Green/Duwamish River Watershed



Pollutant Loading Assessment

Technical Advisory Committee Meeting
April 6, 2016

DEPARTMENT OF ECOLOGY
State of Washington

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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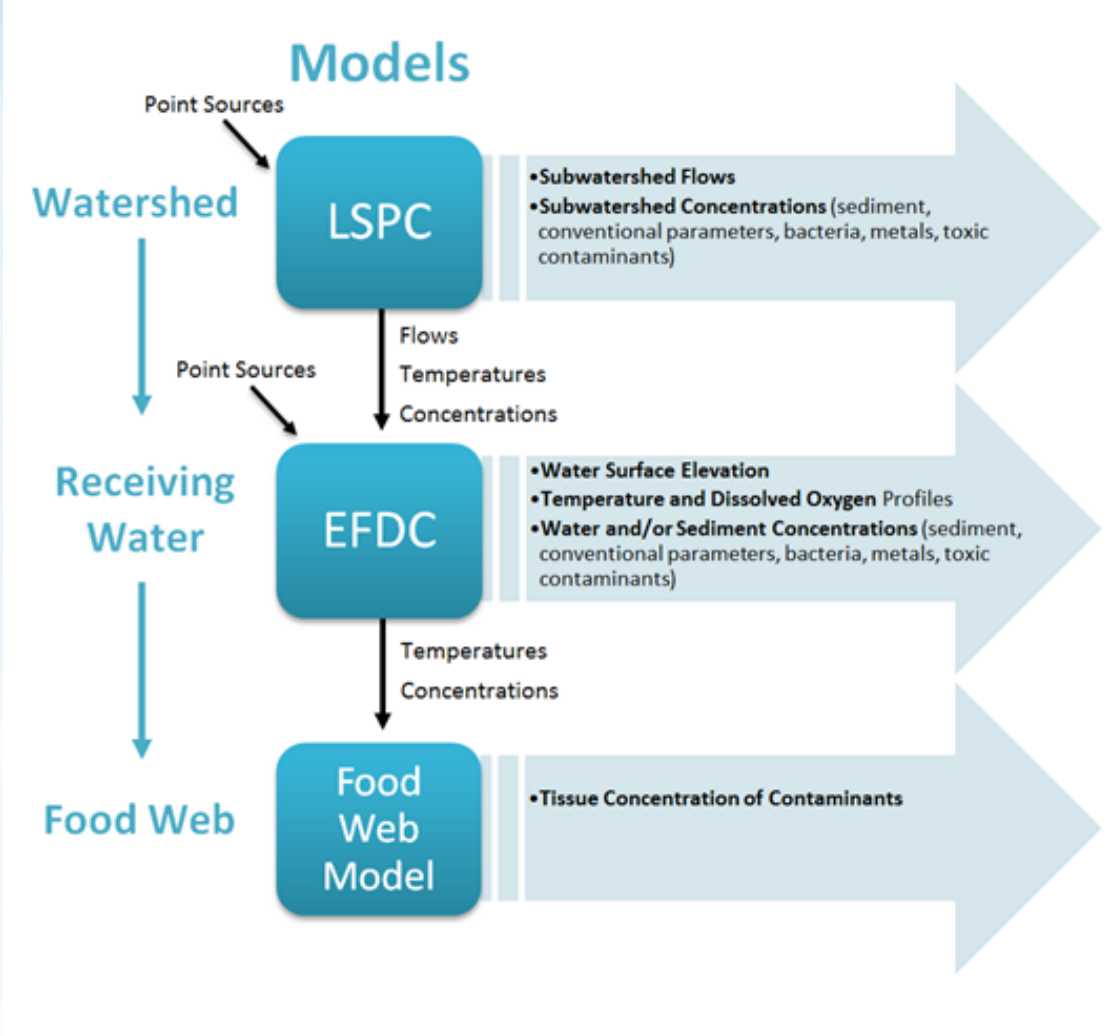
Topics in this segment

- Food Web Model
- Data Management



Food Web Model

- Build from previous FWM for Remedial Investigation or RI (focused on PCBs)
  - Used Arnot and Gobas model of steady-state PCB distribution in biota (total PCBs)
  - Species endpoints: 3 adult fish, 2 adult crabs, and soft clams (target species selected because they were either receptors of concern in the ERA or served as key prey species for other receptors in the eco/human health risk assessment)
  - Estimated long term averages over the whole LDW
    - Calibrated to tissue samples collected from 1997 to 2007
- Goals for PLA model
  - PCBs (simulate as homolog groups?)
  - Expanded to simulate cPAHs

LDW Food Web

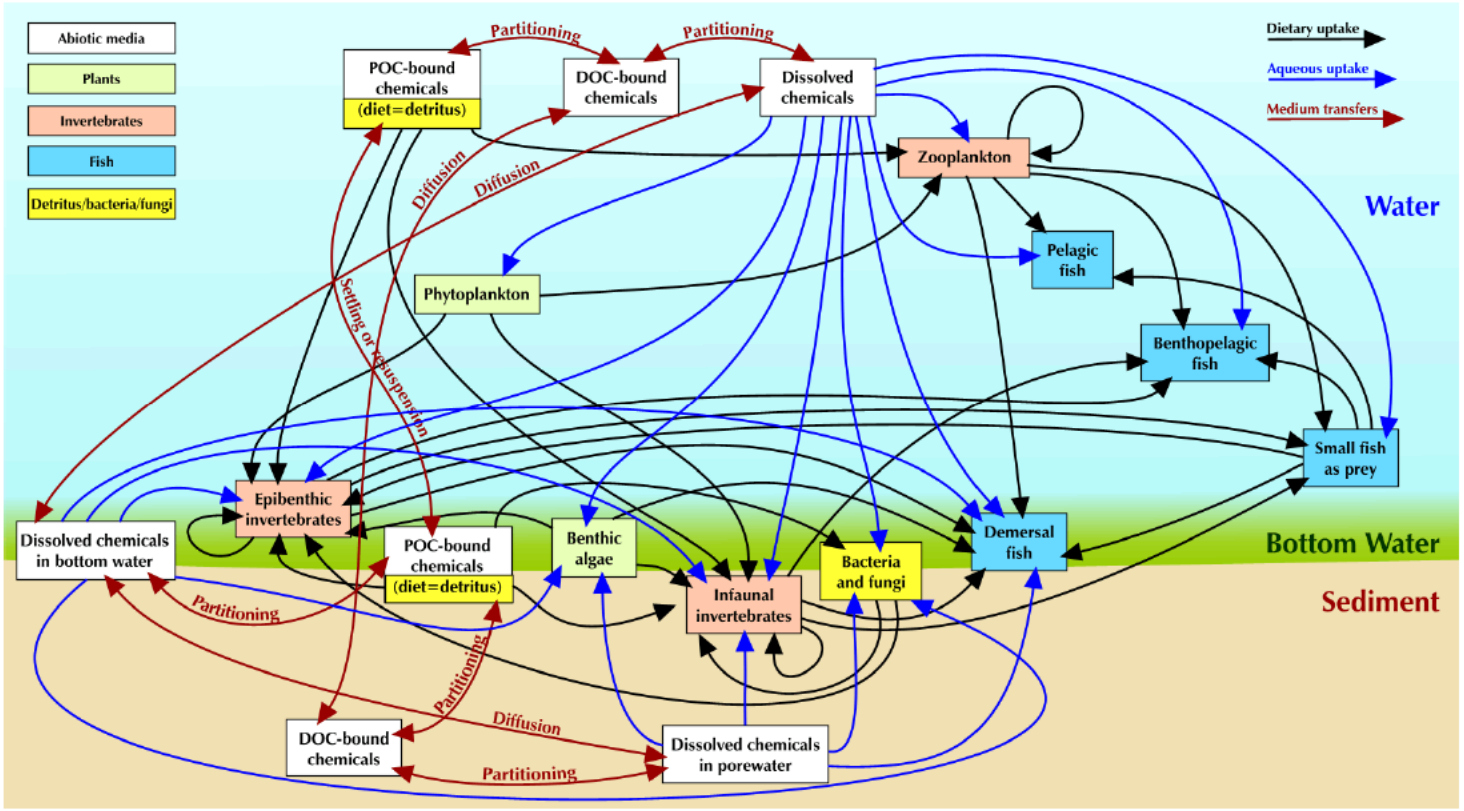


Figure 3-1. Generalized LDW food web model

Windward, 2005

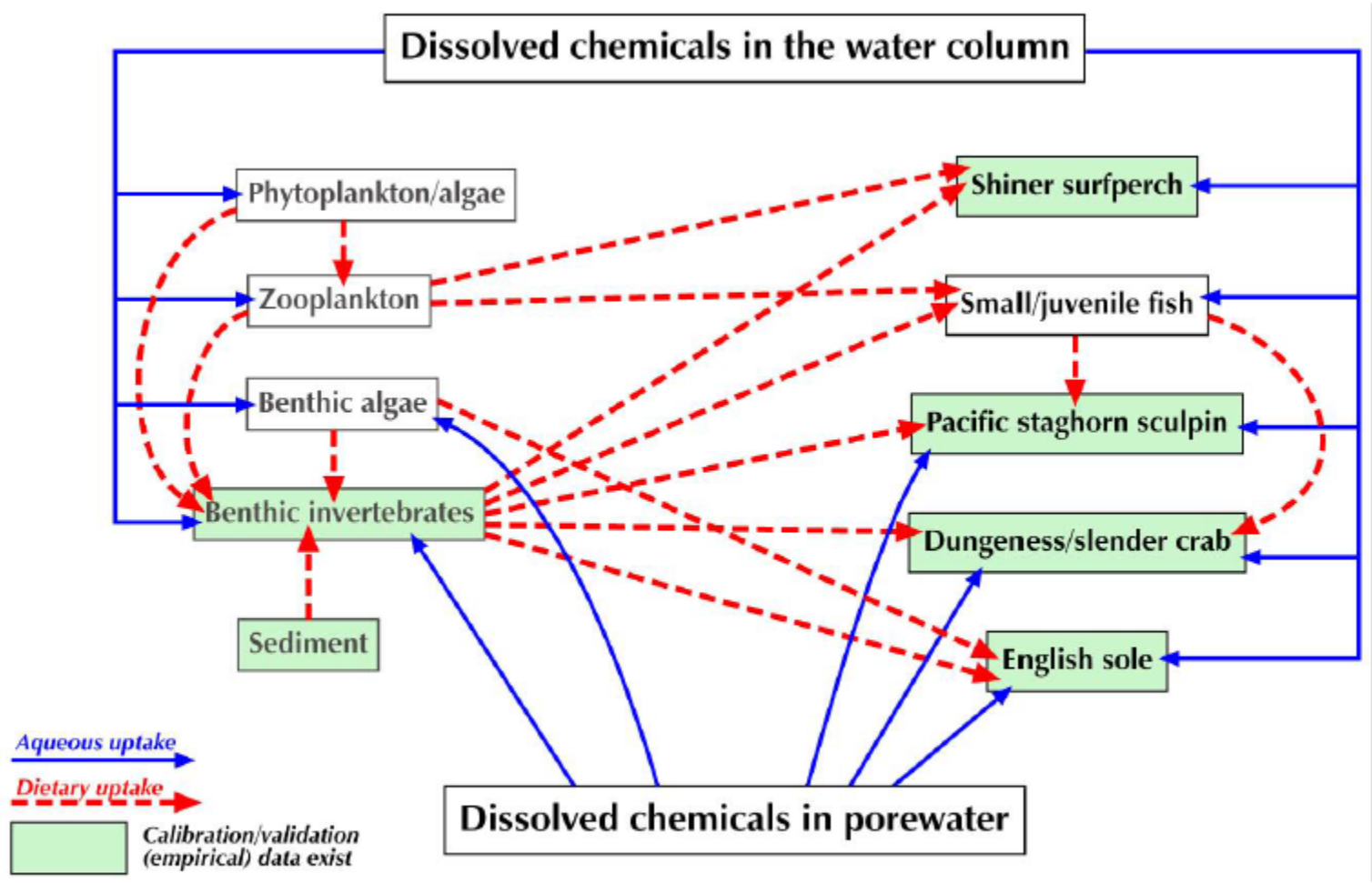


Figure 3-2. Simplified dietary and aqueous uptake routes for LDW biota

Windward, 2005

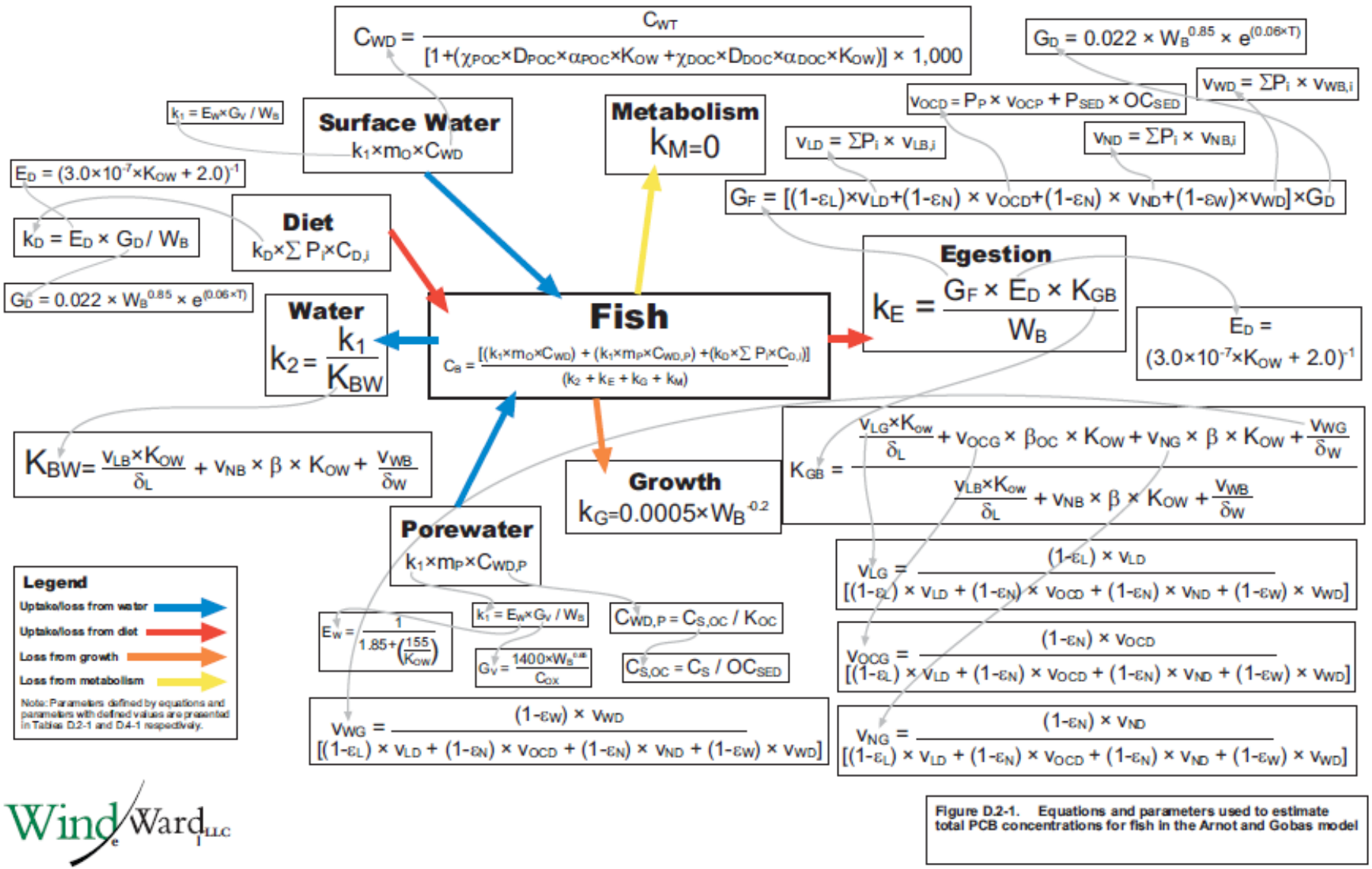


Figure D.2-1. Equations and parameters used to estimate total PCB concentrations for fish in the Arnot and Gobas model

Configuration

- RI/Windward FWM model : factors influencing tissue concentrations
  - **water column concentration**
  - **partitioning coefficients (K_{ow})**
  - **density of lipids**

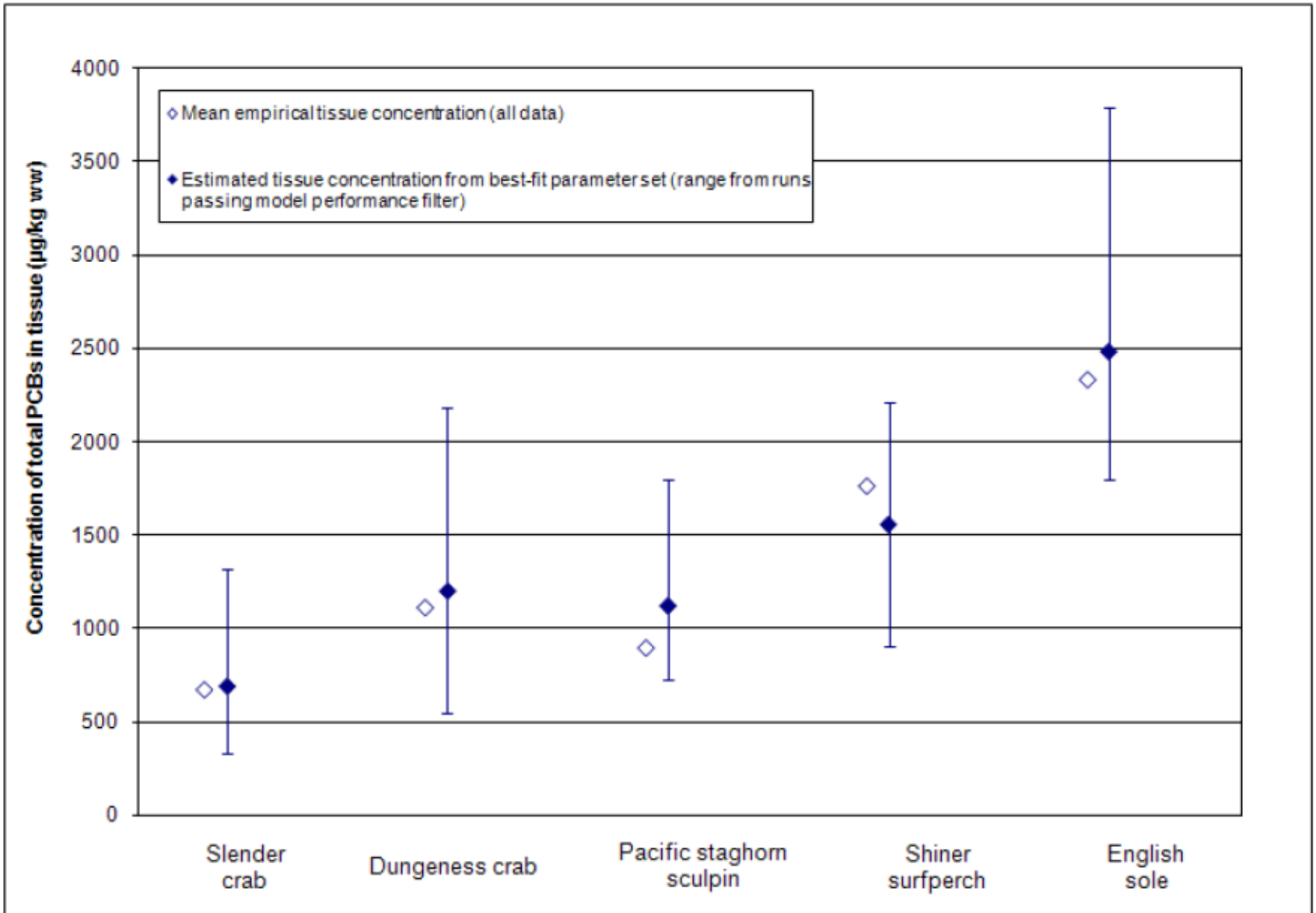
- FWM is a single, fully mixed computational cell
  - All model inputs and outputs are area-wide averages

- Inputs for FWM
  - EFDC contaminant concentrations from water column
  - EFDC and observed data for sediment conc.
  - EFDC – solids and organic carbon

Calibration

- Model accuracy will be evaluated through comparison of modeled and observed tissue concentrations.
- Use sensitivity analysis to select the most important parameters for calibration.
- Probabilistic calibration methods
  - (as defined by minimizing the mean ratio – SPAF (species predictive accuracy factor) across all species with empirical data and approximating the interquartile range).
- Model will be applied to conditions representative of 2004, 2007, and more recent fish tissue sampling efforts.

Example calibrations from LDW RI (2010)



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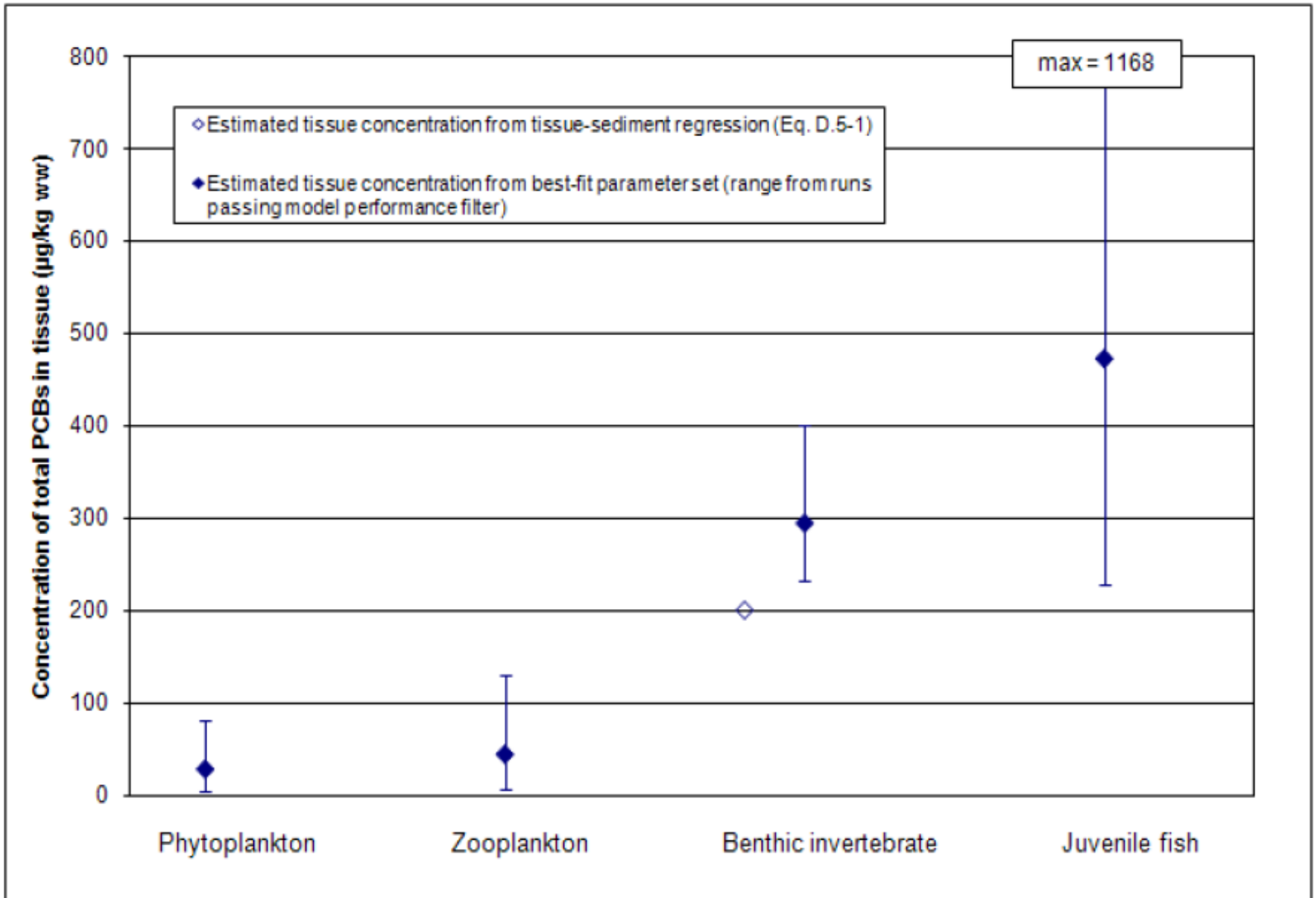

Data Management

- Key secondary data will be compiled from a variety of sources into a common model development database.
- Will include sediment quality data, physical measurements, water quality data (PLA pollutants and parameters needed for the model), and tissue data.
- For PCBs: Aroclor, homolog sums, and individual congener concentrations along with documentation of analytical method (will integrate Leidos work on PCB database)
- Compilation and database development effort expected to begin next year.

Questions and Discussion