CITY OF VENTURA

Special STUDIES for Santa Clara River Estuary

PRESENTATION

November 2014

carollo
Engineers...Working Wonders With Water®

Stillwater Sciences

Special Studies Workshop Agenda

- Welcome and Introductions
- Overview of Special Studies
  - Phases 1 and 2
  - Phase 3
- Work plan for Estuary Monitoring
- 100% Diversion Study
- Discussion/Q&A/Activity
- Summary – Next Steps

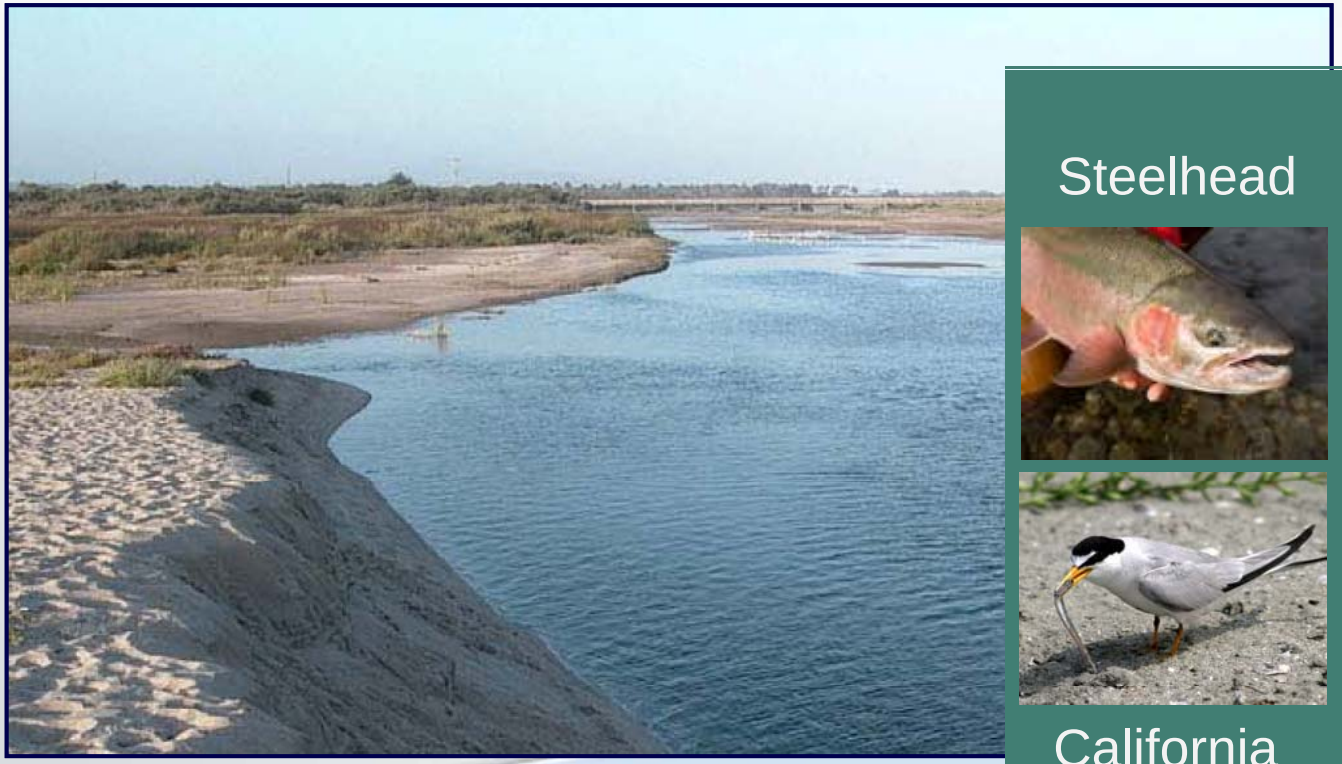
Welcome Back!

The Ventura Wastewater Reclamation Facility (VWRF) discharges to the Santa Clara River Estuary (SCRE)

- ~200 acres
- Open and closed mouth conditions
- Beneficial uses include RARE

Intent of the special studies (2008 NPDES Permit) was to answer…

…What is the best use of the treated water resources from the VWRF to protect the health of the SCRE (<u>and the endangered species that inhabit it</u>)?



Steelhead

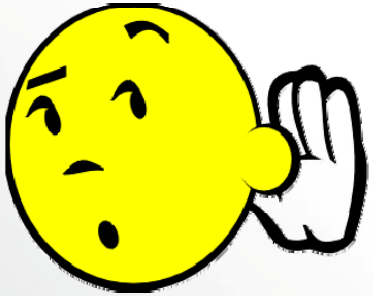
Tidewater goby

California least tern

Western snowy plover

Introductions

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

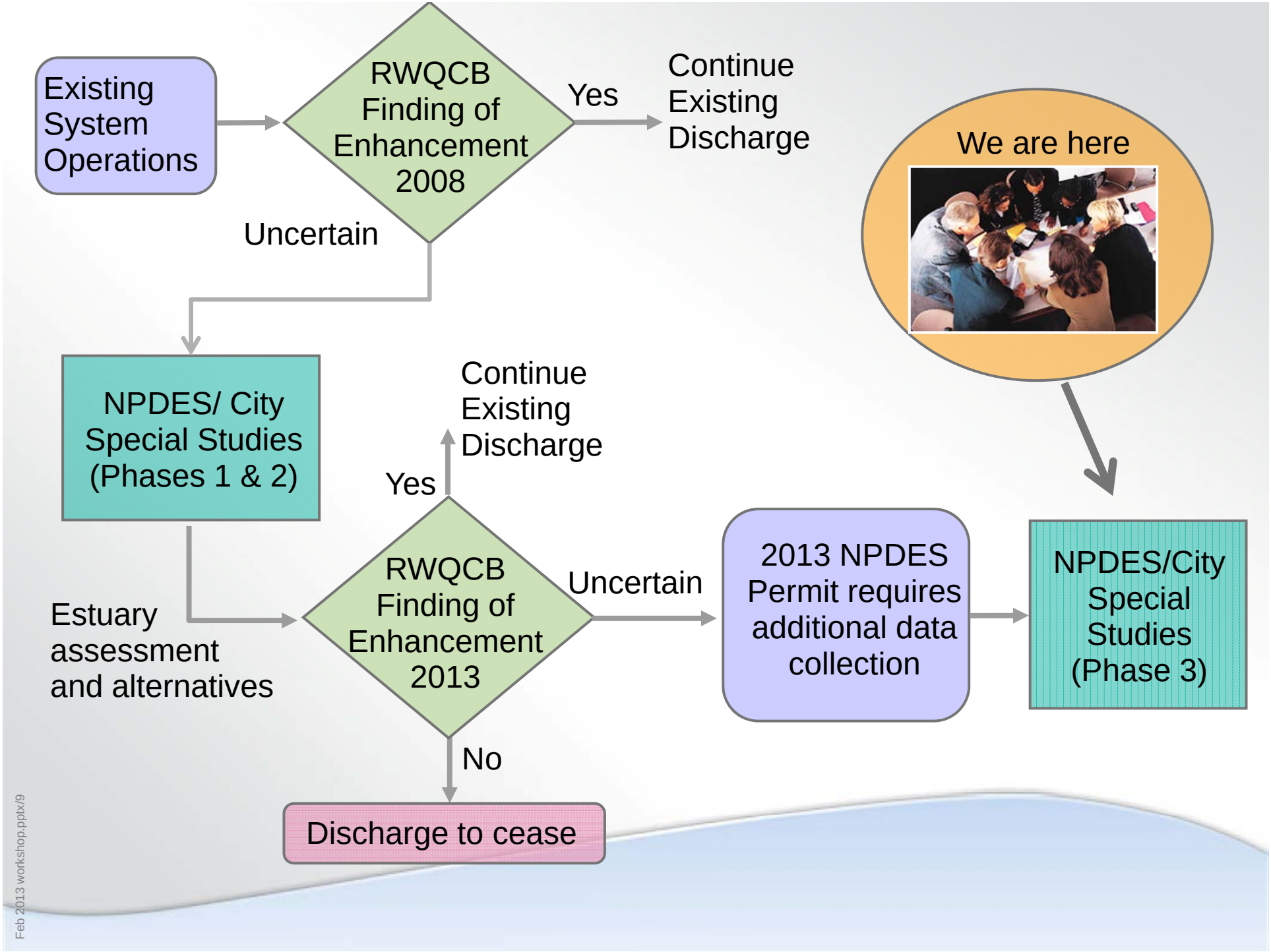


- **Actively Listen!**
  - We want you to understand how we got here and where we are going
- **Actively Participate!**
  - Please contribute ideas and concerns
  - Stakeholder contributions expressed at these workshops shape the project

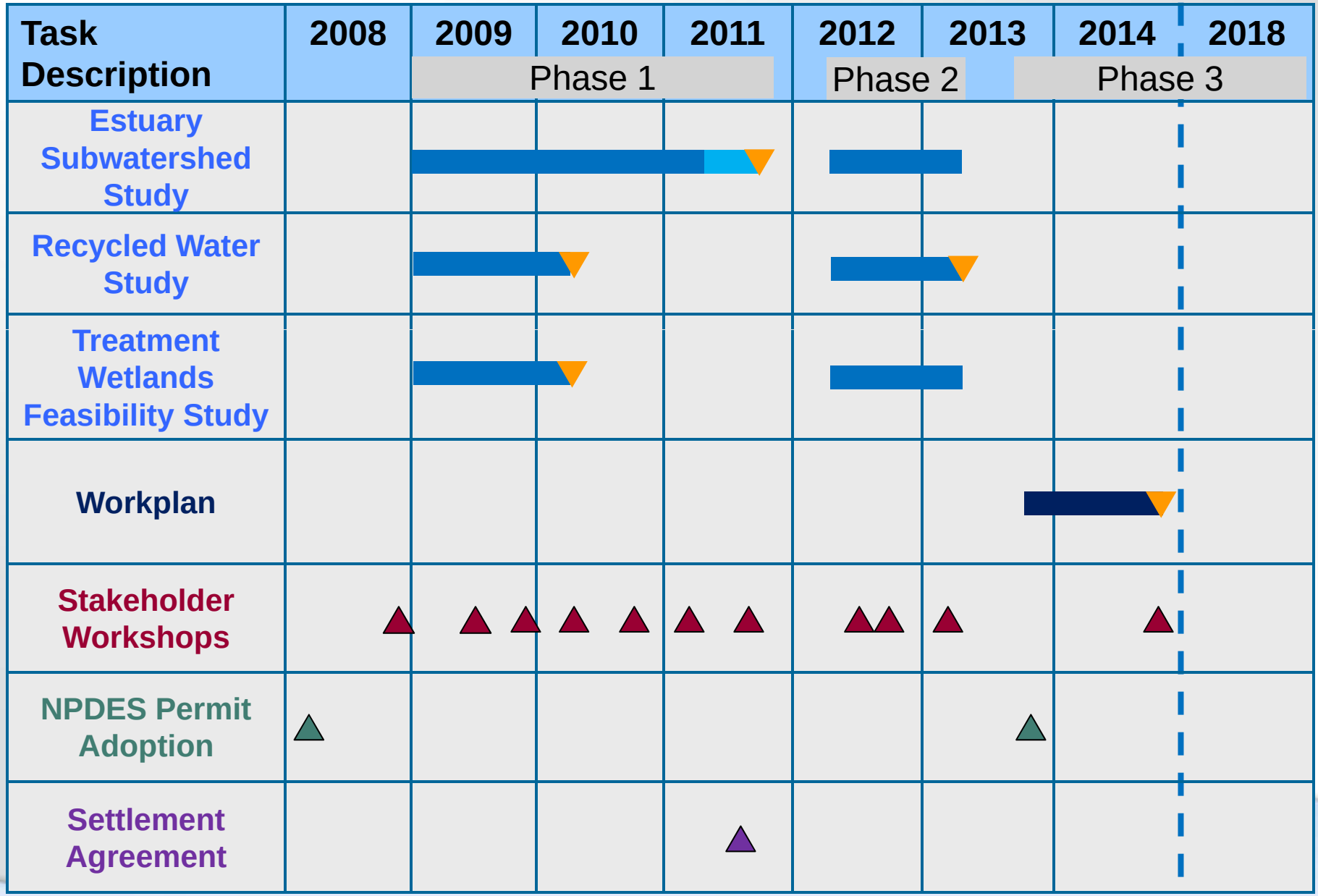
Please introduce yourself…

- Name
- Organization representing
- Interest

Overview of Special Studies


Existing System Operations
RWQCB Finding of Enhancement 2008
Yes
Continue Existing Discharge
Uncertain
We are here
NPDES/ City Special Studies (Phases 1 & 2)
Continue Existing Discharge
Yes
Estuary assessment and alternatives
RWQCB Finding of Enhancement 2013
Uncertain
2013 NPDES Permit requires additional data collection
NPDES/City Special Studies (Phase 3)
No
Discharge to cease

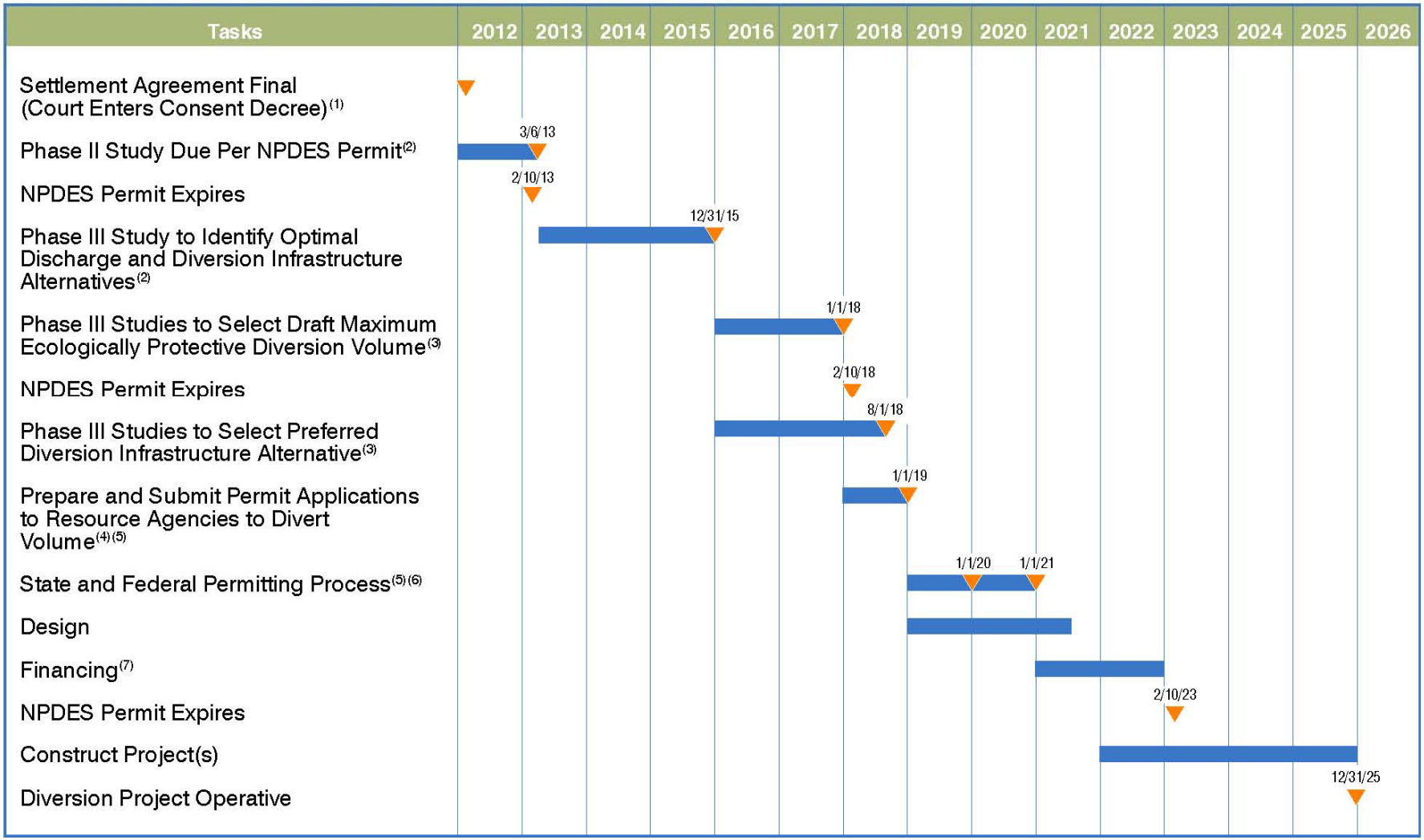
History of the Special Studies



Settlement Agreement Requirements

CITY OF VENTURA

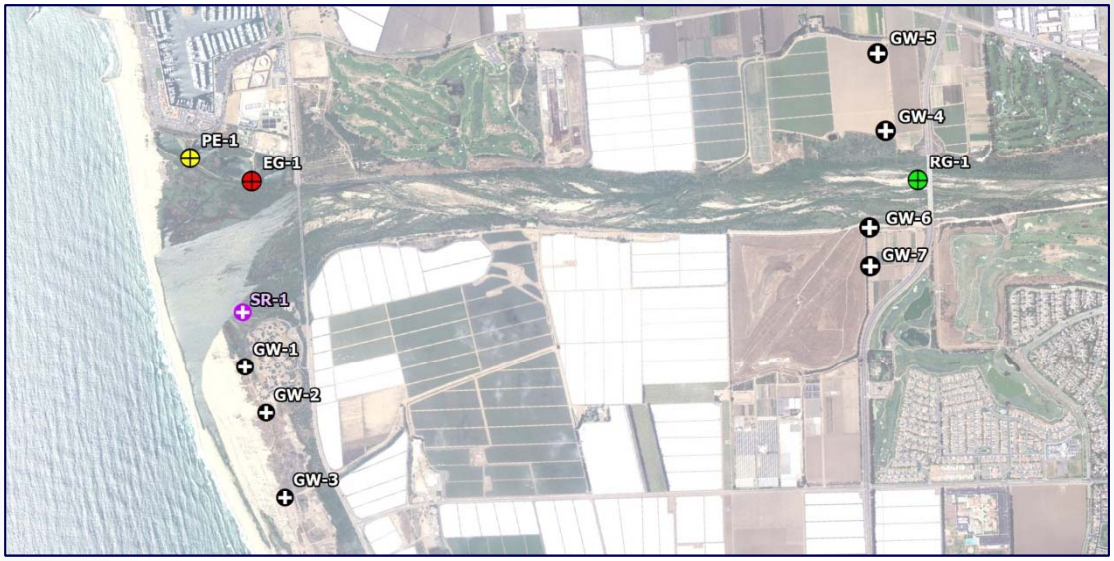
ADDITIONAL SANTA CLARA RIVER ESTUARY STUDIES AND PERMITTING PROCESSES



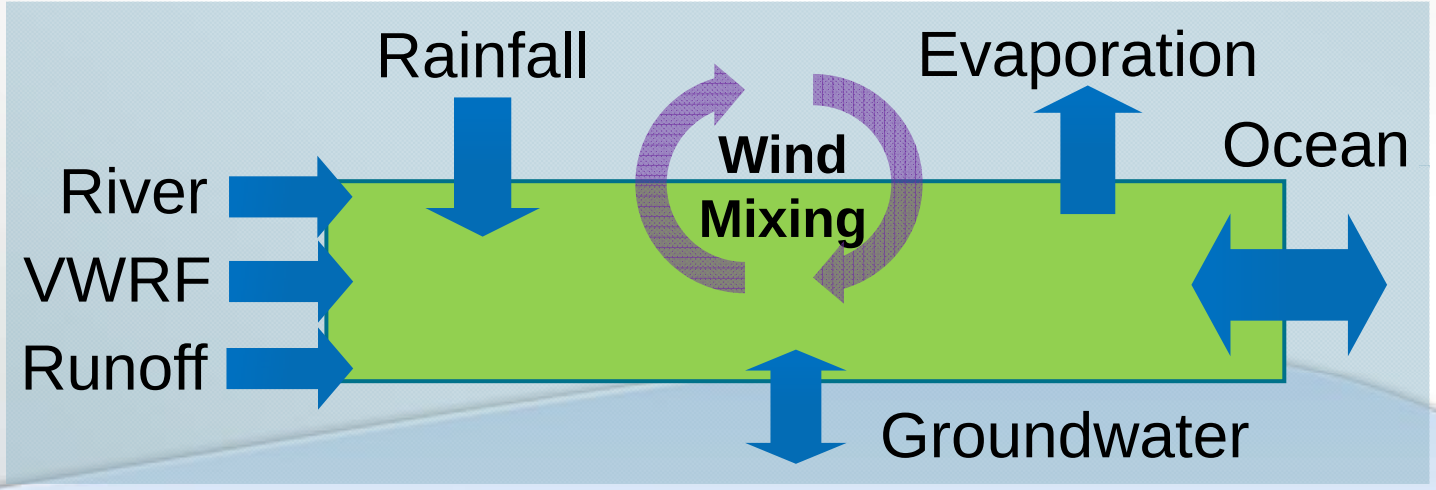
Phase 1

Phase 1 Study - Developed a framework for evaluating SCRE conditions

Hydrologic, Water Quality, and Habitat Monitoring



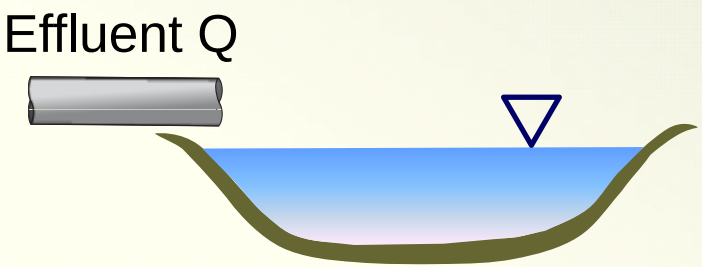
Modeling - Water Balance & Nutrient Balance



Water and nutrient balance used to evaluate effects of reducing the discharge flow and improving quality

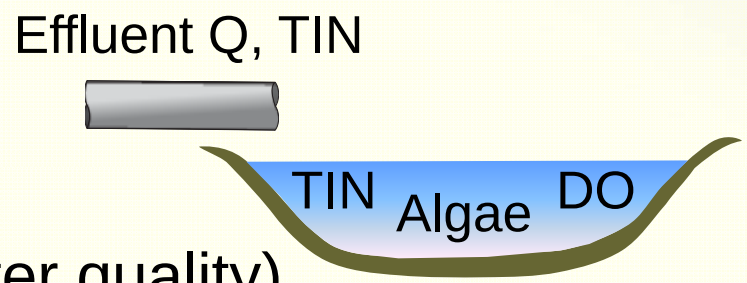
Estuary depth/extent

- Discharge flow volume

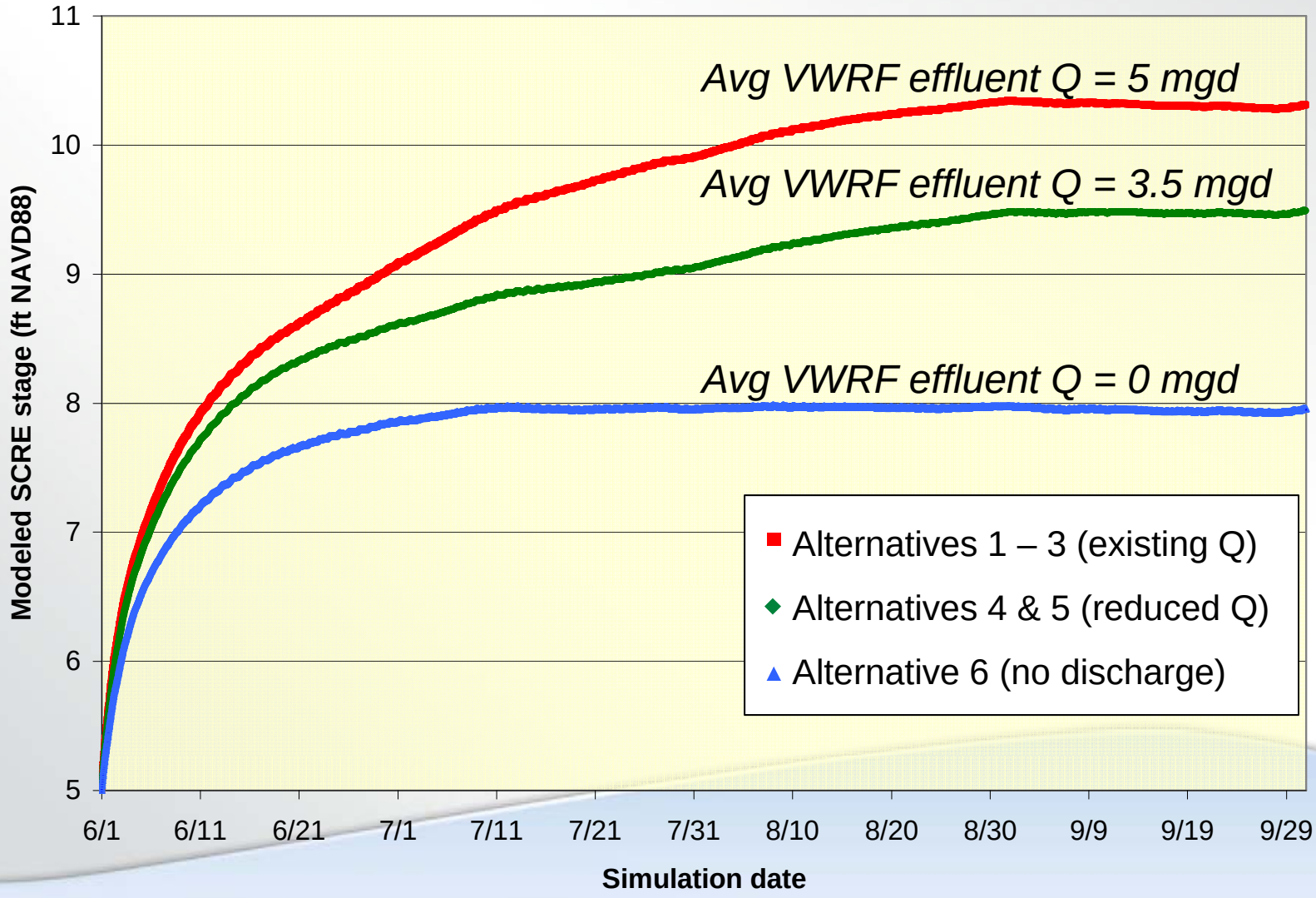


Estuary water quality

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



Estuary Synthesis Report modeled discharge alternatives during critical summer season…

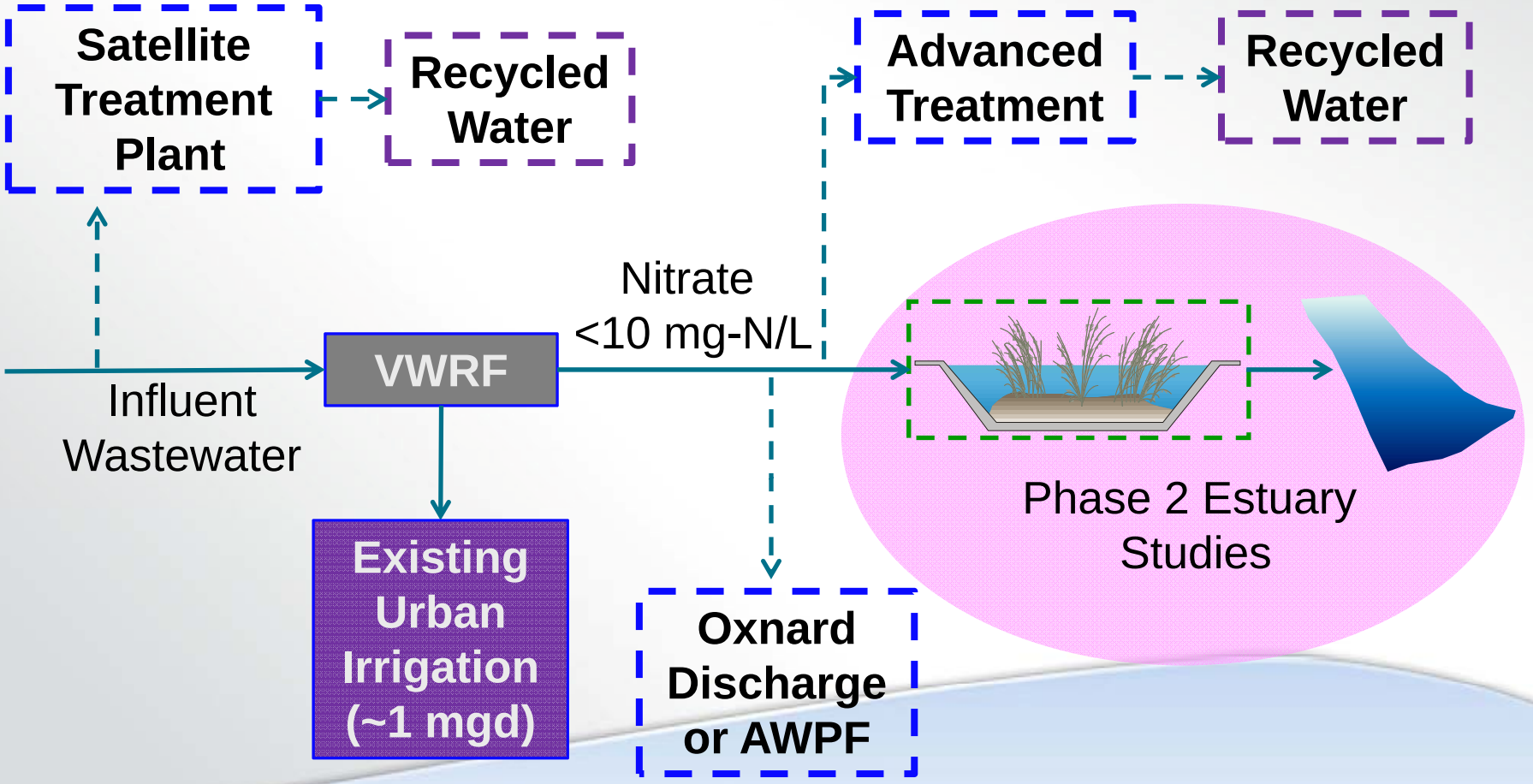


Major Findings of Phase 1 Studies

- 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
  - Less flow in summer to reduce unseasonal breaching
  - Improve water quality to reduce nutrients
- Developed VWRF Diversion and Re-use Alternatives:
  - Phase 2 Studies further developed concepts for VWRF diversion, treatment, and re-use

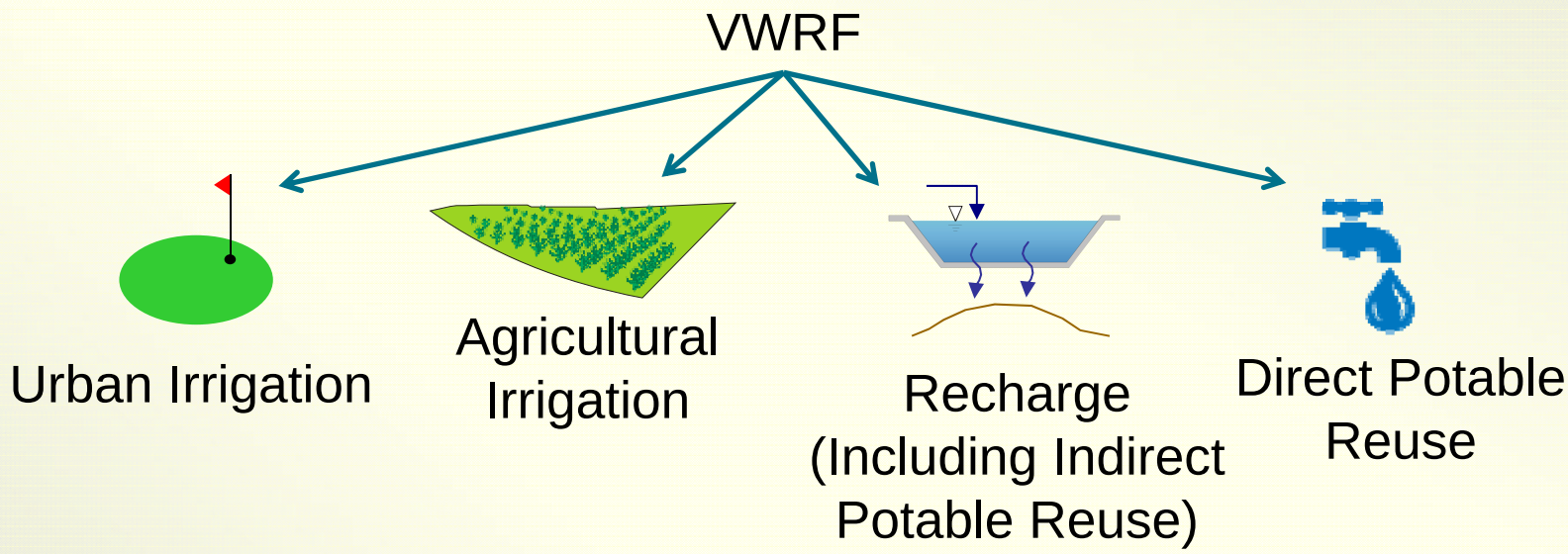
Phase 2

Phase 2 – Additional data collection and evaluation for identifying environmentally protective alternatives

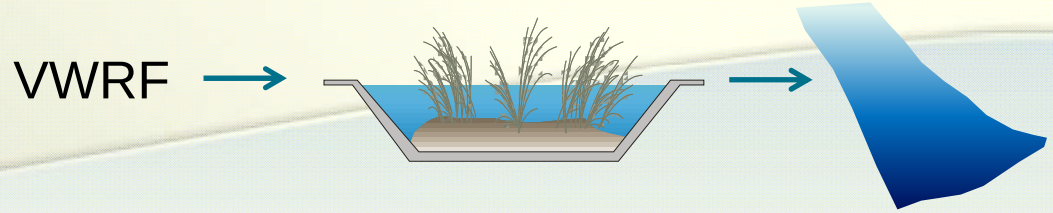


Phase 2 – Included grant funding to evaluate a wide range of reuse alternatives

Recycled Water Alternatives to Reduce Effluent Discharge



Treatment Wetlands to Further Reduce Effluent Nitrate Concentrations



Near the end of Phase 2 we asked Stakeholders three critical questions…

1. How much discharge 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?

How much discharge should be left in the estuary?

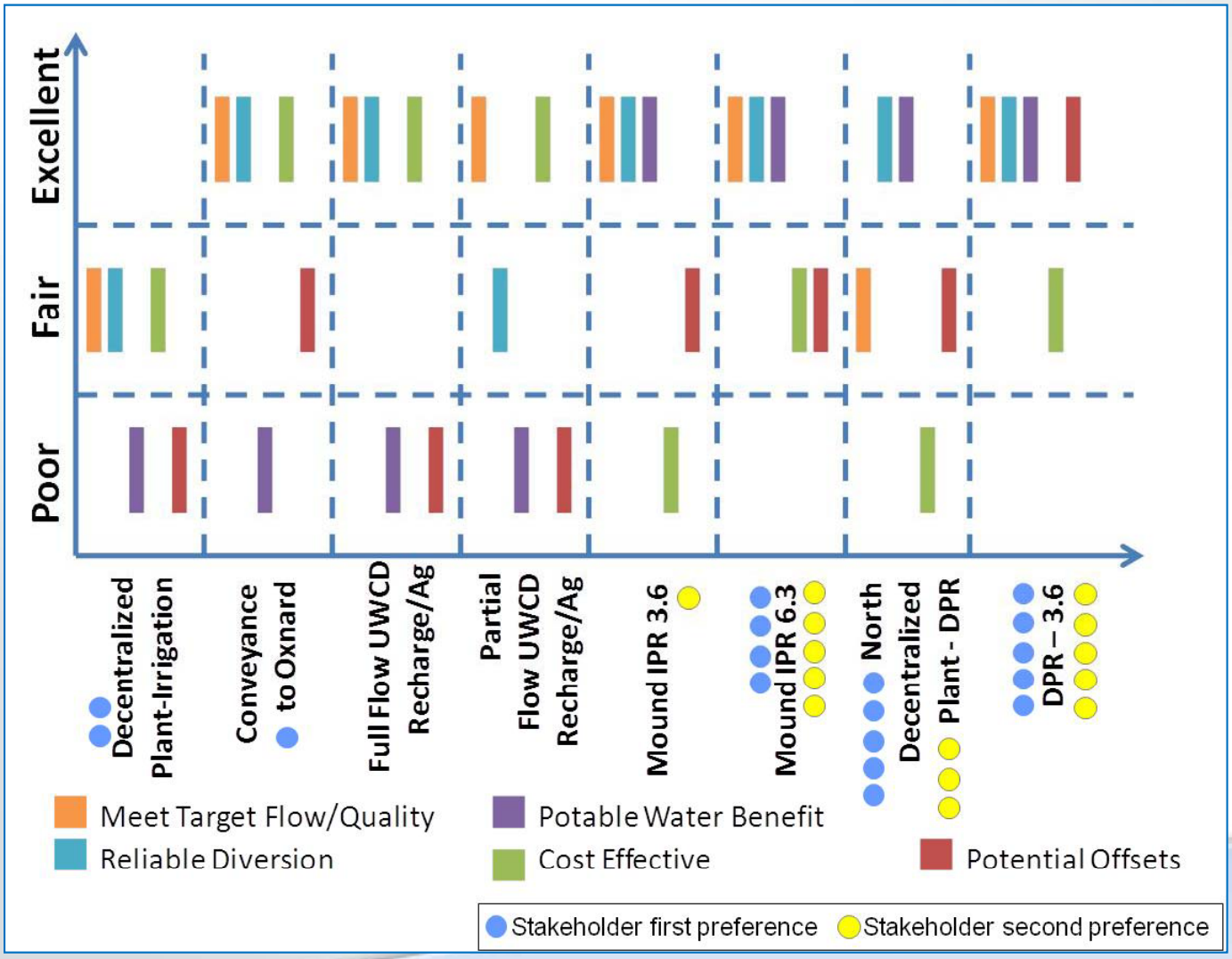
● Discharge flows (from treatment wetlands to the SCRE) selected by stakeholders

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

Summary of Stakeholder Input on flow to SCRE:

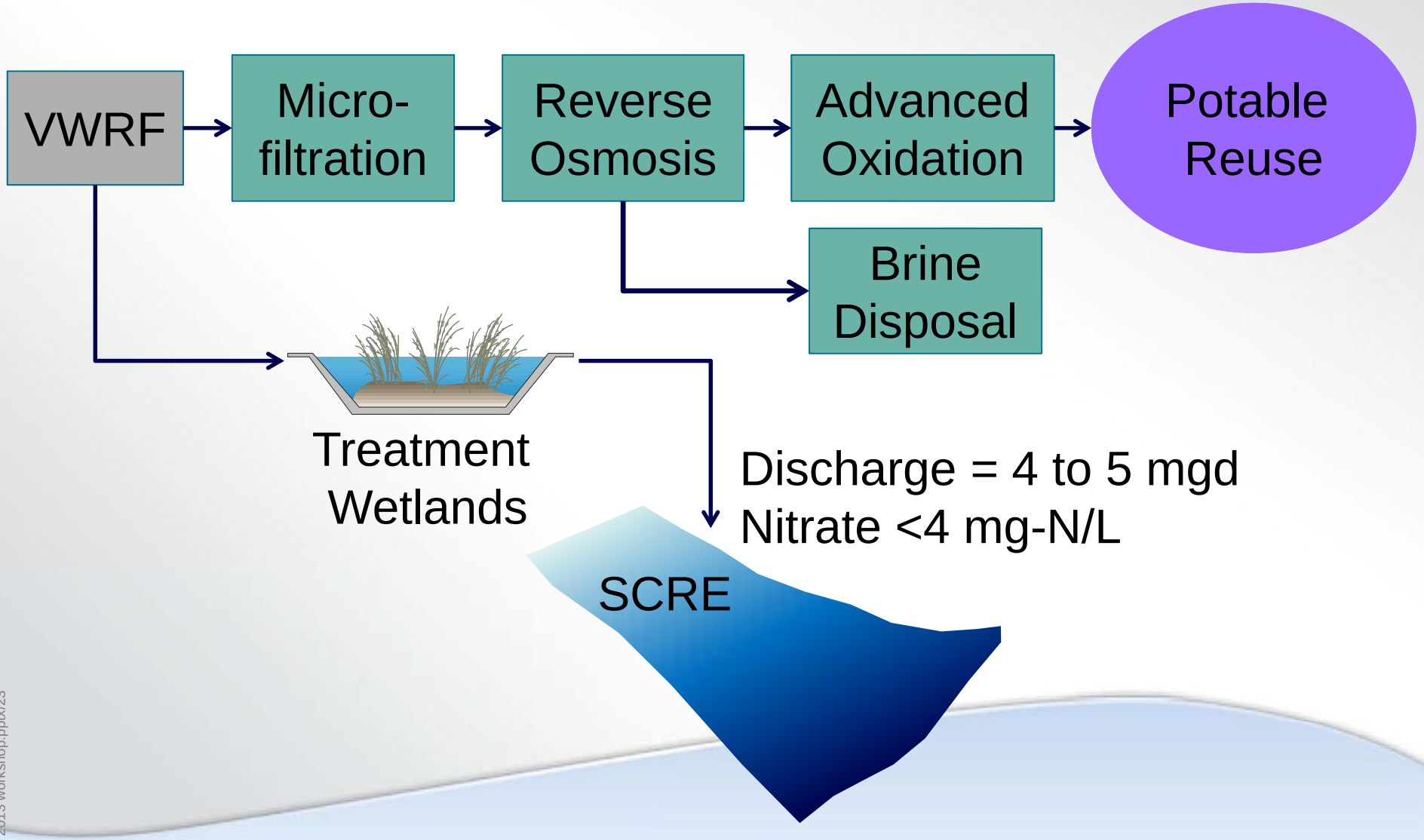
- Support for 4-5 mgd effluent discharge
- Some concern over sufficient data
  - Water quality inputs
  - Groundwater inputs

Which alternatives put the reclaimed water to its best and highest use?



Support for potable reuse options

Phase 2 Recommendations



What additional data/studies are needed?

1. Better Define the Water Balance
   - Evaluation of optimal berm height and stability relative to breaching risk.
   - Collection of additional flow data for SCRE inputs
2. Identify Potential Water Quality Issues
   - Collection of additional groundwater quality data
   - Collection of additional water quality data for SCRE inputs
   - Collection of data regarding presence of constituents of emerging concern
3. Refine Habitat Suitability
   - Collection of additional water quality and other habitat suitability information under typical seasonal and mouth berm conditions
   - Evaluation of SCRE habitat use data for endangered species

What additional data/studies are needed?

4. Water Resources Management
   - Consideration of other alternatives that would improve water reclamation and conservation
   - Development of an integrated water management plan
5. Public Outreach and Education
   - Recycled water for potable and non-potable reuse
6. Treatment Feasibility
   - RO treatment and brine disposal
7. 100% Diversion Study
   - Required by Settlement Agreement

Phase 3 Workplan and Scope Development

Drivers for Phase 3 Scope of Work

- *2013 NPDES Special Studies (Workplan)*
- *Settlement Agreement*
- *Further Develop Diversion Alternative*

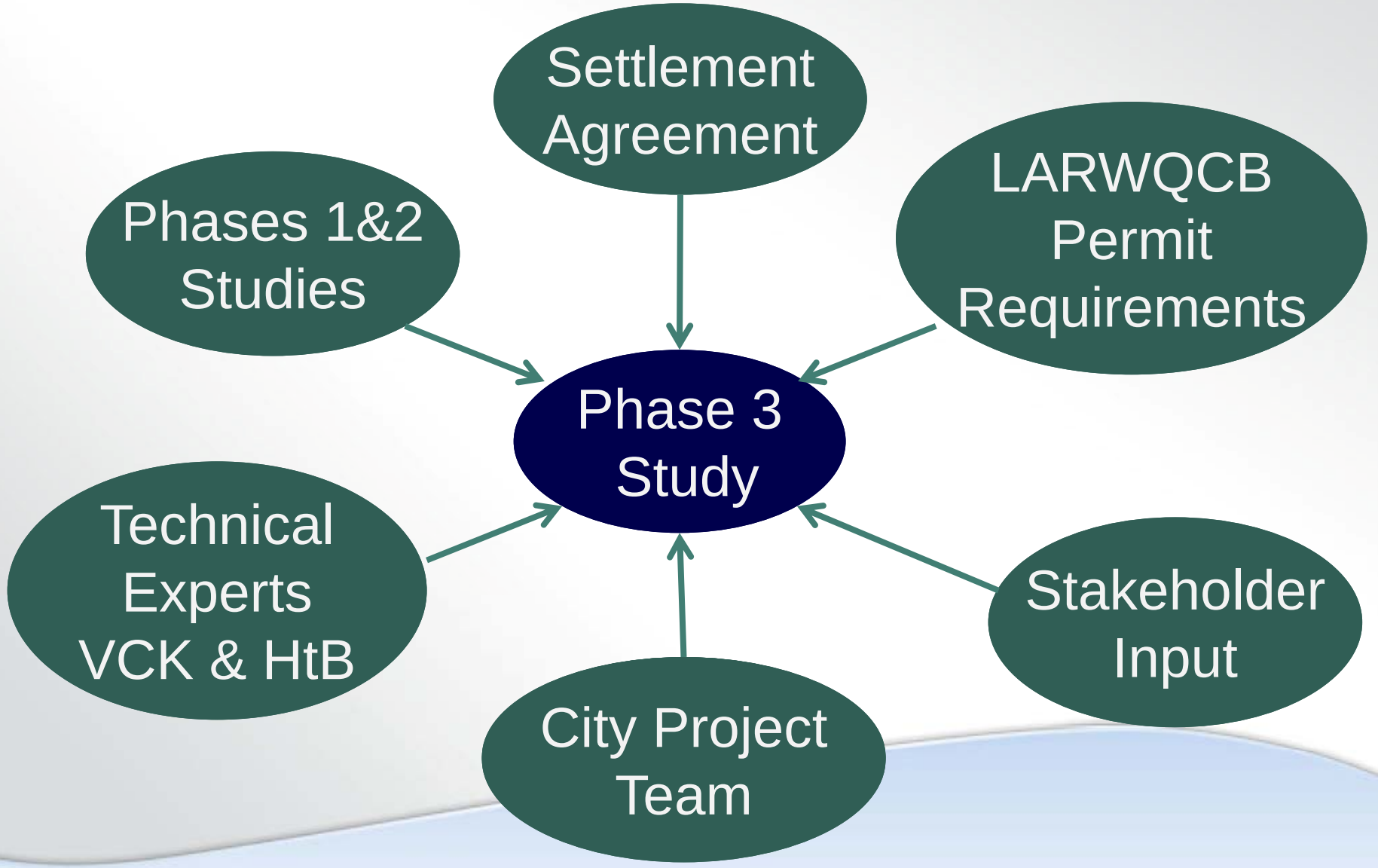
NPDES Special Studies (Workplan)

- *Must provide sufficient and meaningful information to determine if the discharge enhances the Estuary*
- *Evaluation of Estuary enhancement during the next revision of the NPDES Permit, expected in November 2018.*

Settlement Agreement

- *Determine the Maximum Ecologically Protective Diversion Volume (MEPDV) through scientific analysis*
- *Agreement between City, Heal the Bay and Ventura Coastkeeper, by January 1 , 2018*
- *If there is not agreement – Scientific Review Panel Determination*

Development of Phase 3 Study Scope



Scope of Work for Phase 3

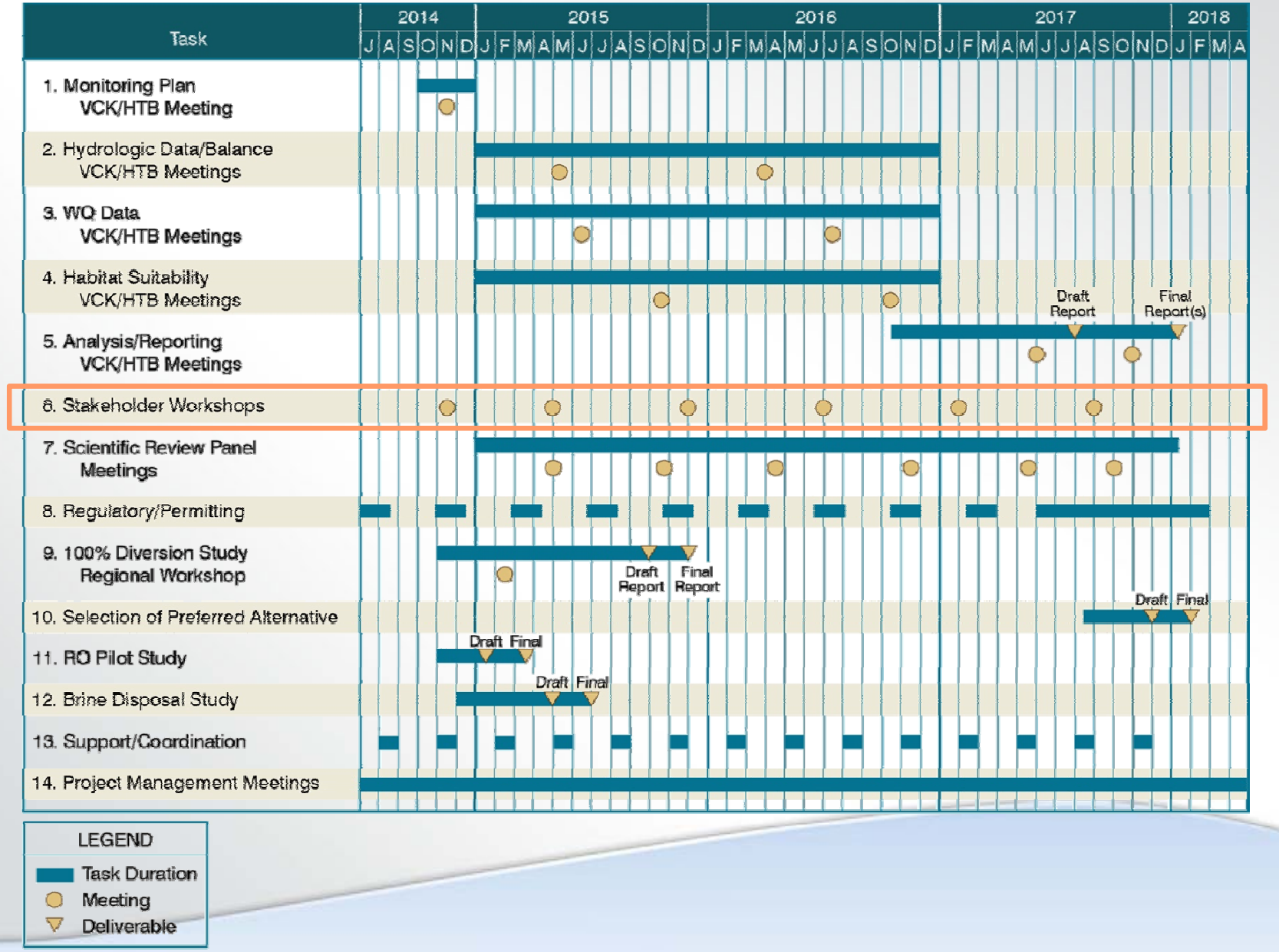
NPDES Required Tasks

1. Monitoring Plan
2. Hydrologic Data Collection
3. Water Quality Data Collection
4. Habitat Suitability
5. Analysis/Reporting
6. Stakeholder Workshops
7. Scientific Review Panel

Other Tasks

8. Regulatory/Permitting
9. 100% Diversion Study
10. Selection of Preferred Alt
11. RO Feasibility Analysis
12. Brine Disposal
13. Support/Coordination
14. Project Management

Phase 3 Project Schedule



NPDES Workplan Development Process

- Approach – Combined Workplan to address data needs of the three studies:
  - Estuary Studies
  - Nutrient and Toxicity Special Study
  - Groundwater Special Study
- Process
  - Preliminary meeting with Heal the Bay, and Wishtoyo Coastkeeper
  - Develop preliminary draft Workplan
  - Technical review by independent experts
  - Workplan Finalization
- Result – *Moving forward with a comprehensive Workplan has been vetted and agreed upon by key stakeholders*

Estuary Studies

Study Components

Water Balance Evaluation

- Update lagoon morphology, berm breach dynamics
- Improved groundwater inflow/outflow estimates
- Estimate SCRE water levels, breaching for VWRF flow scenarios and WY Types (Dry, Normal, Wet)

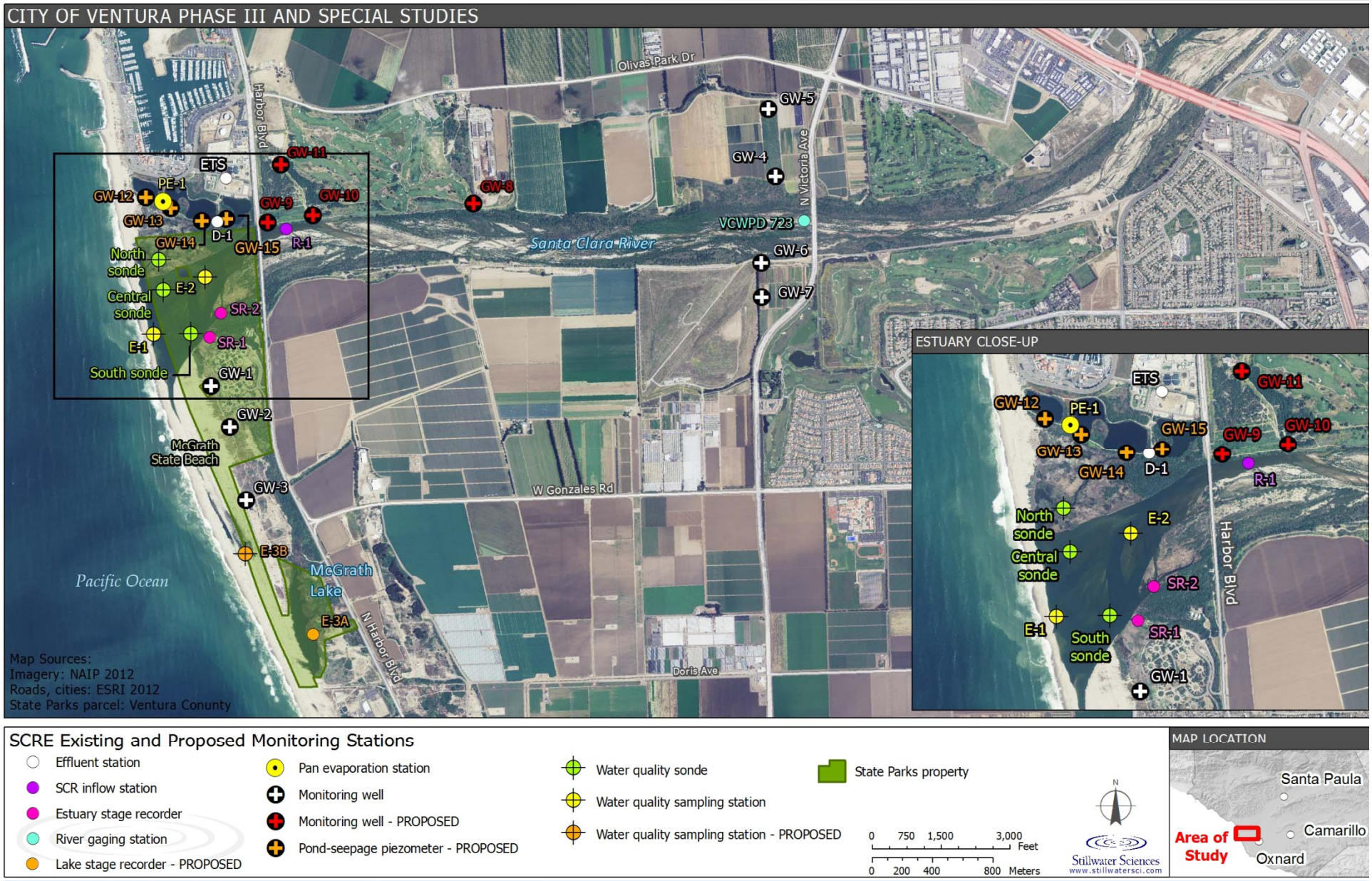
Water Quality Evaluation

- Improved estimates of surface and groundwater water quality contributions to SCRE
- Spatial and temporal characterization of water quality conditions in the SCRE
- Assess water quality for VWRF flow and treatment scenarios

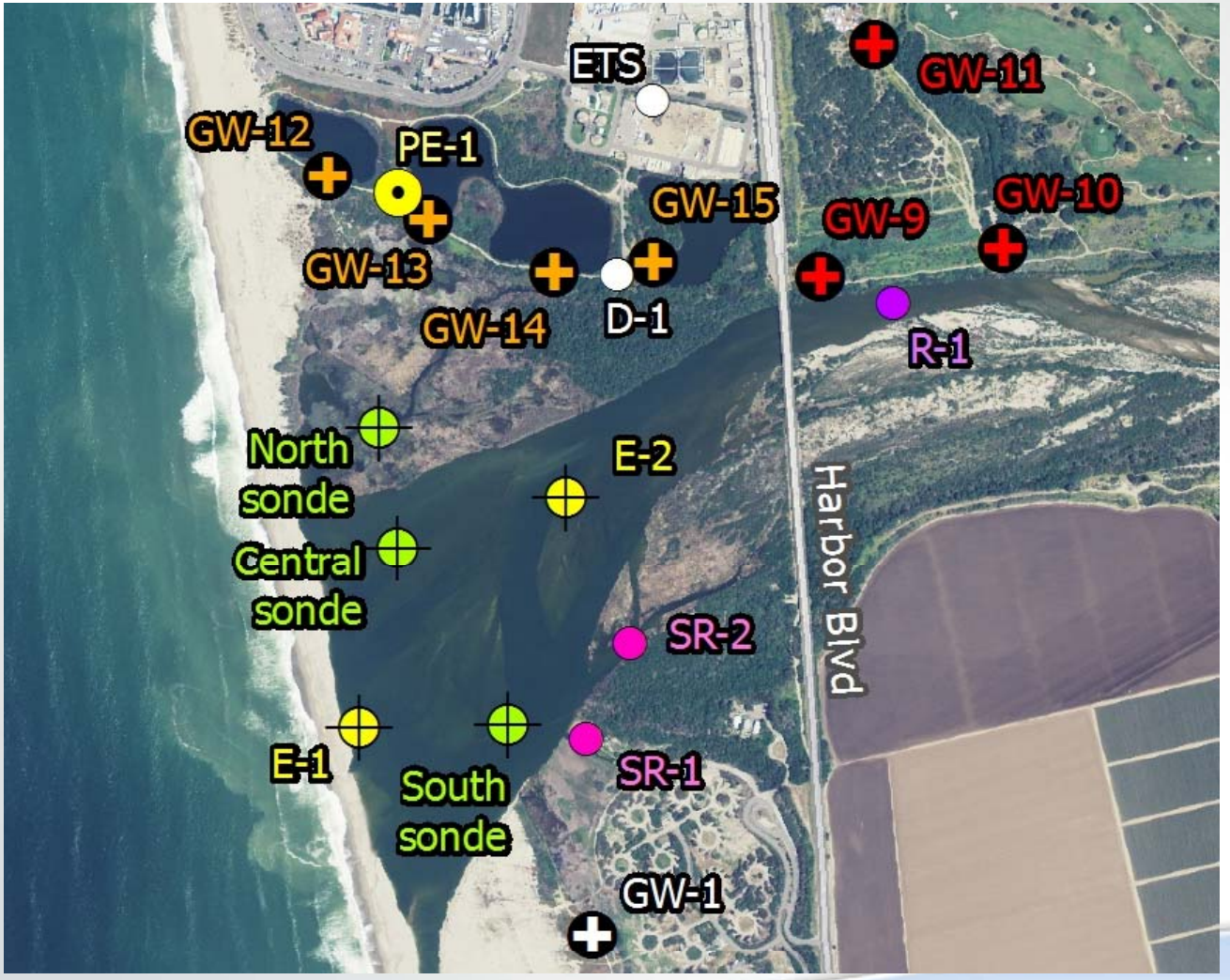
Habitat Suitability Evaluation

- Identify any patterns in special status species habitat use and BMI indicators in relation to water quality and physical characteristics
- Update stage vs area relationships.

Estuary Studies Sampling Locations



Estuary Studies Sampling Locations



- Effluent station
- SCR inflow station
- Estuary stage recorder
- River gaging station
- Lake stage recorder (New)
- Pan evaporation station
- Monitoring well
- Monitoring well (New)
- Pond-seepage Piezometer (New)
- Water quality sonde
- Water quality sampling station
- Water quality sampling station (New)

Estuary Studies - Water Quality

- Additional Data Collection (2 years)
  - Surface water, VWRF effluent, SCRE
    - Temperature, DO, pH, EC
    - Algae and nutrients
    - Trace metals and toxicity
    - CECs
  - Groundwater, VWRF Wildlife Pond seepage
    - Nutrients

Estuary Studies - Habitat Suitability

- Additional Data Collection (1+ years)
  - SCRE fish sampling
    - Species composition and abundance
    - Temperature, DO, pH, EC
  - SCRE habitat mapping
    - Depth, substrate, cover, temperature, DO, pH, EC
  - SCRE Benthic Macro-invertebrate sampling
    - Species composition and abundance
    - Depth, substrate, temperature, DO, pH, EC

Estuary Studies - Habitat Suitability

- Additional Data Collection (1+ years)
  - SCRE fish sampling
    - Species composition and abundance
    - Temperature, DO, pH, EC
  - SCRE habitat mapping
    - Depth, substrate, cover, temperature, DO, pH, EC
  - SCRE Benthic Macro-invertebrate sampling
    - Species composition and abundance
    - Depth, substrate, temperature, DO, pH, EC

Nutrient and Toxicity Special Study

Study Components

NPDES 3-Species Toxicity testing

- Screening and testing for toxicity using water flea, fathead minnow *and* green alga growth

Expanded Toxicity Testing

- Screening and testing of additional species representing freshwater and brackish/marine conditions
- Dependent on open/closed condition and salinity

Water Quality and Toxicity Evaluation

- Surface water quality comparisons to identified thresholds for focal fish species
- Toxicity results as well as ammonia and copper concentrations will be compared with acute and chronic thresholds from literature

Groundwater Special Study

Study Components

Water Balance Evaluation

- Refine water balance calculations with a focus on improving estimates of groundwater interactions with the SCRE

Hydrogeologic Conditions Evaluation

- Review of data previous and current studies on the subsurface characteristics in the Mound sub-basin
- Evaluation of hydrogeologic connectivity to lower aquifer with the Municipal and Domestic Water Supply designated use.

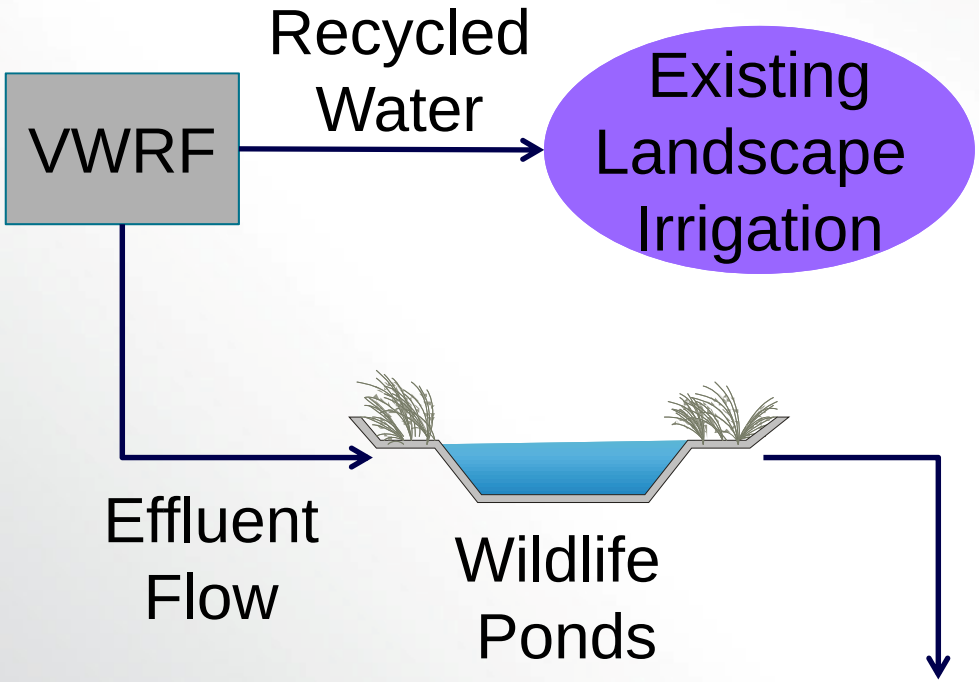
Analysis approach

- Stage vs Habitat relationships
  - Focal Fish Species: depth, cover, areas with suitable water quality
  - Focal Bird Species: min. water depth, vegetation type, cover/density
- Water Quality Considerations
  - Linkages to potential impairments (*Nutrient and Toxicity Study*)
- Water Balance Modeling
  - Use calibrated water balance to estimate equilibrium stage for a range of VWRF flows and meteorology
  - Estimate corresponding habitat areas and suitability
  - Assess potential for campground flooding, breaching
  - Assess any linkages to groundwater beneficial uses (*Groundwater Special Study*)

Stakeholder Input

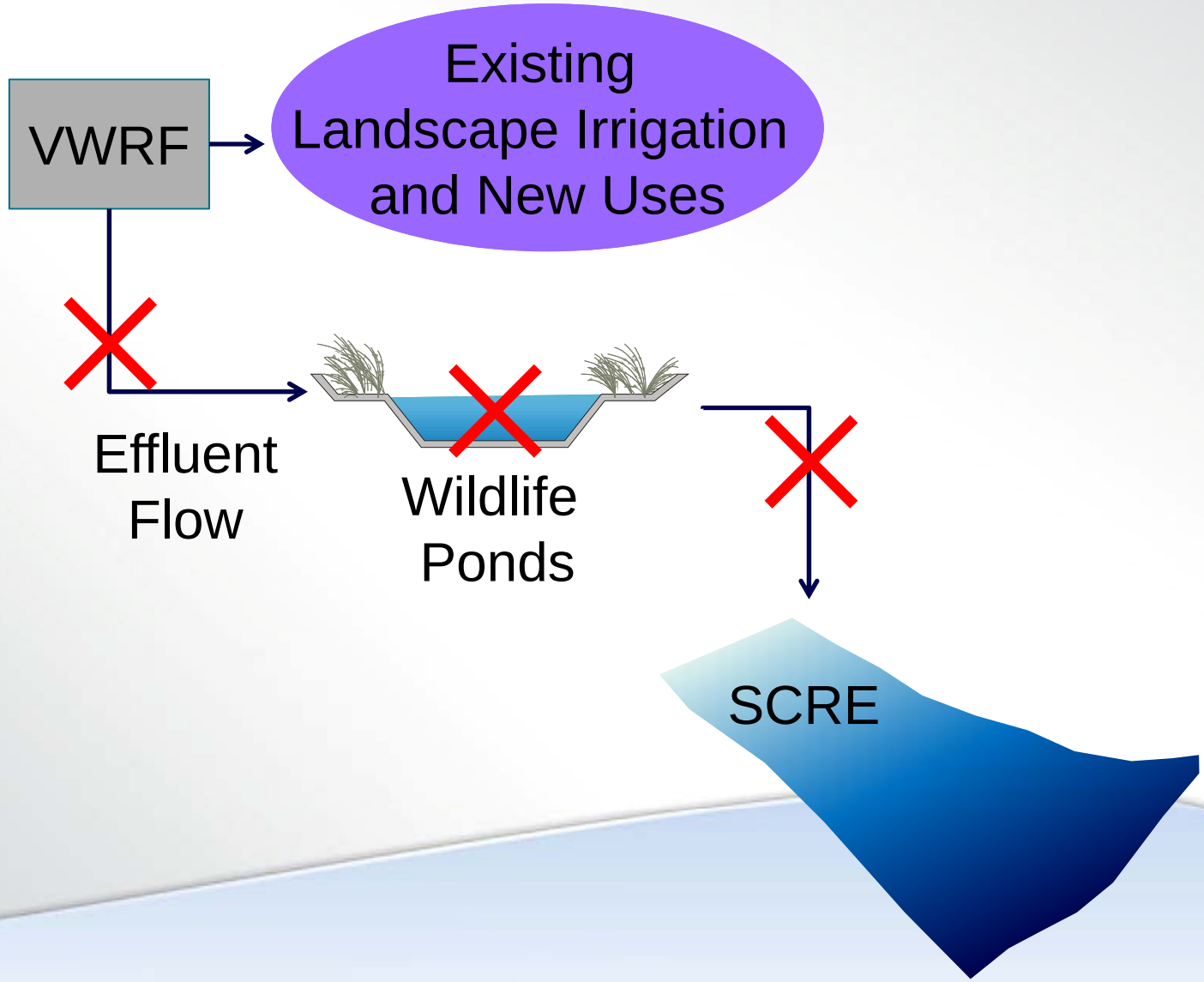
100% Diversion Study

Effluent flow estimates for 100% diversion

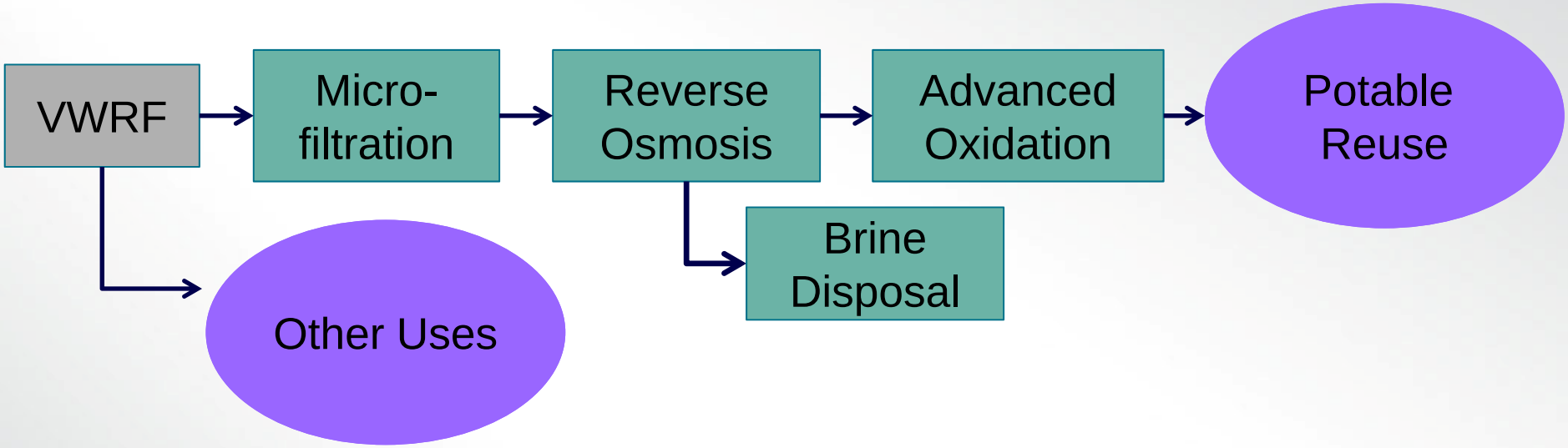


Condition	Effluent Flow (mgd)	
	Existing	Future
Summer	7.3	11.2
Winter*	8.4	12.9
* Maximum month flow		

100% Diversion – All of the effluent is diverted



Phase 2 Preferred Project was potable reuse for 3.6 to 6.3 mgd

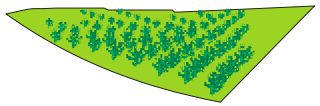


Implement 3.6 mgd Potable Reuse		
Condition	Effluent Flow (mgd)	
	Existing	Future
Summer	2.8	6.7
Winter	3.9	8.4

Implement 6.3 mgd Potable Reuse		
Condition	Effluent Flow (mgd)	
	Existing	Future
Summer	0 (-0.6)	3.3
Winter	0.5	5

What are other projects or combinations of projects to achieve 100% diversion?

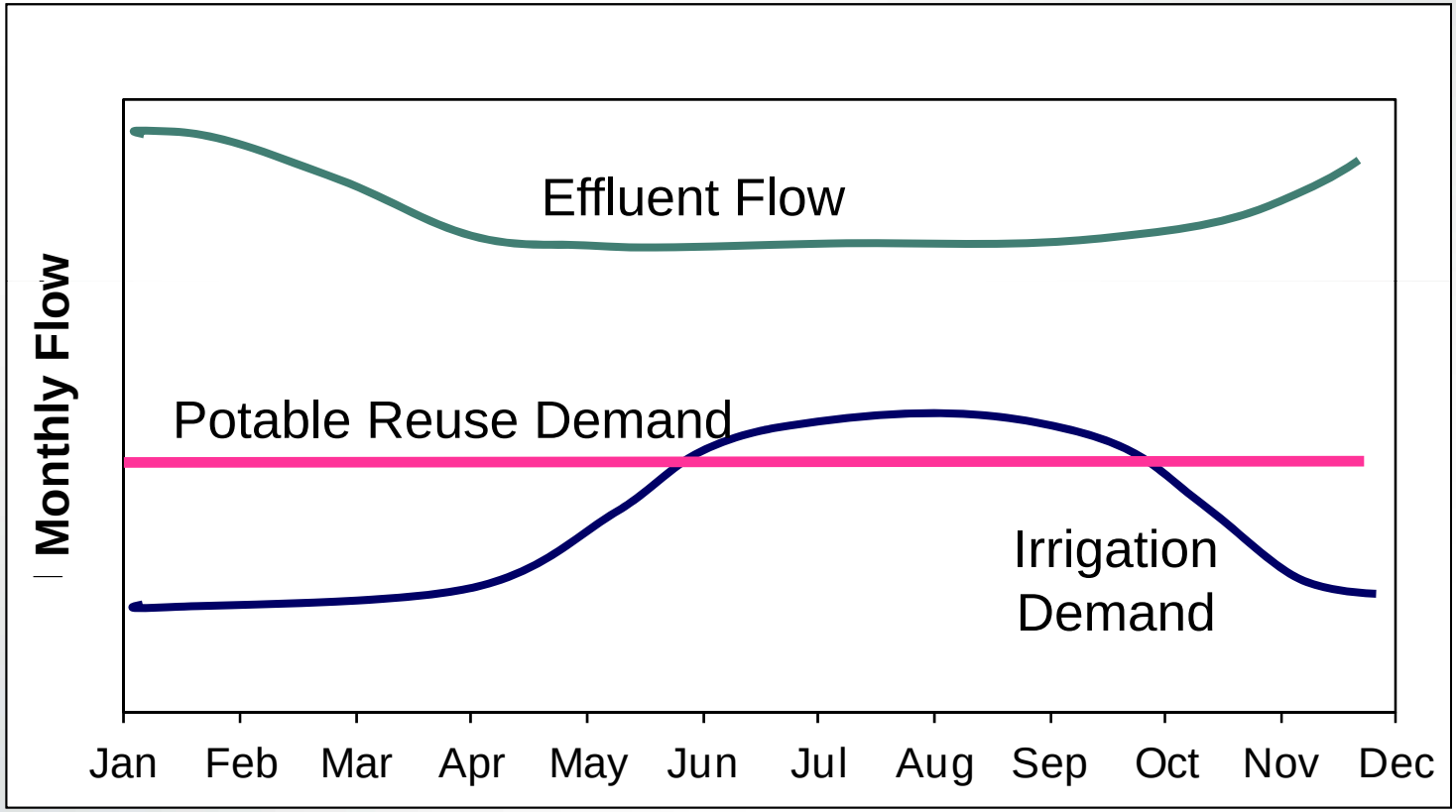
- Increased diversion for one potable reuse method
- A combination of potable reuse methods
- Agricultural Irrigation
  - Partial RO treatment required



- Urban Irrigation
  - Expansion of existing system
  - Decentralized treatment and reuse

In Phases 1 and 2 we identified recycled water demands and treatment needs for various recycled water uses

Recycled water demand for irrigation and effluent flows do not typically align

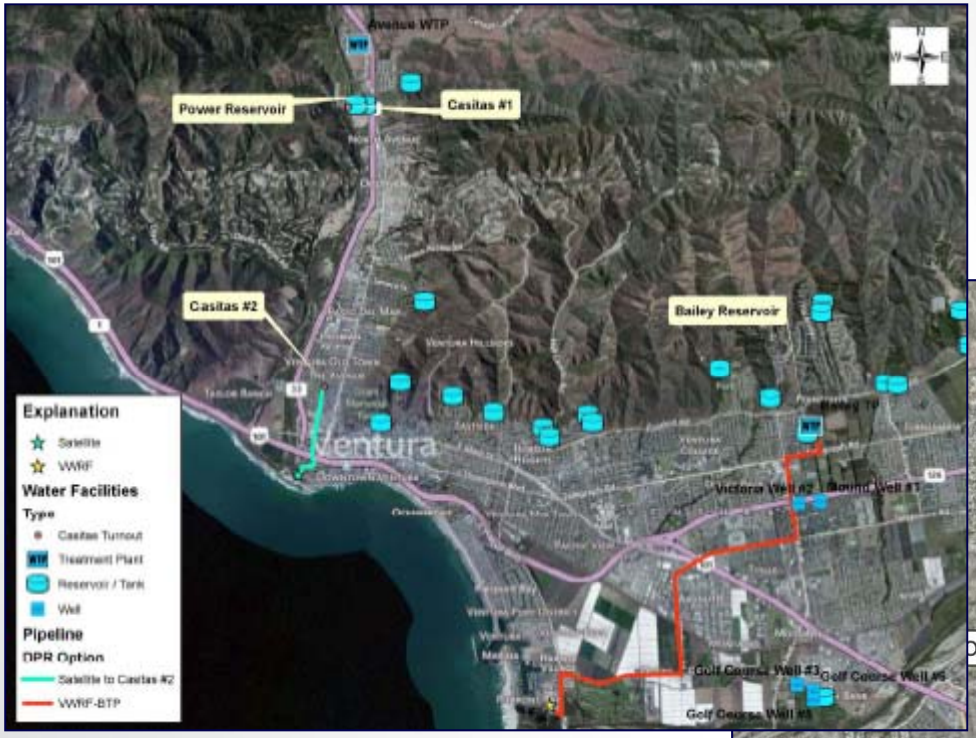


Effluent Flow – Influenced by service area population hydrologic conditions, and water conservation.

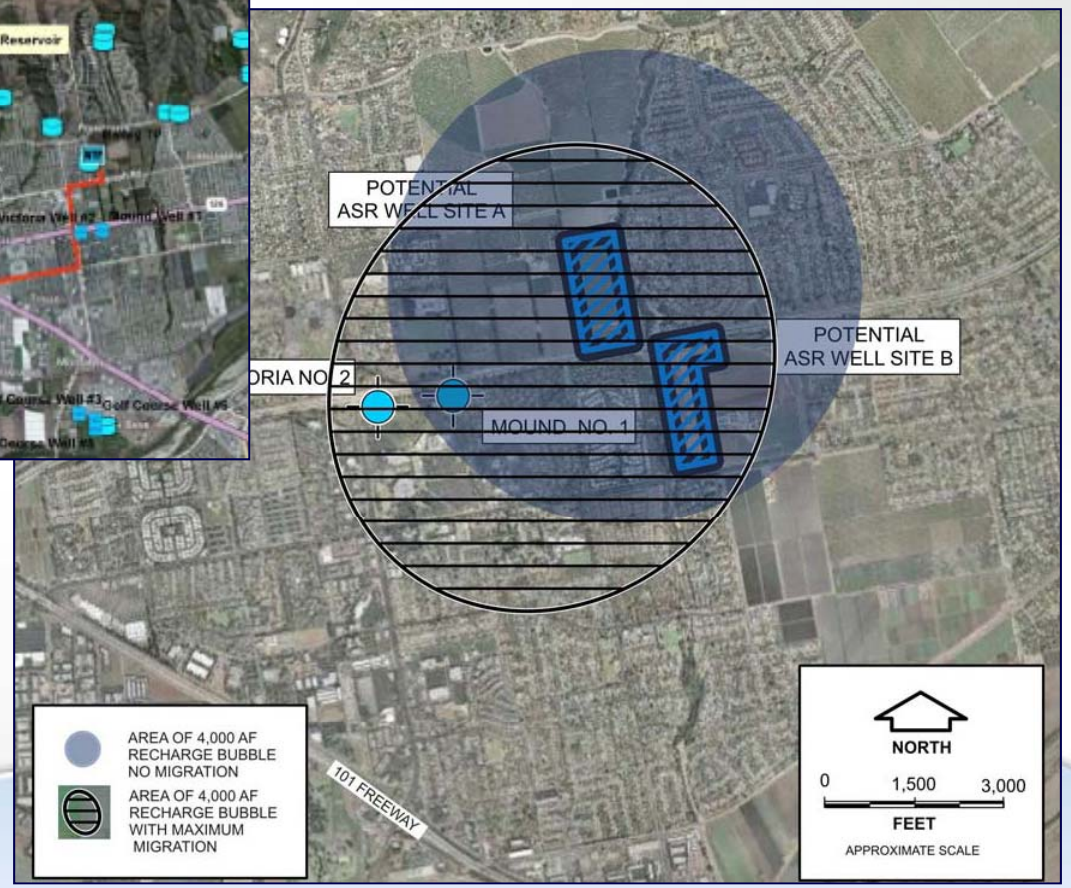
City plans to expand the existing recycled water system (urban reuse)

- City will continue to expand their system as opportunities arise
  - Recycled water focus area
- Users in vicinity of pipelines constructed for other RW projects

Increasing Potable Reuse

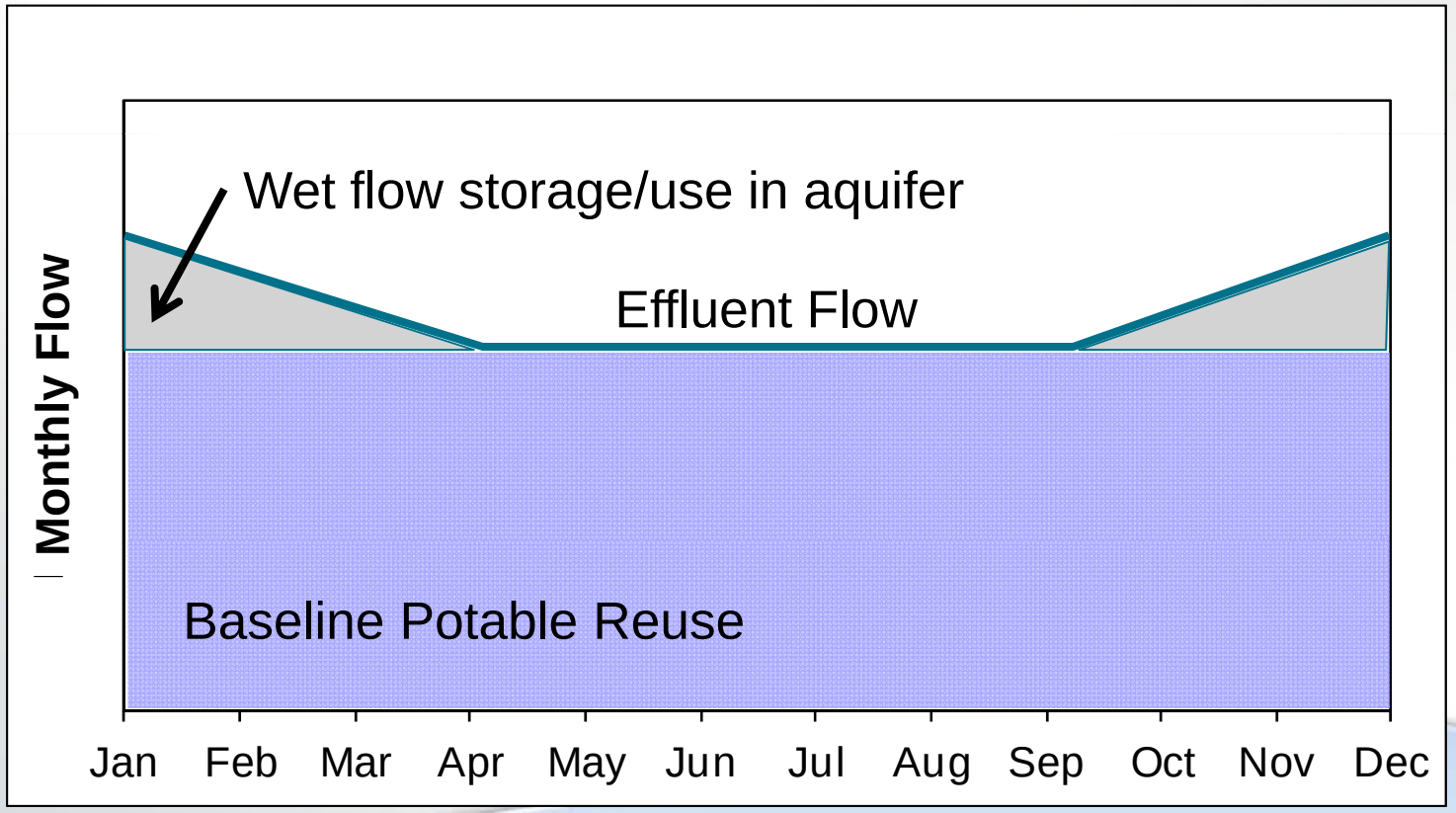


- Where provide buffer or storage – in tanks or in the ground?



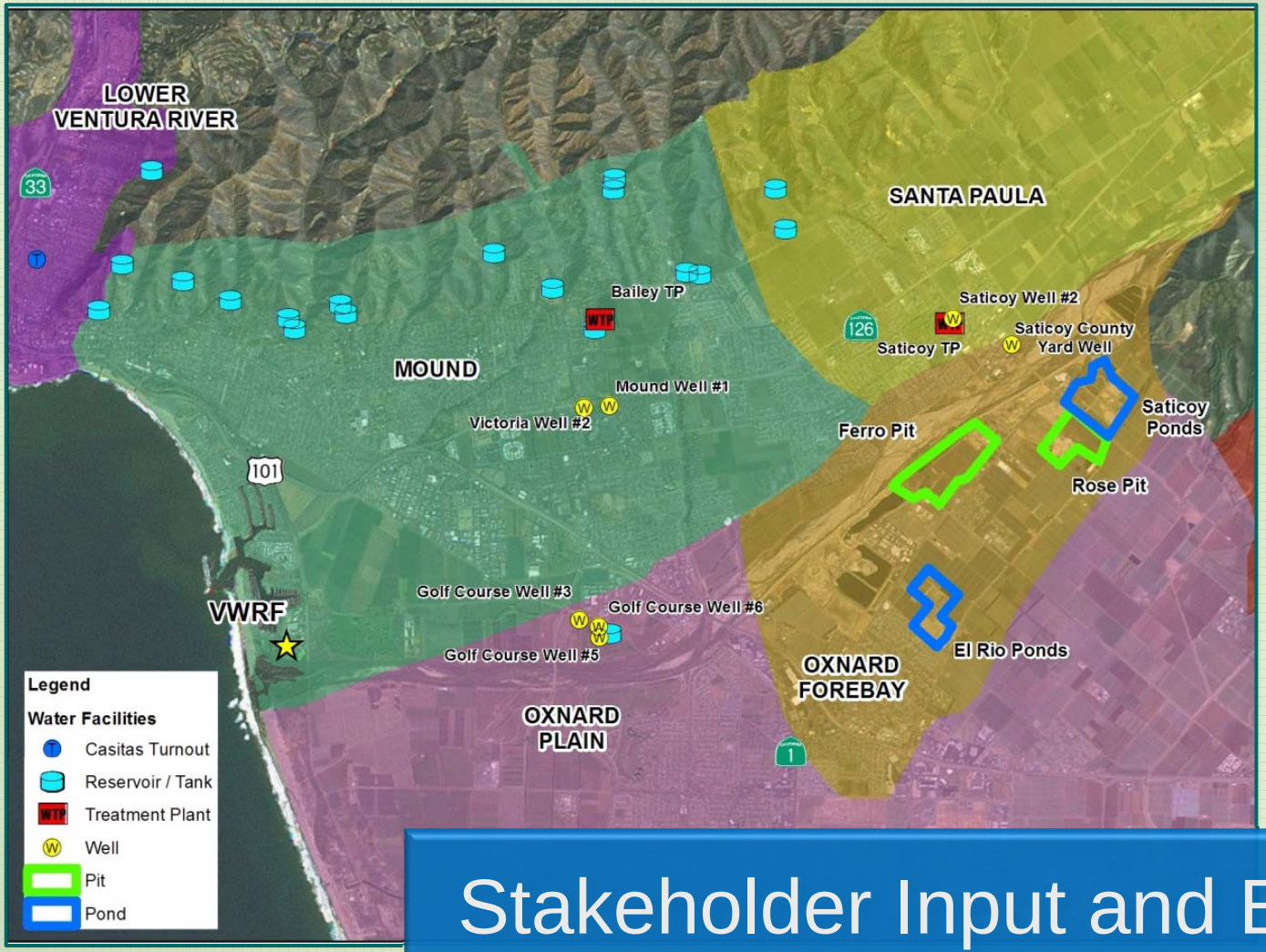
Combination of Potable Reuse with aquifer storage

- Use direct and indirect in combination to divert seasonal effluent flows



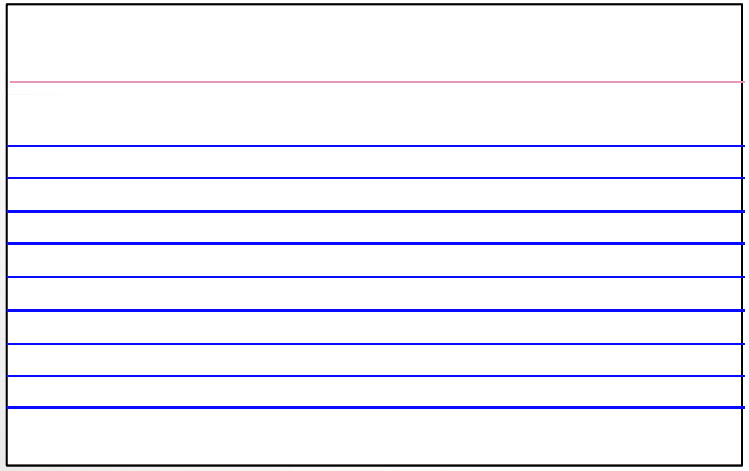
Other combinations of various reuse opportunities

- Example analysis
  - Potable Reuse at 6.3 mgd
  - Urban irrigation within City from VWRF
  - Ag irrigation near VWRF
  - Decentralized treatment and Ag/Urban irrigation



Stakeholder Input and Break

Activity – What projects or combinations should be considered for 100% diversion?



Use your cards to provide input

Next Steps

Next Steps

- We will use your input
  - Generate ideas for 100% diversion projects
  - Understand stakeholder preferences for various diversion projects
- Next stakeholder meeting is Spring 2015
  - RO Pilot
  - Status on 100% Diversion Study
  - Update on implementation of estuary monitoring

RO Pilot at VWRF

RO Pilot Testing Schedule
Winter 2015

Opportunities for Site Visits

- Learn more about potable reuse
- Learn more about research project
- First-hand view of processes
- Taste it?

For more information:

- Project Website

http://www.cityofventura.net/water/screstudies

- Contact

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kwaln@venturawater.net

End