CITY OF VENTURA

Special STUDIES for Santa Clara River Estuary

PRESENTATION

October 2012

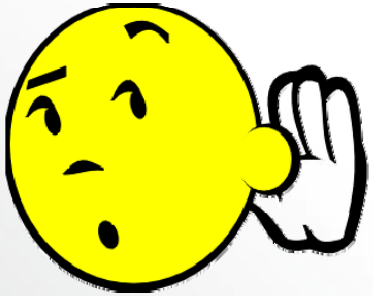
carollo
Engineers...Working Wonders With Water®

Stillwater Sciences

Intent of the special studies is to answer …

… What is the best use of the treated water resources from the Ventura Water Reclamation Facilities to protect the health of the Santa Clara River Estuary?

This is a Stakeholder Driven Process – What does that mean for you?



- **Actively Listen!**
  - We want you to understand the issues and alternatives under consideration.
- **Actively Participate!**
  - Please contribute ideas and concerns.
  - Stakeholder contributions expressed at these workshops shape the project and approach.
  - Your comments will be documented and posted on the City Website.

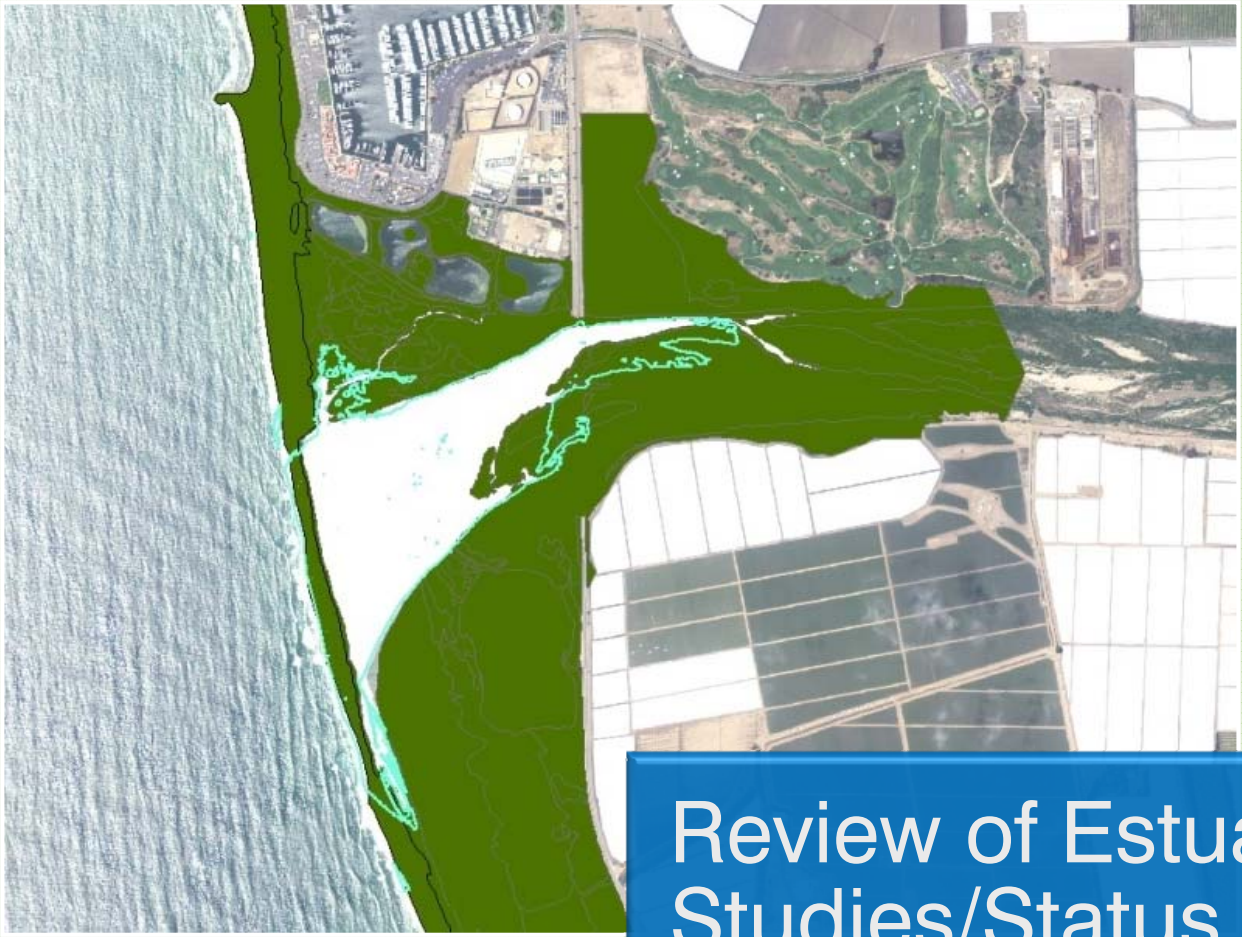
Agenda for the day

- Introductions
- Review of project/status
- Presentation of data collected during Phase 2 study
- Presentation of alternatives
- Breakout session (in small groups) and report back
- NPDES permit renewal and schedule
- Wrap up and next steps

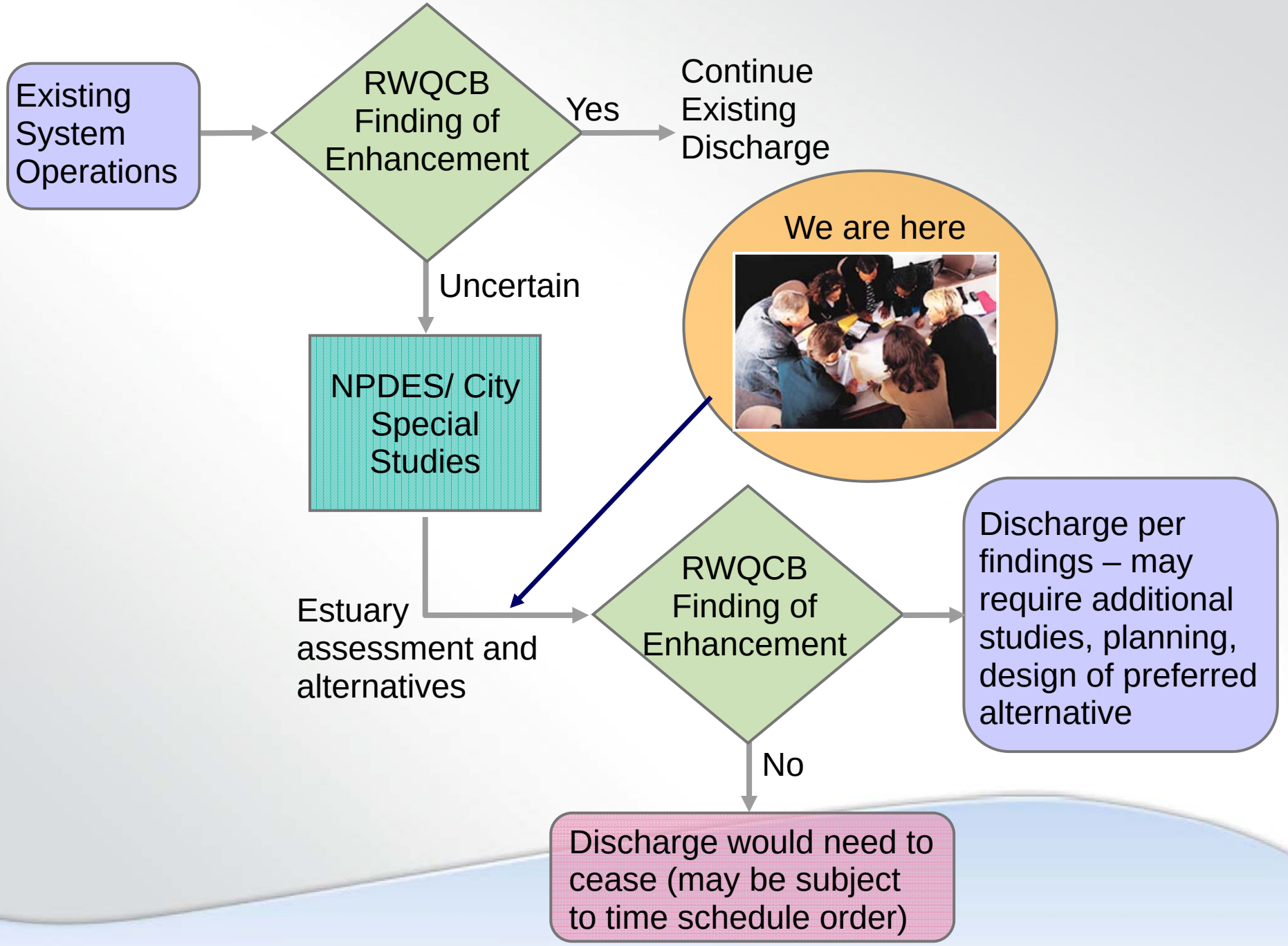
Introductions

Please introduce yourself …

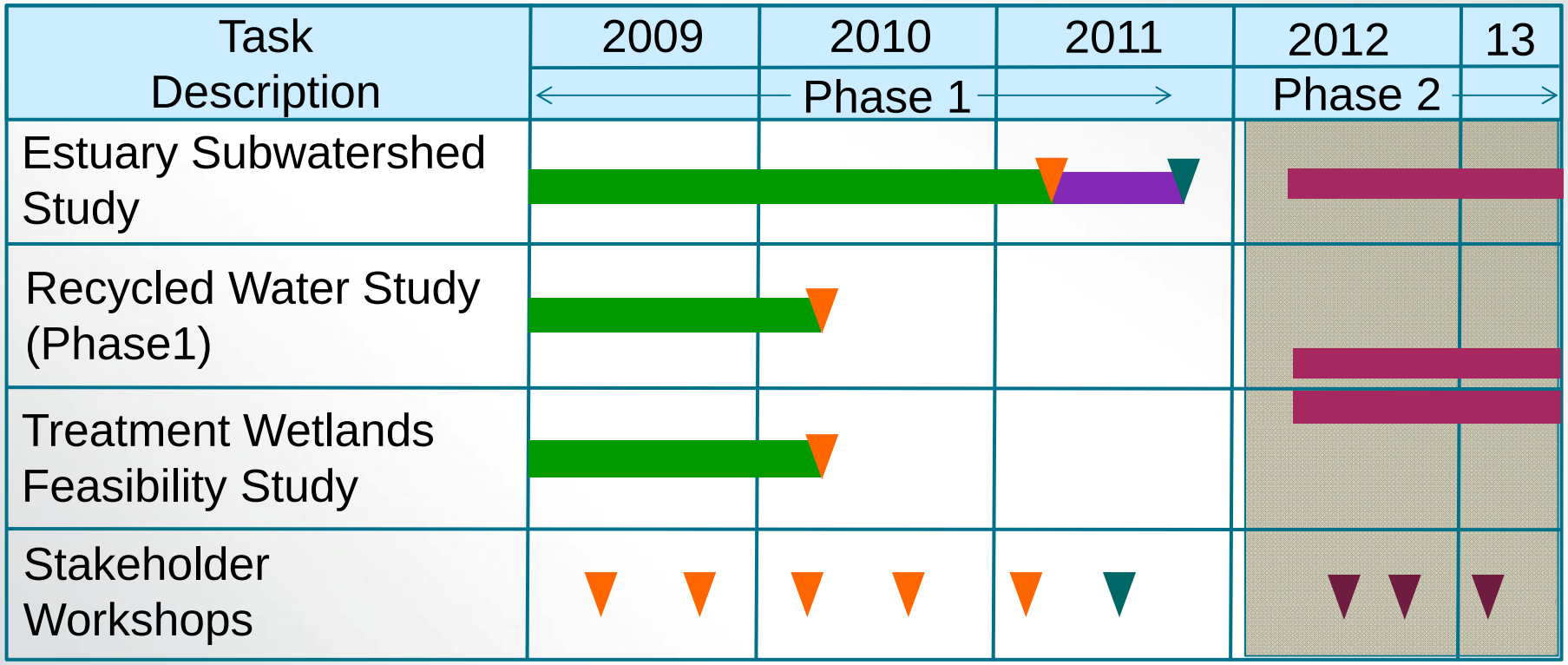
- Name
- Organization representing
- Interest



Review of Estuary Studies/Status Update


Existing System Operations
RWQCB Finding of Enhancement
Yes
Continue Existing Discharge
Uncertain
NPDES/ City Special Studies
We are here
Estuary assessment and alternatives
RWQCB Finding of Enhancement
Discharge per findings – may require additional studies, planning, design of preferred alternative
No
Discharge would need to cease (may be subject to time schedule order)

Three studies were initially required, followed by the current Phase 2 effort



Recommendations memo - findings

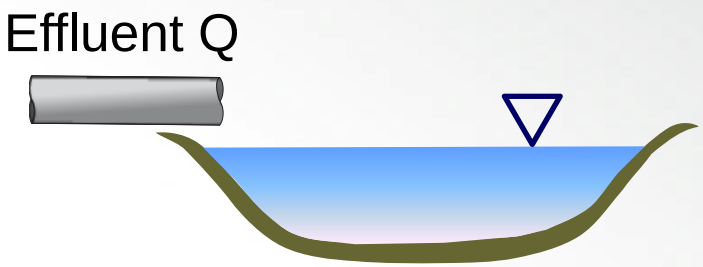
- Major Findings:
  - Current flows to the estuary provide a fuller realization of beneficial uses as compared to zero discharge (additional habitat for tidewater goby and steelhead)
  - Opportunity to further improve /optimize beneficial use
- What can be done to the discharge to further improve beneficial use?
  - Less flow in summer to reduce unseasonal breeching
  - Improve water quality to reduce nutrients

Recommendations for Phase 2 (with Stakeholder input)

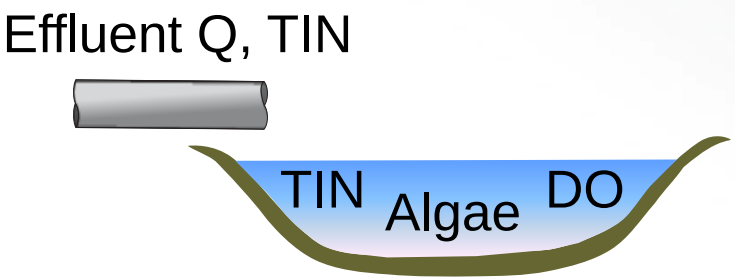
- Evaluate other alternatives and combinations
- Estuary study - additional data collection on:
  - SCRE water balance
  - Water quality data upstream and in SCRE
  - Groundwater elevations, gradients and quality
  - Other species evaluation and more detailed analysis
- Wetlands and recycled water
  - Re-evaluate wetlands siting to include new TNC site
  - Evaluate reuse for urban, agricultural and recharge
  - Evaluate costs, benefits, permitting, CEQA….

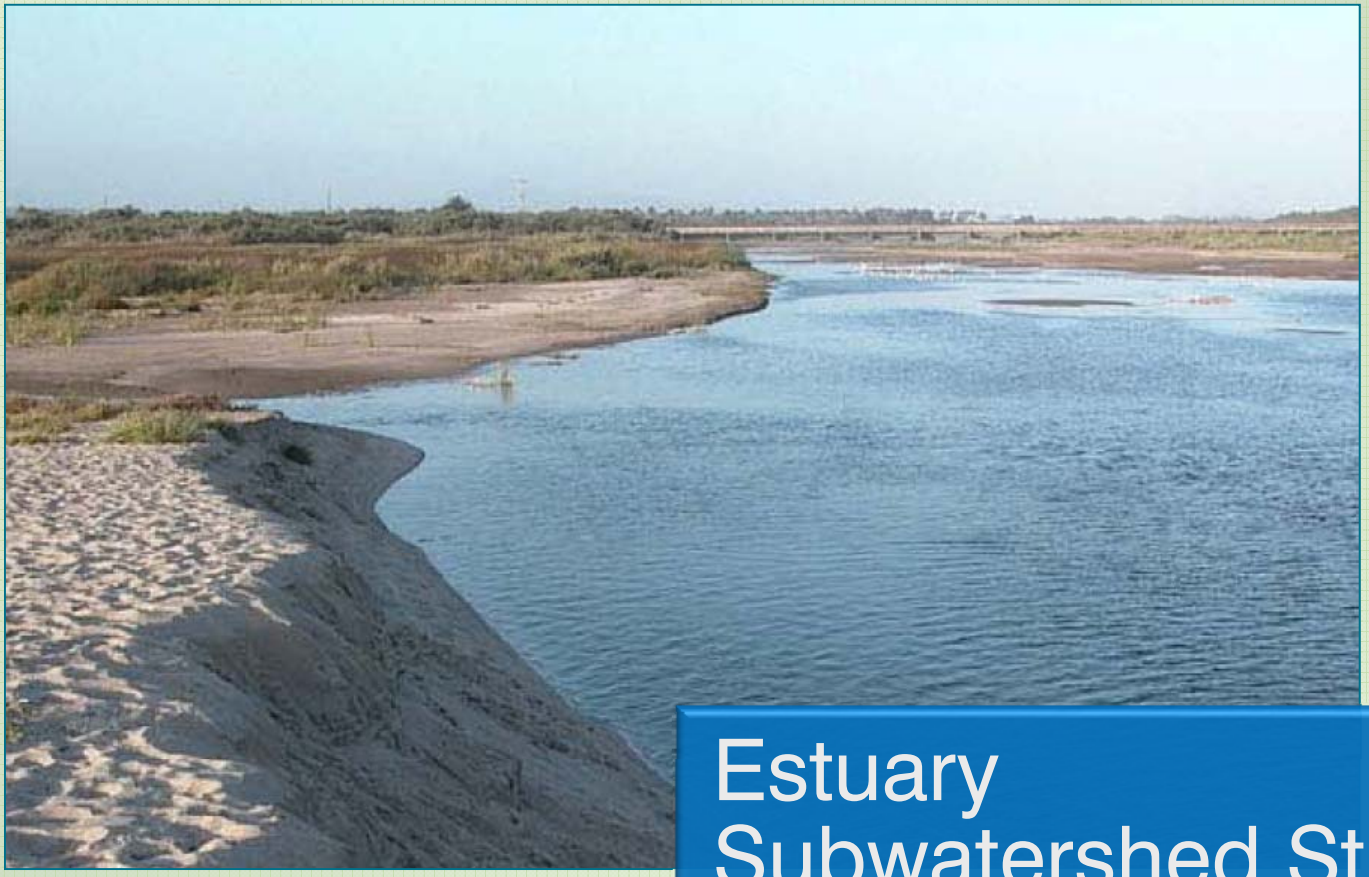
The estuary study results form the basis for environmentally protective alternatives

- Estuary depth
  - Discharge flow volume



- Estuary water quality
  - Discharge water quality
  - Effluent nutrient load (function of flow and water quality)





Estuary Subwatershed Study: Phase 2

Phase 2 continued monitoring

Goals

Collect additional data that …

1. Expand our understanding of SCRE physical and biological conditions
2. Help develop VWRF discharge and/or diversion approaches that optimize SCRE beneficial use

Approach

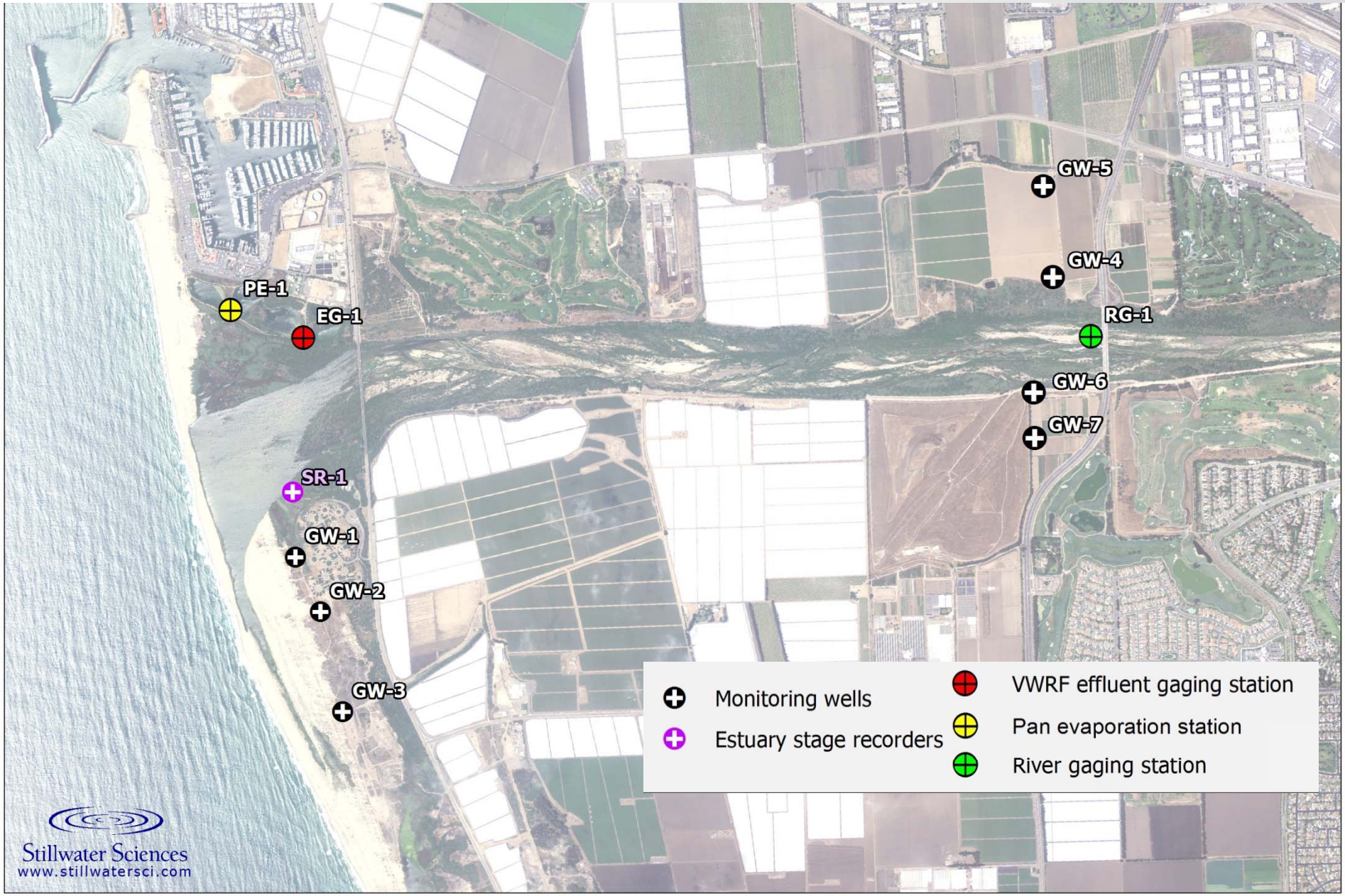
- Continued data collection at Phase 1 locations
- Data collection at newly-established monitoring locations
- Total duration: September 2010 – October 2012

Phase 2 continued monitoring

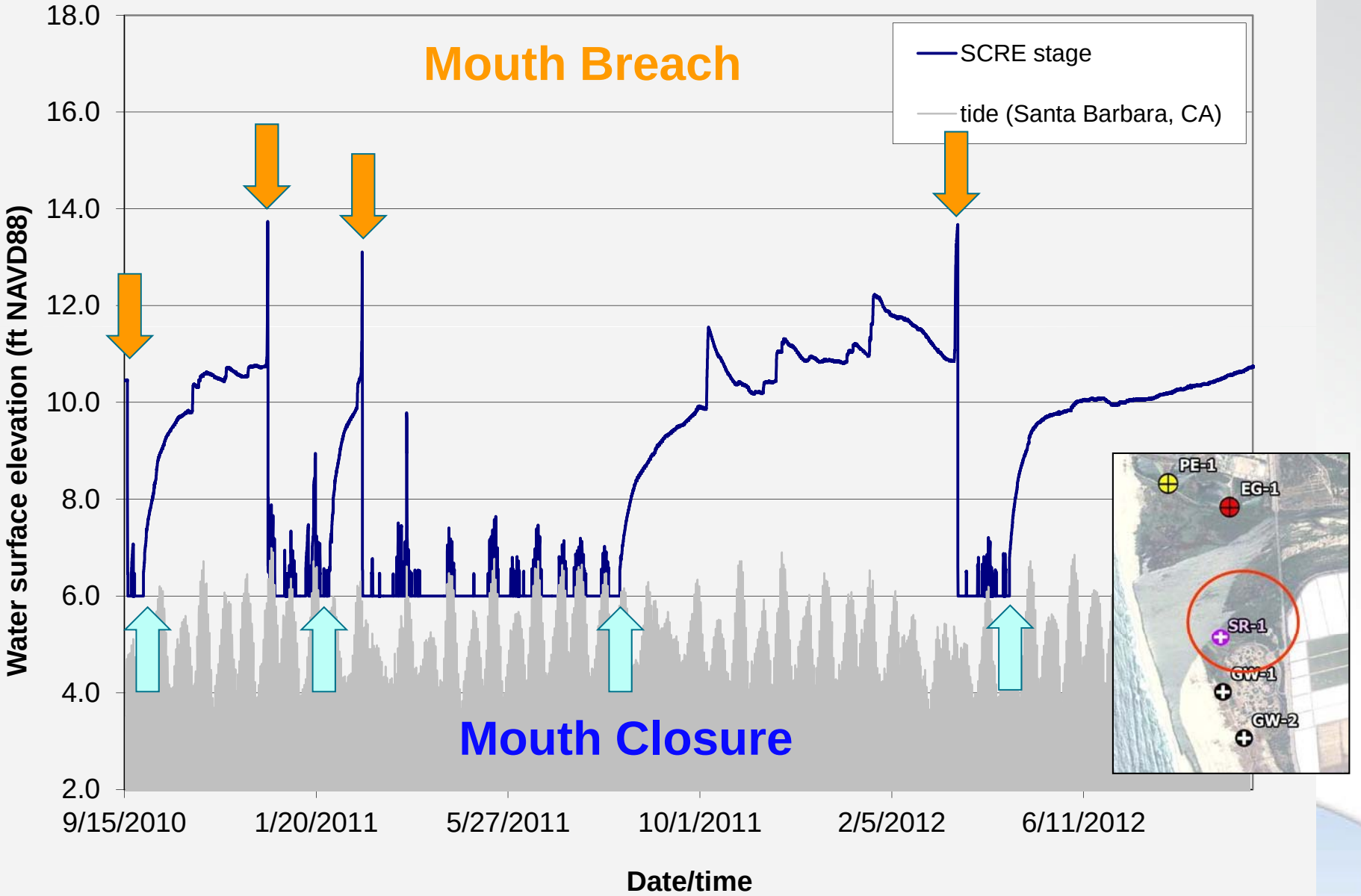
Activities

1. **Hydrology Survey**
   - SCRE stage monitoring
   - SCRE inflow and outflow monitoring
2. **Water Quality Survey**
   - Monthly SCRE and groundwater sampling
   - Intensive SCRE monitoring
3. **Aquatic Species Survey**
   - BMI and non-native fish monitoring
   - Expanded toxicity testing for brackish environments

Hydrology survey: monitoring locations



Hydrology Survey: SCRE Stage (SR-1)



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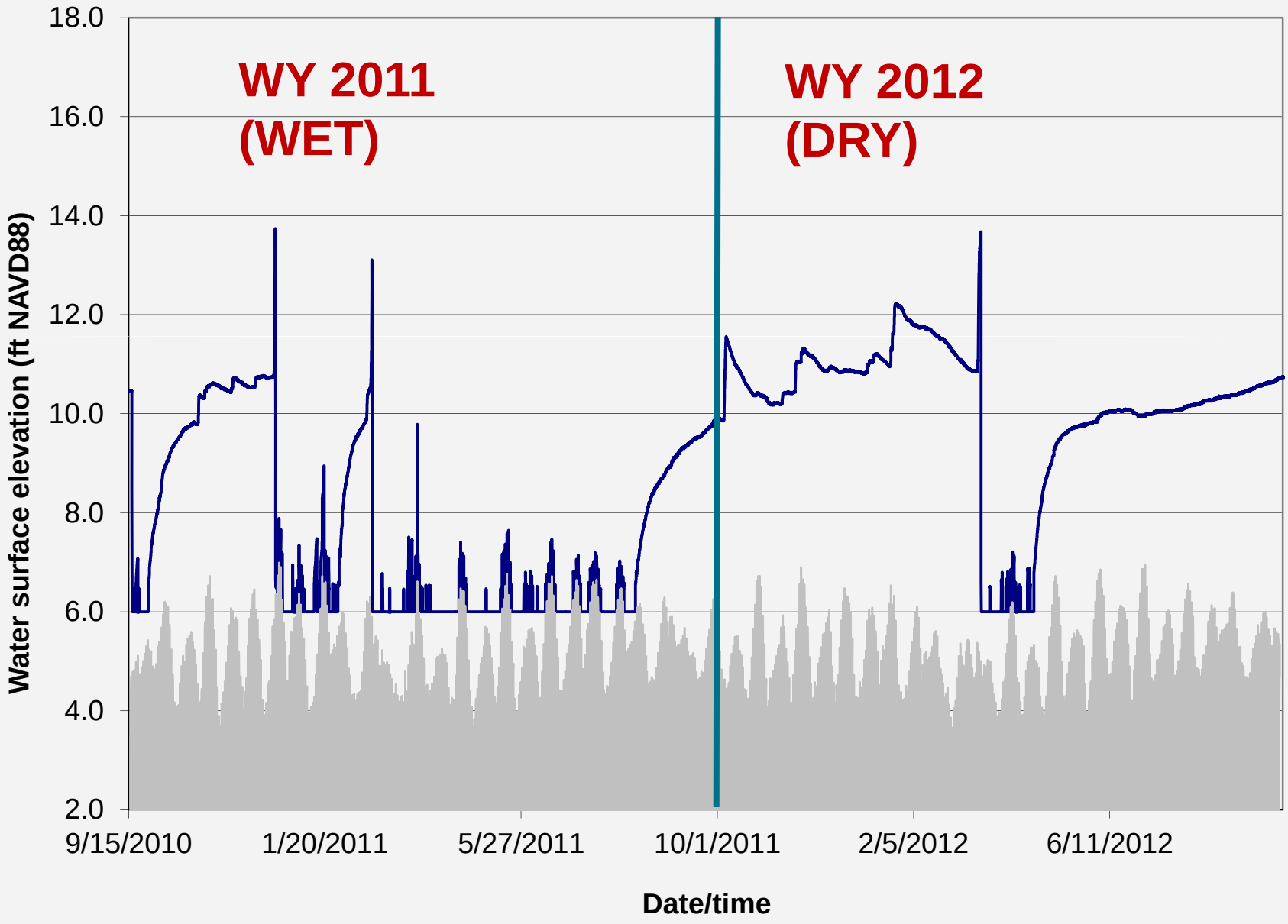
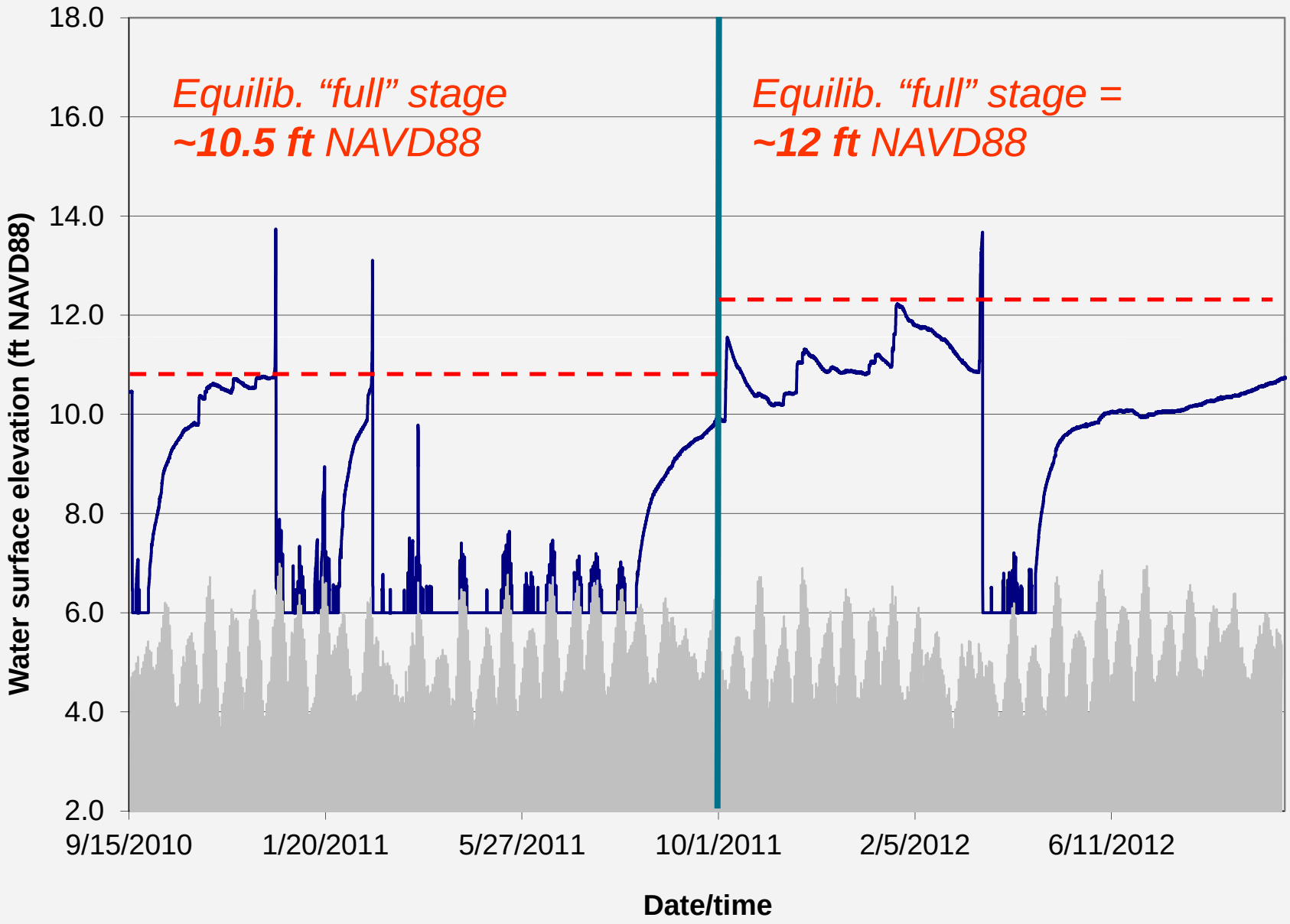
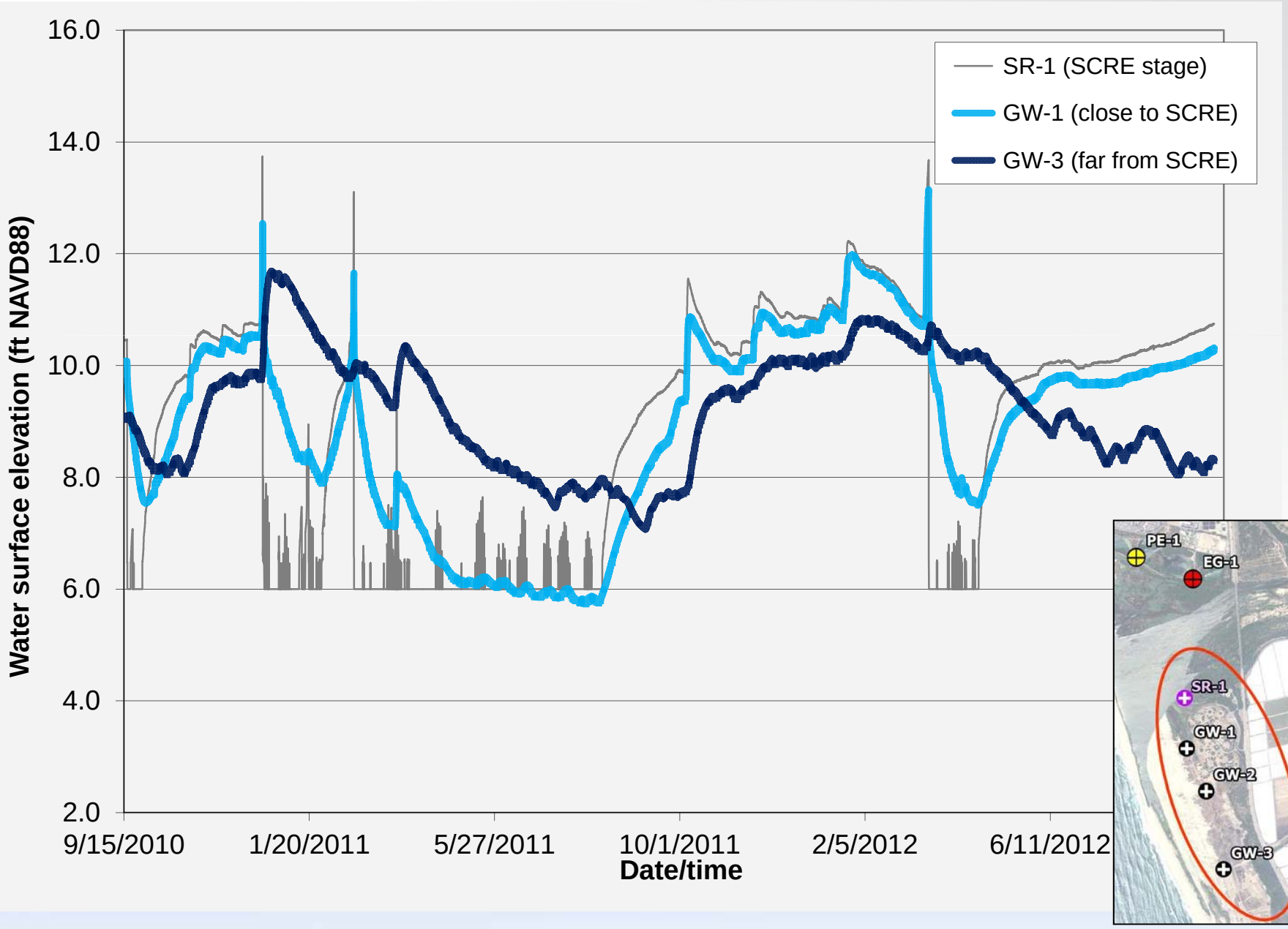


Hydrology Survey: SCRE Stage (SR-1)



Hydrology Survey: GW Elev. (GW-1 & GW-3)



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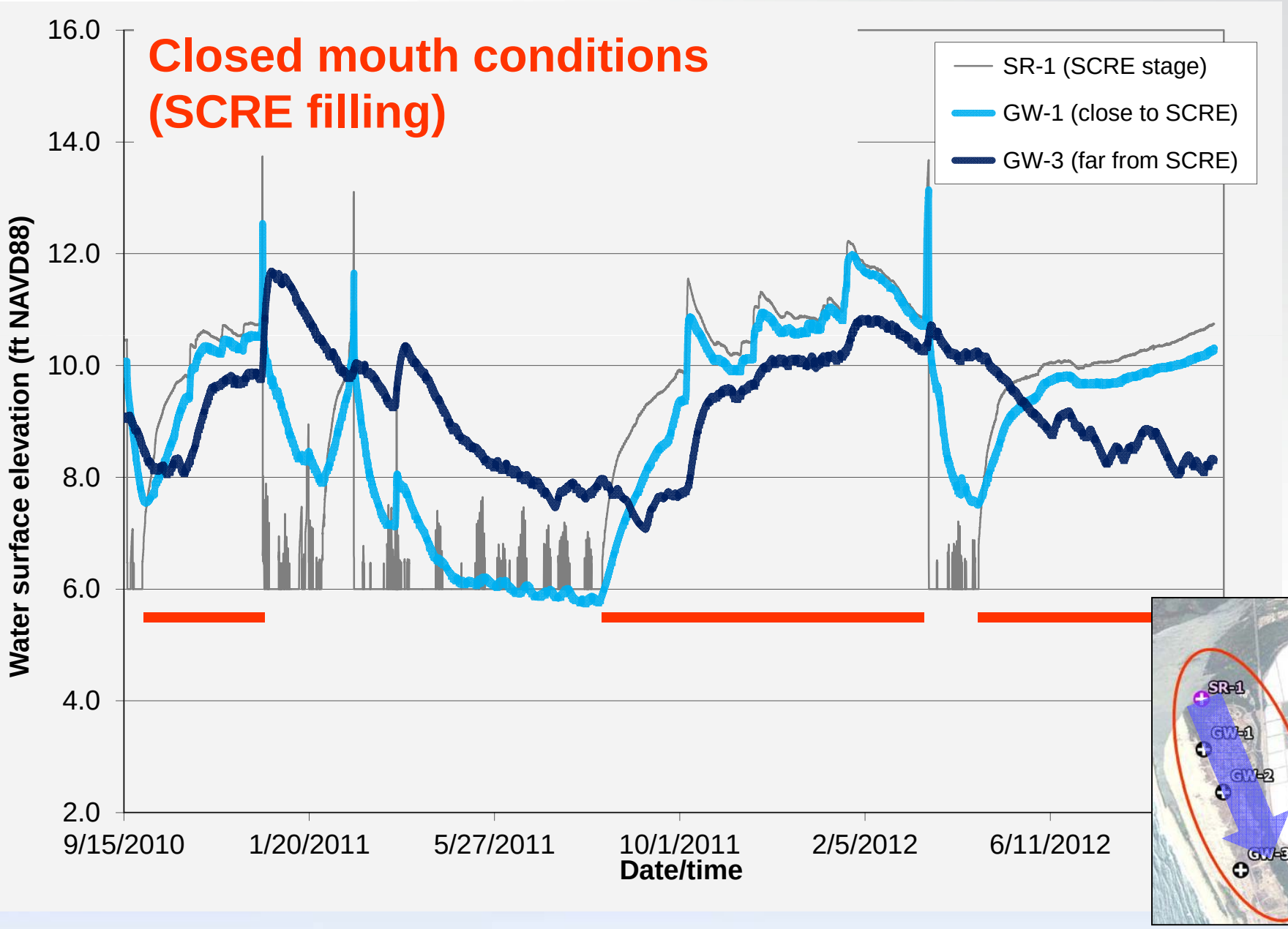

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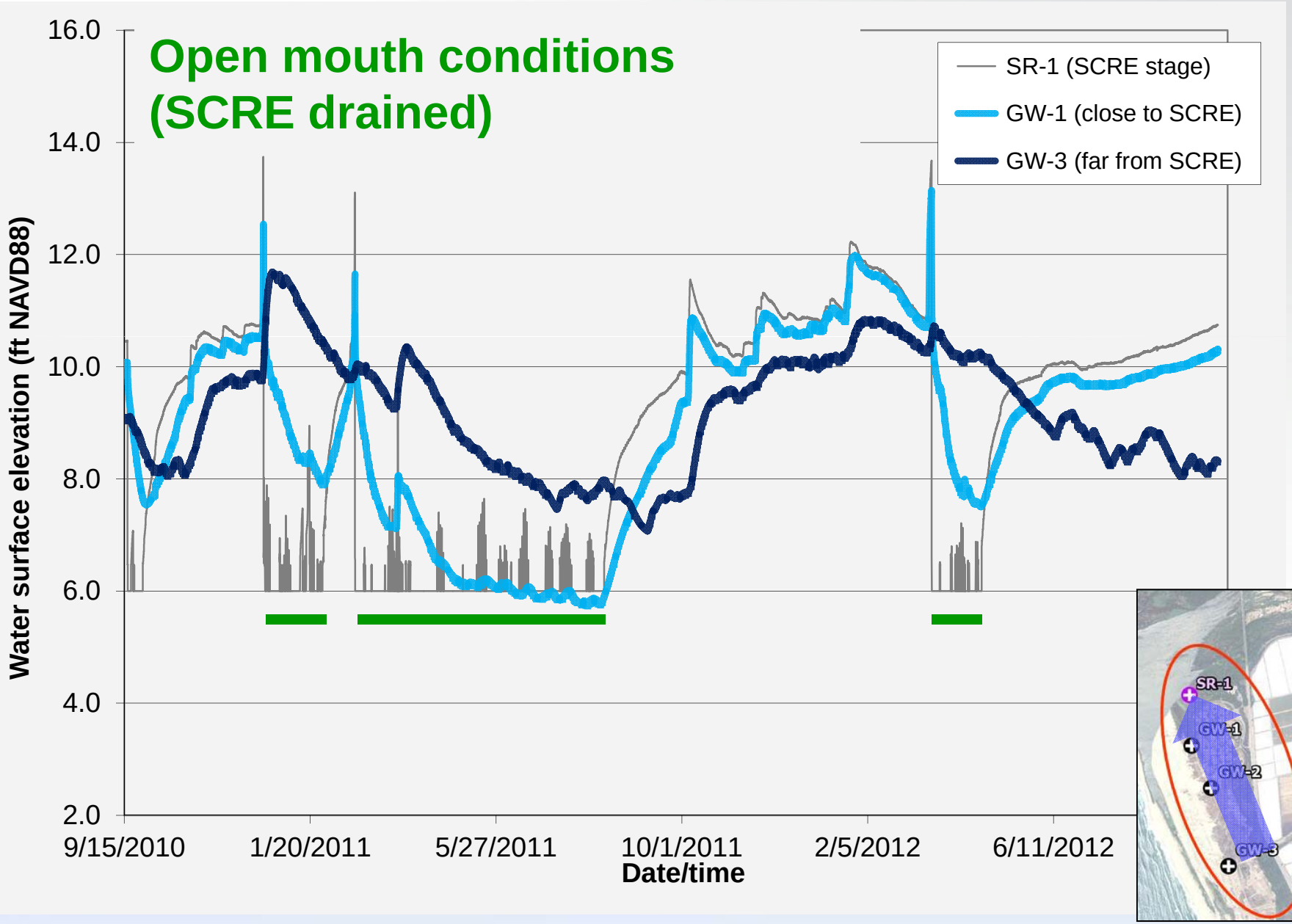
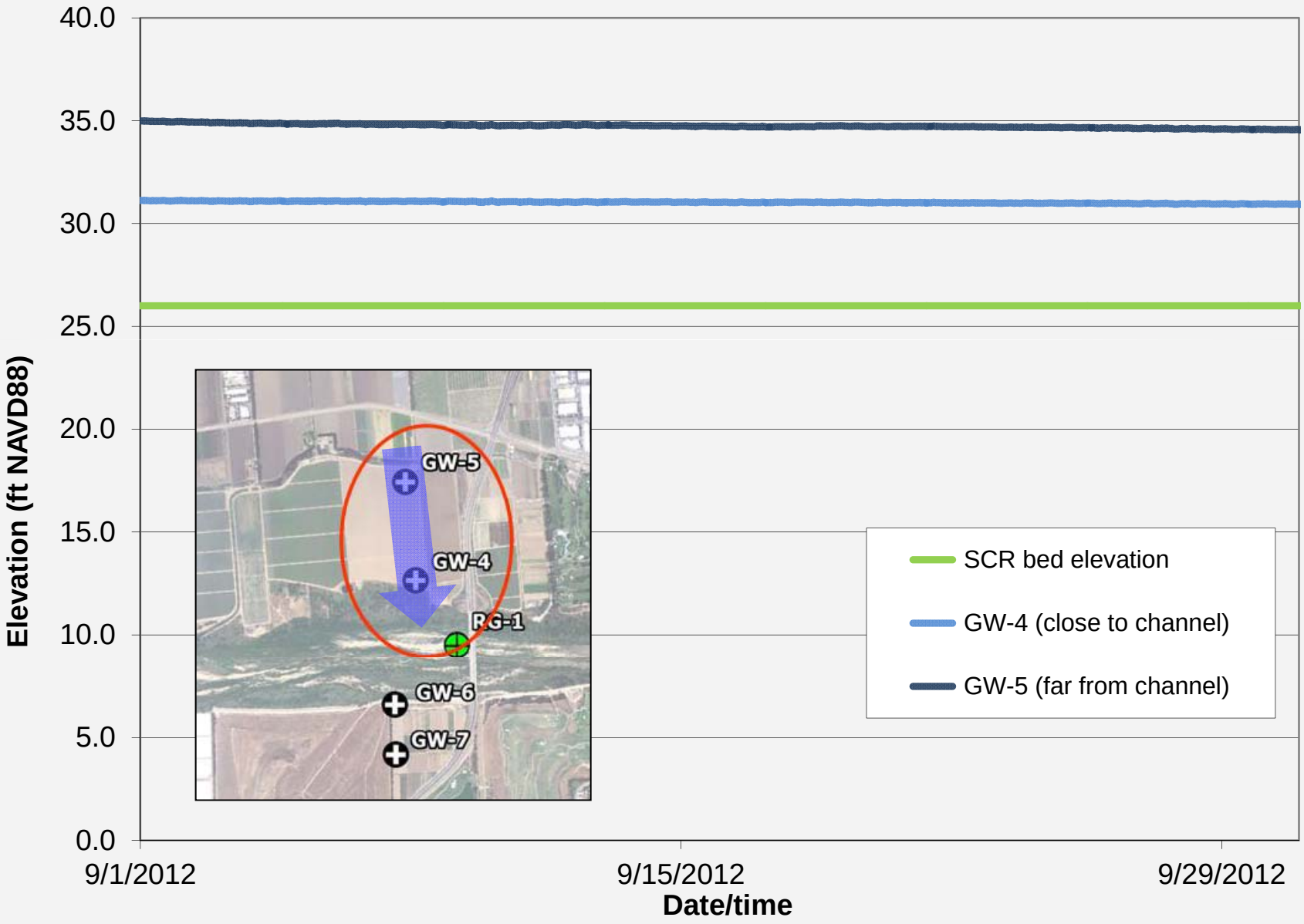
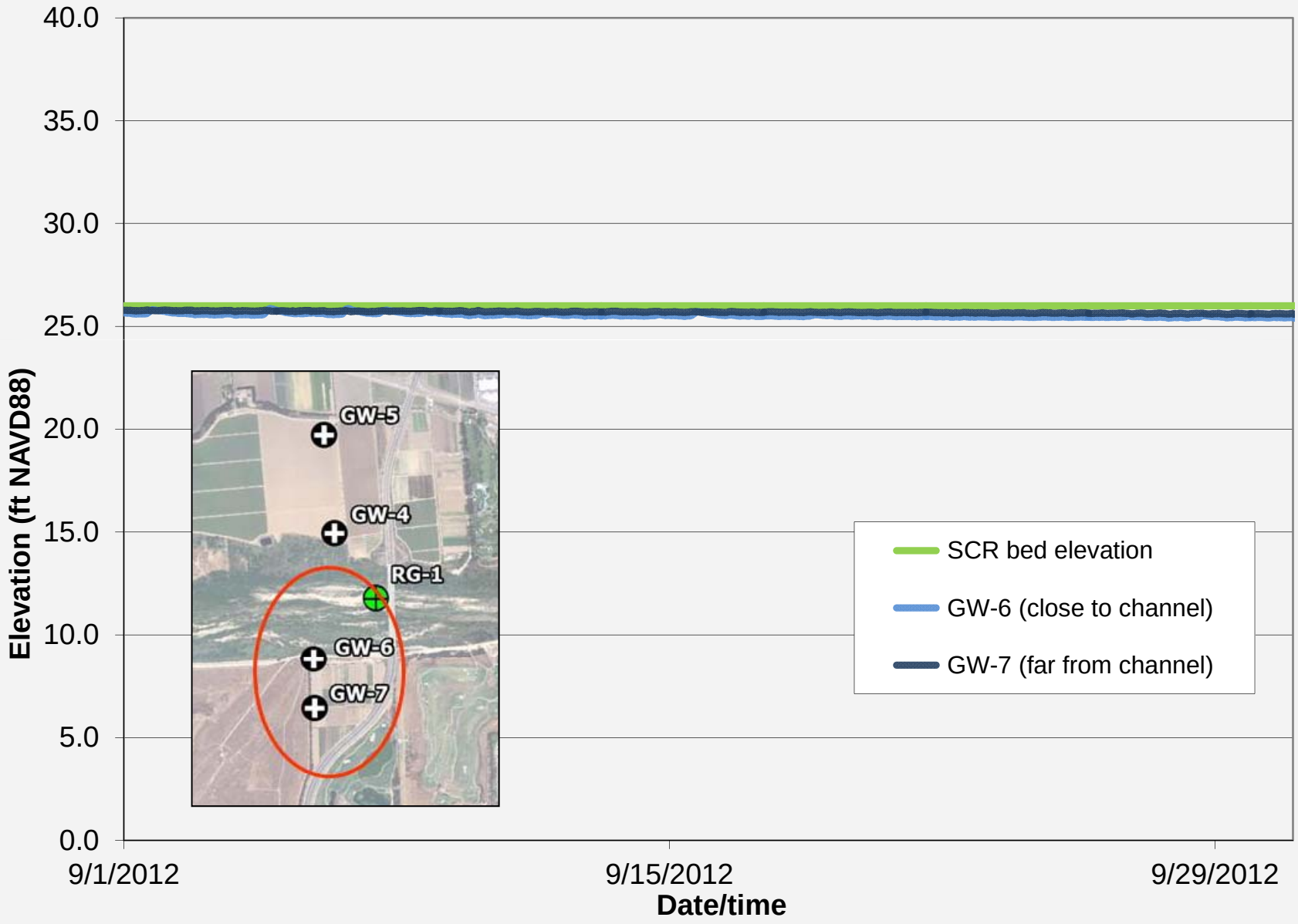


Hydrology Survey: GW Elev. (GW-4 & GW-5)



Hydrology Survey: GW Elev. (GW-6 & GW-7)



Phase 2 Hydrology Survey

Major Findings

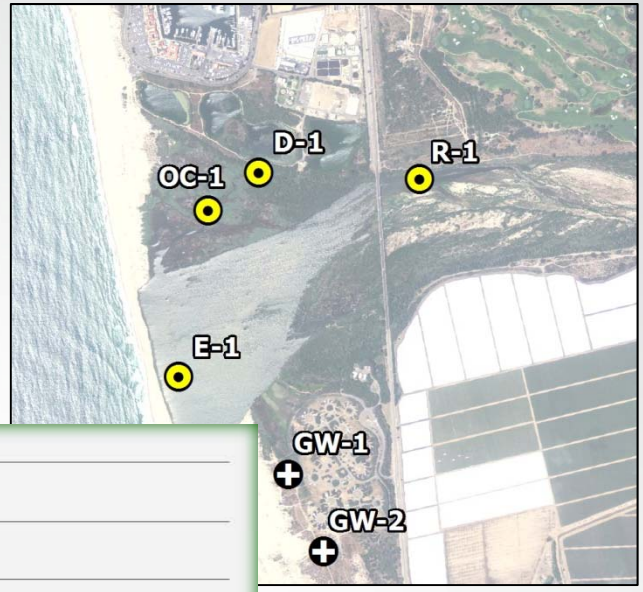
1. The equilibrium "full" stage is ~1.5 ft higher than previously observed in Phase 1
2. The northern floodplain appears to be the dominant groundwater source upstream of Harbor Blvd. bridge

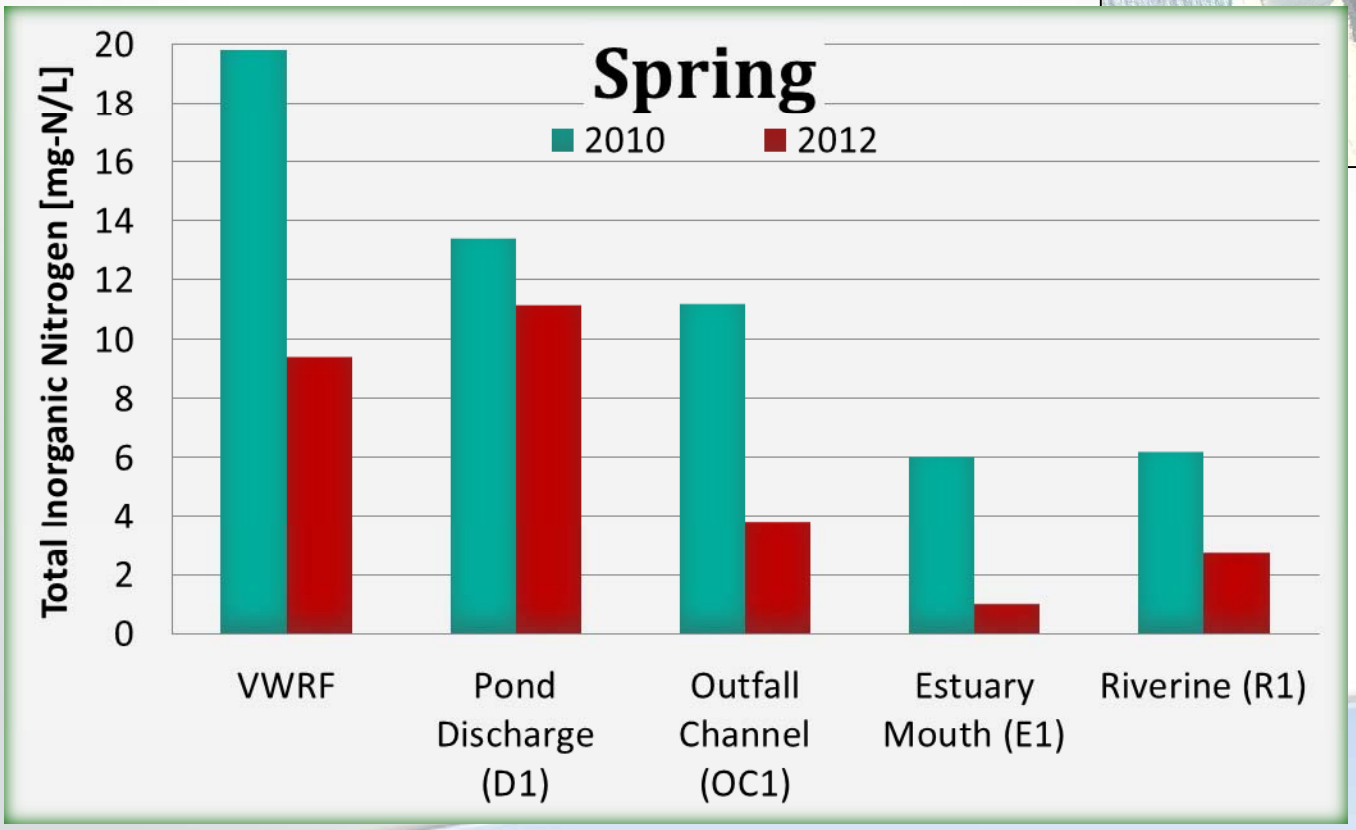
Effect on Estuary Study Findings

1. Need to redo water balance for:
   - New equilibrium stage
   - Dry year conditions
   - New groundwater information
   - New evaporation information
2. Could affect prediction of SCRE water depth and breaching conditions

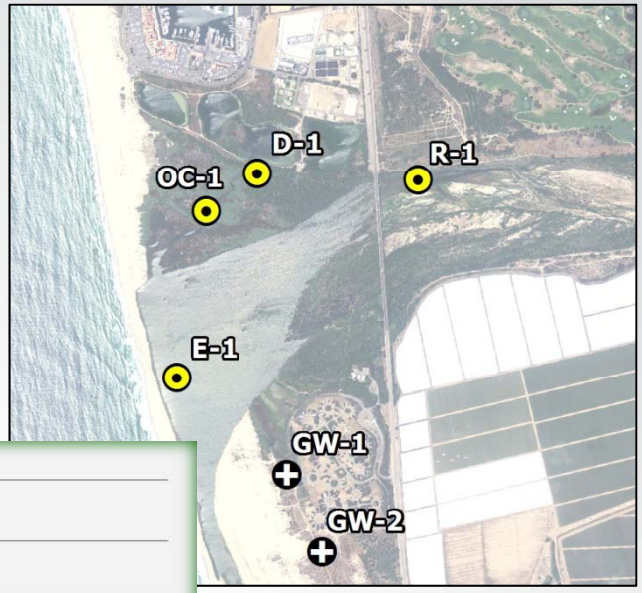
Water Quality Survey: Monitoring Locations

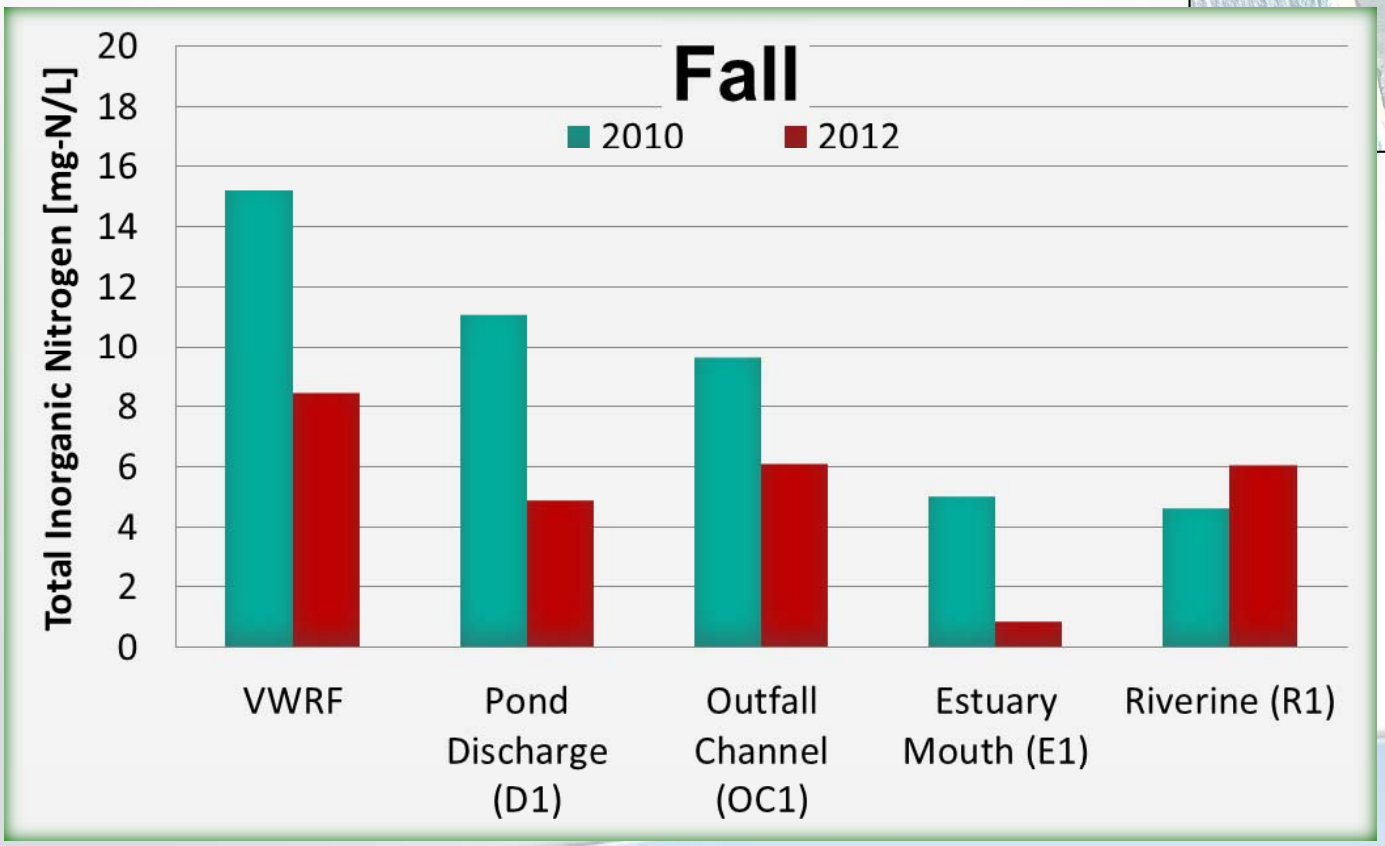
Water Quality Surveys



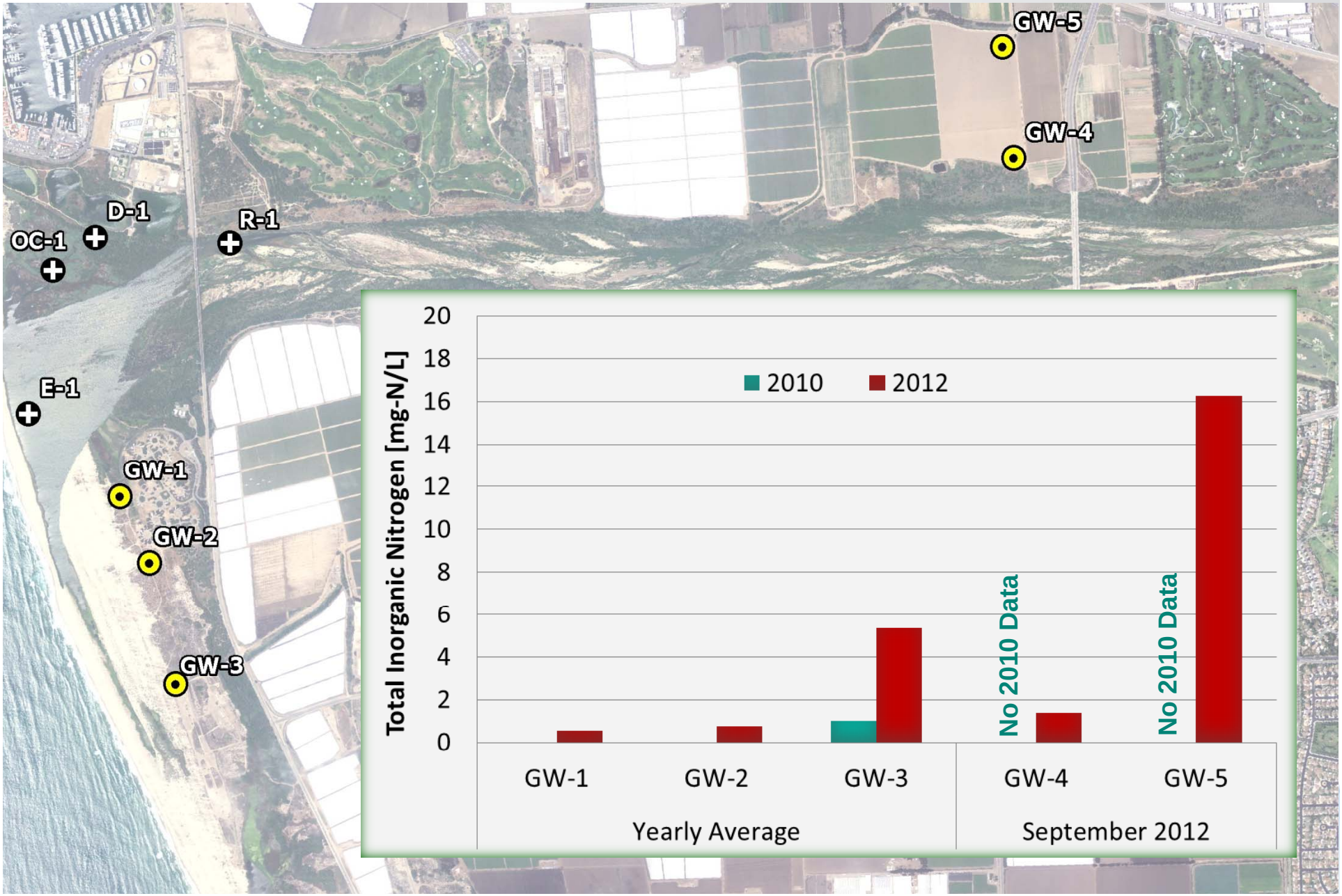


Water Quality Surveys

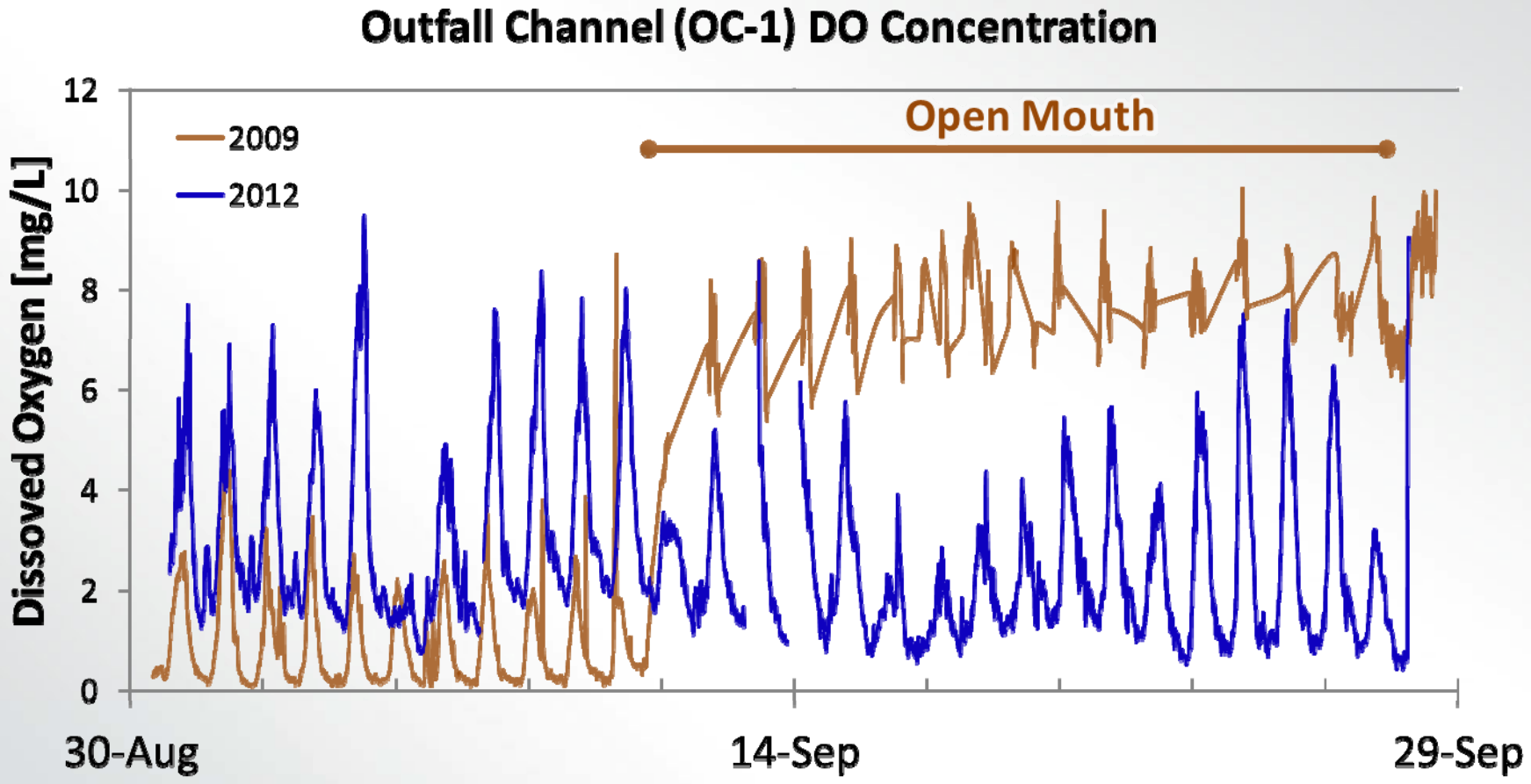




Water Quality Survey: Groundwater Nitrogen



Water Quality Surveys: Continuous DO



Water Quality Survey: Additional Activities

- Expanded Toxicity Testing
  - No toxicity in saltwater fish
  - Low level *Ceriodaphnia* toxicity at several sites, including R-1
  - Low level *Selanastrum* toxicity
- Additional Data Analyses
  - Macroinvertebrate (BMI) Assemblage
  - Fish Species Assemblage

Water Quality Survey: Summary

- VWRF Plant Improvements for TIN
  - Reductions in Nitrogen to SCRE
  - Increased DO in SCRE
  - Lower DO Variability in SCRE
  - Periodic Algal Blooms
- Other Nutrient Sources
  - Increased TIN in New Groundwater Wells
  - Increased TIN in Riverine
- Low Toxicity Levels in Freshwater Organisms
- Additional Analyses (BMI and Fish Assemblages)

How do these water quality findings effect the Estuary Study and the Phase 2 efforts?

- Recent improvements made at the VWRF are showing improved water quality in the estuary
- Higher nitrogen input from other upstream sources means “zero discharge” option may show less water quality benefit than previously estimated
- Need to re-evaluate water quality for discharge alternatives once water balance is updated

Alternatives

Started Process of Further Developing and Evaluating Alternatives

- Last stakeholder meeting
  - Breakout sessions – reuse, recharge, wetlands
  - Screened out alternatives that were not feasible
- Since last meeting - further developed alternatives
- Which alternatives best meet criteria

√ Improve discharge quality

√ Reduce discharge flow

√ Create new habitat

√ City water supply benefit

√ Reliable water management practice

Reuse Alternatives

Alternative carried forward

	Improved Effluent Quality?	Reduced Effluent Flow?	City Water Supply Benefit?	Feasibility Issues
Ag Reuse with Blend	No	Up to 4.1 mgd	No	Large blend fraction required. Lower quality not acceptable.
Decentralized Plant to East	No	Up to 1.9 mgd	Yes	New plant serving Ag and urban users. Need RO. Brine treatment/disposal.
Expand Urban	No	Up to 2 mgd	Yes	Extensive pipe network required for low flow
Ag Reuse with RO	No	Up to 4.1 mgd	No	Quality requires RO. Brine treatment/disposal.
Decentralized Plant to North	No	Up to 2.6 mgd	Yes	New plant serving Ag and urban users, can be used for DPR in future.
Direct Potable	No	Yes	Yes	No Regulations yet. Requires RO and advanced oxidation.
To Oxnard	No	Yes – up to 12 mgd	No	Extensive pumping and piping. No local control.

Recharge Alternatives

Alternative carried forward

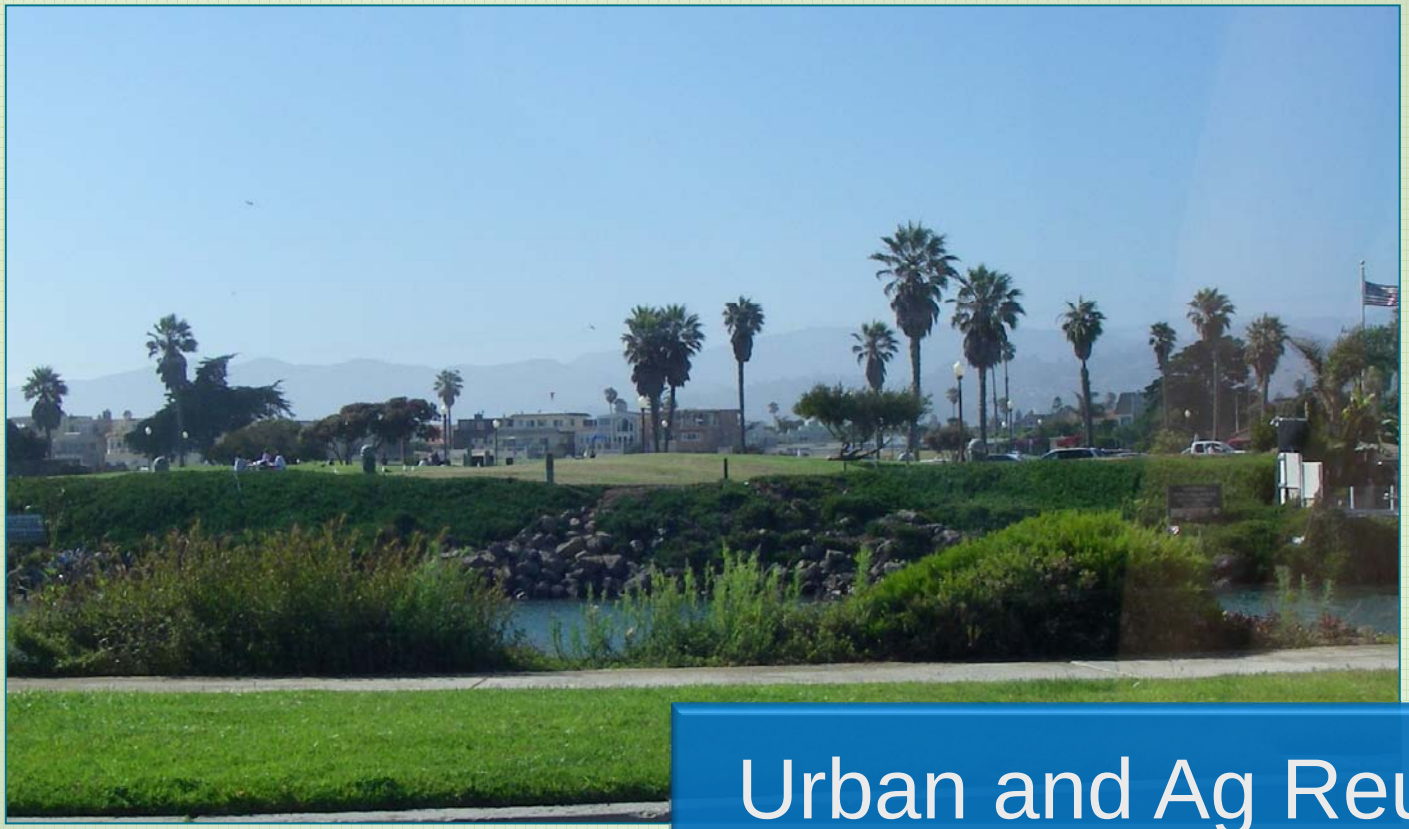
	Improved Effluent Quality?	Reduced Effluent Flow?	City Water Supply Benefit?	Feasibility Issues
Oxnard Plain Basin	No	Yes	Yes	Limited locations available. RO required. More GW players and demands.
Oxnard Forebay	No	Yes	Yes	No viable locations available. RO required
Mound GW Basin	No	Yes- 3.6 to 6.3 mgd	Yes	Injection required. RO and advanced oxidation required. Brine treatment/ disposal.
At UWCD facilities in Oxnard Forebay	No	Up to 12 mgd	Yes	Water quality an issue. Need RO for summer recharge. Brine treatment/ disposal.
To UWCD for Ag supply	No	1 - 8 mgd during summer	No- Summer, Yes - Winter	Amount of diversion depends on river flow. Partial RO required for water quality. Brine treatment/ disposal.

Wetland Alternatives

Alternative carried forward

	Acres	Improved Effluent Quality?	Reduced Effluent Flow?	Feasibility Issues
TNC Property	80-120	Best	No	Planning to let flood. Loss of investment.
Uplands (above TNC property)	Up to 95	Best	No	Land purchase. Lack of connection to river.
Perched Recharge to River	-	-	If east of 101	Limited locations available. Land purchase. Water quality an issue.
Existing Ponds	12	Some	No	Vegetate open water. Limited space.
City Owned Property	29	Better	No	Limited space.
Brine	29	NA	Yes – through other projects	Quality

Wetlands create habitat, but have little to no water supply benefit.



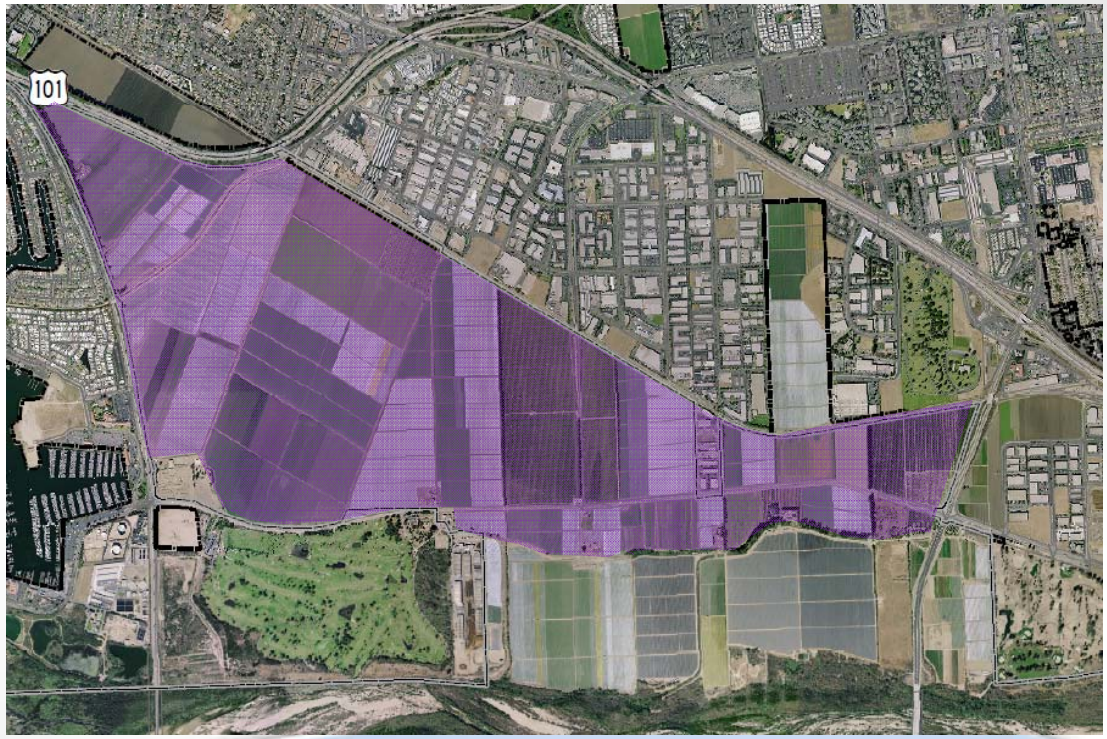
Urban and Ag Reuse

Urban Reuse - City will continue to expand their system as opportunities arise

- Recycled water focus area
- Users in vicinity of pipelines constructed for other RW projects

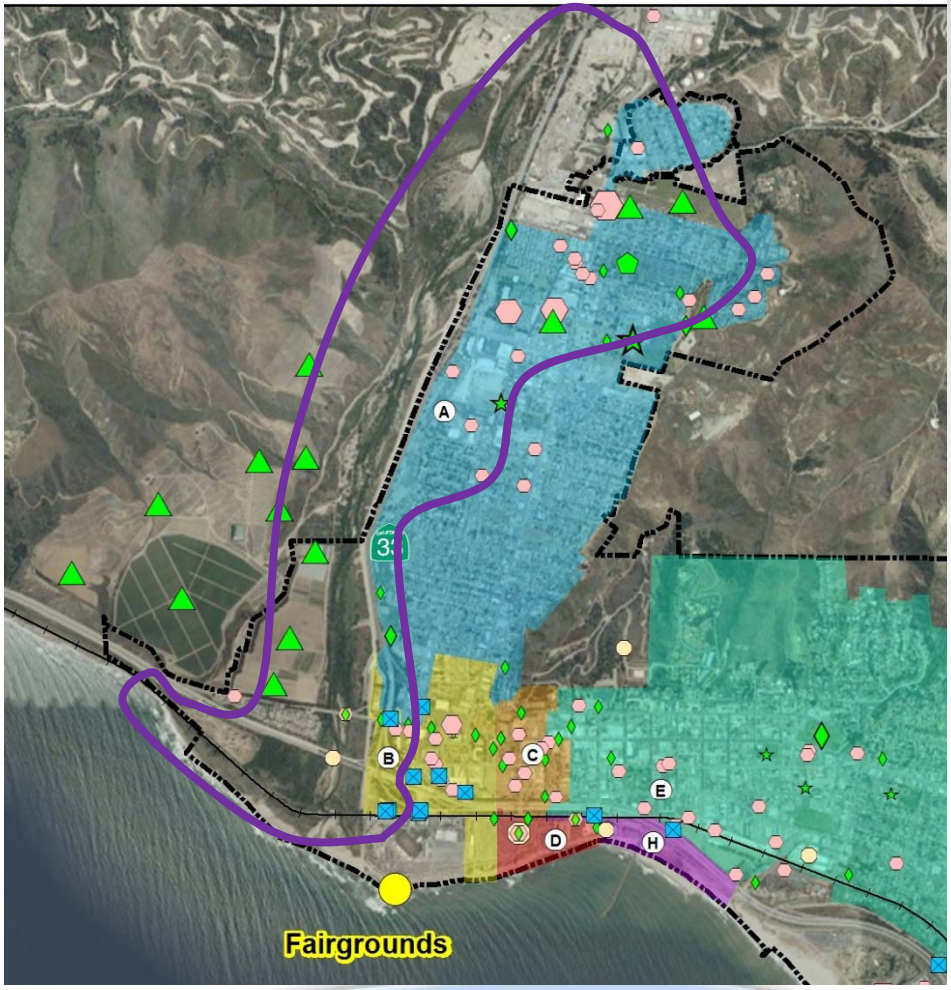
Agricultural Reuse - potential to combine with other alternatives that require RO

- Water Quality - Chloride, TDS & sodium exceed crop specific tolerance levels
- RO for 62% of flow to achieve 117 mg/L chloride
- Ag demand (ave, max month)= 2.5 mgd, 4.1mgd
- Combine with IPR, DPR, UWCD alternatives

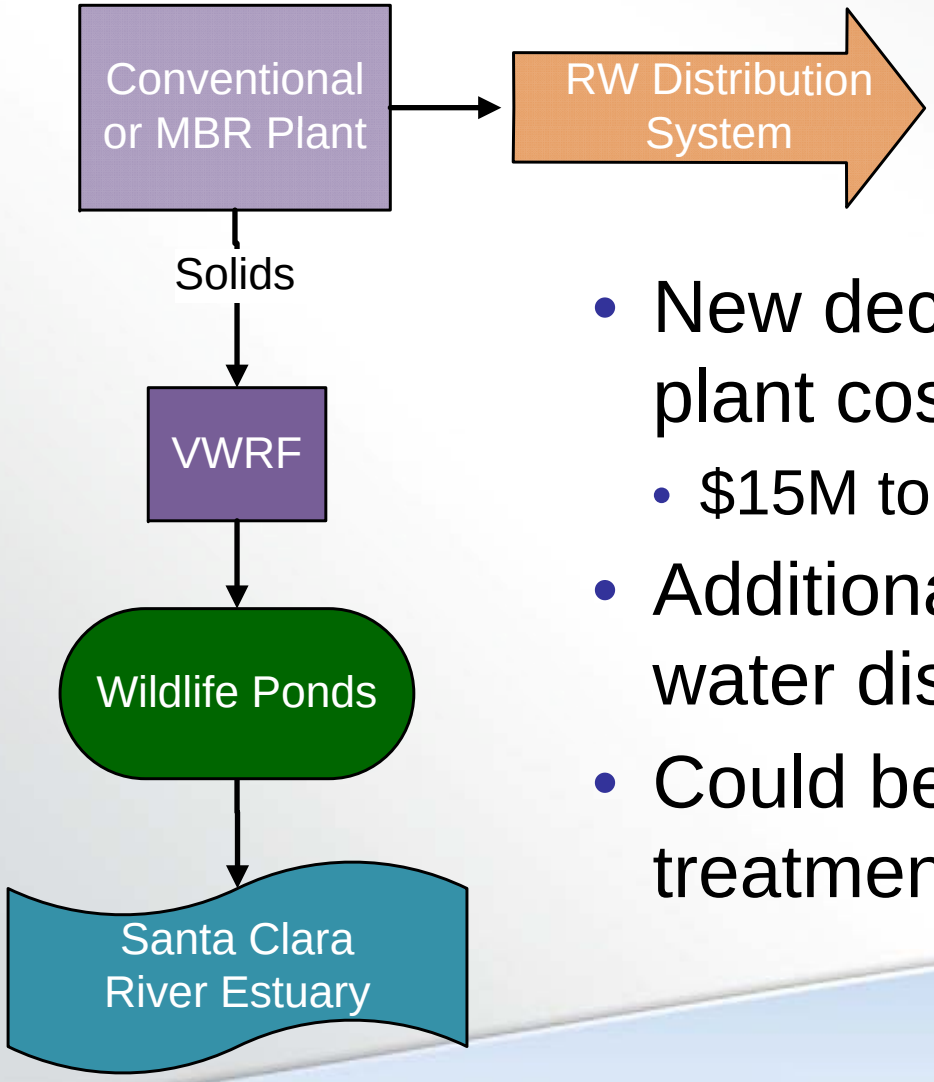


Decentralized Treatment Plant for Urban and Ag Irrigation

- Northern part of City has water suitable for irrigation without RO
- New 2 mgd treatment plant at Seaside pump station
- Ag demand (ave, max month)= 1 mgd, 1.8 mgd
- Urban demand in corridor (ave, max month)= 0.23 mgd, 0.33 mgd



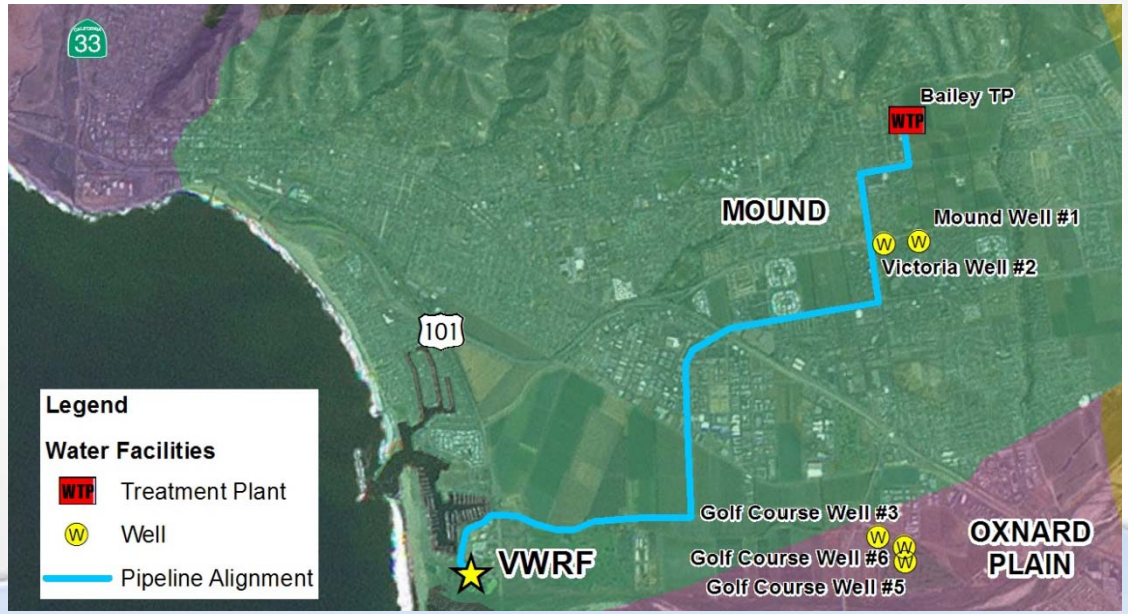
Decentralized Treatment Plant for Urban and Ag Irrigation



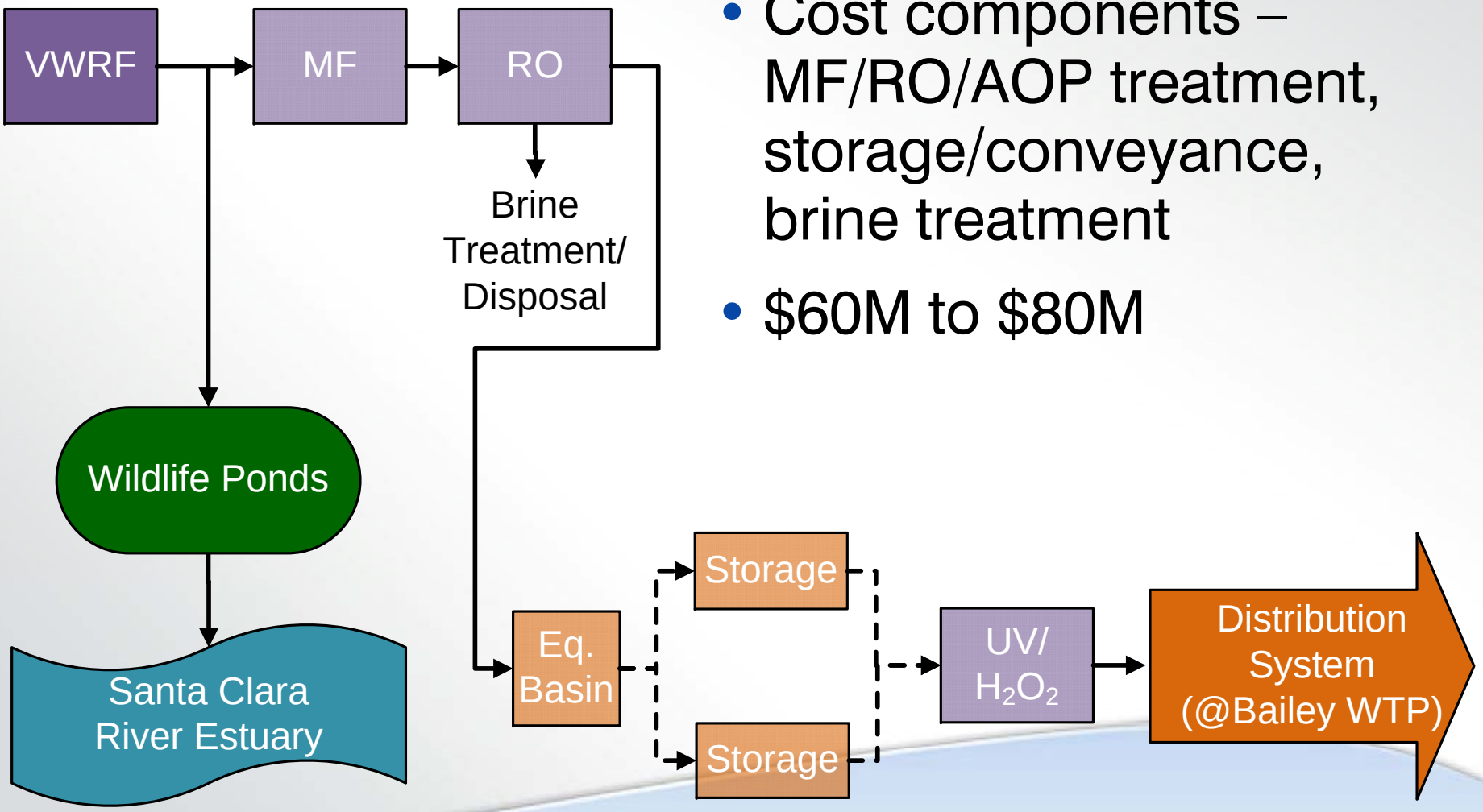
- New decentralized treatment plant costs
  - $15M to $30M
- Additional cost for new recycled water distribution system
- Could be upgraded to advanced treatment for DPR

Direct Potable Reuse

- Concept - Treat to very high level and blend directly into water supply
- No regulatory framework (expected 2016)
- Ongoing research into treatment to be protective of public health

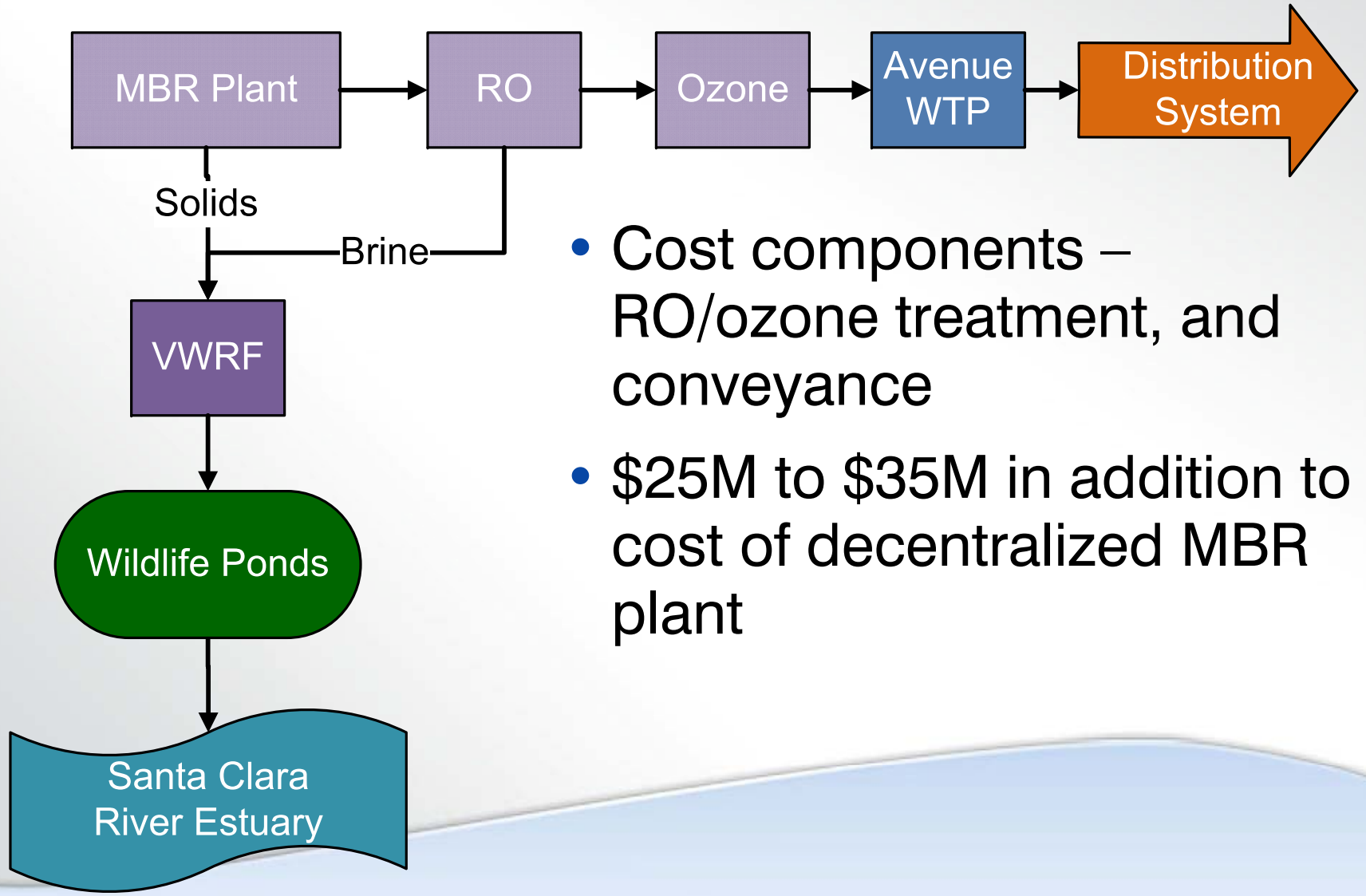


DPR with advanced treatment at VWRF - 3.6 mgd



- Cost components – MF/RO/AOP treatment, storage/conveyance, brine treatment
- $60M to $80M

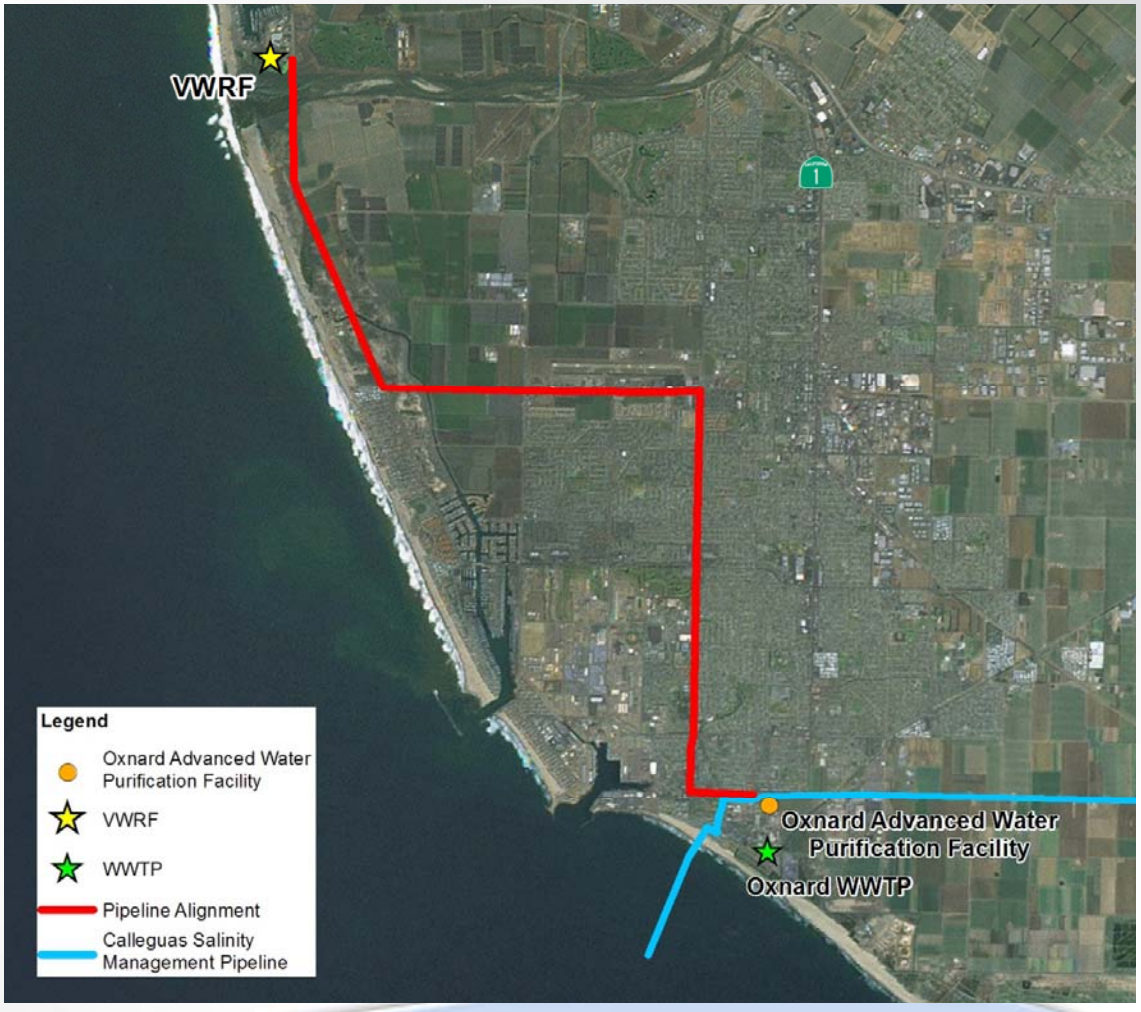
DPR at Avenue WTP: Advanced treatment at North Decentralized Plant – 2mgd



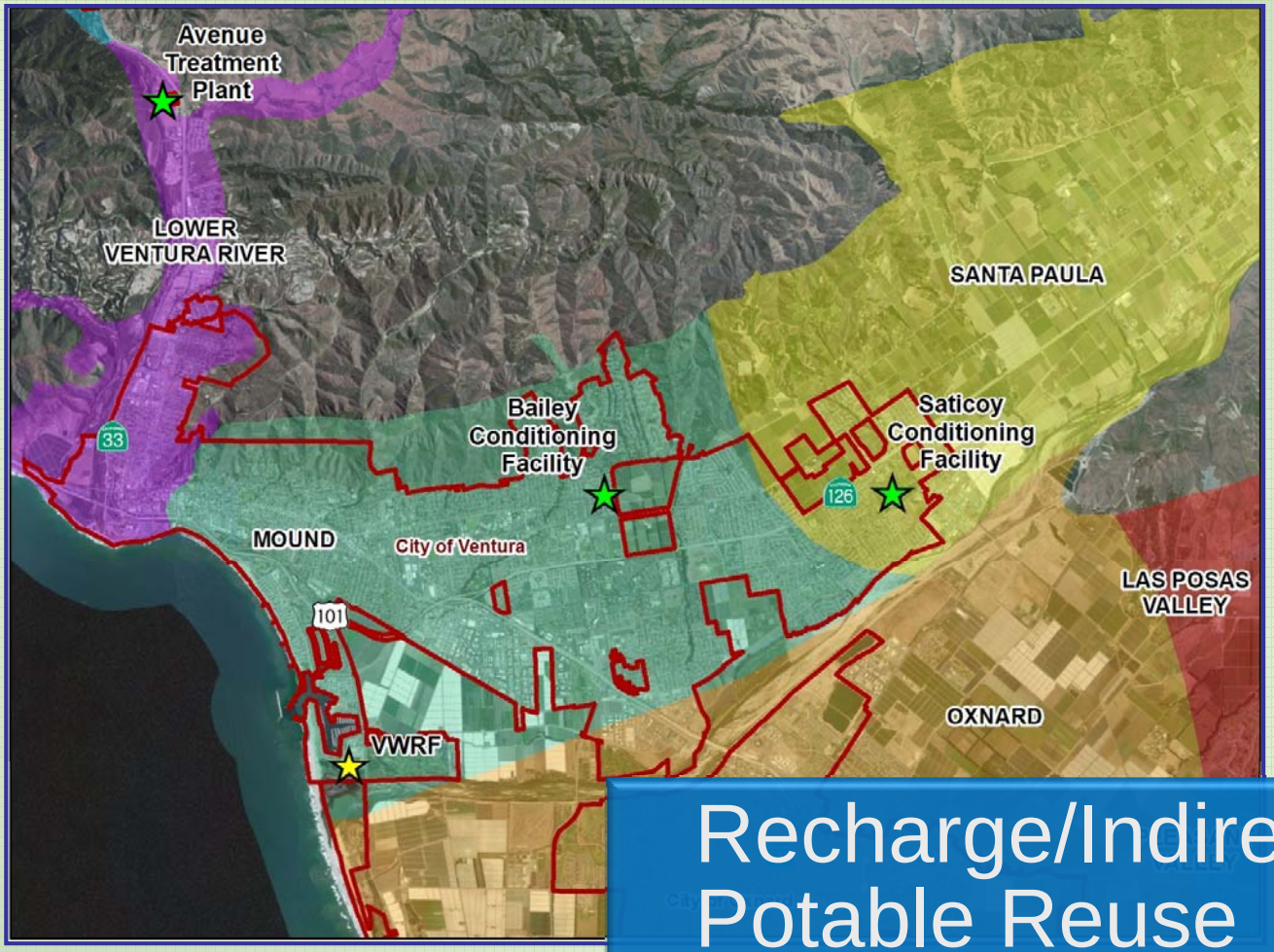
- Cost components – RO/ozone treatment, and conveyance
- $25M to $35M in addition to cost of decentralized MBR plant

To Oxnard WWTP

- Pump up to 12 mgd Secondary Effluent to Oxnard WWTP
- 10 mile pipeline
- Project Cost = $85 million for pipe/pump/ treatment



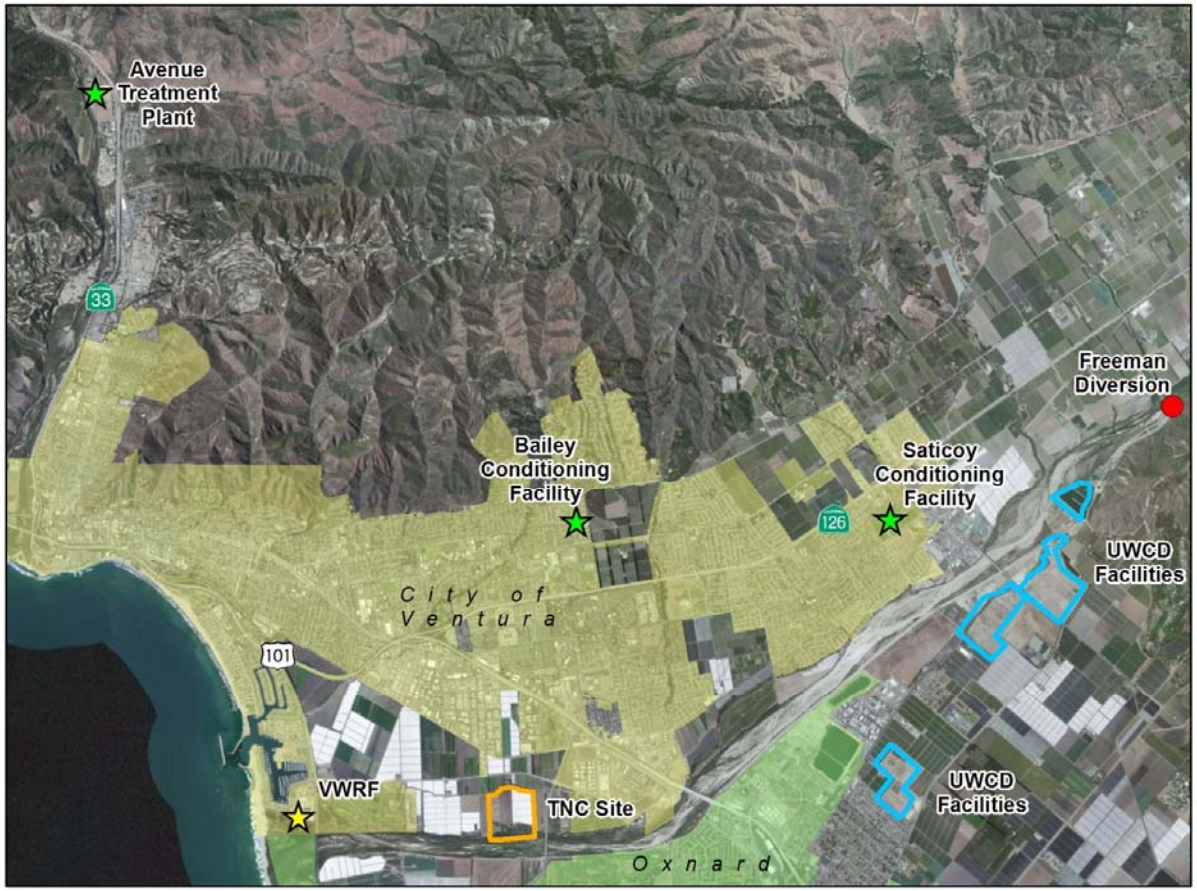
Source: Kennedy Jenks 2012



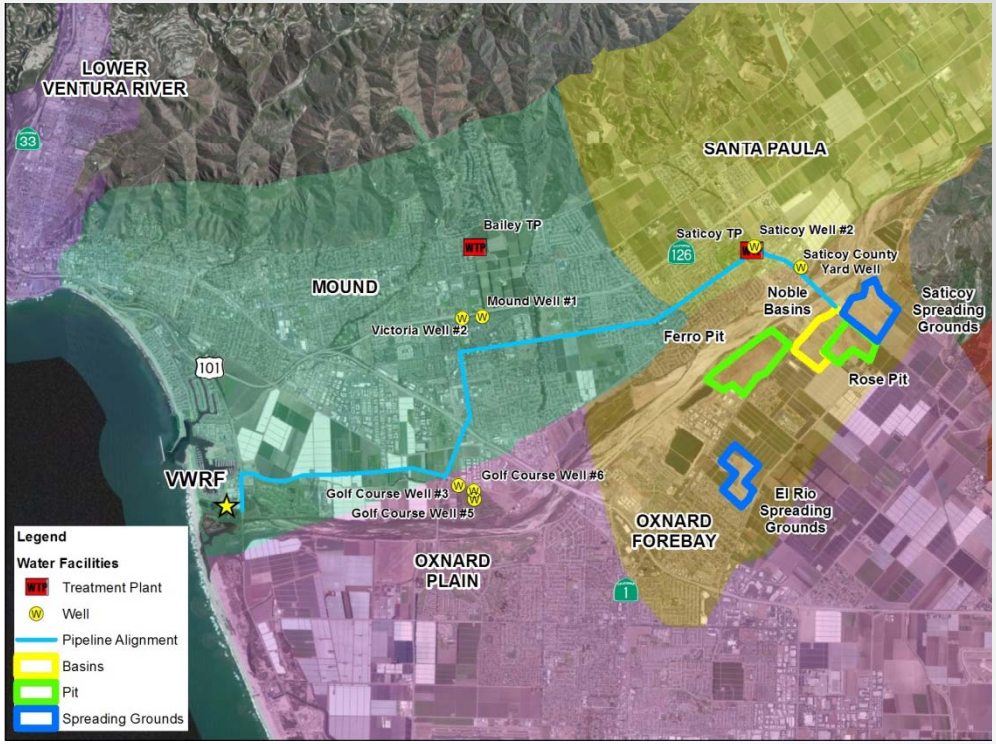
Recharge/Indirect Potable Reuse

Groundwater Recharge/Indirect Potable Reuse Issues to address

- 2011 Draft Regulations different for surface spreading and injection
- Other water quality targets
- Location and travel time

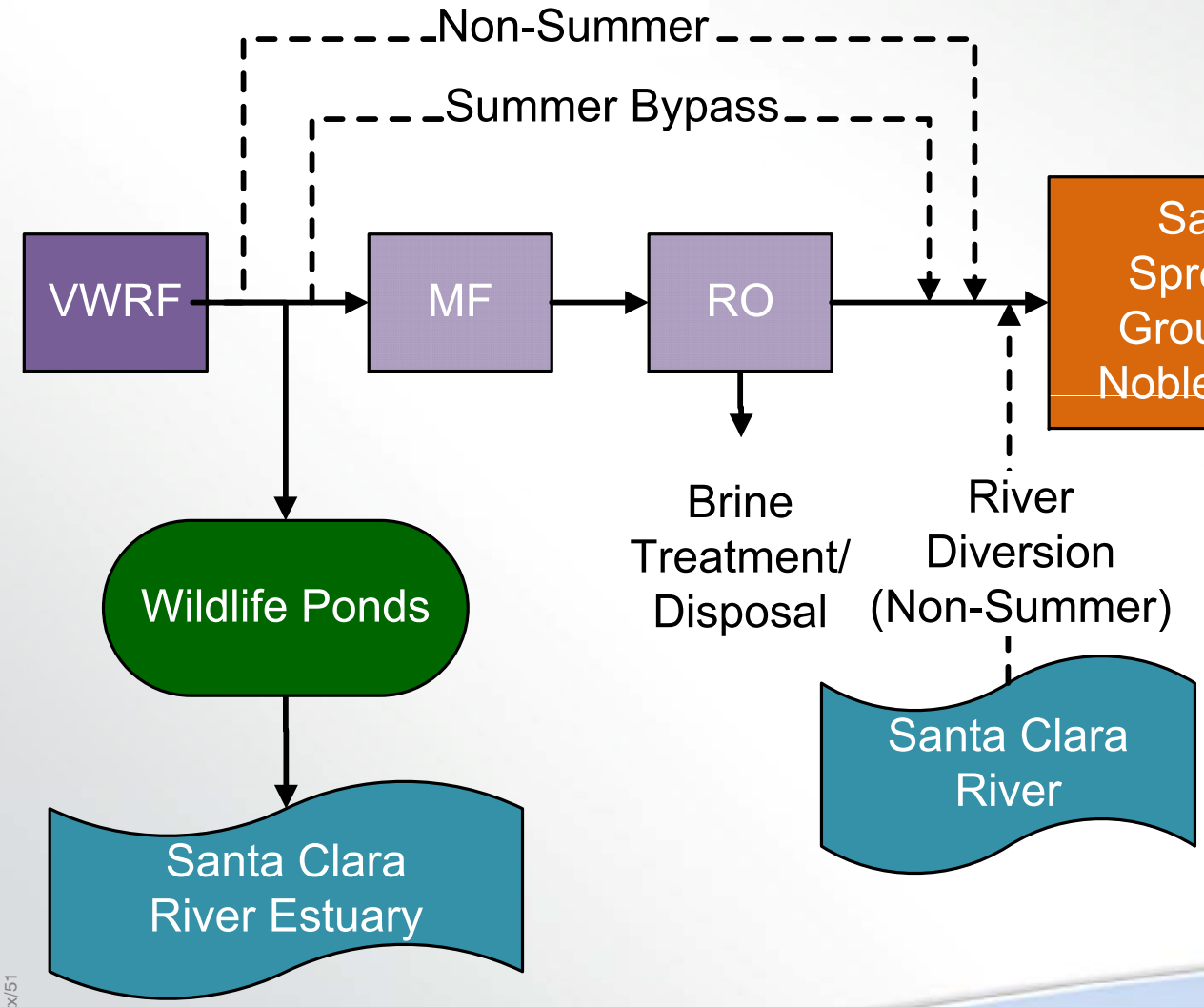


Recharge at UWCD Facilities



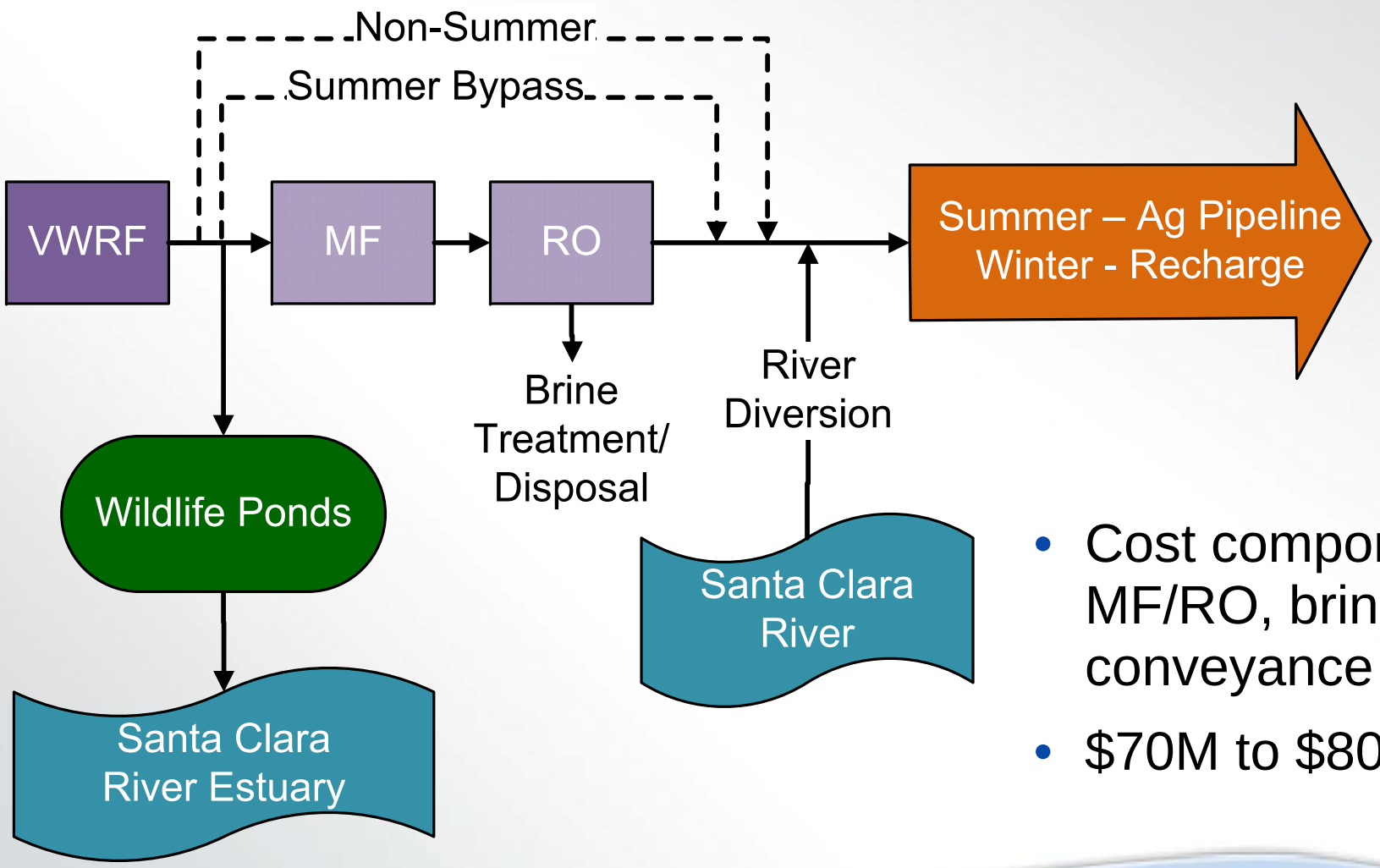
- UWCD
  - Chlorides <117 mg/l
- To meet criteria:
  - Blend with SCR
  - Treat with RO
- Normal to dry years
  - Little to no recharge in summer months (Ag is priority)
  - No source of water diluent water for recharge in summer months
  - Variable amount of diluent water for Ag in summer months
- Summer recharge requires RO of 62% of effluent
- Summer blending for Ag reuse more feasible with partial RO

Recharge at UWCD facilities – 12 mgd



- Cost components – MF/RO, brine, and conveyance
- $130M to $150M

Agricultural Reuse at UWCD – 8 mgd

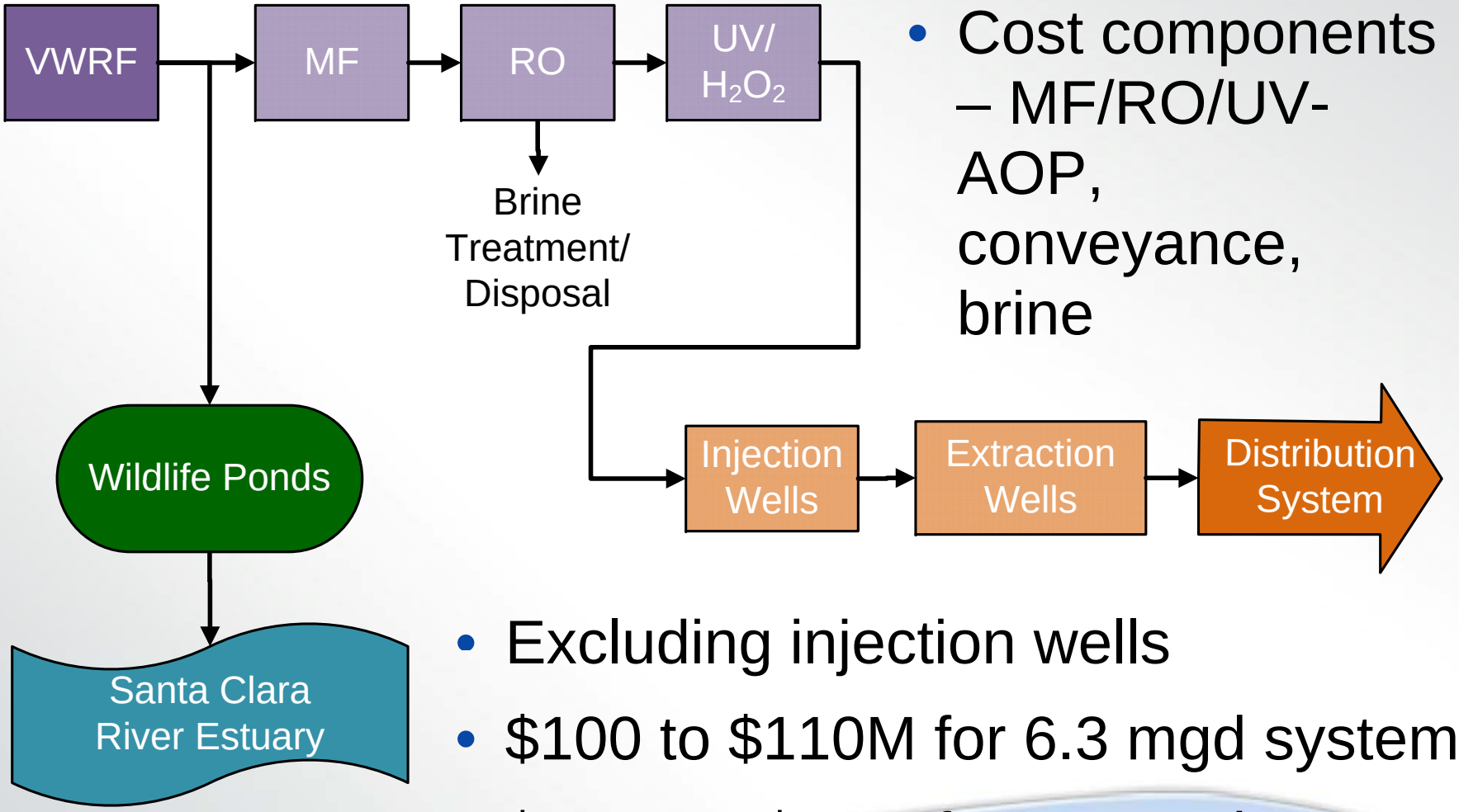


- Cost components – MF/RO, brine, and conveyance
- $70M to $80M

Groundwater recharge in mound basin (indirect potable reuse)

- Treat WWTP effluent with RO and advanced oxidation
- Pump/pipe to location upstream of groundwater wells
- Inject into ground with wells
- Extract downstream and use as water supply

Indirect Potable Reuse Treatment Process

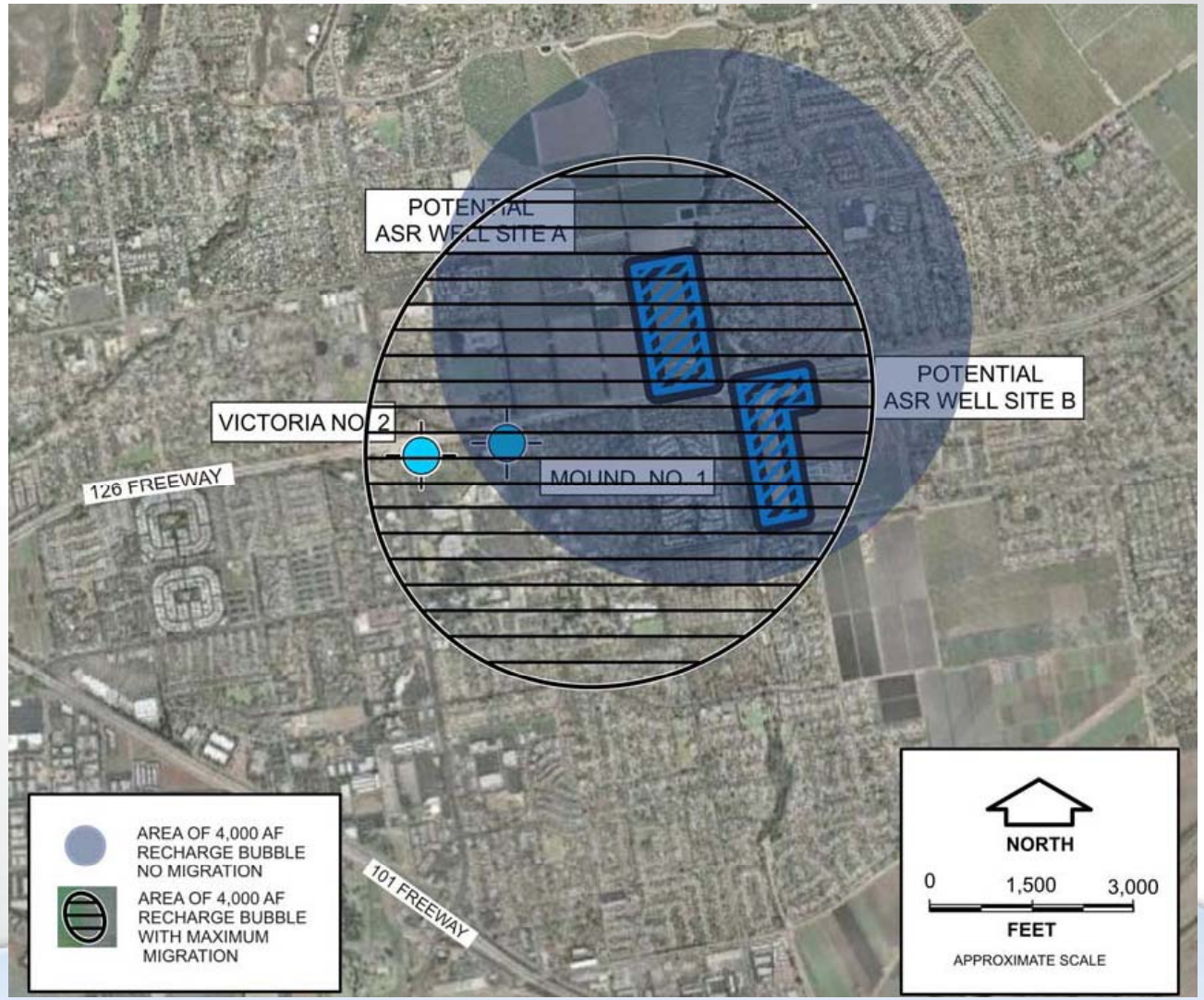


- Cost components – MF/RO/UV-AOP, conveyance, brine

- Excluding injection wells
- $100 to $110M for 6.3 mgd system
- $60 M to $70M for 3.6 mgd system

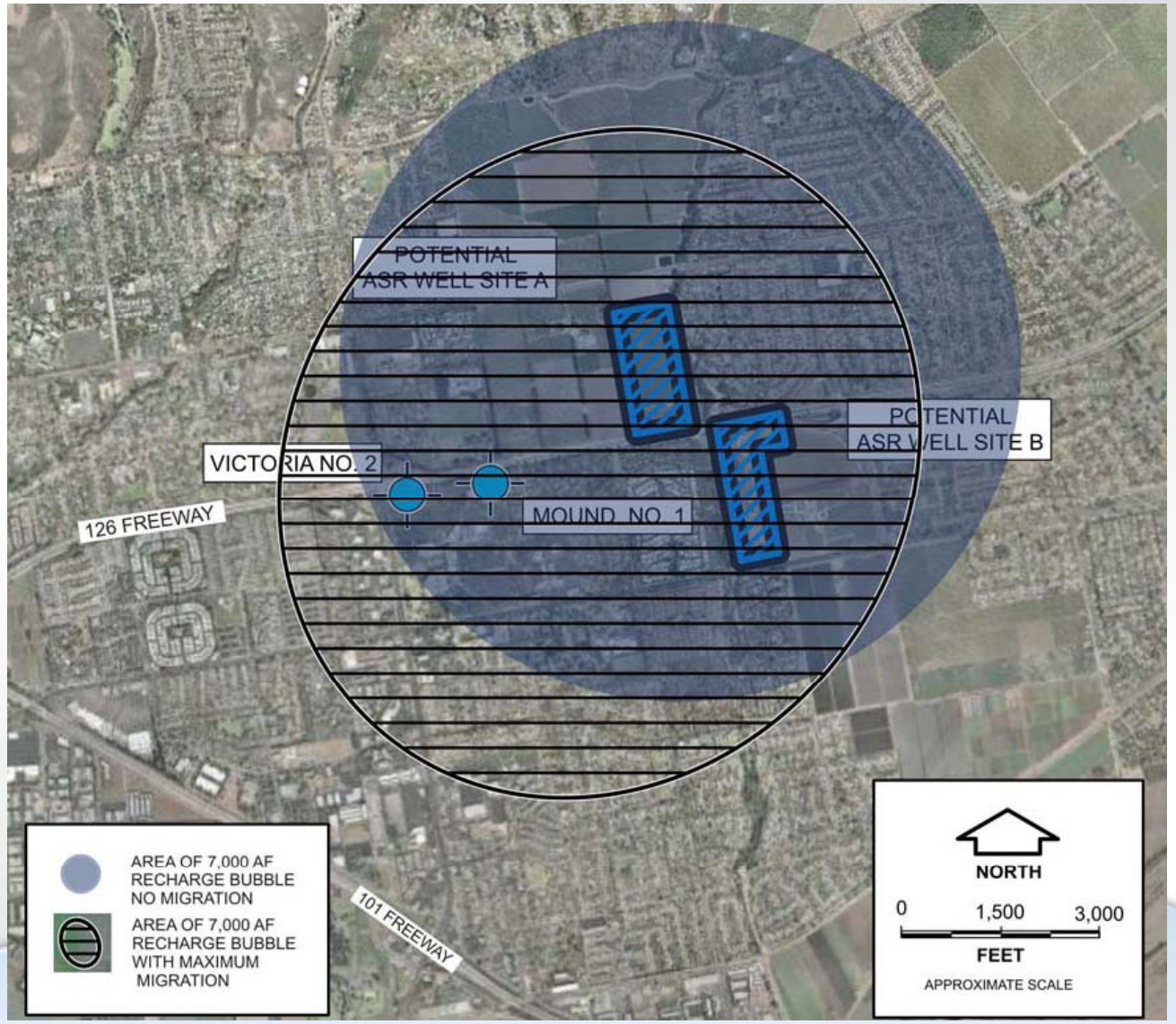
IPR Mound Basin - 4000 AFY (3.6 mgd) Recharge

- Injection at Site A
- 8-9 months to Victoria Well #2



IPR Mound Basin - 7000 AFY (6.3 mgd) Recharge

- Injection at Site A
- 6-8 months to Victoria Well #2



Brine treatment/disposal alternatives

- Several options to consider
  - Zero liquid discharge
  - New brine line (collaboration with other entities in the vicinity)
  - Conveyance to an existing brine line
  - Brine wetlands followed by blending and discharge
- Example ~2 mgd brine
  - Convey to Calleguas Salinity Management Pipeline- $22 M
  - Zero liquid discharge ~$40M

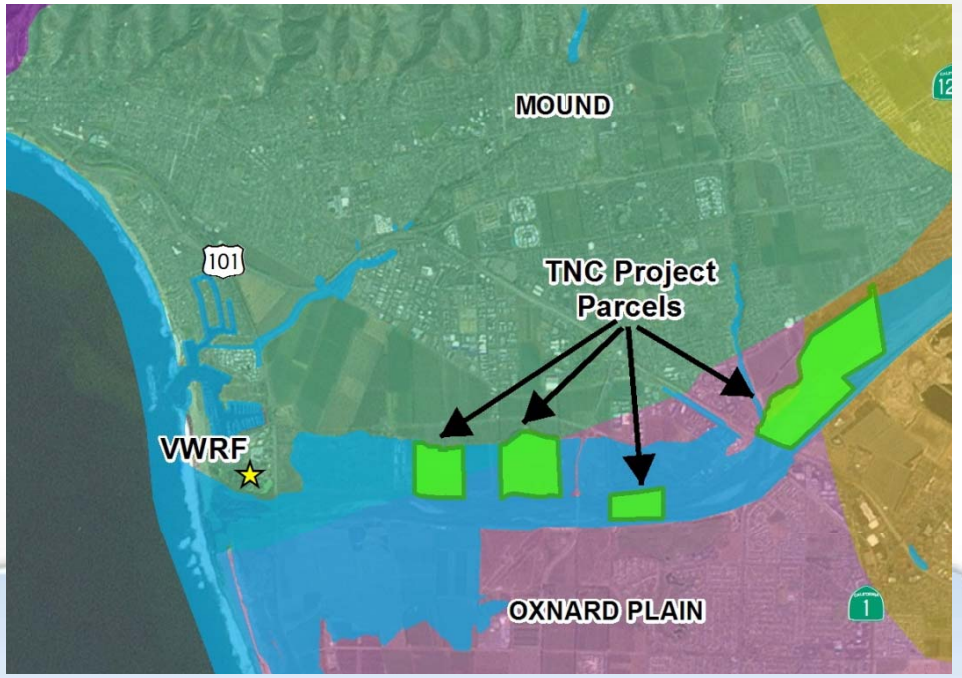
Wetland Options

Phase 1 Wetlands Feasibility Study Identified Onsite and Offsite Opportunities

Remaining Wetlands Options

- Existing Ponds
- City Owned Property
- Effluent or Brine

- TNC Properties to be restored to floodplain
- No land available for perched recharge and quality not suitable



Wetlands can provide habitat while removing nitrates, metals and organics

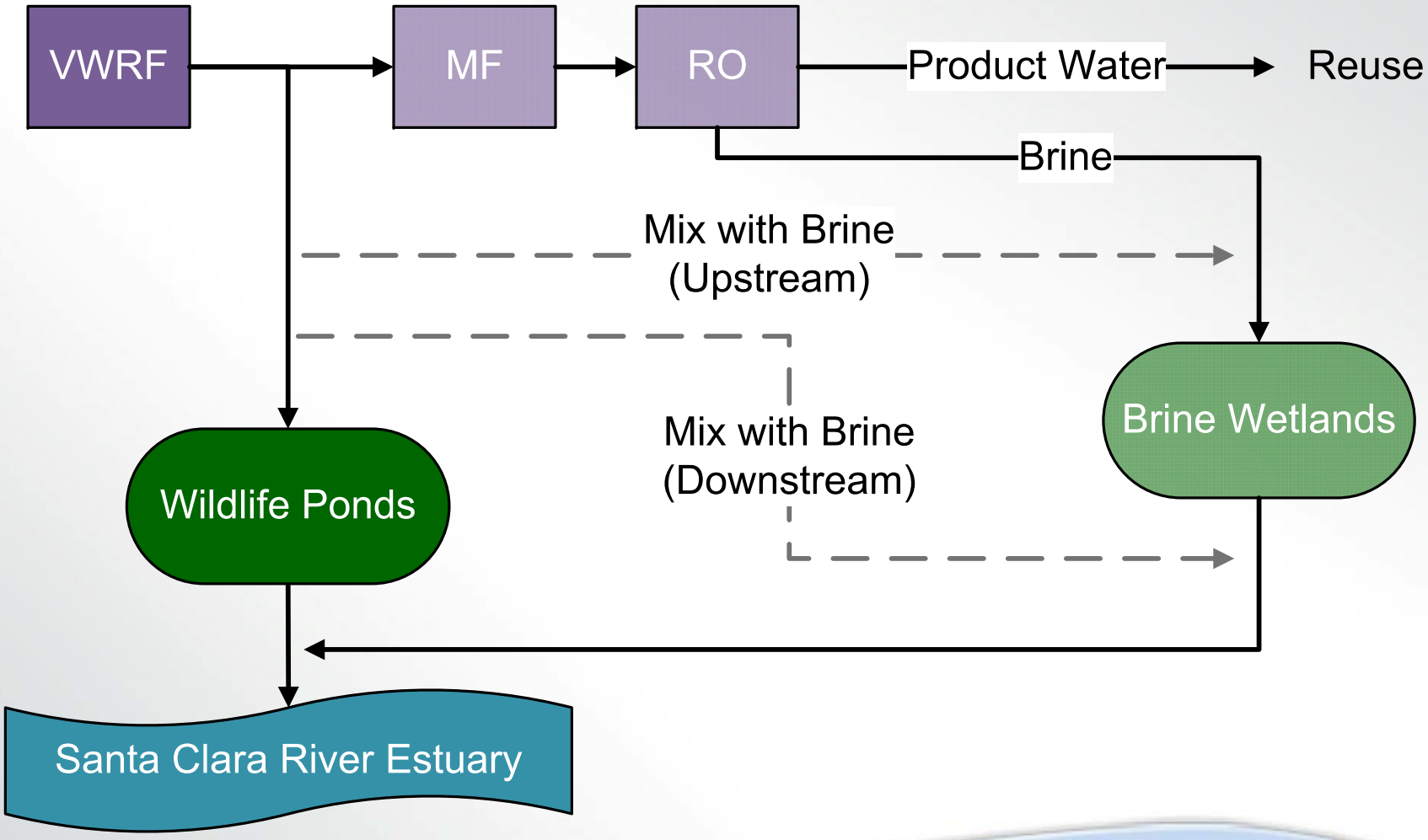
Dense vegetation required for nitrate reduction

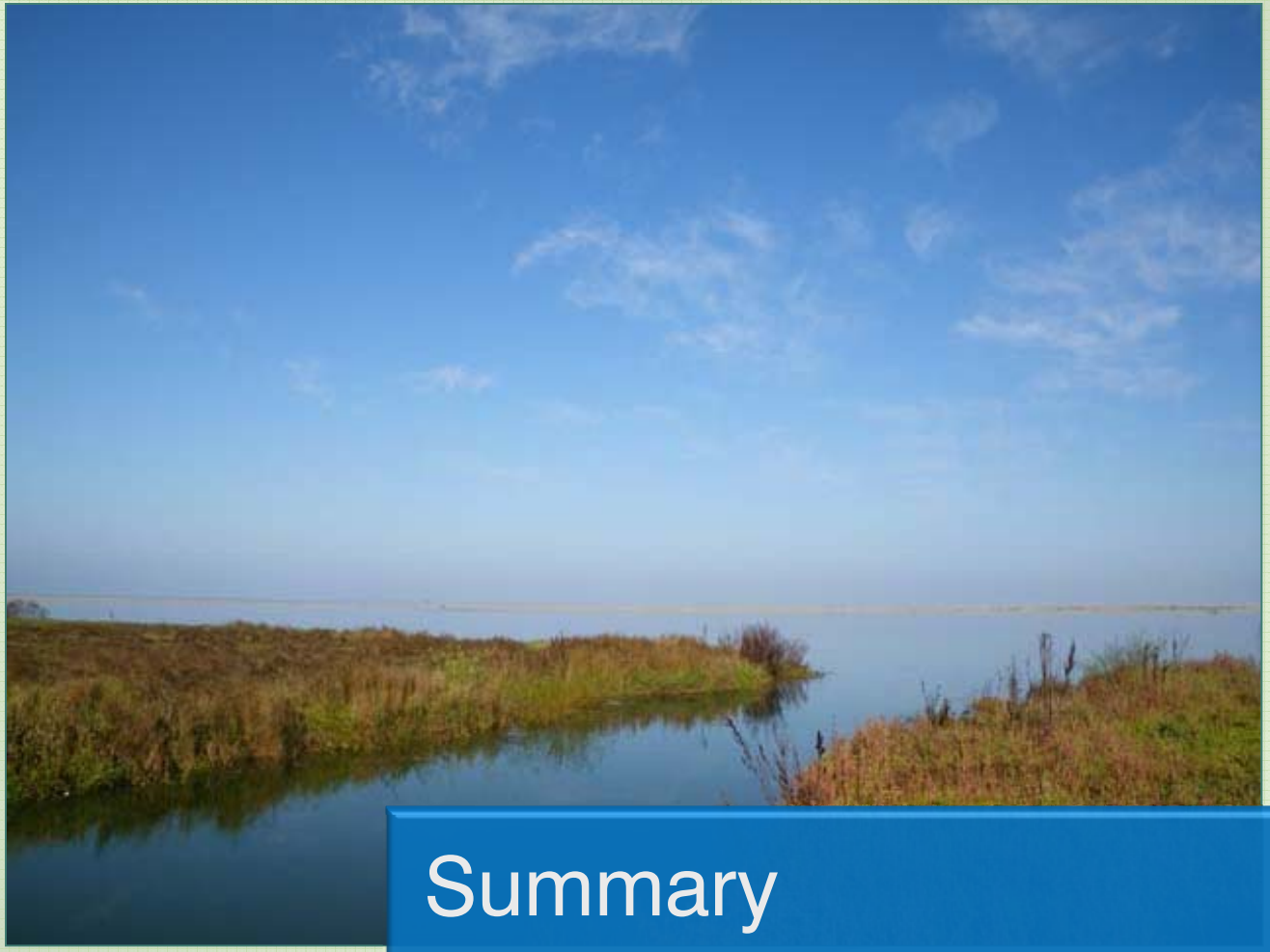
Wetlands Water Quality - Predicted Wetlands effluent, if influent TN = 8 mg/l

Flow, mgd	Summer Effluent quality – Nitrate (mg/L) Onsite (12 ac)	Summer Effluent quality – Nitrate (mg/L) Onsite + Offsite (41 ac)
3	2-6	<1-2
5	4-6	<1-4
7	5-7	3-5
11	6-7	4-6
Estimated costs from Phase 1	$2.8 Million	$2.8 Million + $11.4 Million

Costs will be updated for Phase 2

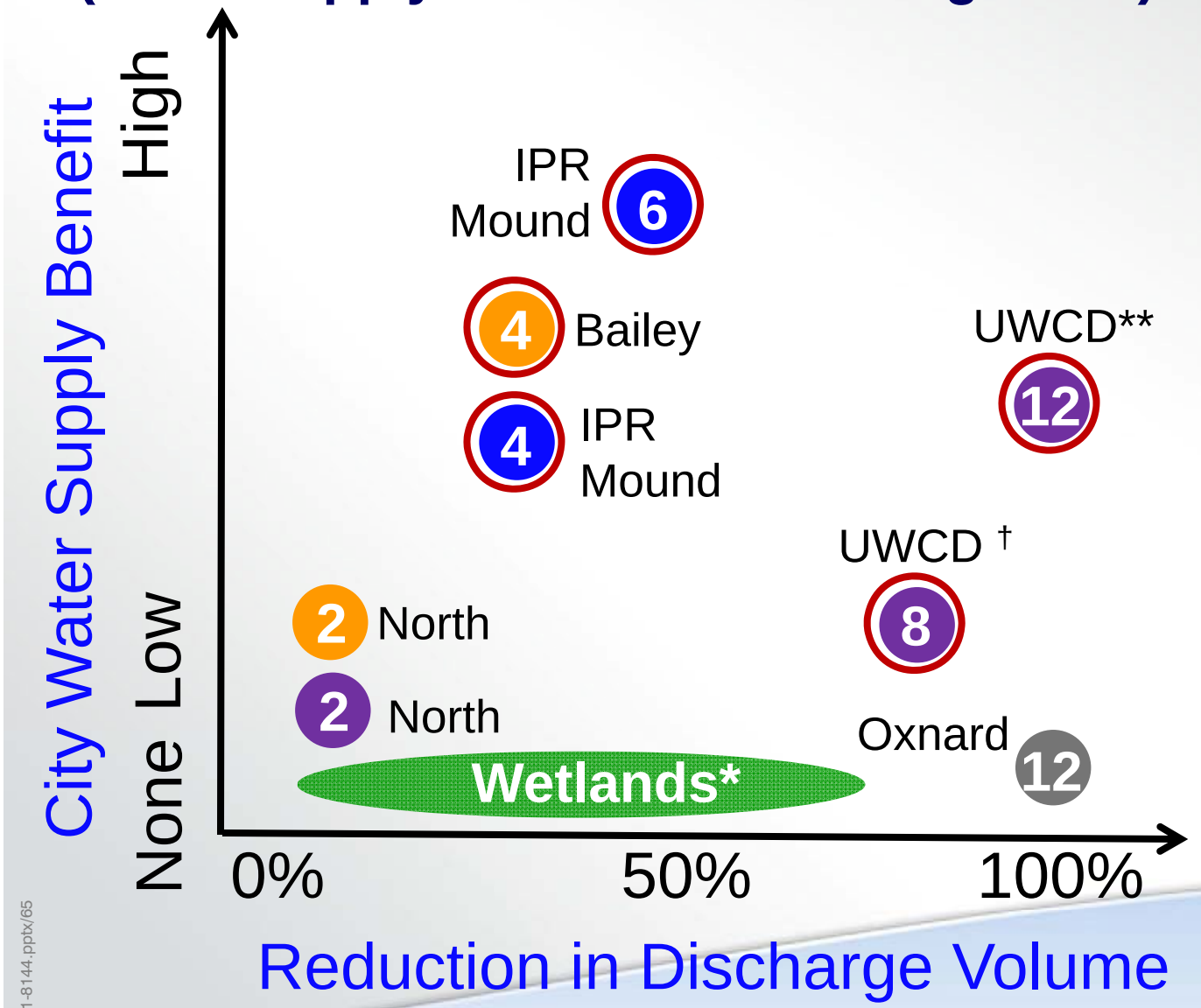
Wetlands as Brine Treatment





Summary

Alternatives Comparison
(water supply benefit vs. discharge flow)



Q Irrigation - Ag /Urban

Q Recharge

Q DPR

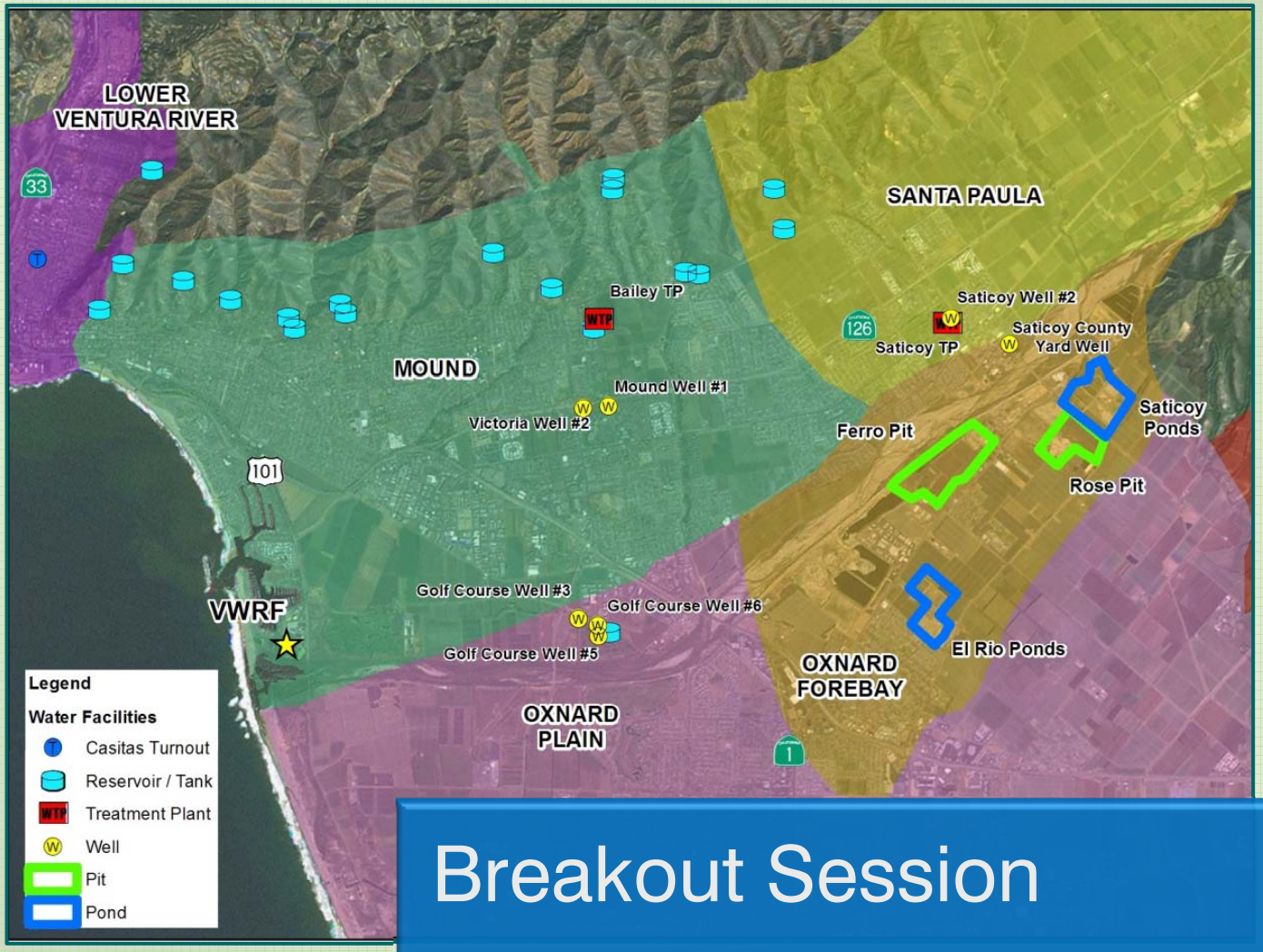
Q Export

Brine (not to sewer)

* Provides habitat

**Year round recharge

†Summer irrigation/ winter recharge



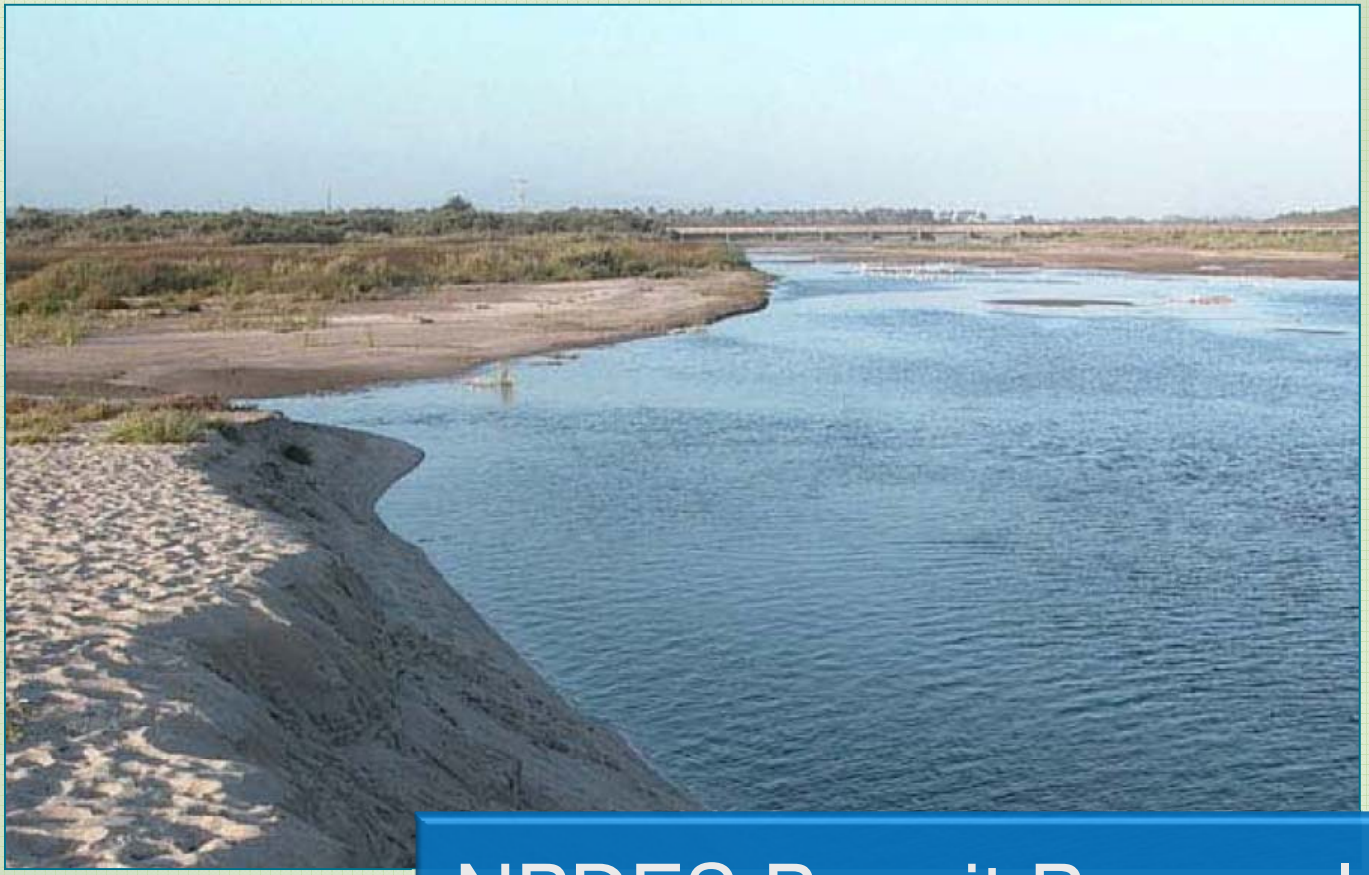
Breakout Session

Breakout into Three Smaller Groups:

To be discussed in Small Groups:

- Are there any eliminated alternatives that should still be evaluated? Or remaining alternatives that should be eliminated?
- What alternatives put the effluent to best use?
- What are the criteria by which alternatives should be compared? – Top three
- Are there combinations of alternatives that would be more attractive?

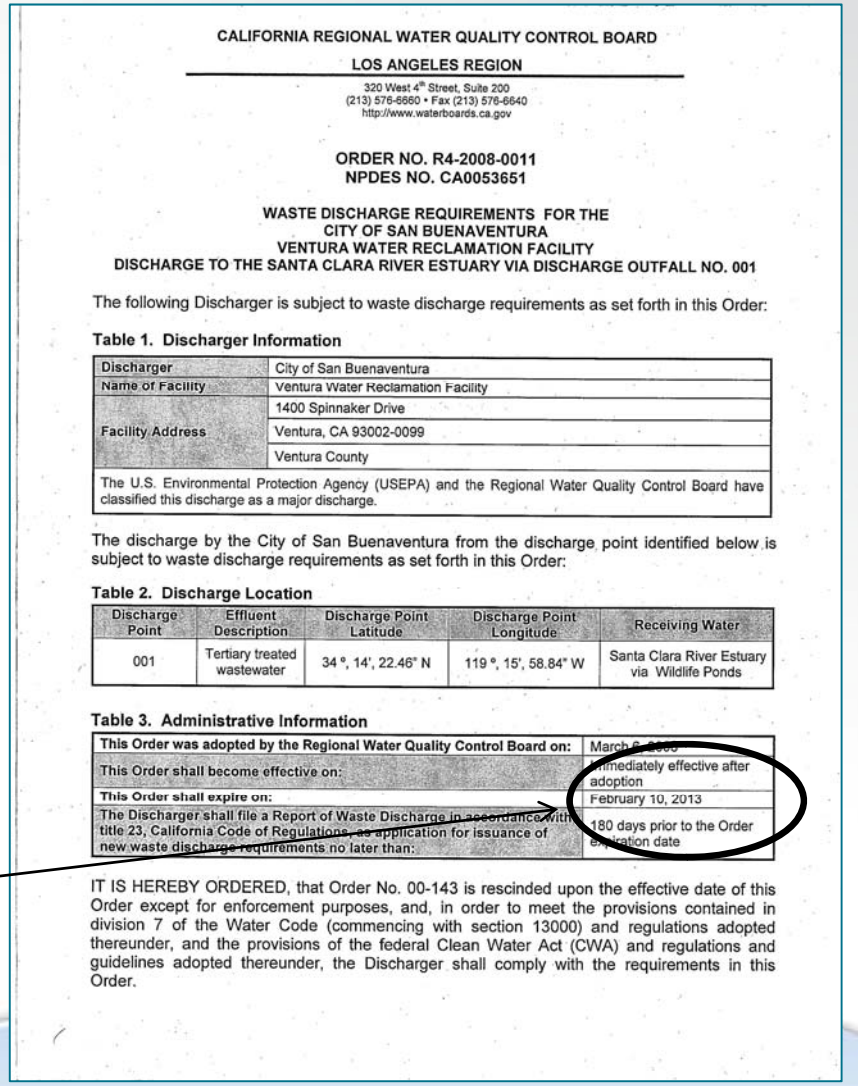
You will be reporting back to larger group



NPDES Permit Renewal

NPDES Discharge Permit

- Discharge is regulated by a permit from LA Regional Water Board
  - Quality and quantity
  - To be protective of beneficial uses
- Expires and is renewed every 5 years
- Existing permit expires Feb 2013



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

LOS ANGELES REGION

320 West 4th Street, Suite 200
(213) 576-6660 • Fax (213) 576-6640
http://www.waterboards.ca.gov

ORDER NO. R4-2008-0011
NPDES NO. CA0053651

WASTE DISCHARGE REQUIREMENTS FOR THE
CITY OF SAN BUENAVENTURA
VENTURA WATER RECLAMATION FACILITY
DISCHARGE TO THE SANTA CLARA RIVER ESTUARY VIA DISCHARGE OUTFALL NO. 001

The following Discharger is subject to waste discharge requirements as set forth in this Order:

Table 1. Discharger Information

Discharger	City of San Buenaventura
Name of Facility	Ventura Water Reclamation Facility
Facility Address	1400 Spinnaker Drive
	Ventura, CA 93002-0099
	Ventura County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the City of San Buenaventura from the discharge point identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Tertiary treated wastewater	34 °, 14', 22.46" N	119 °, 15', 58.84" W	Santa Clara River Estuary via Wildlife Ponds

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	March 6, 2008
This Order shall become effective on:	Immediately effective after adoption
This Order shall expire on:	February 10, 2013
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	180 days prior to the Order expiration date

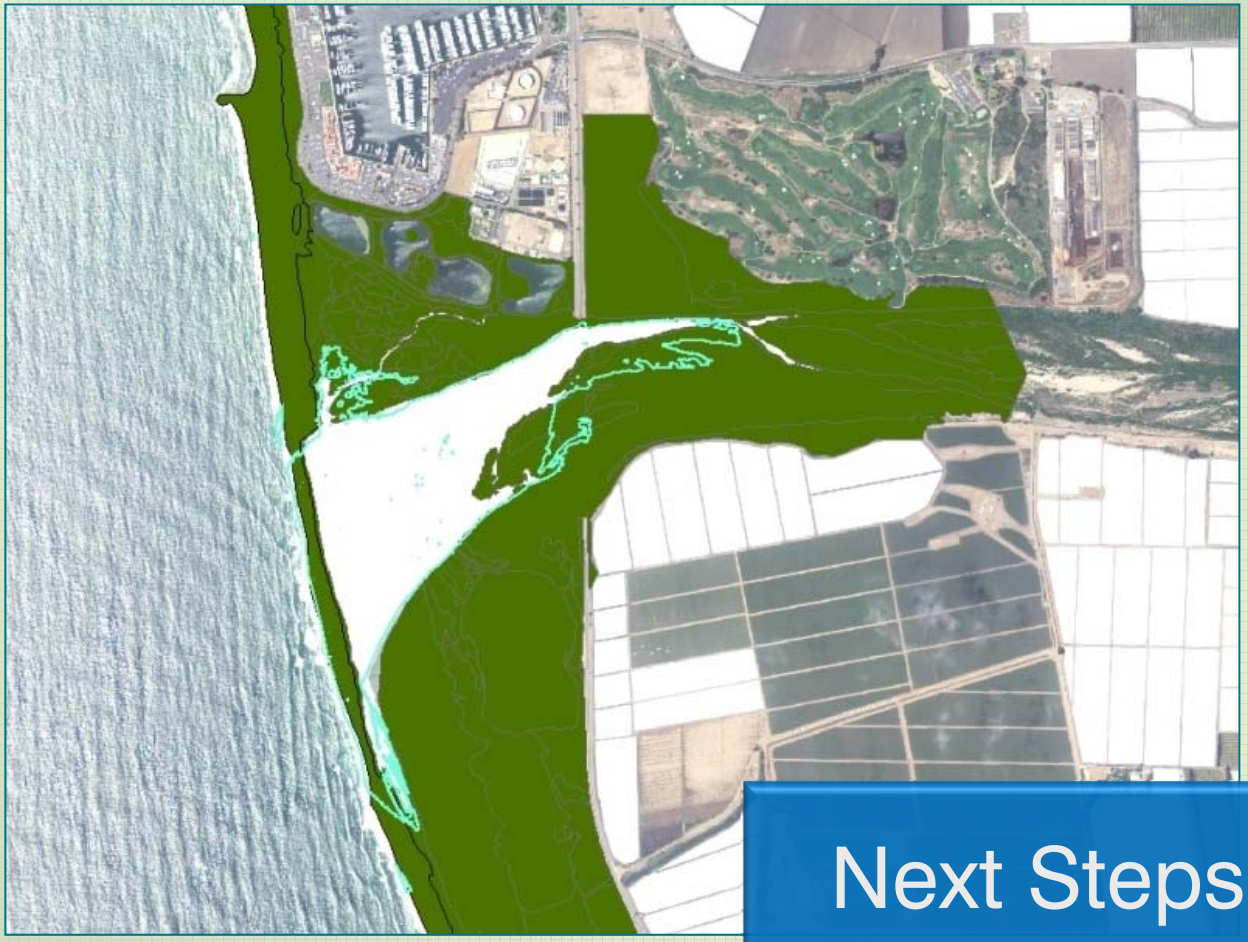
IT IS HEREBY ORDERED, that Order No. 00-143 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

NPDES Permit Renewal Schedule

Description	2012	2013
	J F M A M J J A S O N D	J F M A M J J A S O N D
Report of Waste Discharge complete		
Preparation of NPDES permit		
Public Tentative Permit		
Board hearing, TBD		

Key Issues for NPDES Permit Renewal

- Finding of Enhancement – To be determined
- Will establish tasks and time schedule order for the City to continue to evaluate alternatives and how they are aligned with improving beneficial uses in the estuary
  - Maximum ecologically protective diversion volume (MEPDV)



Next Steps

Next Steps

- Compile/post your comments into meeting notes
- Continue to evaluate alternatives and how they are aligned with optimizing the estuary discharge
  - Water depth
  - Water quality
- Permit renewal by RWQCB - ongoing
- Draft Phase 2 Report to be posted in late January/early February
- *Stakeholder meeting in February*
- Phase 2 Report due to RWQCB March 6, 2013 per approved workplan