

Contaminants of Emerging Concern: Focus on Triclosan

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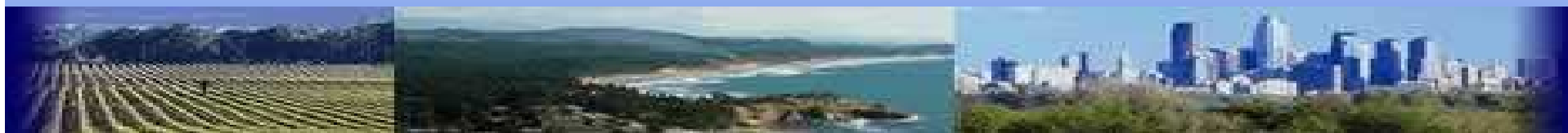
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...to protect human health and the environment

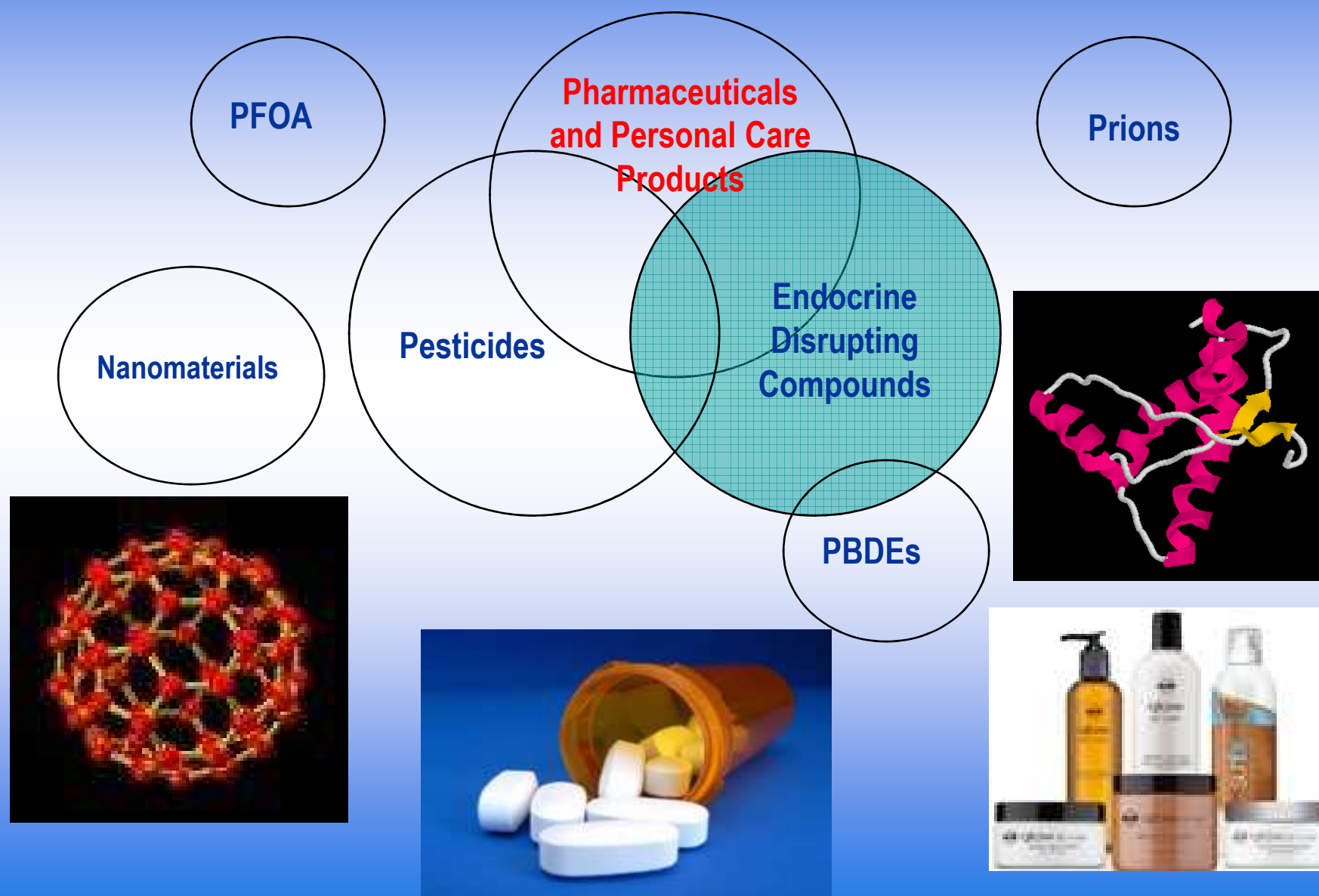
Overview

- Office of Water Focus: Contaminants of Emerging Concern (CEC)
- Triclosan: Effects on Aquatic Life
- Triclosan: Ongoing Research
- Proposed 158W Antimicrobial Data Requirements



...to protect human health and the environment

*Contaminants of Emerging Concern in Water**



*Not an exhaustive list.

EPA Statutory Framework

❖ **Safe Drinking Water Act**

- Contaminant Candidate List (CCL)
- Six Year Review
- Health Advisories
- Unregulated Contaminant Monitoring Rule (UCMR)

❖ **Clean Water Act**

- Human Health and Aquatic Life Criteria
- Water Quality Standards
- Effluent Guidelines for point sources
- Concentrated Animal Feeding Operations (CAFOs)

❖ **Food Quality Protection Act**

- Endocrine Disruptors Screening Program (EDSP)

❖ **Resource Conservation and Recovery Act**

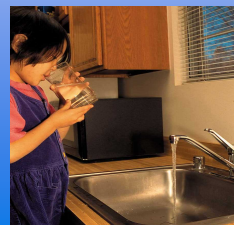
- Universal Waste Rule

❖ **Toxics and Substances Control Act**

- Premanufacture Notices (PMNs), High Production Volume (HPV) chemicals

❖ **Federal Insecticide, Fungicide and Rodenticide Act**

- Pesticide Registration and Re-registration



Why So Much Concern?

- Detected in variety of media – influent, effluent, surface water, biosolids, human breast milk, human urine
- About 96 percent of triclosan use is in consumer personal care products that are ultimately disposed of via residential “down-the-drain” to WWTP
- FDA convened an expert panel that found triclosan is **Not Effective** in antibacterial soaps. Regular soap and water is just as effective.

Aquatic Life Criteria (ALC)

- ALC developed using the “Guidelines” (1985) standardized procedures
- Issued by OW to define limits on chemical exposures which are considered sufficient to preclude unacceptable effects on aquatic communities
- Common element of State water quality standards
- National Pollutant Discharge Elimination System permits
- TMDLs
- Designated use attainment from ambient monitoring data
- Superfund evaluations and remediation goals

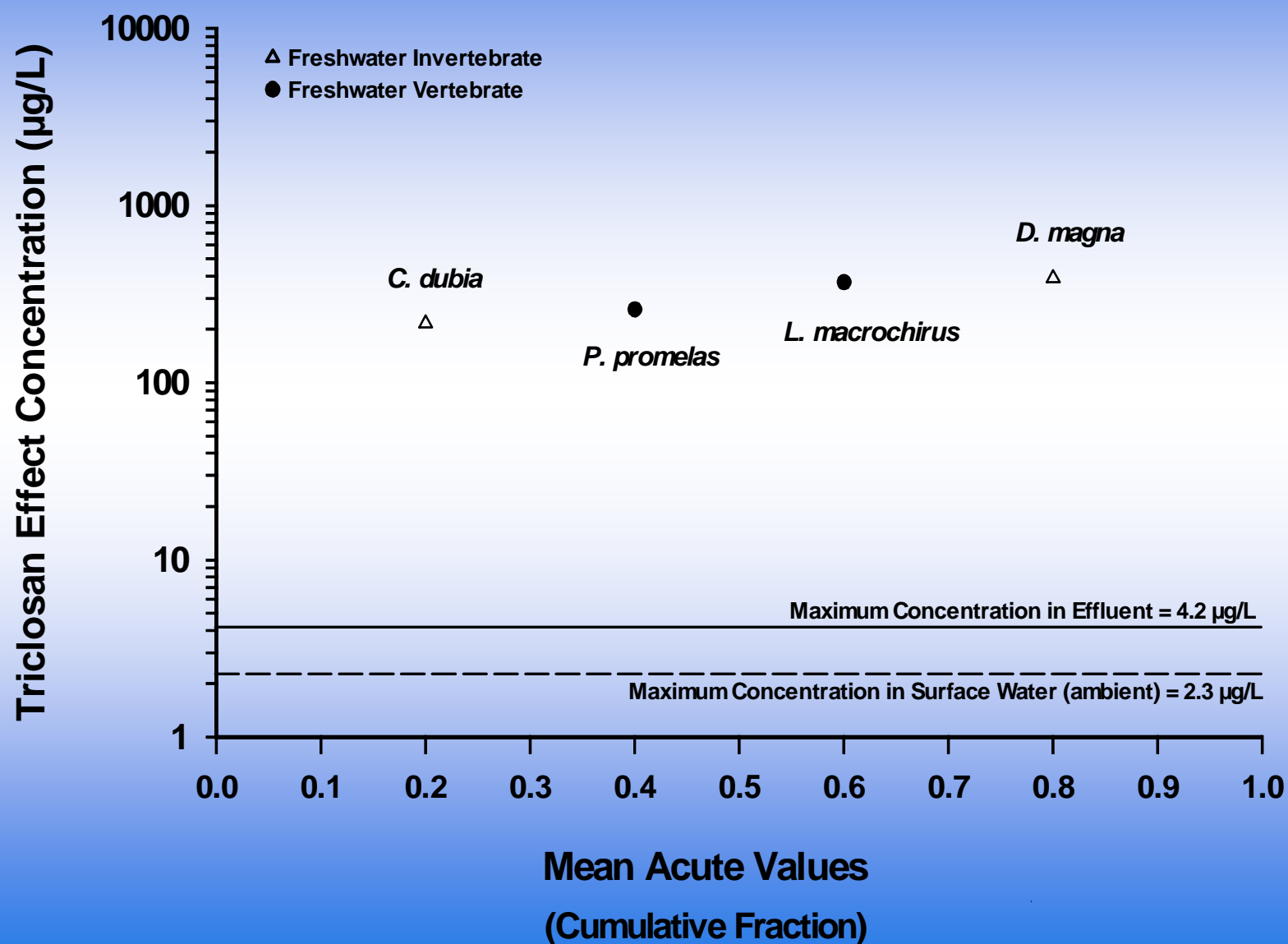


Developing Aquatic Life Criteria for CEC

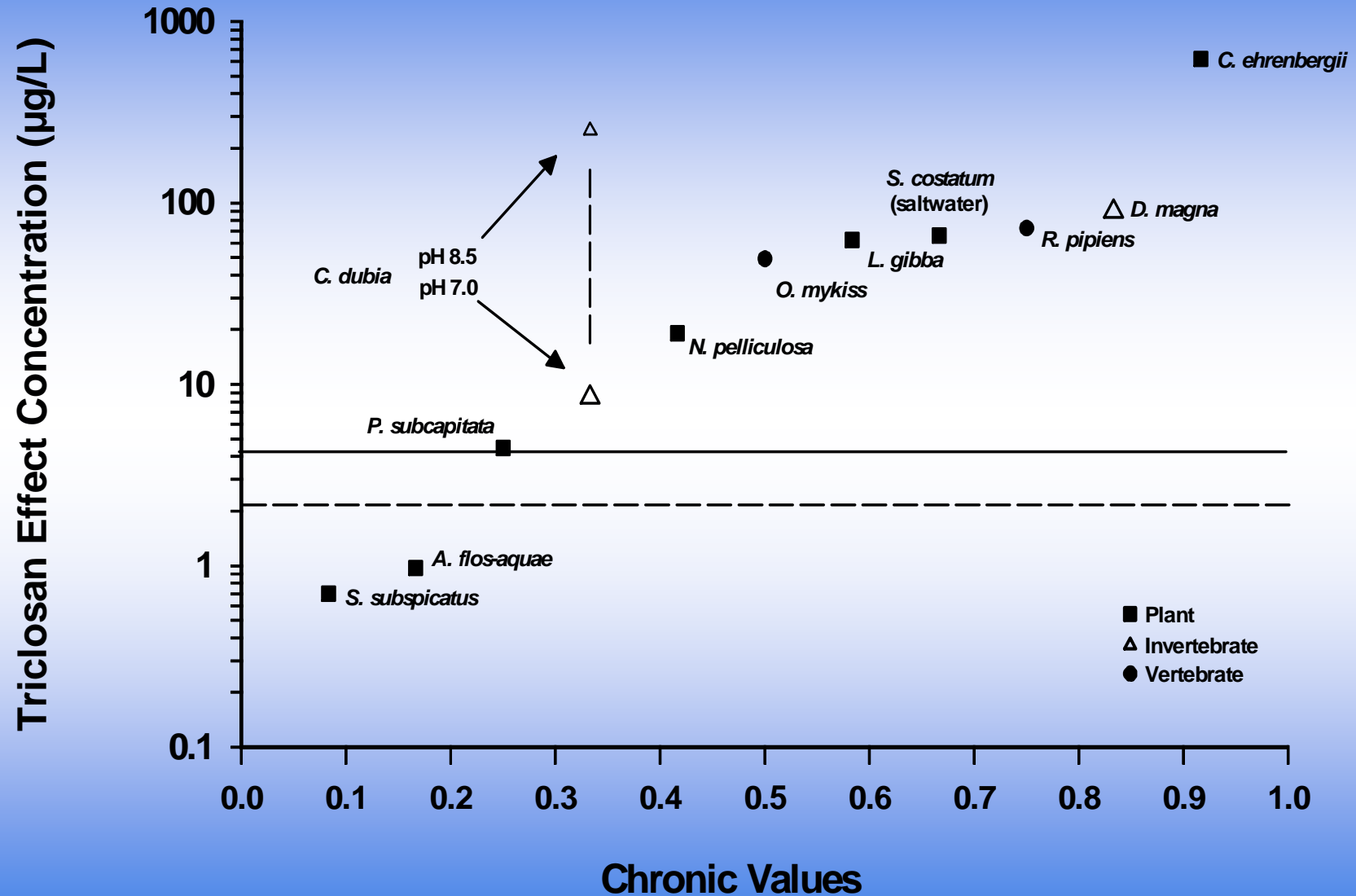
- White Paper: “Aquatic Life Criteria for Contaminants of Emerging Concern:
General Challenges and Recommendations”
 - Relevance of Acute Toxicity Effect Levels in Setting ALC
 - Defining Minimum Data Requirements in Terms of Taxonomic Coverage
 - Use of Non-Resident Species in ALC Development
 - Defining Appropriate Chronic Toxicity Data
 - Selection of Effect(s) Endpoints Upon Which to Base ALC
 - Involvement of an Expert Panel



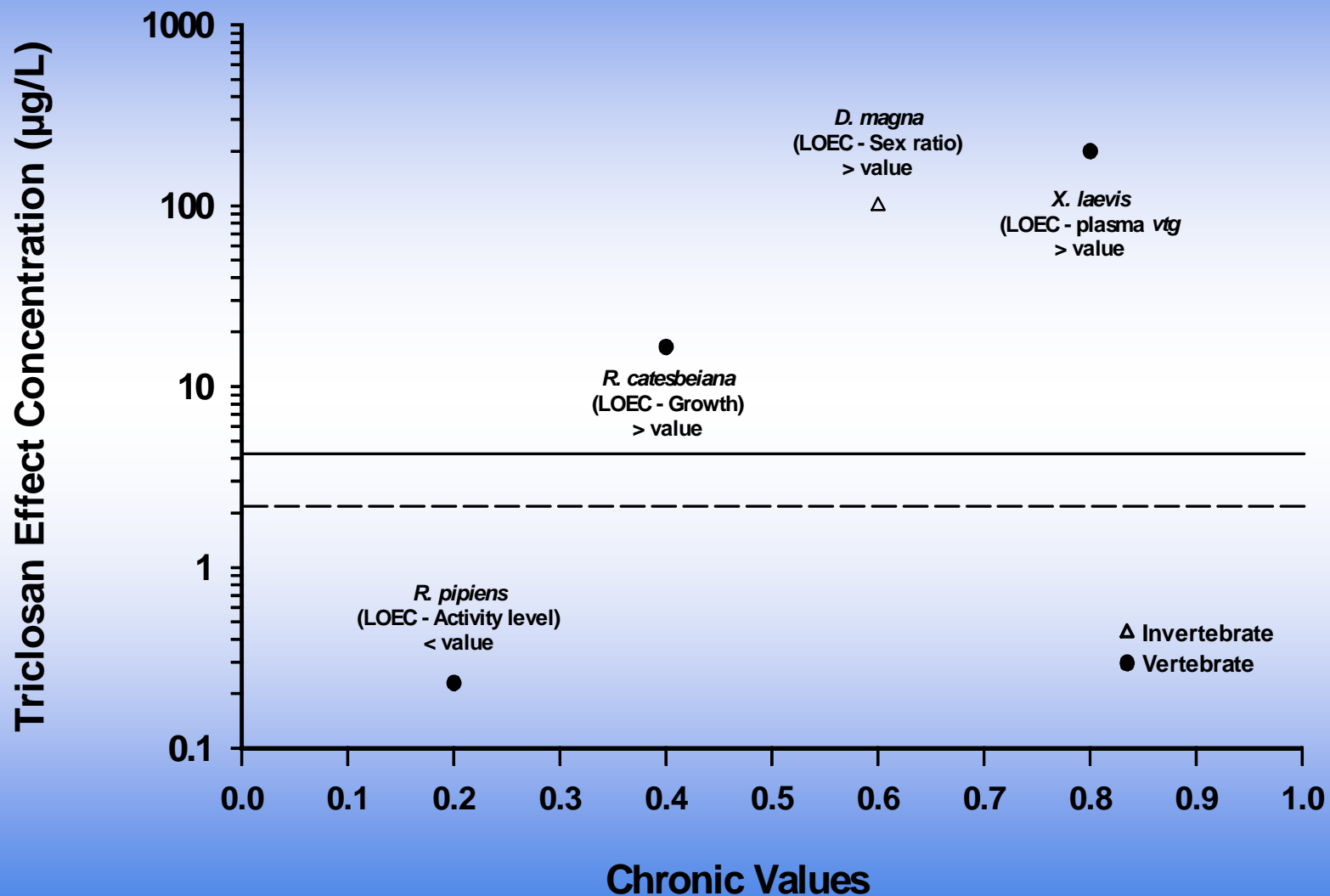
Acute Toxicity for Fish and Invertebrates



Chronic Toxicity of Triclosan



Other Chronic Toxicity Endpoints

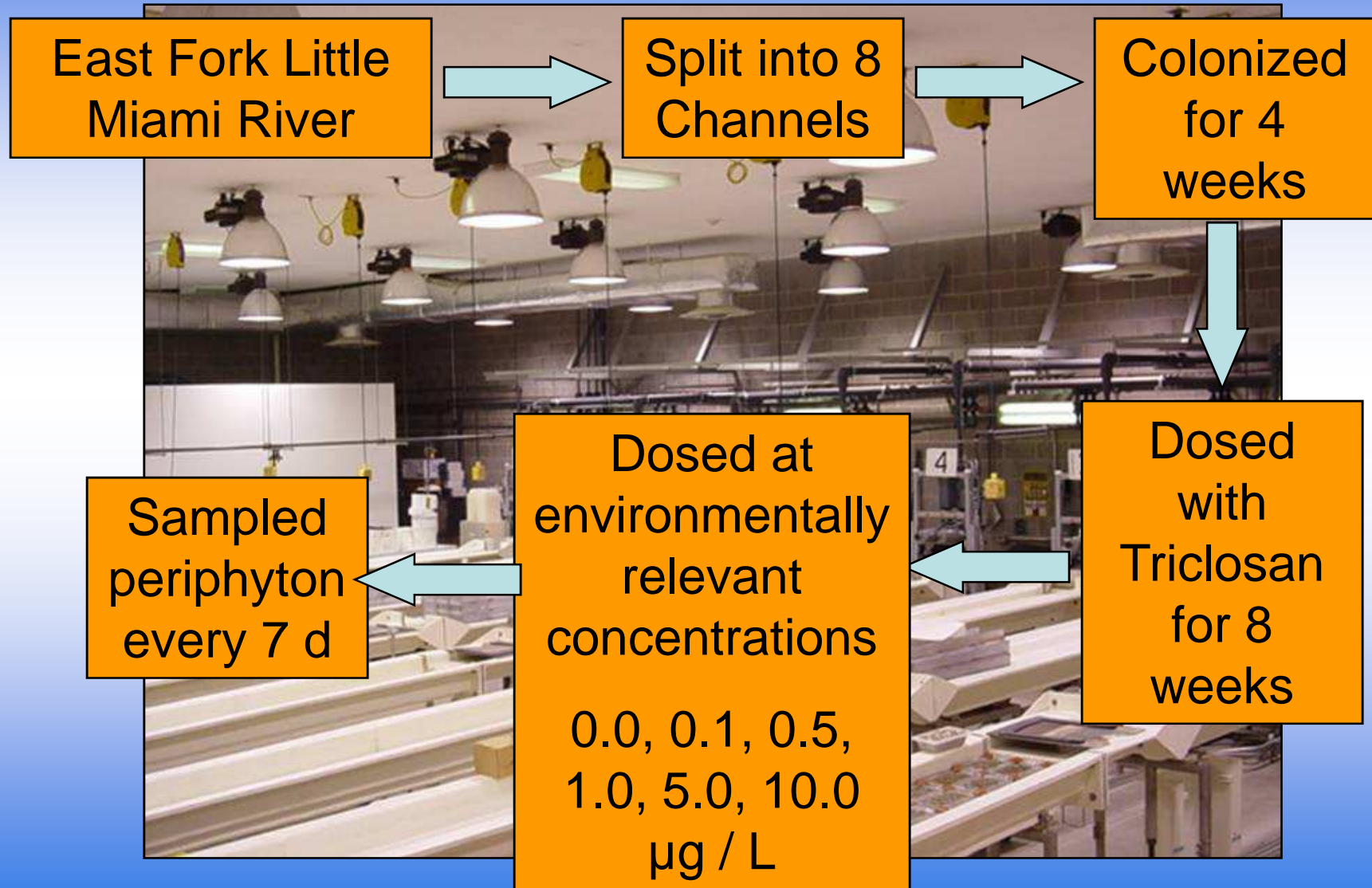


Ongoing Triclosan Research

- **Consequences of Triclosan Exposure to Stream Periphyton (U.S. EPA ORD, NERL and NRMRL)**
 - Erin Quinlan, Christopher Nietch and Jim Lazorchak
- **Two Main Questions**
 - Are there sensitive and specific indicators of triclosan exposure?
 - At what concentrations are these endpoints detectable?



Triclosan Experiments at the USEPA Experimental Stream Facility



Potential Endpoints

- Leaf Litter - Decomposition, Bacteria Density, Fungal Biomass (as ergosterol)



Control

Exposure

158W Antimicrobial Data Requirements

- 9 New Study Requirements
 - 4 human health, 5 environmental
 - ...the data requirement has never been required or has rarely been required on a case-by-case basis, and has not been routinely considered during the Agency's evaluation of the data needed for the purpose of risk assessment

158W New Data Requirements (WWTP)

- Four data requirements were proposed to assess possible adverse effects, and environmental fate and transport of antimicrobial pesticides in WWTPs.
 - **1. Activated sludge sorption isotherm study (OPPTS: 835.1110):** Determine extent to which antimicrobial pesticide distributes itself between activated sludge as the sorbent and water as the solvent.
 - **2. Ready biodegradability study (OPPTS: 835.3110):** Determine likelihood antimicrobial pesticide will rapidly and completely biodegrade in aquatic environments under aerobic conditions.

158W New Data Requirements (WWTP)

- **3. Porous pot study (OPPTS: 835.3220):** Simulate processes in aeration basin of activated sludge treatment process, thus providing measure of extent of biodegradation or removal likely to occur during sewage treatment. This study is not required in all cases, but could be required if antimicrobial pesticide fails ready biodegradability study.
- **4. Modified activated sludge, respiration inhibition test (OPPTS: 850.6800):** Identify antimicrobial pesticides which may harm aerobic microorganisms found in biological WWTP systems and indicate suitable noninhibitory concentrations of antimicrobial pesticides to be used in ready biodegradability test.

“Down-the-Drain Model”

- Screening-level model for estimating concentrations of chemicals in surface water as a result of disposal of consumer products into household wastewaters; module of E-FAST, Version 2
- Assumes household wastewaters undergo treatment at a local WWTP and treated effluent is subsequently discharged into surface waters
- Accounts for removal of chemicals during wastewater treatment
- Estimates the number of days per year that the concentration of a chemical in surface water downstream of a WWTP exceeds COCs for aquatic life
- Estimates of potential exposure to humans from ingestion of drinking water and fish

“Down-the-Drain Model”

- **Input**

- Production volume of chemical or WWTP influent volume (kg/yr)
- % removal of chemical during wastewater treatment
- COCs based on ecotoxicity endpoints for aquatic animals/plants
- HH: Exposure duration (years) from ingestion of drinking water and bioconcentration factor in fish (BCF) from ingestion of fish

- **Output**

- # of days per year and % of year that COCs for aquatic animals/plants are exceeded for both high-end (upper 10th percentile of stream dilution factors) and average (50th percentile of stream dilution factors) scenarios
- Stream flow concentrations for four stream flow conditions (1Q10, 7Q10, 30Q5, and harmonic mean) for both high-end and average scenarios
- Estimates of potential lifetime average daily dose and potential acute dose rate to humans

“Down-the-Drain Model” Summary

- Estimates of potential exposure increase as:
 - WWTP influent volumes increases
 - WWTP removal efficiencies decrease
 - COC values decrease (i.e., aquatic toxicity increases)

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