

CEC Initiative

Los Angeles Region

Michael Lyons

Senior Environmental Scientist

Los Angeles Regional Water Quality Control Board

Region 4 CEC Monitoring Approach

- Four steps:
 1. Effluent monitoring for CECs
 2. Stream monitoring for CECs
 3. Bioanalytical screening and non-targeted analysis
 4. Fish exposure study

Wastewater Effluents



CEC Effluent Monitoring

Step 1

- 23 major POTWs discharging to streams, estuaries or the ocean.
- Upon permits renewal, added a requirement to NPDES permits for a 2-year special study
- Region 4 staff created a list of CECs of interest
- Later augmented the list with recommendations from expert panel

Effluent Monitoring Results

- Galaxolide: 93% of POTWs > 700 ng/L
- Fipronil: 60% of POTWs > 42 ng/L
- Diclofenac: 33% of POTWs > 100 ng/L
- Estrone: 21% of POTWs > 6 ng/L
- Chlorpyrifos: 14% of POTWs > 5 ng/L
- Bisphenol A: 12.5% of POTWs > 60 ng/L
- 17-Beta-Estradiol: 6% of POTWs > 2 ng/L

Effluent Monitoring Results

- Ibuprofen: 0% of POTWs $>$ 100 ng/L
- Triclosan: 0% of POTWs $>$ 250 ng/L
- Bifenthrin: 100% of POTWs $>$ 0.4 ng/L
- Permethrin: 50% of POTWs $>$ 1 ng/L

[note that detection limit was greater than MTL for nearly all POTWs]

Lessons Learned

- Several CECs exceeded MTLs
- Detection limits vary/not always low enough for comparison to MTLs
- Need for additional assessment thresholds (more CECs, effluent standards)
- Update list of CECs of concern (e.g., what about imidacloprid, glucocorticoids, etc.)

Receiving Water Screening Studies

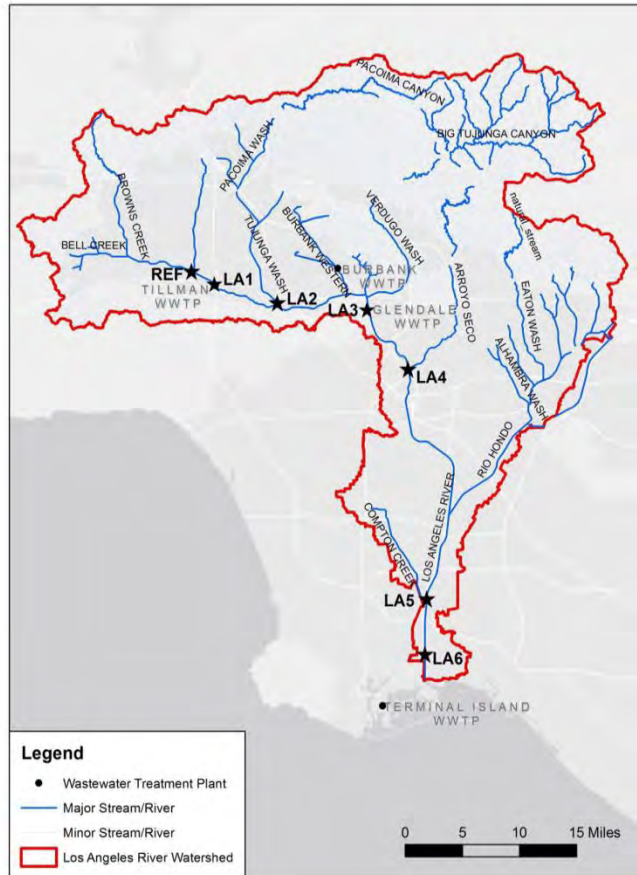


Los Angeles/San Gabriel River CEC Study

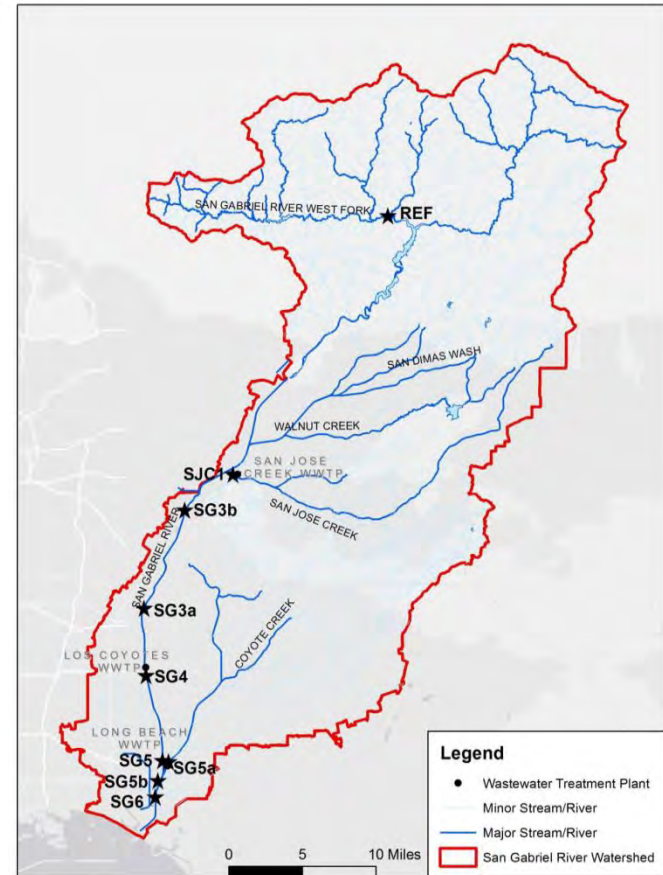
- 2011 Los Angeles Regional Board Study
 - Occurrence of CECs in water
 - In-stream fate and transport
 - Discretionary contract funding
(\$120,000)

Los Angeles/San Gabriel River CEC Study

Los Angeles River Watershed



San Gabriel River Watershed



Los Angeles/San Gabriel River CEC Study

- 52% of targeted CECs detected downstream of wastewater discharges
- Natural and synthetic hormones not detectable
- Galaxolide & bisphenol A: exceeded MTLs
- Fipronil: less than freshwater MTL (but literature suggests possible toxicity to estuarine invertebrates)

Santa Clara River CEC Study

- 2013 Los Angeles Regional Board Study
 - Occurrence of CECs in water
 - In-stream fate and transport
 - Sediment sampling
 - Fish tissue sampling
 - Discretionary contract funding
(\$300,000)

Santa Clara River CEC Study

- CECs in waters of Santa Clara River
 - CECs were detected downstream of wastewater discharges
 - Natural and synthetic hormones not detectable
 - No exceedances of MTLs

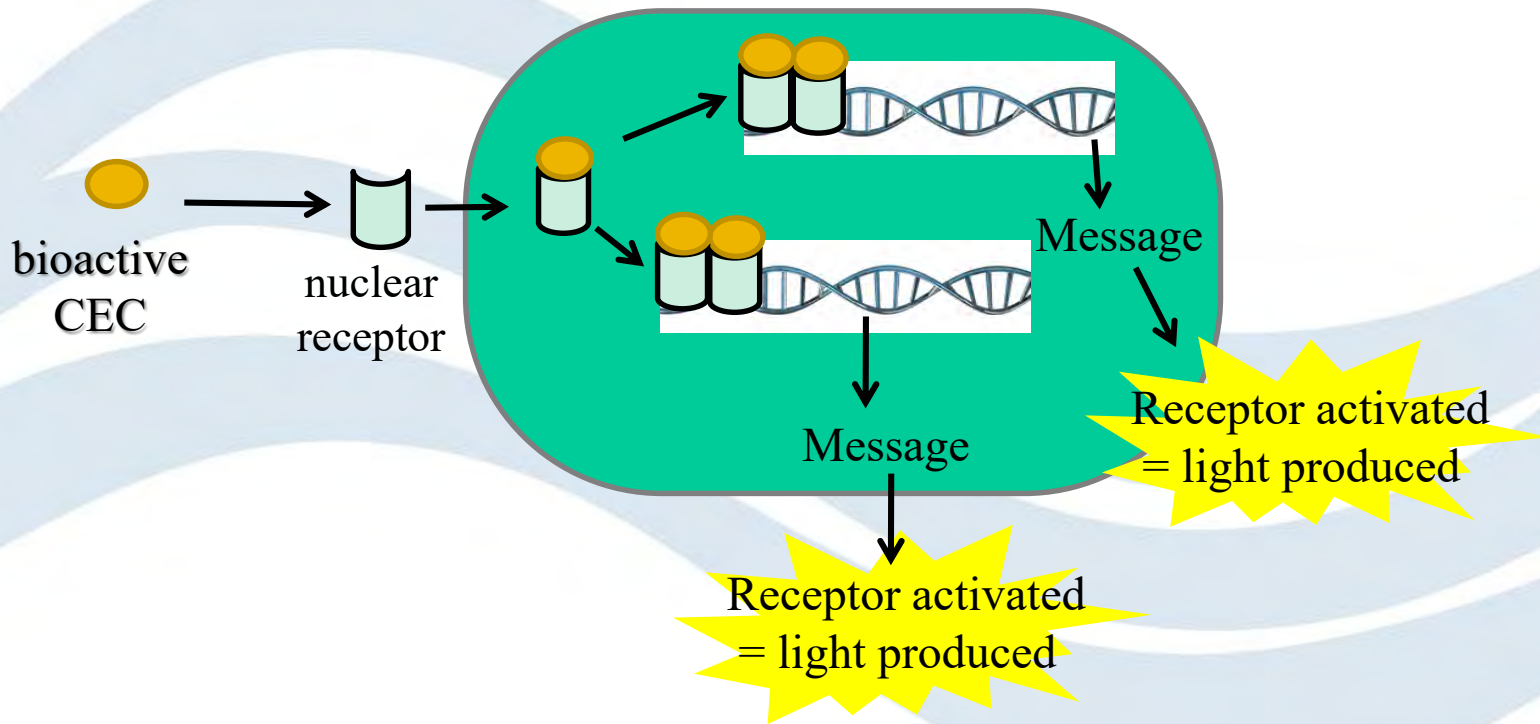
Santa Clara River CEC study

- Sediment monitoring results
 - Exceeded the MTLs
 - bifenthrin
 - permethrin
 - PBDE-47 and PBDE-99
 - fipronil

Santa Clara River CEC study

- Fish tissue concentrations
 - Exceeded MTLs for PBDE-47 and PBDE-99
 - Pyrethroid pesticides and fipronil may be high (no MTLs available)
 - Chlorinated flame retardants may be low (no MTLs available)
 - perfluorinated compounds low (less than MTL)

Bioanalytical Screening and Non-Targeted Analyses for CECs



Bioanalytical Screening and Non-Targeted Analyses for CECs

- Ongoing study in Los Angeles and San Gabriel Rivers
 - Water and sediment samples
 - 4 or 5 in-vitro bioassays per sample
 - Discretionary contract funding (\$150,000)

Biological Responses to CECs



Field Fish Toxicity Study in Los Angeles River

Overall goal: Conduct field-based fathead minnow exposures to assess the water quality of urban-impacted waters

- Two sites with different sources of contamination
 - Urban runoff
 - Treated wastewater effluent discharges
- Fathead minnows held in mobile exposure units under real-time flow-through conditions while maintaining other parameters under control (e.g. flow rate, oxygen...)
- Linkage between chemical occurrence (targeted chemicals), bioanalytical tests, and fish biological changes will be investigated



Self-contained battery-operated exposure unit placed on the bank of the river for field exposure of adult fathead minnows.