Pollutant Source Control

for the

Lower Duwamish Waterway

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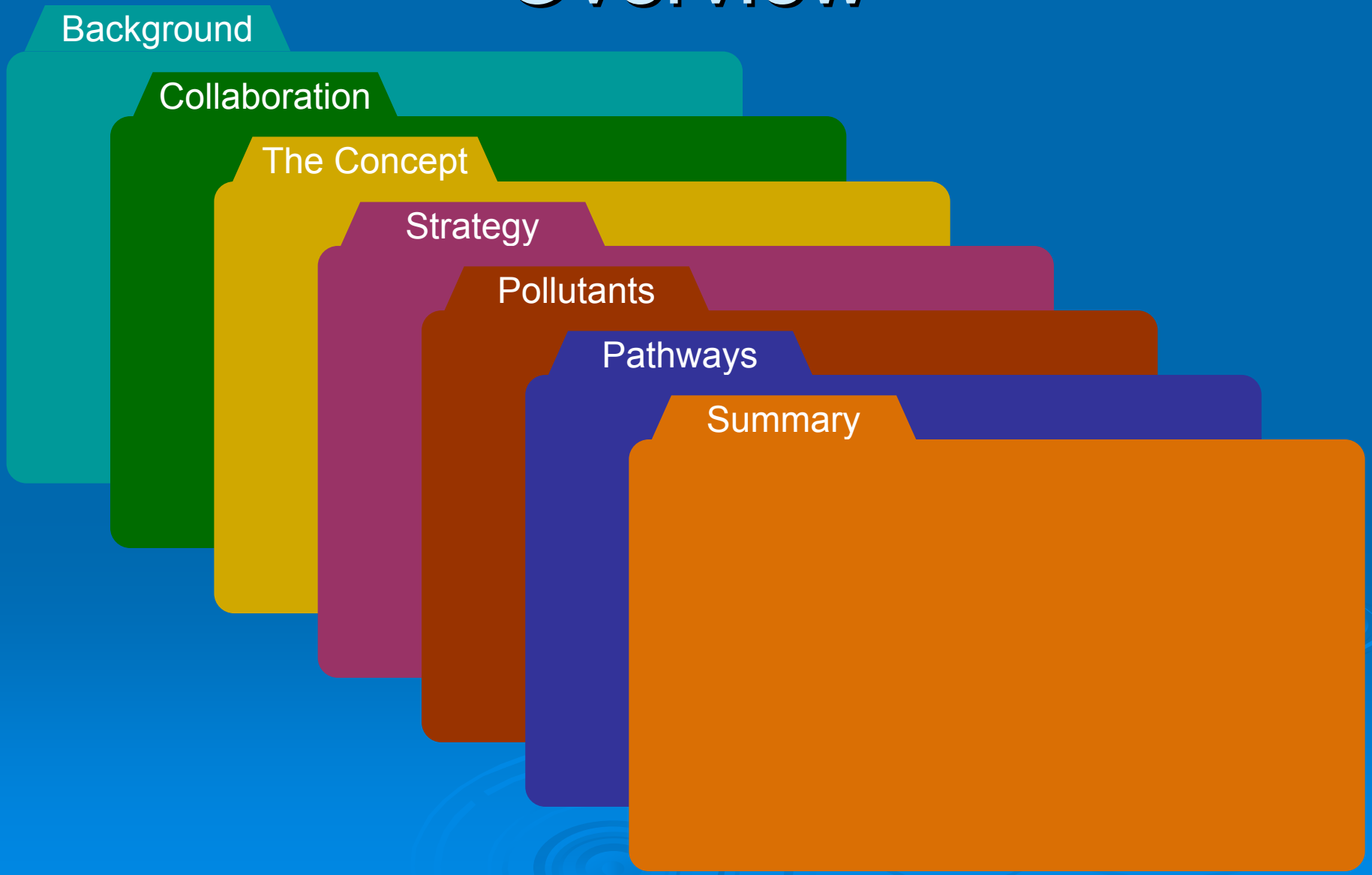
ecology and environment, inc.

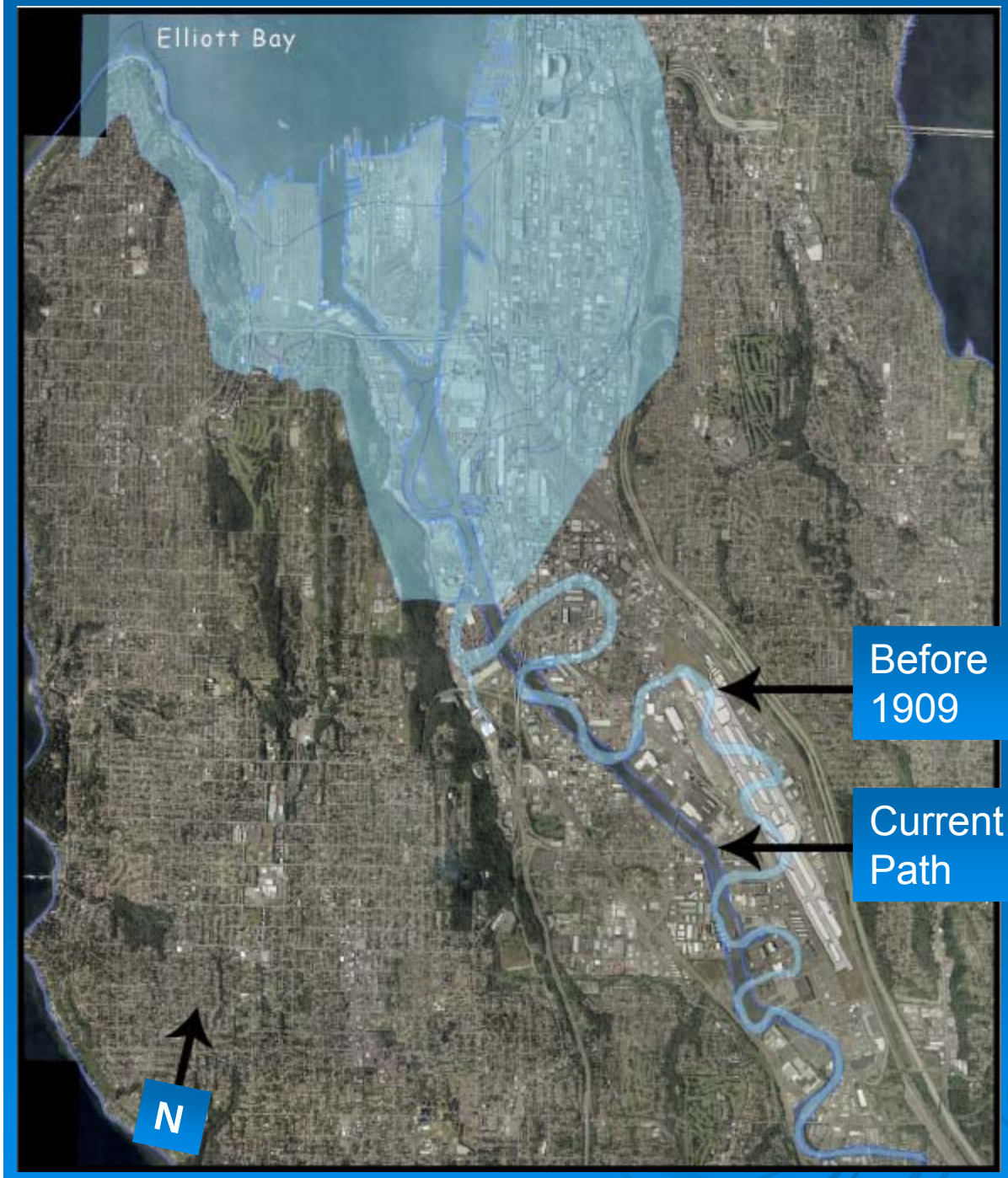

The Salish Sea
from the north end of the Strait of Georgia
to the west end of the Strait of Juan de Fuca
and the south end of Puget Sound
Mt. Waddington
Monmouth Mountain
Desolation Sound
Watershed Boundary
Strait of Georgia
N. Gulf Islands
Vancouver Island
Fraser River
S. Gulf Islands
Mt. Baker
Skagit River
San Juan Islands
Strait of Juan de Fuca
Cape Flattery
Glacier Peak
Puget Sound
Pacific Ocean
Olympic Peninsula
Hood Canal
Nisqually River
Mt. Rainier
N
King County
Duwamish River
Green River
King County
Pierce County


Georgetown
South Park
Slip 6
Hamm Creek


Elliott Bay
Harbor Island
1st Ave. Bridge
Slip 2

Overview


Background
Collaboration
The Concept
Strategy
Pollutants
Pathways
Summary



In the early 1900's the Duwamish River was dredged and straightened.

A 1945 report identified industrial wastes discharge from

- metal plating
- slaughter houses
- packing plants
- carbide sludge
- acid cleaning
- caustic cleaning
- spilled oil
- raw sewage
- treated sewage

Low dissolved oxygen was also noted in subsurface waters.

Today the Lower Duwamish Waterway (LDW):

- 1 of 4 Superfund sites in the Lower Duwamish/Elliot Bay area
- 137 identified contaminated upland sites
- fish and crab with up to 7x more cancer-causing chemicals
- PCBs have been found in nearly all resident species

Collaboration

Who is involved?

Source Control Work Group

- Ecology – overall lead, site cleanup, direct dischargers (all NPDES permit holders)
- King County –sanitary/combined system
- City of Seattle/Tukwila – city storm drains, also some sanitary
- Port of Seattle –Port property/tenants
- EPA – technical assistance, site cleanup

Collaboration

Lower Duwamish Waterway Group

- City of Seattle
- King County
- Port of Seattle
- The Boeing Company

Collaboration

Trustees for the LDW

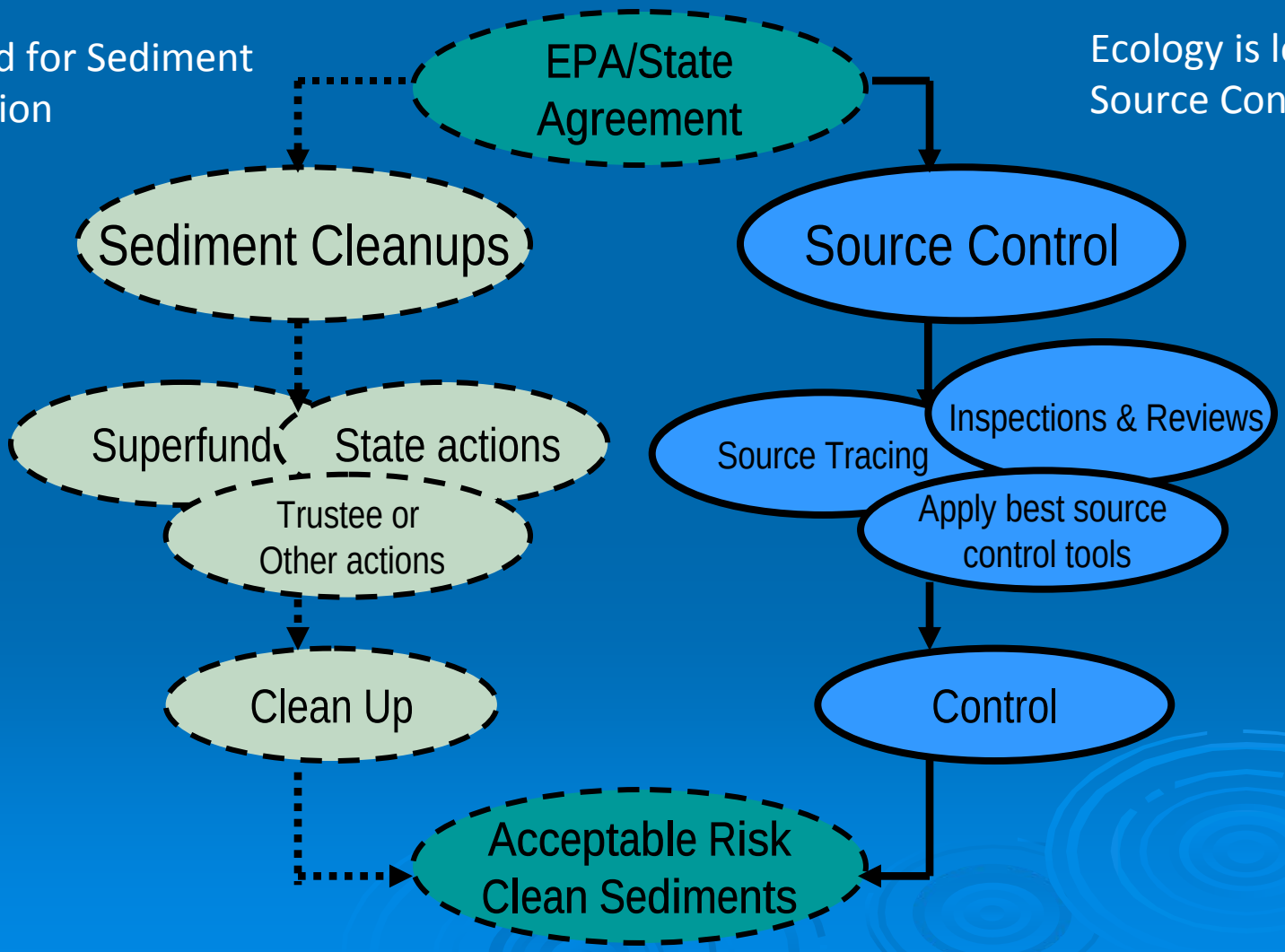
- Suquamish Indian Tribe
- Muckleshoot Indian Tribe
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Department of Interior (FWS & BIA)
- Washington State Departments of
  - Ecology
  - Fish and Wildlife
  - Natural Resources

Collaboration

Who is lead for what?

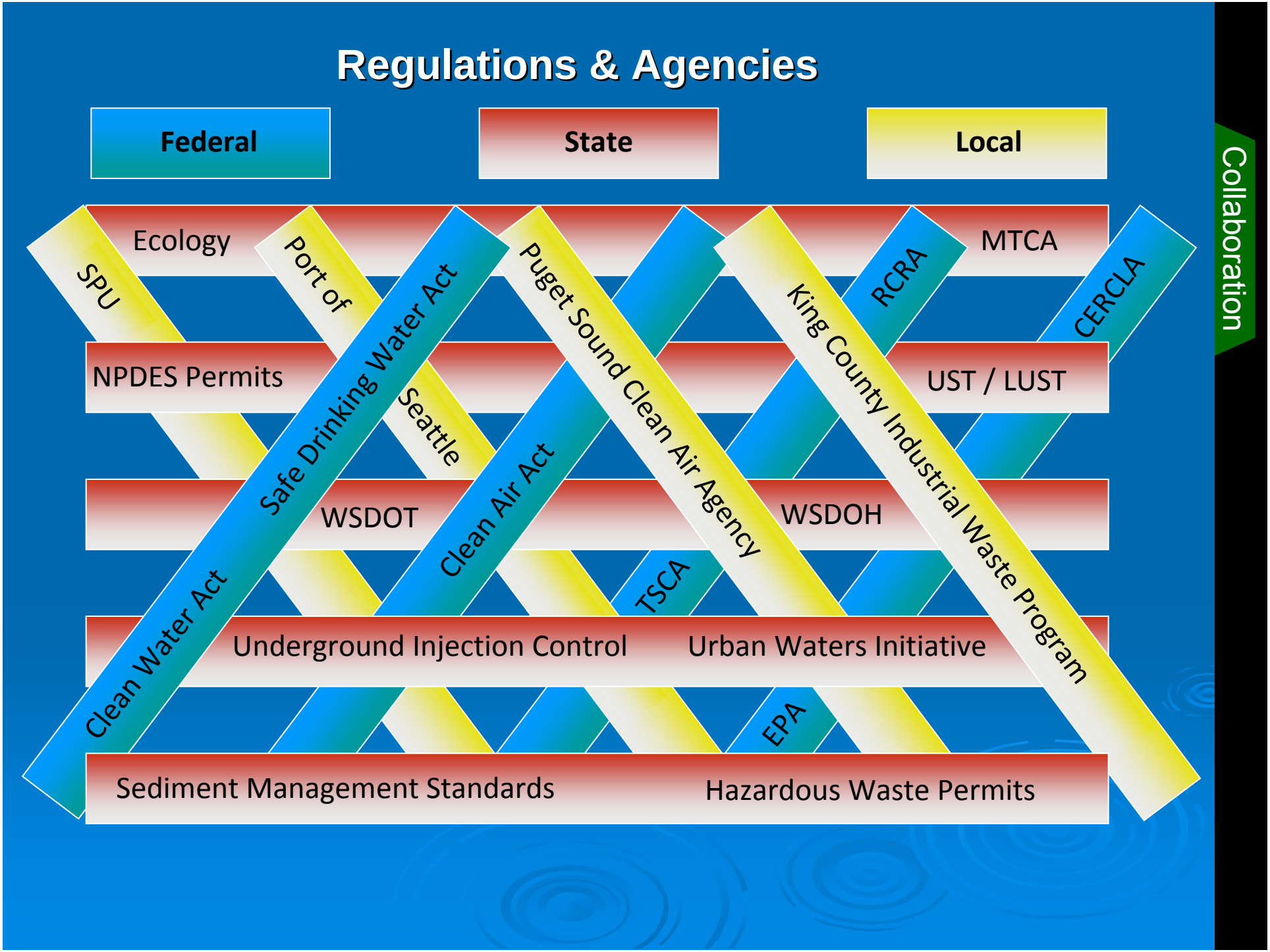
EPA is lead for Sediment Investigation

Ecology is lead for Source Control



Dept. of Ecology (Ecology)

- Hired 2 consultants: E & E and SAIC
- Assigned Source Control Areas to each consultant
- Coordinated data gathering with EPA, Ecology Site Managers, Property Owners and other Stake Holders
- Maintains database to track actions items to be completed


Regulations & Agencies
Federal
State
Local
Collaboration
Ecology
MTCA
SPU
Port of
Safe Drinking Water Act
Puget Sound Clean Air Agency
RCRA
CERCLA
King County Industrial Waste Program
NPDES Permits
UST / LUST
Seattle
Clean Air Act
WSDOT
WSDOH
TSCA
Clean Water Act
Underground Injection Control
Urban Waters Initiative
EPA
Sediment Management Standards
Hazardous Waste Permits

Source Control

Definition

- Source- Hazardous material that is migrating or could migrate.
- Source Control- Find and manage pollutants and keep them from reaching the waterway sediments before any sediment clean up occurs.

Importance

- Paramount to achieving cleanup goals for Puget Sound.
- Must be done to prevent sediment recontamination.

Relevance

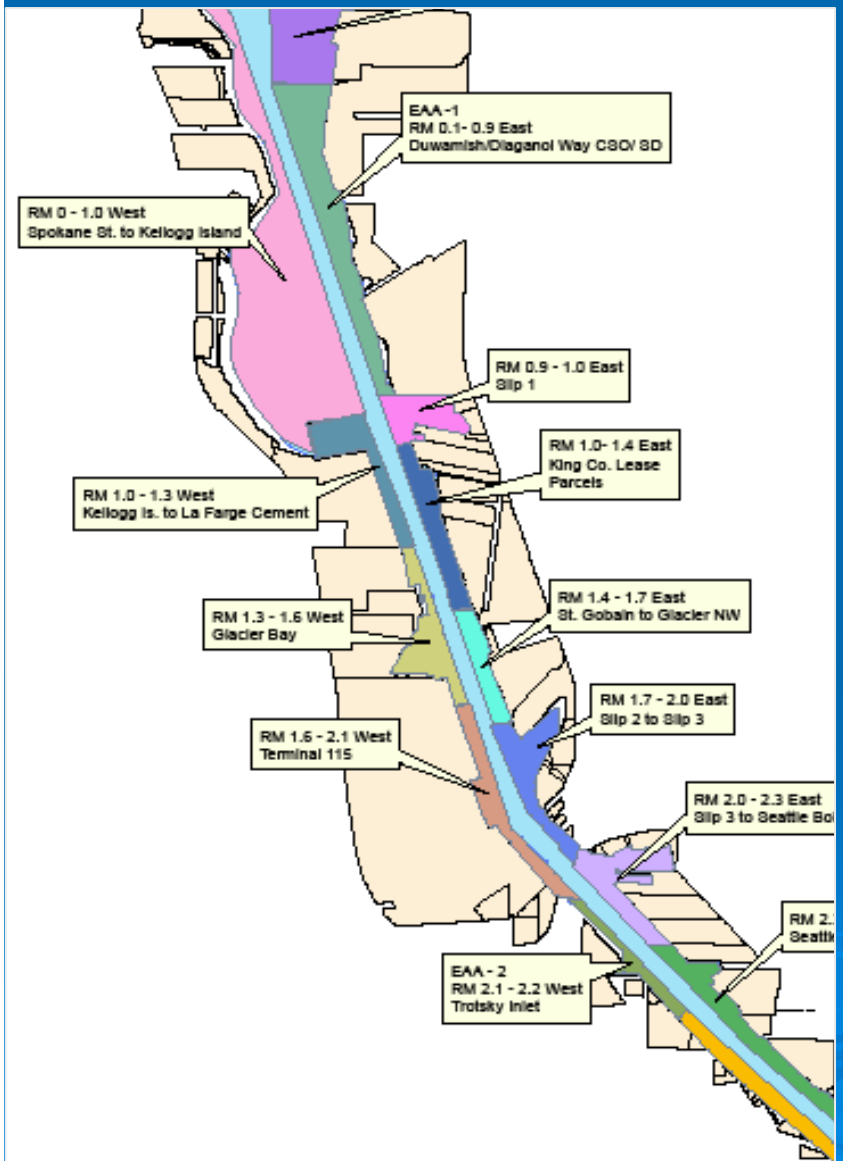
- Chemical Engineers understand the processes that generate chemical wastes, and the hazardous materials involved.
- We have unique skills to help industries & the community avoid, reduce and eliminate chemical wastes.

Source Control Objectives

Identify:

- current & potential upland sources
- potential migration pathways
- data gaps needing attention
- effective source controls already in place
- action items necessary to avoid sediment re-contamination

Source Control Areas



- 23 source control areas (defined by hot spot sediment areas and storm drainage sub-basins)
- Reports completed for 15 areas

Source Examples

Where do pollutants come from?

- Unknown fill material
- Pre-Regulation acts
- Sanitary & stormwater discharges
- Industrial waste water discharges
- Spills
- Residential yards
- Improper storage
- Waterway usage
- Atmospheric deposition

Data Gap Examples

- UST known to have existed, but removal is not documented.
- Hazardous material known to have been spilled, but cleanup has not been confirmed.
- Initial Site Investigation completed, but extents of contamination not defined.
- Method Detection Limits exceeded cleanup levels.

Action Item Examples

- Review missing documentation
- Inspect a facility to insure proper storage, disposal & other BMPs
- Confirm proper connections & permits to discharge wastewater to sanitary sewer
- Conduct source tracing in pipes with known contaminants
- Conduct confirmation sampling
- Conduct a Remedial Investigation

Source Control Strategy - 2004

Tier 1 – High priority & early action areas

Tier 2 – Areas will be identified for cleanup in EPA's Record of Decision (ROD)

Tier 3 – No cleanup, prevent future contamination

Tier 4 – Recontaminated sediment areas

Lower Duwamish Source Control Strategy (2004)

Principles for Managing Contaminated Sediment Risks

(EPA 2002)

- Control Sources Early
- Involve the Community Early and Often
- Coordinate with Stakeholders
- Develop and Refine a Conceptual Site Model
- Iterative Approach
- Evaluate Assumptions and Uncertainties

Strategy

- Identify
  - Key Concepts
  - Regulatory Resources
- Define
  - Sources (site characterization)
  - Contaminants of Concern (COCs)
  - Permitting processes
- Balance
  - Perspectives historic vs ongoing sources
  - Long-term sediment goals vs. current needs for subsistence, recreation, commerce & industry
- Collaborate ↔ Communicate
- Report and Document
- Track

Pollutants

- Waterway vs. Upland
- How much is not OK?
- How much is OK?
- What is OK?
- What data is good data?

COCs in Waterway Sediments

For the waterway sediments, the RI has identified 4 primary risk-driver chemicals:

- PCBs
- Arsenic
- Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)
- Dioxins/Furans

Upland COCs

For source control purposes additional COCs have been identified:

- Other Metals (Pb, Hg, Cd, Cr, Cu, Se, Zn)
- Phthalates (e.g., BBP, BEHP)
- Volatile & Semi-volatile Organic Compounds (e.g., chlorinated solvents, petroleum hydrocarbons)

How much is too much?

- Different Regulations
  - MTCA Method A Cleanup Levels?
  - MTCA Method B Risk Based Cleanup Levels?
  - Sediment Management Standards?
  - State Water Quality Criteria?
- Different Media
  - Groundwater
  - Soil
  - Stormwater
  - Seeps (groundwater emerging above waterline)
  - Catch Basin Solids

How much is OK?

A screening tool was developed by SAIC to help rule out any chemicals that were not likely to contaminate LDW sediments above either Sediment Quality Standards (SQS) or Cleanup Screening Levels (CSL)

Screening Tool Premise

Sorption/desorption partitioning coefficients used to back calculate sediment concentration limits to soil and groundwater concentrations.

- Groundwater to Sediment
- Soil to Groundwater to Sediment

Limitations

- Only applies to groundwater and soil
- Only involves SMS compounds
- Exceedance of a screening tool level does not mean a chemical *is* likely contaminate LDW sediments

Screening Tool Assumptions

- No dilution occurs
- Ample time to reach equilibrium
- Distance is not a factor
- Temperature, pH, grain size and other traits are not factors

Data Review & Analysis

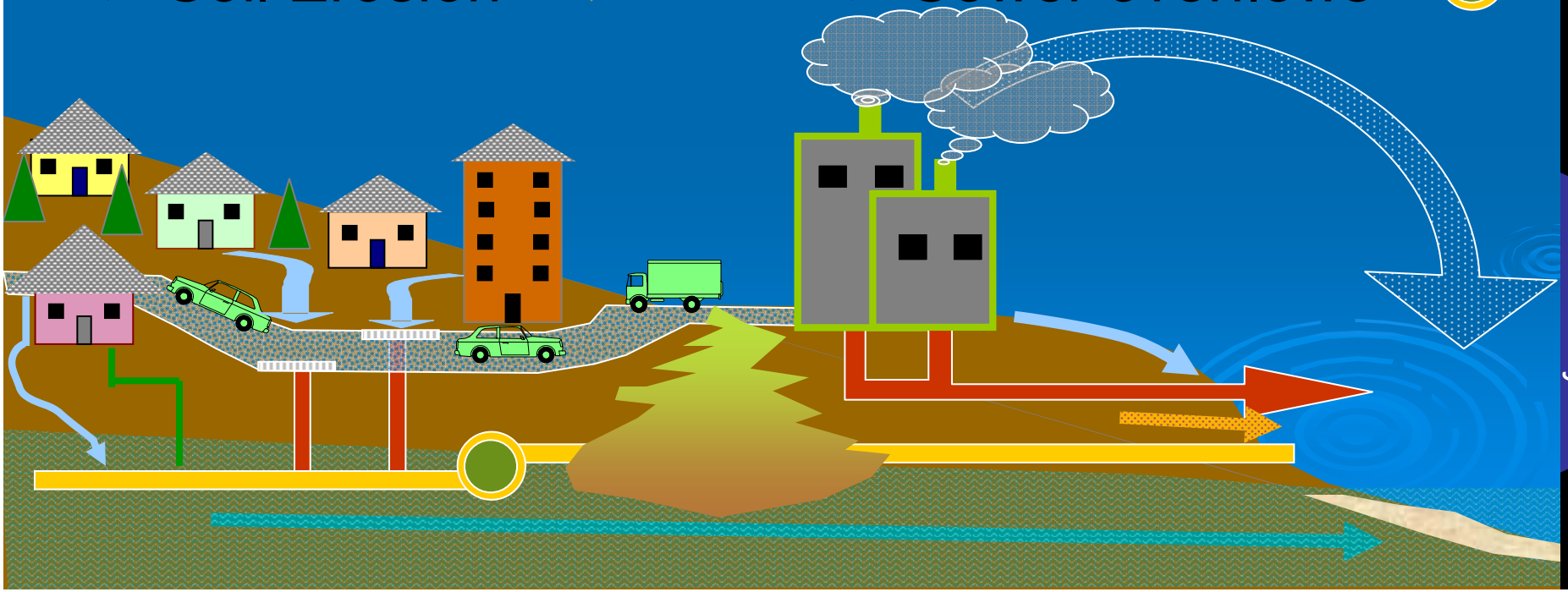
When sampling data is available many factors must be considered:

- Age and amount of data
- Type of Media (GW, soil, seep, catch basin solids, etc)
- Analyte methods used
- Method detection limits
- Applicable cleanup level (then & now)
- Distance to the LDW

PATHWAYS

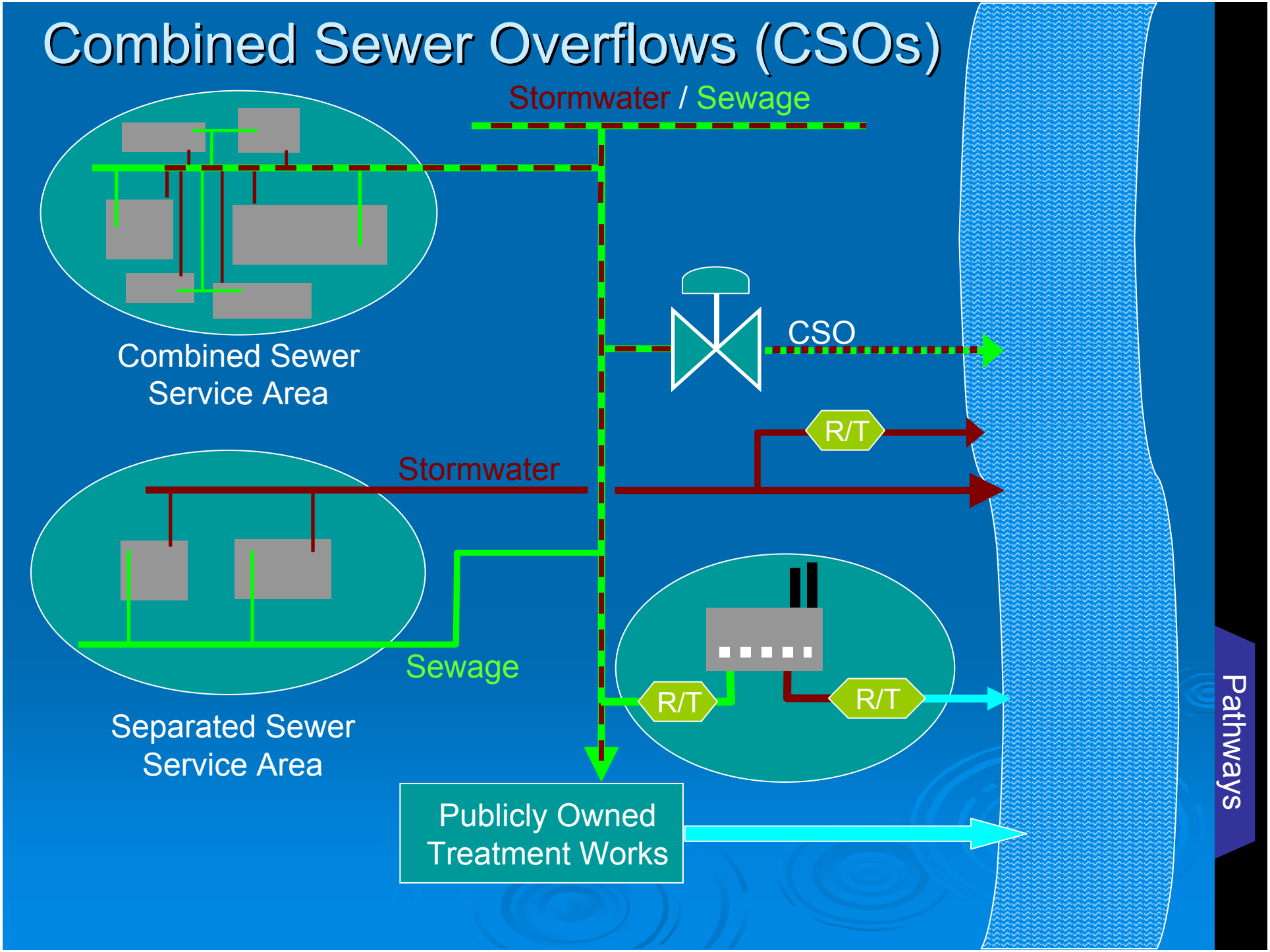
How do pollutants get to the river?

- Surface Runoff
- Storm Drains
- Groundwater
- Soil Erosion
- Spills
- Direct Discharge
- Air Deposition
- Sewer overflows



2 Different Engineered Conveyances

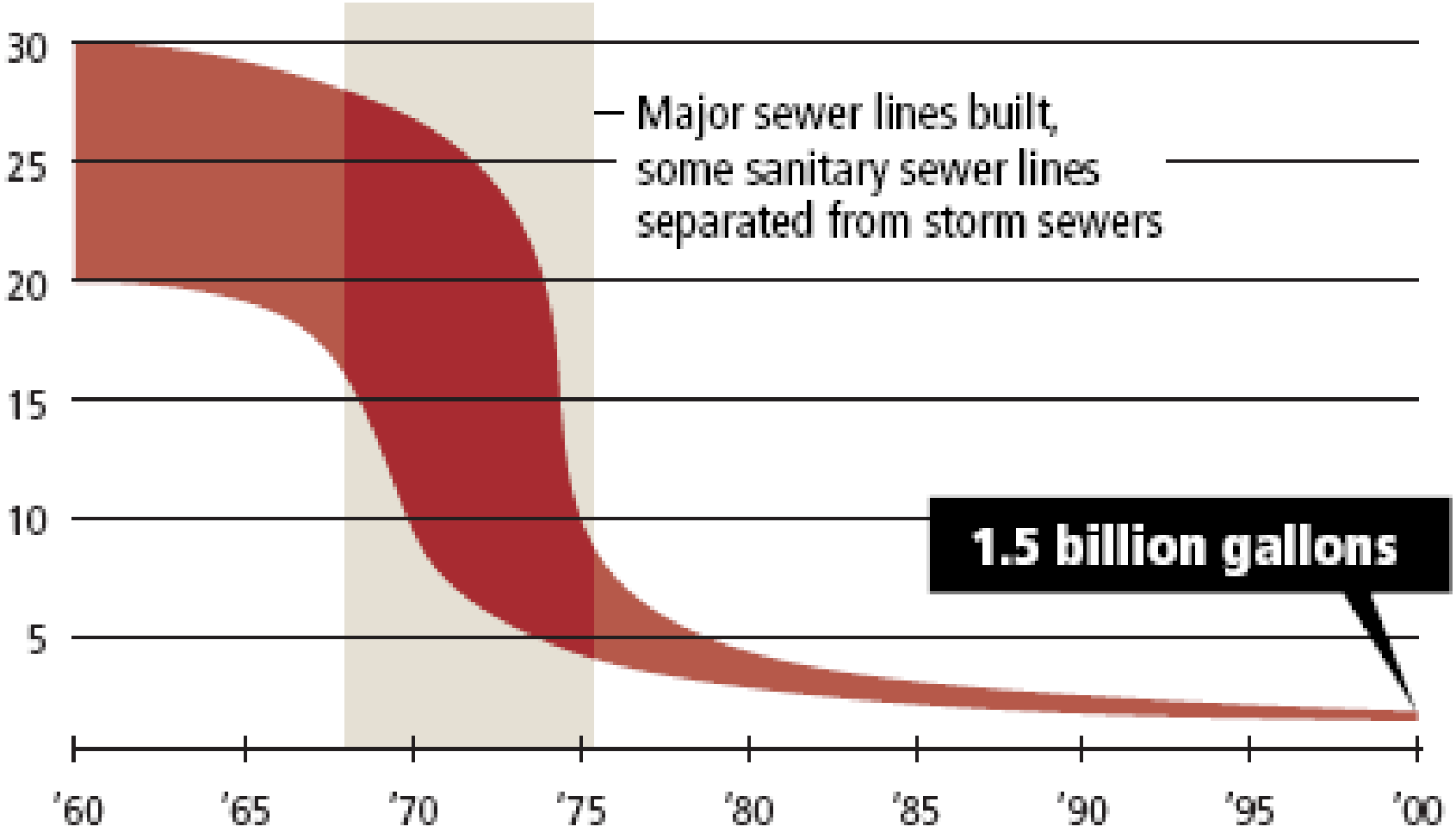
- Combined Sewer–
  - sewage and stormwater in one pipe
  - stormwater normally gets treated with sewage
  - heavy rains can exceed system capacity and cause sewage/rain mix to overflow into the LDW
- Separated Sewer –
  - sewage and stormwater in different pipes
  - sewage is treated
  - stormwater goes directly to the river, often with no treatment
  - sewage can still reach overflow outfall to LDW


Combined Sewer Overflows (CSOs)
Stormwater / Sewage
Combined Sewer Service Area
CSO
R/T
Stormwater
Sewage
Separated Sewer Service Area
R/T
R/T
Publicly Owned Treatment Works
Pathways

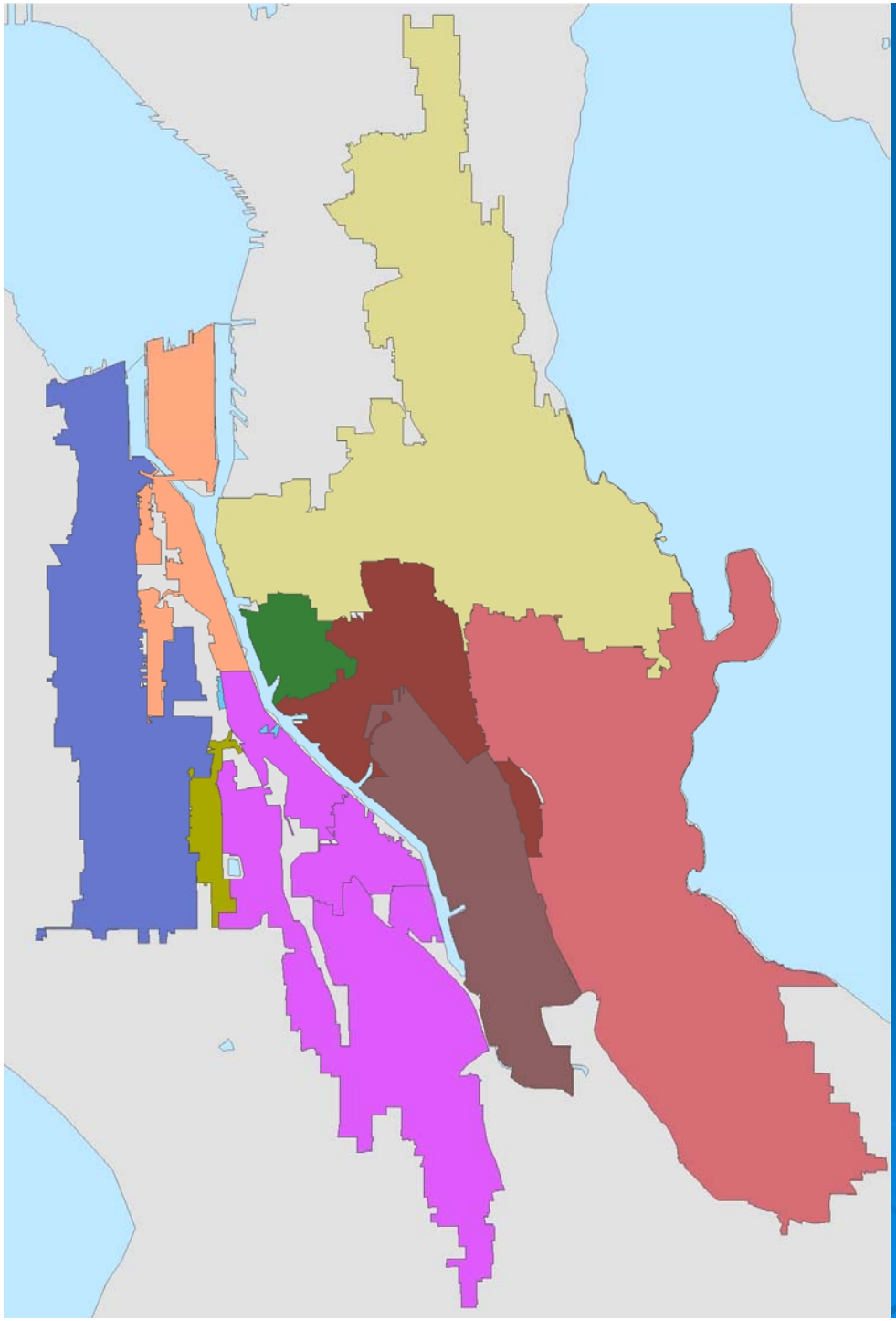
LDW Combined Sewer Overflows

- 32 square miles of CSO basin area for the LDW
- 11 CSO outfalls, 7 already addressed in Source Control Action Plans
- 4 pump station overflow outfalls (over flows caused by mechanical failure)

CSO Reduction Efforts



Pathways



Combined Sewer Overflow Basins

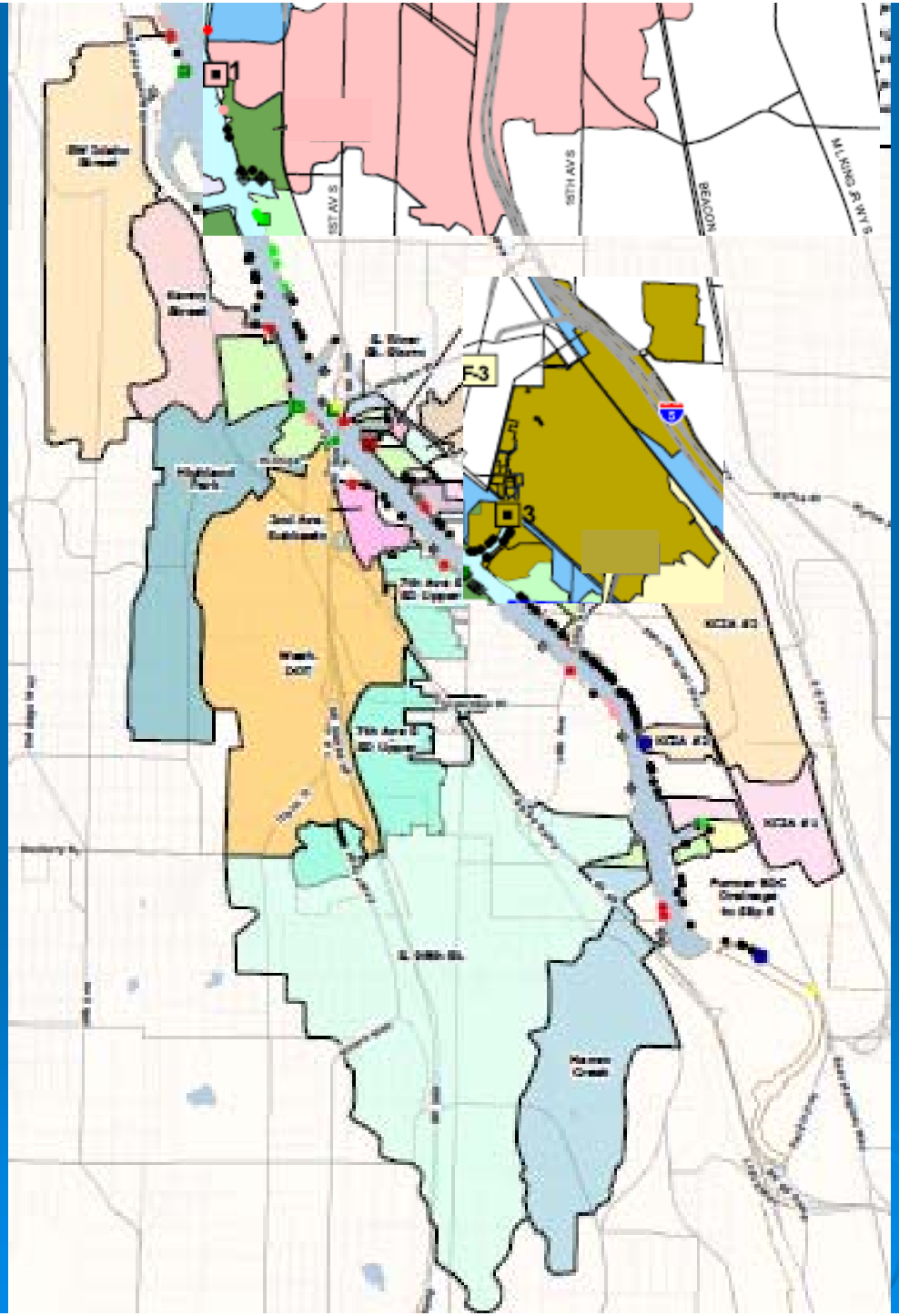
Pathways

Lower Duwamish Stormwater Drainage Basin

- Total drainage basin 14.6 square miles (61% is City of Seattle, 24% is other public, 15% is private waterfront)
- Within that drainage:
  - 44 municipal storm drains
  - 177 private storm drains
  - ~10 streams and ditches

Stormwater Pollutants

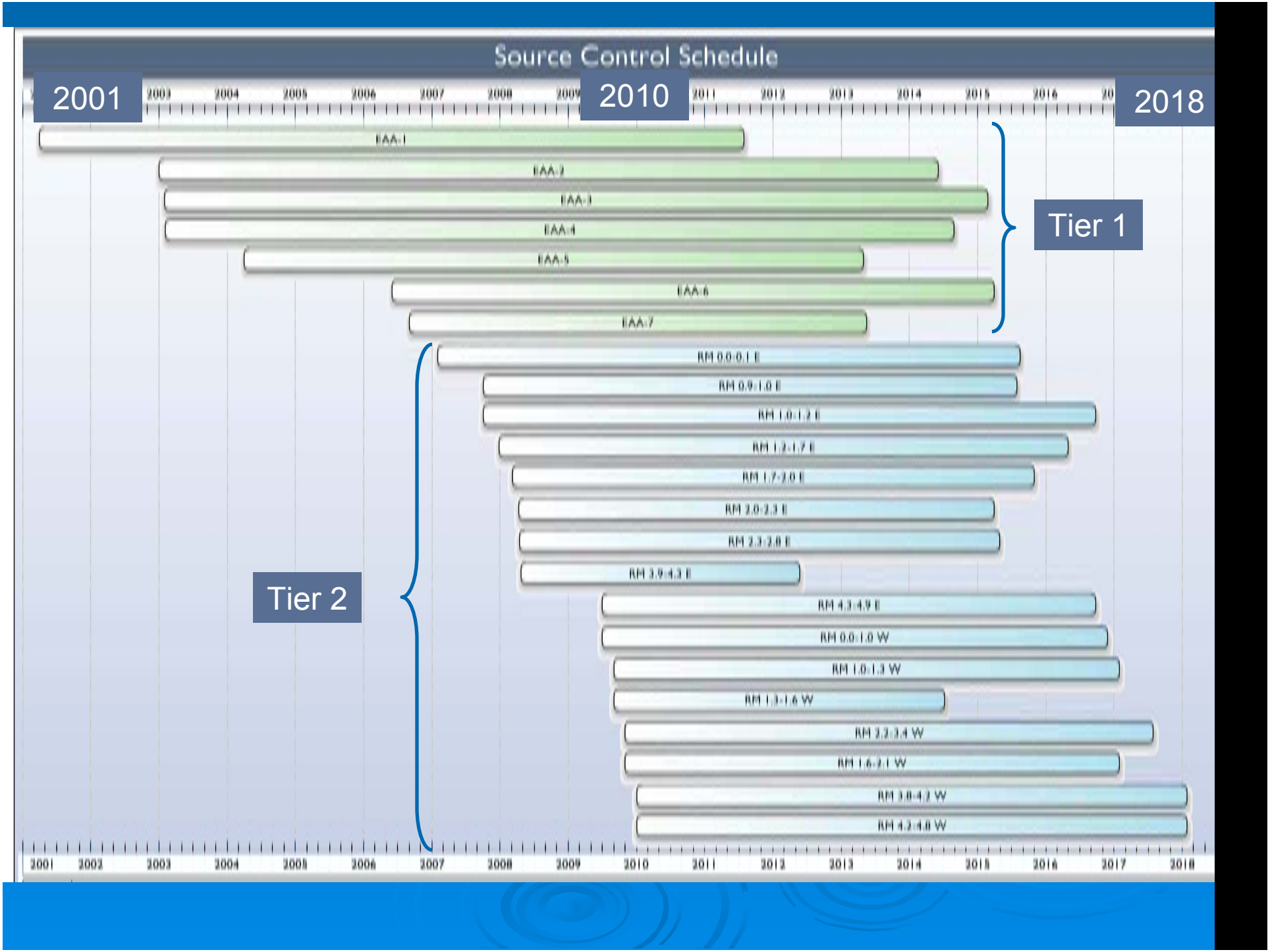
- Suspended solids
- Street contaminants (oils, brake dust, etc.)
- Improperly disposed wastes
- Pesticides, Herbicides
- Fertilizers



Stormwater Drainage Sub-Basins

Pathways

How Long Will It Take?


Source Control Schedule
2001
2010
2018
Tier 1
Tier 2
EAA-1
EAA-2
EAA-3
EAA-4
EAA-5
EAA-6
EAA-7
RM 0.0-0.1 E
RM 0.9-1.0 E
RM 1.0-1.2 E
RM 1.2-1.7 E
RM 1.7-2.0 E
RM 2.0-2.3 E
RM 2.3-2.8 E
RM 3.9-4.3 E
RM 4.3-4.9 E
RM 0.0-1.0 W
RM 1.0-1.3 W
RM 1.3-1.6 W
RM 2.2-3.4 W
RM 1.6-2.1 W
RM 3.8-4.2 W
RM 4.2-4.8 W
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

Summary

- Many Contaminants
- Many Sources
- Complicated Solutions
- Collaboration is Key
- Everyone Can Help
- Will it be funded?

Words of Wisdom

"The dominant message . . . has changed from we are going to enforce [the law] … to now we've got to persuade people." - William Ruckelshaus, EPA Administrator 1970-73, 1983-85, Puget Sound Partnership Chair

Words of Wisdom

"If the public is not engaged . . . we will fail. I have no confidence whatsoever we can get the job done unless and until everybody steps up, accepts responsibility and becomes part of the solution." – Christine Gregoire, WA State Governor

Words of Wisdom

"This we know; The earth does not belong to man; man belongs to the earth. This we know, all things are connected like the blood which unites one family. All things are connected" - Chief Si'ahl, Namesake of the City of Seattle

Questions?