



SANITATION DISTRICTS OF LOS ANGELES COUNTY

Converting Waste Into Resources

A POTW Perspective on CEC Research, Monitoring, and Management

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Laboratories Section

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Key topics that will be covered today



Overview of LACSD
CEC efforts



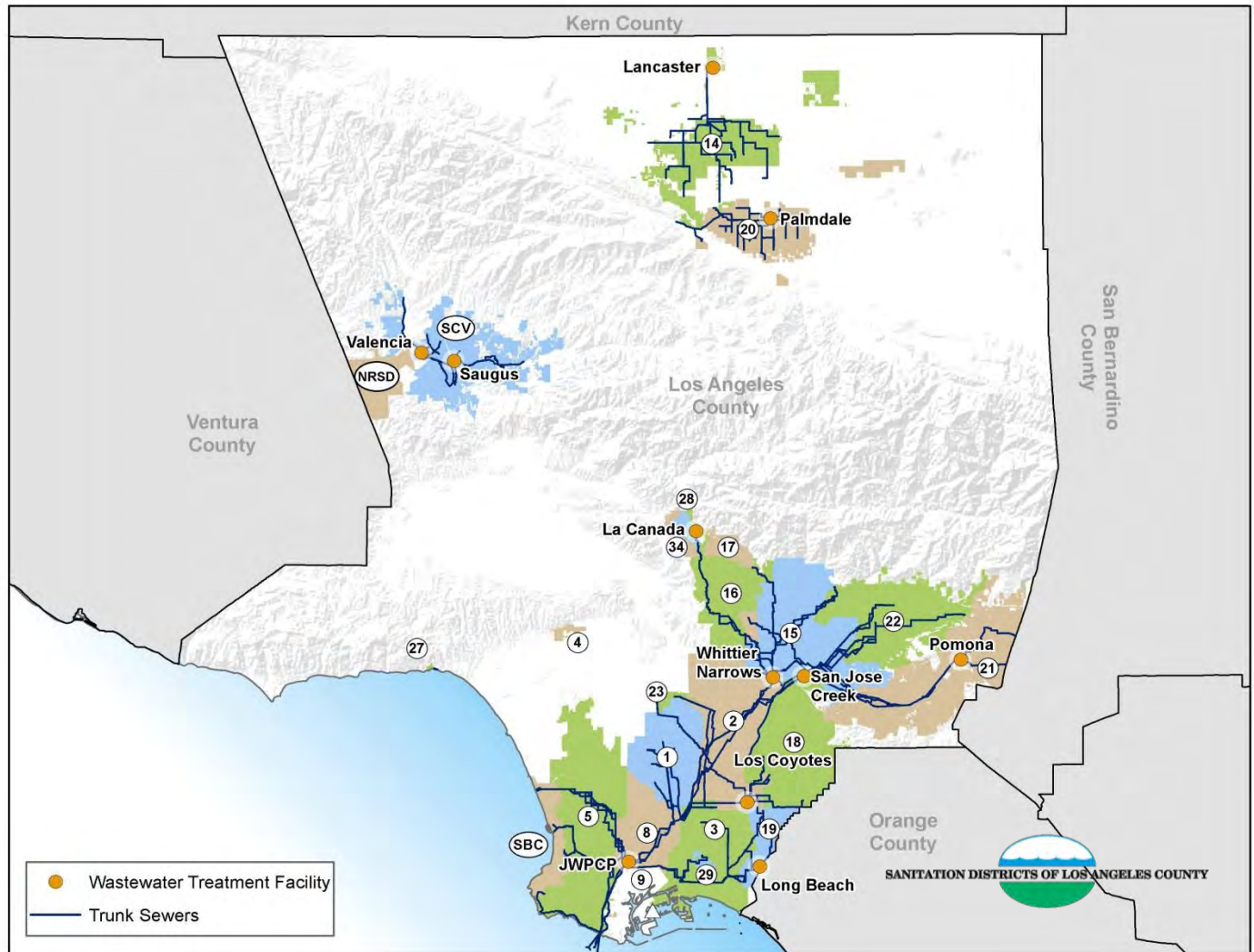
Lessons learned



Going forward



LACSD operates large interconnected wastewater systems in LA County





LACSD is a major recycled water producer



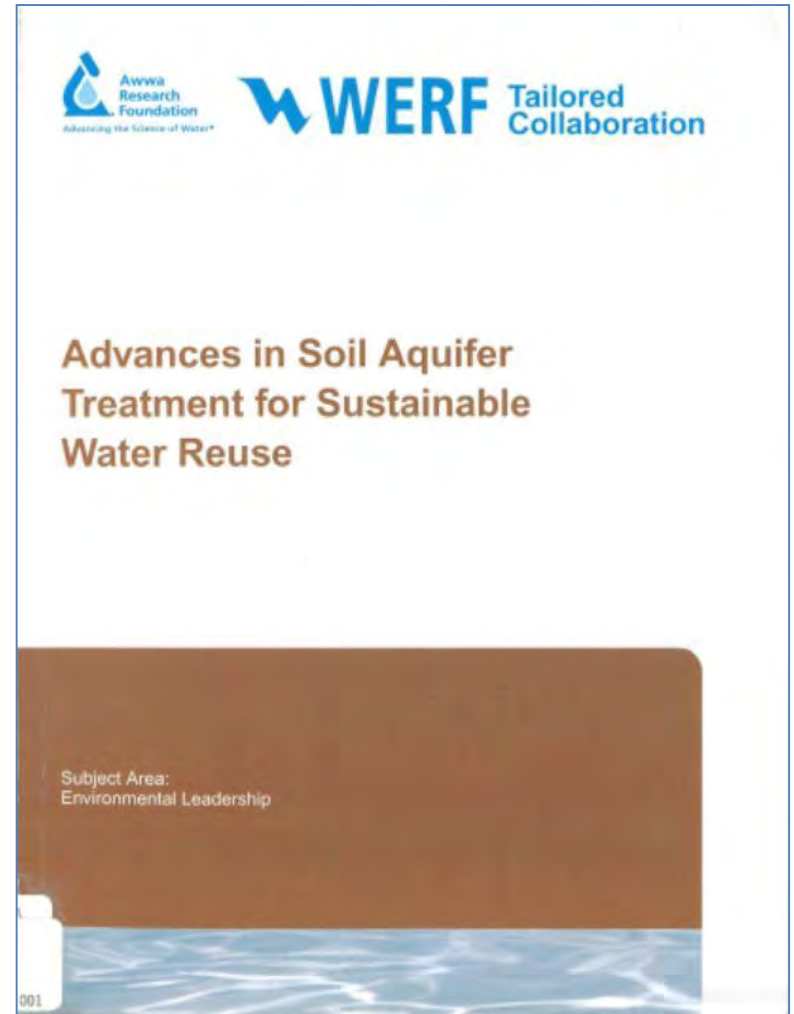
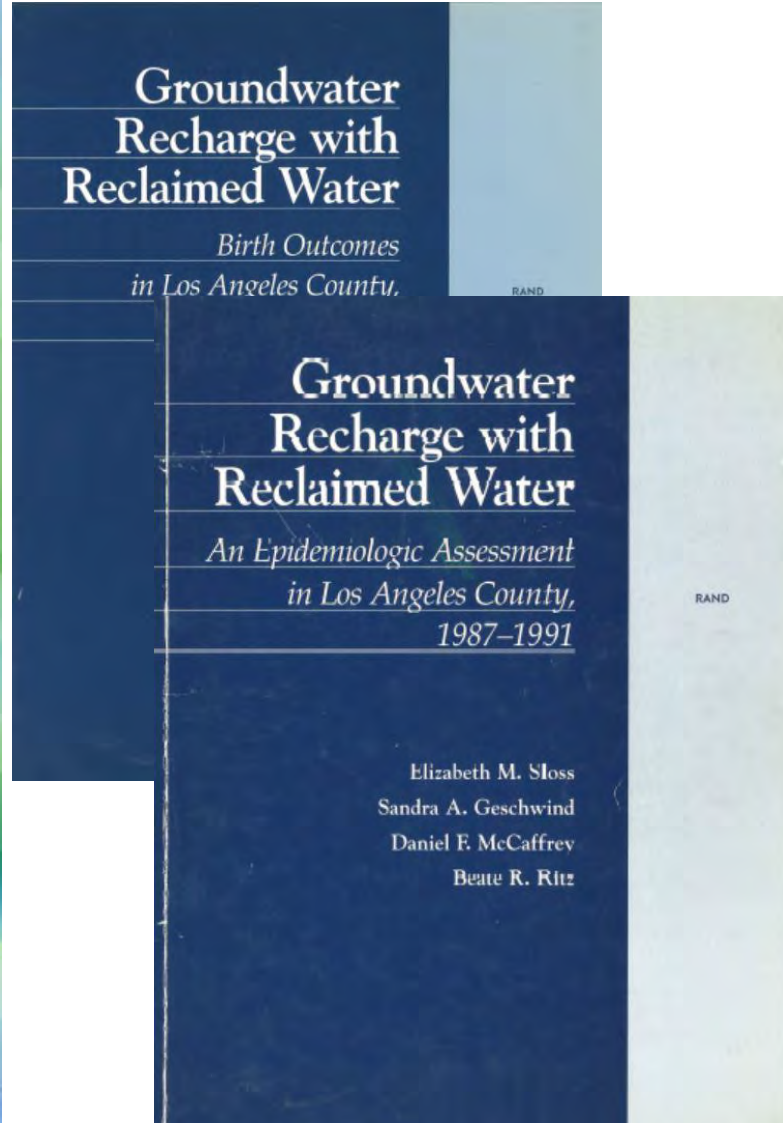


Compost is produced from 350,000 wet tons of LACSD biosolids each per year





LACSD was addressing CECs before they were called CECs





The 1999 USGS Survey brought a new focus



Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams



*Pharmaceuticals, hormones, and other organic wastewater
contaminants were measured in 139 streams during 1999 and
2000.*



LACSD targeted source control efforts on hospitals and residents





LACSD was an early pioneer in method development



6810 Pharmaceuticals and Personal Care Products

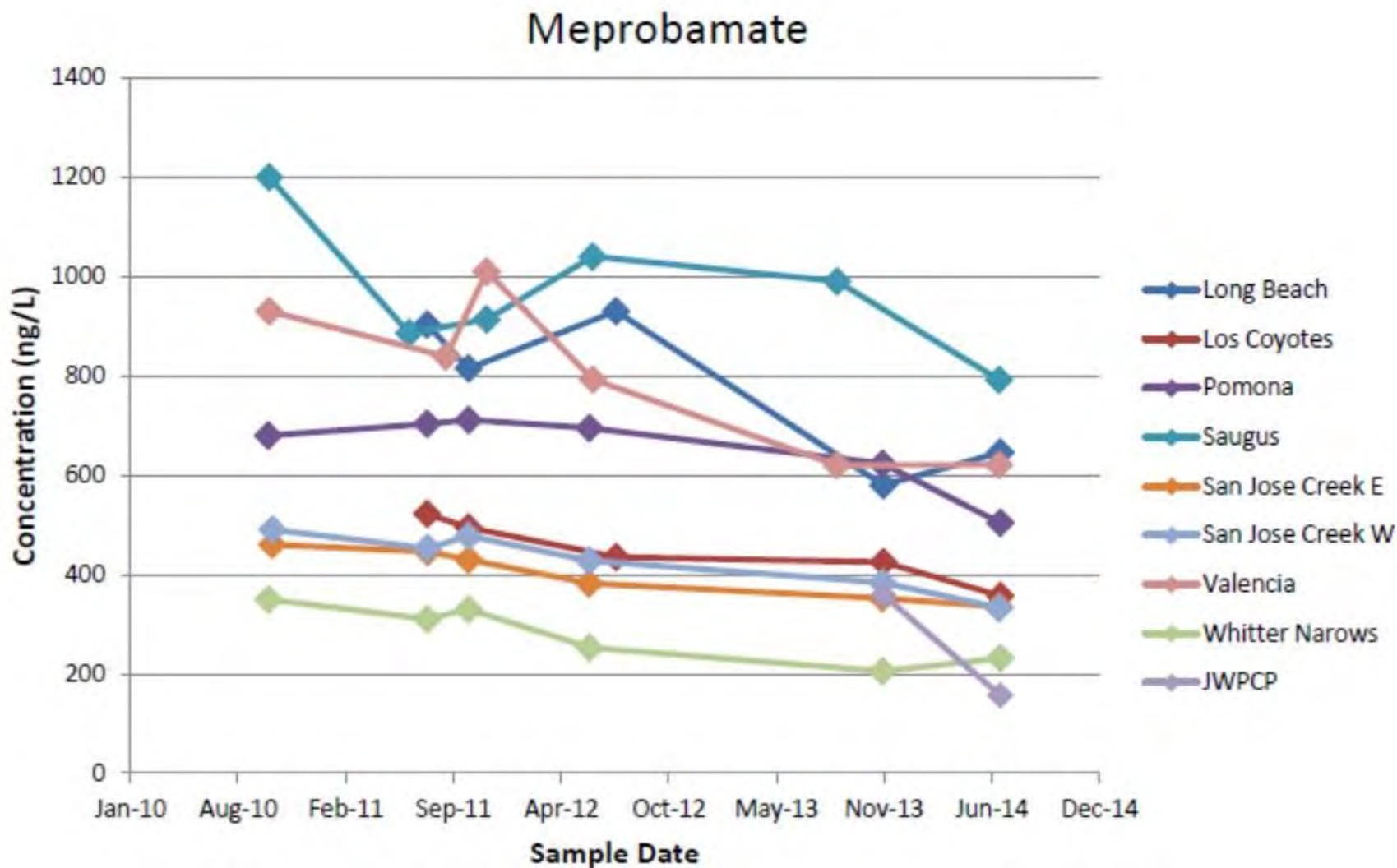
6810 Pharmaceuticals and Personal Care Products

Approved by SM Committee: 2013

- New Methods



LACSD results show no expected impacts and no strong trends



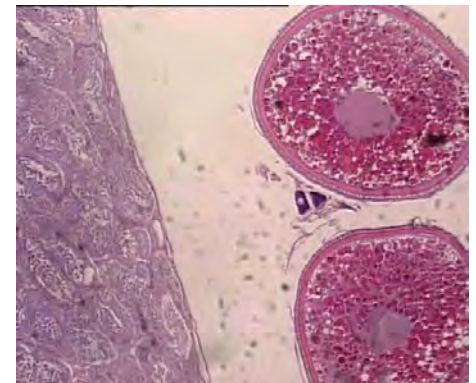
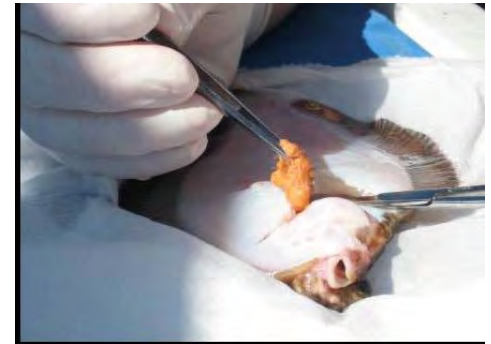


LACSD has conducted wide ranging CEC research efforts





Ocean discharge study showed no organism morphology or population level impacts





Freshwater studies show some compounds above monitoring trigger levels



San Gabriel River



Santa Clara River



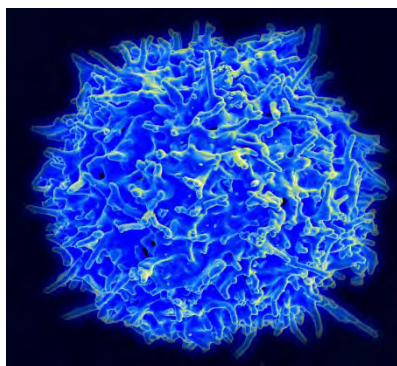


Low potential for reproductive impairment in SJCE WRP final effluent

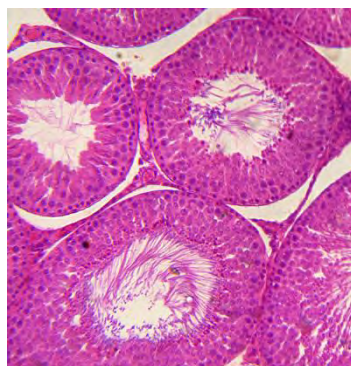




Currently investigating linkages between cellular, tissue, and whole organism effects for 17- β estradiol



Cellular



Tissue



Whole organism





Lessons Learned



Bad QA/QC is bad news

**Male fish with eggs in sewage
off California coast** *Reuters*

11/15/05

Sunscreen Sexually Alters Fish

United Press International

11/15/05

**Sewage pollutants cause southern
California male fishes to bear eggs**

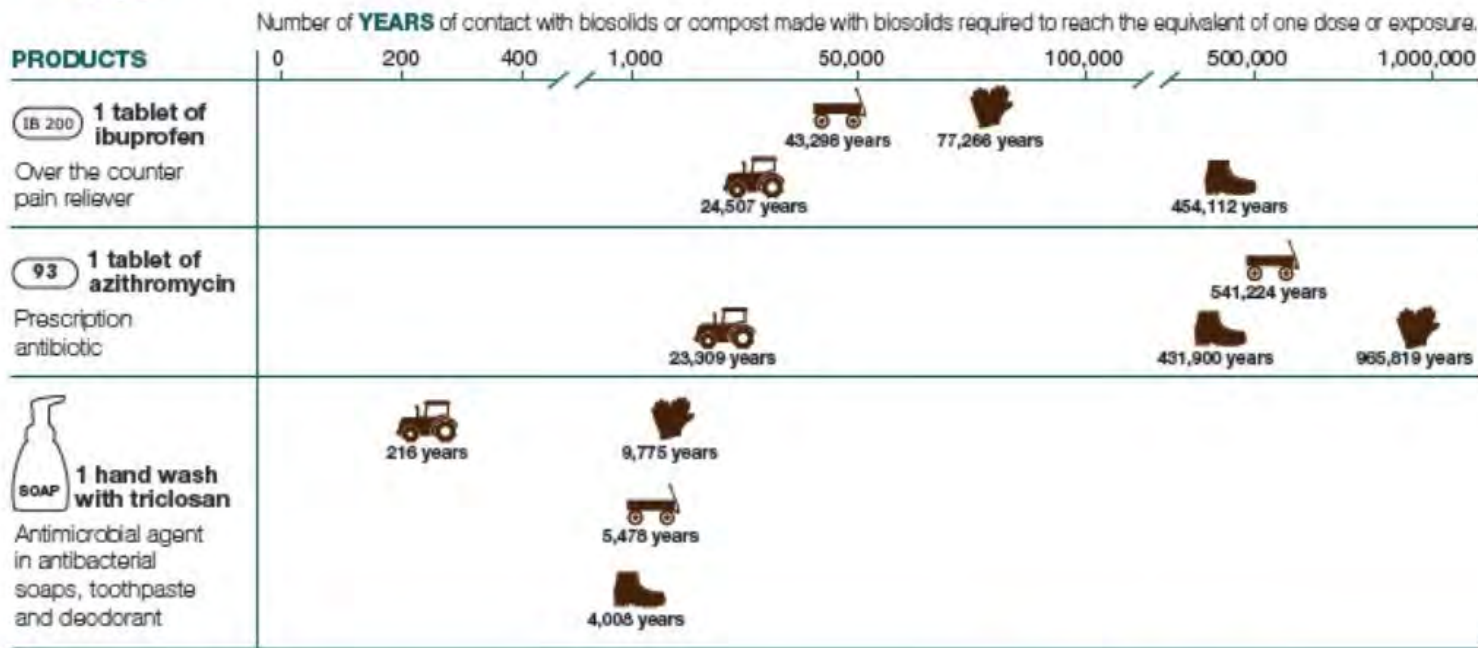
Xinhua English 11/15/2005



Concentrations linked to management actions must be compared to meaningful effects

WHAT'S THE RISK?

It would take many lifetimes of working or playing around biosolids or compost made with biosolids to equal everyday exposure to many common products.



- LEGEND**
- Gardener
 - Child
 - Hiker
 - Agricultural worker
- details on reverse

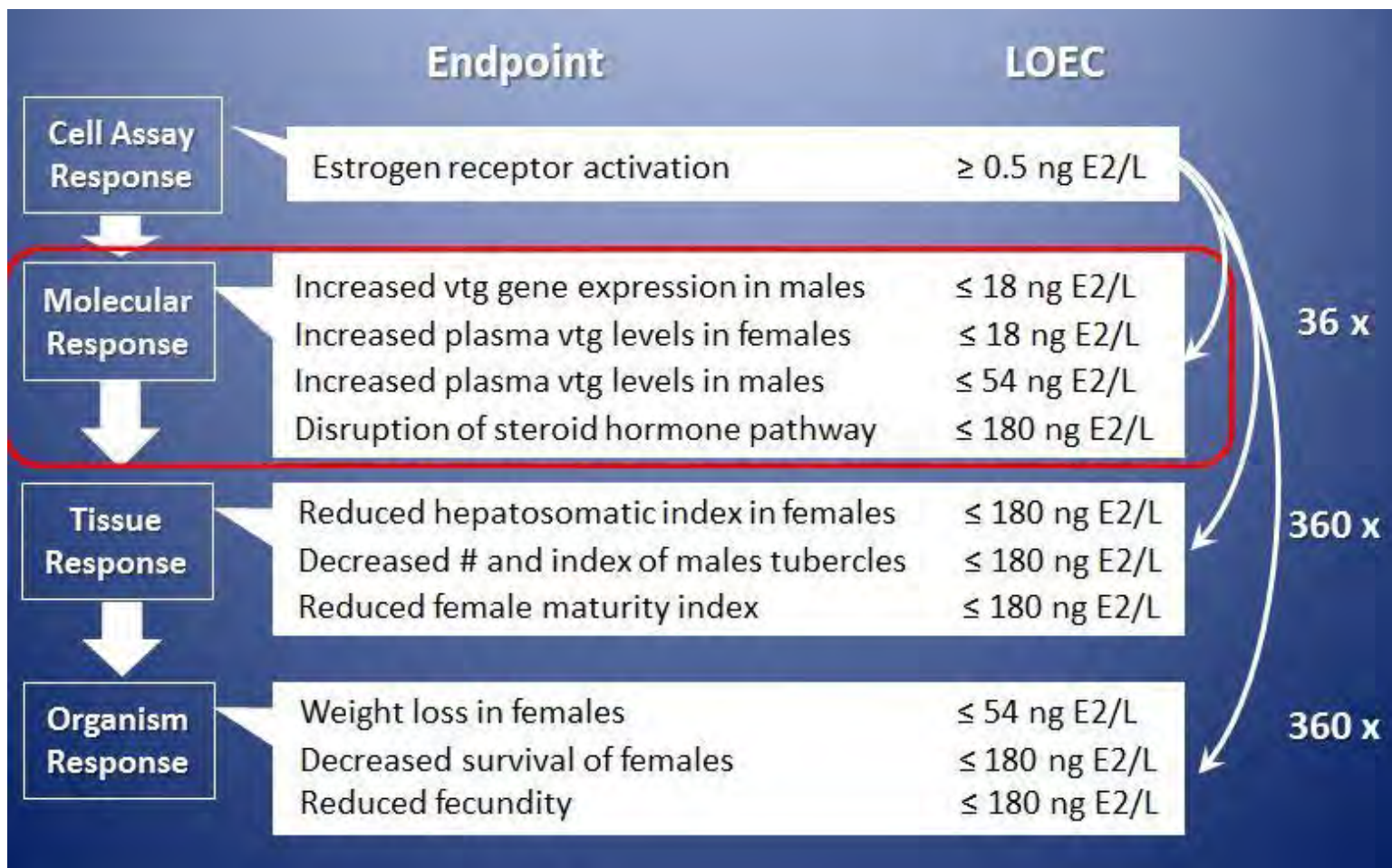
WHAT IS A RISK ANALYSIS?
 A risk analysis estimates the risk to human health by examining how harmful a chemical is (toxicity) and the amount of contact with that chemical (exposure).
 $RISK = TOXICITY \times EXPOSURE$
 Chemicals with high toxicity and high exposure have higher risk, while chemicals with low toxicity and low exposure have lower risk.
 This risk analysis followed the United States Environmental Protection Agency (U.S. EPA) risk assessment methodology.

WHAT ABOUT FOOD?

For this analysis, wheat fertilized with biosolids was tested for over 80 compounds in pharmaceuticals and personal care products and none were found in the wheat grain.



Linkages are key to use of bioanalytical techniques



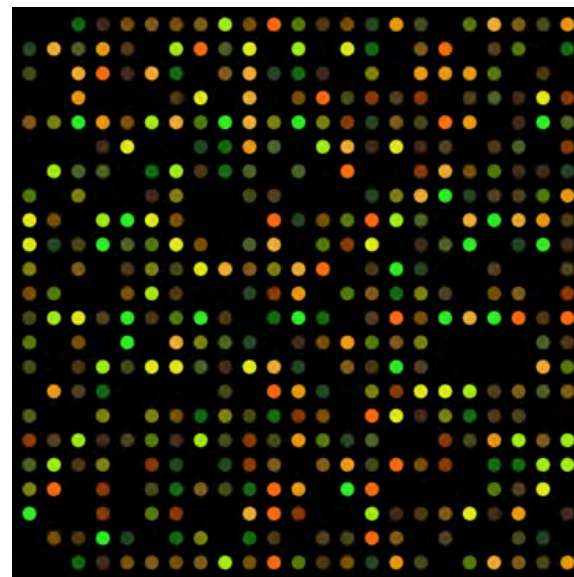
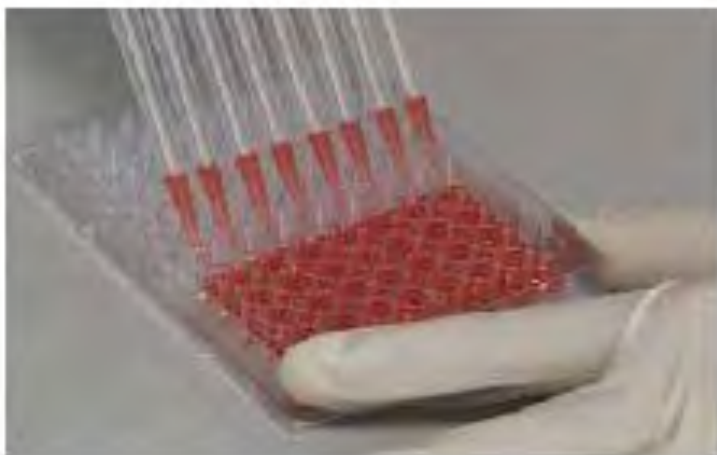


Appropriate use of thresholds needs to be clearly articulated

	Endpoint	LOEC	
Cell Assay Response	Estrogen receptor activation	≥ 0.5 ng E2/L	
Molecular Response	Increased vtg gene expression in males Increased plasma vtg levels in females Increased plasma vtg levels in males Disruption of steroid hormone pathway	≤ 18 ng E2/L ≤ 18 ng E2/L ≤ 54 ng E2/L ≤ 180 ng E2/L	36 x
Tissue Response	Reduced hepatosomatic index in females Decreased # and index of males tubercles Reduced female maturity index	≤ 180 ng E2/L ≤ 180 ng E2/L ≤ 180 ng E2/L	360 x
Organism Response	Weight loss in females Decreased survival of females Reduced fecundity	≤ 54 ng E2/L ≤ 180 ng E2/L ≤ 180 ng E2/L	360 x

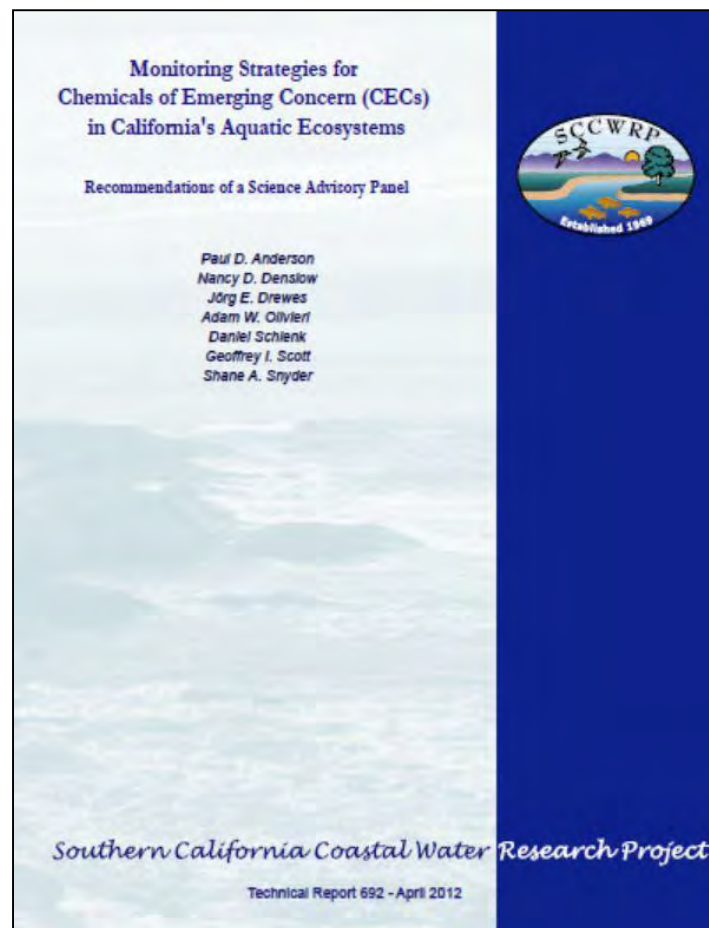
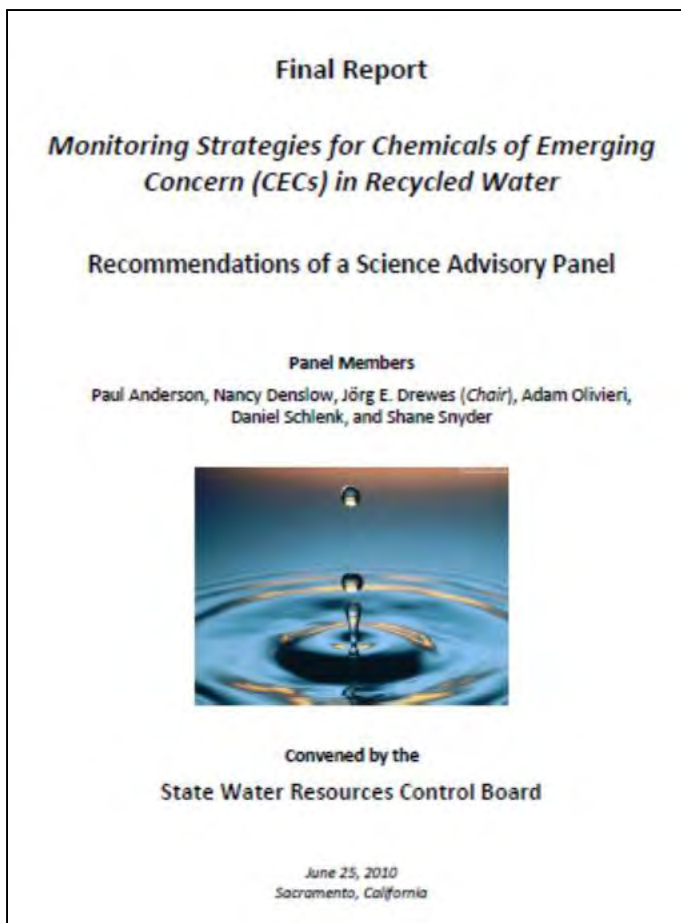


Screening bioassays should be used properly





Scientifically based process should be used to determine CEC monitoring requirements for dischargers



Pesticides monitoring should be conducted by Department of Pesticide Regulation



CA.GOV California Department of Pesticide Regulation

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Surface Water Protection Program

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Surface Water Protection Program (C... ↗)



What our scientists do

The Department of Pesticide Regulation (DPR) protects surface water. Its create and priority, by testing for the presence of pesticides in the environment, allowing them to estimate concentrations, and educating farmers and consumers on pesticide application in the safe and effective use of pesticides.

DPR's Surface Water Protection Program (SWPP) is the first line of its effort.

SWPP staff help identify U.S. Environmental Protection Agency "Endangered Species" or "sensitive" areas—key individual populations.

SWPP scientists also create computer models to evaluate how water rights, flows, or pesticide products. Water, runoff, they find it will eventually follow a use or release product can be used in California. Computer models are also used to help identify a "hot spot" of pesticides for monitoring and to provide PRA aid.

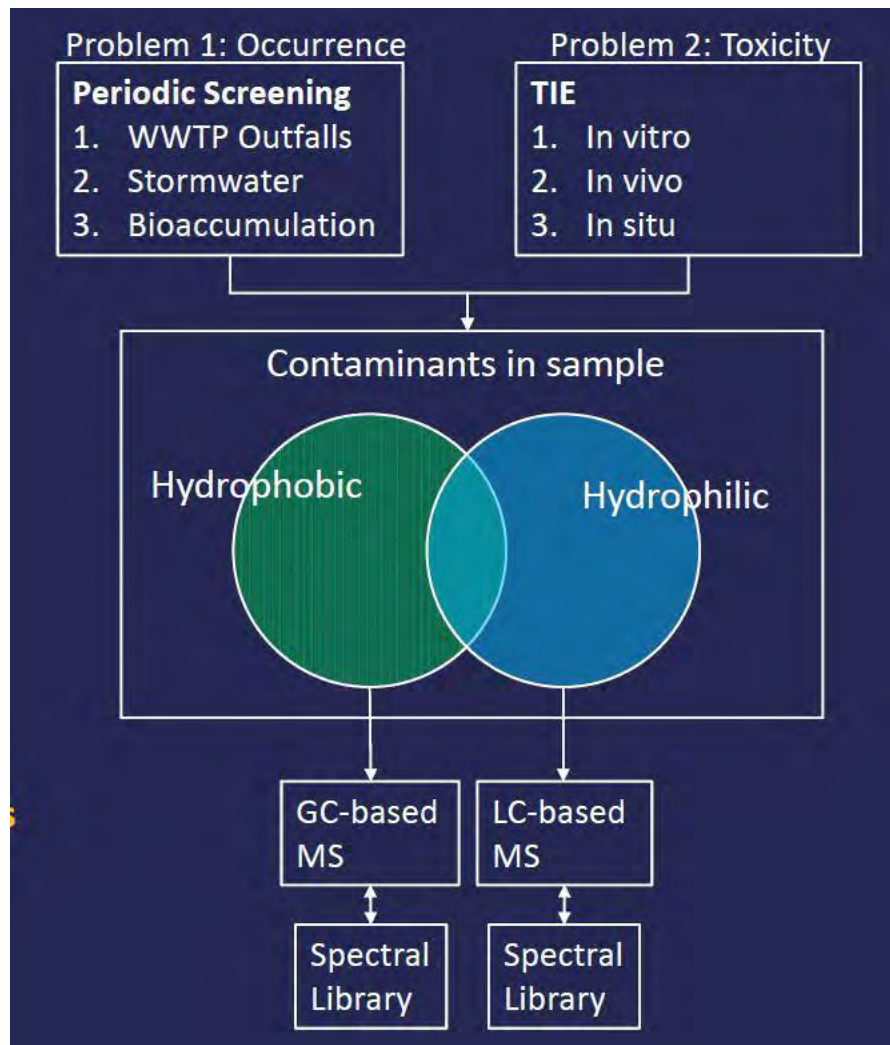
Using this aid, SWPP assesses that analytical methods are available to test for those pesticides of surface water, sediment, and/or water systems, to test for, track and assist to ensure the effectiveness of regulatory measures.

[\(En Español\)](#)

The Department of Pesticide Regulation's (DPR) Surface Water Protection Program protects human health and the environment by preventing pesticides from adversely affecting our surface waters, by addressing both agricultural and nonagricultural sources of pesticide residues in surface waters. It has preventive and response components that reduce the presence of pesticides in surface waters.



Non-targeted analyses have a role to play





Identifying chemicals of concern based on sales/usage is useful



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DIAGNOSTIC TOOLS TO EVALUATE IMPACTS OF TRACE ORGANIC COMPOUNDS ON AQUATIC POPULATIONS

WERF recently completed Phase 1 research on [*Diagnostic Tools to Evaluate Impacts of Trace Organic Compounds on Aquatic Populations and Communities: Phase I -- Prioritization, Development and Testing of a Site-Specific Framework*](#) The following is a brief summary of the series of products/tools from Phase 1 and what they can achieve:

- CEC5R08 --[*Diagnostic Tools to Evaluate Impacts of Trace Organic Compounds*](#) the summary final report of the research performed in Phase 1.
- CEC5R08a -- [*Prioritization Framework for Trace Organic Compounds*](#) outlines prioritization approaches that will be useful to utilities or localities to organize, reduce, and manage the process of screening TORC.
- CEC5R08b -- [*Development of Diagnostic Tools for Trace Organic Compounds and Multiple Stressors*](#) presents a preliminary screening process and ecological diagnostic approaches that could be used to help prioritize and evaluate treated wastewater-influenced sites that may be most at risk from TORC exposure.
- CEC5R08c -- [*Testing Diagnostic Tools for Trace Organic Compounds and Multiple Stressors: Case Studies*](#) presents seven case studies which illustrate the use of different techniques for diagnosing potential effects of TORC at a site. These case studies represent a range of scenarios and the monitoring information available that most utilities and water resource managers are likely to face.

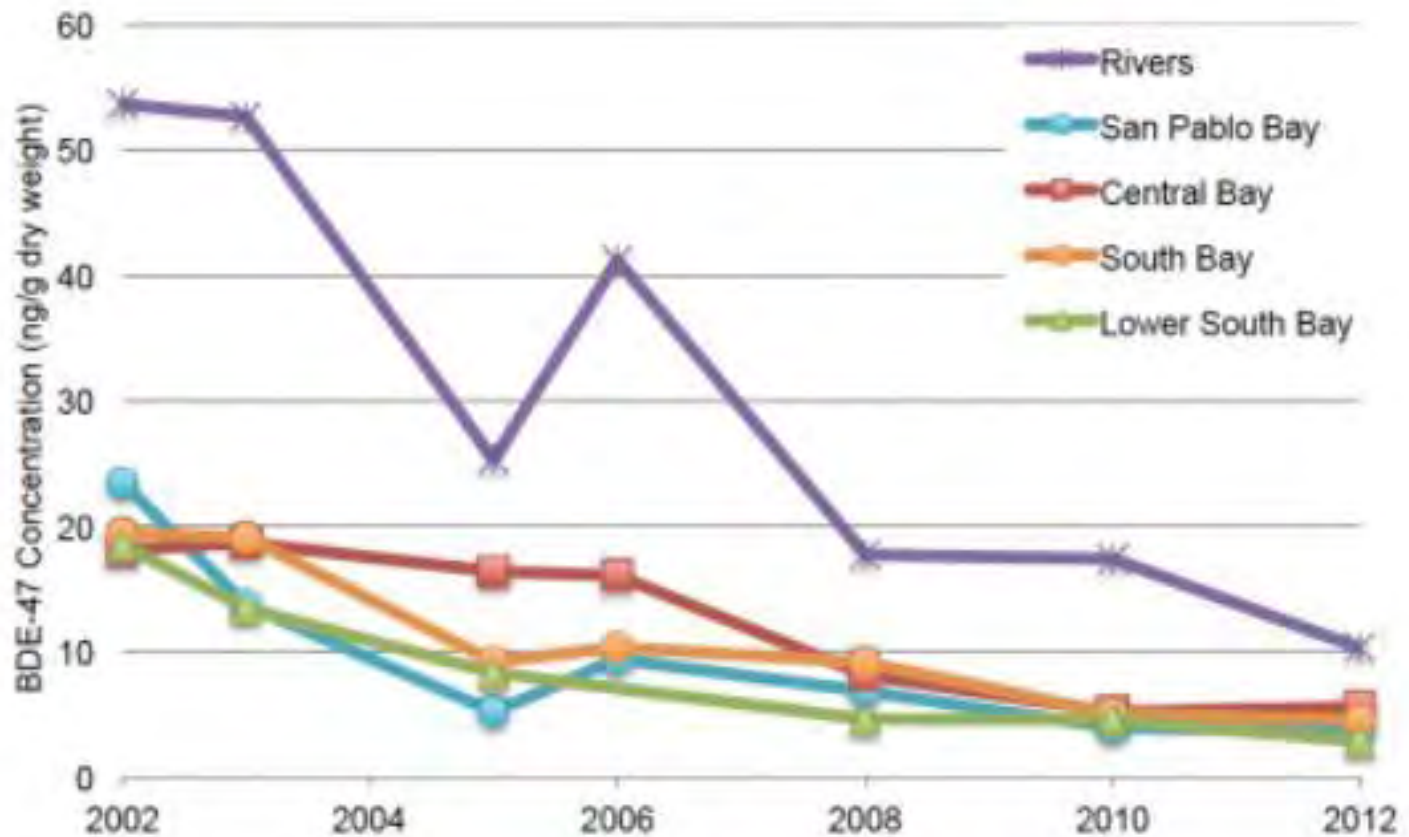


Focus management actions on high threats

	TIER ASSIGNMENTS	MANAGEMENT	MONITORING
 <p>TIER 4 HIGH CONCERN</p>	No CECs currently in this tier	303(d) listing TMDL or alternative management plan. Aggressive control actions for all controllable sources	Studies to support TMDL or an alternative management plan
 <p>TIER 3 MODERATE CONCERN</p>	PFOS Fipronil Nonylphenol and nonylphenol ethoxylates PBDEs	Action plan or strategy Aggressive pollution prevention Low-cost control actions	Consider including in Status and Trends Monitoring Special studies of fate, effects, and sources, pathways, and loadings
 <p>TIER 2 LOW CONCERN</p>	HBCD Pyrethroids Pharmaceuticals and personal care products PBDDs and PBDFs	Low-cost source identification and control Low-level pollution prevention Track product use and market trends	Discontinue screening, or periodically screen in water, sediment, or biota Periodic screening in wastewater effluent or urban runoff to track trends
 <p>TIER 1 POSSIBLE CONCERN</p>	Alternative flame retardants Pesticides Plasticizers Many, many others	Identify and prioritize contaminants of potential concern, track international efforts Develop targeted and non-targeted analytical methods	Screening in water, sediment, biota, wastewater effluent, urban runoff



True source control is a highly effective means of reducing pollutants





Stakeholder input is important





Collaboration is highly valuable





Going forward



Coordination and input are important



Continue statewide coordination



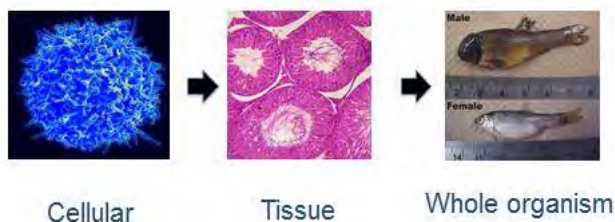
Continue on-going stakeholder involvement



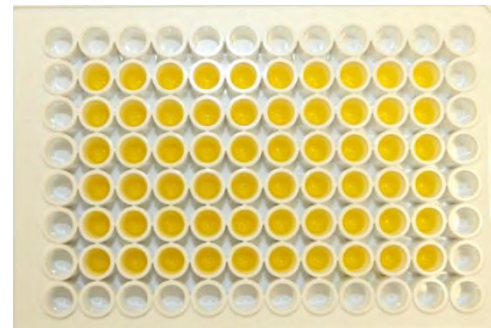
Continue use of expert panels



Focus on important science needs



Linkages for bioassays



Bioassay standardization and validation

Setting thresholds appropriately

	Endpoint	LOEC	
Cell Assay Response	Estrogen receptor activation	≥ 0.5 ng E2/L	
Molecular Response	Increased vtg gene expression in males	≤ 18 ng E2/L	36 x
	Increased plasma vtg levels in females	≤ 18 ng E2/L	
	Increased plasma vtg levels in males	≤ 54 ng E2/L	
	Disruption of steroid hormone pathway	≤ 180 ng E2/L	
Tissue Response	Reduced hepatosomatic index in females	≤ 180 ng E2/L	360 x
	Decreased # and index of males tubercles	≤ 180 ng E2/L	
	Reduced female maturity index	≤ 180 ng E2/L	
Organism Response	Weight loss in females	≤ 54 ng E2/L	360 x
	Decreased survival of females	≤ 180 ng E2/L	
	Reduced fecundity	≤ 180 ng E2/L	

Accurately communicating appropriate use of thresholds



Support true source control efforts



State's Safer
Consumer
Products
Regulations



Federal TSCA
Prioritization of
Chemicals for
Risk Evaluation



Coordination of
pesticide regulation
between Water
Boards and DPR



Pharmaceutical
collection
programs

Questions?