These actions will increase habitat diversity and values of the slough system. Source/Preferred Plan. Mitigation/None as habitat diversity and values will increase and result in a beneficial impact.

8.2 and 8.3 No action or program in the Preferred Plan would result in an adverse impact to plant life. Actions or programs proposed will result in benefits to any unique, rare or endangered plant, or species of concern which may inhabit the area. Nothing in the Preferred Plan would result in the introduction of any new species of plant. Source/Preferred Plan. Mitigation/None required.

9.	ANIMAL LIFE: Will the proposal result in:	Significant Impact?		
		NO	POT.	YES
9.1	Change in the diversity of species, or number of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms or insects)?			X
9.2	Reduction of the numbers of any unique, rare or endangered species of animals?		X	
9.3	Introduction of a new species of animals into an area, or result in a barrier to the migration or movement of animals?	X		
9.4	Deterioration to existing fish or wildlife habitat?	X		

ANIMAL LIFE: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

9.1 The freshwater impoundments are expected to enhance the existing grassland areas for waterfowl nesting and foraging thus increasing habitat values throughout the slough system and maximizing diversification of species. The Preferred Plan includes the opportunity to create an island within the slough to facilitate breeding by shorebirds or waterfowl, while offering protection from predators such as red fox and feral dogs. Source/Preferred Plan. Mitigation/None as habitat diversity and values will increase and result in a beneficial impact. The installation of the flashboard dam at SPRR is not anticipated to impact existing breeding areas of the Santa Cruz long-toed salamander, tiger salamander and red-legged from as inundation levels will be controlled. These habitat areas are located in the very upper reaches (east of Castroville Boulevard adjacent to the High School [Figures 5-4 and 11-1] of Moro Cojo Slough. These upper-reaches are likely to retain soil moisture as a result of the flashboard dam, thus improving habitat values for these amphibians. Source/Preferred Plan. Mitigation/Construction, maintenance and monitoring of flashboard dam to be established in consultation, or permitting by Dept. of Fish and Game and US Fish and Wildlife. The freshwater impoundments can be expected to result in an increase in freshwater mosquito population. Source/North Salinas Valley Mosquito Abatement District. Preferred Plan. Mitigation/Coordinate implementation of the Preferred Plan with the Mosquito Abatement District.

9.2 The freshwater impoundments could impact 65 acres of known habitat for the brackishwater snail and potential habitat for the tidewater goby in the main slough channel downstream of the SPRR. Source/Preferred Plan. Mitigation/Preferred Plan incorporates measures to control the release of freshwater into the main slough channel through use of "eco-engineering" hay bale impoundments, or more traditional methods such as the installation of flashboard dams. More detailed design of the dams, coupled with sampling of snail populations and sampling to determine the presence of the tidewater goby is required to determine potential mitigations at the time of specific project review of proposed dams. Consultation and/or permitting with California Dept. of Fish and Game and the US Fish and Wildlife Service will be required. No action or program of the Preferred Plan would result in the introduction of new animal species or result in a deterioration to existing fish or wildlife. Dept. of Fish and Game and the US Fish and Wild life Service may which to introduce the Tide Water Gobi into the area based upon habitat modifications proposed in the Preferred Plan. Source/Preferred Plan. Mitigation/Consultation and/or permitting with California Dept. of Fish and Game and the US Fish and Wildlife Service.

10. NATURAL RESOURCES: Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
10.1 Increased in rate of use of natural resources?	X		

NATURAL RESOURCES: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

10.1 The Preferred Plan will have no impact in the rate of use of natural resources as no action or program would affect the natural resources of the area. Source/Preferred Plan. Mitigation/None required.

11. ENERGY: Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
11.1 Use of substantial amounts of fuel or energy?	X		
11.2 Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	X		

ENERGY: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

11.1 and 11.2 The Preferred Plan will have no impact on the use, or increase of fuel or energy, or require the development of new sources of energy as no action or program of the Preferred Plan would utilize substantial amounts of energy or demand energy. Source/Preferred Plan. Mitigation/None required.

12. LAND USE Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
12.1 A substantial alteration of the present or planned land use of an area?		X	
12.2 Reduction in acreage of any agricultural crops?		X	

LAND USE: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?

12.1 The Preferred Plan could result in changes to the **present** and **planned** land use in the area as approximately 60 acres of land in agricultural production and designated "Agricultural" could be partially or fully inundated by freshwater impoundments. Also, an other 75 acres of agricultural land in production and designated "Agricultural" could be utilized as a buffer to protect the transitional area between agricultural production and partially or fully inundated agricultural lands. Source/Preferred Plan. Mitigation/Acquisition, purchase of easements, or some other method of acquisition from willing land owners would be required prior to planning to construct any water impoundment structure which would impact agricultural lands.

12.2 The freshwater impoundments could result in the loss of up to 60 acres of land in agricultural production. Source/Preferred Plan. Mitigation/Acquisition, purchase of easements, or some other method of acquisition from willing land owners would be required prior to planning to construct any water impoundment structure which would impact agricultural lands.

13. POPULATION Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
13.1 Will the proposal alter the location, distribution, density, or growth rate of human population of an area?	X		

POPULATION: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
13.1 No action or program is contained in the Preferred Plan that would alter the location, distribution, density, or growth rate of human population in the area. Source/Preferred Plan. Mitigation/None required.

14. HOUSING: Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
14.1 Will the proposal affect existing housing, or create a demand for additional housing?	X		

HOUSING: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
14.1 No action or program is contained in the Preferred Plan that would affect existing housing, or create a demand for additional housing. Source/Preferred Plan. Mitigation/None required.

15. TRANSPORTATION/CIRCULATION: Will the proposal result in:	Significant Impact?		
	NO	POT.	YES
15.1 Generation of substantial additional vehicular movement?	X		
15.2 Effects on existing parking facilities, or demand for new parking?	X		
15.3 Substantial impact upon existing transportation systems?	X		
15.4 Alteration to present patterns of circulation or movement of people/good?	X		
15.5 Alterations to waterborne, rail, or air traffic?	X		
15.6 Increases in traffic hazards to motor vehicles, bicyclists or pedestrians?	X		

TRANSPORTATION/CIRCULATION: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
15.1, 15.2, 15.3, 15.4 15.5, and 15.6. No action or program is contained in the Preferred Plan that would result in any impacts to Transportation/Circulation in the area. Source/Preferred Plan. Mitigation/None required.

16. PUBLIC SERVICES: Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:	Significant Impact?		
	NO	POT.	YES

16.1	*Fire protection?*	X		
16.2	*Police protection?*	X		
16.3	*Schools?*	X		
16.4	*Parks or other recreational facilities?*	X		
16.5	*Maintenance of public facilities, including roads?*	X		
16.6	*Other governmental services?*	X		

PUBLIC SERVICES: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
16.1, 16.2, 16.3, 16.4, 16.5, and 16.6. No action or program is contained in the Preferred Plan that would have any impacts to public services. Source/Preferred Plan. Mitigation/None required.

17.	*UTLITIES:* *Will the proposal result in:*	*Significant Impact?*		
		NO	*POT.*	*YES*
17.1	*A need for new systems, or substantial alterations to the area utilities?*	X		

UTILITIES: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
17.1 No action or program is contained in the Preferred Plan that would have any impacts to utilities. Source/Preferred Plan. Mitigation/None required.

18.	*NOISE:* *Will the proposal result in:*	*Significant Impact?*		
		NO	*POT.*	*YES*
18.1	*Increases in existing noise levels?*	X		
18.2	*Exposure of people to severe noises?*	X		

NOISE: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
18.1 No action or program is contained in the Preferred Plan that would have any impacts resulting from noise. Source/Preferred Plan. Mitigation/None required.

19	HAZARDS/HUMAN HEALTH: Will the proposal result in:	Significant Impact?		
		NO	POT.	YES
19.1	A risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?	X		
19.2	Possible interference with an emergency evacuation plan?	X		
19.3	Creation of any health hazard or potential health hazard?		X	
19.4	Exposure of people to potential health hazards?		X	

***HAZARDS/HUMAN HEALTH:** Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?*

19.1 and 19.2 No action or program is contained in the Preferred Plan that would create the risk of an explosion or the release of hazardous substances. Source/Preferred Plan. Mitigation/None required.

19.3 and 19.4 The freshwater impoundments are expected to increase the freshwater mosquito population. The freshwater winter mosquito has increased its presence in the region over the last nine years and is considered a serious public health and resource management concern. Source/Preferred Plan and North Salinas Valley Mosquito Abatement District. Mitigation/Aerial spraying of oil has been utilized to control this mosquito. Implementation of the Preferred Plan will be coordinated with the Mosquito Abatement District to prevent any serious public heath impacts.

20.	AESTHETICS: Will the proposal result in:	Significant Impact?		
		NO	POT.	YES
20.1	The obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	X		

***AESTHETICS:** Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?*

20.1 No action or program is contained in the Preferred Plan that would result in impacts to scenic vistas, public views or create an aesthetically offensive site open to public view. Source/Preferred Plan. Mitigation/None required.

21.	CULTURAL RESOURCES: Will the proposal result in:	Significant Impact?		
		NO	POT.	YES
21.1	The alteration of, or the destruction of, a prehistoric or historic site?	X		
21.2	Adverse physical or aesthetic effects to a prehistoric or historic building, structure or object?	X		
21.3	Does the proposal have the potential to cause a physical change which would affect unique ethnic or cultural values?	X		
21.4	Restrict existing religious or sacred uses within the potential impact area?	X		

CULTURAL RESOURCES: Conclusions w/evidence - Persons contacted. Mitigation/Monitoring Measures?
21.1, 21.2, 21.3 and 21.4. No action or program is contained in the Preferred Plan that would result in impacts to cultural resources. Source/Preferred Plan. Mitigation/None required.

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22. CUMULATIVE/GROWTH INDUCING IMPACTS:

NOTE: Describe any cumulative/growth inducing impacts that may occur due to implementation of the project. Identify checklist topic related to the impact and provide adequate evidence.

No action or program is contained in the Preferred Plan that would result in any cumulative/growth inducing impacts that may occur due to implementation. Source/Preferred Plan. Mitigation/None required.

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23. FEASIBLE PROJECT ALTERNATIVES:

NOTE: If there are significant environmental impacts caused by the project that are unmitigable below significance, describe below any possible project alternatives that would have less environmental impacts.

NO SIGNIFICANT ENVIRONMENTAL IMPACTS WOULD BE CAUSED BY THE PROJECT THAT ARE UNMITAGABLE. MITIGATIONS ARE IDENTIFIED WITHIN THIS DOCUMENT .

The RAC considered four alternatives to the selected Preferred Plan to enhance resources in the watershed of Moro Cojo Slough:

1) Tidal regime
2) Partially tidal regime
3) Enhanced existing condition
4) No project

Each of the four alternatives evaluated suggest actions to protect existing significant biotic resources, increase overall habitat values within the slough environs, resolve existing resource problems and land use conflicts and provide passive recreational/educational uses. These alternatives are described in Appendix II, pp.10-6 to 10-9. The RAC selected the Preferred Plan as the most environmentally beneficial plan as it maximizes habitat heterogeneity by increasing freshwater habitats within the Moro Cojo Slough system.

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24. STATEMENT OF MANDATORY FINDINGS OF SIGNIFICANCE:

NOTE: If there are significant environmental impacts which cannot be mitigated and no feasible project alternatives are available, then complete the mandatory findings of significance and attach to this Initial Study as an appendix. This is the first step for starting the environmental impact report (EIR) process.

Not applicable

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25. ADDITIONAL COMMENTS

None

26. ATTACHED APPENDICES

1) Environmental Setting (Chapter 1, Executive Summary

2) Project Description (Chapter 2 Introduction and Chapter 10, Preferred Lower Watershed Plan)

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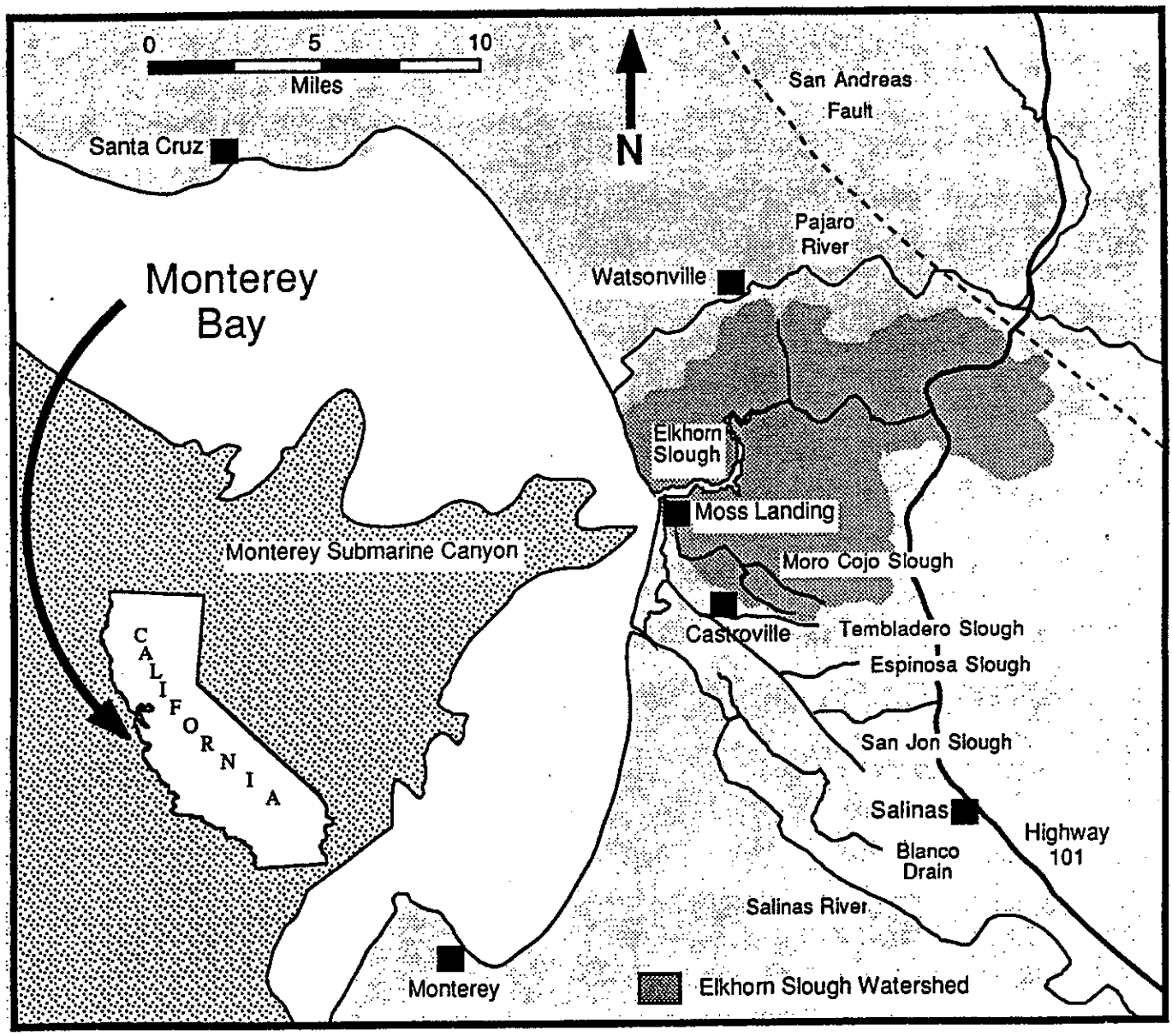
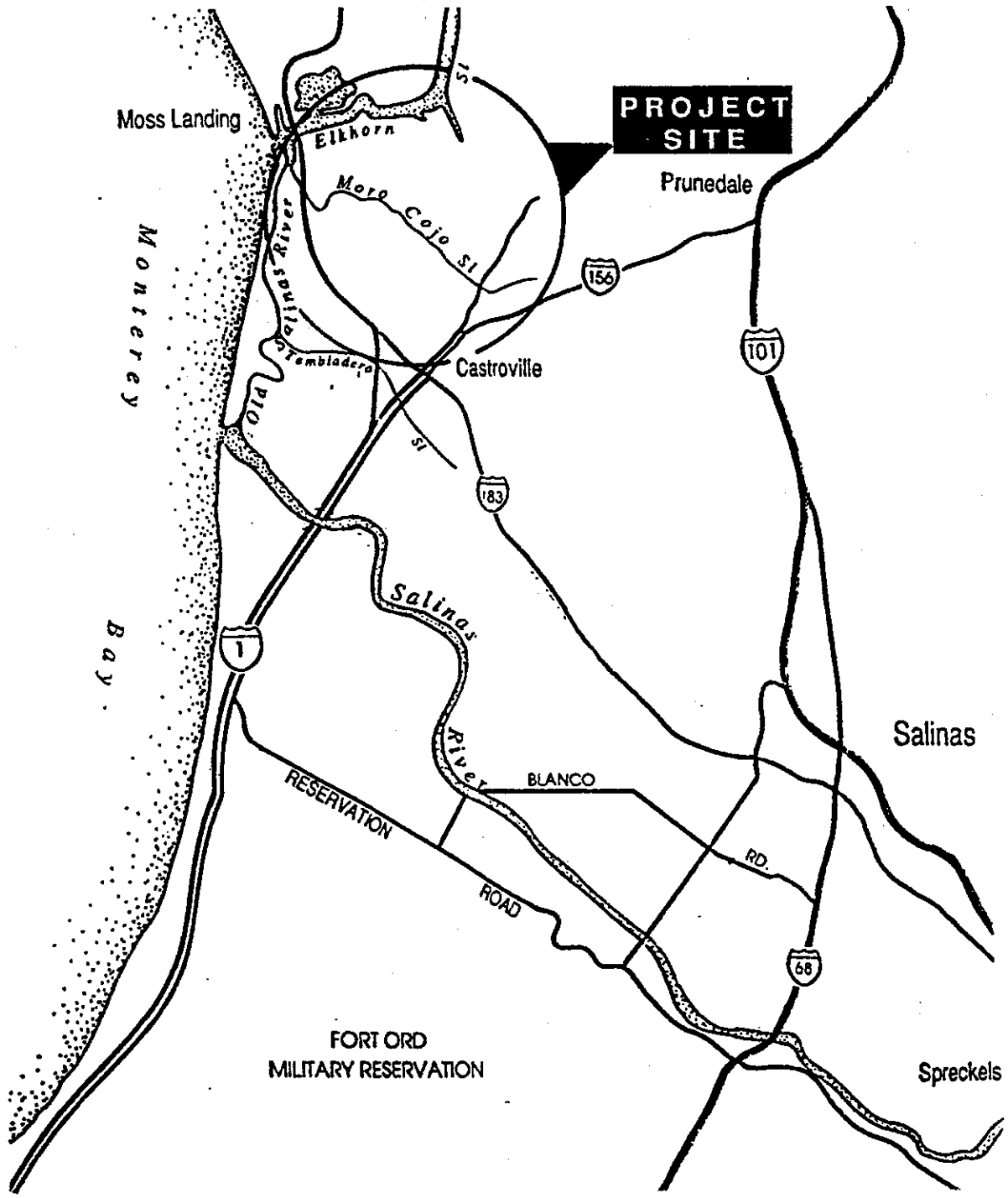
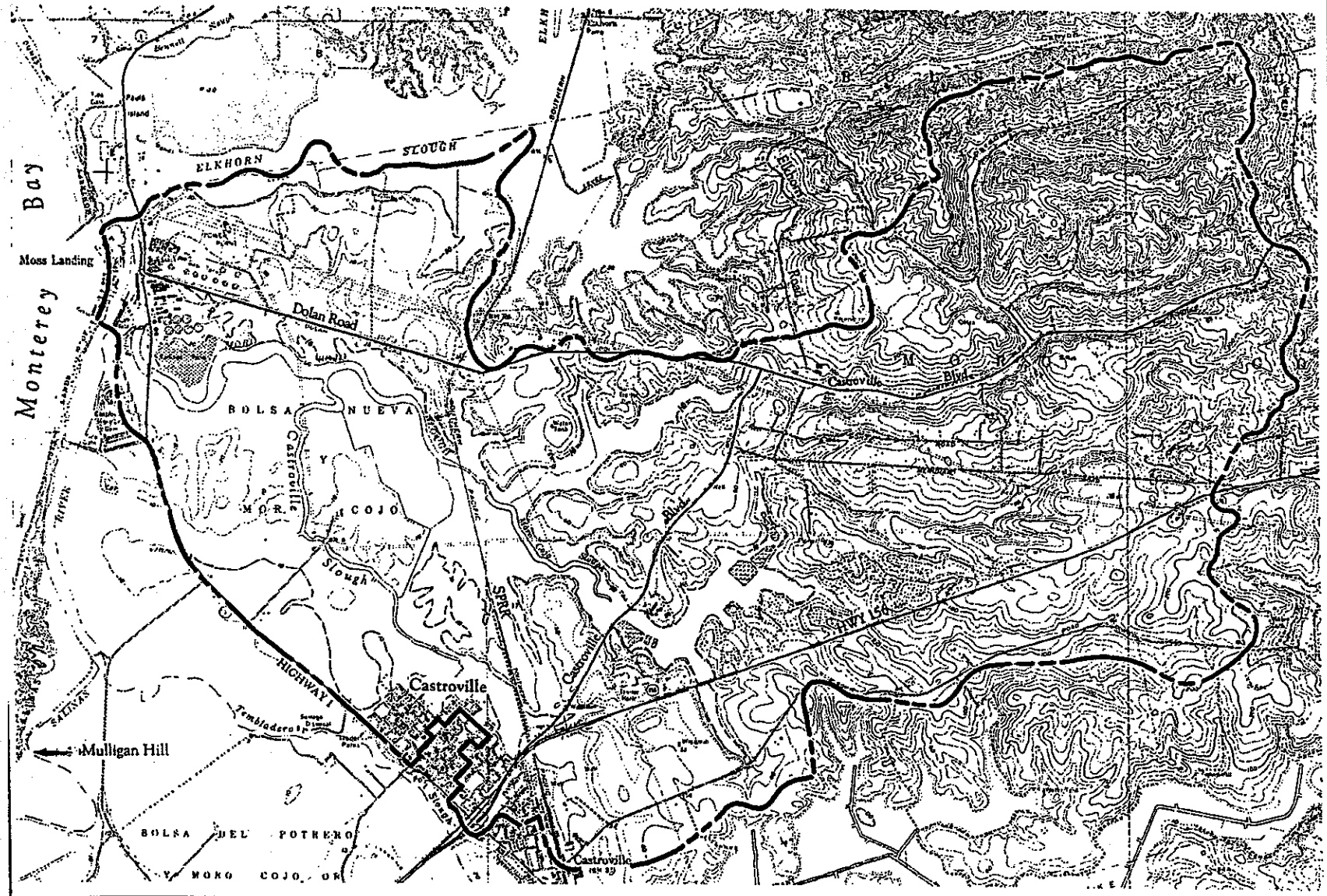


Figure 0-1 **Monterey Bay area showing the location Moro Cojo Slough within the Elkhorn Slough Watershed and the major rivers and sloughs in the area** (from ABA Consultants)



The Habitat Restoration Group Mitchell Swanson & Associates VB Agricultural Services Applied Marine Sciences	Moro Cojo Slough Management and Enhancement Plan Project Vicinity Map	Figure 1-1 2/96 705-01



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• Applied Marine Sciences

Moro Cojo Slough Management and Enhancement Plan
Project Study Area

2/96
705-01

Figure 1-2

CHAPTER 1
EXECUTIVE SUMMARY

The Moro Cojo Slough Management and Enhancement Plan describes the environmental resources of the Moro Cojo Slough watershed (hydrologic features, biologic resources, agricultural practices and water quality and land use issues) and recommends actions to enhance, restore and manage the significant resources on both public and privately-owned lands within the slough system.

The management and enhancement plan was initiated by Monterey County in response to land use conflicts and development pressures within the slough watershed. The project was funded jointly by a grant from the State Coastal Conservancy; with contributions from Monterey County, Monterey County Water Resources Agency (MCWRA), State Water Resources Control Board and the Elkhorn Slough Foundation. The study was conducted during 1993 and 1994.

The administrative draft of Volume I - Existing Conditions was submitted to the County of Monterey and the Elkhorn Slough National Estuarine Research Reserve Advisory Committee (RAC) on November 1, 1993. A Draft report was prepared and submitted to the County and the RAC on March 21, 1994. Following review of the existing conditions report and meetings with the RAC; the County, RAC, individual RAC members, and State and Federal agencies submitted comments on the Draft Existing Conditions Report. These comments, and their responses, are presented in the Volume I - Existing Conditions, Response to Comments Report.

Volume II - Resource Alternatives Report was prepared following completion of the Existing Conditions Report and concurrent with the Existing Conditions, Response to Comments Report. The Alternatives Report examines five various alternatives for the lower watershed (Moss Landing Road to Castroville Boulevard) and presents recommended Best Management Practice's (BMP's) practices for the entire watershed.

The alternatives report provided information to Monterey County and the RAC on the various alternatives to enhance and manage the Moro Cojo Slough watershed and provided an objective, planning-level analysis of the various actions that may be pursued within the watershed, including issues regarding land use, biological resources, hydrologic resources, and agricultural activities.

The RAC selected a preferred alternative which is presented in the Final Management and Enhancement Plan. Public hearings on the preferred alternative will be conducted by Monterey County to solicit input from interested parties, with final approval by the Monterey County Board of Supervisors.

Appendices to this report are included in a separate Technical Appendix.

PHYSICAL FEATURES

The Moro Cojo Slough watershed encompasses approximately 17 square miles within northern Monterey County (Figure 1-1). The project study area encompasses the entire watershed, and in general, is bound by Moss Landing Harbor and State Highway 1 to the west, State Highway 156 to the south, Prunedale/ San Miguel Canyon Road to the east and Paradise Canyon, Dolan Road and Elkhorn Slough to the north. Castroville Boulevard and the Southern Pacific Railroad (SPRR) tracks bisect the study area in a north-south direction. Meridian Road and Dolan Road bisect the study area in an east-west direction (Figure 1-2).

The watershed can be characterized into two geographic areas: 1) the lower slough; and 2) the upper watershed. The lower Moro Cojo Slough is characterized by a gently sloping valley floor confined by old marine and fluvial terraces constructed by the Salinas River; the salient topographic features are the slough channels and the adjacent floodplain. The lower slough is primarily occupied by wetland slough habitat and both wetland and upland agricultural and grazing lands. The lower slough area is generally bound by Moss Landing Harbor and Highway 1 to the west, Castroville to the south, Castroville Boulevard to the east and Elkhorn Slough to the north.

The upper watershed area is comprised of low-lying slough drainages and gently to moderately sloping terrace slopes that bound the slough. The upper watershed is a mixture of low-elevation wetlands, upland grassland and chaparral, agriculture, cattle grazing and rural residential development. The upper watershed is generally bound by Castroville Boulevard to the west, Highway 156 to the south, Prunedale to the east and Paradise Canyon to the north.

HISTORICAL INFLUENCES

Historical influences within the Moro Cojo Slough watershed can be categorized into four periods: pre-1850, 1850-1910, 1910-1947, and 1947-present. Prior to the 1750's, indigenous people, known as the Ohlone, inhabited the Moro Cojo region. The earliest known accounts of the area were from Spanish explorers during the late 1500's. Their journals described the greater Monterey Bay region as an environment much wetter than today, with wetlands of large size stretched over lowland areas and water channels, and upland areas of native bunchgrass. The Ohlone are known to have practiced land management and harvesting techniques, including burning grasslands, burning woodland understory and cutting of shrubs. It is expected that these land management activities were occurring within the Moro Cojo Slough watershed area. By the mid-1700's Spanish missionaries and large ranching families occupied the lands and began grazing large herds of cattle and sheep. This began the conversion of many of the upland native perennial grasslands to non-native annual grasslands and the reduction in many of the native large mammal populations.

Accounts of environmental conditions in 1854 depict the lower Moro Cojo Slough as subject to tidal seawater exchange from the ocean, as well as winter freshwater runoff and spring flow from the Moro Cojo watershed. A bridge connected the current Moss Landing Peninsula to the mainland, however, no channel structures were evident. A ferry was in operation across Elkhorn Slough at its confluence with the Salinas River. Salt marsh vegetation was recorded along both the Elkhorn Slough and Moro Cojo Slough from its confluence with the Salinas River (now Moss Landing Harbor) and upstream, probably a distance beyond the present location of the SPRR tracks. Open water ponds were evident adjacent to Moro Cojo Slough channel, as were numerous side channels and low-lying wetland areas. The upland areas surrounding the slough were grassland; the upper watershed areas were dominated by annual grasslands, chaparral and oak woodland habitat.

Between 1850 and 1910, major changes in the resources of the study area occurred as tidal control structures were installed across the Moro Cojo Slough channel. By 1886 the Pajaro Valley Railroad and SPRR had crossings over the slough. A county road (near the current Moss Landing Road) and Castroville Road crossed the slough at or near their present locations. The Pajaro Valley railroad crossing and the county road (e.g., Moss Landing Road) crossing were earthen fill across almost all of the slough, resulting in a restriction in tidal exchange (e.g., Sandholdt Dam). Agricultural land uses, predominantly cattle grazing, were common above the tidal range within the watershed. Reports of surfperch, steelhead and other fish were recorded from the slough from the turn of the century until the 1930's.

Between 1910 and the mid-1940's, extensive reclamation of wetlands for agricultural use occurred around Monterey Bay. Reclamation of tidal land around Moro Cojo Slough appears to have occurred in the 1930's and 1940's, primarily through ditching, levees and berms. Also during this time was the loss of shallow groundwater in the Moss Landing and surrounding areas, presumably by agricultural and other uses. Industrial uses, such as the Pacific Gas & Electric (PG&E) Moss Landing Power Plant and Kaiser Refractories Plant, were built before 1949. Wetland habitats during this period were confined between levees or berms, and cut off from tidal exchange. In 1946-47, the Moss Landing Harbor entrance was constructed which created a deep tidal inlet at the mouth of Moro Cojo Slough. This action, coupled with the relocation of the Salinas River in 1910, ensured that marine conditions prevailed in the slough.

Between 1947 and the present, land uses such as residential development, grazing and agriculture (i.e., crops of artichokes and strawberries) intensified within the watershed. Additional levees and ditches were constructed adjacent to the slough to facilitate year-round agriculture (1940 through 1989), industrial development occurred along the northwestern portion of the watershed (e.g., expansion of the PG&E and National Refractories developments between 1949 and 1968), land fill activities relating to commercial development near Moss Landing (1949 through 1976), and residential and school development (1976 through 1979). Portions of riparian corridors were channelized and/or dammed between 1976 and 1979. There are reports of the presence of steelhead, striped bass and salmon in the slough as late as the 1940's. In 1988, the culverts of Sandholdt Dam under Moss Landing Road were replaced so that very limited tidal inflow now occurs.

HYDROLOGY

The hydrology of the Moro Cojo Slough watershed is complex having changed significantly over geologic and historic time. Fluvial processes, coastal processes, groundwater and human modifications have affected the hydrologic features of the slough system. The Moro Cojo Slough watershed is located within the northeastern corner of the Salinas Valley groundwater basin. The hydrologic regime has been modified by the construction of a tide gate at the mouth of the slough, man-made drainage channels, levees, and use of ground and surface water for agriculture and residential development.

The lower watershed includes the remnants of Moro Cojo Slough, which is incised within a valley floor of recently deposited estuarine muds. Elevations on the valley floor range from 0.0 feet mean sea level (MSL) at the top of the slough channel to about +8.0 feet MSL at the valley edges. The lower slough, between Moss Landing Road at the mouth and the confluence with Castroville Slough, exhibits channel widths up to 500 feet, narrowing gradually to less than 50 feet at the SPRR and then less that 5 feet at its head near Castroville Boulevard A nearly continuous levee system bounds Moro Cojo Slough between the SPRR and Highway 1; behind these levees are drainage ditches serviced by pump systems. Castroville Slough drains the northeastern side of the town of Castroville into Moro Cojo Slough about 2 miles above Moss Landing Road. Other tributaries have been filled or reclaimed.

A variety of hydraulic structures have been constructed in and around Moro Cojo Slough to drain marsh land for agricultural use or to provide road crossings over the slough, including Sandholdt Dam. The MCWRA manages tide levels in the slough between −2.0 and −1.5 feet MSL to prevent flooding of residential and agricultural lands. The culverts at Highway 1 forms a constriction in addition to the SPRR crossing and Castroville Boulevard culverts.

Annual precipitation averages 17.3 inches in the Moro Cojo area and conveyance of flood flows is restricted by the artificial hydraulic controls at SPRR, Highway 1, Moss Landing Road and the levee and ditch system surrounding the slough, flood control facilities are managed and administered by the

MCWRA. Local farmers operate the Sea Mist Dam and pump system on Castroville Slough, as well as small scale drainage around farm lands.

BIOTIC RESOURCES

Vegetation

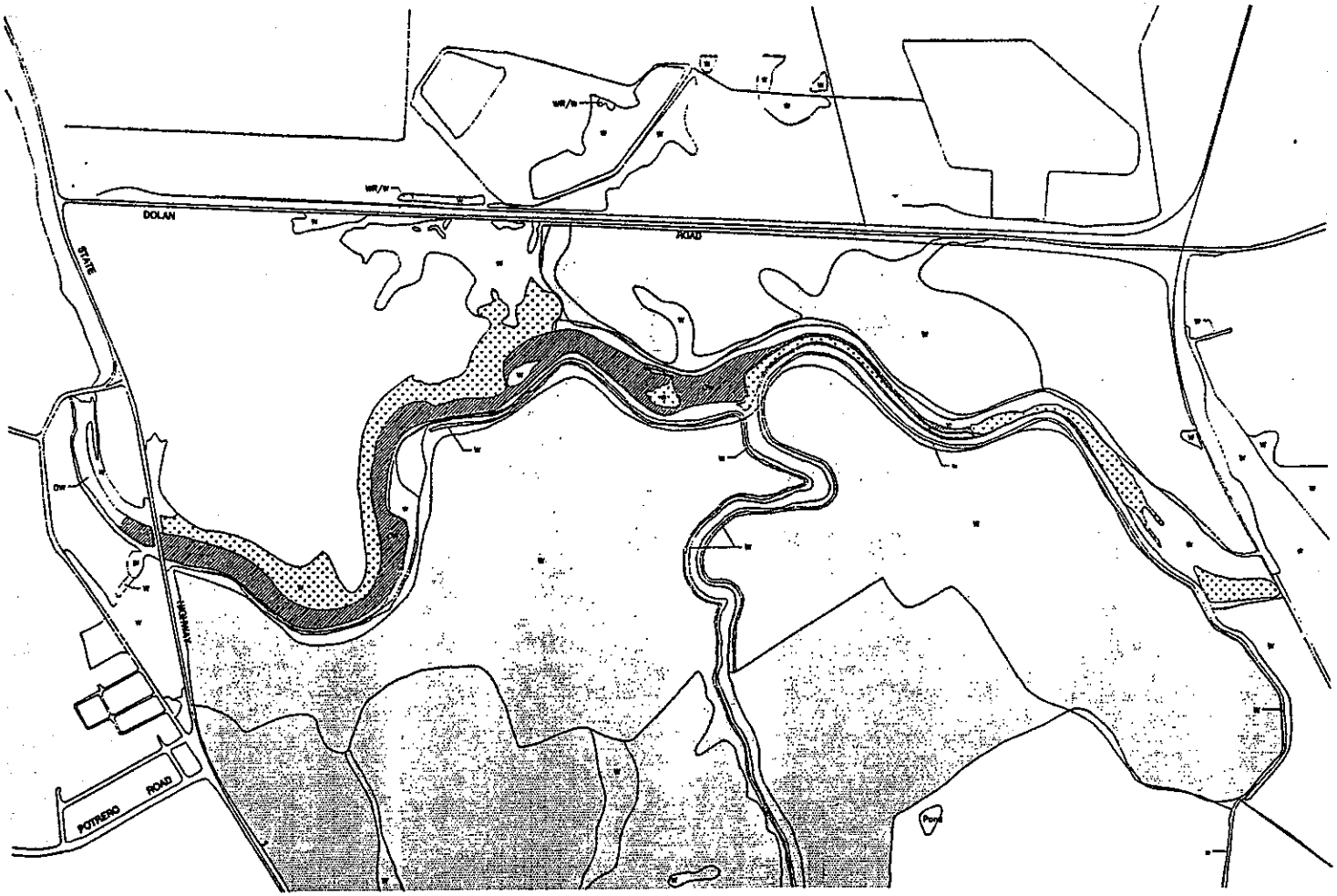
The vegetation within the Moro Cojo Slough watershed is comprised of several plant communities: wetlands (coastal salt marsh, freshwater marsh, herbaceous wetlands, and central coast arroyo willow riparian forest); grasslands (coastal alkali grasslands, mixed and non-native grasslands); maritime chaparral; coast live oak woodland; coyote brush scrub; and several types of non-native plant communities (residential landscaping, agricultural lands, ruderal, and non-native landscape trees).

The wetland communities are the dominant feature along the slough channels and form almost continuous bands along the watercourses. The width of the coastal salt marsh has been limited historically by the construction of man-made levees, berms and drainage ditches along the border of the slough. The modified tidal regime also restricts the linear extent of the salt marsh vegetation from the mouth of the slough to just upstream of the SPRR tracks. Areas previously inhabited by salt marsh vegetation show evidence of conversion to a species composition that is more tolerant of freshwater. Above Castroville Boulevard there are stands of arroyo willow riparian forest; small freshwater tributaries to the slough are vegetated with a combination of herbaceous wetlands and willow riparian habitat. Much of the upland plant communities within the watershed have been modified by various land uses. Areas historically inhabited by maritime chaparral are now a mixture of chaparral and residential landscaping, including non-native trees (i.e., eucalyptus groves). Remnant grasslands remain throughout the study area, the most prominent are in areas being used as pasture land; a portion of the historic alkali grasslands remain near Highway 1.

The records of the California Department of Fish and Game's (CDFG) California Natural Diversity Data Base (CNDDB) and other reports for the region indicate the following rare, endangered and/or locally unique plant species have the potential to occur or have been reported within the study area: Hooker's manzanita, Pajaro manzanita, Santa Cruz Mountains pussypaws, Monterey ceanothus, Monterey spineflower, Lewis's clarkia, seaside bird's-beak, Eastwood's goldenbush, fragrant fritillary, small-leaved lomatium, curly-leaved monardella, Dudley's lousewort, Gairdner's yampah, wild petunia, Yadon's piperia, Hickman's cinquefoil, round woolly marbles and Santa Cruz microseris. Gairdner's yampah was observed within the mixed grassland community and Hooker's manzanita and Pajaro manzanita were observed in the maritime chaparral (Figures 5-3 and 5-4).

Wildlife

The Moro Cojo Slough watershed is a valuable resource to a great variety of wildlife species. The slough and its associated wetlands habitats, with its close proximity to the nearby Elkhorn Slough system, Old Salinas, Salinas and Pajaro River mouth areas and Monterey Bay, combine to make the most important wetland system on the central coast for wildlife. Wildlife habitats are comprised of the plant communities mentioned above, as well as hypersaline ponded areas, mudflats and perennial and seasonally inundated freshwater and brackishwater ponds. Wildlife species diversity and abundance varies depending on the season and the water levels of the slough wetlands. While some wildlife species may be restricted to certain plant communities due to specific habitat requirements, many of them utilize several of the habitats in the watershed.



SYMBOL LEGEND

SYMBOL	DESCRIPTION OF SYMBOL
W	WETLAND
WR/W	CENTRAL COAST ARROYO WILLOW RIPARIAN FOREST/ WETLAND
OW	OPEN WATER
	CALIFORNIA BRACKISHWATER SNAIL – DOCUMENTED
	SHOREBIRD & WATERFOWL NESTING/FORAGING AREA
	POTENTIAL UPLAND HABITAT FOR: CALIFORNIA RED-LEGGED FROG, CALIFORNIA TIGER SALAMANDER, SANTA CRUZ LONG-TOED SALAMANDER

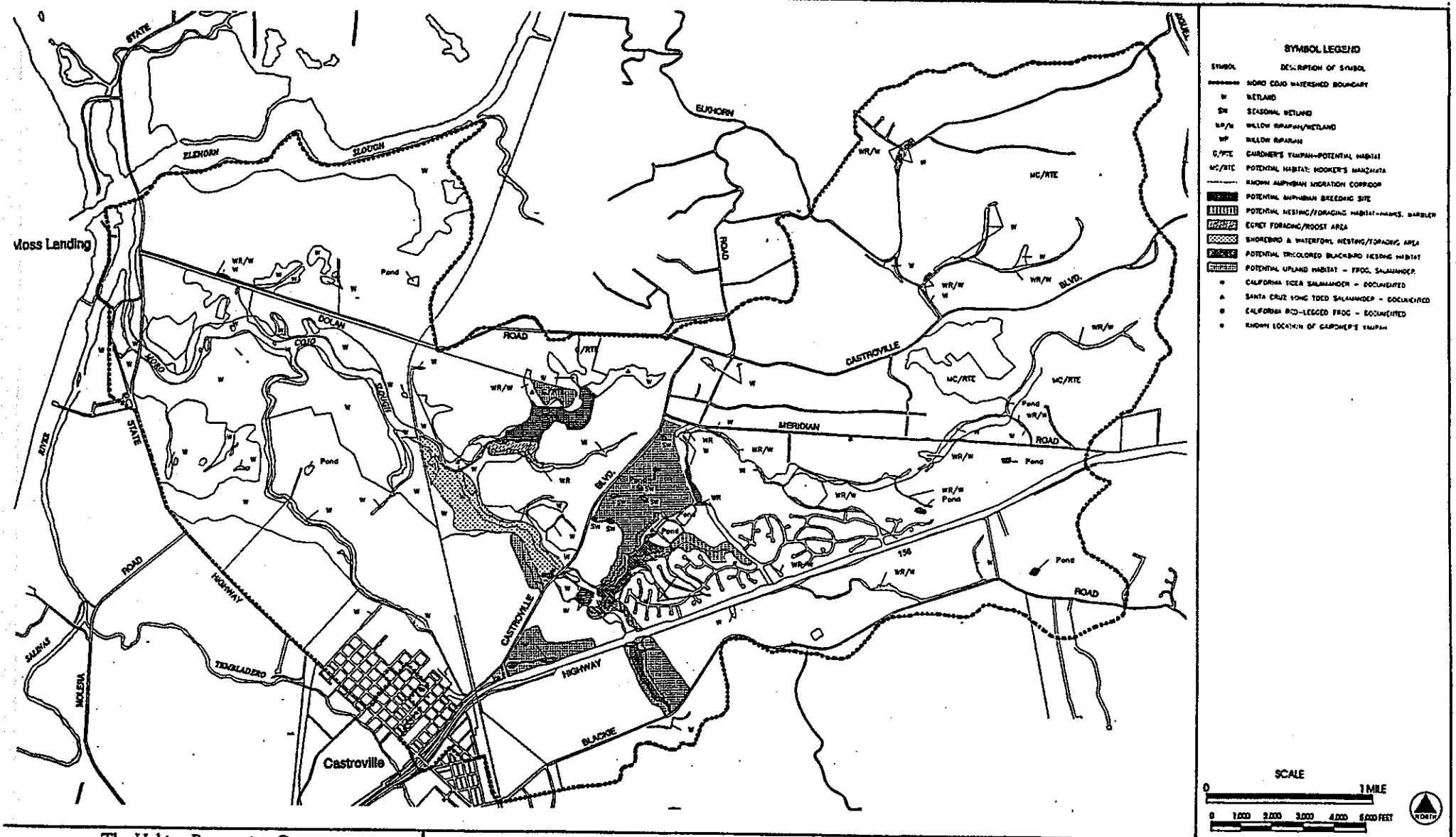
SCALE

0 — 1 MILE

0 — 1,000 — 2,000 — 3,000 — 4,000 — 5,000 FEET

NORTH

The Habitat Restoration Group • Mitchell Swanson & Associates • VB Agricultural Services • Applied Marine Sciences	Moro Cojo Slough Management and Enhancement Plan Sensitive Biotic Resources of Lower Watershed	2/96 705-01	Figure 5-3



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• Applied Marine Sciences

Moro Cojo Slough Management and Enhancement Plan
Sensitive Biotic Resources of Entire Watershed

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705-01

Figure 5-4

1-4

Several significant wildlife uses have been identified in the watershed. These include amphibian migration corridors, potential amphibian breeding sites, potential nesting/foraging habitat for hawks and warblers, egret foraging/roost area, black-shouldered kite roosting area, shorebird and waterfowl nesting and foraging habitat, potential tricolored blackbird nesting habitat, potential amphibian upland habitat and known occurrences of rare and endangered species (Santa Cruz Long-toed Salamander [SCLTS]) and species of special concern (California tiger salamander, California red-legged frog).

Fisheries and Aquatic Resources

The fishery resources of the slough are known from very limited sampling. Anecdotal accounts indicate that large numbers of red-tailed sea perch (surfperch), steelhead and other fish populated Moro Cojo Slough from before the turn of the century until the 1930's (Hansen, 1976). Studies during the 1970's and 1990's recorded the presence of native and non-native non-game fishes. Fish species typical of the lower slough include threespine stickleback, long-jaw mudsucker, staghorn sculpin, jacksmelt and mosquitofish. Tidewater goby, a Federal endangered species, may inhabit the lower slough.

The study assessed the presence of the brackishwater snail, an aquatic species of special concern and candidate for Federal threatened listing. Studies documented widespread presence of the snail from approximately half-way between Moss Landing Road and Highway 1, east to just upstream of the confluence with Castroville Slough. The snail appears to utilize the area of shallow, slow-moving tidal waters and depositional mud deposits of the slough.

AGRICULTURAL RESOURCES

Agriculture is a major land use in the study area, with approximately 10,000 acres in agricultural production within the Moro Cojo Slough watershed. The crops include artichokes, strawberries, flowers, vegetables and cattle operations. The row crops are grown year-round, mostly on land adjacent to the lower slough. Artichokes, the predominant vegetable crop, are grown by Sea Mist Farms on approximately 875 acres on three ranches within the lower slough.

Strawberries are the largest fruit crop in production within the watershed for a total of approximately 2,000 acres. The strawberry fields are located in the upper watershed and are farmed by lessees which tend to be renewed on a yearly basis. Most individual farms are between 10 and 50 acres. In addition to fertilization of the ground prior to planting, the land is fumigated to kill weed seeds, nematodes and plant diseases. Although approximately 20 pesticides are regularly used on the strawberry crop, some growers are using biological controls for some pests (i.e., mites). Several of the strawberry farms within the watershed have crops planted immediately adjacent to the slough, where problems with soil erosion (development of hard pans) and water contamination from sprays and fertilizers are evident.

Vegetables are grown in many areas of the slough, primarily near Highway 1 and Dolan Road. Crops include brussels sprouts, broccoli, lettuce, spinach and cauliflower. Crop production activities are similar to artichokes, except for more intensive application of fertilizer. Vegetable growers are implementing practices to minimize erosion and runoff into the slough and typically cover crop their fields every 2-3 years to replenish soil fertility.

Nurseries growing cut flowers are located in the upper watershed area near Elkhorn Road. Fumigants, pesticides and fertilizers are utilized prior to or during production with irrigation occurring by sprinklers and drip tape. The nurseries have recently improved management practices to collect runoff and correct hillside erosion problems.

Cattle operations occur along Highway 1, Highway 156, Dolan Road and Castroville Boulevard and two dairies are located along Dolan Road. Many of the operations border the slough, and some have no separation between operations and the watercourses. Small grazing operations exist in the upper watershed rural residential areas, including acreage with horses, pigs, chickens and cattle.

WATER QUALITY

Water quality of the Moro Cojo Slough has been altered by a variety of human activities. These include diking and draining of wetlands, point and non-point discharges by industry, reduction in surface and groundwater supply, and uncontrolled runoff from some agricultural practices. One package treatment plant (a factory which gathers wastes and conducts all treatment on-site), the WaterTek facility, serves the Oak Hills community near Castroville Boulevard and consists of percolation ponds and a spray field. With the exception of Oak Hills, the areas served by the Castroville County and Moss Landing County Sanitation Districts, the watershed developments are on septic systems.

The primary threats to the resources of the slough are due to increased nutrient input, septic system failure, inadvertent release of hazardous materials, and persistent pesticide residue. Many the agricultural operations bordering the slough implement land management practices to minimize impacts to the slough water quality. These include roads to prevent irrigation runoff, fertilizer runoff or pesticide over-spray from entering the slough.

Nutrients enter the slough from uncontrolled agricultural runoff, seepage from holding ponds and poorly placed or faulty septic systems. The nutrient enrichment can cause eutrophication, resulting in algal blooms that ultimately reduce oxygen availability for aquatic animals.

Persistent pesticide residues from past use of DDT, toxaphene, dieldrin, endrin, and aldrin are suspected of being present in the water and underlying slough sediments. Endosulphan, a pesticide currently in use, may also be present in the water. Detailed water and sediment testing is required to determine whether these pesticides or their derivatives are present.

LAND USE

Moro Cojo Slough is a major wetland resource occupying a significant percentage of land within the study area. Other predominate land uses include agriculture and low density rural residential development on uplands surrounding the slough. Industrial uses occupy a small percentage of land in the lower slough, with some commercial and high density residential development in Castroville and along Highways 1 and 156. All of these land uses have had some impact on the slough system over the last 100+ years.

The 1982 North County Land Use Plan (LUP) is the County Planning document which guides future land use changes in the study area. This plan places a strong emphasis upon preservation of natural resources including environmentally sensitive habitats (wetlands and rare-endangered species), as well as protection of viable agricultural lands. On lands without sensitive resources and unsuited for agricultural use, coastal-dependent development has priority. Other types of development (residential, non-coastal dependent commercial) are designated in parts of the study area. The Local Coastal Program also includes implementation plans (1988a, b) which provide development regulations and permit processing requirements to enact policies within the LUP.

PUBLIC ACCESS AND EDUCATION

Public access to the slough is limited for all modes of transportation. Vehicular access is supplied by intersections of the slough with county roads and State Highway 1. Pedestrian access is limited to public rights-of-way, with little separation from traffic. No public trails exist adjacent to the slough itself. The existing public trails in the watershed are limited to the hiking/equestrian trails in Manzanita Regional Park and the California Coastal Bicycle Route, although ad hoc trails do exist in scenic easement areas within the Oaks Hills community. The North County Trails Plan proposes numerous new trails in the Moro Cojo Slough watershed. These include trails along existing roadways and trails within scenic easements.

There are five public schools within the watershed, providing opportunities for education activities on the slough's resources. An existing agreement with North Monterey County High School specifies the development of a wetland educational program.

MANAGEMENT AND ENHANCEMENT

The present ecological condition of Moro Cojo Slough is substantially degraded as introduced land uses have altered both tidal influences, groundwater-spring flow and, consequently, the backbone of most of the original habitat. Significant hydrologic changes have occurred, including blockage of tidal seawater inflows with the construction of a dam at the mouth of the slough, reclamation of vast marsh lands to agricultural uses, clearing and urbanization of the upper watershed and Castroville areas, and over exploitation of groundwater resources throughout the watershed. A recent lack of freshwater due to the extended drought (1987-1992 and 1994) and a decline in groundwater quality has reduced the agricultural value of land in the former tidal areas surrounding the slough.

Moro Cojo Slough is degraded and has far less ecological value than the original system; however, an opportunity exists to enhance, manage and restore what are now relatively rare habitats in the Monterey Bay area.

Habitat enhancement and restoration often involves physically manipulating land and water (raising or lowering levees or berms, removing dam structures, grading land, etc.) in order to re-introduce the hydrologic conditions that support vegetation and wildlife habitat. However, physical manipulations must also be designed for other land uses that were absent in the pre-European era, such as flood control, mosquito control, agricultural use, and infrastructure. Restoration must look to the past for guidance and examples but the design must recognize that modern conditions may not allow for the restoration of the original and natural conditions. In order to optimize environmental values, the design must be compatible with the current conditions.

Preferred Lower Watershed Plan

Five alternatives to enhance resources within the lower watershed of Moro Cojo Slough (e.g., Moss Landing Road to Castroville Boulevard) were developed. These alternatives were evaluated by the RAC, who then selected the preferred resource management alternative for the lower watershed. The five alternatives reviewed were; Alternative A, Tidal Regime; Alternative B, Partially Tidal Regime; Alternative C, Enhanced Existing Conditions; Alternative D, Winter/Spring Freshwater Conditions; and Alternative E, No Project.

Each of the five alternatives evaluated suggest actions to protect existing significant biotic resources, increase overall habitat values within the slough environs, resolve existing resource problems and land

use conflicts and provide passive recreational/educational uses. The RAC reviewed each of the alternatives presented in the Resource Enhancement Alternatives report and, through consensus, selected Alternative D, Winter/Spring Freshwater Conditions as the Preferred Plan (Figure 10-1).

The Preferred Plan - Winter/Spring Freshwater Conditions creates areas for freshwater impoundments within the lower slough watershed between Moss Landing Road and Castroville Boulevard The plan does not modify the existing tidal environment below the SPRR. The tide gates at Moss Landing Road will be retained and operated in the same manner as the existing operation. A flashboard dam will be installed at SPRR to restrict tidal movement and to allow upstream impoundment of freshwater during the winter and spring. Freshwater impoundments would also be created in existing alkali grasslands, and/or excavated into the grassland, between Highway 1 and the SPRR. The RAC has recommended the use of "eco-engineering" (e.g., hay bales) to create barriers between the freshwater impoundments and the main slough channel. The hay bale barriers will need to be constructed so they are effective in impounding water, to create the desired freshwater "lakes", as well as preventing excessive leakage of freshwater into the adjacent salt/brackish main slough channel, to protect habitat for the brackishwater snail. Existing brackishwater areas above the SPRR would convert to more freshwater conditions due to the construction of a flashboard dam at the SPRR overcrossing. Areas currently freshwater near Castroville Boulevard would persist. Most areas below the 10-foot contour between Highway 1 and SPRR would be subject to freshwater inundation during the winter and spring, depending upon rainfall. The RAC has recommended the use of reclaimed water to maintain the freshwater impoundments during the winter and spring, if rainfall and/or runoff from the watershed is not sufficient to keep the impoundments inundated. The preferred plan incorporates agriculture and/or grazing on lands above the 10-foot contour.

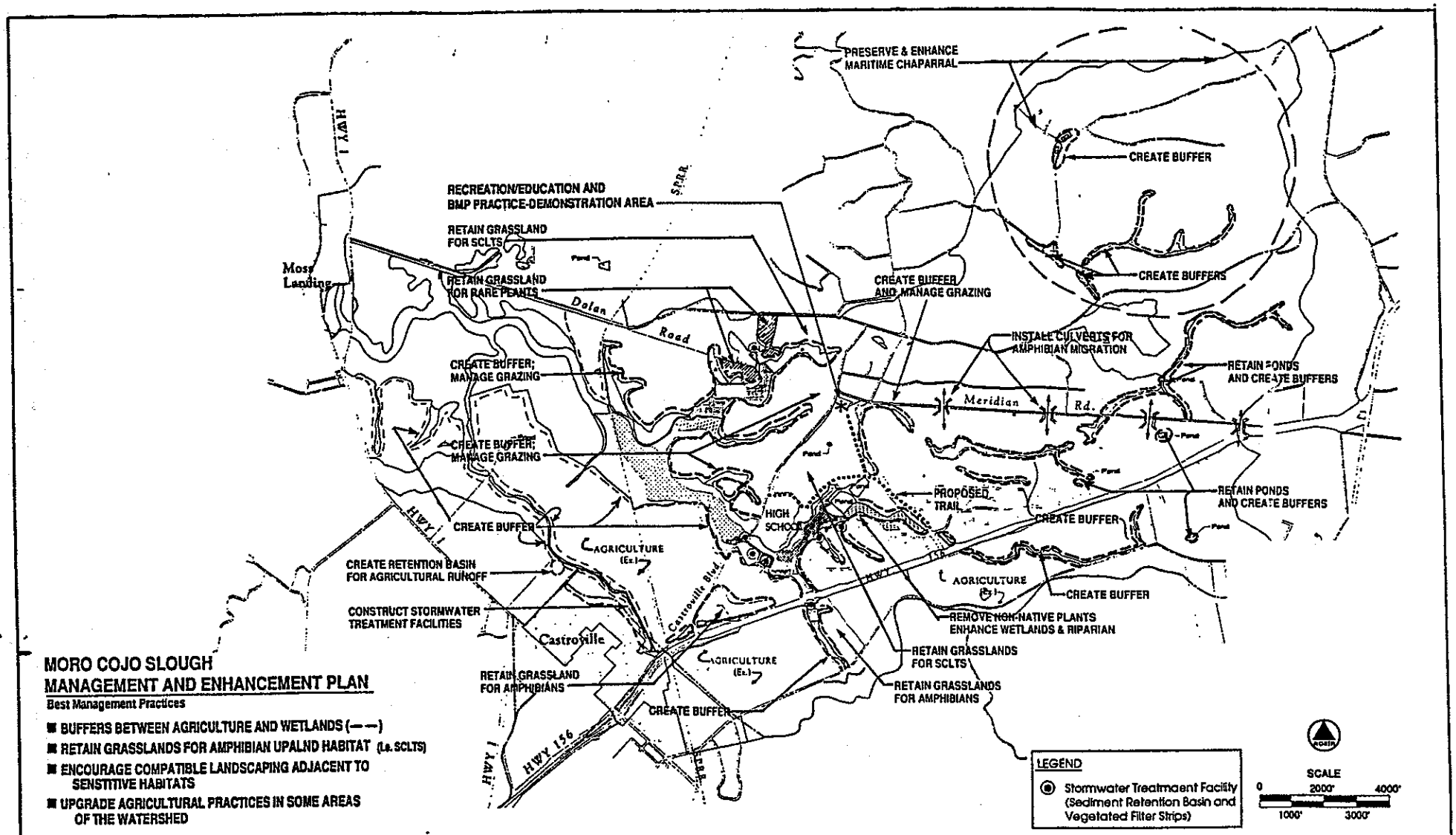
The preferred plan offers several features that meet the project goals and objectives. The plan also poses several constraints, including hydrologic, biological, and agricultural land use issues. The alternative will also require several permits from regulatory agencies. An analysis of the key actions and the anticipated impacts and mitigations of this alternative are described below and summarized on Table 10-2.

Project-wide Best Management Practices (BMP's)

BMP's are recommended for the entire watershed to provide resource protection and enhancement (Figure 11-1). The BMP's are consistent with guidance documents developed as part of Section 6217 of the Coastal Zone Reauthorization Amendments of 1990 (CZARA). This act requires states with federally approved coastal zone management programs, such as California, to develop and implement Coastal Nonpoint Pollution Control Programs to ensure the protection and restoration of coastal waters.

The BMP's address sediment/erosion, confined animal facilities, nutrient management, pesticide management, livestock grazing, new development, sewage systems, pollution prevention, stormwater runoff, protection and restoration of wetland and riparian areas, and public education. The BMP's also recommend actions to protect and manage rare, threatened, endangered and locally unique plant and animal species and their habitats.

The locations for each action are depicted in Figure 11-1. Landowners are encouraged to voluntarily implement these actions in order to meet the overall project goal of enhancement and resource values of the Moro Cojo Slough watershed. Each action is intended to be implemented by/with willing landowners.



MORO COJO SLOUGH MANAGEMENT AND ENHANCEMENT PLAN

Best Management Practices

- BUFFERS BETWEEN AGRICULTURE AND WETLANDS (— —)
- RETAIN GRASSLANDS FOR AMPHIBIAN UPALND HABITAT (i.e. SCLTS)
- ENCOURAGE COMPATIBLE LANDSCAPING ADJACENT TO SENSTITIVE HABITATS
- UPGRADE AGRICULTURAL PRACTICES IN SOME AREAS OF THE WATERSHED

The Habitat Restoration Group • Mitchell Swanson & Associates • VB Agricultural Services • Applied Marine Sciences	Moro Cojo Slough Management and Enhancement Plan Project-Wide Best Management Practices	2/96 705-01	Figure 11-1

CHAPTER 2
INTRODUCTION

PURPOSE OF MANAGEMENT AND ENHANCEMENT PLAN

The purpose of the Management and Enhancement Plan for the Moro Cojo Slough is to identify actions and measures to enhance, restore and create a diverse and productive mix of wetland habitats, improve water quality, manage flood waters consistent with the protection of natural and agricultural resources and provide for public access and education in appropriate areas adjacent to the slough. The plan indicates specific wetland enhancement alternatives and conceptual restoration designs for selected sites. The plan also identifies actions to: control erosion and sedimentation on the watershed, improve water quality of the slough, protect endangered and threatened species, manage flood control and agricultural practices to maximize compatibility with wetland viability, and indicates opportunities for public access and recreation.

This plan addresses wetland resources that are identified in the Monterey County General Plan and the LUP, a segment of the Monterey County Local Coastal Program. The plan addresses resource management measures for both public and privately-owned lands, including those owned and/or managed by MCWRA, Elkhorn Slough Foundation, CDFG, and National Oceanic and Atmospheric Administration (NOAA) for the Monterey Bay National Marine Sanctuary.

The request for a management and enhancement plan was initiated in 1990 by Monterey County in response to land use conflicts and development pressures within the slough watershed, as identified in the Local Coastal Program. The project was funded jointly by a grant from the State Coastal Conservancy; with in-kind contributions from Monterey County, MCWRA, State Water Resources Control Board and Elkhorn Slough Foundation.

Monterey County Planning and Building Inspection Department and the State Coastal Conservancy coordinated the preparation of the plan. The Habitat Restoration Group (HRG) was selected as the consultant to prepare the plan in 1993. The Elkhorn Slough National Estuarine Research Research Reserve Advisory Committee (RAC) provided review and guidance on development of the plan.

GOALS AND OBJECTIVES

GOALS

The goals of the Moro Cojo Slough Management and Enhancement Plan are derived from the LUP and RAC. Goals and objectives developed at the July 1993 RAC meeting are designated as "(RAC)" in the text below.

- Preserve, enhance and restore the natural resource values of the wetlands and adjacent upland habitat of the slough for maximum biological resource values.

- Reduce the impacts of human activities (including water quality, sedimentation and erosion) on the slough's wetland resources.

- Utilize resources of other projects as a vehicle for restoration (e.g., CalTrans, Moss Landing Harbor, Elkhorn Slough National Estuarine Research Reserve [where property within the reserve lies within the Moro Cojo Slough watershed] and other agencies, as applicable).

- Provide passive recreational uses of the slough and adjacent habitat where compatible with natural resource management and adjacent land uses.

- Increase freshwater supply to benefit wetland habitat values (RAC).

- Develop BMP's for the slough and immediate vicinity.

- Restore and enhance habitat for plant and wildlife species of special status.

- Provide natural resource interpretation for the residents of, and visitors to, the Moro Cojo Slough region.

OBJECTIVES

The objectives of the Moro Cojo Slough Management and Enhancement Plan are the derived measurable results of implementing the goals.

General Overall Objectives

G-1 Examine the benefits of maximizing freshwater retention (RAC).

G-2 Achieve habitat diversity through non-mechanical, low-maintenance and low-cost projects that have minimum habitat disturbance (RAC).

Biological Objectives

B-1 Evaluate the benefits, costs and feasibility of separating and increasing freshwater marshes and wetlands (RAC).

B-2 Evaluate the benefits, costs and feasibility of separating and increasing salt/brackish water marshes and wetlands.

B-3 Control and/or eradicate invasive non-native plant species. Minimize opportunities for non-native plant species to establish in and around the natural habitat areas.

B-4 Create barriers to deter domestic pets, feral animals and non-native wildlife from habitat areas. These animals reduce the value of natural habitats for waterfowl and other species naturally associated with such resources.

B-5 Manage habitat in and around the wetlands in a manner conducive to maintaining and/or enhancing wildlife habitat values.

B-6 Where possible, create buffers between existing and/or proposed agricultural/urban developments and the sensitive slough habitat areas, consistent with the Local Coastal Program.

B-7 Revegetate barren and degraded areas with native plant species to enhance botanical and wildlife values.

B-8 Maintain the local gene pool of native vegetation by planting locally native species.

Water Quality and Non-Point Pollution Objectives

W-1 Identify alternative methods to address water quality problems at the source (RAC).

W-2 Minimize sedimentation and soil erosion through the use of vegetation cover and other surface erosion control measures.

W-3 Improve and/or create stormwater detention facilities to protect/enhance water quality of the slough from agricultural and urban runoff.

W-4 Manage water and drainage to accommodate agricultural uses on adjacent lands.

W-5 Avoid actions that impact groundwater.

W-6 Coordinate with mosquito abatement district on measures to minimize impacts to sensitive habitat features.

W-7 Develop a monitoring program to evaluate the success of the slough management program.

Agricultural Objectives

A-1 Identify alternative management practices (RAC).

A-2 Identify practices which can benefit agricultural drainage and wetland resources (RAC).

A-3 Develop management plans for current agricultural crops to minimize impacts to wetlands.

A-4 Identify practices to minimize erosion, control irrigation drainage and minimize pesticide and fertilizer runoff into wetlands.

A-5 Identify agricultural-wetland conflicts and mitigation measures for solutions.

Land Use Objectives

L-1 Evaluate potential habitat restoration areas on marginal agricultural lands (RAC).

Public Access and Education Objectives

P-1 Evaluate linking public access with educational facilities within and adjacent to Moro Cojo Slough (RAC).

P-2 Encourage citizen involvement and participation in the planning and implementation phases of the watershed management plan.

P-3 Explore potential revenue sources and regulatory mechanisms to implement the plan.

CHAPTER 10
PREFERRED LOWER WATERSHED PLAN

INTRODUCTION

Five alternatives to enhance resources within the lower watershed of Moro Cojo Slough (e.g., Moss Landing Road to Castroville Boulevard) were developed. These alternatives were evaluated by the RAC, who then selected the preferred resource management alternative for the lower watershed. The five alternatives reviewed were; Alternative A, Tidal Regime; Alternative B, Partially Tidal Regime; Alternative C, Enhanced Existing Conditions; Alternative D, Winter/Spring Freshwater Conditions; and Alternative E, No Project.

Each of the five alternatives evaluated suggest actions to protect existing significant biotic resources, increase overall habitat values within the slough environs, resolve existing resource problems and land use conflicts and provide passive recreational/educational uses. Each action was analyzed as to its potential benefits (i.e., ability to meet stated goals and objectives of the plan) and potential impacts. Measures to reduce impacts were also identified. A general description of each alternative and why they were not selected by the RAC is presented below; a full description and analysis of each alternative is in Volume II - Resource Enhancement and Alternatives Report on file at Monterey County Planning and Building Inspection Department. The reader is directed to the Resource Enhancement and Alternatives Report for representative cross-sections and conceptual features of the alternatives not selected by the RAC.

Selection of the Preferred Plan

The RAC reviewed each of the alternatives presented in the Resource Enhancement Alternatives report and, through consensus, selected a preferred alternative. The RAC, in addition to the goals and objectives developed for the watershed-wide plan, identified several habitat and/or land use criteria that they felt were necessary for the preferred lower slough watershed plan. Each of the alternatives were evaluated by these criteria:

RAC criteria for lower slough:

1) retain both saltwater and freshwater habitats within the lower slough,
2) maintain known habitat for rare and endangered species (i.e., brackishwater snail and SCLTS),
3) maintain existing saltwater flow in the lower slough below SPRR bridge,
4) utilize treated, reclaimed water to recharge aquifers,
5) create freshwater conditions in lower slough (east if Highway 1),
6) retain water in the lower slough through the creation of impoundments,
7) maximize freshwater in lower slough through increased run-off and use of reclaimed water,
8) utilize eco-engineering,
9) recognize the need for maintenance and monitoring, and
10) maximize buffers between wetlands and adjacent land uses.

Based on these criteria, the RAC selected Alternative D, Winter/Spring Freshwater Conditions as the Preferred Plan.

The preferred plan, as presented in this report, is conceptual; additional analysis, design, and agreements with willing landowners will be required prior to implementation or construction. The actions proposed to occur under the preferred alternative are listed on Table 10-1. The ability of a proposed action to meet

the objectives of the management and enhancement plan are identified below; please refer to Chapter 2 for the list (and codes) of the various objectives. The potential impacts of implementing the Preferred Plan, and recommended mitigation measures to mitigate such impacts, are described below and summarized in Table 10-2.

The RAC has recommended phasing the implementation of the management actions into four phases (I-IV), estimated years of 1995 through 2005 (Table 10-2).

Phase I - Education and Enforcement through Existing Programs
(Year 1 and on-going)

- Develop Moro Cojo Management and Enhancement Plan framework.
- Identify management plan objectives and develop management plan monitoring program and success criteria.
- Formulate and implement a broad, watershed-wide education program.
- Initiate wetland restoration of previously converted wetland areas and easements through cooperation of landowners.
- Initiate regulatory permitting with applicable agencies and Monterey County.
- Identify potential funding sources and secure monies for implementation of the management plan actions.

Phase II - Establish Buffers between Wetlands and Other Lands with Willing Landowners
(Years 2 and 3)

- Create buffers with willing landowners.
- Initiate land management (e.g., move fences/cattle, install signs).

Phase III - Ecological Engineering
(Years 2 and 3)

- Obtain necessary permits from regulatory agencies and Monterey County.
- For Highway 1/Dolan Road/Castroville Triangle, design and implement educational and demonstration projects.
- Design eco-engineered structures for freshwater impoundments, evaluate effectiveness, and initiate construction of the impoundments utilizing chosen techniques.
- Investigate placement of flashboard dam at Castroville Slough, conduct design studies.
- Design selected BMP features, such as retention ponds and filter swales with willing landowners.

Phase IV - Design and Implement Structural Engineering Actions
(Years 4-10)

- Install flashboard dam at SPRR and Castroville Slough.
- Design and construct waterfowl island.
- Design and construct levees, install agricultural drainage pumps.
- Design and construct other plan features to protect structures and/or agricultural lands from flooding.
- Install selected BMP features on applicable lands.

PREFERRED PLAN - WINTER/SPRING FRESHWATER CONDITIONS

General Description of the Preferred Plan

The Preferred Plan — Winter/Spring Freshwater Conditions creates areas for freshwater impoundments within the lower slough watershed between Moss Landing Road and Castroville Boulevard. The plan does not modify the existing tidal environment below the SPRR. The tide gates at Moss Landing Road will be retained and operated in the same manner as the existing operation. A flashboard dam will be installed at SPRR to restrict tidal movement and to allow upstream impoundment of freshwater during the winter and spring. Freshwater impoundments would also be created in existing alkali grasslands, and/or excavated into the grassland, between Highway 1 and the SPRR. The RAC has recommended the use of "eco-engineering" (e.g., hay bales) to create barriers between the freshwater impoundments and the main slough channel. The hay bale barriers will need to be constructed so they are effective in impounding water, to create the desired freshwater "lakes", as well as preventing excessive leakage of freshwater into the adjacent salt/brackish main slough channel, to protect habitat for the brackishwater snail. Existing brackishwater areas above the SPRR would convert to more freshwater conditions due to the construction of a flashboard dam at the SPRR overcrossing. Areas currently freshwater near Castroville Boulevard would persist. Most areas below the 10-foot contour between Highway 1 and SPRR would be subject to freshwater inundation during the winter and spring, depending upon rainfall. The RAC has recommended the use of reclaimed water to maintain the freshwater impoundments during the winter and spring, if rainfall and/or runoff from the watershed is not sufficient to keep the impoundments inundated. The preferred plan incorporates agriculture and/or grazing on lands above the 10-foot contour.

Benefits and Constraints of the Preferred Plan

The preferred plan offers several features that meet the project goals and objectives (see pages 2-2 and 2-3) and the RAC's 10 criteria (see page 10-1). The plan also poses several constraints, including hydrologic, biological, and agricultural land use issues. The preferred plan will also require several permits from regulatory agencies and a program for maintenance and monitoring. An analysis of the key actions and the anticipated impacts and mitigations of this alternative are described below and summarized on Table 10-2.

Creation of Freshwater Impoundment Areas. The plan proposes the creation of winter/early spring freshwater impoundment areas within the marsh plain of the lower slough (below SPRR) and retainment of freshwater within the main slough upstream of SPRR. An "eco-dam" or a flashboard dam would be installed at the confluence of Castroville Slough and Moro Cojo Slough (Action H-3). These actions will not result in any modification of the tide gates at Moss Landing Road or saltwater flow below SPRR (RAC criteria 3). The freshwater impoundments are expected to enhance the existing grassland areas for waterfowl nesting and foraging (Action B-7), thus addressing plan Objectives G-1, B-1, B-5, B-6, W-4, W-5, A-2 (see pages 2-2 and 2-3), and the RAC criteria 1, 5, 6, 7, and 8 (see page 10-1).

The creation of the freshwater impoundments may result in partial or full inundation of approximately 375 acres below the 10-foot contour between the SPRR and Highway 1; these areas will require purchase or conservation easements from willing landowners (Actions L-1, L-2, A-1 [see Table 10-1]). Additionally, adjacent agricultural lands will require protection from flooding. Inundation of the alkali grassland west of SPRR may cause a gradual conversion of the area to freshwater plant species (Action B-1). Likewise, freshwater impoundments east of SPRR may convert the brackishwater marsh areas to a more freshwater habitat (Action B-2). Mitigation would include the construction of earthen berms at the 10-foot contour and management/upgrade of existing agricultural drainage pump systems (Actions F-1 and

F-2). These actions will increase habitat values of the slough system, addressing Objectives G-1, B-2, B-5, B-6, A-3, L-1 (see pages 2-2 and 2-3), and the RAC criteria 5, 6, 7, and 8 (see page 10-1). The impoundments may utilize treated, reclaimed water runoff to recharge aquifers (RAC criteria 4). Additionally, the plan would allow some public access and citizen involvement in implementing the plan (Objectives P-1 and P-2).

The operation of the freshwater impoundments could impact 65 acres of known habitat for the brackish-water snail and potential habitat for the tidewater goby in the main slough channel downstream of the SPRR. As mitigation, the plan incorporates measures to control the release of freshwater into the main slough channel. The RAC has proposed the use of "eco-engineering" to create the impoundments (Action H-6), such as the use of hay bales (Objective G-2 and RAC criteria 2 and 8). This methodology is less costly than more traditional methods, such as the installation of flashboard dams. As discussed above, the use of a method such as hay bales, should be tested as to their effectiveness in preventing excessive leakage of freshwater into the main slough. The integrity of the impoundments will need to be periodically checked, and repairs made as necessary, throughout the winter and spring, particularly after storm events (RAC criteria 9 and Objective W-7). If hay bales are not deemed effective, it is recommended that flashboard dams be installed. With either of the methods, some leakage of fresh water is expected and there may be some loss of habitat immediately adjacent to the dam outlets. More detailed design of the dams, coupled with sampling of snail populations and sampling to determine the presence of tidewater goby is required to determine the significance of the potential impacts. Consultation and/or permitting with regulatory agencies will be required.

If the freshwater impoundments are to be excavated in the alkali grassland, rather that allowing inundation of the existing grasslands, there will be disturbance of existing wetland and/or removal of some contaminants from the slough area. The feasibility of excavation and deposition of this material within receiving waters (i.e., Monterey Bay) or onto adjacent lands will require a more detailed analysis and consultation/permitting with appropriate regulatory agencies (i.e., NOAA, COE, RWQCB). A sediment management plan for pollutants will be prepared (Action H-5).

The plan proposes to maintain the existing tidal activity within the main slough channel between Highway 1 and SPRR (Action H-4, Table 10-1, and RAC criteria 3). This is not expected to result in significant changes in existing saltmarsh mosquito management. The creation of freshwater impoundments during the winter and early spring, however, is expected to result in an increase in the freshwater winter mosquito population (P. Ghormely, North Salinas Valley Mosquito Abatement District, pers. comm., 1994) (Action B-5, Table 10-1). The freshwater winter mosquito has increased its presence in the region over the last nine years and is considered a serious public health and resource management concern (*ibid.*). The life cycle begins in November-December and lasts through the spring. The species produces one brood per year and they are vicious biters. The mosquito population is difficult to manage through conventional means, as treatments such as oil and Bt have little effect (*ibid.*). A cooperative research project is currently underway to determine suitable treatments for this species of mosquito. The preferred management action to control this species is to drain seasonal wetlands or to have impoundments of constant water level with little/no vegetative breeding habitat. This management action, however, is contrary to the intent of the preferred plan. It is expected that freshwater winter mosquito populations will be a management concern in the impoundment areas both upstream and downstream of the SPRR. If aerial spraying of oil is utilized as a management action, for example, it is estimated to cost approximately $6,000 per application. Implementation of the preferred plan will be coordinated with the mosquito abatement district (Objective W-6).

Creation of Island for Waterfowl Breeding. The plan includes the opportunity to create an island within the slough to facilitate breeding by shorebirds or waterfowl (Action B-6, Table 10-1). As proposed,

the island would include a deep water channel to discourage predation by mammals. Of particular concern are red fox and feral dogs; the deep water channel may discourage their access to the breeding island (addresses Objective B-4). A more detailed sediment transport study is needed to determine whether the creation of the deep water channel would significantly impact existing brackishwater snail habitat. Additional study is needed to determine if sediments will accumulate in the channel over time and if periodic dredging would be necessary (Action H-5). Permits from regulatory agencies would need to be acquired prior to implementation of this action.

Erosion and Flooding. The preferred plan is not expected to cause erosion of the marsh plain, since the grade control structure at Highway 1 will be maintained (Action H-1, Table 10-1). This action addresses Objective W-2.

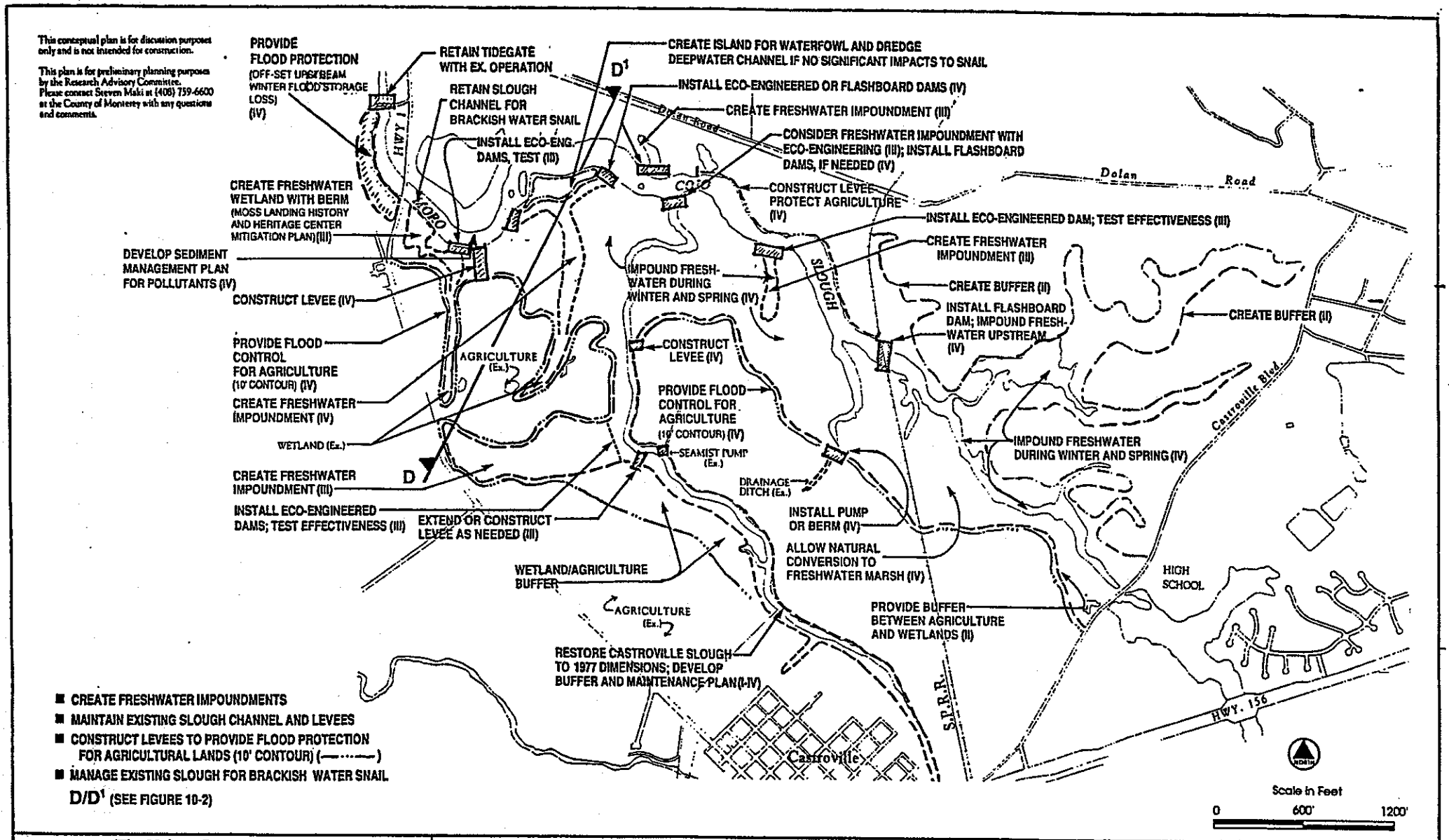
Flood flows may result in flooding of existing properties between Highway 1 and Moss Landing Road; however, the extent of flooding may be reduced by the capture of runoff in the freshwater impoundments. It is expected that floodwalls or purchase of property would still be required (Action F-2).

Modification of the SPRR Track Overcrossing to Install a Flashboard Dam. The installation of a flashboard dam at SPRR (Action H-2) will require the modification to the SPRR overcrossing. The installation of the dam is expected to gradually convert the existing brackish marsh areas upstream of SPRR to a more freshwater habitat (Action S-2, Table 10-1). This may affect approximately 200 acres. This action addresses Objective B-2 (see page 2-2) and the RAC criteria 5, 6, and 7 (see page 10-1).

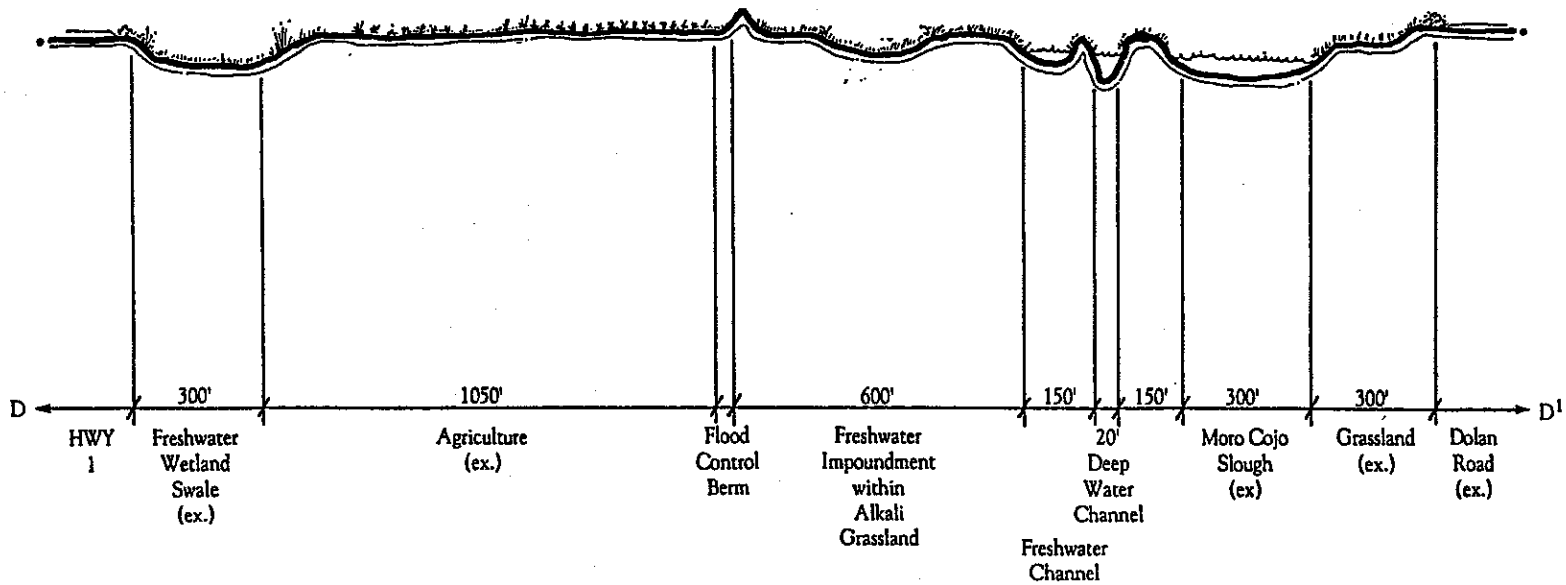
The installation of the flashboard dam at SPRR is not anticipated to impact existing breeding areas of the SCLTS, tiger salamander and red-legged frog, unless inundation levels occur within the breeding areas. Proper maintenance and management of the flashboard dam is expected to prevent impacts to the breeding areas. The need for maintenance and monitoring is recognized in RAC criteria 9 and Objective W-7.

Creation of Buffers between Existing Agriculture and Wetland Resources. The plan includes the creation of buffers between existing wetlands and agricultural land uses (Actions L-1, A-2, B-3 [Table 10-1]). These buffers are for two general areas: 1) areas downstream of the SPRR, and 2) areas upstream of SPRR. The buffer areas downstream of SPRR are proposed to be situated along the 10-foot contour adjacent to the flood control berms/levees (Action F-1). The buffers are intended to provide area for the construction of retention basins, filter swales or other features to reduce impacts to the adjacent wetlands from agricultural and/or grazing land uses (Action A-3). Buffer areas upstream of SPRR will be established between wetland areas and agricultural and/or grazing lands. The establishment of buffer areas would be pursuant to purchasing land or obtaining conservation easements from willing landowners. Assuming a 50-foot-wide buffer zone, approximately 75 acres of agricultural land would be affected above the SPRR; below the SPRR, approximately 375 acres may be affected. The establishment of buffer and water quality management features addresses Objectives B-5, B-6, W-1, W-2, W-3, A-1, A-2, A-4 and RAC criteria 10. If needed, the buffer areas could be revegetated with native species and invasive plants removed (Objectives B-3 and B-8).

Widening Castroville Slough to 1977 Dimensions. This proposed action (Action B-4, Table 10-1) is intended to restore habitat values within portions of Castroville Slough through the re-establishment of wetland habitat. Working with willing landowners, there may be opportunities to improve agricultural drainage and other drainage/flooding problems through a re-design of the slough (Action A-4, Table 10-1). Suggested designs include a one-bank widening with a lowered berm upon which native wetland habitat can be established. A more detailed investigation of 1977 conditions, identification of wetland-agricultural conflicts, an analysis of design opportunities, and cooperation with landowners is required for implementation of this action. Based on a preliminary analysis of aerial photos, over 10 acres of



The Habitat Restoration Group • Mitchell Swanson & Associates • VB Agricultural Services • Applied Marine Sciences	Moro Cojo Slough Management and Enhancement Plan Preferred Plan for Lower Watershed	2/96 705-01	Figure 10-1



The Habitat Restoration Group • Mitchell Swanson & Associates • VB Agricultural Services • Applied Marine Sciences	Moro Cojo Slough Management and Enhancement Plan Cross-section Showing Design of Lower Watershed Preferred Plan-Winter/Spring Freshwater Conditions (D/D¹)	2/96 705-01	Figure 10-2

agricultural land may be affected. Addressing these land use conflicts and restoring habitat along Castroville Slough addresses Objectives A-5, B-5, B-7 and RAC criteria 5.

According to available information, there are no known official violations with the COE for actions along Castroville Slough. Previous activities may have resulted in the fill of wetlands, however they have not been cited as violations by State or Federal regulatory agencies. Recent filling of apparent wetlands within the Castroville area occurred through an adjustment of the coastal zone boundary by CCC. Violations to the County's riparian setback policy have been addressed by the County and a restoration plan has been prepared. If filling occurs in the future and the COE assumes jurisdictional authority, they may require re-establishment of impacted areas. In similar instances within the region, the COE has required re-establishment of habitat based on conditions five years previous to the citation (i.e., 1989). The RAC, as part of the preferred plan, has recommended restoration of Castroville Slough to its dimensions as of January 1, 1977, the date Section 404(f) of the Clean Water Act was enacted (see Chapter 2, U.S. Army Corps of Engineers). The RAC wants to use this as the baseline date for management and enhancement; however, the date should not restrict enhancement objectives (RAC, August 1994).

OTHER ALTERNATIVES CONSIDERED BY THE RAC

The following alternatives for the lower watershed were considered by the RAC, but were rejected. A brief description of each alternative and the rationale for its rejection is presented below.

Alternative A - Tidal Regime

Alternative A, The Tidal Regime, is an alternative that would create an open tidally-influenced system from Moss Landing Road to Castroville Boulevard. The alternative is modeled after the conditions believed to be present within the lower watershed in the 1850's, prior to the installation of tide gates at Moss Landing Road. The alternative incorporates agriculture and/or grazing on lands above the 10-foot contour (believed to be the condition in the 1850's), and periodic tidal inundation of lands currently being grazed below the 10-foot contour.

Benefits and Constraints of Alternative A. This alternative offers several features that meet the project goals and objectives. The alternative also poses several constraints, including hydrologic, biological, and agricultural land use issues. The alternative would also require several permits from regulatory agencies. The removal of tide gates at Moss Landing Road (Sandholdt Dam) is one of the key actions of this alternative. Removal of the tide gates will allow tidal circulation within the slough. In conjunction with the installation of tide gates at SPRR, a fully tidal saltmarsh environment, including mudflats, marsh habitat and adjacent habitat is expected between Highway 1 and SPRR. In addition to the removal of the tide gates at Moss Landing Road, several breaks will be made in the existing levee system to allow inundation of grassland below the 10-foot contour. These habitats are expected to increase the areas value to tidal marsh-dependent wildlife.

As proposed in the Preferred Plan, an island, with a deep water channel to discourage predation by mammals, would be created. Tidal activity is expected to maintain the deep water channel, however if sediments accumulate, periodic dredging may be necessary. Restoring tidal activity in the lower slough may cause erosion of the marsh plain. As mitigation a new grade control structure would need to be installed at Highway 1.

Increased tidal flows may result in partial or full inundation of approximately 375 acres below the 10-foot contour between the SPRR and Highway 1; as with the Preferred Plan, these areas will require purchase or conservation easements from willing landowners and protection from flooding and/or tidal flows. This

alternative includes the creation of buffers between existing wetlands and agricultural land uses as proposed in the Preferred Plan. The increased tidal action may affect adjacent agricultural lands (i.e., artichokes) below SPRR if salts rise within the root zone (±3 feet below surface) by capillary action.

The increased tidal activity could impact approximately 65 acres of known populations of brackishwater snail, a species of special concern. The tidewater goby, a Federally endangered species, which may inhabit the slough, would potentially be impacted by this alternative. Mitigation would include the construction of shallow tidal channels to create compensation habitat for these species. More detailed sampling of snail populations and sampling to determine the presence of tidewater goby and consultation with regulatory agencies is required. The creation of shallow channels would require dredging of marsh sediments; this may result in the disturbance and/or removal of some contaminants from the slough area. The feasibility of deposition of this material within receiving waters (i.e., Monterey Bay) onto adjacent lands will require a more detailed analysis (Action H-7) and consultation/permitting with appropriate regulatory agencies (i.e., NOAA, COE, RWQCB).

Increased tidal activity between Highway 1 and Castroville Boulevard is expected to create conditions unsuitable for mosquitos. The daily tidal activity is expected to reduce potential breeding habitat for saltmarsh mosquitos. Mosquitos may remain a management concern in upper reaches of the slough where areas are more brackish-fresh. Mitigation measures could include the construction of runnels (i.e., channels) or other drainage features in coordination with the Mosquito Abatement District.

The increased tidal activity to Castroville Boulevard will require the modification to the SPRR overcrossing. The crossing will need to be enlarged to allow additional flow. The increased flows are expected to gradually convert existing freshwater marsh areas upstream of SPRR to a more tidally-influenced habitat. This may affect approximately 225 acres. The increased tidal activity upstream of the SPRR may impact existing breeding areas of the SCLTS, tiger salamander and red-legged frog, encompassing three known sites over approximately 90 acres. Mitigation would include the construction of berms/levees around breeding ponds to preserve the habitat. A more detailed analysis of this action would need to be explored with regulatory agencies in order to evaluate its effectiveness.

Increased tidal activity above the SPRR has the potential to affect seawater percolation into groundwater where the upper and lower aquifers may be connected. This potential impact requires a more detailed investigation of groundwater movement and tidal activity.

This alternative recommends restoring habitat values within portion of Castroville Slough through the re-establishment of wetland habitat to 1989 conditions. Based on a preliminary analysis of aerial photos, approximately 10 acres of agricultural land may be affected.

Reason for Rejection of Alternative A. The RAC rejected this alternative due to the potential impacts (and recommended mitigation measures) to endangered species (i.e., brackishwater snail below the SPRR, and SCLTS above SPRR) and the numerous structural changes that would be required (i.e., modification to Moss Landing Road culverts, construction of tidal channels). The RAC also was concerned that regulatory permitting for this alternative would be extensive.

Alternative B - Partially Tidal Regime

Alternative B - Partially Tidal Regime creates a tidal environment upstream to SPRR. As in Alternative A, the tide gates at Moss Landing Road will be removed; however, tidal influence will be prevented past the SPRR. Existing brackishwater conditions (a short distance upstream of SPRR) and freshwater conditions upstream of SPRR to above Castroville Boulevard would persist. Similar to Alternative A,

existing areas below the 10-foot contour between Highway 1 and SPRR would be subject to tidal inundation. The alternative incorporates agriculture and/or grazing on lands above the 10-foot contour.

Benefits and Constraints of Alternative B. As in Alternative A, one of the key actions of this alternative is the removal of the tide gates at Moss Landing Road to allow full tidal circulation within the slough. The removal of the tide gates and several breaks in the existing levee system would allow inundation of grassland below the 10-foot contour.

As proposed in Alternative A, Alternative B includes the opportunity to create an island within the slough to facilitate breeding by shorebirds, partial or full inundation of lands below the 10-foot contour between the SPRR and Highway 1. The increased tidal activity is expected to adversely impact a portion of the known populations of brackishwater snail, a species of special concern. Approximately 3,000 linear feet (24 acres) of snail habitat may be affected. Increased tidal activity between Highway 1 and SPRR is expected to create conditions unsuitable for mosquitos. The daily tidal activity is expected to reduce potential breeding habitat for saltmarsh mosquitos. Mosquitos are expected to remain a management concern in the slough above SPRR where areas will be dominated by freshwater. This alternative includes the creation of buffers between existing wetlands and agricultural land uses, as described in Alternative A. Please refer to the discussion in Alternative A regarding the benefits and constraints of these actions.

The installation of tide gates at SPRR will require the modification to the SPRR overcrossing. The installation of tide gates is expected to gradually convert the existing brackish marsh areas upstream of SPRR to a more freshwater habitat. This may affect approximately 200 acres. The management of the tide gates at SPRR is not anticipated to impact existing breeding areas of the SCLTS, tiger salamander and red-legged frog. Although tide gates may leak, the influence of the leakage is not expected to extent upstream to the breeding areas. Increased tidal activity to the SPRR has the potential to affect seawater percolation into groundwater where the upper and lower aquifers may be connected. This potential impact requires a more detailed investigation of groundwater movement and tidal activity; however, the impact is less likely than in Alternative A since the tidal exchange will stop short of the potential recharge areas. This action, if deemed a significant impact, would be contrary to Objective W-5.

Reason for Rejection of Alternative B. The RAC rejected this alternative due to the potential impacts to endangered species (i.e., brackishwater snail) and the numerous structural changes that would be required (i.e., modification to Moss Landing Road culverts, construction of tidal channels). The RAC was also concerned that regulatory permitting for this alternative would be extensive.

Alternative C - Enhanced Existing Conditions

Alternative C - Enhanced Existing Conditions creates a modified tidal environment upstream to SPRR. The tide gates at Moss Landing Road will be retained, but modified to allow greater the tidal influence to the SPRR. Existing brackish (for a short distance upstream of SPRR) and freshwater conditions upstream of SPRR to above Castroville Boulevard would persist. Similar to Alternative A, existing areas below the 10-foot contour between Highway 1 and SPRR would be subject to tidal inundation. The alternative incorporates agriculture and/or grazing on lands above the 10-foot contour.

Benefits and Constraints of Alternative C. This alternative proposes a modification of the tide gates to allow tidal circulation within the slough to SPRR. This is expected to enhance the existing tidal saltmarsh environment, including creating some additional channels for mudflat and pickleweed marsh habitat. These habitats are expected to enhance the value of the lower slough to tidal marsh-dependent wildlife. The alternative includes several breaks in the existing levee system to allow inundation of grassland below the 10-foot contour.

This alternative includes the opportunity to create an island within the slough to facilitate breeding by shorebirds. The increased tidal flows may result in flooding (tidal and flood-related) of existing properties between Highway 1 and Moss Landing Road. Increased tidal activity between Highway 1 and SPRR is expected to create conditions unsuitable for mosquitos. The daily tidal activity is expected to reduce potential breeding habitat for saltmarsh mosquitos. This alternative includes the creation of buffers between existing wetlands and agricultural land uses. Please refer to the discussion in Alternative A regarding the benefits and constraints of these actions.

Modification of the tide gates, while retaining the culverts at Highway 1, is not expected to cause erosion of the marsh plain. This action addresses Objective W-2. Increased tidal flows may result in partial or full inundation of approximately 375 acres below the 10-foot contour between the SPRR and Highway 1. These areas will require purchase or conservation easements from willing landowners (Action L-1). Additionally, adjacent agricultural lands will require protection from flooding and/or tidal flows. Mitigation would include the construction of earthen berms at the 10-foot contour and management/ upgrade of existing agricultural drainage pump systems (Action F-1). This action will increase habitat values of the slough system.

The increased tidal activity is expected to adversely impact a portion of the known populations of brackishwater snail, a species of special concern. Approximately 1,200 linear feet (8 acres) of snail habitat may be affected. The tidewater goby, a Federally endangered species, which may inhabit the slough, would potentially be impacted by this alternative. Mitigation would be similar to Alternative A, where shallow tidal channels will be constructed to create compensation habitat for these species. The installation of tide gates at SPRR will require the modification to the SPRR overcrossing. The installation of tide gates is expected to gradually convert the existing brackish marsh areas upstream of SPRR to a more freshwater habitat. This may affect approximately 200 acres.

The small modification of tidal activity has the potential to affect seawater percolation into groundwater where the upper and lower aquifers may be connected. This potential impact requires a more detailed investigation of groundwater movement and tidal activity; however, the impact is considered low since the tidal exchange will stop short of the potential recharge areas, as described in Alternative A.

Reason for Rejection of Alternative C. The RAC rejected this alternative due to the potential impacts to endangered species (i.e., brackishwater snail). The RAC also was concerned that regulatory permitting for this alternative would be extensive.

Table 10-1. Summary of Lower Watershed Preferred Alternative Plan Actions, Moro Cojo Slough Management and Enhancement Plan

ACTION	PHASE (I-IV)
Land Use Actions: L-1. Through voluntary landowner involvement, obtain conservation easements, purchase or land exchange for pasture and/or agricultural lands below the 10-foot contour between SPRR and Castroville Boulevard to provide buffer between agricultural lands and wetlands. (Addresses RAC criteria 10; Plan Objectives B-6 and A-5.)	II
L-2. Through voluntary landowner involvement, obtain conservation easements, purchase or land exchange for pasture and/or agricultural lands below 10-foot contour west of SPRR for construction of fresh-water impoundments. (Addresses RAC criteria 5 and 6; Plan Objectives G-1 and B-1.)	IV
Hydrologic Actions: H-1. Replace Highway 1 crossing with a spanning bridge to allow additional flows; maintain grade control structure. (Addresses RAC criteria 1 and 3; Plan Objectives W-2.)	IV
H-2. Modify the SPRR track overcrossing to accommodate additional flows, and install flashboard dam to impound water. (Addresses RAC criteria 2, 5 and 6; Plan Objectives G-1, B-1, B-5, W-4, W-5, W-6 and A-2.)	IV
H-3. Install "eco-dam" or a flashboard dam at the confluence of Castroville Slough and Moro Cojo Slough to limit/control tidal movement in Castroville Slough and control releases of freshwater into Moro Cojo Slough. (Addresses RAC criteria 1, 2 and 8; Plan Objectives G-1, B-1, B-5, W-4, W-5, W-6 and A-2.)	III (eco dam) IV (flashboard dam)
H-4. Maintain existing operation of tide gate at Moss Landing Road (Sandholdt Dam) to allow for tidal action and storms. (Addresses RAC criteria 1, 2 and 3; Plan Objectives B-2, B-5, W-4 and A-2.)	I
H-5. Develop sediment management plan for pollutants. (Addresses Plan Objectives W-2 and W-3.)	IV
H-6. Install barriers (e.g., eco-engineered hay bales or flashboard dams) between freshwater impoundments and main slough channel to create impoundments. Preserve brackishwater character of main slough. (Addresses RAC criteria 2, 3, 5 and 6; Plan Objectives G-1, B-1, B-5, W-6 and A-2.)	III IV
Flood Control Actions: F-1. Provide tidal/flood water protection for agricultural lands west of SPRR through construction of levees, berms, pump systems, as needed. (Addresses Plan Objectives W-4, W-7, A-2, A-5 and P-2.)	III IV

Table 10-1. Summary of Lower Watershed Preferred Alternative Plan Actions, Moro Cojo Slough Management and Enhancement Plan (Cont'd.)

ACTION	PHASE (I-IV)
F-2. Provide protection of private property/structures in Moss Landing from flood water inundation (7 parcels). (Addresses Plan Objective A-5.)	IV
Agricultural Actions: A-1. Through willing landowners, obtain conservation easement, purchase or land exchange for the conversion of existing pasture and/or agricultural lands west of SPRR to managed wetland habitat (i.e., remove or limit cattle activities). (Addresses RAC criteria 5 and 6; Plan Objectives B-5, B-7, B-8, W-2, W-3, A-5, L-1 and P-2.)	IV
A-2. Through willing landowners, obtain conservation easement, purchase or land exchanges for the conversion of marginal agricultural land adjacent to the slough between SPRR and Castroville Boulevard to wetland/agricultural buffer area. (Addresses RAC criteria 5 and 6; Plan Objectives B-5, B-7, B-8, W-2, W-3, A-5, L-1 and P-2.)	II
A-3. Through willing landowners, obtain conservation easement, purchase or land exchange to minimize potential conflicts between agricultural land practices and habitat protection by constructing grass-lined swales, sediment control structures, and perimeter ditches. (Addresses RAC criteria 8, 9 and 10; Plan Objectives G-2, B-5, W-1, W-2, W-3, W-7, A-3, A-4, P-2 and P-3.)	II-IV
A-4. Through willing landowners, obtain conservation easement, purchase or land exchange to restore Castroville Slough to its 1977 dimensions. Investigate various designs, such as a lowered berm on one bank, to allow wetland restoration, compatible with adjacent agricultural land use and water quality protection. (Addresses RAC criteria 5; Plan Objectives B-2, B-5, B-7, W-2, A-5, P-2 and P-3.)	I-IV
Surface Water Actions: S-2. Impound available freshwater in impoundments during spring and summer. (Addresses RAC criteria 5 and 6; Plan Objectives G-1, B-1, B-5, W-4, W-5 and A-2.)	III-IV
Biotic Resources: B-1. Gradually convert alkali grassland to freshwater plant species west of SPRR. (Addresses RAC criteria 5 and 7; Plan Objective G-1.)	III-IV
B-2. Allow natural conversion of brackishwater marsh areas east of SPRR to a more freshwater plant association. (Addresses RAC criteria 5 and 7; Plan Objective G-1.)	IV
B-3. Protect existing wetlands and riparian habitat through creation of wetland/agricultural buffers. (Addresses RAC criteria 10; Plan Objectives B-6 and A-5.)	II-IV

Table 10-1. Summary of Lower Watershed Preferred Alternative Plan Actions, Moro Cojo Slough Management and Enhancement Plan (Cont'd.)

ACTION	PHASE (I-IV)
B-4. Restore wetland habitat along Castroville Slough to 1977 dimensions. (See A-4, above.)	I-IV
B-5. Potential change in species composition and abundance of mosquito populations. (Addresses RAC criteria 5; Plan Objective W-6.)	III-IV
B-6. Provide island along main slough to facilitate waterfowl breeding. (Addresses Plan Objective B-4.)	IV
B-7. Create freshwater impoundment areas for waterfowl habitat. (Addresses RAC criteria 2, 5 and 6; Plan Objectives B-1 and B-5.)	III-IV

Table 10-2. Analysis of Lower Watershed Preferred Alternative Plan - Winter/Spring Freshwater Conditions, Moro Cojo Slough Management and Enhancement Plan

ISSUES AND CONCERNS	WINTER/SPRING FRESHWATER CONDITIONS
PROJECT COSTS	
Easements/Land Purchase	$3.7 million ($8,000/acre)
Construction/Planning	$2.0 million
Mitigation/Revegetation	$1.0 million
Maintenance (5 yrs)	$1.0 million
Mosquito Abatement (5 yrs)	$0.1 million
Total Cost	$7.8 million
GENERAL DESCRIPTION	Creation of impoundments between Highway 1 and Castroville Blvd. to hold freshwater during winter/early spring. Install flashboard dam at SPRR. Widen portions of Castroville Slough to 1977 dimensions. Utilize "eco-engineering" in early phases and test effectiveness.
BENEFITS OF PLAN	Creates areas for freshwater impoundments for waterfowl nesting and foraging. "Eco-engineered" barriers (i.e., hay bales) or flashboard dams installed between impoundments and main slough to protect existing habitat of brackish-water snail and potential tidewater goby habitat. Creation of island to facilitate breeding by waterfowl. Converts brackish/freshwater habitat upstream of SPRR to predominantly freshwater habitat; retains existing endangered species habitat (i.e., salamander). Enhancement of habitat values within Castroville Slough by widening portions of the marsh plain.
HYDROLOGY: IMPACTS, MITIGATIONS AND ENHANCEMENTS	
Tidal Inundation	**Impact:** Action H-1. Replace Highway 1 crossing with spanning bridge will inundate agriculture. **Mitigation:** See F-1 and F-2.
	Impact: Action H-2. Modifying SPRR track overcrossing with flashboard dam will inundate agriculture. **Mitigation:** See F-1 and H-3.
	Impact: Creation of freshwater impoundments may affect salinity of slough **Mitigation:** Action H-6. RAC proposes to utilize "eco-engineered" hay bales between impoundment and slough. If not effective, install flashboard dams between freshwater impoundments and main slough channel to keep slough brackish. Action H-3. Install tide gate at confluence of Castroville and Moro Cojo Sloughs.
Flood Control	**Impact:** Potential flooding of existing agricultural lands below SPRR. **Mitigation:** Action F-1. Construct earthen berms at 10-foot contour between Highway 1 and SPRR; inundate 375 acres with freshwater.

Table 10-2. Analysis of Lower Watershed Preferred Alternative Plan - Winter/Spring Freshwater Conditions, Moro Cojo Slough Management and Enhancement Plan (Cont'd.)

ISSUES AND CONCERNS	WINTER/SPRING FRESHWATER CONDITIONS
Flood Control (Cont'd.)	**Impact:** Potential flooding impacts (flood related) to properties between Highway 1 and Moss Landing Road. **Mitigation:** Action F-2. Construct floodwalls below Highway 1; acquire selected parcels below Highway 1.
	Impact: Potential flooding impacts to structures and properties upstream of Castroville Blvd. **Mitigation:** Requires more detailed topography and analysis.
Surface Water/ Groundwater	**Impact:** The volume of freshwater stored will be highly dependent upon rainfall. Based upon an initial water balance analysis, it appears that this alternative will create only seasonal wetlands in some years. **Mitigation:** Action S-2. Release freshwater during spring and summer from flashboard dams, if water is available to release. RAC recommends use of reclaimed water to supplement freshwater impoundments.
WATER QUALITY	
Deposition of Fill	**Impact:** Removal of some contaminants from slough, and deposition of contaminated dredge material into receiving waters or adjacent lands for construction of impoundment; detailed sediment analysis and dispersal study required. **Mitigation:** Action H-5. Sediment management plan for pollutants.
BIOTIC RESOURCES: IMPACTS, MITIGATIONS AND ENHANCEMENTS	
Vegetation	**Impact:** Action B-1 will inundate existing alkali grassland below 10-foot contour with freshwater during winter and spring; may result in gradual conversion of alkali grassland to freshwater plant species (375 acres). **Mitigation:** see Land Use
	Impact: Installation of flashboard dam at SPRR will prevent tidal inundation above SPRR and allow for gradual conversion of brackishwater marsh areas east of SPRR to more fresh water plant association (200 acres). **Mitigation:** None
	Impact: Freshwater impoundments will be created above and below the SPRR, totalling 250 acres. **Mitigation:** see Land Use
	Impact: Action B-3. Protects existing habitat via creation of wetland/agricultural buffers. **Mitigation:** see Land Use
	Impact: Action B-4. Create wetland habitat along portions of Castroville Slough to 1977 dimensions.

Table 10-2. Analysis of Lower Watershed Preferred Alternative Plan - Winter/Spring Freshwater Conditions, Moro Cojo Slough Management and Enhancement Plan (Cont'd.)

ISSUES AND CONCERNS	WINTER/SPRING FRESHWATER CONDITIONS
Wildlife	**Impact:** Action B-6. Provide island along slough to facilitate waterfowl breeding. **Mitigation:** Requires permit from COE to alter existing wetland and deposition of dredged material. Investigate if this would significantly impact brackishwater snail or tidewater goby.
	Impact: Inundation of additional lands with freshwater may result in an increase in freshwater winter mosquito populations. Treatment may affect wildlife resources depending on the method employed (e.g., use of mosquito fish).
Fisheries and Aquatic	**Impact:** Modification of the water regime (i.e., increase in storage/release of freshwater) may result in loss of 8,000 linear feet (65 acres) of brackishwater snail habitat. **Mitigation:** Action B-5 will install "eco-engineered" hay bale dams between the freshwater impoundments and the main slough to protect existing brackishwater snail habitat. Monitoring is needed to test effectiveness of hay bales to prevent excessive release of freshwater into the slough in order to prevent impact to the snail. If not effective, flashboard dams should be utilized.
	Impact: Inundation of additional lands with freshwater may result in an increase in freshwater winter mosquito populations within the lower watershed. **Mitigation:** It is not known if the "eco-engineered" hay bales will allow sufficient manipulation of water levels to reduce breeding habitat for mosquitos and minimize mosquito abatement operations. The winter/spring freshwater regime will be very favorable for mosquitos; mosquitos may be of significant management concern. Runnels and other drainage features could be used to reduce standing water but may be contrary to design plan. Cost of mosquito abatement may be high. Treatment may affect aquatic resources, depending on method.
Agricultural Resources	**Impact:** Increased inundation of lands below 10-foot contour will remove 375 acres from existing grazing and/or other agricultural use. **Mitigation:** Action A-1; obtain conservation easement to convert pasture and/or agricultural lands west of SPRR to managed wetland habitat.
	Impact: Creation of buffers between agriculture and wetlands will remove 75 acres from agriculture. **Mitigation:** Action A-2 will purchase or obtain conservation easement to convert pasture and/or agricultural land between SPRR and Castroville Blvd. to wetland/agricultural buffer.

Table 10-2. Analysis of Lower Watershed Preferred Alternative Plan - Winter/Spring Freshwater Conditions, Moro Cojo Slough Management and Enhancement Plan (Cont'd.)

ISSUES AND CONCERNS	WINTER/SPRING FRESHWATER CONDITIONS
Agricultural Resources (Cont'd.)	**Impact:** Creation of retention basins, grassland swales and perimeter ditches in buffer between agriculture and wetlands upstream of SPRR will remove 75 acres from agriculture. **Mitigation:** Actions A-2 and A-3 will purchase or obtain conservation easement to create a wetland/agricultural buffer to minimize conflicts between agricultural land practices and habitat protection (i.e., grass-lined swale, sediment control, perimeter ditches).
	Impact: Widening of portions of Castroville Slough to restore wetlands along Castroville Slough to 1977 dimensions will remove more than 10 acres of existing agriculture. **Mitigation:** Action A-4 would encourage landowners that have filled wetlands without COE permits to re-establish wetlands along the slough.
LAND USE	
Land Ownership/ Property Rights	**Impact:** Conversion of agricultural land to wetland habitat. **Mitigation:** Action L-2. Obtain conservation easements for pasture and/or agricultural lands below the 10-foot contour west of SPRR to construct fresh-water impoundments (375 acres). Some landowners may be reluctant to give conservation easement and may make action unfeasible.
	Impact: Opportunity to redesign Highway 1 with CalTrans project. **Mitigation:** None.
REGULATORY PERMITS	
Monterey County	M-1. Environmental Impact Report.
	M-2. Development permit for construction/grading.
CDFG	C-1. Streambed alteration agreement for work in channel.
U.S. Army Corps of Engineers	COE-1. Section 404 permit required for excavation of slough channels and deposition of materials onto wetlands for levee construction; probable mitigation of wetlands at minimum 1:1 acreage. COE-2. Federal environmental review FONSI/EIS.
CA Regional Water Quality Control Board	RB-1. Certification of water quality compliance.
NOAA	N-1. Permit for deposition of fill into National Marine Sanctuary and possible migration of contaminants into Elkhorn Slough, if deposition utilized.
USFWS	U-1. Section 7 consultation for potential impacts to endangered species; tidewater goby, long-toed salamander; brackishwater snail and red-legged frog, if listed.
Moss Landing Harbor District	HD-1. Permit required for activity within slough.