

# PUBLIC MEETING BACTERIA TMDL COST BENEFIT ANALYSIS

AUGUST 17, 2017

# PUBLIC MEETING AGENDA

- 9:30   ▪ Welcome and Introductions
  - Lewis Michaelson, Katz and Associates
- 9:40   ▪ Purpose and Development Process
  - Chad Praul, Environmental Incentives
- 9:45   ▪ CBA Structure and Scenarios
  - Chad Praul, Environmental Incentives
- 10:10   ▪ CBA Guidance and Benefits Analysis
  - Mark Buckley, ECONorthwest
- 10:30   ▪ Findings and Discussion
  - Chad Praul, Environmental Incentives
  - Lewis Michaelson, Katz and Associates
- 11:55   ▪ Next Steps

# PUBLIC MEETING GOAL AND OBJECTIVES

**Our goal** is to provide information and clarify the report and analysis rather than resolve issues arising from comments or feedback.

## **Audience**

- Understand the context, purpose and use of the CBA
- Provide information to support reading, comprehension and submittal of written comments

## **Steering Committee and Consultants**

- Understand audience's areas of interest & level of understanding

# STEERING COMMITTEE

## Regional Water Quality Control Board

James Smith

Jeremy Haas

Michelle Santillan

Cynthia Gorham

## County of San Diego

Todd Snyder

Stephanie Gaines

## City of San Diego

Drew Kleis

Ruth Kolb

Jeff Van Every

## County of Orange

Chris Crompton

Jian Peng

## Tax Payers Association

Ted Shaw

## San Diego River Park Foundation

Rob Hutsel

# TECHNICAL ADVISORY COMMITTEE

## TAC Lead

Ken Schiff, Southern California Coastal Water Research Project

## Stormwater Expert

Eric Strecker, Geosyntec Consulting

## Economics Expert

Charles Colgan, Middlebury Institute

## Wastewater Expert

Rhodes Trussel, Trussel Technologies

## Epidemiology Expert

Tim Wade, USEPA Office of Research and Development

# CONSULTANTS

## Environmental Incentives

Chad Praul

Maso Motlow

Evan Branosky

## ECONorthwest

Mark Buckley

Joel Ainsworth

Kevin Frazier

Ed MacMullan

Ralph Mastromonaco

Sarah Reich

Virginia Wiltshire-Gordon

Ryan Knapp

## TetraTech

Clint Boschen

Vada Yoon

## Brown and Caldwell

Bill Leever

Tony Hancock

Lisa Skutecki

## Soller Environmental

Jeff Soller

## ESA

David Pohl

# PURPOSE AND DEVELOPMENT PROCESS

# CBA INFORMS POTENTIAL TMDL AND BASIN PLAN AMENDMENTS

Evaluation of Contact Water Recreation (REC-I) WQOs  
and the Methods for Quantifying Exceedances

1. Participate in technical, scientific  
and regulatory advisory groups

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2. Conduct workshop on state of  
applicable science

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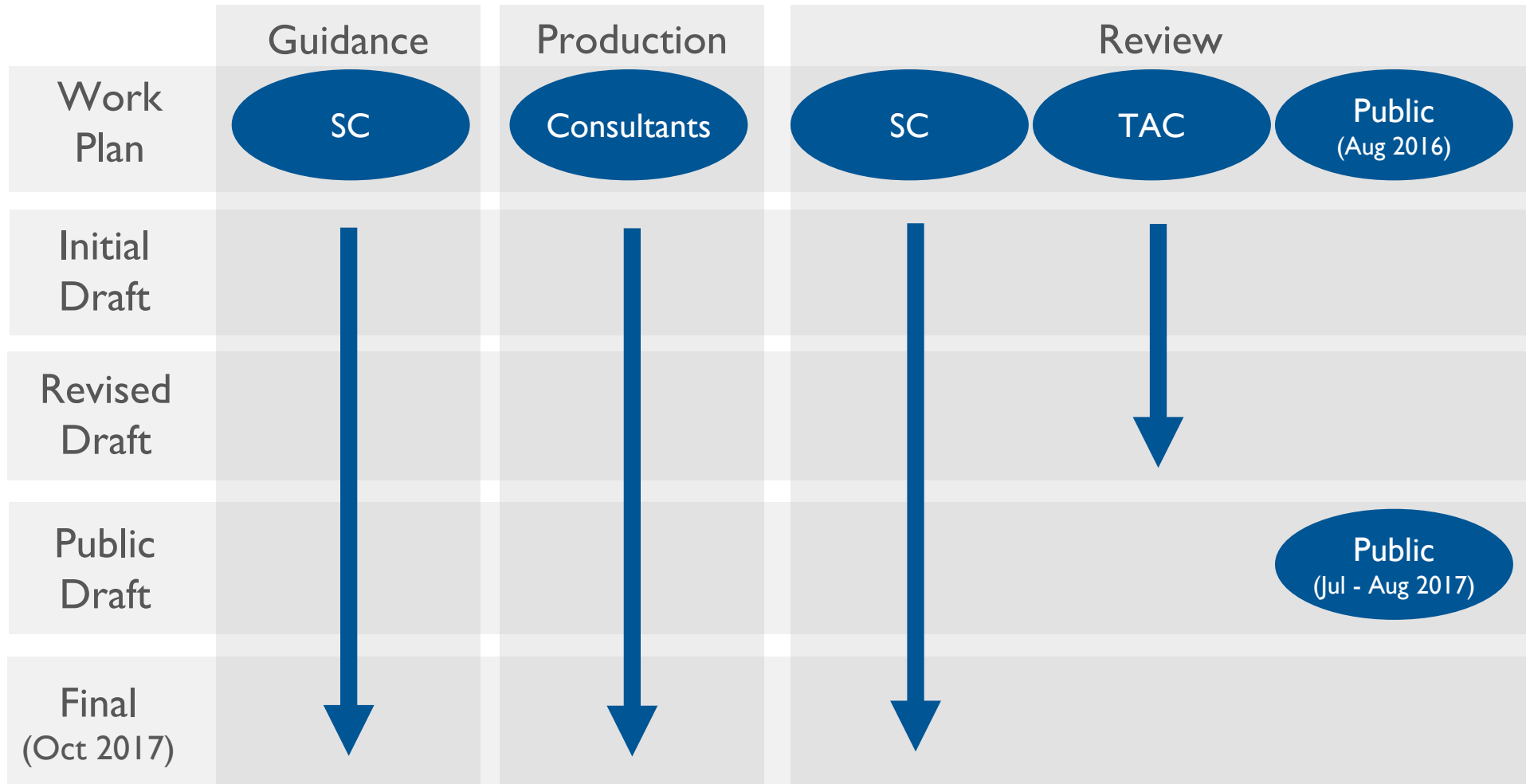
Triennial Review  
Commitment

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3. Seek Third-Party  
Cost-Benefit Analysis



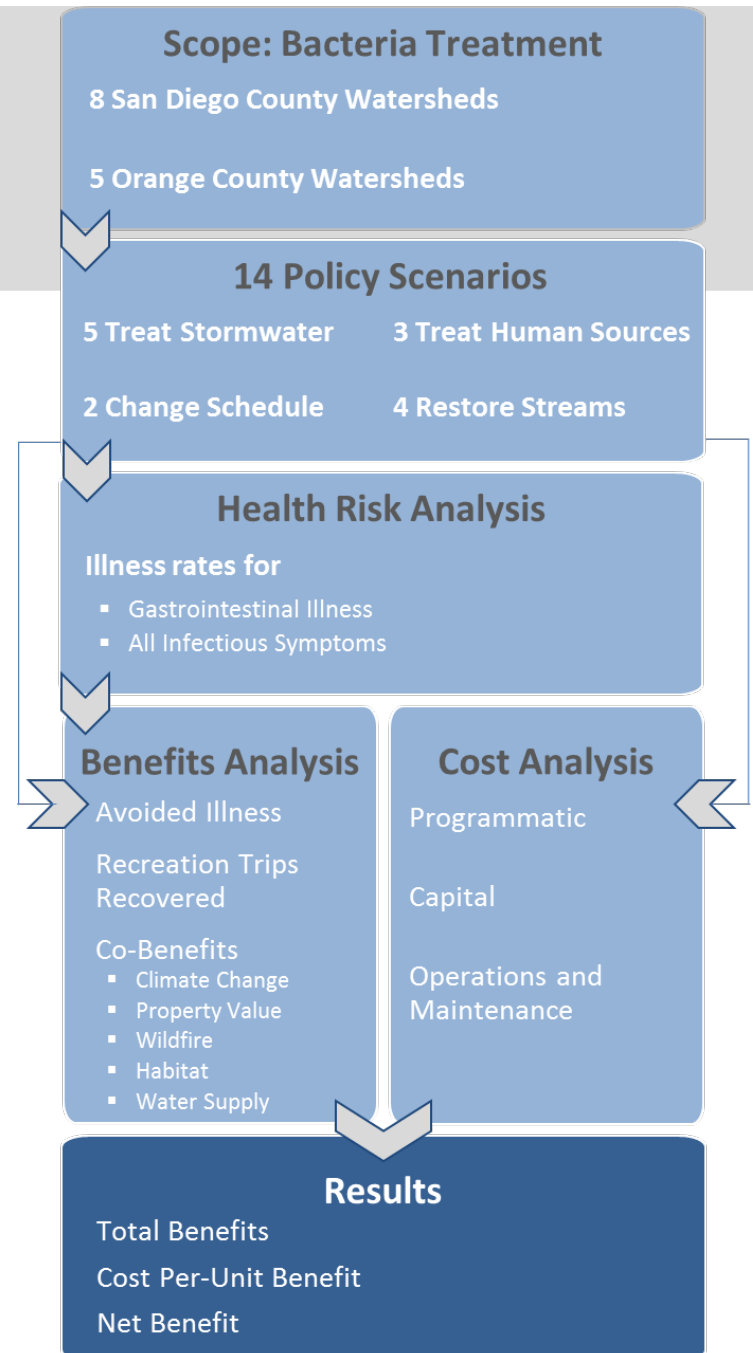
# CBA DEVELOPMENT PROCESS ENCOURAGED FEEDBACK FROM DIVERSE STAKEHOLDERS



# STRUCTURE AND SCENARIOS

# OVERVIEW OF ANALYSIS

- Scenarios each alter an aspect of TMDL implementation
- Scenario bacteria concentrations are used to find illness rates
- Benefits analysis finds values for avoiding illnesses, regaining beach days and co-benefits of BMPs
- Cost analysis finds costs for BMPs to achieve scenario goals
- Results convey findings for total benefits, cost-effectiveness and net benefits



## SCENARIO TYPE: FOCUS ON STORMWATER IMPLEMENTATION

Scenario Type	Scenarios	FC WQO*	Summary
Focus on Stormwater Implementation	2010 TMDL	400	Meet Bacteria TMDL through WQIP Strategies
	2012 REC Criteria	565	Meet USEPA 2012 Recreational Water Quality Criteria
	Move Compliance Locations	400	Meet Bacteria TMDL in Recreational Areas
	Flow-Based Suspensions	400	Suspend REC-I under high-flow when exposure unlikely
	Adjust All Beach WQO	2,215	Meet beach-specific WQO endpoint at all TMDL beaches

\*Note: FC WQO in colonies/100ml

## SCENARIO TYPE: CHANGE SCHEDULE OF COMPLIANCE

Scenario Type	Scenarios	FC WQO	Summary
Change Schedule of Compliance	CIP Schedule	400	Coordinate structural BMP implementation with capital improvement projects to meet Bacteria TMDL
	Compliance by 205 I	400	Extend wet weather compliance deadline for Bacteria TMDL from 203 I to 205 I

# RESULTS:

## FOCUS ON STORMWATER IMPLEMENTATION AND CHANGE SCHEDULE OF COMPLIANCE

### Water Quality

- BMP quantity to meet FC WQO for each scenario and watershed
- Average *Enterococcus* concentration for each storm day, and three following days, for each scenario and watershed over 25-year period
- Resulting load reduction per scenario and watershed
- Reductions of other pollutants
- Low, best and high bracket values for uncertainty analysis

\* Benefits estimates are based on *Enterococcus* modeling results at the beach (assuming dilution) and the resulting illness risk calculations

### Costs\*

- Cost for BMP implementation by scenario and watershed to reach compliance

\* Costs are based on fecal coliform modeling and cost estimates to be consistent with the San Diego WQIP

# SCENARIO TYPE: TARGET HUMAN WASTE SOURCES OF BACTERIA

Scenario Type	Scenarios	FC WQO*	Summary
Target Human Waste Sources of Bacteria	Human Sources: High	N/A	Identify, repair and replace high-priority sewer pipes and septic systems, and house transient population
	Human Sources: High+Med	N/A	Same as Human Sources: High but add medium-priority sewer pipes and septic systems
	Human Sources: High+Med+Low	N/A	Same as Human Sources: High+Med but add low-priority sewer pipes and septic systems

\*Note: Human Sources meet SCCWRP 2016 monitoring for HF183

## RESULTS: TARGET HUMAN SOURCES OF BACTERIA

### Water Quality

- HFI83 load reduction by watershed and scenario
- Low, best and high bracket values of HFI83 concentrations for three watersheds, extrapolated to others for uncertainty analysis

### Costs

- Annual cost for infrastructure repair and rehousing by watershed and scenario



# REDUCE BACTERIA THROUGH STREAM RESTORATION

Scenario Type	Scenarios	FC WQO*	Summary
Reduce Bacteria Through Stream Restoration	Stream: Instream Only	Varies	Restore streams to increase infiltration and retention time
	Stream: +10% Wetland	Varies	Restore streams and install wetlands to reduce loads by 10%
	Stream: +20% Wetland	Varies	Restore streams and install wetlands to reduce loads by 20%
	Stream: +MS4	Varies	Meet Bacteria TMDL by restoring streams and installing wetlands

\* Note: Stream Scenarios calculate load reduction to baseline, so concentrations vary among watersheds.

# RESULTS:

## REDUCE BACTERIA THROUGH STREAM RESTORATION

### Water Quality

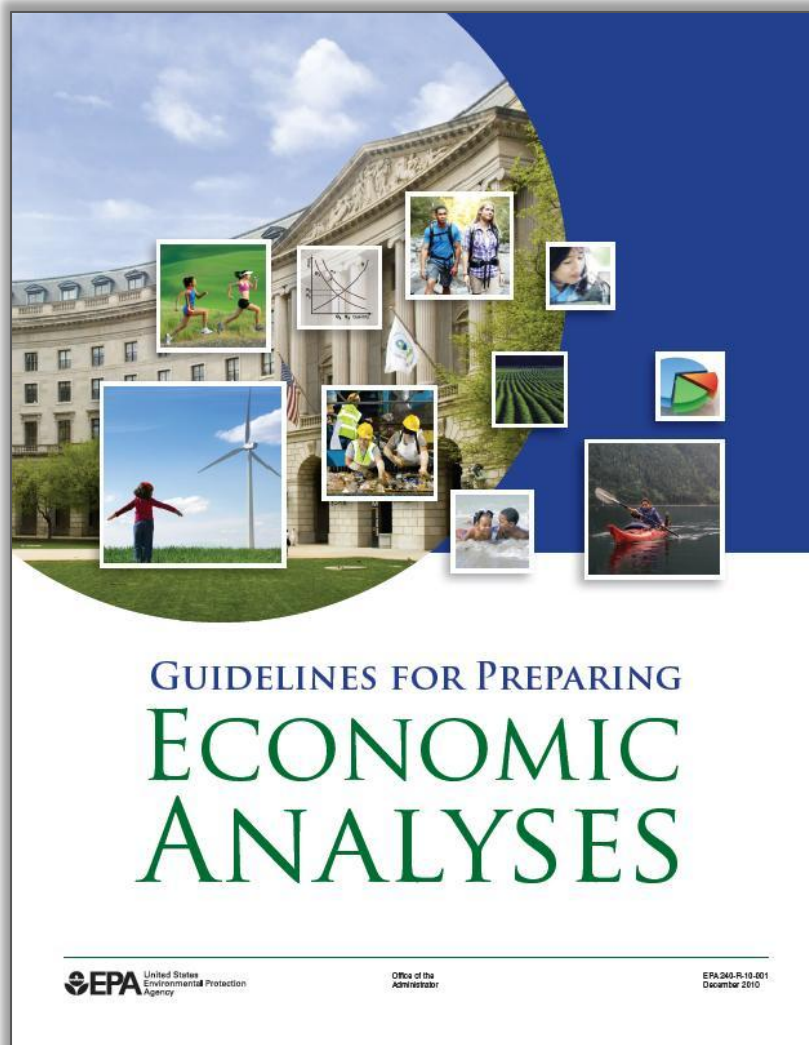
- Baseline *Enterococcus* load for each watershed
- Load reduction for Stream: Instream Only and Stream: MS4 scenarios (others fixed at 10% and 20%)
- Reduction in *Enterococcus* concentration per scenario and watershed
- Load and concentration reductions for uncertainty analyses, which vary number of projects installed and wetland removal efficiency

### Costs

- Cost for stream restoration and wetland installation by scenario and watershed

# GUIDANCE AND BENEFITS ANALYSIS

# CBA BASED ON FEDERAL GUIDANCE



- *USEPA Guidelines for Preparing Economic Analyses*
  - General guidance for agencies for economic analysis in regulatory context
  - Recommends consistent monetary terms and a focus on net benefits
  - Marginal/incremental analysis
  
- *OMB Circular A-4*
  - Emphasizes inclusion of all costs and benefits to the extent possible

# ALL IDENTIFIABLE BENEFITS INCLUDED

- Primary/Direct Benefits (All quantified and monetized)
  - Avoided Illness (gastrointestinal and all infectious illness)
  - Additional Beach Trips
- Co-Benefits (Bold quantified and monetized)
  - **Water Supply**
  - **Carbon Sequestration**
  - **Air Quality**
  - **Property Values**
  - Human Health and Well-Being
  - Flood Control
  - **Wildfire Risks**
  - **Riparian Habitat**
  - Recreation and Amenities
  - **Other Pollutant Removal**

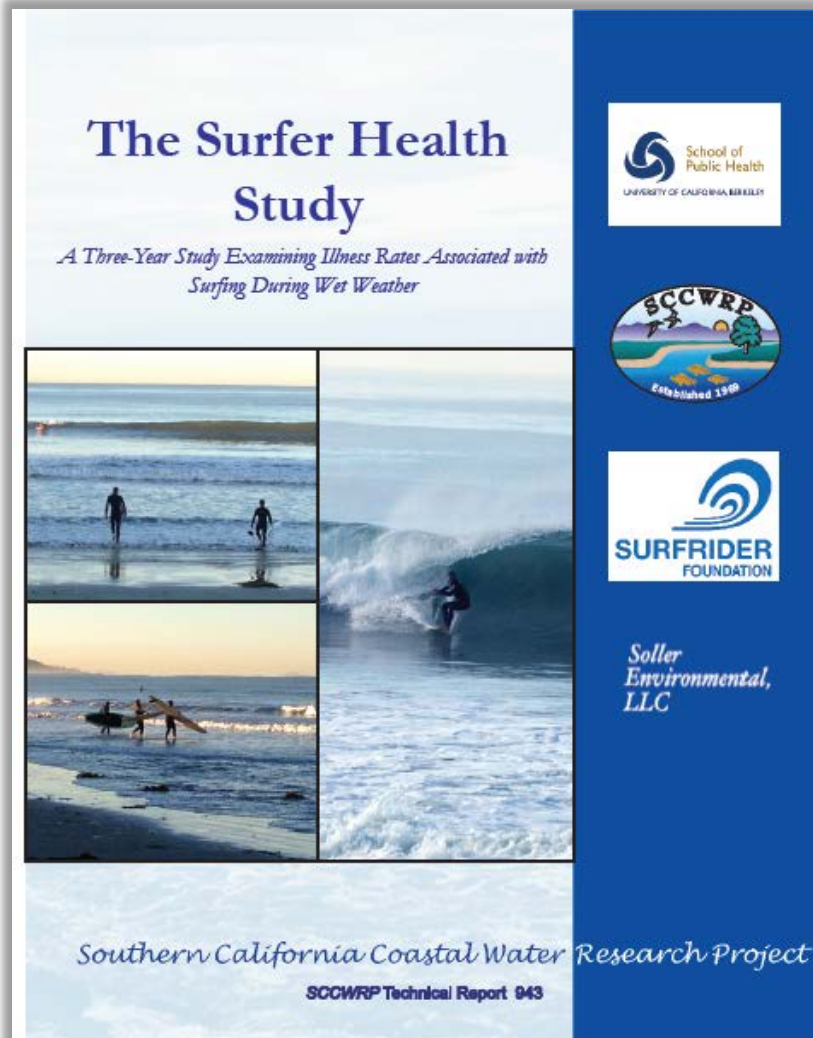
Only likely (not potential) benefits quantified or described.

Human Sources scenario secondary effects not defined sufficiently for quantification.

# BASIC ASSUMPTIONS

- 65 Year timeframe (to standardize across all scenarios)
- 3 percent discount rate (variable discount rate sensitivity analysis)
- Does not include economic impacts (jobs, income)
- Focused on wet weather BMPs and their benefits

# CBA USES REGIONAL SURFER HEALTH STUDY



- First of-its-kind wet weather epidemiological study during 2014-2015 winters
- Measures rates of acute illness after seawater exposure countywide
- Determines relationship between levels of fecal indicator bacteria and illnesses at two beaches
- Establishes basis of CBA health risk analysis

# PUBLIC HEALTH BENEFITS



- Compiled all available beach attendance data
  - Including daily data and visitor type
- Developed statistical (econometric) model of exposures (surfers and swimmers) on wet days (storm, storm +1, +2, +3)
- Used peer-reviewed value of avoided illnesses based on literature review including willingness-to-pay, healthcare costs, and lost work/leisure time.

BENEFIT	VALUE (LOW)	VALUE (HIGH)
Avoided GI Illness	\$78.9	\$263
Avoided Any Non-GI Infectious Illness	\$78.9	\$2,630



# RECREATION BENEFITS

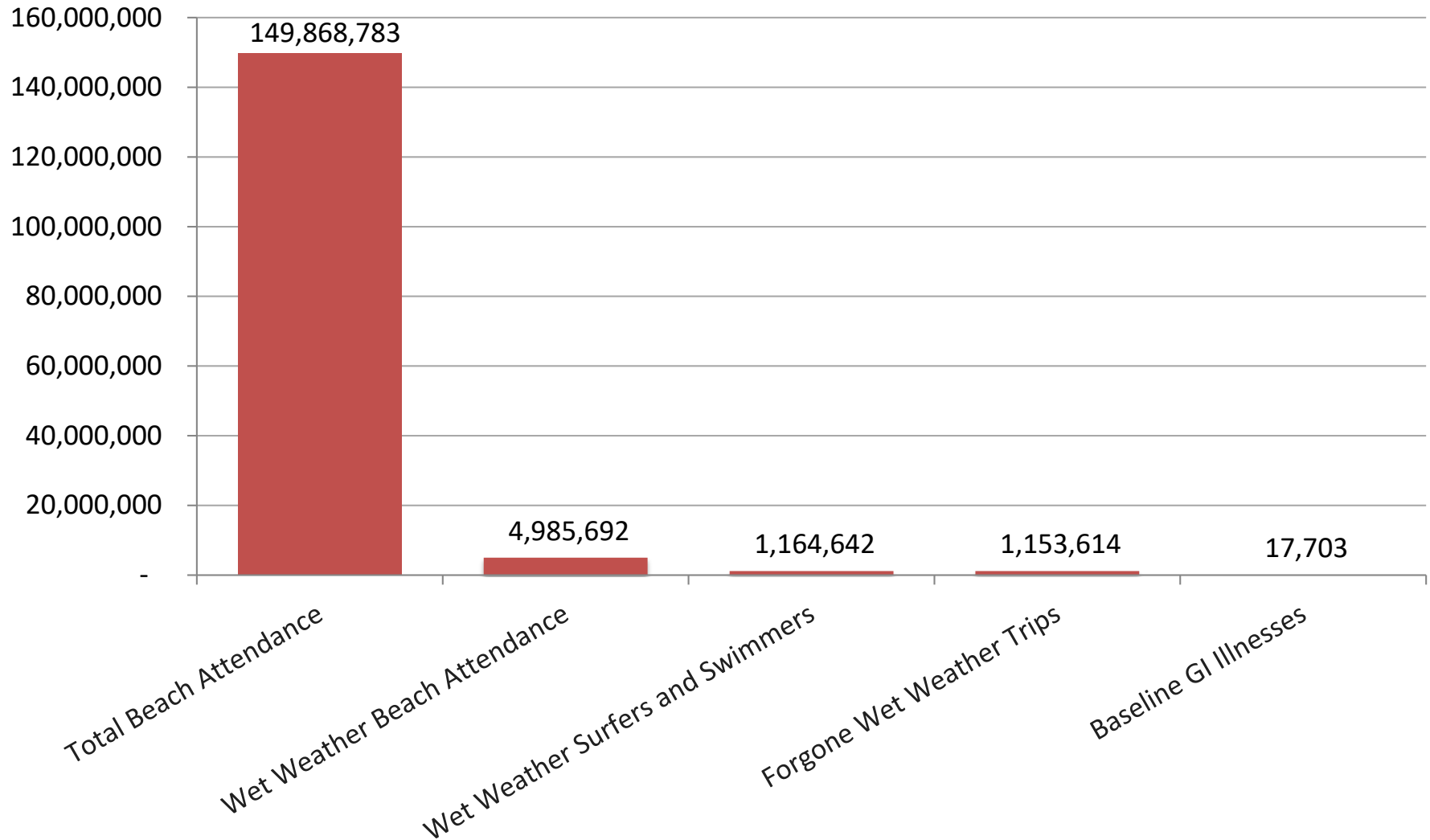


- Calculated forgone trips based on beach attendance data for non-storm wet days
- Included all beach visitors (surfers, swimmers, and non-swimmers)
- Calculate change in safe wet days
- Trip value based on peer-reviewed survey-based study from San Diego County
- \$39.68 per trip value (consumer surplus, or net benefit to visitor)

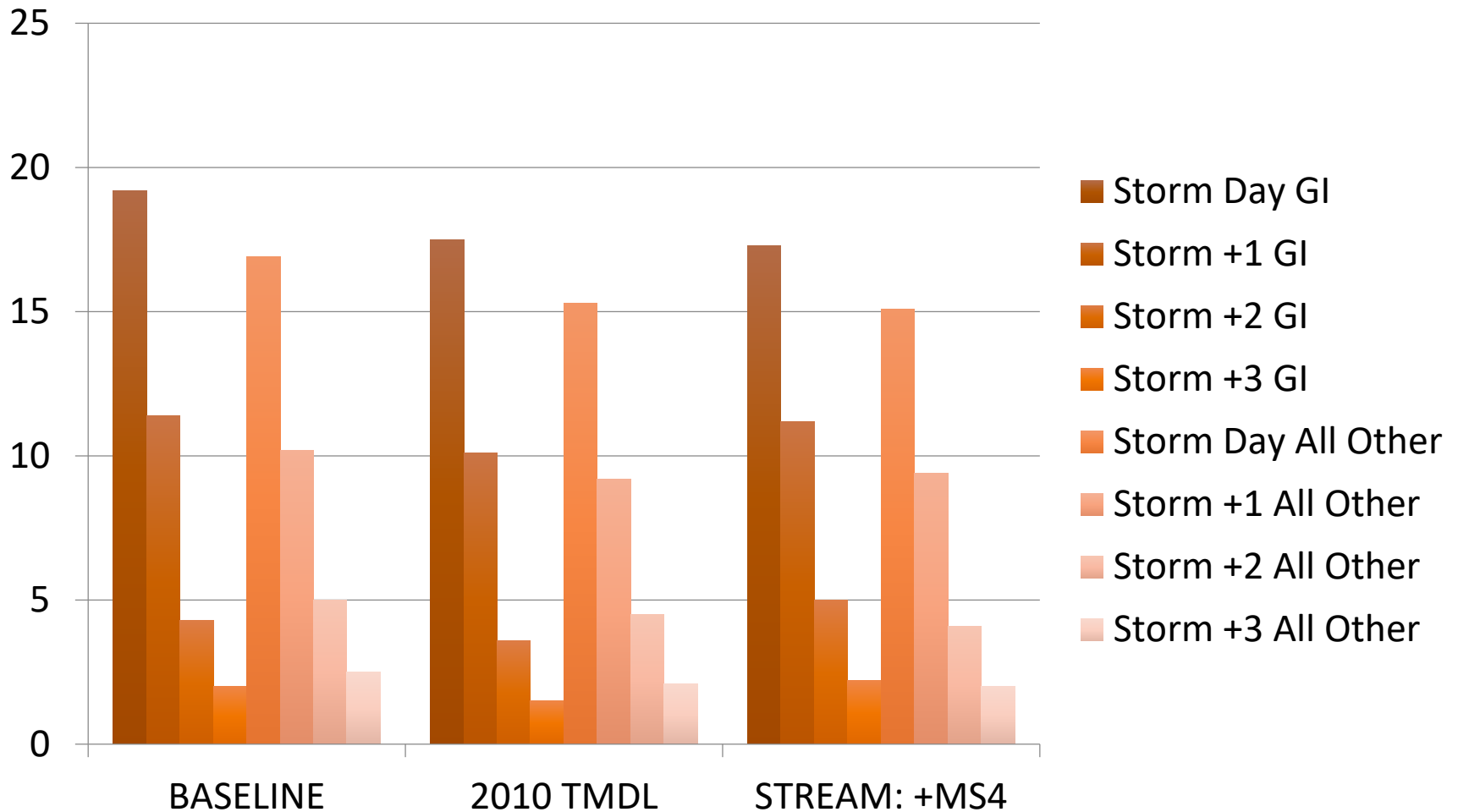
# CO-BENEFIT HIGHLIGHTS

- Carbon benefits based on trees as part of green stormwater infrastructure
- Air quality benefits based on tree absorption
- Amenities based on property values (literature)
- Wildfire risk reduction based on invasive species removal
- Riparian habitat based on stream restoration acreages, revealed regional expenditures
- Other pollutants based on existing TMDLs by watershed and BMP-specific pollutant removal

# WET WEATHER BEACH VISITS (ANNUAL)

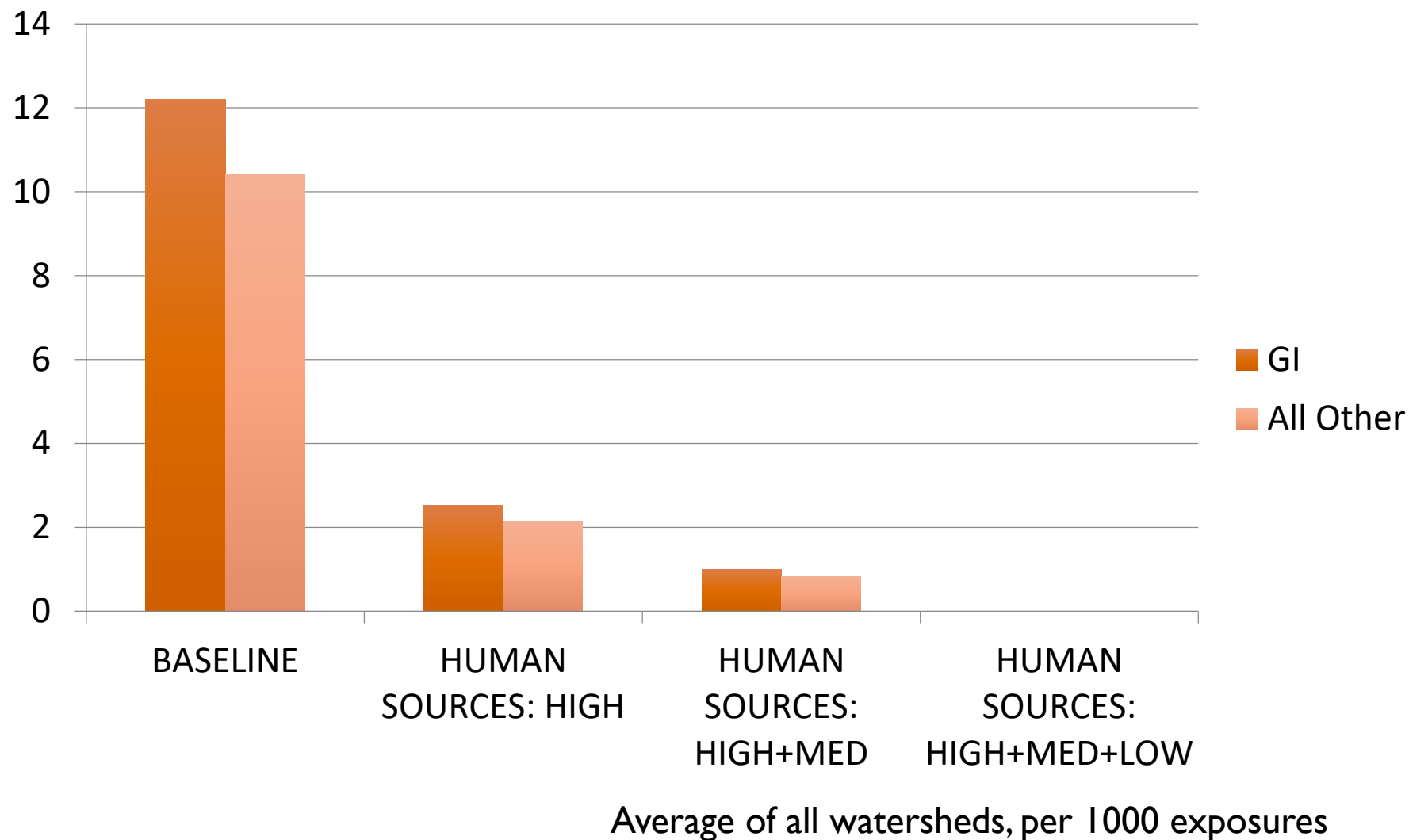


# ILLNESS RATE CHANGES

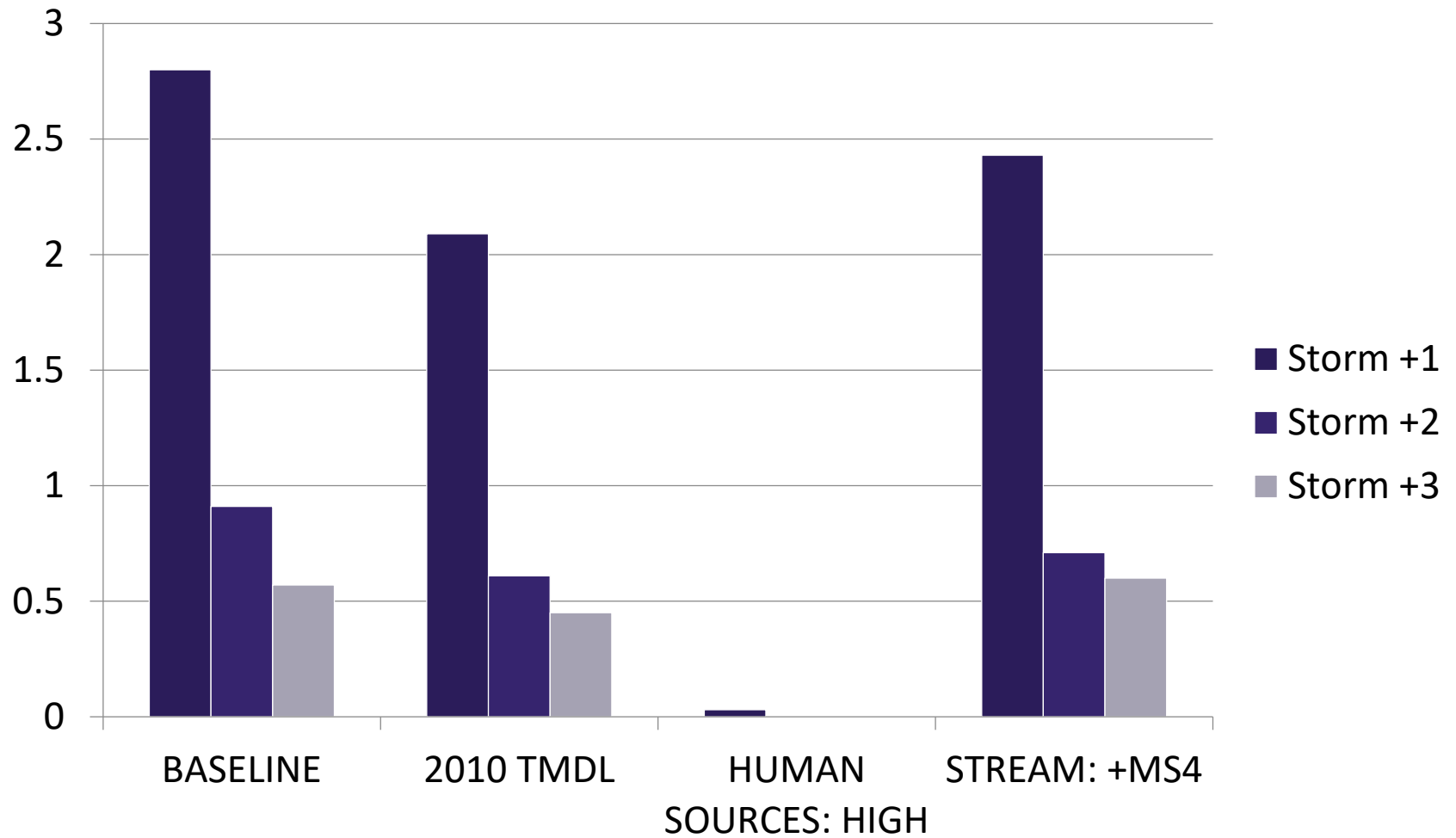


San Diego County, per 1000 exposures

## ILLNESS RATE CHANGES (CONTINUED)

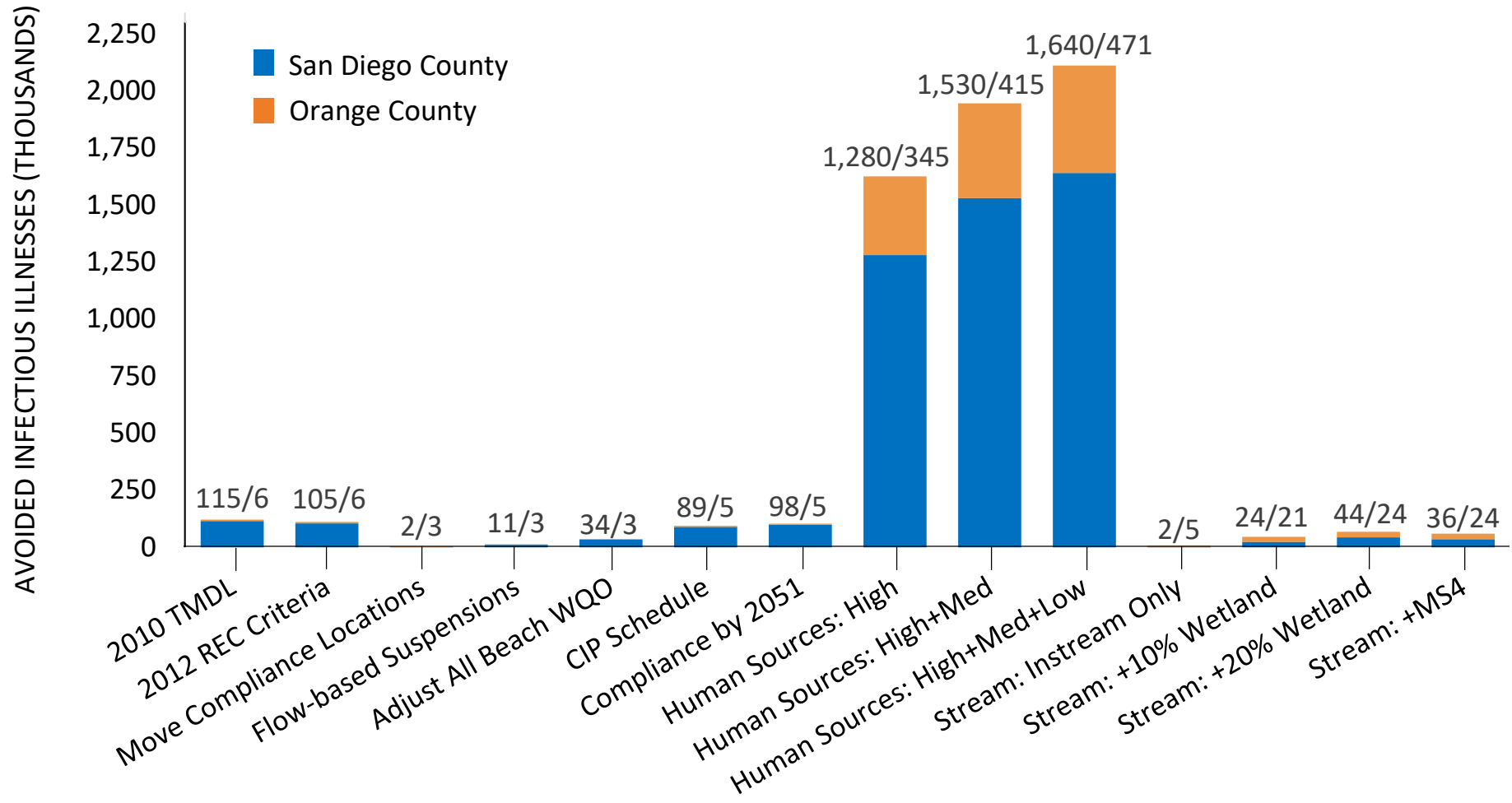


# CHANGE IN UNSAFE SWIMMING DAYS



San Diego County Data

# TOTAL AVOIDED ILLNESSES BY COUNTY (65 YEARS)

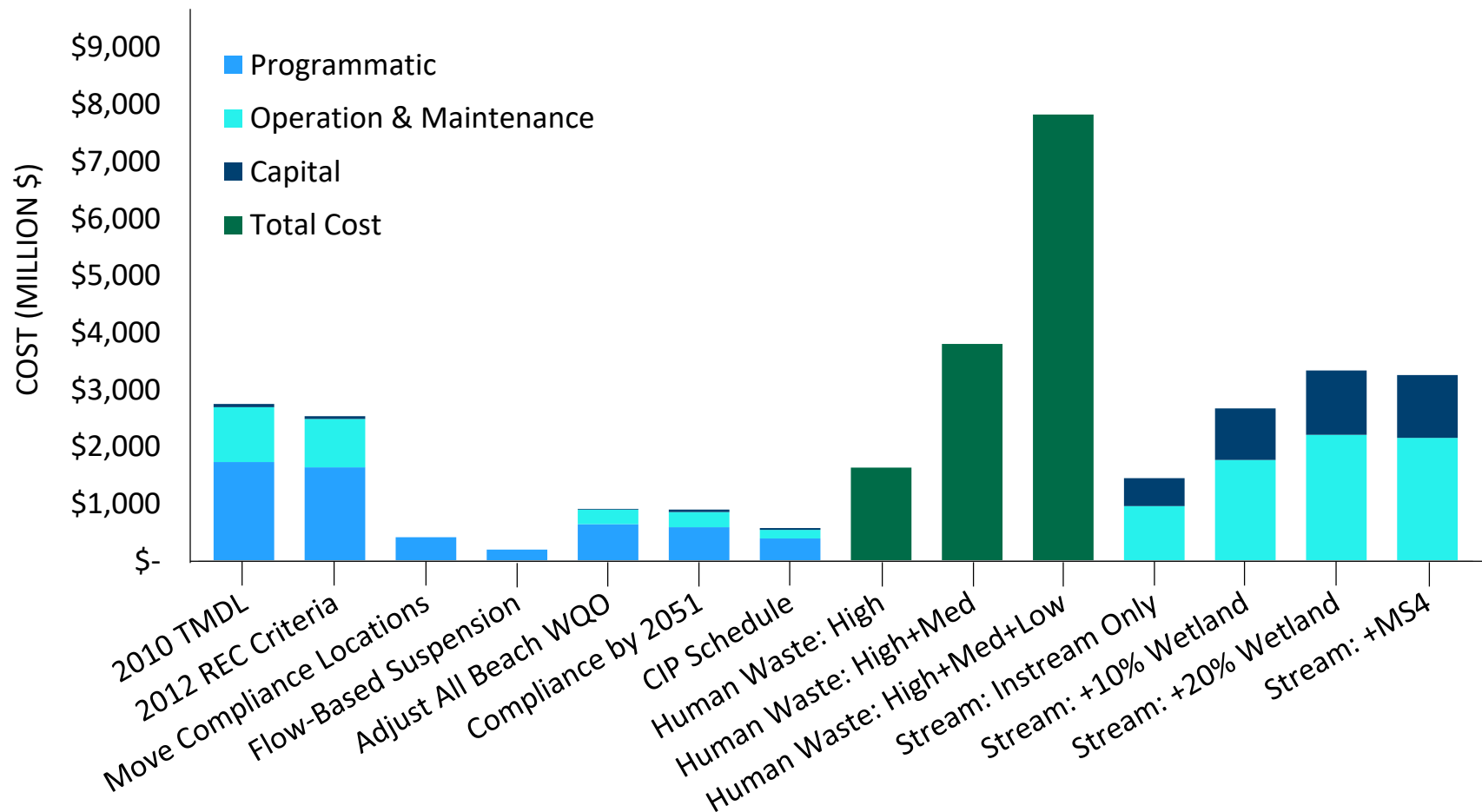


DESCRIBE AND DISCUSS FINDINGS



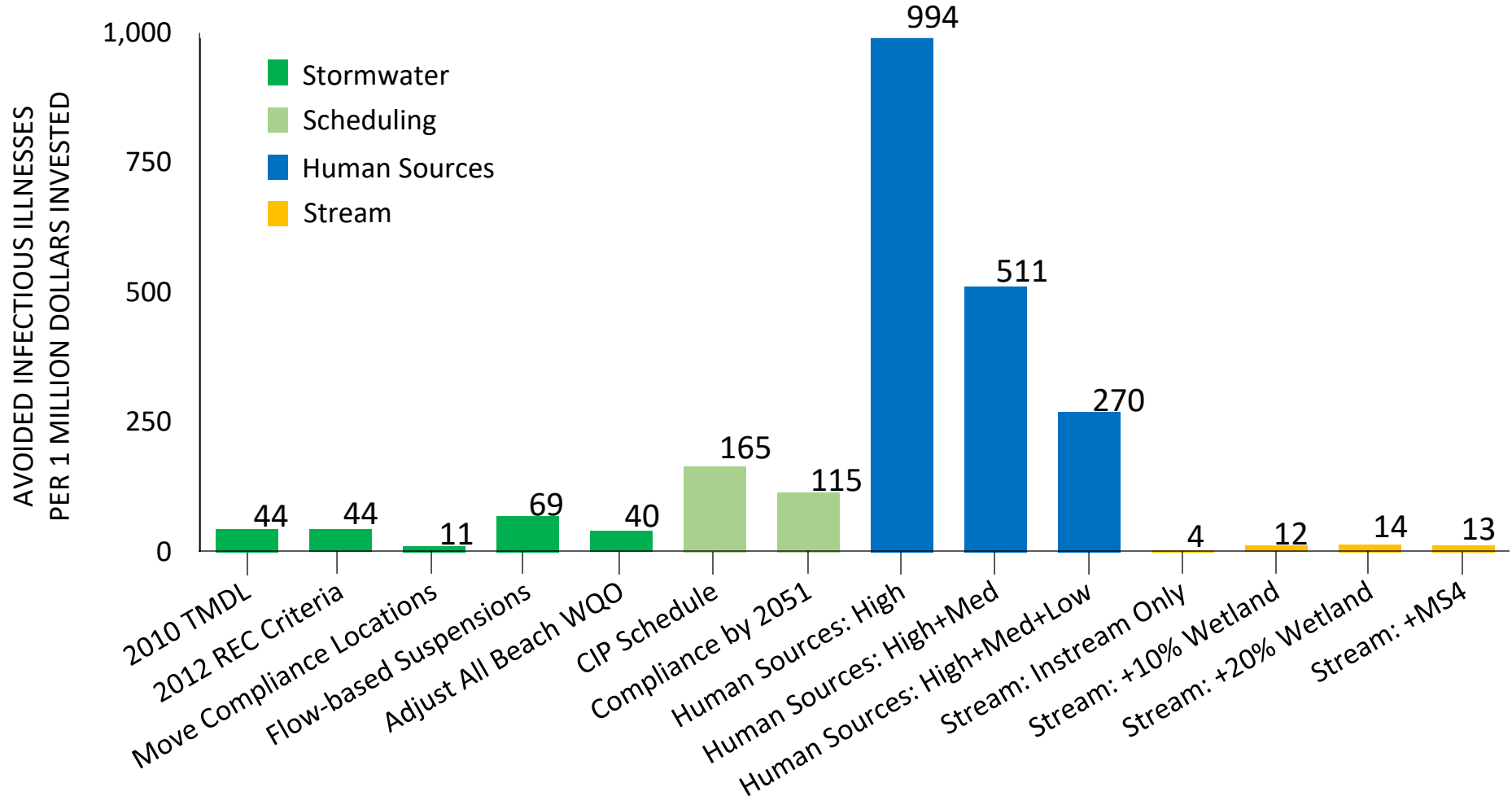
# COST ANALYSIS RESULTS

COSTS BY CATEGORY  
(2017-2081, 3% discount rate)

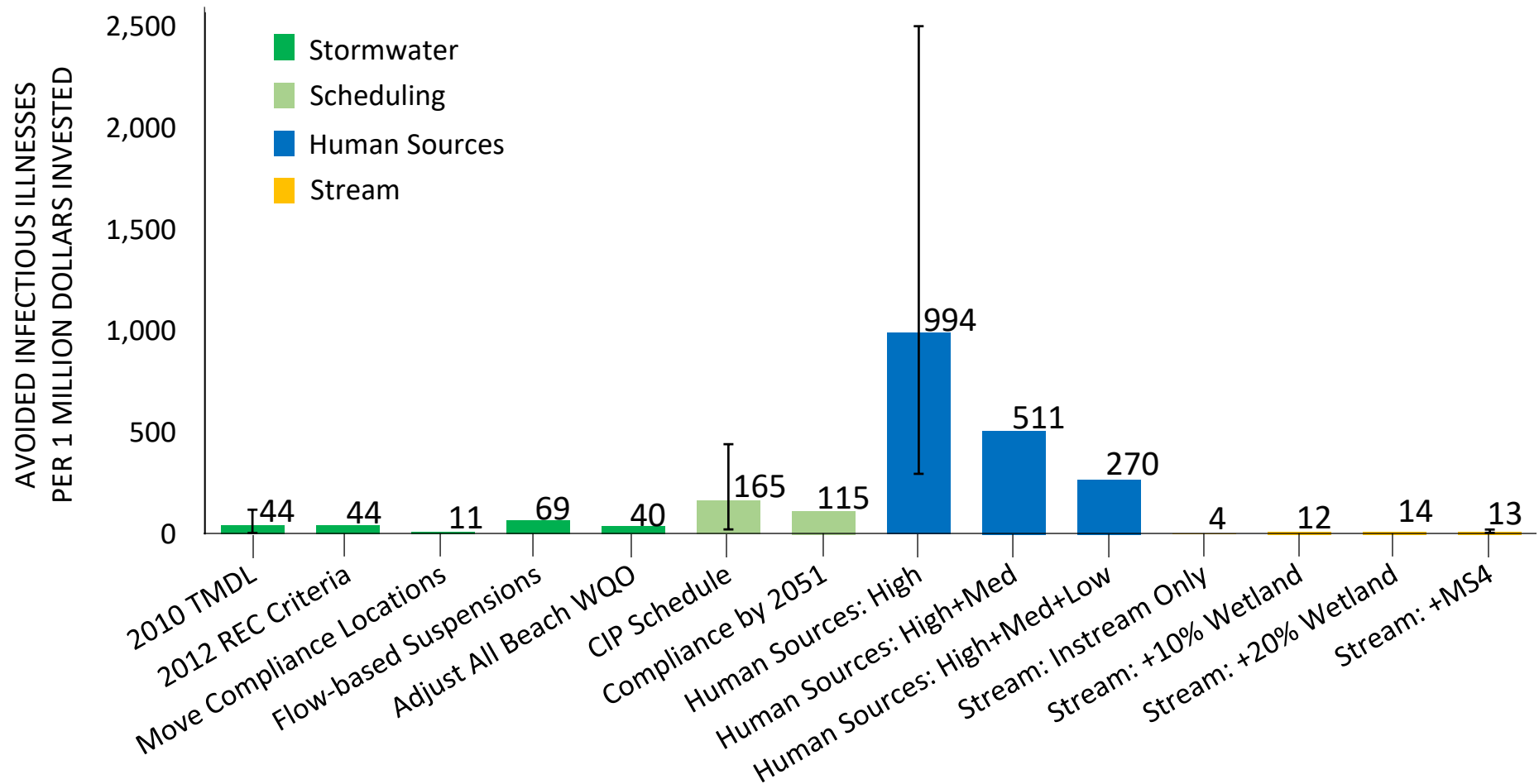


# TARGETING HUMAN WASTE SOURCES IS THE MOST COST-EFFECTIVE STRATEGY

## PUBLIC HEALTH COST-EFFECTIVENESS

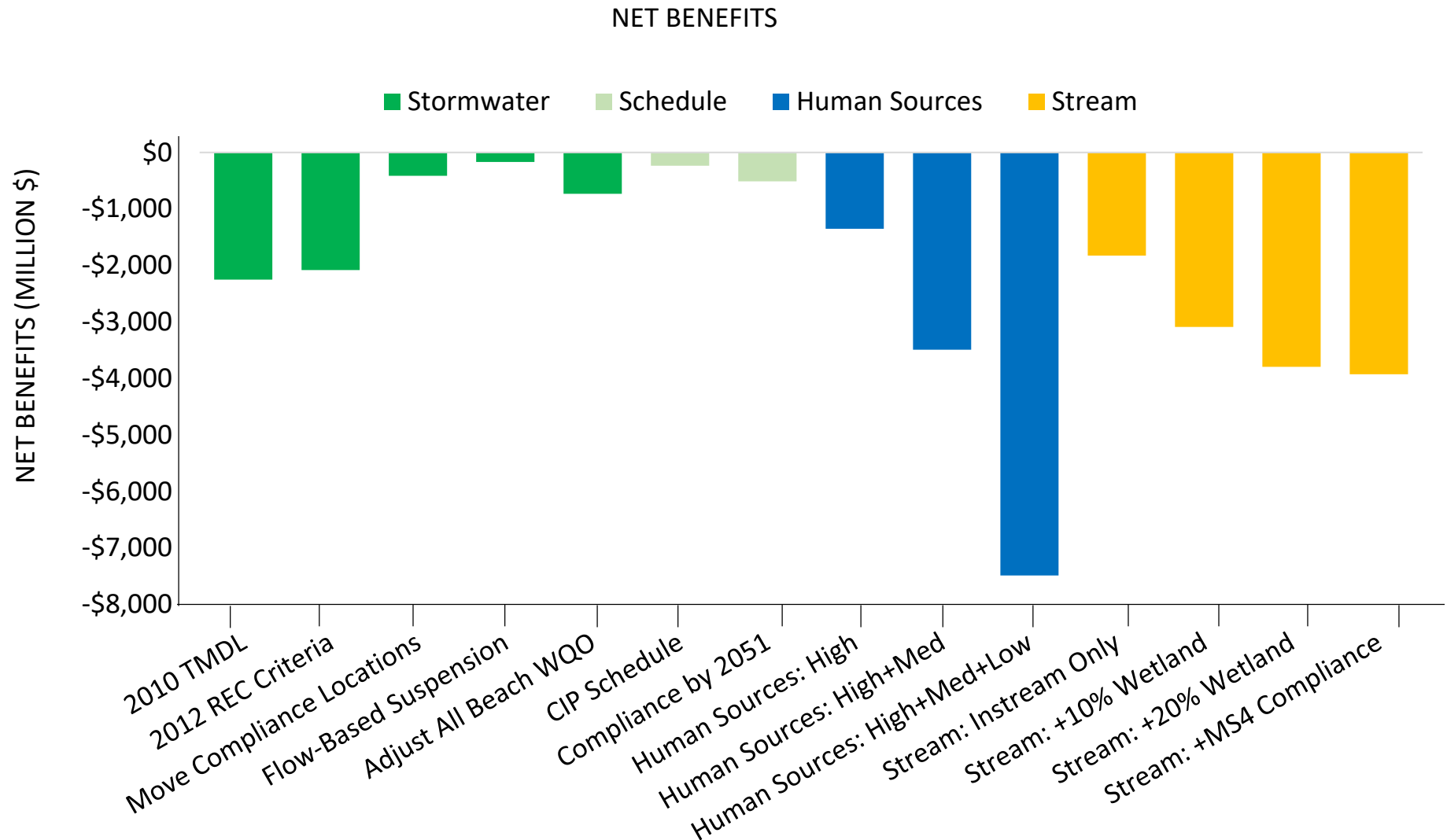


# SUBSTANTIAL UNCERTAINTY, HOWEVER...



Numeric results could change but are unlikely to adjust major findings

# QUANTIFIABLE NET BENEFITS ARE NEGATIVE



## SCREENING FCA INDICATES HIGH FINANCIAL BURDEN

	MEDIAN HOUSEHOLD INCOME	COST PER HOUSEHOLD	RESIDENTIAL INDICATOR SCORE	LEVEL OF BURDEN
<b>Current Services</b>				
Stormwater and Wastewater	\$66,100	\$2,660	4.02%	High
<b>Additional Services</b>				
Bacteria TMDL	\$66,100	\$391	0.590%	N/A
Trash Amendment	\$66,100	\$18.5	0.030%	N/A
<b>Current + Additional Services</b>	<b>\$66,100</b>	<b>\$3,070</b>	<b>4.63%</b>	<b>High</b>

## ADDITIONAL QUESTIONS & DISCUSSION

NEXT STEPS

# SUBMITTING COMMENTS AND FINAL SCHEDULE

- Document, Fact Sheet and Comment Instructions are available at website for San Diego Regional Water Quality Control Board  
[www.waterboards.ca.gov/sandiego/water\\_issues/programs/basin\\_plan/issue3](http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/issue3)
- Please email comments to [sandiego@waterboards.ca.gov](mailto:sandiego@waterboards.ca.gov) before midnight on August 27, 2017



