Water Quality Conditions in the San Diego and San Mateo Watersheds

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Overview

- Practical Vision and Monitoring Framework
- Primer on Biological Endpoints
- San Diego River Watershed
  - Ecosystem Health
  - Fish Tissue
- San Mateo River Watershed
  - Ecosystem Health
Practical Vision: Monitoring & Assessment

To be strategic and effective in carrying out its mission of protecting and restoring the health of waters in the San Diego Region, the San Diego Water Board needs information that cannot be produced without appropriate monitoring and assessment.
Core Beneficial Uses

Is Our Water Safe to Drink?

Is it Safe to Swim in Our Waters?

Is it Safe to Eat Fish and Shellfish?

Are Our Aquatic Ecosystems Healthy?

http://www.mywaterquality.ca.gov/index.html
Monitoring Framework

- Conditions Monitoring: M1
- Stressor Identification: M2
- Source Identification: M3
- Performance Monitoring: M4
- Permit Modifications
- Restoration Funding
- Cleanup Orders
- Total Maximum Daily Loads

Protect!
Are Habitats and Ecosystems Healthy?
Are Fish and Shellfish Safe to Eat?

Grab Samples?
Primer on Ecological Assessment Tools

Biological endpoints are essential to holistic assessment of water body condition:

- Provide direct evidence of aquatic life status
- Respond to many chemical stressors (including unanticipated ones)…help with diagnosis
- Incorporate measures of non-chemical stresses (e.g., fine sediments, hydromodification, invasive species)
- Integrate impacts over time/space (unlike water-chemistry grabs)
Primer on Ecological Assessment Tools

Complementary tools have been developed for assessing several classes of biological indicator in streams/wetlands in California:

1. **benthic macroinvertebrate** community composition
   - “BMIs”/“bugs”; includes insects, snails, crustaceans
2. **benthic algae** community composition
   - diatoms
   - non-diatom ("soft") algae

*who’s present reveals information about condition*

3. **wetland habitat condition**
   - California Rapid Assessment Method (CRAM)
Benthic Macroinvertebrates ("bugs")

- most widely used freshwater bioindicator worldwide
- intermediate trophic level (1° & 2°)
- highly responsive to instream habitat quality, flows, dissolved oxygen, sedimentation
- California Stream Condition Index (Mazor et al. 2016)
Benthic Algae

- primary producers
- highly responsive to water quality (esp. nutrients)
- community composition can shift quickly
- relatively unconstrained by microhabitats
- **Indices of Biotic Integrity** (Fetscher et al. 2014)
California Rapid Assessment Method (CRAM)

(Wetland Condition)

Landscape

Hydrology

Physical Structure

Biotic Structure

Stressor Check List

(L2 Committee/CWMW, 2013)
San Diego River Watershed

440 Square Miles

3 Major Surface Water Reservoirs

Cuyamaca Peak = 6512 feet
San Diego River Watershed

Cities:
- San Diego
- La Mesa
- Santee
- El Cajon

County of San Diego
- Alpine
- Lakeside
- Julian

Barona
Capitan Grande
Inaja & Cosmit

Cleveland National Forest

Cuyamaca Rancho State Park
Assessing the Ecological Health of the San Diego River Watershed
Assessment Overview

- N = 40 sampling stations
- Ecological data sources:
  - Stormwater Monitoring Coalition (SMC)
  - Surface Water Ambient Monitoring Program (SWAMP)
  - co-permittees
- Results (from 3 “indicators”, combined)
  - upper watershed: good to excellent
  - lower watershed: poor to fair
Estimated Stream Ecological Condition Throughout Watershed

- subset of sampling stations (N=25) part of a “probability survey” (yields condition estimate for overall watershed)

- nearly ½ of aggregate stream length is in fair or better condition

- decent sample size $\Rightarrow$ $\sim$narrow 95% confidence intervals
What Story Do Individual Indicators Tell?

- lowest condition scores via “lens” of algae
- highest based on bugs and habitat
- differential responses provide 1st step to inferring stressors
Trends in Ecological Condition Over Time

e.g., bugs provide evidence for Boulder Cr. recovery from Cedar fire
Trends in Ecological Condition Over Time

*e.g., bugs provide evidence for Boulder Cr. recovery from Cedar fire*
Trends in Ecological Condition Over Time

e.g., bugs provide evidence for Boulder Cr. recovery from Cedar fire

Photos: SWAMP
Next Steps for San Diego River Watershed

- Can use as foundation for working through M1→M4 of the Monitoring & Assessment Framework

- Per Practical Vision Ch. 2: basic groundwork for a stakeholder watershed monitoring group (SDRWMAP) has been laid out

-Began making permit changes to support program (e.g., Padre Dam/Stormwater Monitoring Coalition); more stakeholders to be incorporated
San Diego River: Safe to Eat?

Not Monitored in 15-20 years

Recreational and Subsistence Fishing

Historic Monitoring Found OC Pesticides, PCBs, Mercury
San Diego River: Safe to Eat?

Simple Question = Complex Answer

OEHHA
Science for a Healthy California

GOOD CATCH CALIFORNIA
Your Fish Advisor
San Diego River: Safe to Eat?

What Can We Do?

- Collect the Data
- Compare Pollutant Levels to Thresholds of Concern
- Make the Public Aware of the Data
San Diego River: Safe to Eat?

- Collect the Data
  - Hook and Line, Trap, Shock
  - SWAMP Collection and Analysis
  - Target 3 Species
San Diego River: Safe to Eat?

Compare Pollutant Levels to Thresholds of Concern

- Recreational Consumption
- “Not static bright lines”
- Starting Point for OEHHA
San Diego River: 15-20 years Ago
Consumption Risk High

Chlordane | PCBs | Dieldrin | DDT | Mercury | Selenium

Percent of Samples
San Diego River: Now Consumption Risk Lower

Percent of Samples

Chlordane  PCBs  Dieldrin  DDT  Mercury  Selenium
San Diego River: Mercury

Contamination levels for Largemouth Bass, Green Sunfish, Brown Bullhead, Bluegill, and Black Crappie in ng/g (ppb) range.
San Diego River: Mercury

ATL: No Consumption

ATL: Limited Consumption

Tissue Mercury (ppb)

Total Length (mm)
San Diego River: Safe to Eat?

In Summary
- Improvement!
- Highest Risk Associated with Large Largemouth Bass & Fish in Mining Ponds
- Lowest Risk in All Other Species at Other Locations

Next Steps:
- Confirm Selenium Levels in Mining Ponds
- Addition of Downstream Sampling Sites
- OEHHA Consultation
San Mateo Watershed

139 Square Miles

No Major Surface Water Impoundments
San Mateo Watershed

City of San Clemente

County of San Diego

County of Orange

County of Riverside

Cleveland NF:
San Mateo Wilderness

US Marine Corps:
Camp Pendleton

San Onofre State Park
San Mateo Watershed

Threats:
- Non-native Species
- Groundwater Withdrawal
- Development
Assessing Ecological Health of the San Mateo Creek Watershed

- Are ecosystems healthy?
- Is it safe to swim?
- Are fish and shellfish safe to eat?
- Is water safe to drink?
Assessment Overview

- N = 17 sampling stations
- Data sources:
  - SMC
  - SWAMP
- Overwhelmingly good conditions throughout watershed: > 75% of aggregate stream length in “good”/“excellent” condition, indicators combined
What Story Do Individual Indicators Tell?

San Mateo better than So Cal region overall, but not as good as Reference.

San Mateo exceeded Reference.

subpar condition

So Cal streams overall ("ambient")

high-quality streams

BMI ("bugs")

CRAM (habitat)

soft algae

diatoms

estimated median score
Closing Thoughts

• The assessment tools can help achieve mission of protecting, enhancing water resources

• Status sheets on ecological data:
  • Important for PV Chapter 2 to understand & communicate watershed conditions, plan next steps
  • Board feedback welcomed
  • More watershed-based sheets to be rolled out; prioritized based on levels of interest & data availability
Estimated Stream Ecological Condition Throughout Watershed