

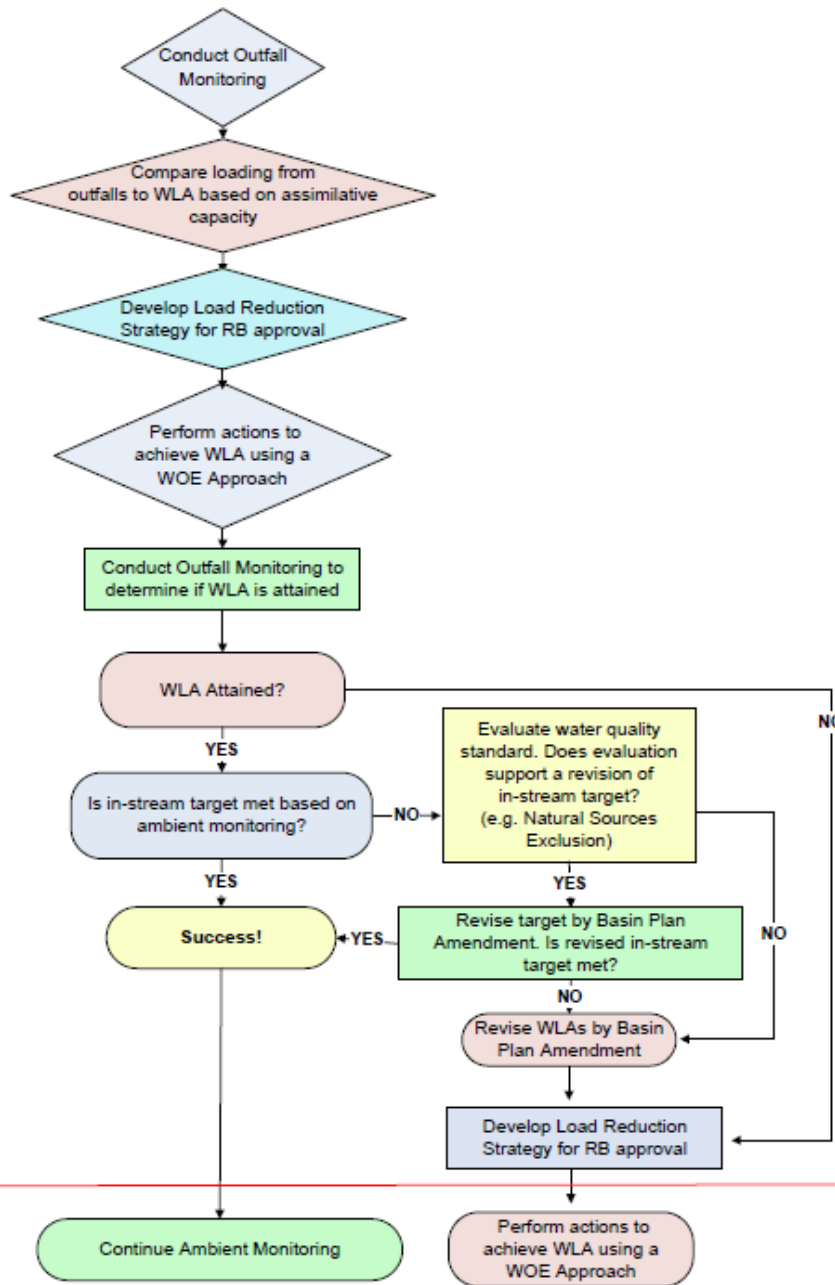
**Dry Weather  
Implementation Approach for  
LA River Bacteria TMDL**

**Joint Steering Committee/WT Group  
April 24, 2009**

# Overview

- Review of Framework (flow chart)
- 3<sup>rd</sup> Diamond
  - Identifying Problematic Drains
    - Monte Carlo
  - BMP Selection
  - BMP Assessment
    - Monte Carlo

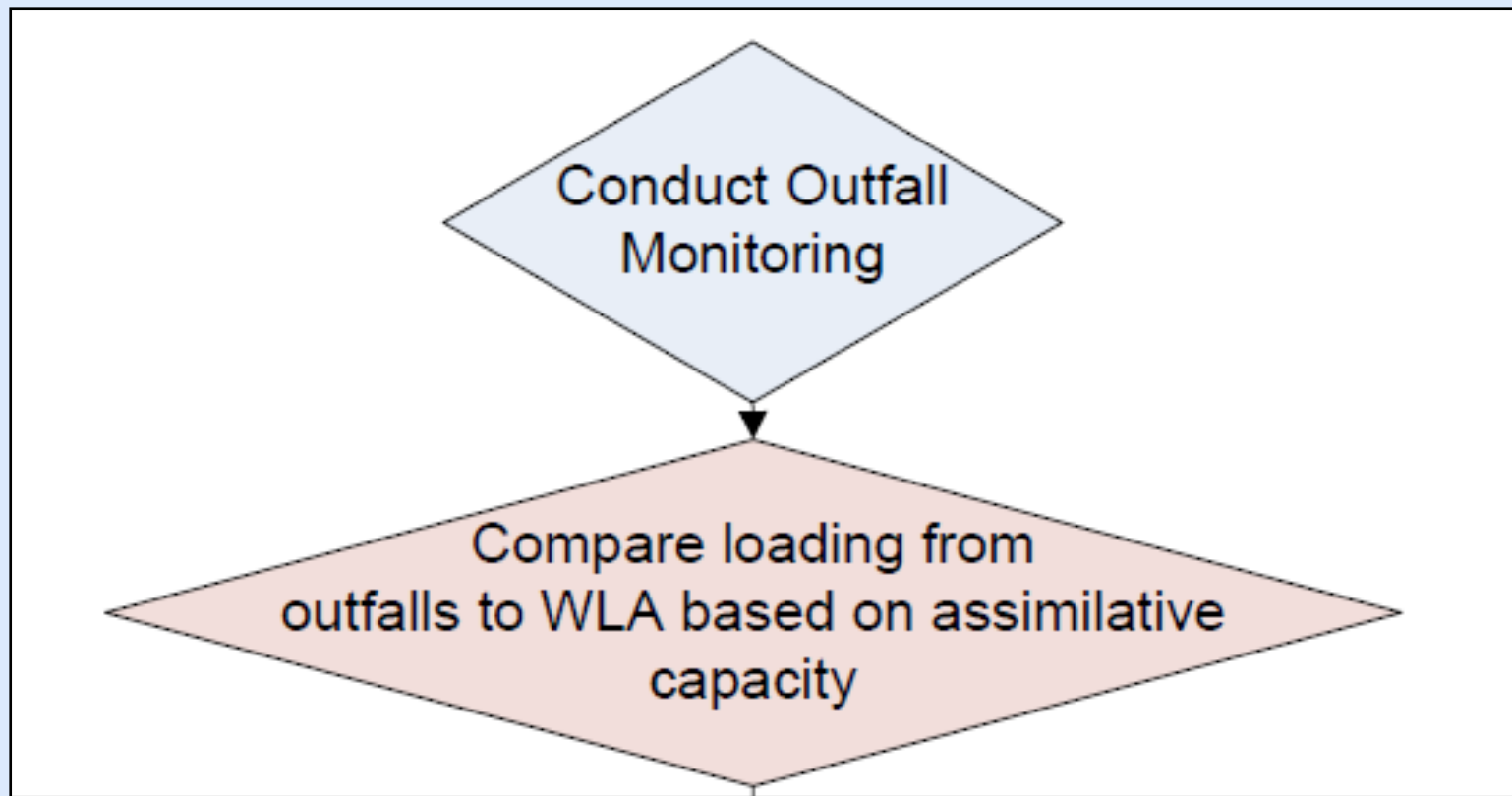
**BEGINNING OF PHASE**



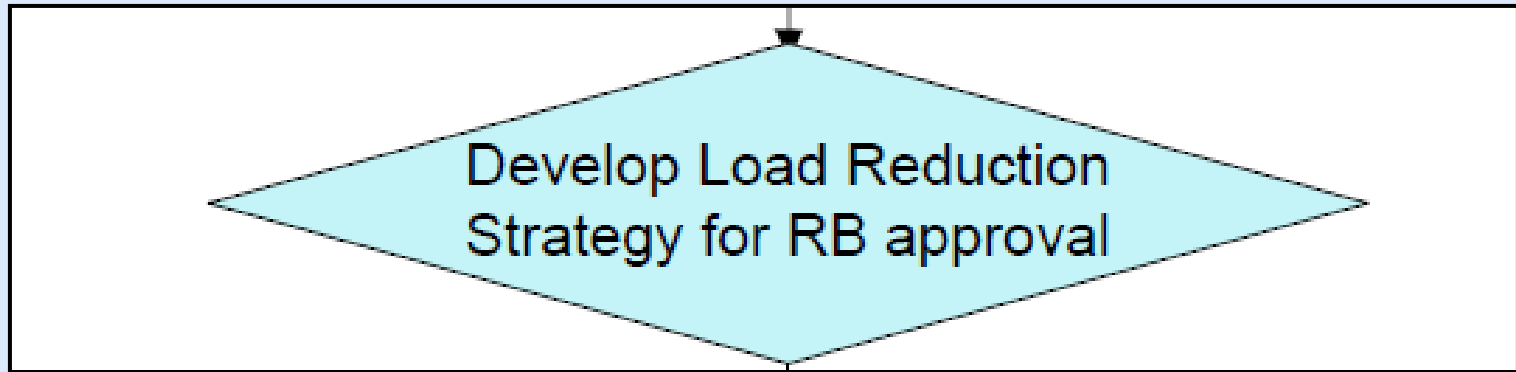
**END OF PHASE**

**BEGINNING OF PHASE**

**CONTINUE AS ABOVE**



- **Collect outfall data to**
  - Evaluate loading from drains in reach of interest
  - Support prioritization of outfalls based on WOE
  - Determine required actions



- Detailed Strategy that
  - Identifies drains and actions
  - Is approved by RB to support iterative process
- Actual load reduction strategy developed after TMDL adoption in each Phase

# Identify Drains

## STEP #1:

Create model (Monte Carlo) of storm drain discharges along LA River reach based on outfall monitoring data.

Outfall	Estimated <i>E. coli</i> Loading Rate (10 <sup>9</sup> MPN/day)
RX-1	18
RX-2	298
RX-3	24
RX-4	123
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.	.
.	.
RX-35	6

## STEP #2:

Rank outfalls from highest to lowest based on simulated *E. coli* percent reduction and categorize using WOE Approach.

Outfall	Estimated <i>E. coli</i> Loading Rate (10 <sup>9</sup> MPN/day)	Estimated <i>E. coli</i> Loading Percent Reduction if Outfall Removed	Problematic for WOE Indicators other than <i>E. coli</i> ?
RX-17	385	22%	YES ✓
RX-2	298	17%	YES ✓
RX-31	245	14%	YES ✓
RX-14	210	12%	NO
RX-9	158	9%	YES ✓
RX-24	140	8%	NO
RX-32	105	6%	YES ✓
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
RX-7	18	1%	NO

# ELEVATED LOADING RATES

# REACH 2 Storm Drains

# ELEVATED CONCENTRATIONS

DIFFERENT

CONSISTENT

RARE

DIFFERENT

CONSISTENT

RARE

Statistically Higher

Top 5 Drain at least 3 of 6 Events

Loading Rate >50% of Event Total at Least Once

Statistically Higher (Virus = 3 Positives)

>90th Percentile Concentration at least 2 of 6 Events (Virus = 2 Positives)

99th Percentile Concentrations (Virus = 1 Positive)

R2-N

R2-A  
R2-K  
R2-N

R2-N  
R2-T  
R2-NEW-20

*E. coli*

R2-A  
R2-N  
R2-NEW-18

R2-A  
R2-N  
R2-NEW-18

R2-NEW-18  
R2-NEW-20

R2-A  
R2-02  
R2-N

R2-A  
R2-02  
R2-F  
R2-K  
R2-N

R2-A  
R2-02  
R2-G

**HUMAN**  
*Bacteroidales*

R2-A  
R2-N  
R2-02

R2-A  
R2-02  
R2-N

R2-A

**VIRUS**

R2-B  
R2-F  
R2-G  
R2-J

R2-A  
R2-N  
R2-Q  
R2-06

R2-A  
R2-G  
R2-N

**Entero**

R2-A  
R2-N  
R2-O  
R2-NEW-18

R2-NEW-18  
R2-NEW-20

R2-A  
R2-E  
R2-F  
R2-B  
R2-Q

R2-F  
R2-N

**Universal**  
*Bacteroidales*

R2-N

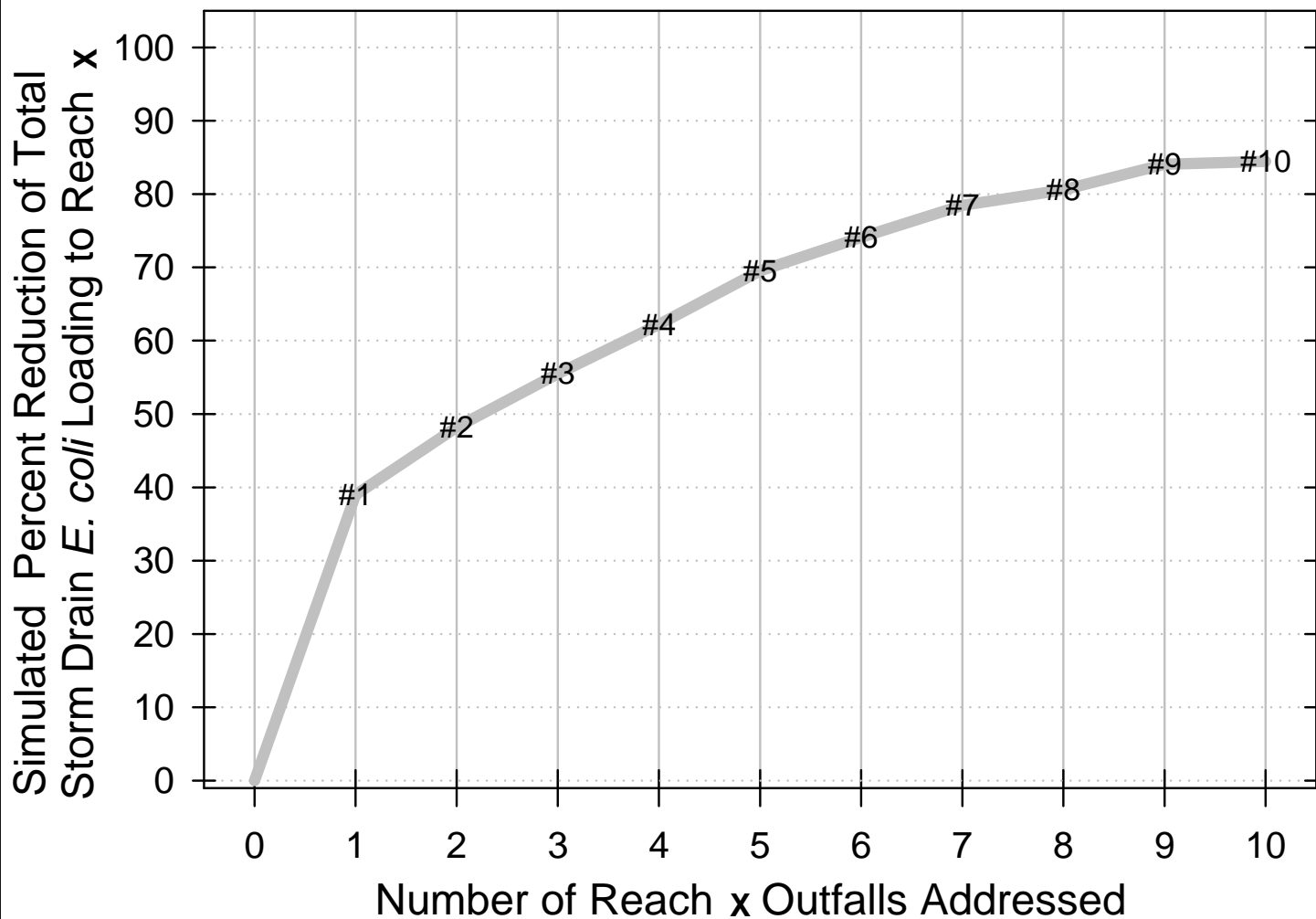
R2-A  
R2-F  
R2-N  
R2-Q

R2-N

## STEP #2:

Rank outfalls from highest to lowest based on simulated *E. coli* percent reduction and categorize using WOE Approach.

Outfall	Estimated <i>E. coli</i> Loading Rate (10 <sup>9</sup> MPN/day)	Estimated <i>E. coli</i> Loading Percent Reduction if Outfall Removed	Problematic for WOE Indicators other than <i>E. coli</i> ?
RX-17	385	22%	YES ✓
RX-2	298	17%	YES ✓
RX-31	245	14%	YES ✓
RX-14	210	12%	NO
RX-9	158	9%	YES ✓
RX-24	140	8%	NO
RX-32	105	6%	YES ✓
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
RX-7	18	1%	NO



### STEP #3:

Determine the number of WOE outfalls required to reduce total storm loading to below WLA (based on Monte Carlo simulation median).

Outfall	Estimated <i>E. coli</i> Loading Percent Reduction if Outfall Removed	Total Storm Drain Loading once Removed (Cumulative) based on Simulation Median) (10 <sup>3</sup> MPN/day)
RX-17	22%	1365
RX-2	17%	1070
RX-31	14%	820
RX-9	9%	670
RX-18	7%	540
RX-32	6%	440
RX-28	6%	330
RX-11	5%	250
RX-19	4%	180
.	.	.
.	.	.
.	.	.
RX-7	1%	325

**Below WLA**

## STEP #4:

Perform implementation actions on WOE outfalls that fell above the WLA “cutoff”.

### Minimum Outfalls Subject to Implementation Actions

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RX-17 ✓

RX-2 ✓

RX-31 ✓

RX-9 ✓

RX-18 ✓

RX-32 ✓

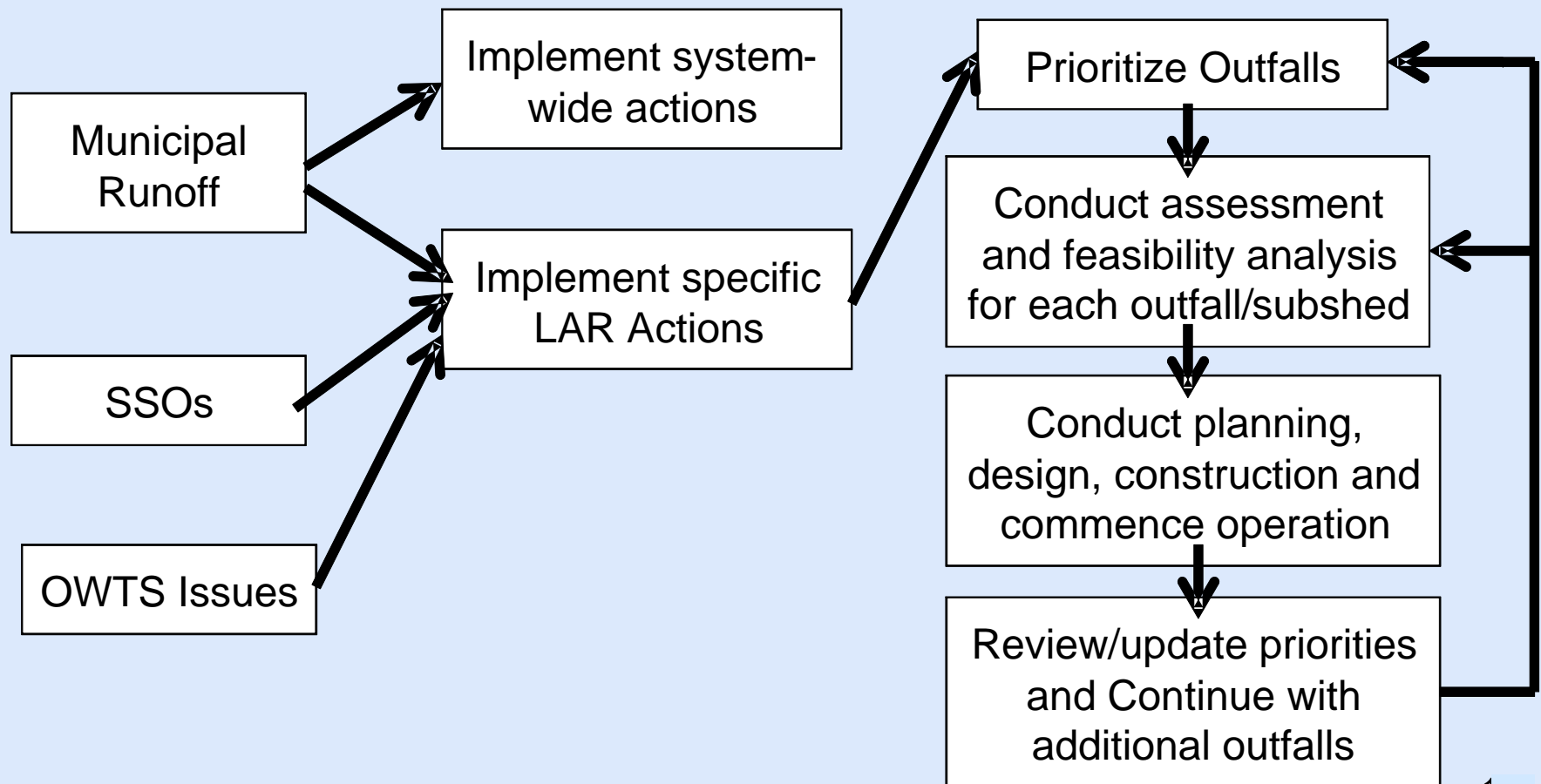
RX-28 ✓

# Develop Strategy

# Overview

- Implementation actions are the steps taken to plan and execute a load reduction strategy for a phase
- Essentially represented by the third and fourth diamonds in the WLA Approach (refer back to WLA diagram)

# Typical Implementation Actions and BMPs per Phase



# Approach to Developing Schedule Identify Priority Outfalls for Phase

## Example Priority Outfalls

Reach X Priority Outfalls <sup>1,2</sup>	Permittees in Drainage Area	Reach X Priority Outfalls <sup>1,2</sup>	Permittees in Drainage Area
RX-17	Agency A		Agency E
RX-2	Agency B	RX-9	Agency F
	Agency C		Agency G
	Agency D	RX-4	Agency M
	Agency E		Agency N
	Agency F	RX-32	Agency A
RX-31	Agency A		
	Agency D	RX-28	Agency Q

<sup>1</sup> Theoretically, based on outfall monitoring and Monte Carlo analysis, removal of discharges from these outfalls will result in attainment of the WLA for Reach X.

<sup>2</sup> If BMPs are utilized that provide less than 100% removal, additional outfalls (from Step 3 in Implementation Prioritization) will likely need to be added to this list to meet the WLA for Reach X.

# Approach to Developing Schedule

## Develop Time Line for Implementation Steps

### Example Implementation Steps

	Plan	Submit for Approval/Acceptance	Execute
<b>Actions</b>	<ul style="list-style-type: none"> <li>■ Initiate investigations of project feasibility for reach X outfalls</li>   <li>■ Coordinate among agencies</li>   <li>■ Develop reach-specific Strategic Plan with details of the outfall actions in the Phase</li> </ul>	<ul style="list-style-type: none"> <li>■ Submit Reach-specific Strategic Plan with Details of Proposed Outfall Actions for RWQCB approval including:               <ul style="list-style-type: none"> <li>- Approach to each individual priority outfall.</li> <li>- Demonstration with model (Monte Carlo) the expected reduction in loading based on proposed actions at</li> <li>- Demonstration with model (Monte Carlo) that expected loading from all outfalls after actions are taken will meet the WLA.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Complete design and construction and begin operation of diversion or structural BMPs</li>   <li style="text-align: center;">and / or</li> <li>■ Implement non-structural / source control BMPs</li>   <li style="text-align: center;">and / or</li> <li>■ Complete SSO elimination project</li>   <li style="text-align: center;">and / or</li> <li>■ Complete actions to eliminate OTWS Source (s)</li> </ul>
<b>Time Frame</b>	<ul style="list-style-type: none"> <li>■ --- months after the effective date of TMDL</li> </ul>	<ul style="list-style-type: none"> <li>■ --- months after submittal of Reach-Specific Plan</li> </ul>	<ul style="list-style-type: none"> <li>■ By the end of the Phase (----Years)</li> </ul>

# Quantify Approach

### STEP #3:

Determine the number of WOE outfalls required to reduce total storm loading to below WLA (based on Monte Carlo simulation median).

Outfall	Estimated <i>E. coli</i> Loading Percent Reduction if Outfall Removed	Total Storm Drain Loading once Removed (Cumulative) based on Simulation Median) (10 <sup>3</sup> MPN/day)
RX-17	22%	1365
RX-2	17%	1070
RX-31	14%	820
RX-9	9%	670
RX-18	7%	540
RX-32	6%	440
RX-28	6%	330
RX-11	5%	250
RX-19	4%	180
.	.	.
.	.	.
.	.	.
RX-7	1%	325

**Below WLA**

Outfall	Estimated <i>E. coli</i> Loading Rate (10 <sup>9</sup> MPN/day)	Proposed Action	Expected <i>E. coli</i> Loading Removal Effectiveness of Proposed Action	Total Storm Drain Loading once Actions are Implemented (Cumulative) based on Simulation Median) (10 <sup>9</sup> MPN/day)
RX-17	385	Diversion	100%	1,365 ✓
RX-2	298	<b>Wetland</b>	<b>60%</b>	1,190 ✓
RX-31	245	Diversion	100%	940 ✓
RX-9	158	<b>Sand Filter</b>	<b>75%</b>	820 ✓
RX-18	123	Diversion	100%	700 ✓
RX-32	105	Infiltration	100%	600 ✓
RX-28	105	Infiltration	100%	490 ✓
RX-11	88	Diversion	100%	410 ✓
RX-19	70	Infiltration	100%	330 ✓
<hr style="border-top: 1px dashed black;"/>				
RX-3				320
.				.
.				.
RX-7				120

Below WLA

# Conclusions

- Approach based on simple tool that incorporates Weight of Evidence approach
- Provides a balance of flexibility and quantification to support iterative process
- **Integration of this approach into MS4 Permits very important**