

Flooded Islands Pre-Feasibility Study

June 2005



Lower Sherman Lake

Big Break

Franks Tract

Clifton Court Forebay

Goals

Develop and evaluate site concepts:

- Enhance ecosystem values
- Improve water quality
- Improve recreational amenities

Study Participants

- DWR

- Consultants

EDAW, Inc.

Moffat & Nichol
Engineers

Natural Heritage Institute
Resource Management
Associates

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- Science Advisory

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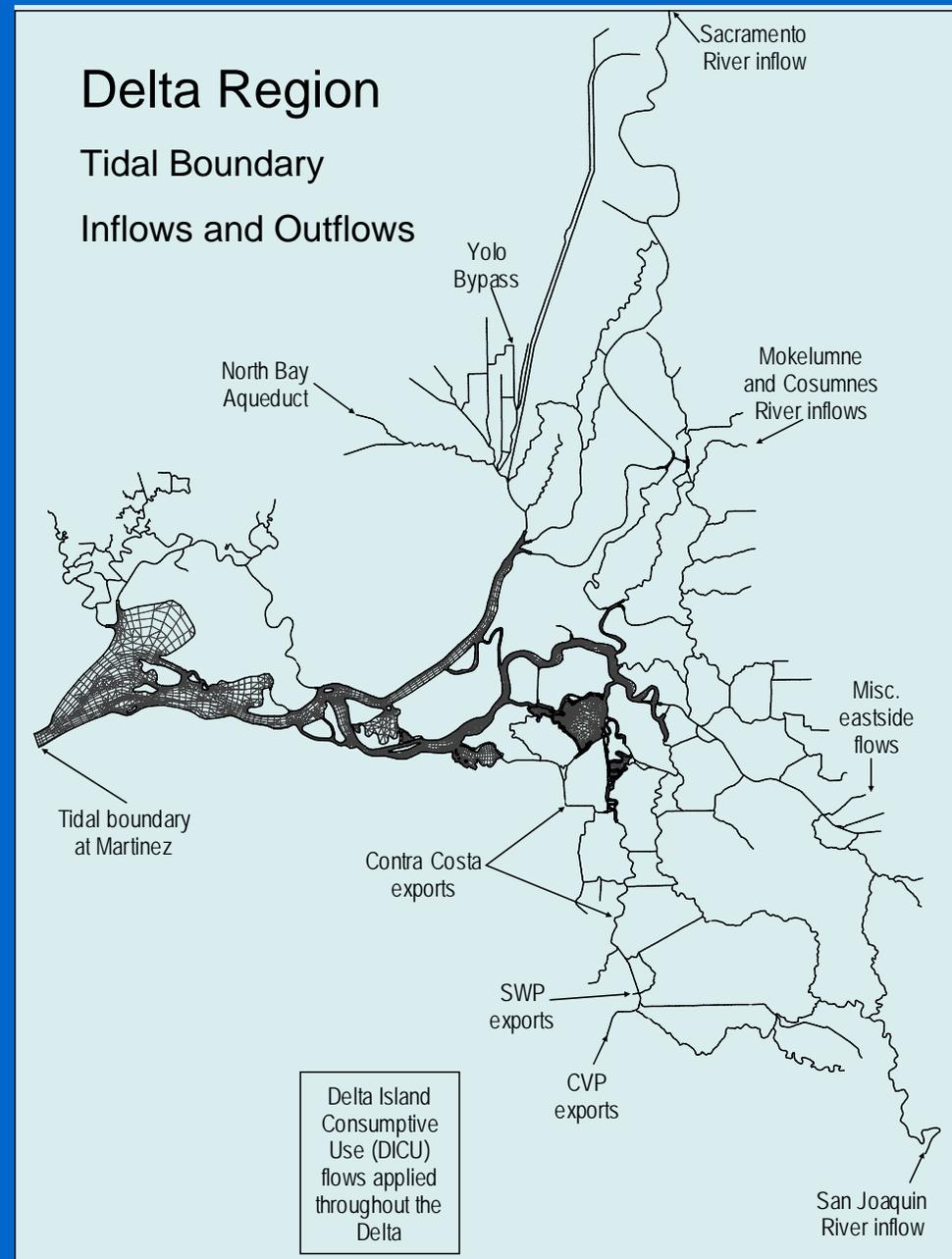
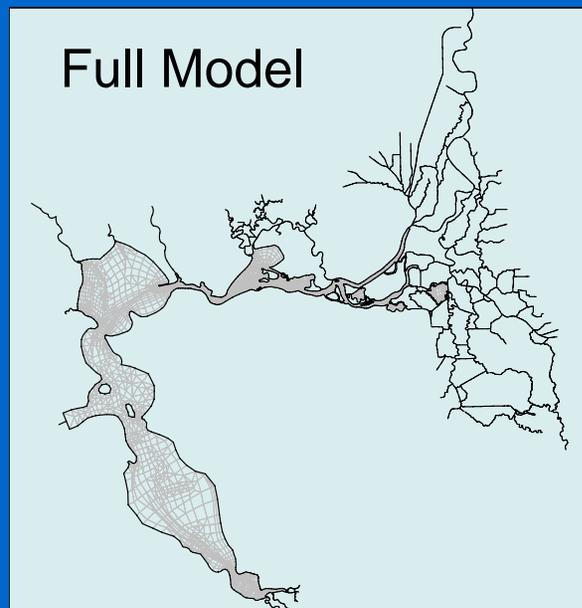
Karl Malamud-Roam,
CCM&VCD

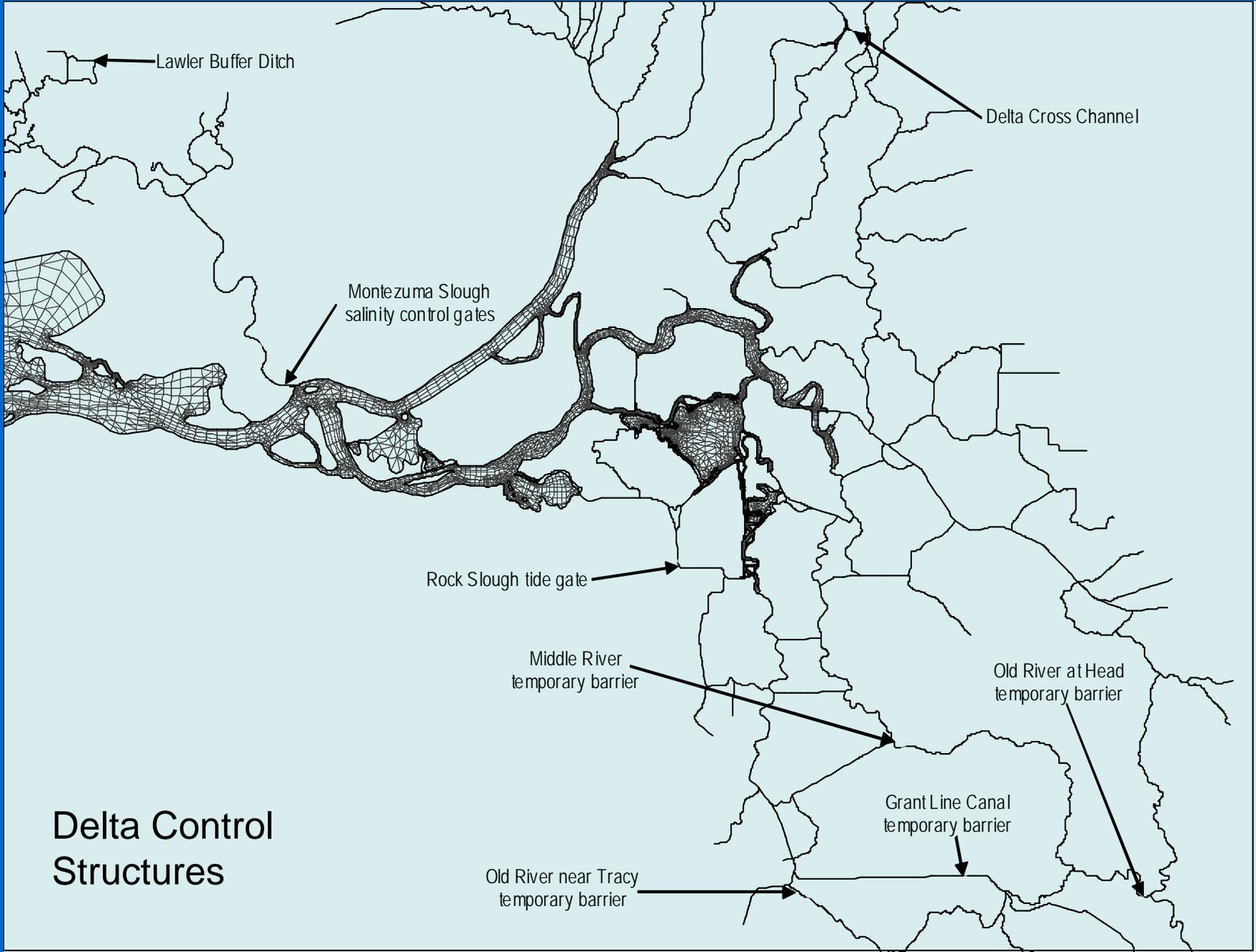
Study Approach

- Develop site concepts in all 3 flooded islands
 - Water Quality
 - Ecosystem
 - Recreation
- Evaluate and screen concepts using pre-modeling screening tools
- Conduct WQ modeling runs on selected concepts
- Combine ecosystem, recreational, and WQ elements into a suite of alternatives
- Select alternatives for further analysis
- Develop pilot projects for each selected alternatives

RMA Bay-Delta Model

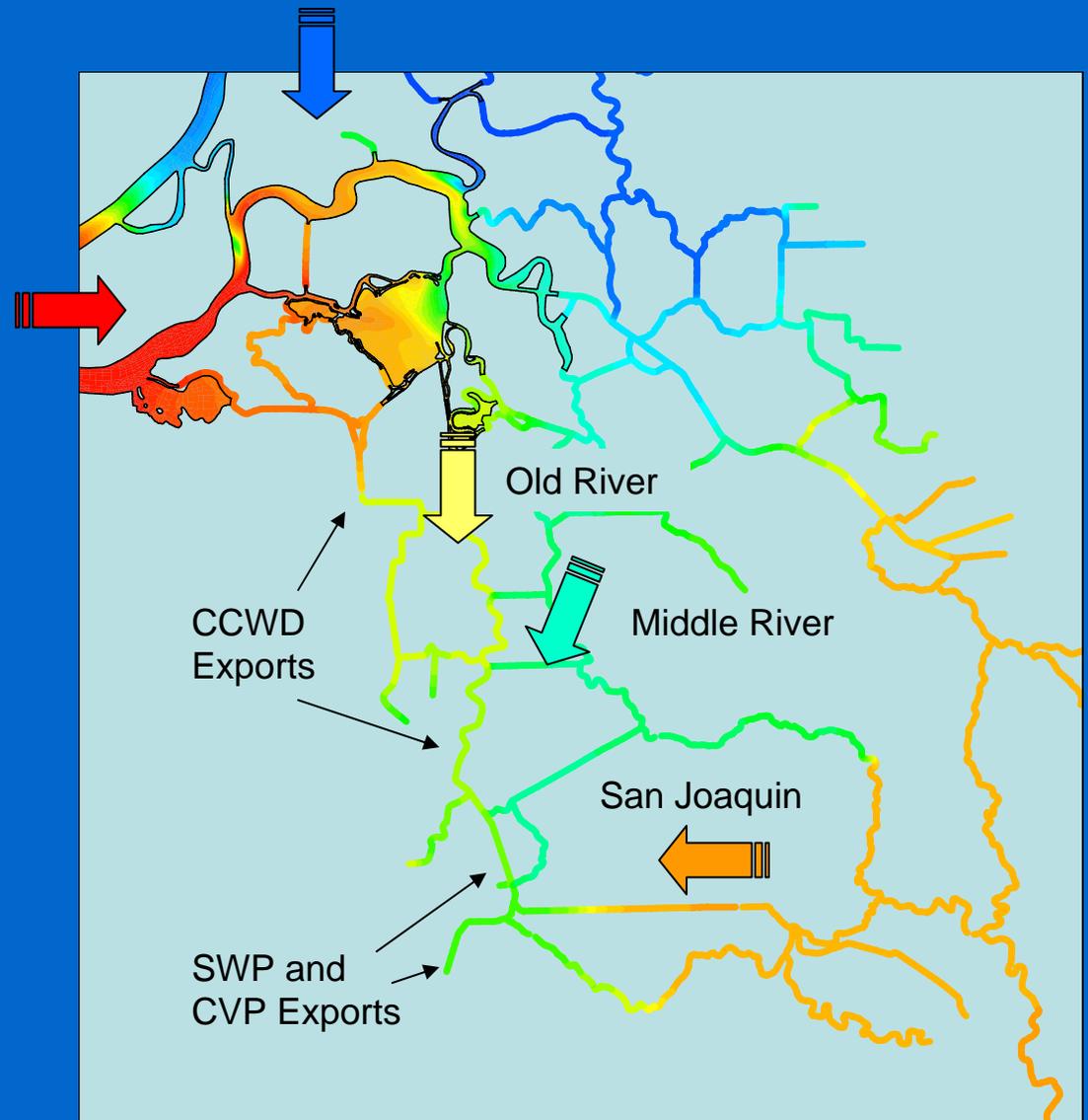
- Numerical Model of Flow and Salinity Transport
- Bay-Delta System (only Delta Region used in this study)
- Outputs include velocity, stage, channel flow, EC, residence time





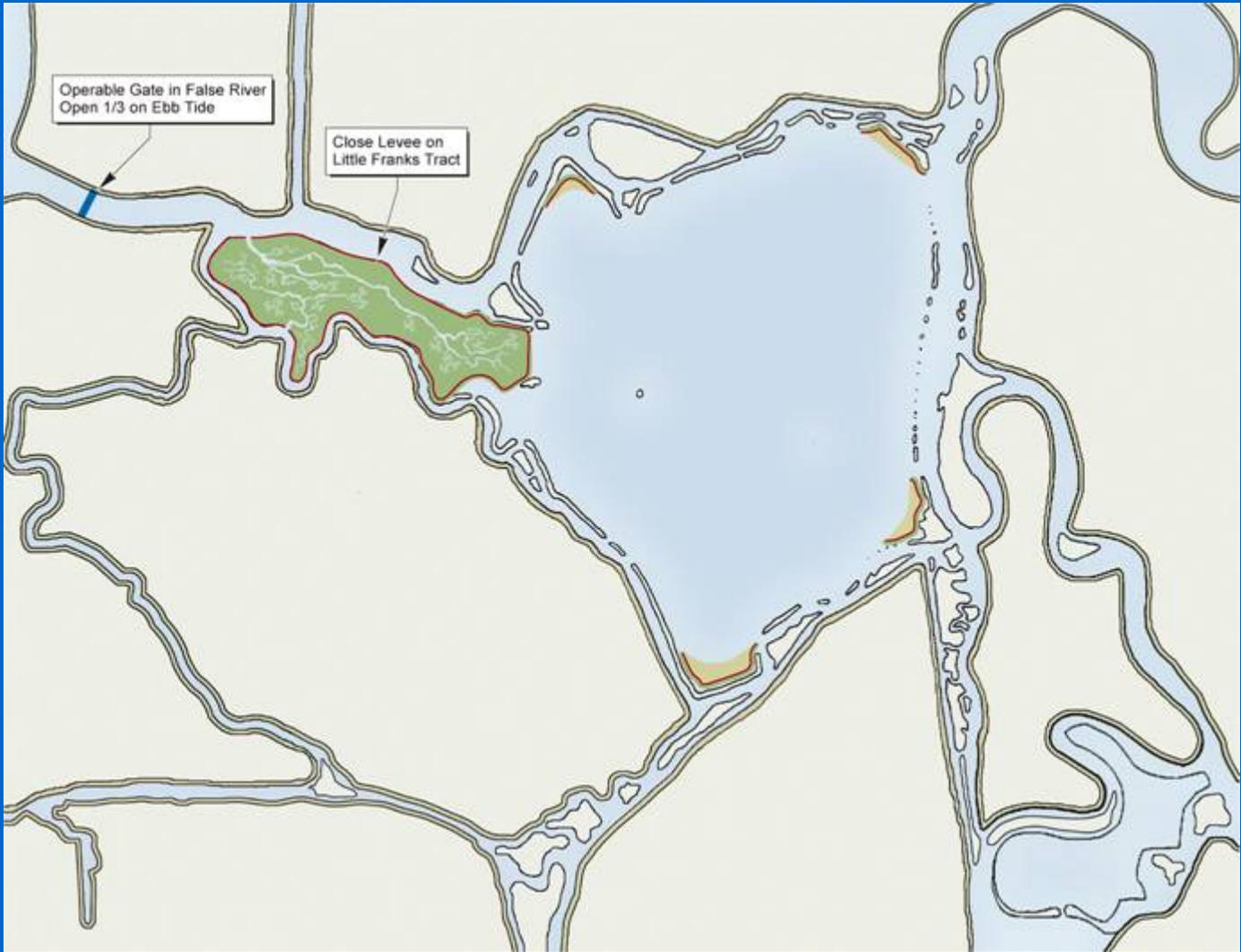
Delta Control Structures

- Water Quality at the primary Delta Export Locations results from a mixture of water from Old River, Middle River, and the San Joaquin
- Franks Tract plays a central role in determining both the balance of flows and the water quality in Old River and Middle River





West False River Gate Alternative



Alternative Features

1 operable gate

Common Features

Little Franks Tract Marsh Restoration

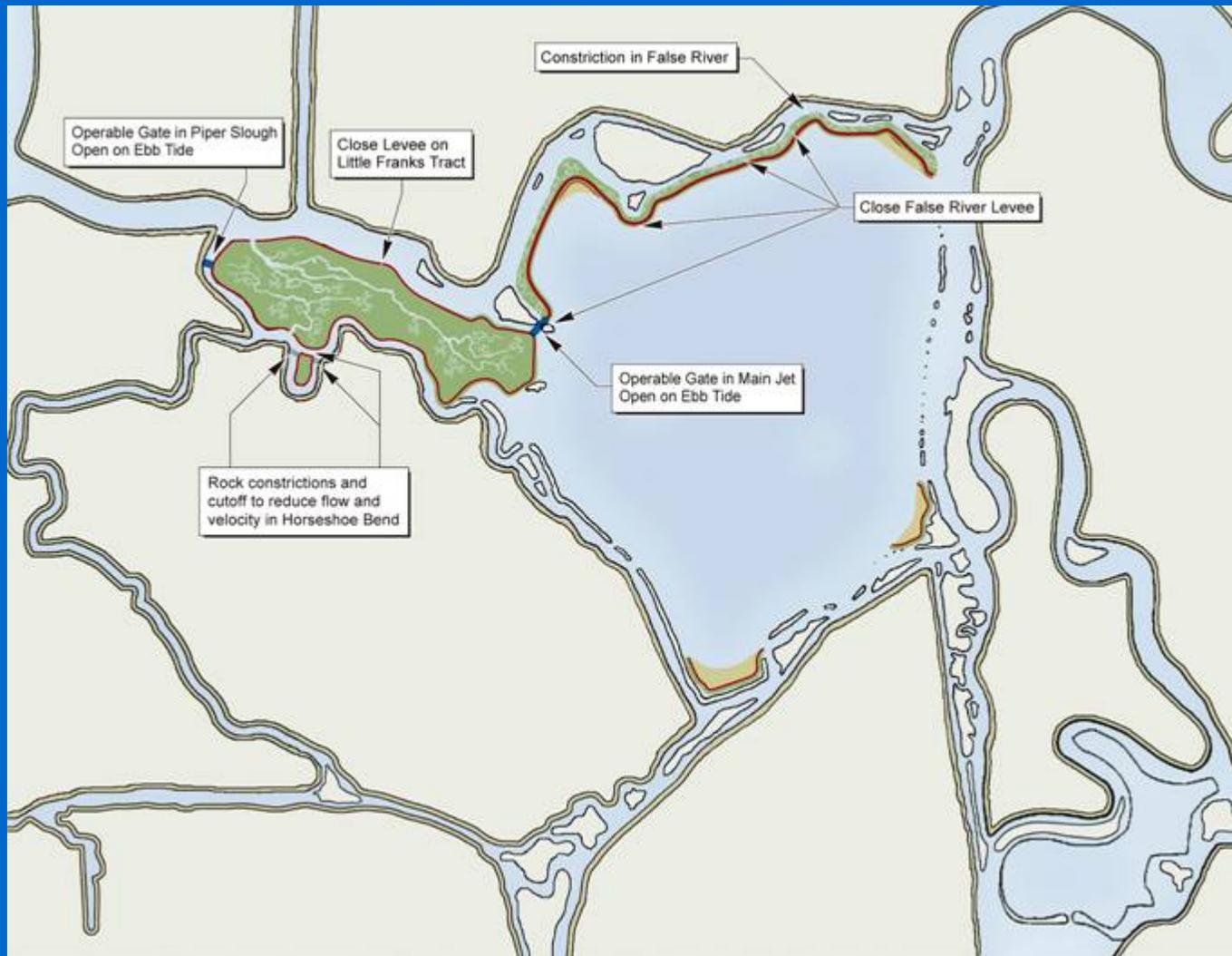
4 Pocket Beaches

Cost \$310 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

North Levee and Two Gates Alternative



Alternative Features

- 2 operable gates
- North Levee with Marsh
- False River Constriction

Common Features

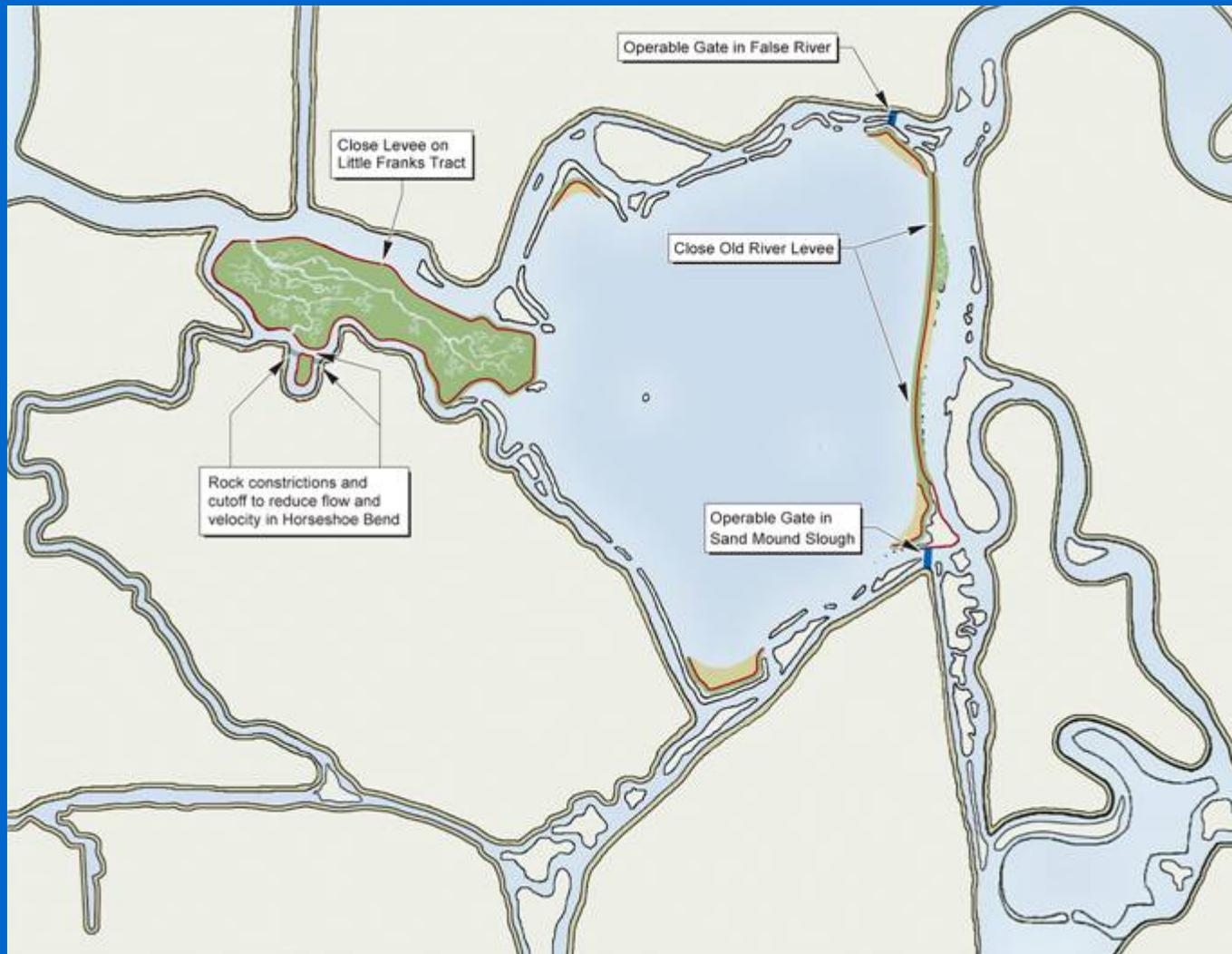
- Little Franks Tract Marsh Restoration
- 4 Pocket Beaches
- 2 Constrictions on Piper Slough
- Horseshoe Bend Cutoff

Cost \$324 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

East Levee and Two Gates Alternative



Alternative Features

- 2 operable gates
- East Levee with Marsh and Beach

Common Features

- Little Franks Tract Marsh Restoration
- 4 Pocket Beaches
- 2 Constrictions on Piper Slough
- Horseshoe Bend Cutoff

Cost \$297 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

Cox Alternative



Alternative Features

2 non operable gates/barriers

Common Features

Little Franks Tract Marsh Restoration

4 Pocket Beaches

Cost \$294 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

Cost Summary (\$millions)

Alternative	Levee	Gate	LFT Marsh	Beach/ Habitat	False Const	Total Cost
West False River Gate	-	193	91	26	-	310
North Levee & Two Gates	25	176	97	26	0.4	324
East Levee & Two Gates	18	156	97	26	-	297
Cox		177	91	26		294

Average EC Reductions

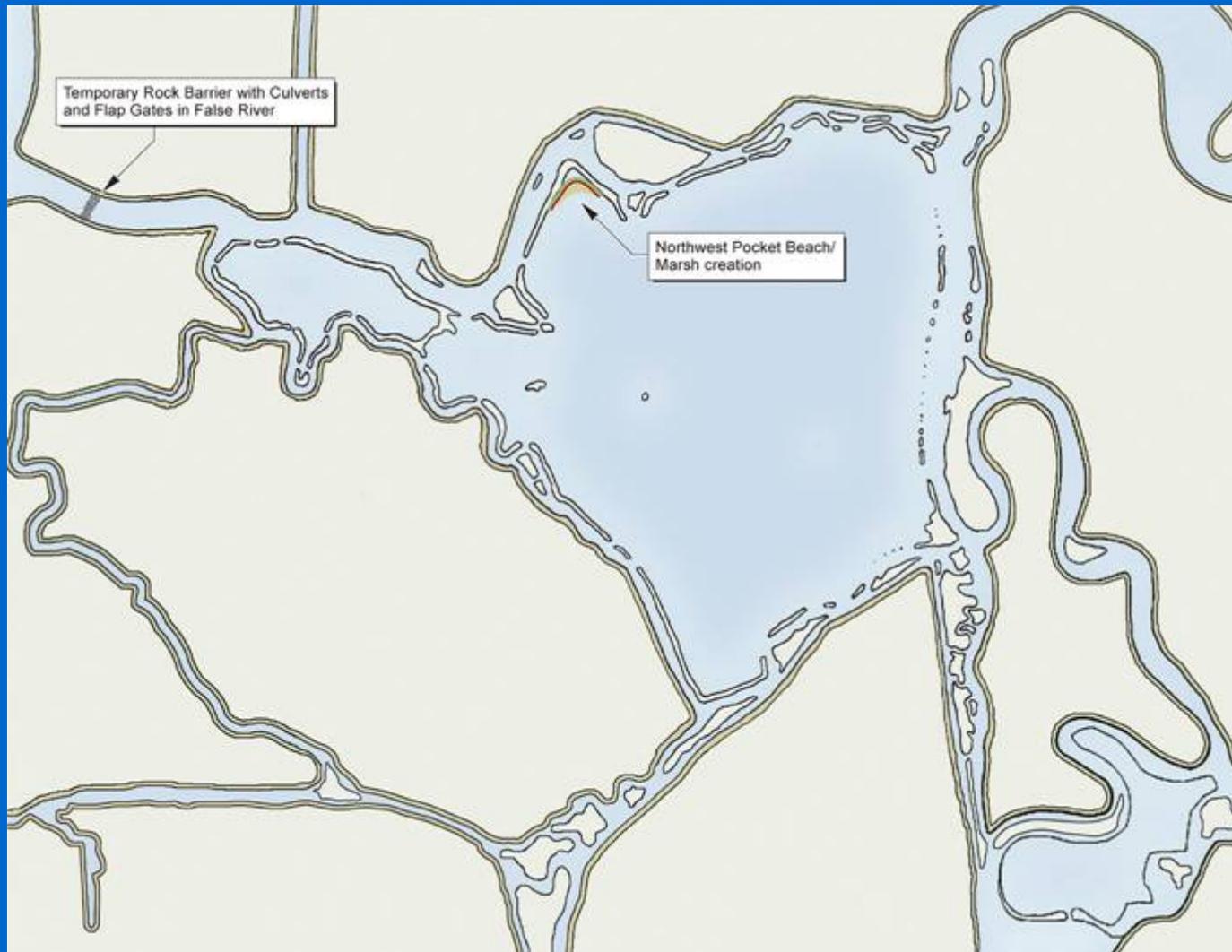
(June – December 2002 monthly average)

ALTERNATIVE	SWP	CVP	CCWD (R. S.)	CCWD (O.R.)	AVE
Cox	8.1	4.6	19.1	14.4	11.6
West False River Gate	10.4	7.0	18.0	15.6	12.7
North Levee & Two Gates	2.0	0.0	11.5	7.1	5.2
East Levee & Two Gates	13.3	9.0	22.9	19.4	16.2

Other Parameters

Alternative	Residence Time, FT (days)	Stage, July 2002 (meters)	Stage, Jan. 1997 (meters)	Velocity (m/sec)
West False River Gate	6	-.01 min -.06 max	N/M	0.7(F. C.) 0.5(O. R.)
North Levee Two Gates	3	N/M	No change	0.5 (F.C.) 0.6 (O. R.)
East Levee Two Gates	15	N/M	.01 max in OR/MR	0.5 (F. C.) 0.5 (O. R.)
Cox	7	+/-0.02 min -0.12 max	N/A	0.6 (MIDR)

West False River Gate Alternative – Preliminary Pilot Project Components



Preliminary Pilot Project Components

Temporary Rock Barrier with Culverts and Flap Gates in False River

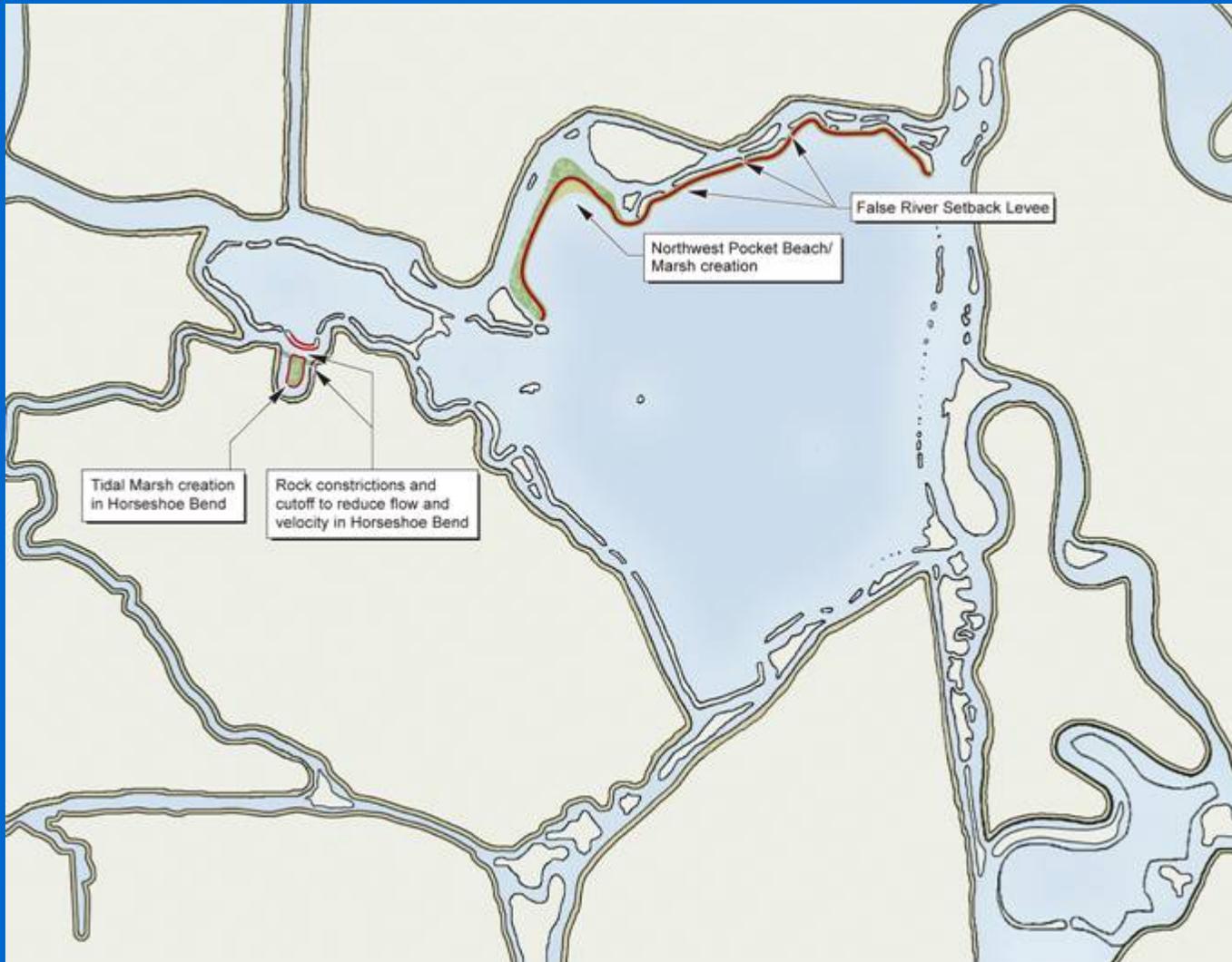
Northwest Pocket Beach/Marsh Creation

Cost \$13.4 million

Legend

- Existing Levee
- Rock Dyke
- Temporary Rock Barriers
- Tidal Marsh
- Beaches

North Levee and Two Gates Alternative - Preliminary Pilot Project Components



Preliminary Pilot Project Components

North (False River) Setback Levee Creation

Rock Constrictions in Piper Slough

Horseshoe Bend Cutoff and Tidal Marsh Creation

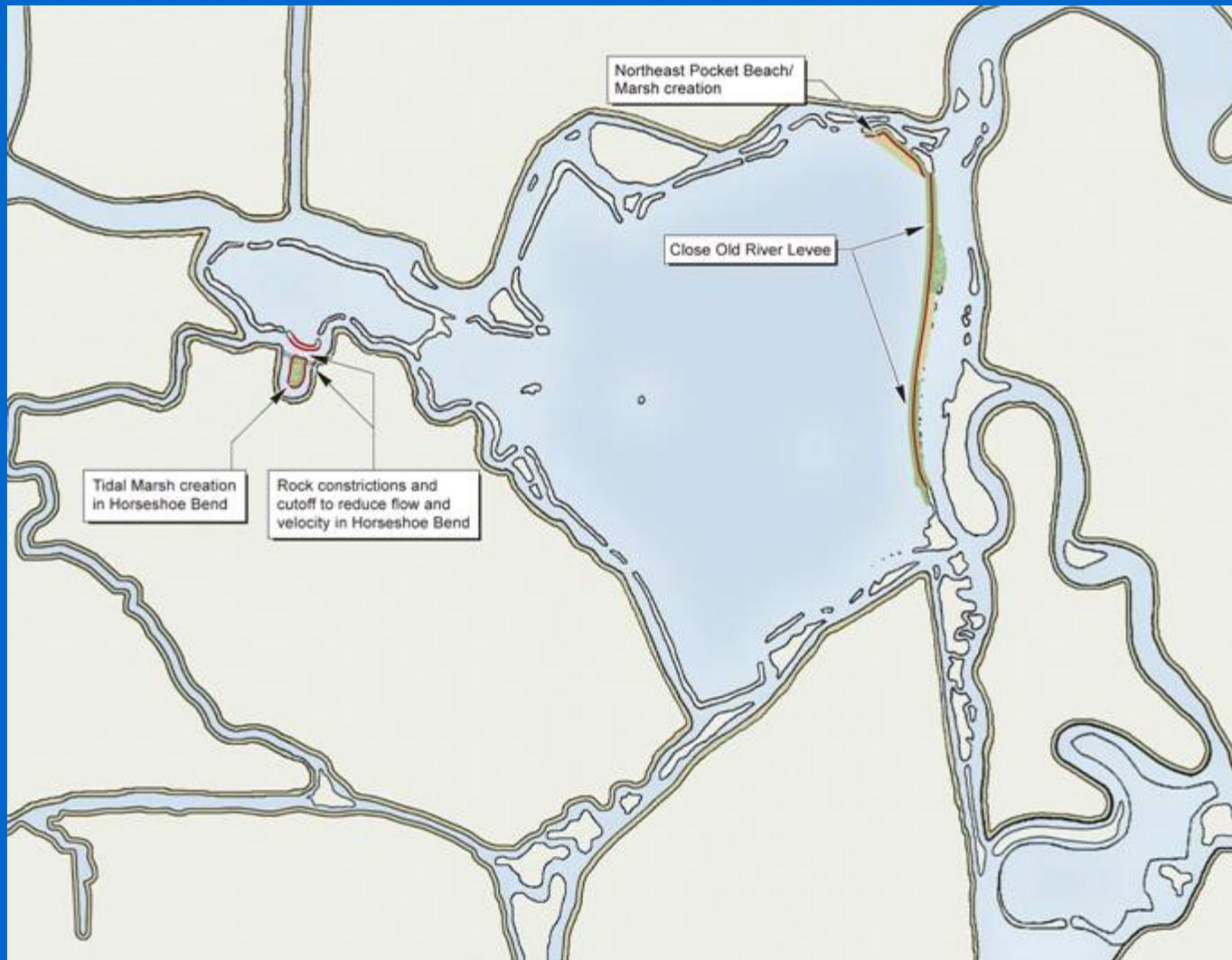
Northwest Pocket Beach/Marsh Creation

Cost \$36.1 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Tidal Marsh
- Beaches

East Levee and Two Gates Alternative – Preliminary Pilot Project Components



Preliminary Pilot Project Components

East (Old River) Setback Levee Creation

Rock Constrictions in Piper Slough

Horseshoe Bend Cutoff and Tidal Marsh Creation

Northeast Pocket Beach/Marsh Creation

Cost \$29.2 million

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Tidal Marsh
- Beaches

Cox Alternative – Preliminary Pilot Project Components



*Preliminary Pilot Project
Components*

*2 Temporary Rock Barriers
Northwest Pocket
Beach/Marsh Creation*

Cost \$13.7 million

Legend

- Existing Levee
- Rock Dyke
- Temporary Rock Barriers
- Tidal Marsh
- Beaches

Cost Summary

(Pilot Projects, \$millions)

Alternative	Levee	Rock Barrier	Beaches/ Habitat	Horseshoe Bend Cutoff	O&M	Total Cost
West False River Gate	-	6.2	5.5	-	1.7	13.4
North Levee & Two Gates	24.9	-	5.5	5.7	-	36.1
East Levee & Two Gates	17.6	-	5.9	5.7	-	29.2
Cox		6.6	5.5	-	1.6	13.7

Next Steps

- Refinement and optimization of pilot project alternatives
- Selection of a Preferred Pilot Project Alternative
- Fisheries Investigation
- Environmental Documentation
- Pilot Project Construction and Monitoring

Questions?????

- **Contacts**

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Reports available at:
<http://baydeltaoffice.water.ca.gov/ndelta/floodedislands/index.cfm>



Study Approach - Recreation

- Recreation concept/element development
- Evaluation criteria
- Recreation improvement concepts

Study Approach - Ecosystem

- Habitat restoration and enhancement
- Evaluation criteria
- Ecosystem restoration concepts

Study Approach - Water Quality

- Initial modeling - water quality benefits more effective at Franks Tract
- Transport and mixing within Franks Tract
- Evaluation criteria
- Water quality improvement concepts

Background

- In 2001, DWR applied for a CALFED grant to conduct study
- In 2004, DWR executed contracts to begin study
- By June 2005, DWR must complete the study showing conceptual alternatives and cost estimates which would include a pilot project

RMA Bay-Delta Model

- Models SF Bay and Sacramento-San Joaquin Delta up to Freeport on Sac R. and Vernalis on SJ R.
- 2-dimensional representation for bays and major rivers
- Simulates EC, stage, velocity, and residen.
- Simulation Period – April 10, 2002-Jan.1,2003

Other Parameters

Alternative	Residence Time, FT (days)	Stage (cm)	Velocity (m/sec)
West False River Gate	6		0.7(F. C.) 0.5(O. R.)
North Levee Two Gates	3	N/A	0.5 (F.C.) 0.6 (O. R.)
East Levee Two Gates	15	N/A	0.5 (F. C.) 0.5 (O. R.)
Cox	7		0.6 (MIDR)

EC Reductions (MONTHLY AVE. %)

SWP

Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	-1	10	12	11	10	10	5	8.1
West False River Gate	0	11	18	17	13	8	6	10.4
North Levee & Two Gates	0	4	10	8	2	-6	-4	2.0
East Levee & Two Gates	1	12	16	17	20	17	10	13.3

EC Reductions (MONTHLY AVE. %)

CVP

Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	-1	5	5	6	7	7	3	4.6
West False River Gate	0	7	12	12	10	5	3	7.0
North Levee & Two Gates	0	1	5	4	0	-6	-4	0.0
East Levee & Two Gates	1	7	10	12	15	12	6	9.0

EC Reductions (MONTHLY AVE. %)

CCWD (OLD RIVER)

Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	-3	17	20	21	18	16	12	14.4
West False River Gate	0	17	24	24	19	14	11	15.6
North Levee & Two Gates	0	9	17	16	8	0	-1	7.1
East Levee & Two Gates	1	18	23	24	27	25	18	19.4

EC Reductions (MONTHLY AVE. %)

CCWD (ROCK SLOUGH)

Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	-1	22	25	25	25	23	15	19.1
West False River Gate	1	20	26	27	25	20	7	18.0
North Levee & Two Gates	1	13	21	21	17	7	1	11.5
East Levee & Two Gates	2	23	26	28	32	31	18	22.9

EC CHANGES (Monthly Ave. %)

Jersey Point

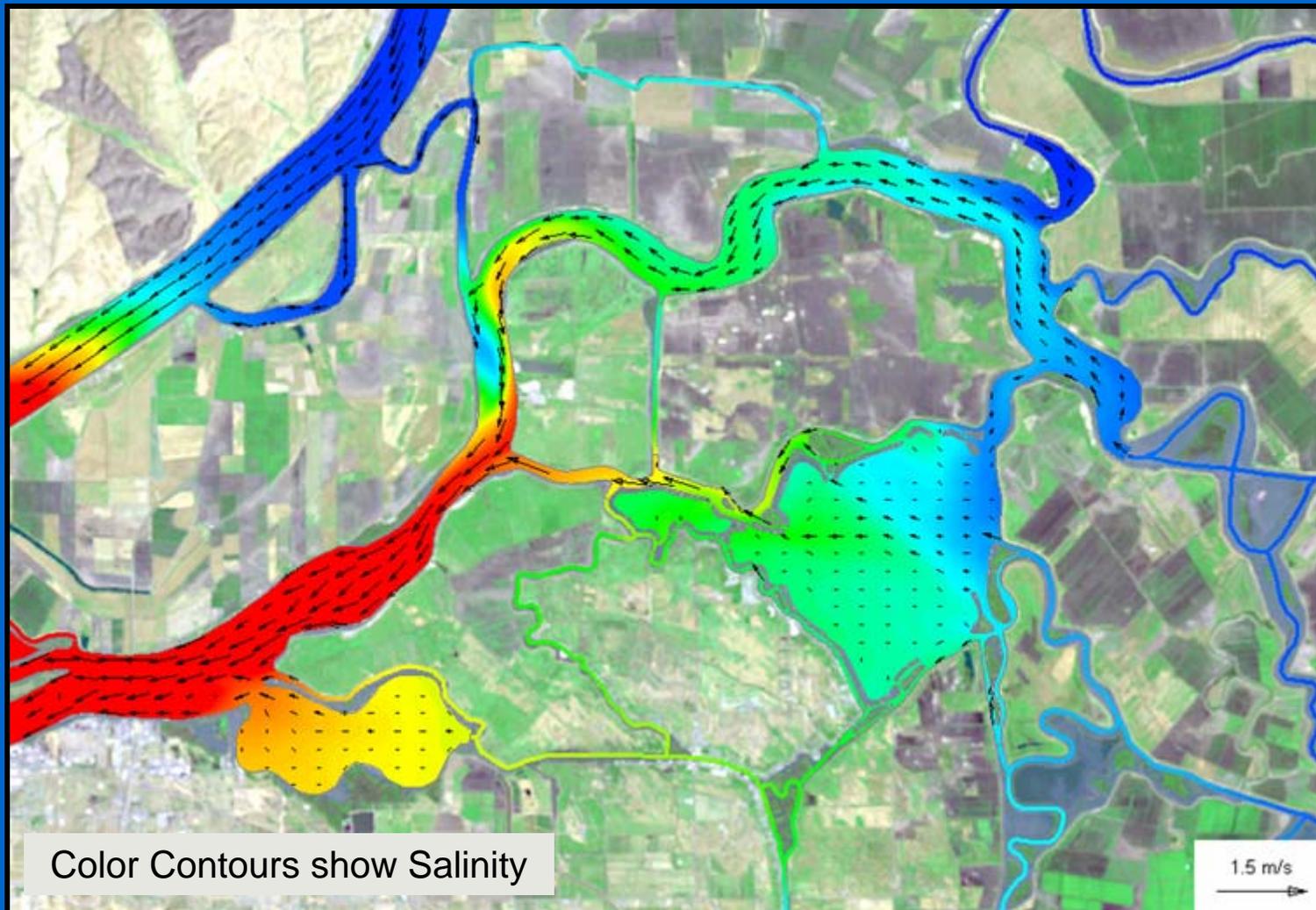
Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	4	6	4	1	-2	-2	-2	1.3
West False River Gate	14	29	30	29	28	25	23	25.4
North Levee & Two Gates	15	32	32	33	31	25	20	26.9
East Levee & Two Gates	6	15	14	10	5	3	2	7.9

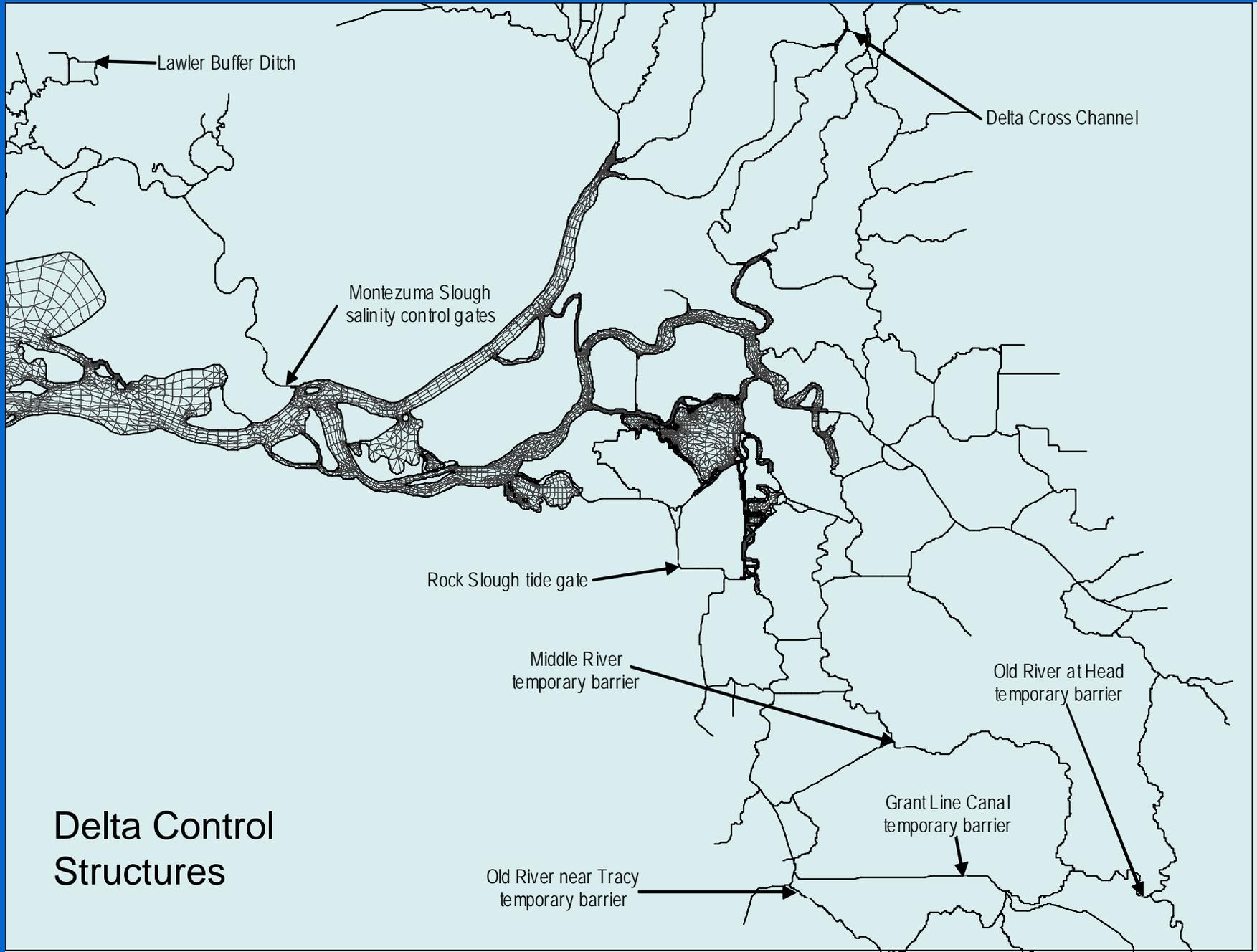
EC CHANGES (Monthly Ave. %)

Middle River @ Victoria Island

Alternative	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Cox	2	-8	-18	-19	-11	-9	-5	-9.7
West False River Gate	-1	-4	-3	-5	-6	-7	-5	-4.4
North Levee & Two Gates	1	-12	-15	-18	-18	-21	-16	-14.1
East Levee & Two Gates	1	-5	-7	-7	-1	-1	-1	-3.0

Complex mixing processes in the Delta are driven by River Inflows, Exports, and Tides





Delta Control Structures

Franks Tract Aerial Photo, September 2002



Source: Airphoto USA

WATER QUALITY IMPROVEMENT ELEMENTS

- Levee reconstruction
- Permanent Barriers
- Operable tidal gates
- Marsh restoration

EVALUATION CRITERIA

- Water Quality (salinity, residence time, DOC transport)
- Ecosystem (tidal marsh creation, egeria)
- Recreation (boat access, beaches)
- Island Stability (stage, velocities, stability of adjacent islands)
- Implementation (cost, engineering feasibility, sustainability, incremental)