The City of San Diego's Approach to Reduction of Highest-Risk Human Sources

State Water Board & CASQA Bacteria Summit
September 15, 2022

Agenda

- Introduction
- Science Based Approach to Water Quality Protection
- Adaptive Management – Effective and Efficient Processes
- Challenges

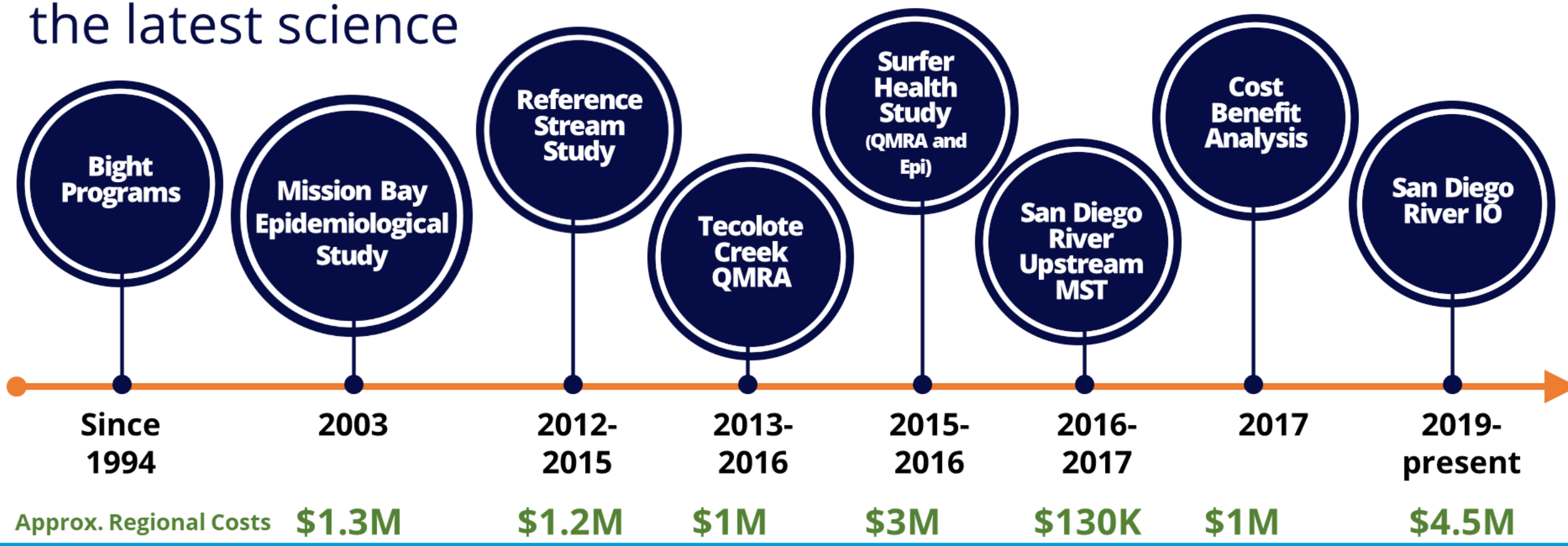
City of San Diego Stormwater Department

- Innovative solutions
- Protect our communities
- Funding Strategy
- WIFIA Loans/Grants

Science Based Approach to Water Quality

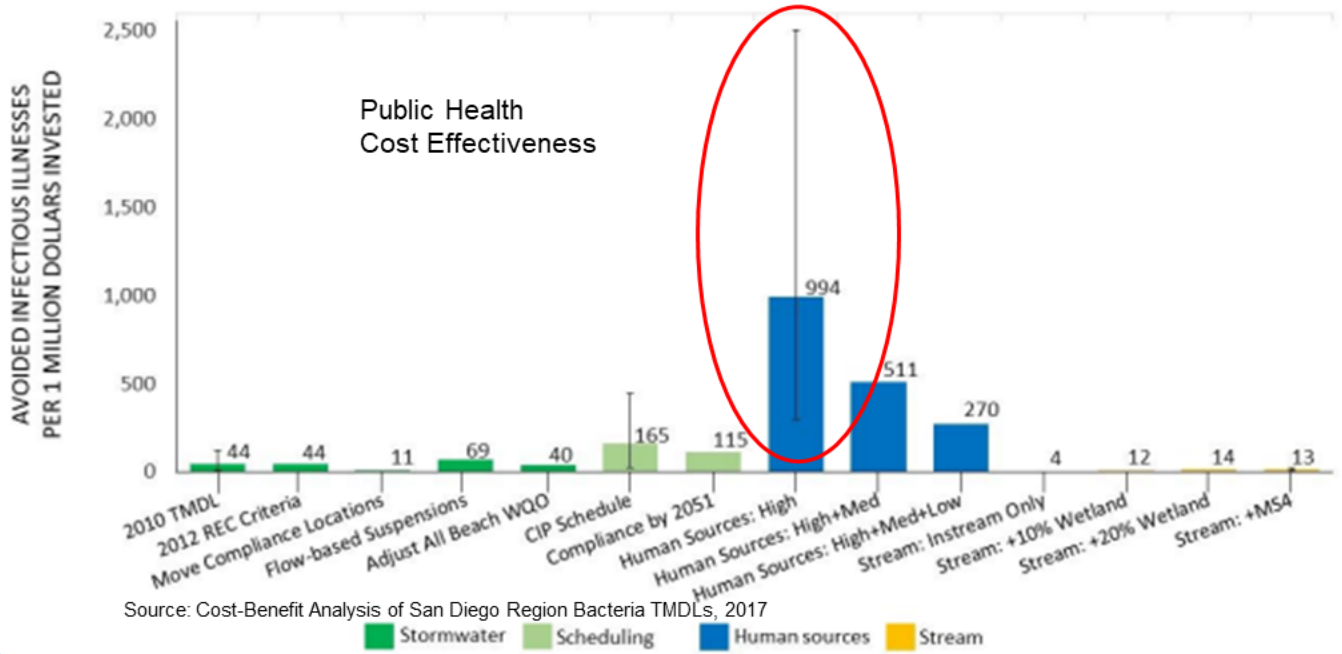
City of SD's Science-based Approach

Active regional partners over the 20+ years in applying the latest science

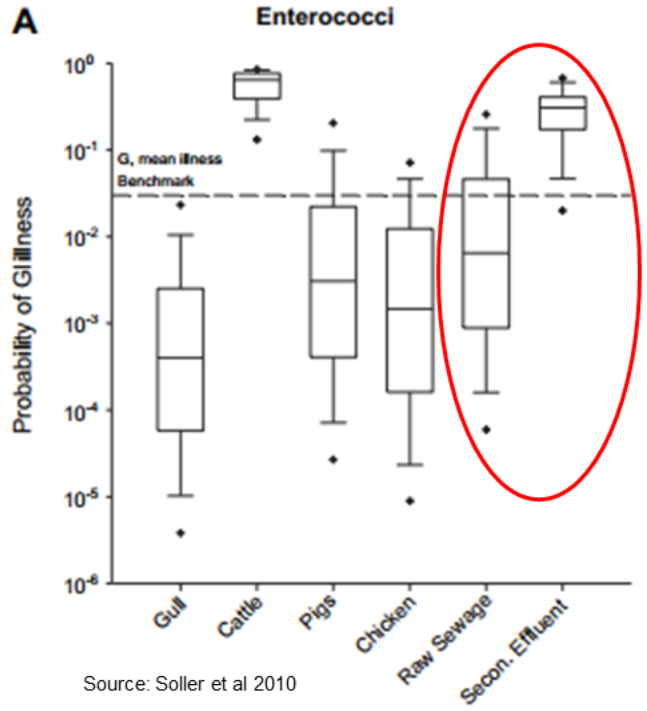


City of SD's Science-based Approach

- Human sources matter the most from a risk perspective
- Control of human sources is the most cost-effective way to address risk



Source: Cost-Benefit Analysis of San Diego Region Bacteria TMDLs, 2017

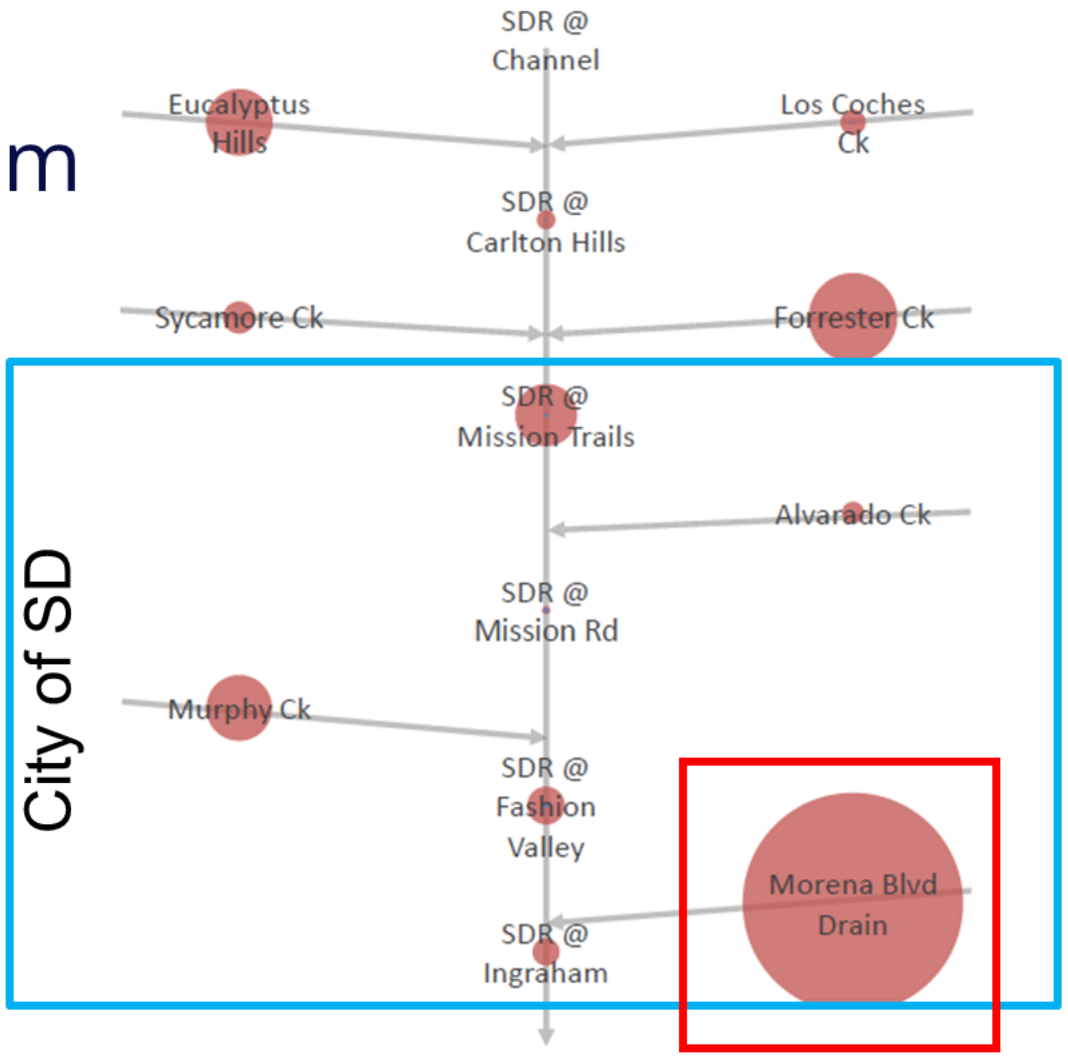


Source: Soller et al 2010

City of SD's Science-based Approach

San Diego River Upstream Source Tracking Study

Concentrations of HF183 during 2016 storm event



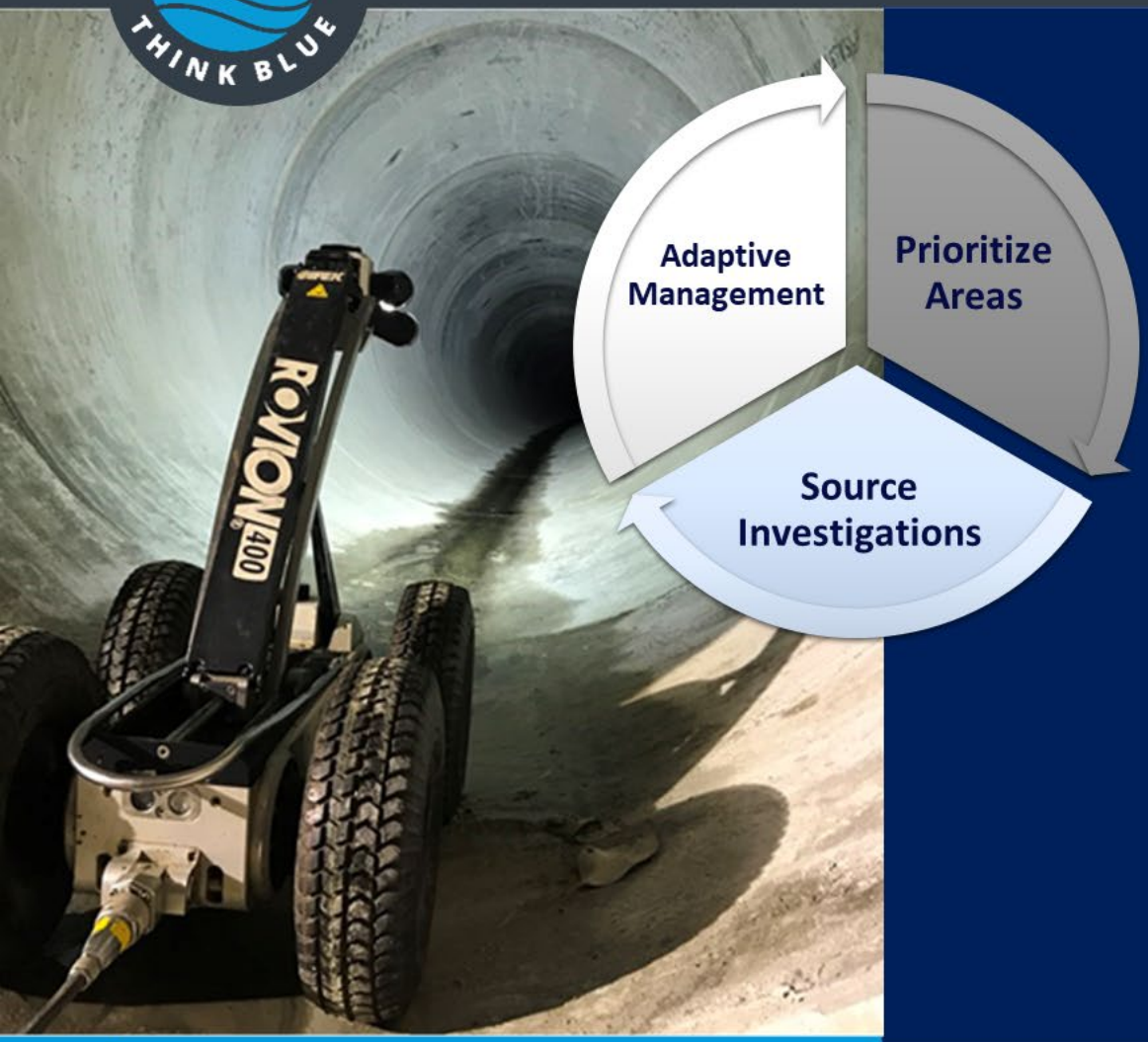
Driver for adaptive management

Adaptive Management Approach to Human Source Control

Traditional methods for human source control and their limitations

- Inspections and Code Enforcement
- Monitoring
- Drain cleaning
- Street Sweeping
- Structural BMPs

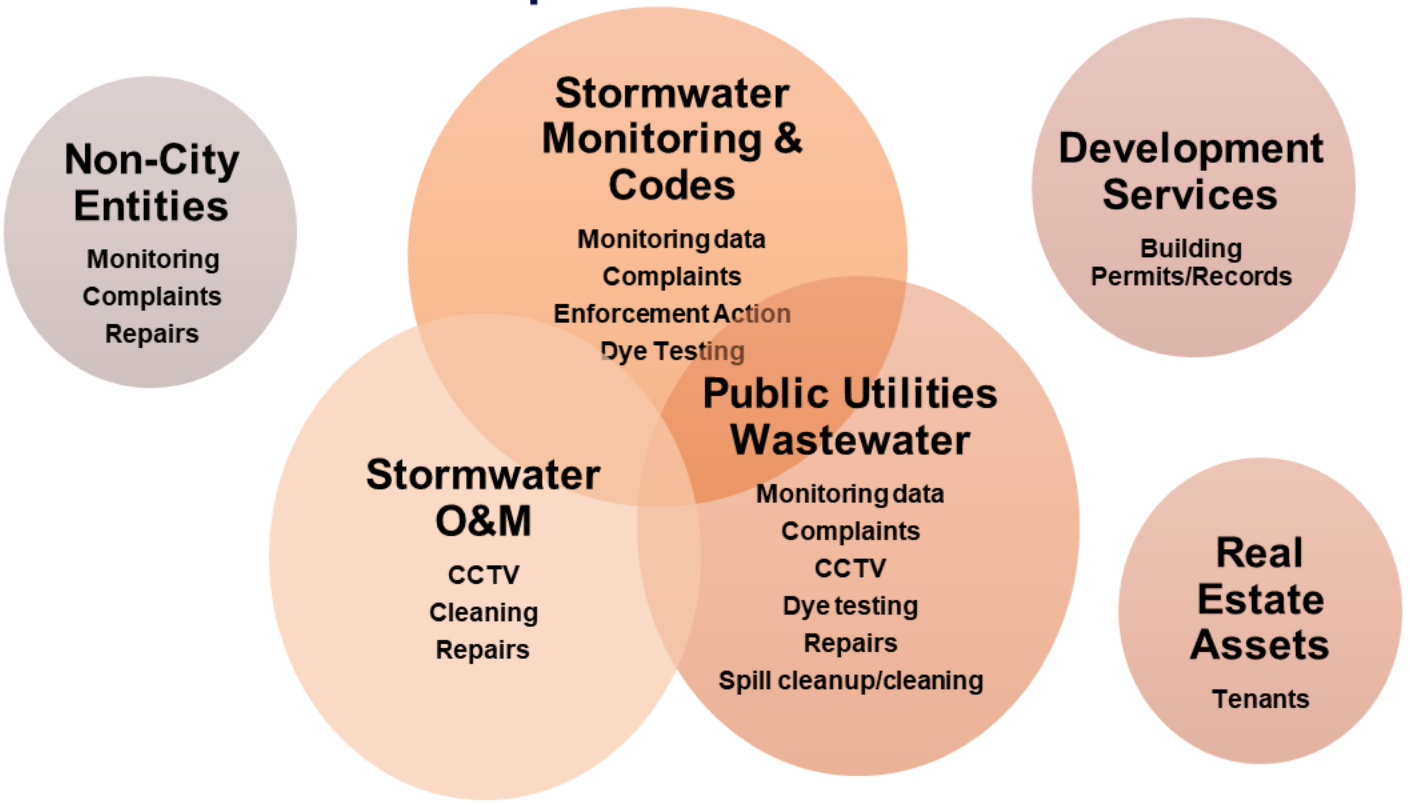
Adaptive Management Approach to Human Source Control



- Tiger Team established in response to SHS data
- Rapid response to findings of elevated HF183
- Combined traditional tools + new tools (HF183) + intra and interdepartmental collaboration

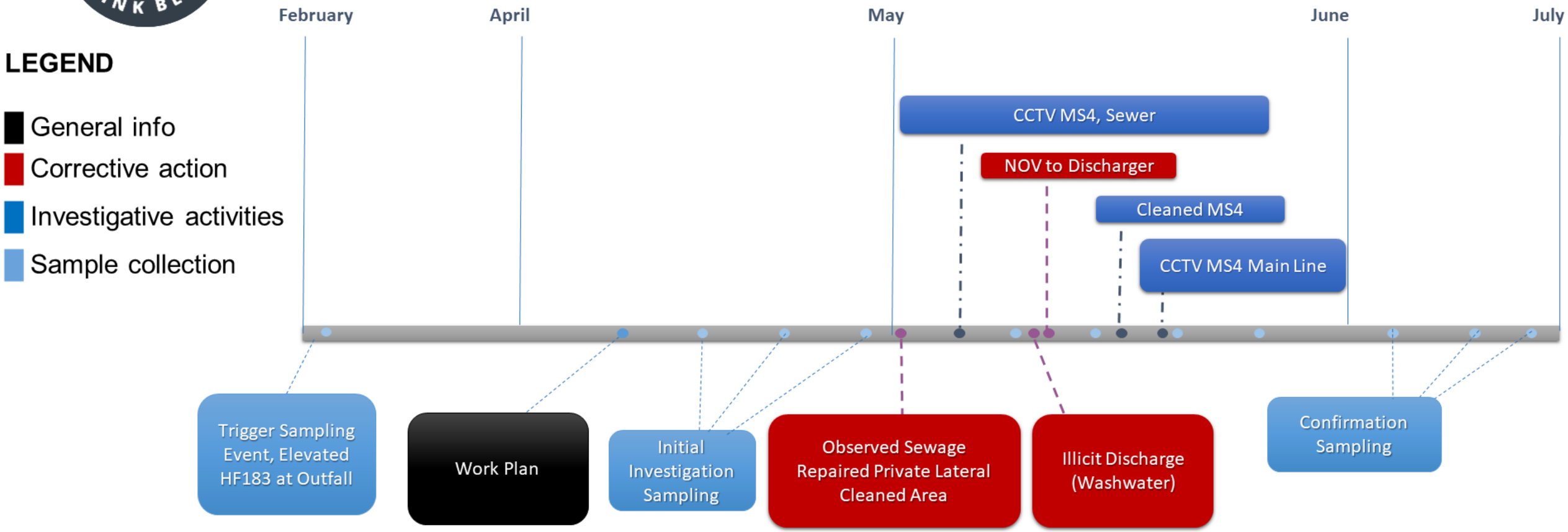
Adaptive Management Approach to Human Source Control

Intra/Interdepartmental Collaboration + Toolbox Approach



- GIS Analysis
- Visual Surveys
- Traditional Investigative Tools:
  Dye testing, CCTV, facility inspections
- Water Quality Testing:
  Field WQ, Chemistry, FIB, MST markers (including HF183), PCPs
- Flow Monitoring

Adaptive Management Approach to Human Source Control

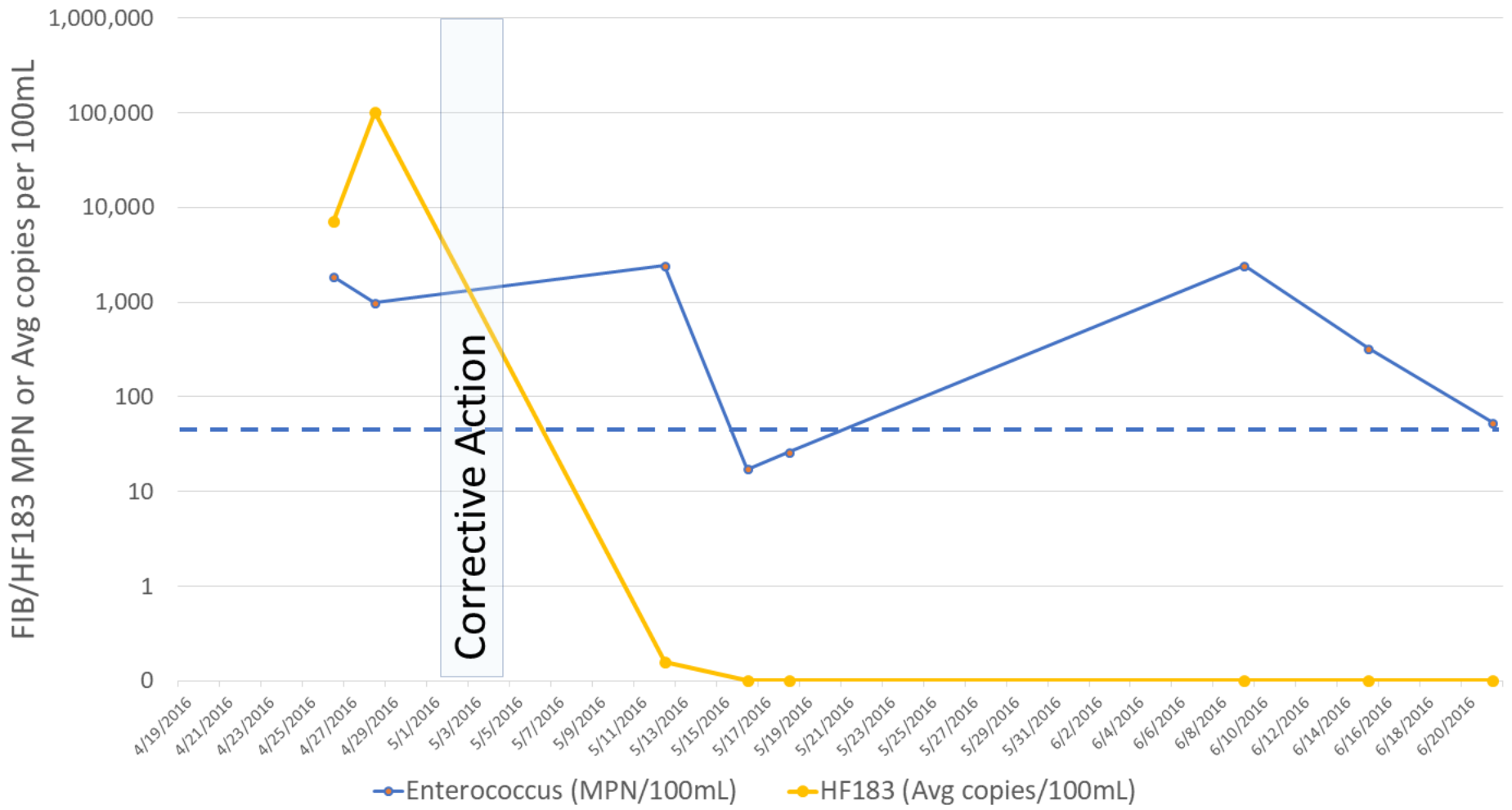


Tiger Team Morena Timeline

Adaptive Management Approach to Human Source Control

Adaptive Management Approach to Human Source Control

HF183 fully abated, **FIB persists above action level**



Focus on effective and efficient processes

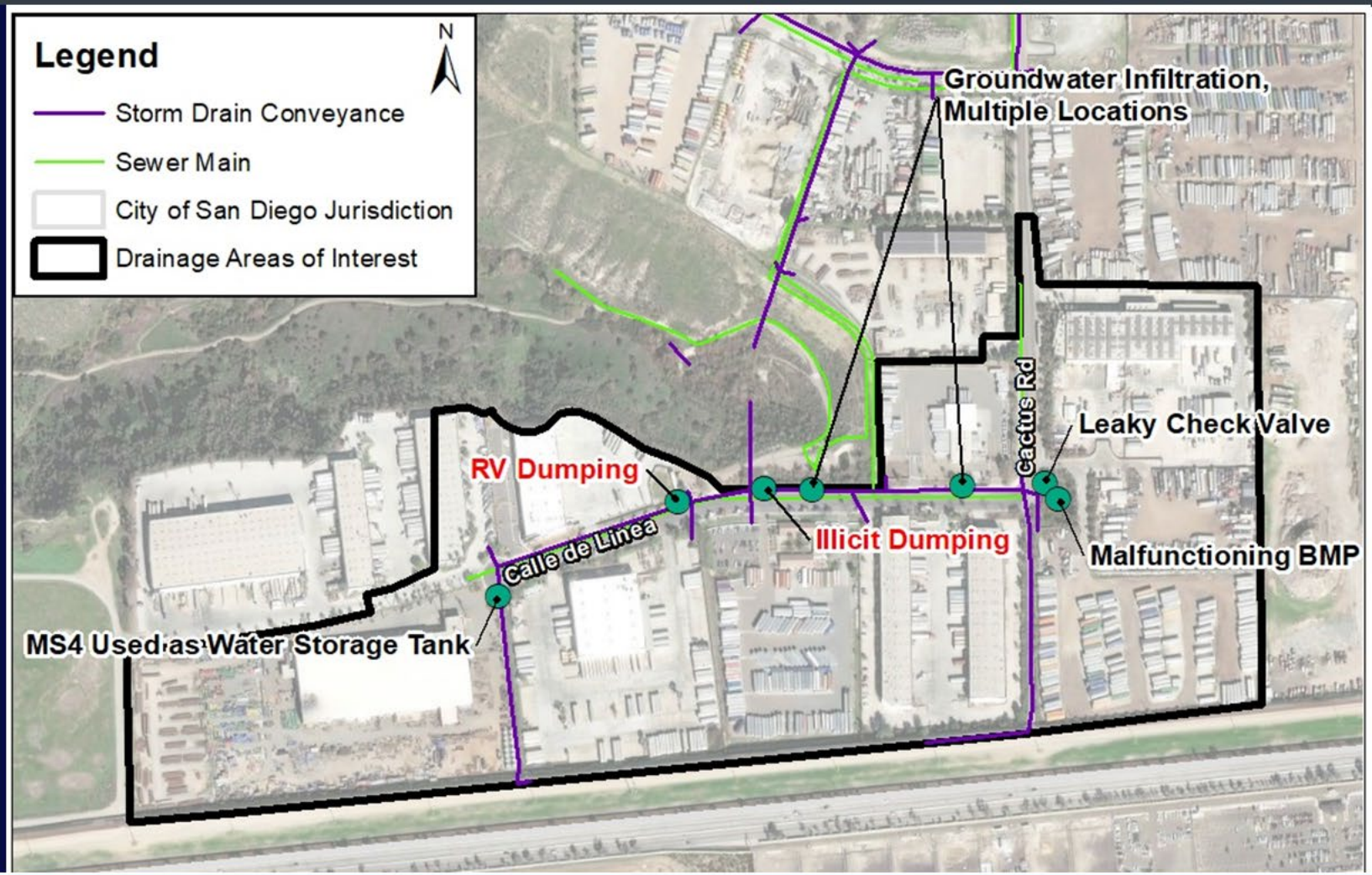
Adaptive Management Approach to Human Source Control

Expanded City-wide, holistic approach to focus on human sources

- **Strategies to Reduce and Abate Bacteria**
  Outlines all bacteria related activities City-wide
- **Prioritization Process**
  Uses a combination of CHWSRS, regulatory deadlines, and other factors
- **Water Quality Response Team**
  Dedicated team of staff investigating and abating human sources and other priority pollutants

Water Quality Response Team

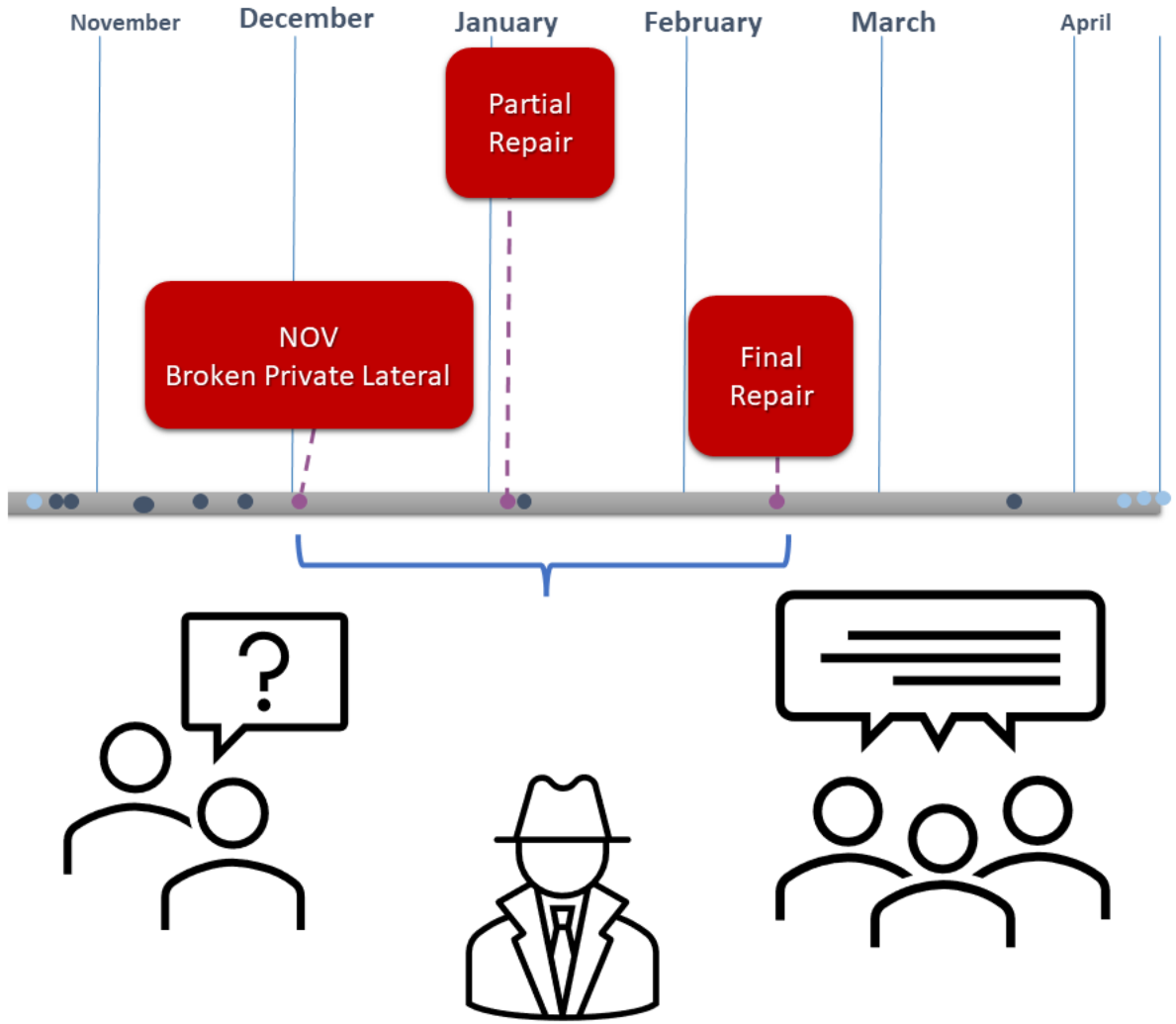
Water Quality Response Team prioritizes human sources, but also identifies and abates complex flow and FIB sources



Challenges

Source abatement process has had its challenges

- Corrective action timelines
- Coordination with other agencies or property owners
- No clear “smoking gun” source



Challenges

Despite applying the latest science, current bacteria TMDL regulations are still unachievable

- Prioritizing science-based strategies to protect swimmers and aquatic habitats
- TMDL dry weather deadline passed April 2021
- No regulatory relief – compliance impacts

Finding Solutions Together

City of San Diego's continued efforts

- Focusing limited resources on highest-risk human sources
- Continuing to work with Regional Board, stakeholders and partners
- A committed partner to find solutions


THINK BLUE
The City of
SAN DIEGO
Thank you!
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City of SD's Science-based Approach

Evolution of microbial water quality science

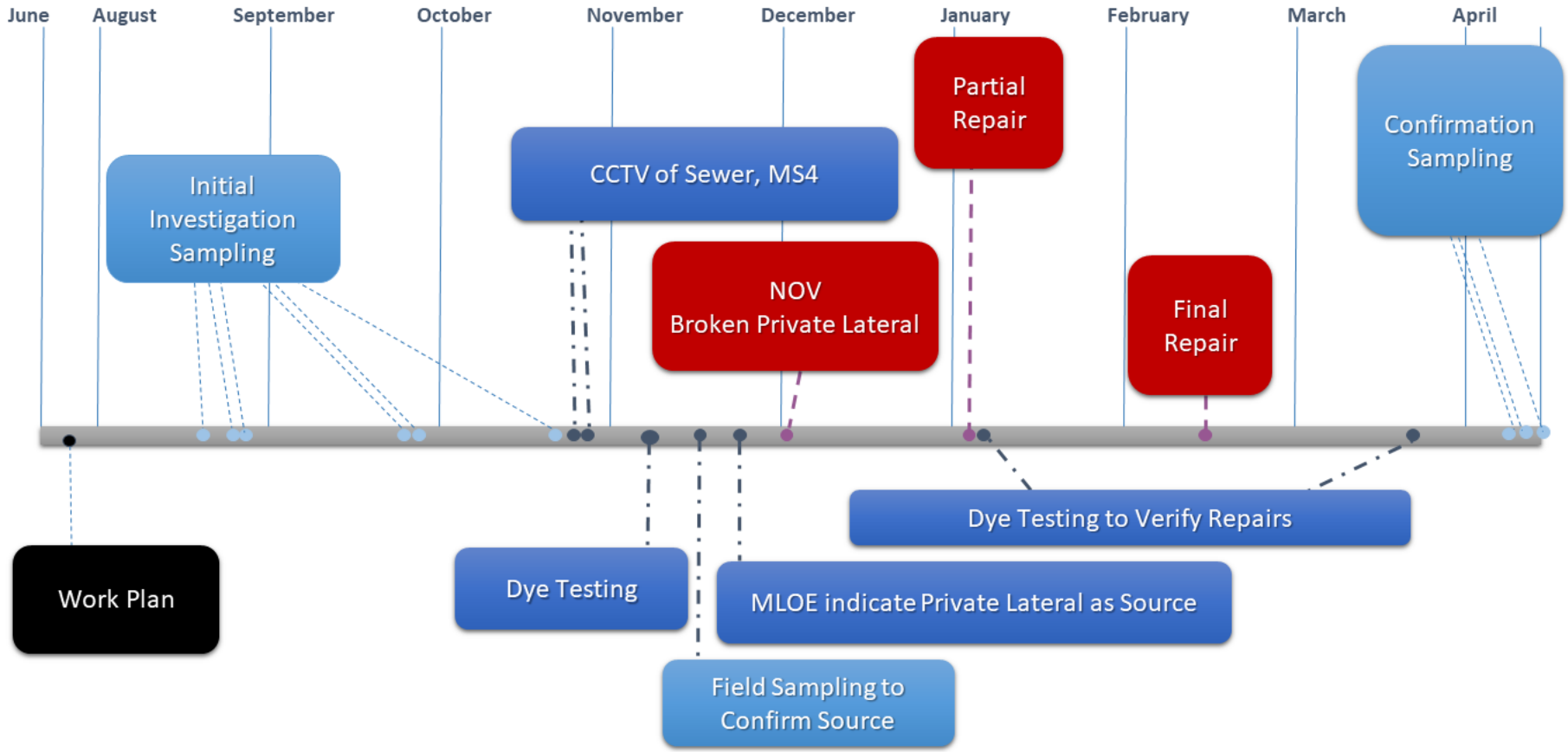
NOW ← THEN

What are the sources of FIB?	How we measure fecal pollution	Risk of fecal pollution, use
??	Culture-based FIB Methods	There is risk, measure through epidemiology
Humans, animals, environmental regrowth/reservoirs	qPCR Methods (Faster) Source Tracking Methods (More Specific)	Human sources generally higher risk than animals QMRA studies to model risk

Adaptive Management Approach to Human Source Control

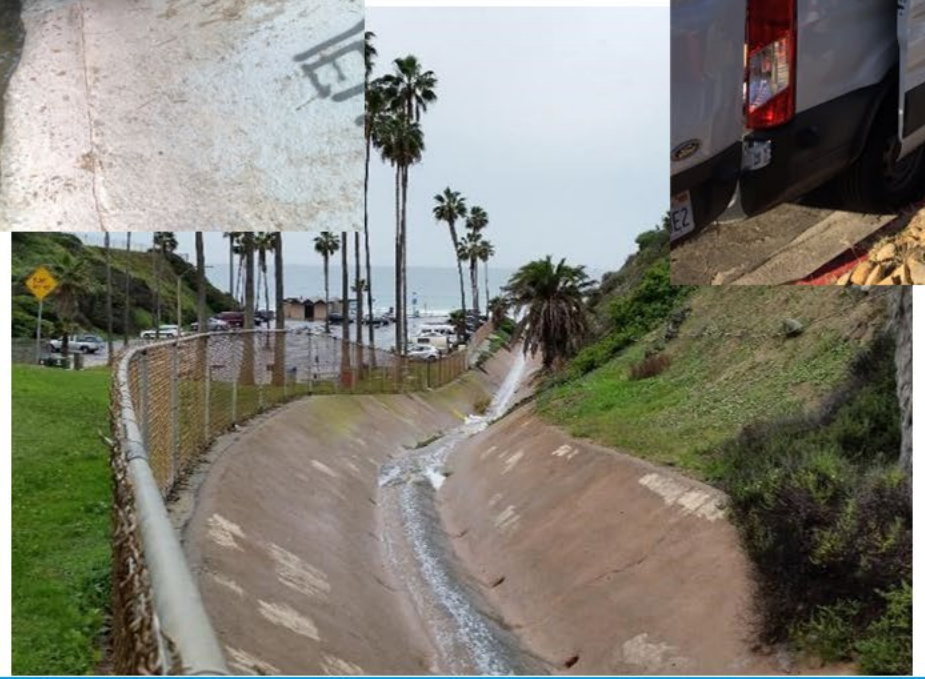
LEGEND

- General info
- Corrective action
- Investigative activities
- Sample collection



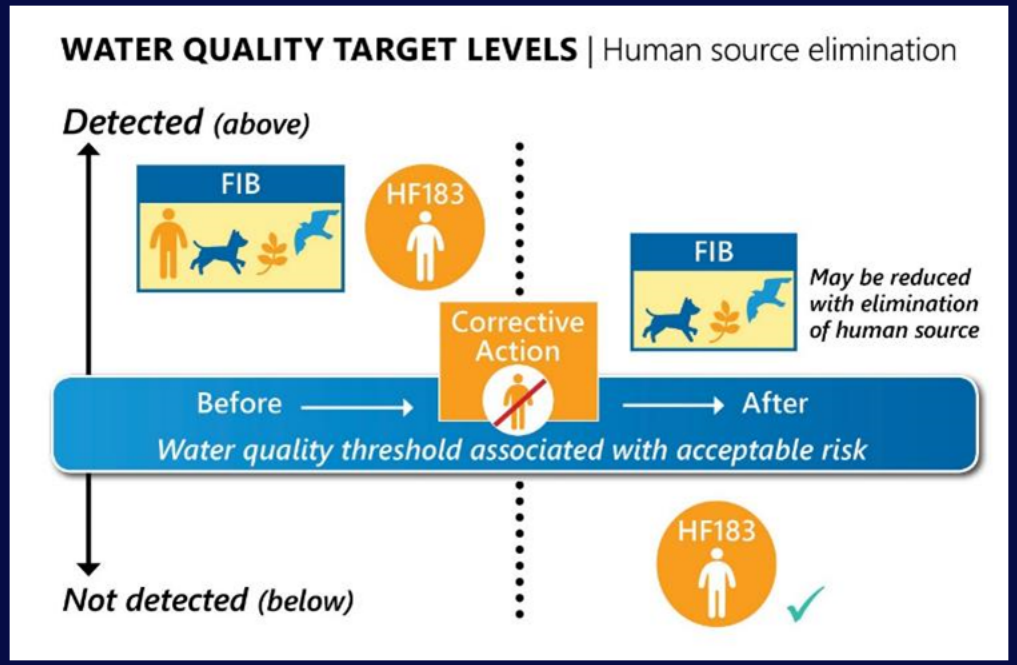
Tiger Team Tourmaline Timeline

Adaptive Management Approach to Human Source Control



Adaptive Management Approach to Human Source Control

- Again, human source controlled, FIB persist
- Tiger Team and human focus shown to be an effective and efficient process



Maximum Concentration Observed	Before Corrective Action	After Corrective Action
HF183 (copies/100mL)	37,962	Not Detected
E. coli (MPN/100mL)	>24,196	321
Ammonia (mg/L)	6.48	0.29

Challenges

MS4 Outfall Screening

Are major outfalls contributing HF183 to the receiving water?

Upstream Investigation

Is HF18 present upstream of outfall?
Which portion is it originating from?

Is the source in the eastern conveyance:
- Discharge from residential properties?
- Infiltration through MS4 defects?

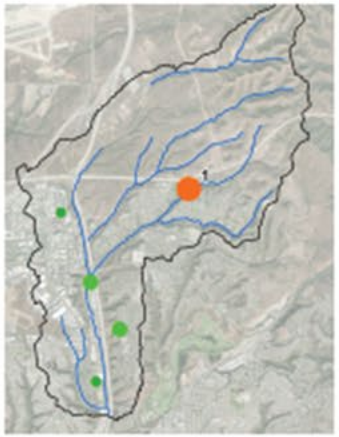
Corrective Actions

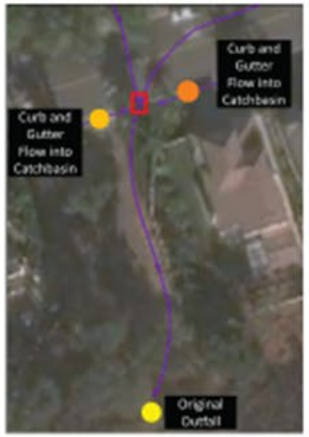
Enforcement
- Flow abatement
- Private infrastructure maintenance and repair

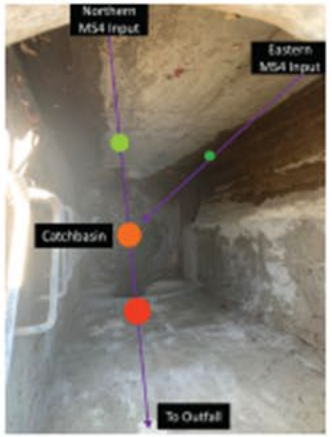
Confirmation Sampling

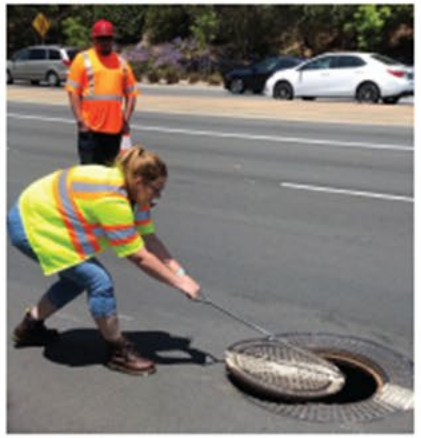
Multiple samples at outfall showed reduction in HF183

Source not confirmed









Average HF183 cps per 100 ml

10 100 1,000 10,000

January April July October January April

2020 2021