CITY OF VENTURA

Special STUDIES for Santa Clara River Estuary

PRESENTATION

February 2013

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?

Feb 20,13 workshop.pptx/2

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.

Feb 2013 workshop.ppt#3

Agenda for the Day

- Introductions/Project Status
- Presentation of Alternatives
- Effect of Alternatives on Estuary
- Stakeholder Input on Alternatives

< Break for 15 minutes >

- Discussion
- Schedule
- Wrap Up and Next Steps

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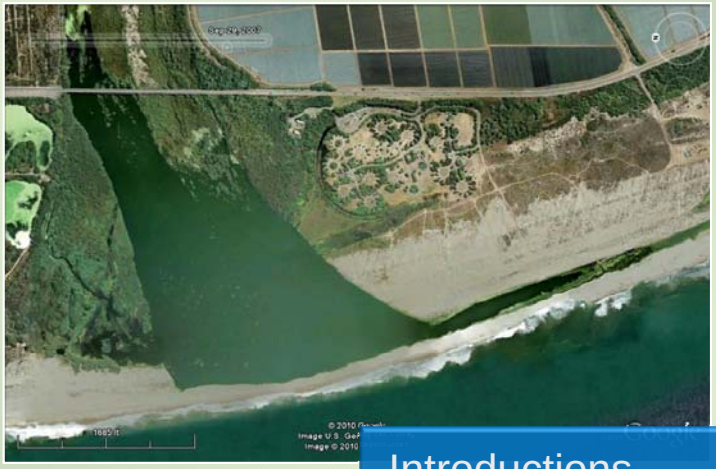
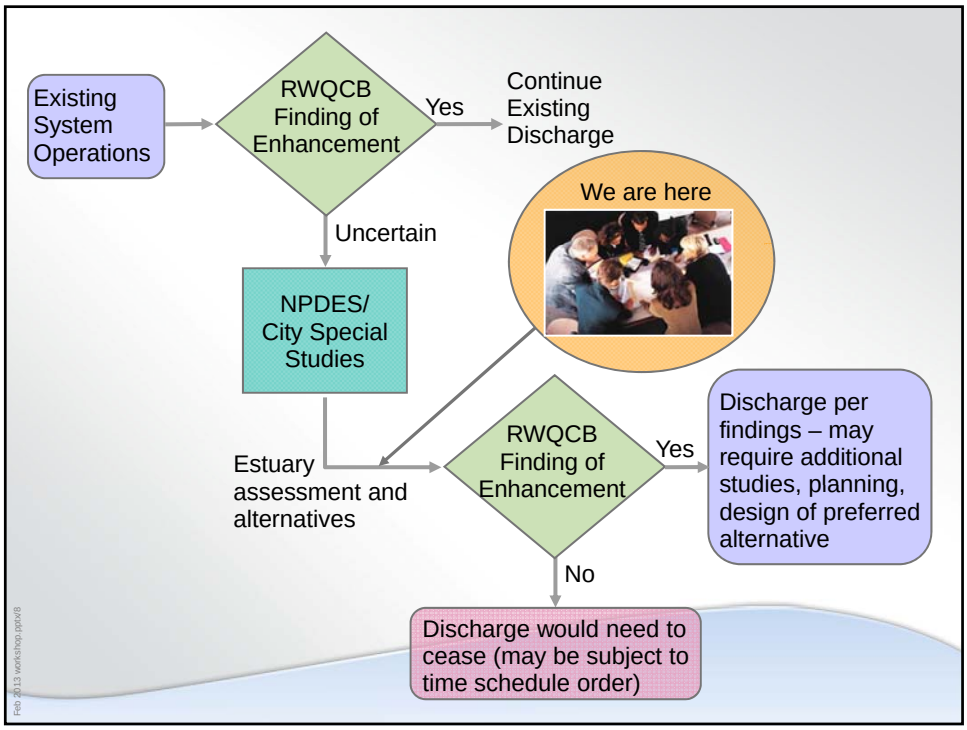


Introductions

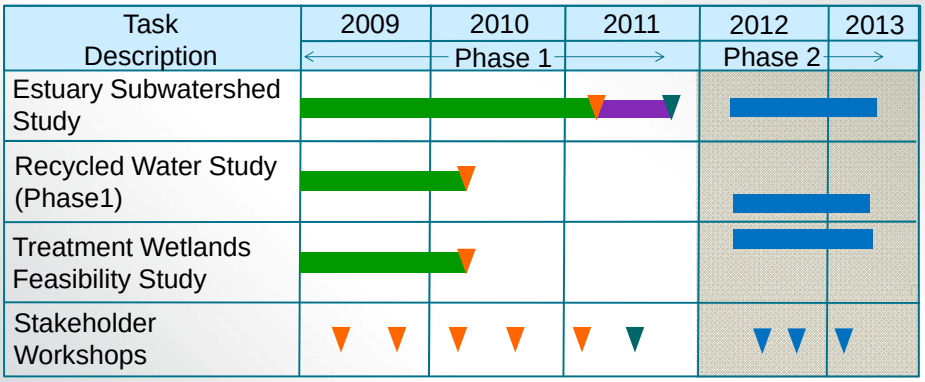
Please introduce yourself…

- Name
- Organization representing
- Interest

Review of Estuary Studies/Status Update



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



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Major Findings and Recommendations of Phase 1:

- Major Findings:
  - Current flows to the estuary provide a fuller realization of beneficial uses as compared to zero discharge
  - Opportunity to further improve /optimize beneficial use
    - Less flow in summer to reduce unseasonal breeching
    - Improve water quality to reduce nutrients
- Recommendations:
  - Evaluate other alternatives and combinations
  - Additional data collection
  - Look at opportunities, costs and benefits

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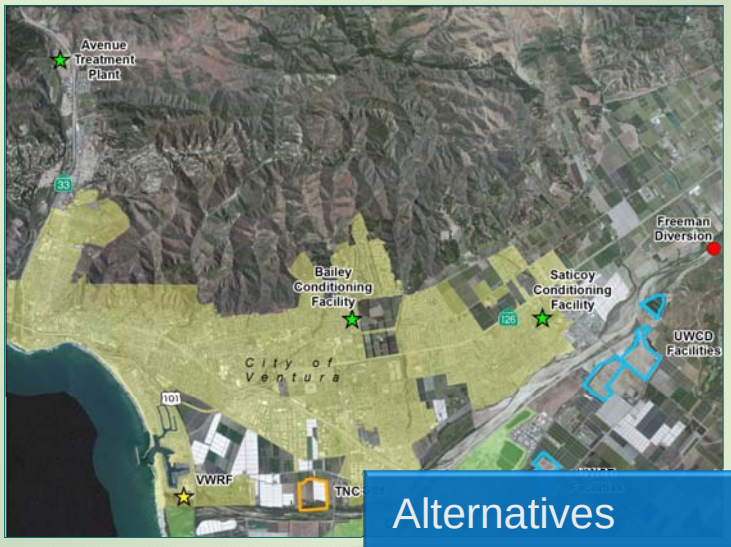

Alternatives

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Consistent with an Integrated Water Management approach alternatives were screened using stakeholder criteria:

- √ Improve effluent quality
- √ Reduce effluent flow
- √ Create new habitat
- √ City water supply benefit
- √ Reliable water management practice

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Alternatives were narrowed down to most feasible and most beneficial

Reuse Alternatives	Recharge Alternatives	Wetlands Alternatives
Alternatives carried forward		
Decentralized Plant to North	Mound GW Basin	Existing Ponds
Direct Potable	Recharge/Ag at UWCD	City Owned Property
To Oxnard		
Alternatives to be considered as part of other options		
Expand Urban		Brine
Ag Reuse with RO		
Alternatives to be eliminated		
Ag Reuse with Blend	Oxnard Plain Basin	TNC Property
Decentralized Plant to East	Oxnard Forebay	Uplands (above TNC property)
		Perched Recharge to River

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Urban and Ag Reuse

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Decentralized treatment plant for urban and Ag irrigation

- New 2 mgd treatment near fairgrounds
- New recycled water distribution system
  - Ag demand = 1 mgd ave, 1.8 mgd max month
  - Urban demand = 0.23 mgd ave, 0.33 mgd max month

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Direct Potable Reuse (DPR)

- Treat to very high level (RO/advanced oxidation) and blend directly into water supply
- No regulatory framework (expected 2016)
- Ongoing research to protect of public health

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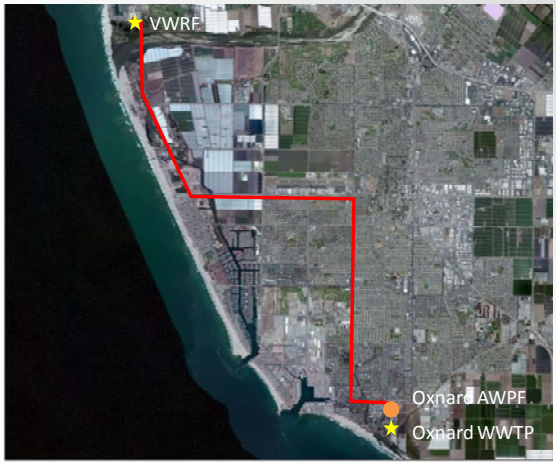
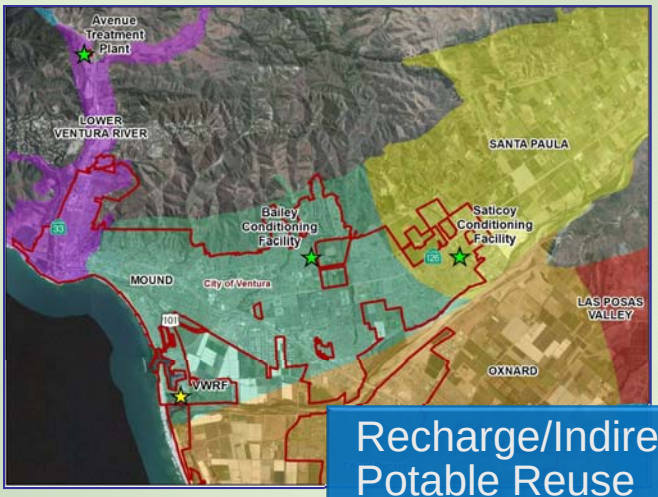
To Oxnard WWTP

- Pump Secondary Effluent to Oxnard
- 10 mile pipeline, improvements at Ventura's and Oxnard's plants
- Use for recycled water or dispose via ocean outfall



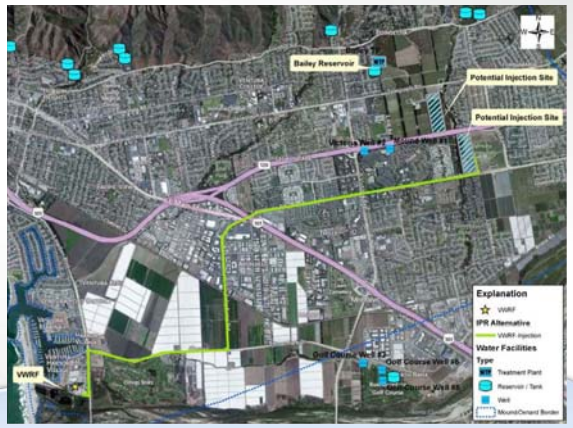
Source: Adapted from Kennedy Jenks 2013



Recharge/Indirect Potable Reuse

Groundwater recharge in Mound Basin (Indirect Potable Reuse or IPR)

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



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Recharge/Ag Reuse at UWCD Facilities

- Treat portion with RO to meet chloride levels
- 13 mgd diverted = RO of 62% for recharge
- 8 mgd diverted = RO of 33% for Ag/recharge

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Wetland Options

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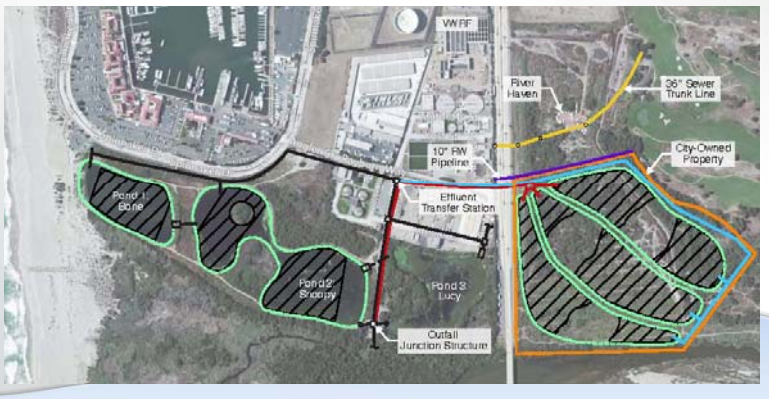
Wetlands were added to all alternatives to improve quality of the discharge

- Acreage needed depends on flow to estuary
- Land Available: 1) Existing ponds, 2) City owned



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Comparison of current summer flow (7.3 mgd) and effluent quality by alternative

Alternative at Existing Flows (VWRF effluent = 7.3 mgd)	Treatment Wetland location	Diverted Effluent, mgd	Influent to Wetland, mgd	Discharge to SCRE, mgd	Discharge to SCRE Nitrate (mg-N/L)
No Action	None	-	-	6.3	8
North decentralized (Irrigation or DPR)	Onsite + City-Owned	2.0	5.3	4	4
Conveyance to Oxnard or Full Flow Ag/Recharge at UWCD	Onsite	>7.3	0	0	0
Partial Flow Ag/Recharge at UWCD	Onsite	>7.3	0	0	0
Mound Basin IPR & DPR (3.6 mgd)	Onsite	4.5	2.8	2	4
Mound Basin (6.3 mgd)	Onsite	>7.3	0	0	0

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Comparison of future summer flow (11.2 mgd) and effluent quality by alternative

Alternative at FUTURE Flows (VWRF effluent = 11.2 mgd)	Treatment Wetland location	Diverted Effluent, mgd	Influent to Wetland, mgd	Discharge to SCRE, mgd	Discharge to SCRE Nitrate (mg-N/L)
North decentralized (Irrigation or DPR)	Onsite + City-Owned	2.0	9.2	8	5
Conveyance to Oxnard or Full Flow Ag/Recharge at UWCD	Onsite	>11.2	0	0	0
Partial Flow Ag/Recharge at UWCD	Onsite + City-Owned	7.7	3.2	2	4
Mound Basin IPR & DPR (3.6 mgd)	Onsite + City-Owned	4.5	6.7	5	4
Mound Basin (6.3 mgd)	Onsite + City-Owned	7.9	3.3	2	4

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Comparison of Alternatives

Cost Comparison of Alternatives

Alternative	Project Cost Components ($M)				CEQA and Permits	Total Project Cost ($M)
	Treatment	Brine Disposal	Convey/ Store/ Inject	Wetlands		
North decentralized - Irrig	21		3.5	6.8	1.5	**$33**
Conveyance to Oxnard 1	5		41	6.8	2.0	**$54**
Conveyance to Oxnard 2	45		41	6.8	2.0	**$95**
Full Flow UWCD Recharge/Ag	41	22	27	6.8	2.5	**$100**
Partial Flow UWCD Recharge/Ag	16	22	27	6.8	2.5	**$74**
Mound Basin IPR -3.6 mgd	32	22	30	6.8	2.5	**$94**
Mound Basin IPR -6.3 mgd	52	22	39	6.8	2.5	**$122**
North decentralized - DPR	38		4	6.8	3.0	**$52**
DPR at Bailey (3.6 mgd)	32	22	16	6.8	3.0	**$80**

Cost Comparison of Alternatives

Alternative	Effluent Diversion, (mgd)	Total Project Cost ($M)	O&M Cost ($M/yr)	Cost per Gallon diverted ($/gal)	Cost per gal water supply benefit ($/gal)
North decentralized - Irrig	*2*	$33	0.9	**13**	**107**
Conveyance to Oxnard 1	*13*	$54	16.2	**4**	**None**
Conveyance to Oxnard 2	*13*	$95	5.2	**7**	**None**
Full Flow UWCD Recharge/Ag	*13*	$100	5.6	**7**	**None**
Partial Flow UWCD Recharge/Ag	*8*	$74	2.1	**8**	**None**
Mound Basin IPR -3.6 mgd	*4.5*	$94	3.2	**19**	**24**
Mound Basin IPR -6.3 mgd	*7.9*	$122	5.3	**15**	**18**
North decentralized - DPR	*2.3*	$52	2.1	**20**	**25**
DPR at Bailey (3.6 mgd)	*4.5*	$80	3.0	**16**	**20**

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Results of Alternatives on Estuary

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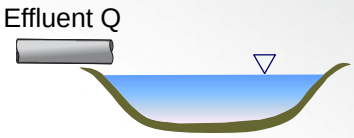
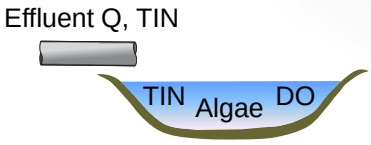
The estuary study results form the basis for environmentally protective alternatives

- Estuary depth
  - Discharge flow volume
  - Habitat area



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

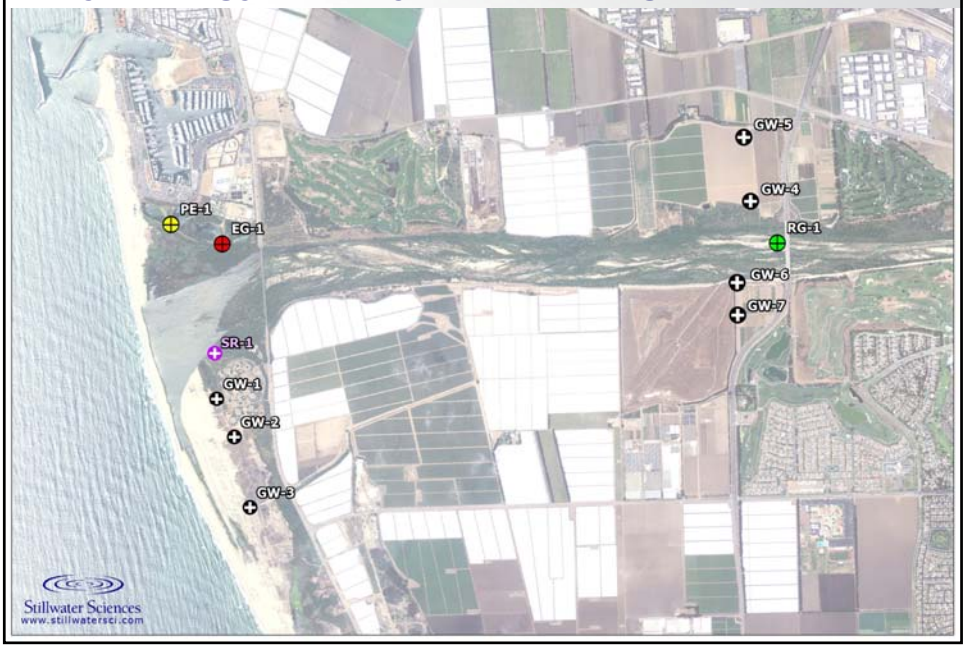


Additional data was gathered during the Phase 2 continued monitoring

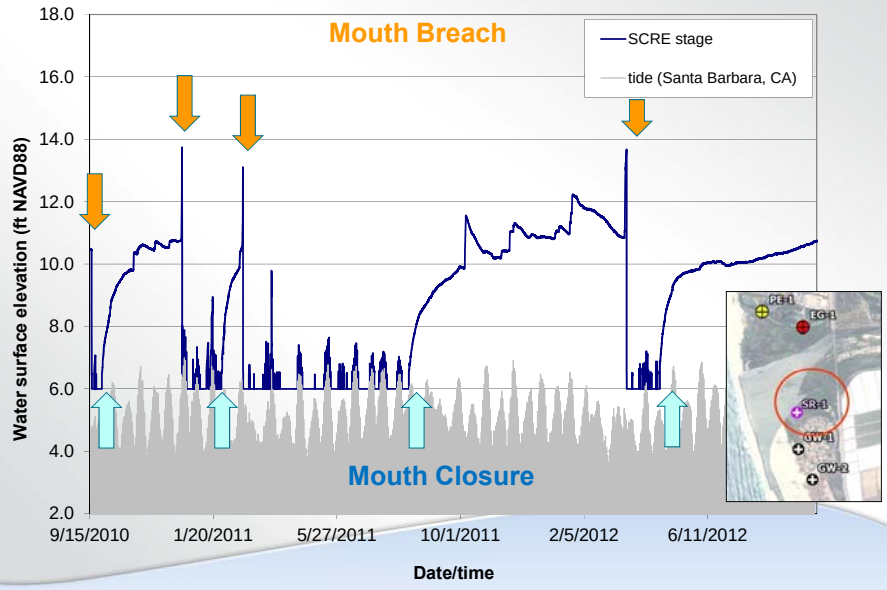
Major Activities

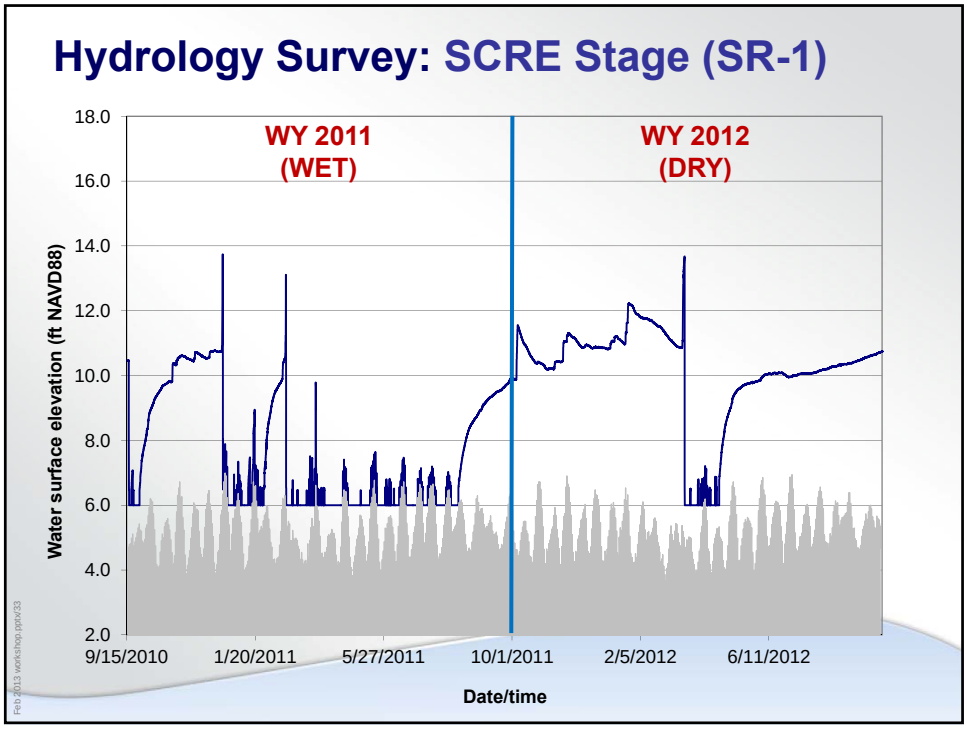
1. Hydrology Survey
   - SCRE stage monitoring
   - SCRE inflow and outflow monitoring
2. Water Quality Survey
   - Monthly SCRE and groundwater sampling
   - Intensive SCRE monitoring

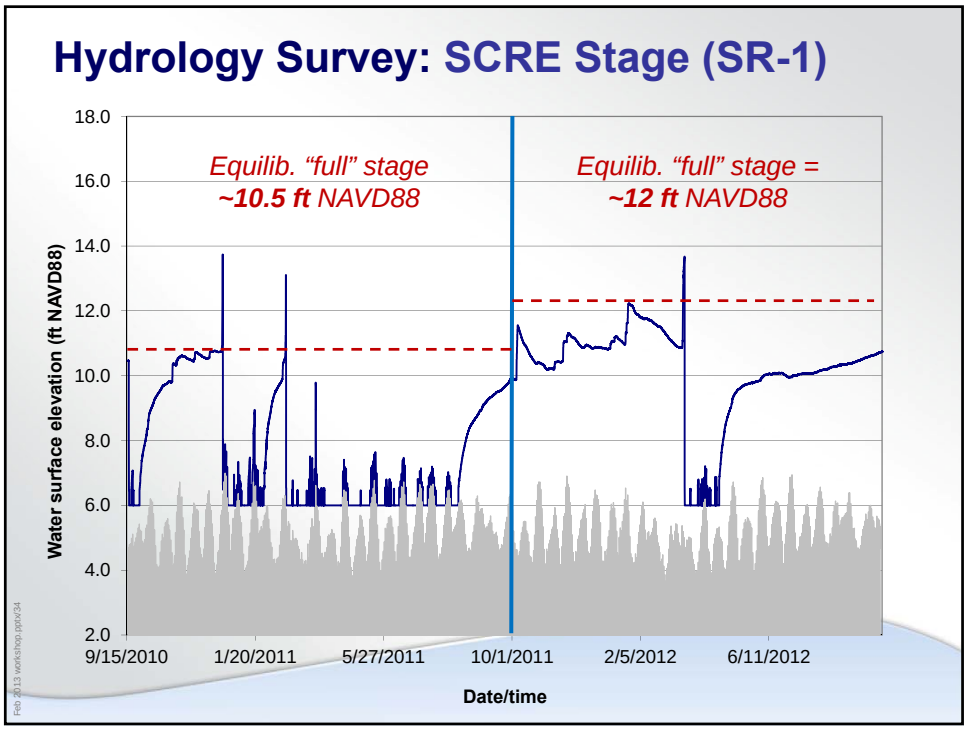
Hydrology Survey: Monitoring Locations

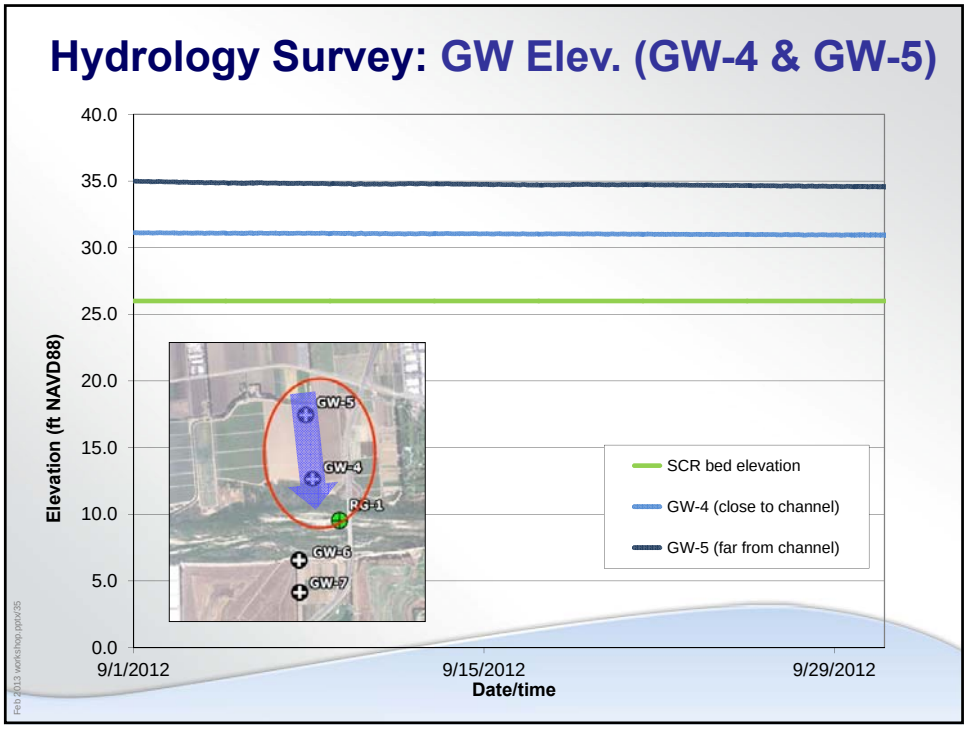


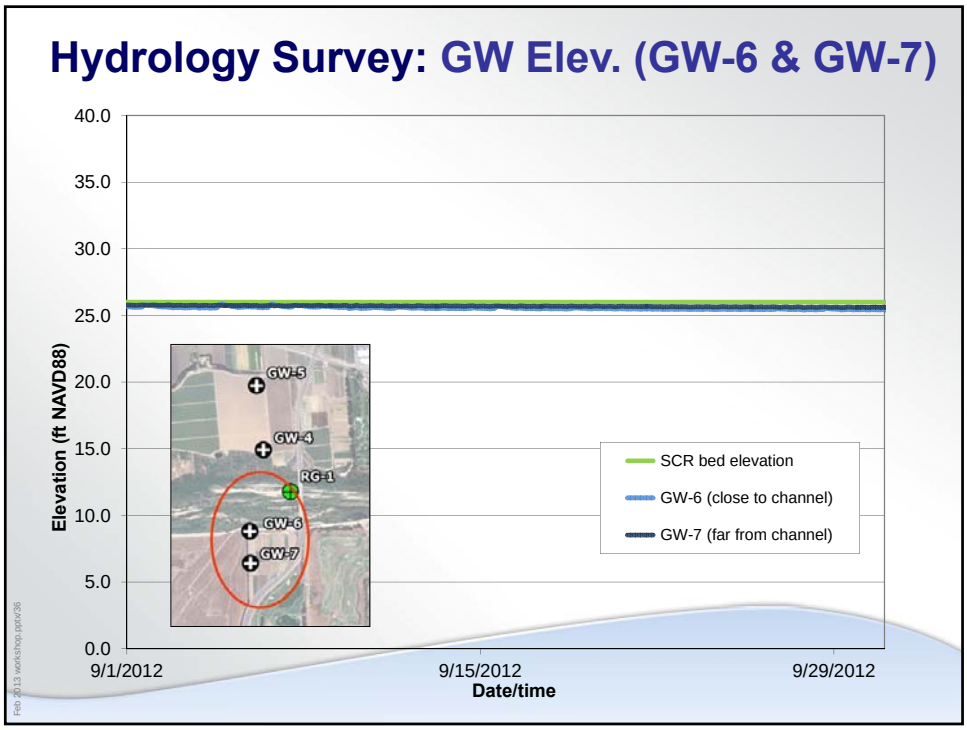
Hydrology Survey: SCRE Stage (SR-1)




Hydrology Survey: SCRE Stage (SR-1)
WY 2011
(WET)
WY 2012
(DRY)
Water surface elevation (ft NAVD88)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
9/15/2010
1/20/2011
5/27/2011
10/1/2011
2/5/2012
6/11/2012
Date/time


Hydrology Survey: SCRE Stage (SR-1)
Equilib. "full" stage
~10.5 ft NAVD88
Equilib. "full" stage =
~12 ft NAVD88
Water surface elevation (ft NAVD88)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
9/15/2010
1/20/2011
5/27/2011
10/1/2011
2/5/2012
6/11/2012
Date/time


Hydrology Survey: GW Elev. (GW-4 & GW-5)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Elevation (ft NAVD88)
9/1/2012
9/15/2012
9/29/2012
Date/time
GW-5
GW-4
RG-1
GW-6
GW-7
SCR bed elevation
GW-4 (close to channel)
GW-5 (far from channel)


Hydrology Survey: GW Elev. (GW-6 & GW-7)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Elevation (ft NAVD88)
9/1/2012
9/15/2012
9/29/2012
Date/time
GW-5
GW-4
RG-1
GW-6
GW-7
SCR bed elevation
GW-6 (close to channel)
GW-7 (far from channel)

Phase 2 Hydrology Survey

Major Findings

1. The equilibrium "full" stage is ~1.5 ft higher than 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. Recalibrate water balance for:
   - New equilibrium stage
   - Dry year conditions
   - New groundwater information

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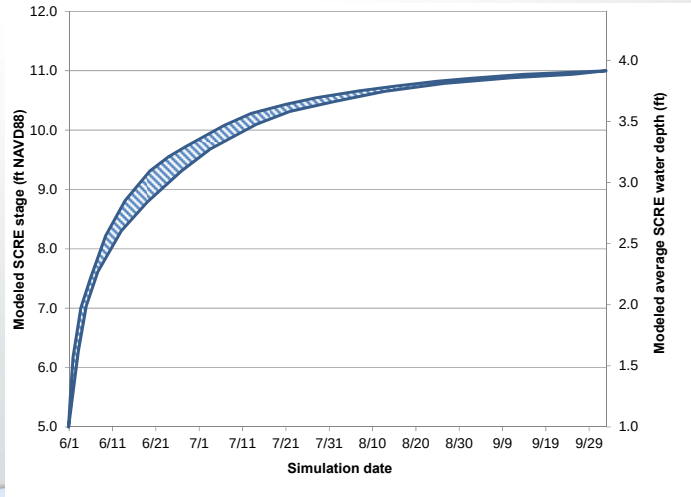
Modeled SCRE stage and average depth range for the No Action (6.3 mgd current average dry season discharge)



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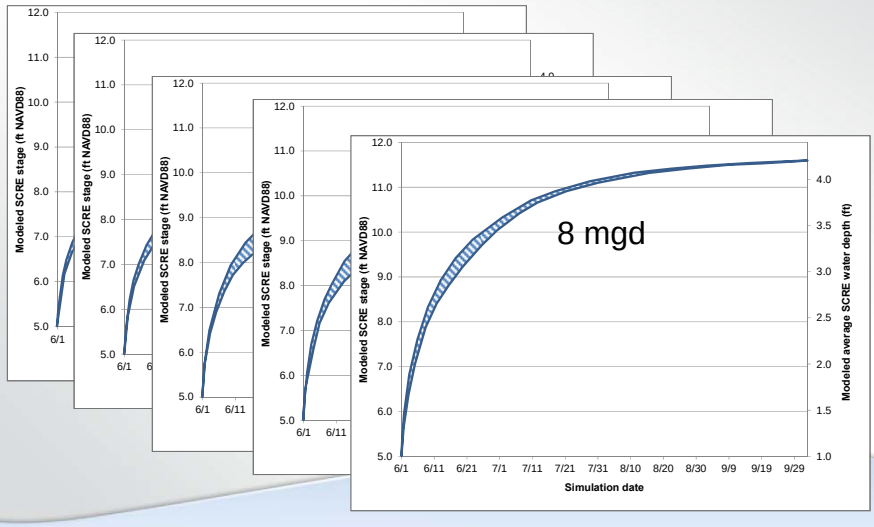
SCRE stage and average depth ranges were modeled for range of flows remaining in the Estuary at 0, 2, 4, 5, and 8 mgd



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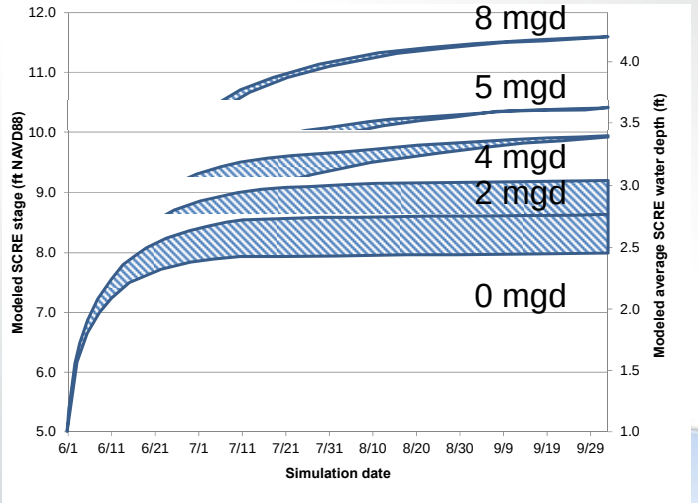
Comparison of Estuary Stage for discharge alternatives



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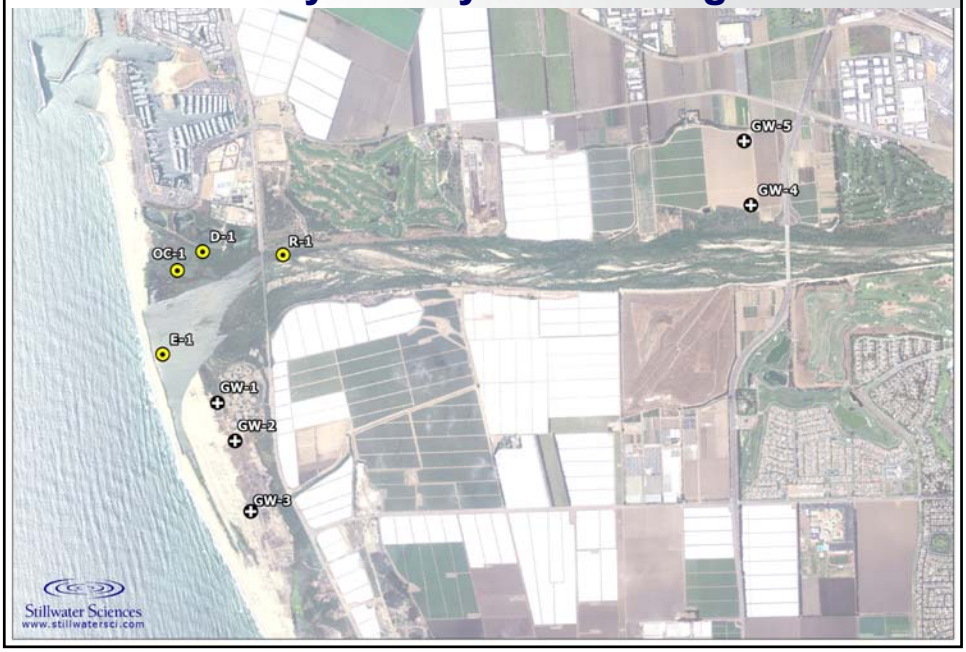
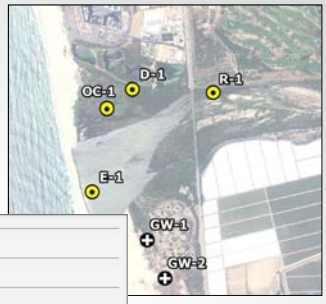
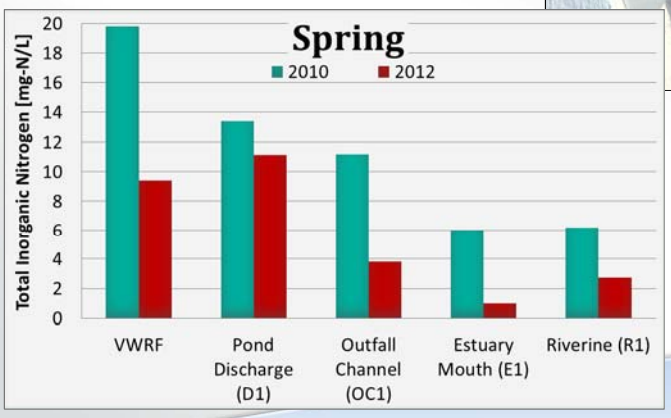
Water Quality Survey: Monitoring Locations



Water Quality Surveys





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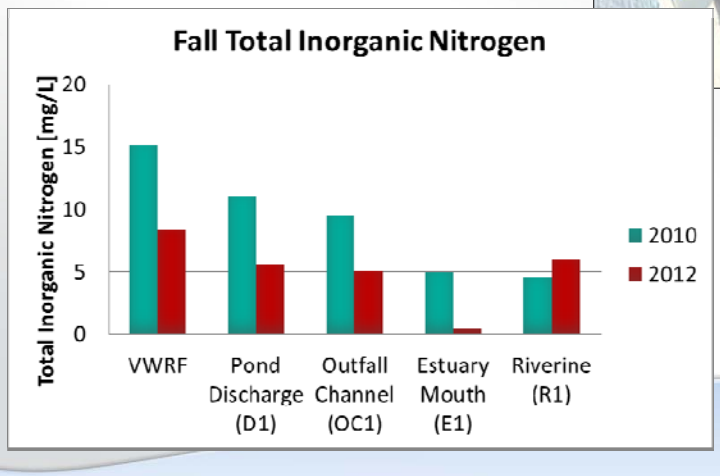
Water Quality Surveys



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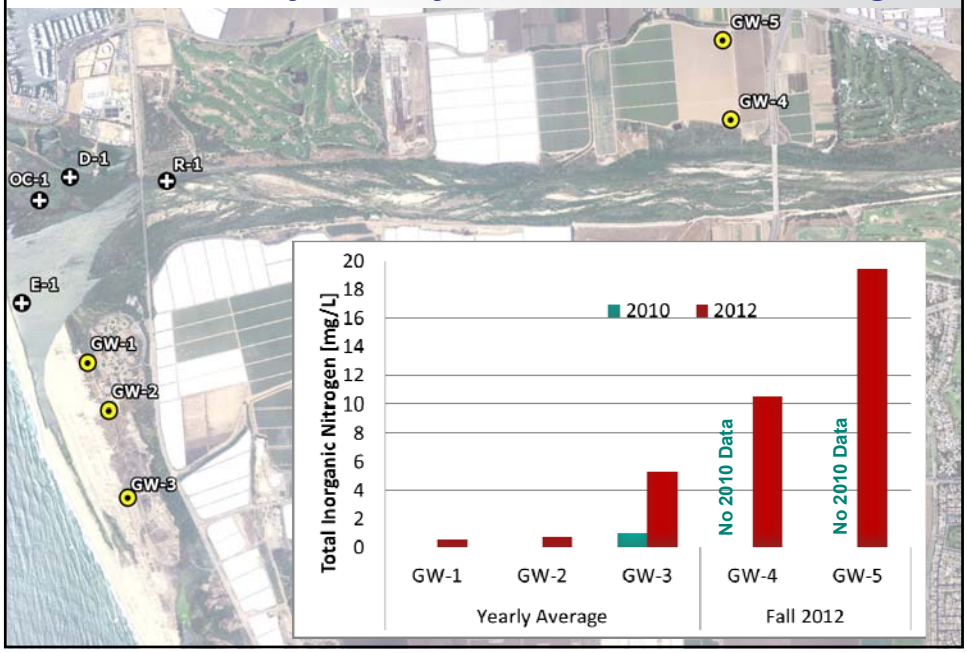
Water Quality Surveys: Groundwater Nitrogen



Water Quality: Summary

Major Findings

1. VWRF plant improvements for TIN
   - Reductions in nitrogen to SCRE
   - Lower DO variability in SCRE
   - Periodic algal blooms
2. Other nutrient sources
   - Increased TIN in new groundwater wells
   - Increased TIN in Riverine inflow
3. Revised nutrient balance for new inputs
   - Reduced SCRE TIN due to WWTP reductions
   - Increased SCRE TIN in at zero discharge

Estimated average dry season flows, nitrate and habitat area for each alternative

Discharge to SCRE – Flow and Water Quality		Predicted SCRE Nitrate Concentration Range (mg-N/L) (1)(3)	Predicted Habitat, acres		
Flow (mgd)	Nitrate Concentration from treatment wetlands (mg-N/L)		Steelhead	Tidewater Goby	CLT and WSP nesting (2)(3)
No Action (6.3)	8 (no wetlands)	6.2 – 7.7	148	101	167
0	0	9.6 – 12.5	58	107	183
2	4	4.5 - 8	78	110	183
4	4	3 – 5.2	115	111	182
5	4	2.8 – 4.7	132	110	177
8	5	3.5 – 4.9	157	85	160

(1) Concentration range is based on range of denitrification rates and wet and dry hydrologic conditions.
(2) CLT = California least tern; WSP = Western snowy plover
(3) Color gradations for SCRE nitrate concentrations and habitat area show lowest quality/habitat in the light shades and the highest quality/habitat in the darkest shades. For similar numbers the same color shading was applied.

Summary/Recommendations

- High nitrate in groundwater affects water quality
- 4-5 mgd of effluent in the estuary appears to provide the most benefit
  - Habitat area
  - Water quality

Discharge to SCRE – Flow and Quality		Predicted SCRE Nitrate Concentration Range (mg-N/L)	Predicted Habitat, acres		
Flow (mgd)	Nitrate Concentration from treatment wetlands (mg-N/L)		Steelhead	Tidewater Goby	CLT and WSP nesting
No Action (6.3)	8 (no wetlands)	6.2 – 7.7	148	101	167
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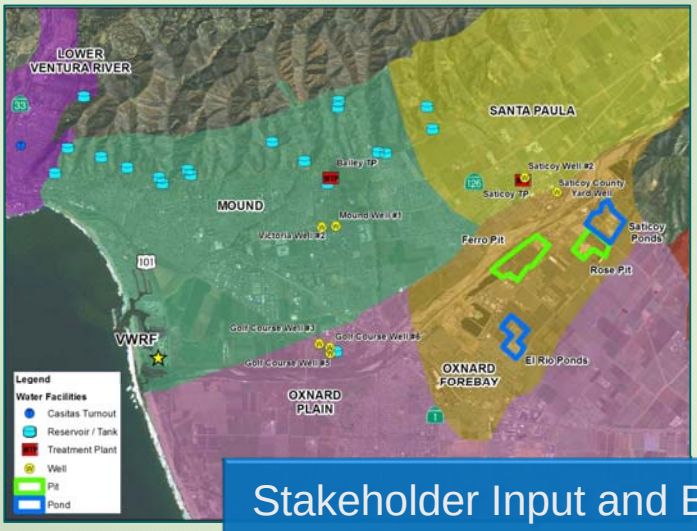

Stakeholder Input and Break

Phase 3 Research Needs

- What else do we need to be able to determine the Maximum Ecologically Protective Diversion Volume?
  - Additional Data Collection?
  - Additional Studies?

Review of alternatives evaluation criteria:

- √ Improve effluent quality
- √ Reduce effluent flow
- √ Create new habitat
- √ City water supply benefit
- √ Reliable water management practice
- √ Cost

Discharge to SCRE – Flow and Quality			Predicted Habitat, acres		
Flow (mgd)	Nitrate Concentration from treatment wetlands (mg-N/L)	Predicted SCRE Nitrate Concentration Range (mg-N/L)	Steelhead	Tidewater Goby	CLT and WSP nesting
No Action (6.3)	8 (no wetlands)	6.2 – 7.7	148	101	167
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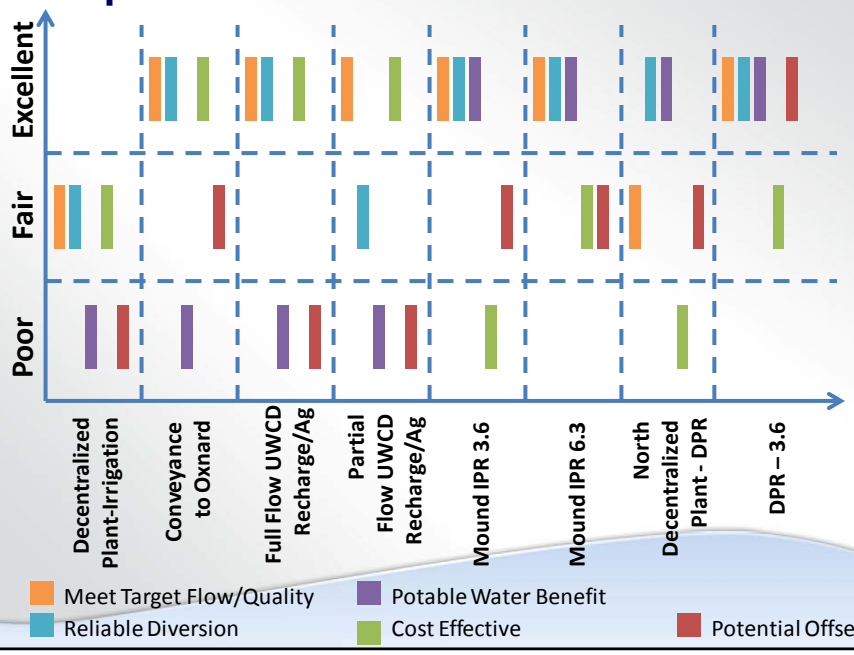
8	5	3.5 – 4.9	157	85	160

Comparison of alternatives for criteria



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Discussion Questions

Main Questions to be Answered:

1. Based on Phase 2 data presented, how much flow should be left in the estuary?
2. Which alternatives best meet the needs of the estuary and put the valuable resource (water) to its best and highest use?
3. What additional data/studies are needed to confirm flow to remain in estuary and which reuse alternative to implement?

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Your opportunity to provide input

- You each have 3 Dots
- Use Red Dot to mark what flow should remain in estuary
- Use Blue Dots to mark 1st choice and Yellow Dots to mark second choice for preferred alternatives

Discharge to SCRE – Flow and Quality		SCRE Nitrate (mg-N/L)	Predicted Habitat, acres		
Flow (mgd)	Nitrate wetlands (mg-N/L)		S	T Goby	CLT and WSP
No Action (6.3)	8	6.2 – 7.7	148	101	167
0	0	9.6 – 12.5	58	107	183
2	4	4.5 - 8	78	110	183
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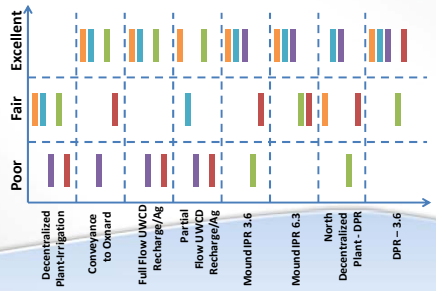
5	4	2.8 – 4.7	132	110	177
8	5	3.5 – 4.9	157	85	160



Based on Phase 2 Report information and subject to additional data collection and confirming studies

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TAKE A 15 MINUTE BREAK

Please Use Your Dots!

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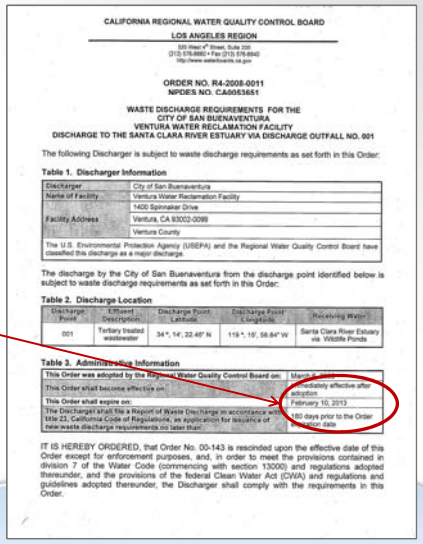
Schedule

NPDES discharge permit is in the process of being renewed

- Discharge regulated by a permit from LA Regional Water Board
- Permits are renewed every 5 years
- Existing permit needs to be renewed in 2013
- Public opportunity to comment on the draft permit in April



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

LOS ANGELES REGION

320 West 4th Street, Suite 200
(213) 576-6600 • 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', 22.48" 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 [illegible]
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.

Phase 2 special studies and 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
Phase 2 Special Studies		Draft Final due 3/6/13
Preparation of NPDES permit	ROWD complete	
Public Tentative Permit		
Board hearing, TBD		

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Key Issues for NPDES Permit Renewal

- Finding of Enhancement – To be determined
- Will establish tasks and timeline 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)

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Next Steps

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Next Steps

- Compile/post your comments into meeting notes
- Permit renewal by RWQCB - ongoing
- Written comments on report accepted until February 28, 2013
- Comments will be documented, made available with final report, and incorporated as much as possible into final report
- Final Phase 2 Report due to RWQCB March 6, 2013
- Post-report submission responses to comments after March 6, 2013

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