Green-Duwamish Watershed Pollutant Loading Assessment

Lower Duwamish Waterway

Stakeholder Meeting

November 18, 2014

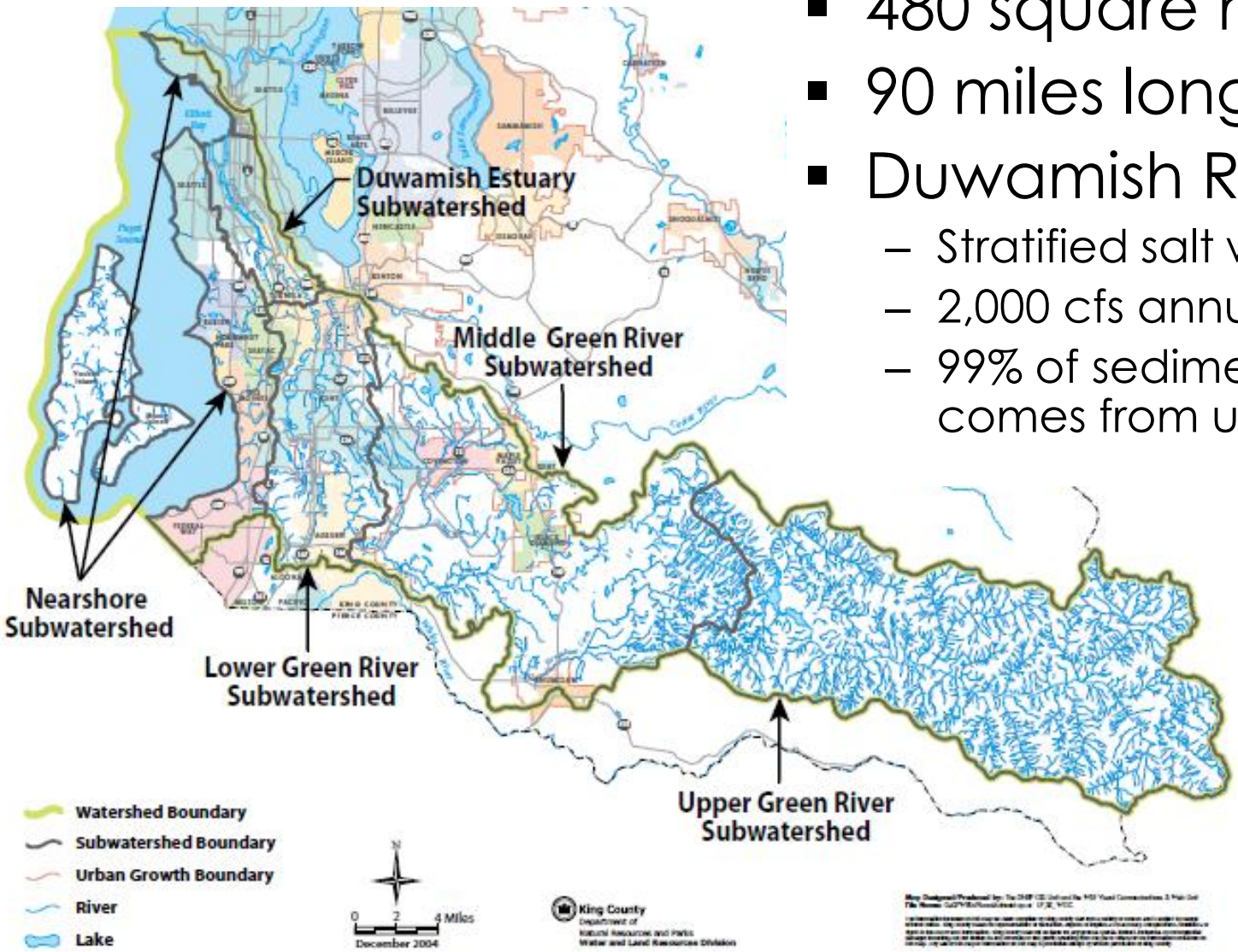
DEPARTMENT OF ECOLOGY
State of Washington

DOVETAILING SUPERFUND AND CLEAN WATER ACT

- Why assess pollutant loading at the watershed scale?
- Recommended technical approach
- Project organization
- Next steps

Why assess pollutant loading at the watershed scale?

Green-Duwamish River Watershed



- 480 square miles
- 90 miles long
- Duwamish River
  - Stratified salt wedge
  - 2,000 cfs annual mean flow
  - 99% of sediment load comes from upstream

Regulatory Context

CWA, WPCA

- Water Quality Standards
  - Criteria to protect designated uses
- NPDES Permits
  - Effluent Limits
  - CSO Controls
- Water Quality Assessment
  - Multi-media
  - Impaired / 303(d) list
    - Total Maximum Daily Load or water clean up plan

CERCLA, MTCA, SMS

- Site definition
  - Multi-media
- Numeric Criteria
  - Remedial Action Levels
  - Background
  - Cleanup Levels
- Remedy Selection
  - Balancing criteria
  - Active cleanup
  - Natural Recovery

Sediment, Water and Fish Tissue are Influenced by the Watershed

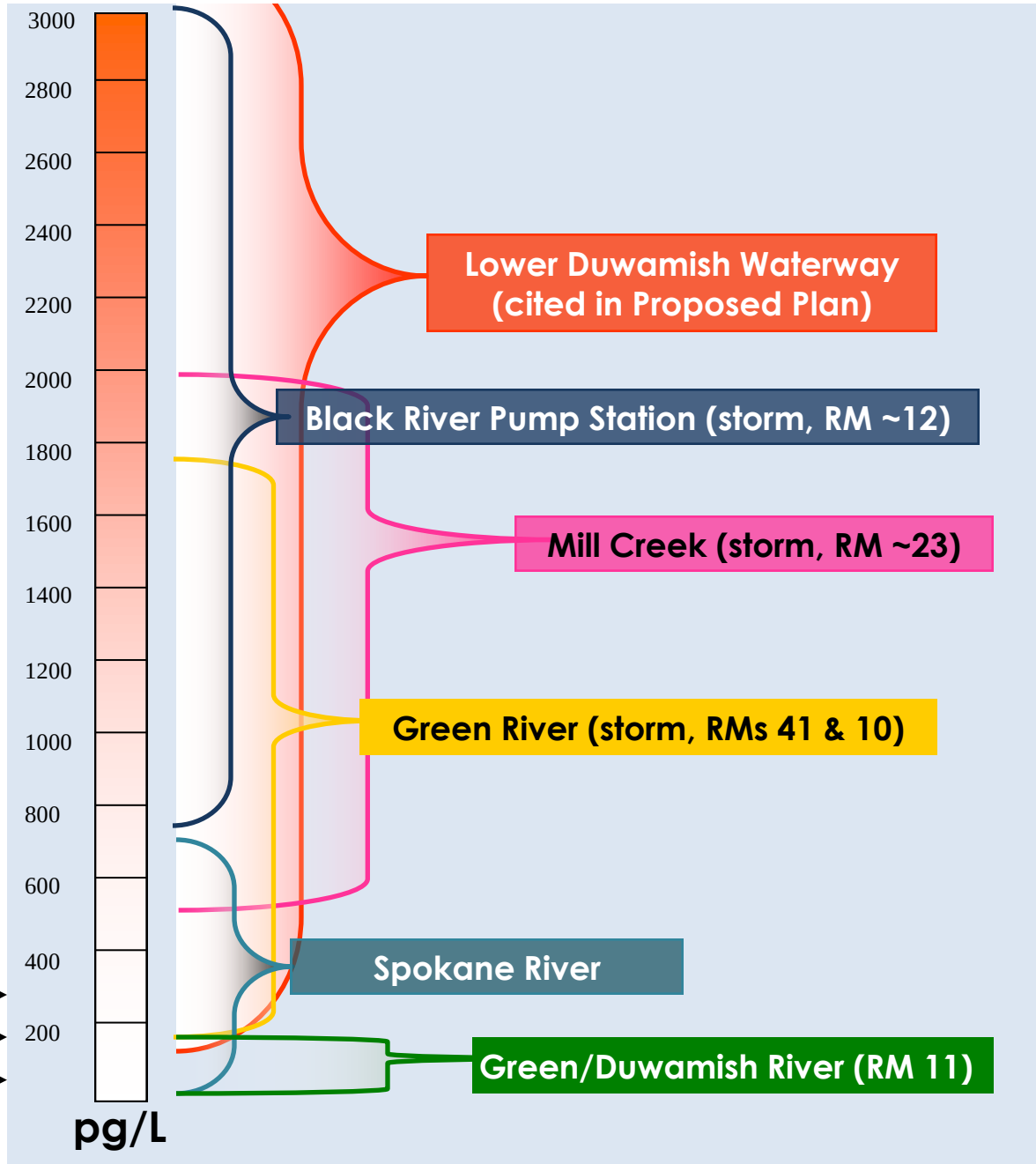
- LDW RI/FS focus was on sediments
- Proposed LDW sediment remedy not designed to attain CWA designated uses
- CWA "impaired" listings in LDW
- Research has found COCs in water and air throughout the watershed

Green-Duwamish: PCBs in Surface Water

pg/L or parts per quadrillion

Green River & Tributaries storm flow data from King County, 2014

Duwamish River, River Mile 11 data from USGS, 2014



Needs

- Understand pollutant loading from
  - Point sources and pathways (regulated)
  - Diffuse sources (uncontrolled)
- Compare pollutant reduction alternatives
  - Management scenarios
  - Identify priorities
- Predict improvements in fish tissue, sediment and water quality
  - Short term and long term

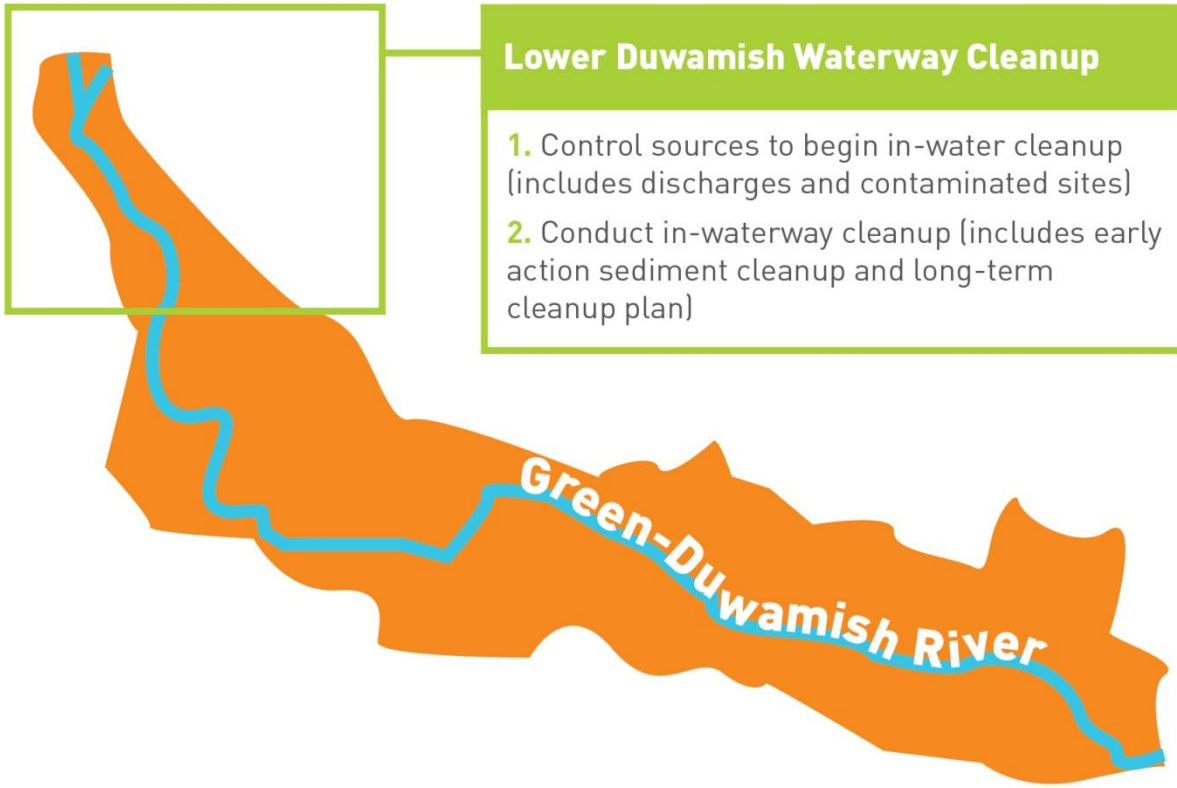
Needs (continued)

- Correlate media values
  - Water, sediment, fish tissue
- Inform permits and best practices
- Minimize sediment recontamination
- Improve effectiveness of LDW remedy
- Support adaptive management
  - Modeled outcomes
  - Monitoring data

Dovetailing Clean Water & Cleanup

Pollutant Loading Assessment Modeling Tool

1. Identify pollution sources throughout the watershed
2. Develop source reduction targets and strategies (including for diffuse unregulated sources)



Lower Duwamish Waterway Cleanup

1. Control sources to begin in-water cleanup (includes discharges and contaminated sites)
2. Conduct in-waterway cleanup (includes early action sediment cleanup and long-term cleanup plan)

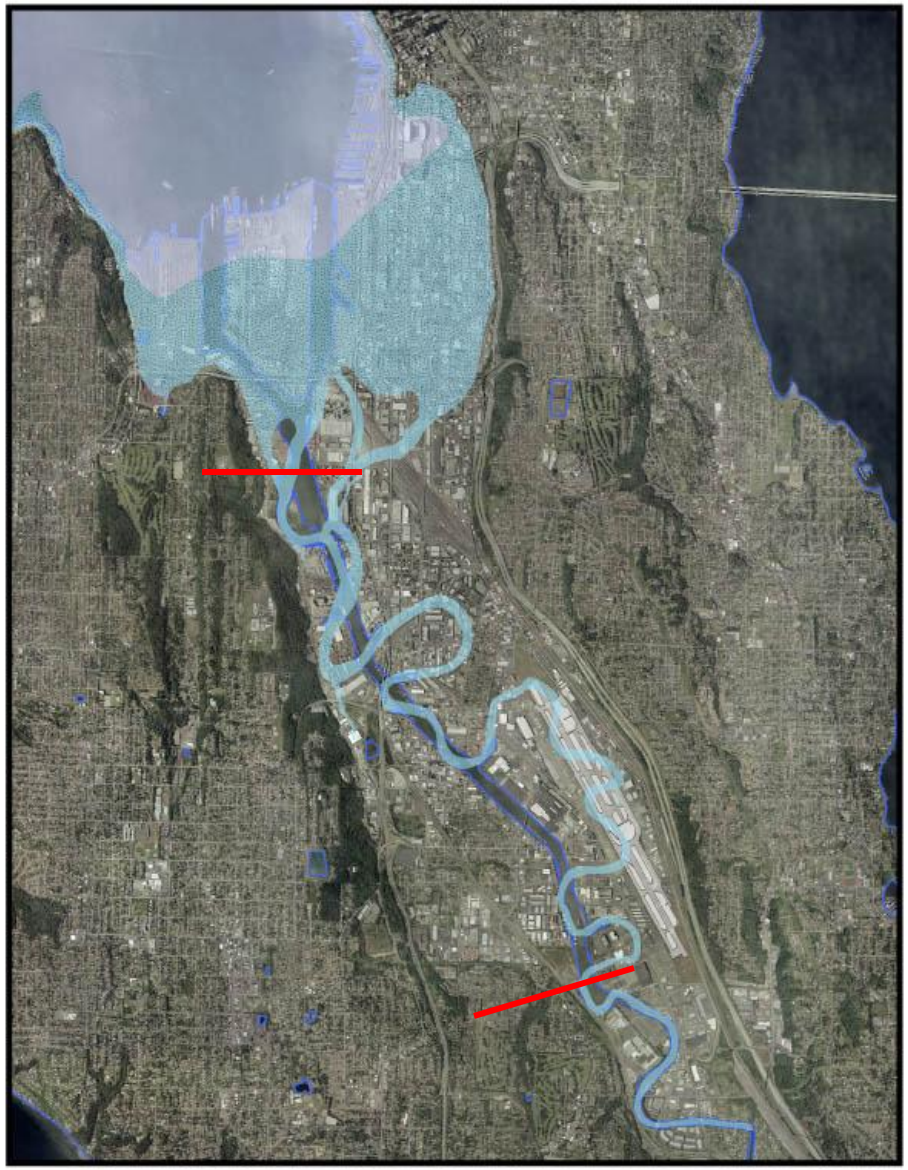
What does this mean for source control?

- Source identification is complicated by
  - Multiple sources and congener patterns
  - Dynamic river systems, air sheds
  - Cost of low level lab analyses
- Stormwater controls are expensive
  - WRIA 9 retrofit estimate: $210M/yr for 30 yrs
  - Single basin treatment: $24.3M (const.)
- Toxics reduction focused on true sources
  - PCBs: building materials, pigments

Recommended Technical Approach

How was this Technical Approach developed?

- EPA funding for contractor
- Compiled and evaluated:
  - Available models
  - Existing data
- Summarized potential environmental targets
  - Sediment, water & fish tissue
  - Regulatory & guidance



Technical Approach Recommendations

- Develop a linked watershed – receiving water – food web model
  - Watershed: LSPC
  - Receiving water: EFDC
  - Food web: Arnot and Gobas & DYMBAM
- Represent important processes
  - Hydrology & hydrodynamics
  - Sediment transport, resuspension, build up
  - Pollutant transformations and transport
    - Dissolved and particulate

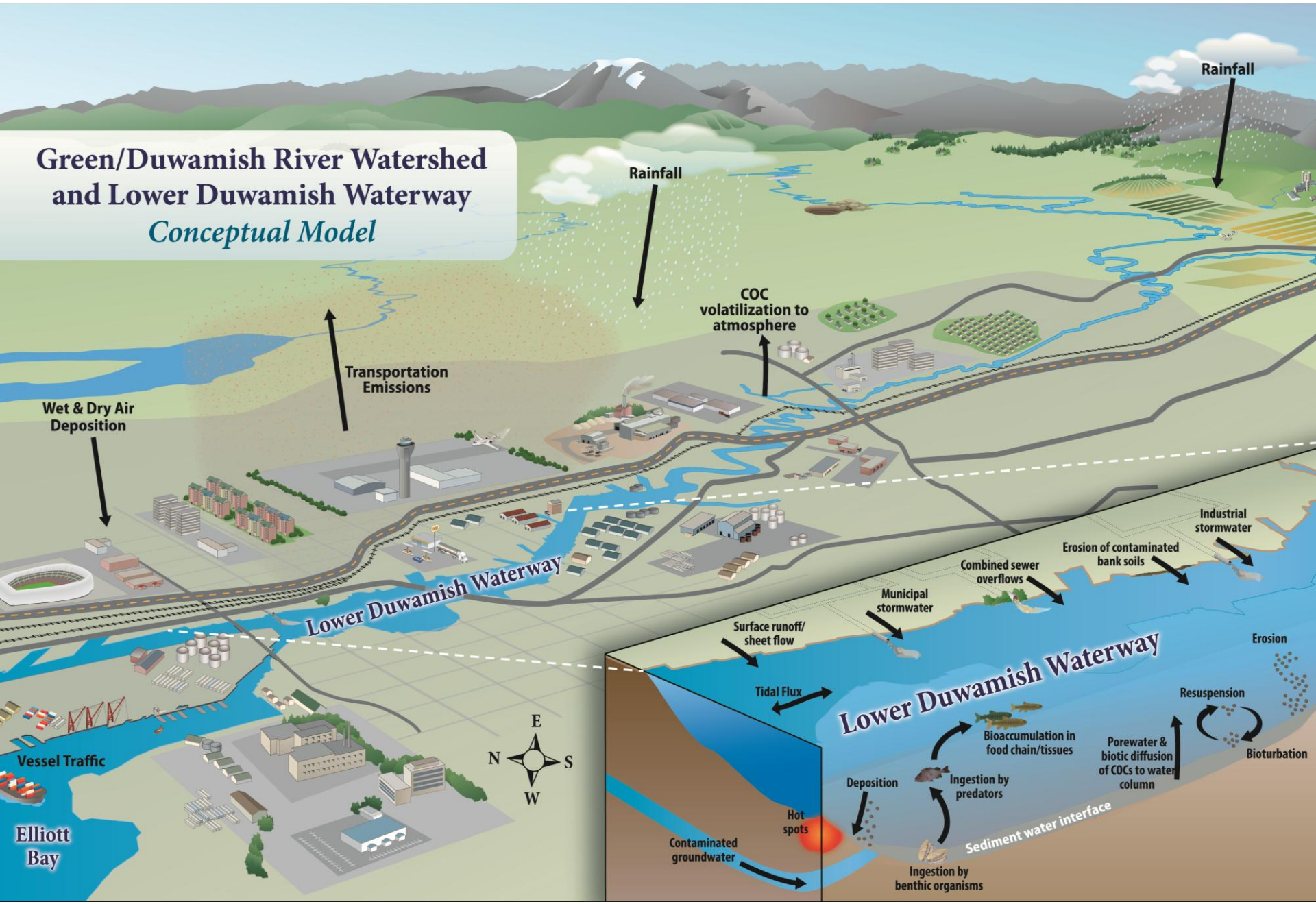
Technical Questions

Indicator Parameters & Data Gaps

- Which toxic pollutants should be modeled?
- What, if any, surrogates should be used?
- Is existing data sufficient to calibrate the models?
- What additional data is needed? Why?
  - Ambient vs. discharge
  - Multi-media

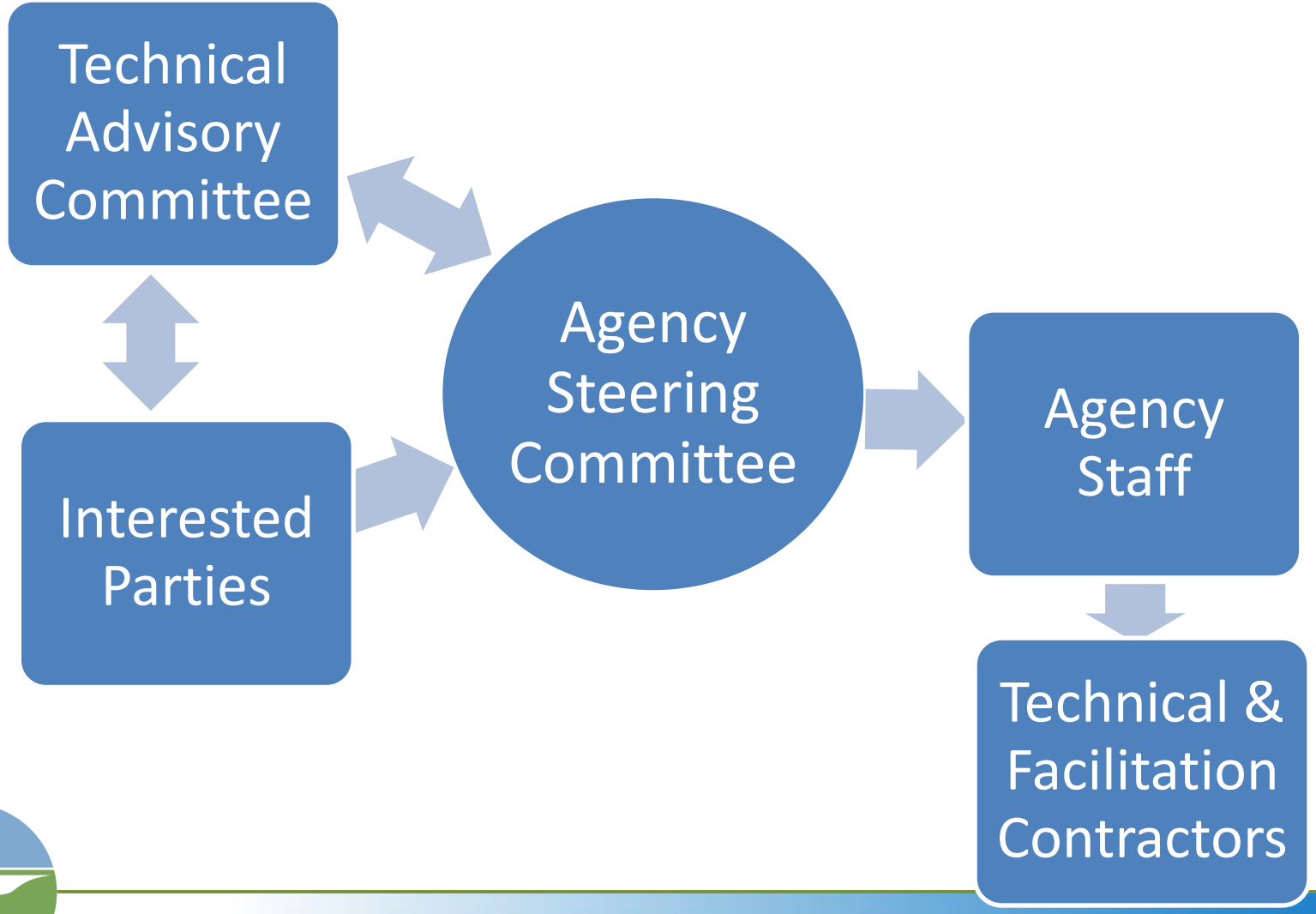
Sources & Pathways

- How can the models distinguish between pollution sources and pathways?
  - Sources: building materials, combustion
  - Pathways: stormwater & air deposition
- How to accurately represent drainage and air patterns?


Green/Duwamish River Watershed
and Lower Duwamish Waterway
Conceptual Model
Rainfall
Rainfall
COC
volatilization to
atmosphere
Transportation
Emissions
Wet & Dry Air
Deposition
Lower Duwamish Waterway
Vessel Traffic
Elliott
Bay
E
N
S
W
Industrial
stormwater
Erosion of contaminated
bank soils
Combined sewer
overflows
Municipal
stormwater
Surface runoff/
sheet flow
Lower Duwamish Waterway
Erosion
Tidal Flux
Resuspension
Bioaccumulation in
food chain/tissues
Porewater &
biotic diffusion
of COCs to water
column
Bioturbation
Deposition
Ingestion by
predators
Hot
spots
Sediment water interface
Contaminated
groundwater
Ingestion by
benthic organisms

Project Organization

Organizational Structure



Steering Committee

Representing	Management Representative
Ecology SMT, Sponsor	Josh Baldi, Regional Director, Northwest Regional Office
Ecology Water Quality Program	Kevin Fitzpatrick, Section Manager
Ecology Toxics Cleanup Program	Bob Warren, Section Manager Ron Timm, alternate
USEPA Region X, Sponsor	Dan Opalski, Director, Office of Water and Watersheds
USEPA Office of Water	David Croxton, Unit Manager
USEPA Environmental Cleanup	Lori Cohen, Associate Director, Office of Environmental Cleanup

Technical Advisory Committee (Invitees)

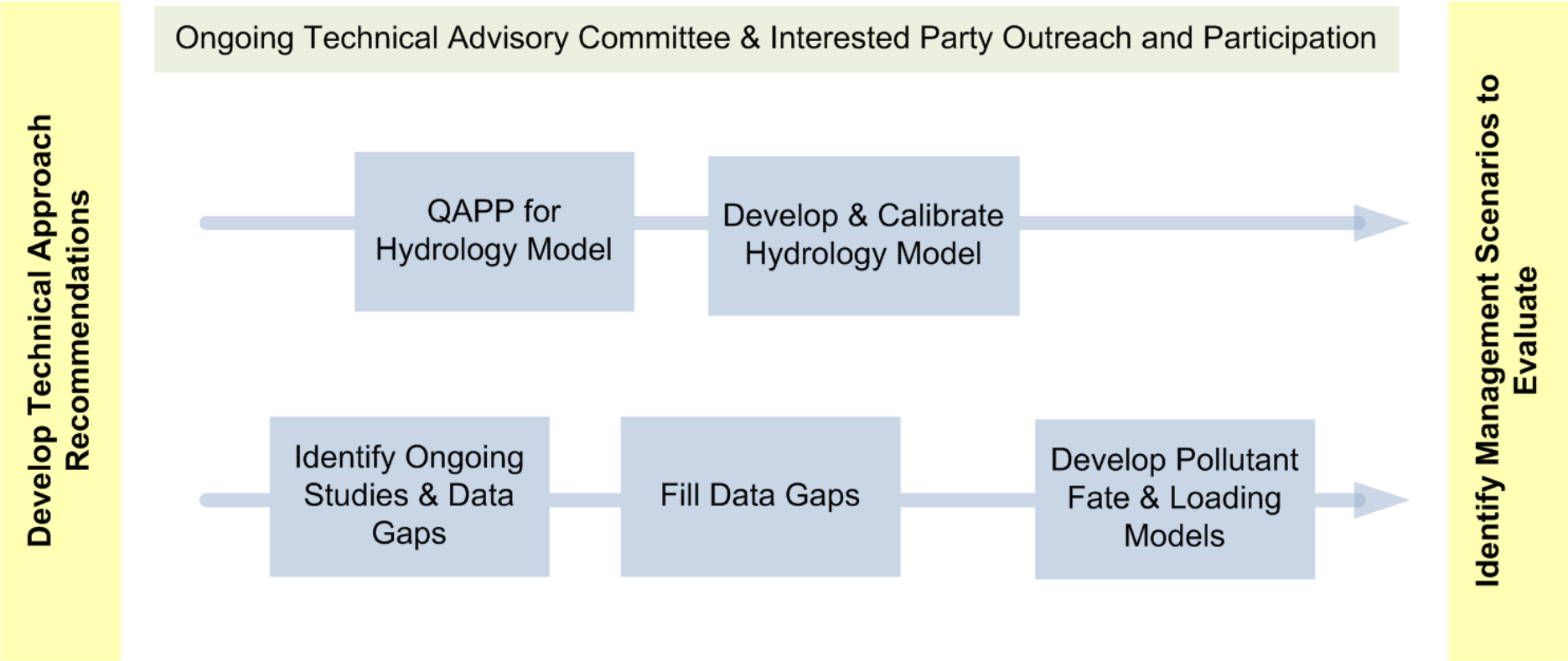
- Muckleshoot Indian Tribe
- Suquamish Indian Tribe
- Duwamish River Cleanup Coalition
- King County
- City of Seattle
- Port of Seattle
- City of Tukwila
- City of Kent
- City of Auburn
- City of Renton
- Ecology-Environmental Assessment Program
- US Army Corps of Engineers

Interested Parties: How to Be Involved

- Mailing list for announcements
  - Contact: athomson@enviroissues.com
- Webpage
  - http://www.ecy.wa.gov/geographic/GreenDuwamish/pla.html
- First meeting expected Q1 2015
- TAC will help formulate key questions for broader input

Timeline

This is a long-term project. Initial phase illustrated below.



Next Steps

PLA Next Steps

- Steering committee meetings
- Technical advisory committee meetings
  - Approx 4 through Q1 2015
  - Develop recommendations
- Interested party meeting(s)
- Develop project plan for hydrology model

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