

Sacramento-San Joaquin Delta Emergency Operations Plan (EOP)

Department of Water Resources, Division of Flood Management

with assistance from

URS Corporation

Emergency Management and Homeland Security Services



Department of Water Resources
Division of Flood Management

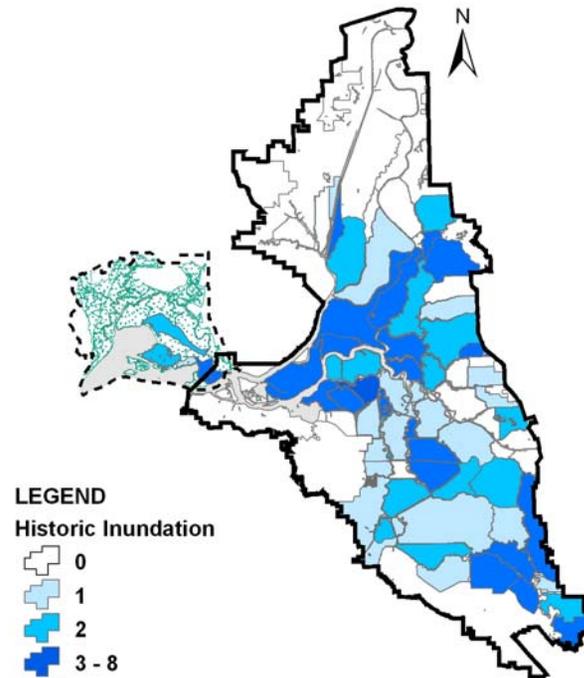
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Van Sickle Island, Dec 2005 – Jan. 2006 Floods

Need for the EOP

- Since 1900, there have been over 160 delta levee failures leading to island inundation
- Risk of failure due to:
 - Earthquake
 - Flooding
 - Structural degradation
- Impact to life, property, and public health/safety
- Potential disruption to statewide water distribution due to saltwater intrusion



Island Inundations Since 1900



Need for the EOP

- Ongoing efforts to assess risk and develop analytical tools for managing response:
 - Delta Risk Management Strategy (DRMS)
 - ✓ Emergency Response and Repair (ER&R) Model
 - ✓ Water Analysis Module (WAM)
- What can DWR do *right now* if a Delta levee failure disaster occurs?
- How will DWR respond – in terms of life/safety, protecting the local communities and the state's water supply, and protecting the environment?



Phase 1 – Response Options

- “Toolkit” approach
- Concept paper with table cataloging existing actions
- Summary sheet for each action:
 - Source
 - Responsible party
 - Region affected
 - Impact
 - Implementation difficulty

REPORT
Department of Water Resources (DWR)
Delta Emergency Response Concept Paper
DRAFT - February 21, 2007

Response Action	Region	Responsible Party	Comments	Comments on Action
Operational, and LEAD EMERGENCY Action: SWSI Functions within DWR	South Delta	DWR, Division of Flood Management	Operate and maintain SWSI functions within the Delta Emergency Response Concept Paper.	The SWSI will be a Delta-wide action during periods of Delta-wide flooding. SWSI functions include maintaining SWSI equipment, SWSI equipment, and SWSI equipment.
Activate emergency response system to reduce Delta-wide flooding	South Delta	DWR, Division of Flood Management	Activate emergency response system to reduce Delta-wide flooding.	Work with CDF, CWA, UCC, etc.
Activate Flood Operations	South Delta	DWR, Division of Flood Management	Activate Flood Operations.	The FLO will coordinate with CDF, UCC, and other agencies to ensure that the FLO is able to take the best response for the Delta during periods of Delta-wide flooding.
Controlled Canal	South Delta	DWR, Division of Flood Management	Controlled Canal.	
At-Channel, In-Channel, and Off-Channel	South Delta	DWR, Division of Flood Management	At-Channel, In-Channel, and Off-Channel.	
Measurements of Delta to determine extent of flooding	South Delta	DWR, Division of Flood Management	Measurements of Delta to determine extent of flooding.	
At-Channel, In-Channel, and Off-Channel	South Delta	DWR, Division of Flood Management	At-Channel, In-Channel, and Off-Channel.	

FACT SHEETS

RESPONSE ACTION

Response Action: Decrease CVP Tracy Pumping Plant Exports

Region Affected: South Delta (primarily) and Central Delta

Source: Ref. 2 – 1986 SJD Delta Emergency Water Plan

Response Action Description: Upon report of a low-Delta-inflow, multiple-stand flooding event, immediately reduce Tracy export pumping to one pump only (approximately 900 cfs).

Responsible Party: USBR CVP Operations

Impact: Reduction of export pumping will decrease the influx of salinity into the central and southern Delta. This is important because the southern Delta is very difficult to flush.

Constraints/Limitations

Key Event Characteristics	Environmental	Time to Implement	Cost	Legal/Contractual	Coordination
Low-inflow, Multi-stand	L	L	L	L	L

Difficulty Scale: High (H), Medium (M), Low (L)

RESPONSE ACTION

Response Action: Place riprap and wave erosion protection on interior of flooded islands

Region Affected (Isolated Delta Isles): Local

Source: DWR, Sacramento-San Joaquin Emergency Water Plan

Response Action Description:

This response action will be utilized when strong winds accompany high water to prevent wave erosion of levee slopes. Levees adjacent to wave stretches of water should be watched during periods of strong wind to detect the early stages of wave erosion. During sustained periods of strong wind and high water, personnel should stand by to observe and monitor the affected areas. Viqueque and wood panels can be used to prevent or protect slopes from wave erosion. Placement of riprap can also protect levee slopes from wind erosion and is a longer-term action.

Responsible Party: DWR, Division of Flood Management

Impact:

The emergency repair methods are used to prevent levee failure.

Constraints/Limitations

Key Event Characteristics	Environmental	Time to Implement	Cost	Legal/Contractual	Coordination
Viqueque	M	L	L	L	L
Wood Panel	M	L	L	L	L
Riprap	M	L	L	L	L

Difficulty Scale: High (H), Medium (M), Low (L)

Viqueque Wave Erosion Protection

Wave erosion protection can be fabricated with plastic (Viqueque) or wood panels for temporary solutions or riprap can be placed to provide longer-term protection, as summarized below:

Viqueque wave wash protection involves placing viqueque (bought in 20-foot wide by 120-foot long by 12 mil rolls) along the wastewater levee slopes. Wooden stacks and sandbags are used to anchor the viqueque to the levee slope.

Wood Panel Wave Erosion Protection

Wood panels are generally prefabricated, 3-foot high, and 16-foot long and are secured to the levee face with baling wire, wood stakes, and sandbags.

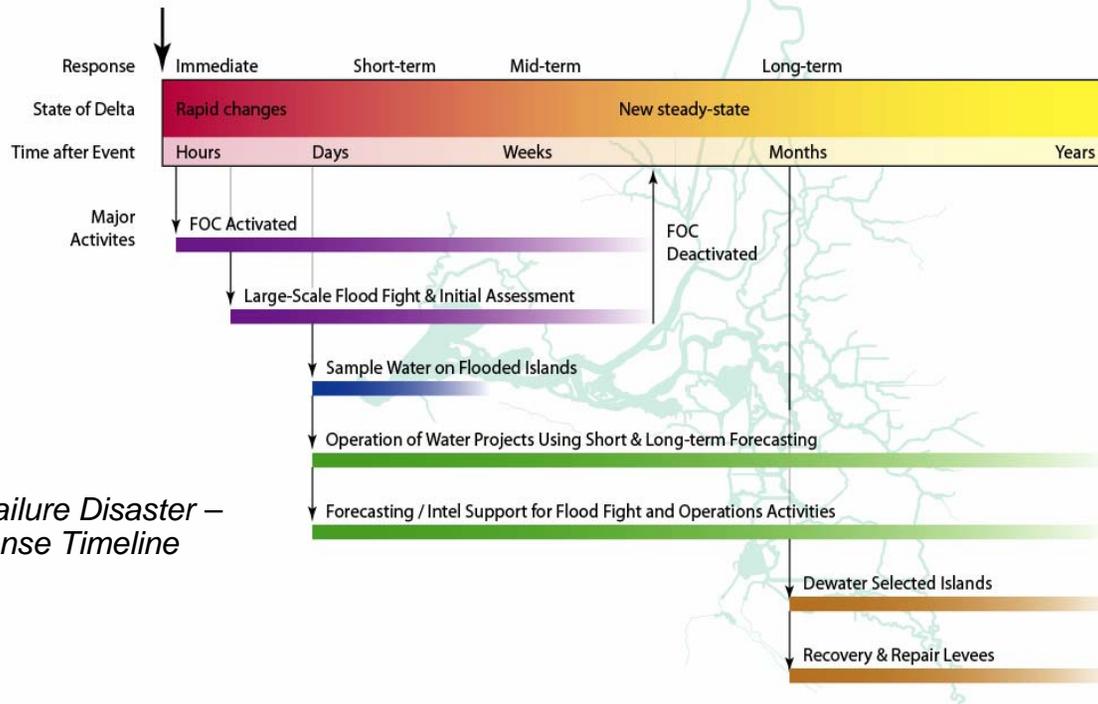
Riprap Wave Erosion Protection

Riprap or rock slope protection can be strategically placed by trucks or barges to armor levee slopes. The rock slope protection prevents scour and erosion caused by wave action. The size of the riprap should be appropriate for the velocity of the channel; the higher the velocity, the larger the size and weight of the rock should be. Ideally, filter material or bedding should be placed between the existing levee slope and the riprap. Regular maintenance of protected slopes will ensure longer-term slope protection.



Phase 1 – Response Options

- Range of impacts:
 - Immediate (within hours of the event) to long-term (several months)
- Regional perspective:
 - Multiple actions can be initiated at the same time
 - Responses can be initiated from different regions of the state
 - Responses have varying impacts on different regions



Delta Levee Failure Disaster – Response Timeline



Risk Reduction Activities

Action	Early Pre-Event Preparation	Delta Risk Management Strategy (DRMS)	Delta Specific Emergency Operations Plan (EOP)
Training & Exercises			✓
Transfer Facilities	✓		✓
Stockpile Quarry Materials ¹ Vulnerability Studies for Quarries Pre-Qualify and Certify Quarries	✓	✓	✓ ✓
Stockpile Non-Quarry Materials & Tools ¹	✓	✓	✓
Purchase / Lease Marine Equipment			✓
Warehouse for Non-Quarry Materials & Tools ¹	✓	✓	✓
Temporary Barrier Use	✓		
Decontamination / Exposure Plan	✓		
Predefined Priorities ²		✓	
Pre-Event Analyses Emergency Response & Repair (ER&R) Model Water Allocation Model (WAM) Reservoir Releases <i>Overall Incident Management Response Strategy</i> Temporary Barrier Optimization		✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
Small Facility Improvements	✓		✓
Standard Operating Procedures ³			✓
Advance Agreements / Contracts ³			✓

1. Stockpile and warehouse facilities should be co-located with transfer facilities. Locations can be rented for initial deployment.

2. Due to the sensitive nature of these decisions, this activity will require the development of high-level policy.

3. These actions require some pre-event analyses to be completed.

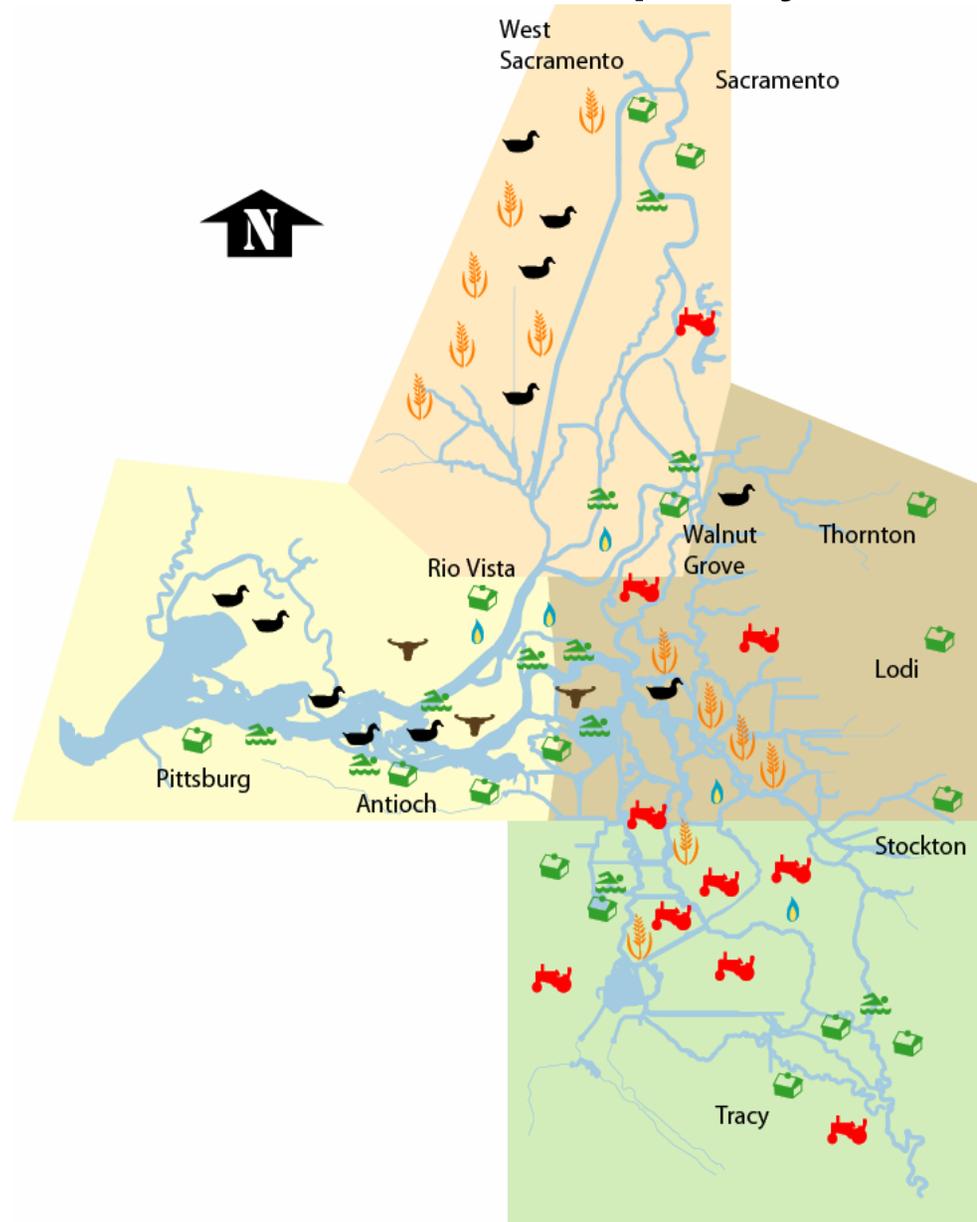
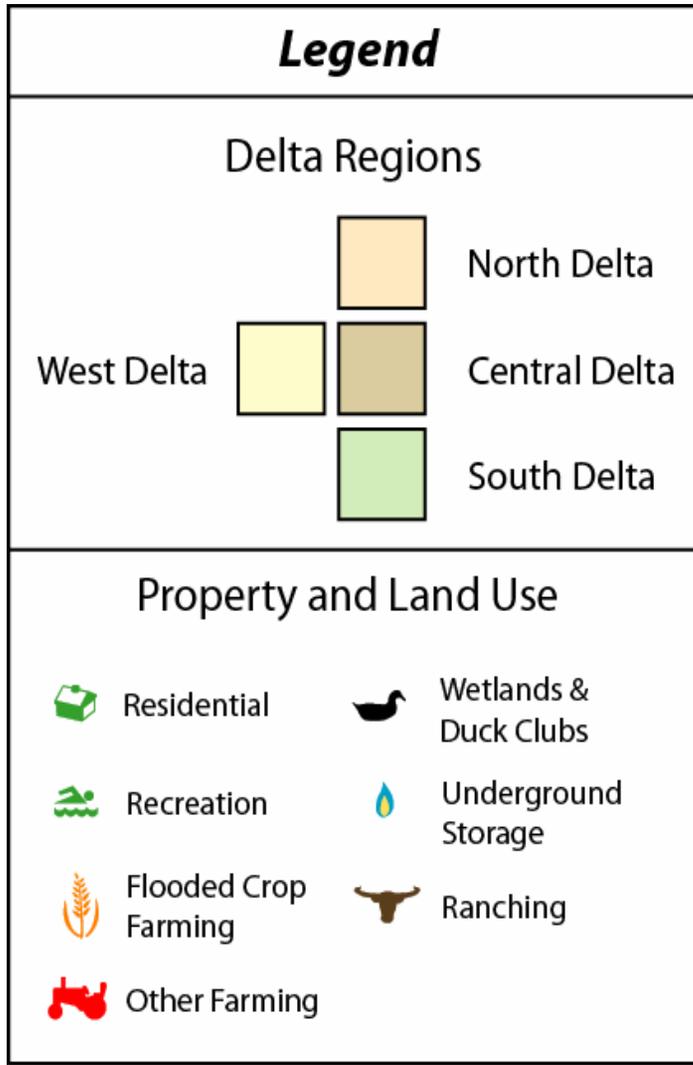


Environmental Process & Documentation

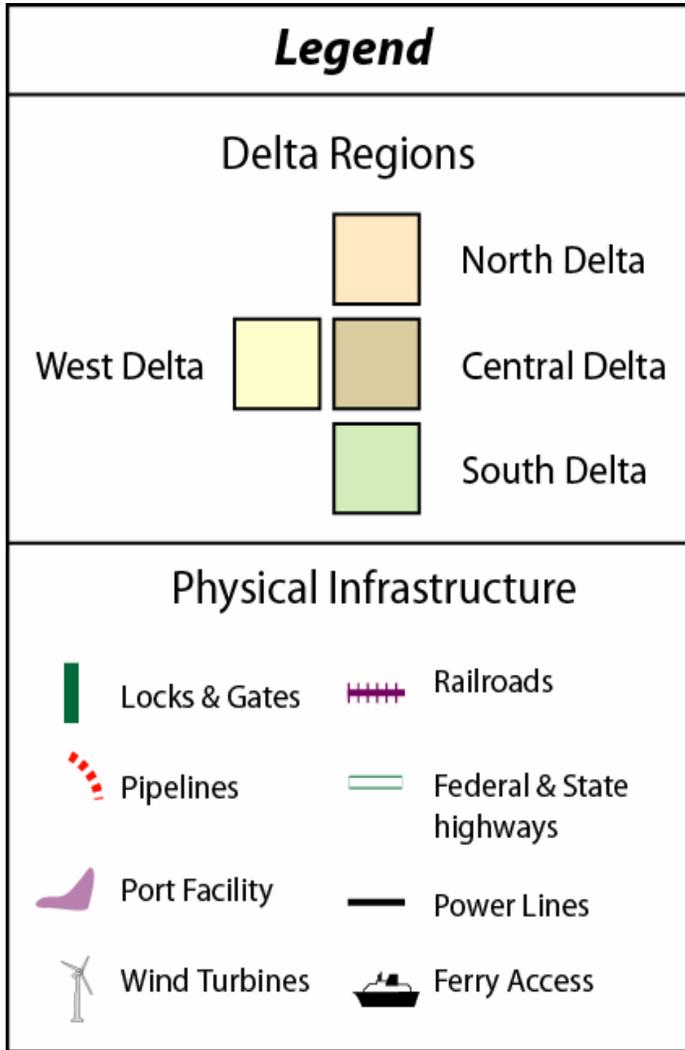
- **Pre-Event Planning**
 - Consult with resource agencies and experts over draft emergency response actions
 - Follow advice given to refine and improve emergency response strategies
- **Mitigate Impacts**
 - Follow mitigation standards and requirements



Strategy for Life & Local Property

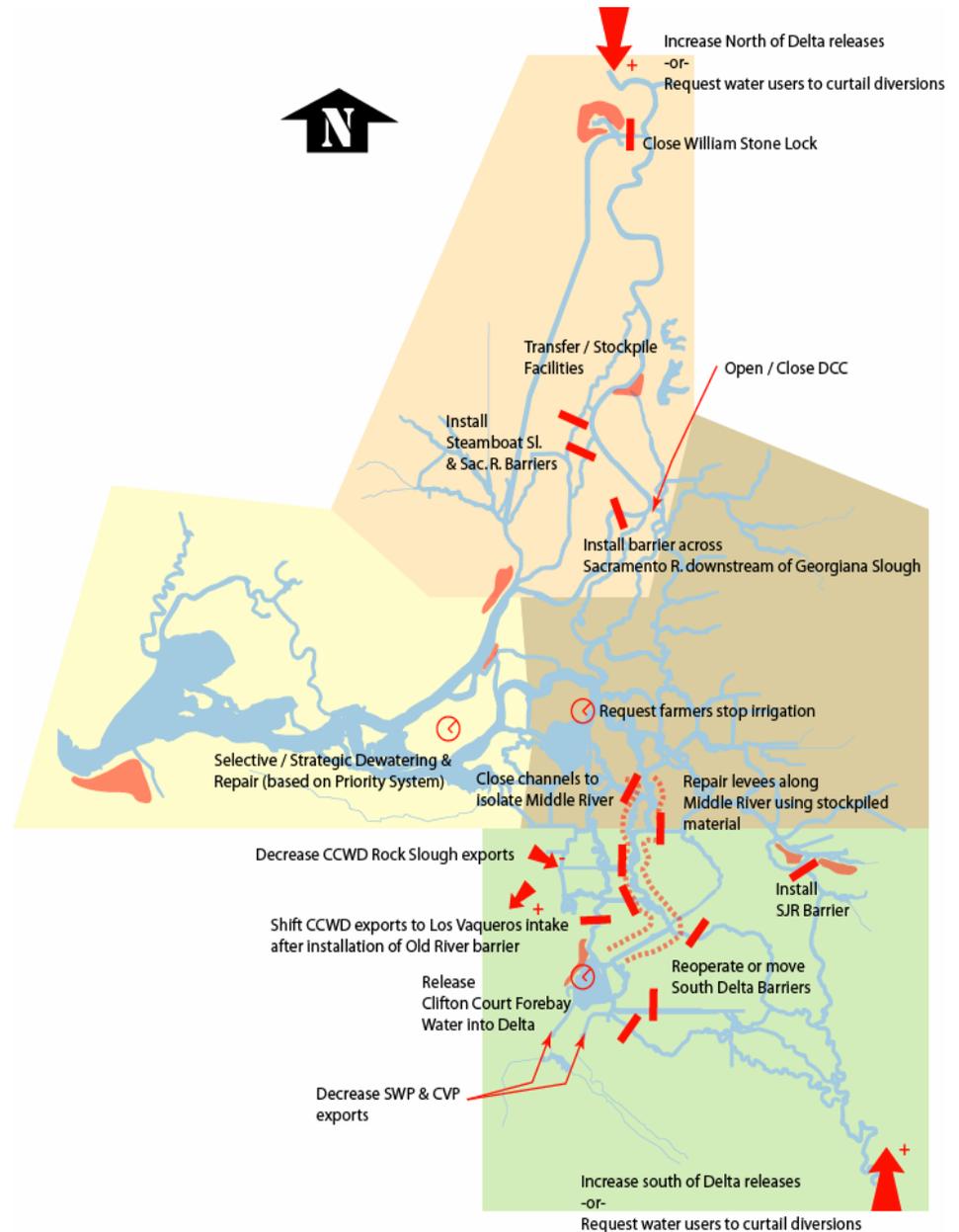


Strategy for Local Infrastructure



Strategy for Protection Water Supply

Legend									
Delta Regions									
	<table border="0"> <tr> <td></td> <td>North Delta</td> </tr> <tr> <td></td> <td>West Delta</td> </tr> <tr> <td></td> <td>Central Delta</td> </tr> <tr> <td></td> <td>South Delta</td> </tr> </table>		North Delta		West Delta		Central Delta		South Delta
	North Delta								
	West Delta								
	Central Delta								
	South Delta								
No Regrets Activities									
	barrier								
	priority repair work								
	stockpile / transfer site								
	timed / regional reoperation								
	flow changes								



Phase 2 – Develop EOP

- Prepare initial example response strategy based on earthquake scenario
- Conduct quantitative analyses to verify impacts
- Develop strategies for additional scenarios and prepare analyses
- Prepare EOP based on strategies
- Evaluate EOP through tabletop and functional exercises
- Identify gaps in response capabilities
- Engage stakeholders throughout the process



Phase 1 – Recommended Actions for Near-Term Implementation

Recommendations for Immediate Implementation	Example of Options/Considerations
Identify Transfer Facilities	Identify existing dock space to lease in strategic locations
Stockpile Quarry Material	Identify vacant land to lease or purchase near transfer facilities
Identify Warehouses for Non-Quarry Material and Tools	Rent existing climate controlled warehouses at strategic locations
Design Temporary Barriers	Confirm effectiveness of temporary barriers on the Sacramento (including Steamboat and Sutter Sloughs) and San Joaquin rivers prepare for emergency installation
Develop Decontamination/ Exposure Plan	Develop site implementation plans, define risks, prepare training information (include site logistics)
Develop and Implement Analytical Tools	<ul style="list-style-type: none"> • Quantify amount of upstream water available in various months and water years and identify when to release it for effective flushing • Establish ER&R model as an emergency management tool • Establish WAM from DRMS as an emergency management tool • Develop a priority system for levee repair in multi-island flooding events • Develop examples of water management strategies for various multi-island flooding scenarios (occurring at various times and for various types of year)



Development of EOP – Benefits

- Clarification of roles and responsibilities within DWR
- Strengthening of partnerships with local, state, and Federal agencies
- Clarification of DWR's role within SEMS, as it pertains to a disaster in the Delta
- Better definition of actions beyond immediate efforts, such as measures to protect and stabilize the water supply
- Compliance with SEMS and NIMS, ensuring consistency with national preparedness initiatives
- Incorporation of analytical tools into response planning
- Identification of gaps in response capabilities

