Perspectives of a State Pesticide Regulator on the Control of Copper in the Marine Environment

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Environmental Monitoring Branch

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Why does DPR care about Cu?

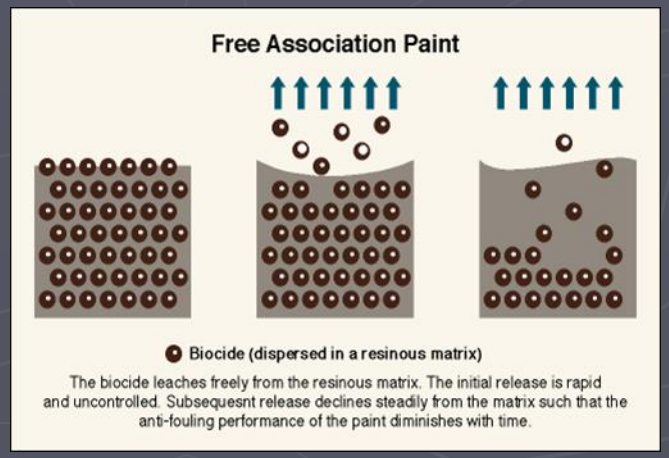
- DPR's mission: Protect human health & the environment by regulating sales & use of pesticides
  - All pesticide products must be registered w/ DPR
- Cu is a common active ingredient in pesticide products
  - Algaecide, fungicide, antimicrobial & antifouling agent
- DPR's mandate: No significant adverse ecological effects
- Cu has an ambient water quality standards established in the form of the California Toxics Rule
- High level of stakeholder & legislative interest (SB 623 & AB 425)

Non-Marine Uses

- Terrestrial – Ag
- Reservoir
- Antimicrobial – urban runoff & wastewater
  - Industrial
  - Consumer products

Marine Uses

- Wood preservatives
- Antifouling paints/coatings:
  - commercial vessels
  - military vessels
  - recreational vessels (a.k.a. pleasure crafts)



AFP Use & Pollution in CA

- U.S. EPA & DPR regulation on Tributyl Tin (TBT)
- Sudden shift to copper-based AFPs
- Shelter Island Yacht Basin (SIYB) – San Diego
  - copper TMDL (late 1990's)
  - passive leaching & in-water hull cleaning
- Marina del Rey (MdR) & Lower Newport Bay Metals TMDLs
- DPR initiated broader investigations
- Copper AFP Sub-Workgroup (2004)
  - gather existing data & identify gaps
  - coordinate CA studies

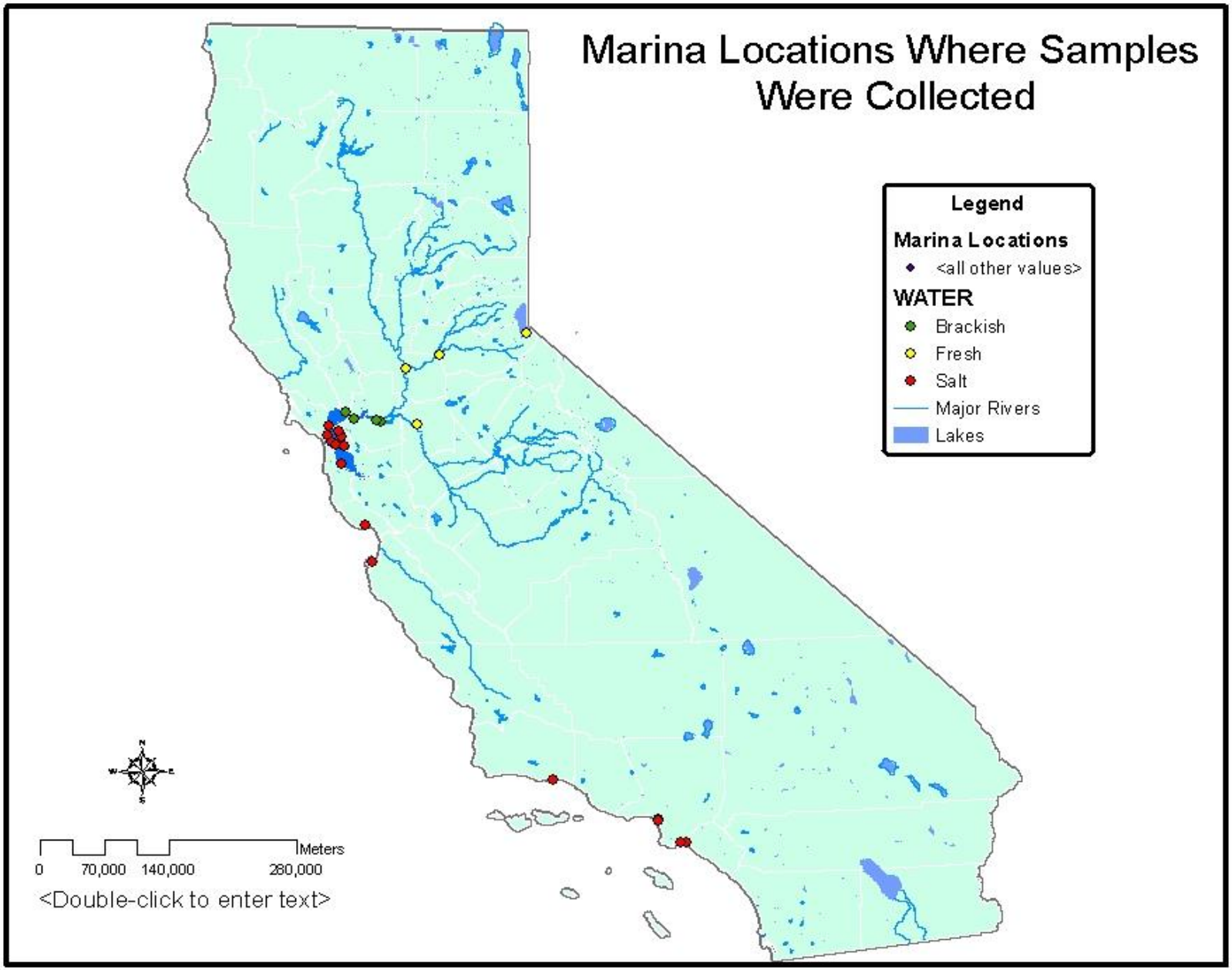
- DPR Multi-Regional Study (Summer/Fall 2006)

DPR Study Objectives

1. Assess the occurrences of AFP biocide indicators - Cu, Zn, and Irgarol/M1) & the magnitude of their concentrations in CA marinas
2. Determine if concentrations exceed water quality standards or other relevant benchmarks?
3. Marina vs. Background?
4. Fresh vs. Brackish vs. Salt water marinas?
5. Measure toxicity of marina waters & confirm identity of toxicant
6. Apply predictive toxicity models to ascertain potential copper toxicity on a larger scale

CF 5730XF
958
YAMAHA

Downtown Shoreline Marina, Long Beach


Marina Locations Where Samples Were Collected
Legend
Marina Locations
<all other values>
WATER
Brackish
Fresh
Salt
Major Rivers
Lakes
Meters
0
70,000
140,000
280,000
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Results

Median Dissolved Cu Concentrations - DPR 2006 Study

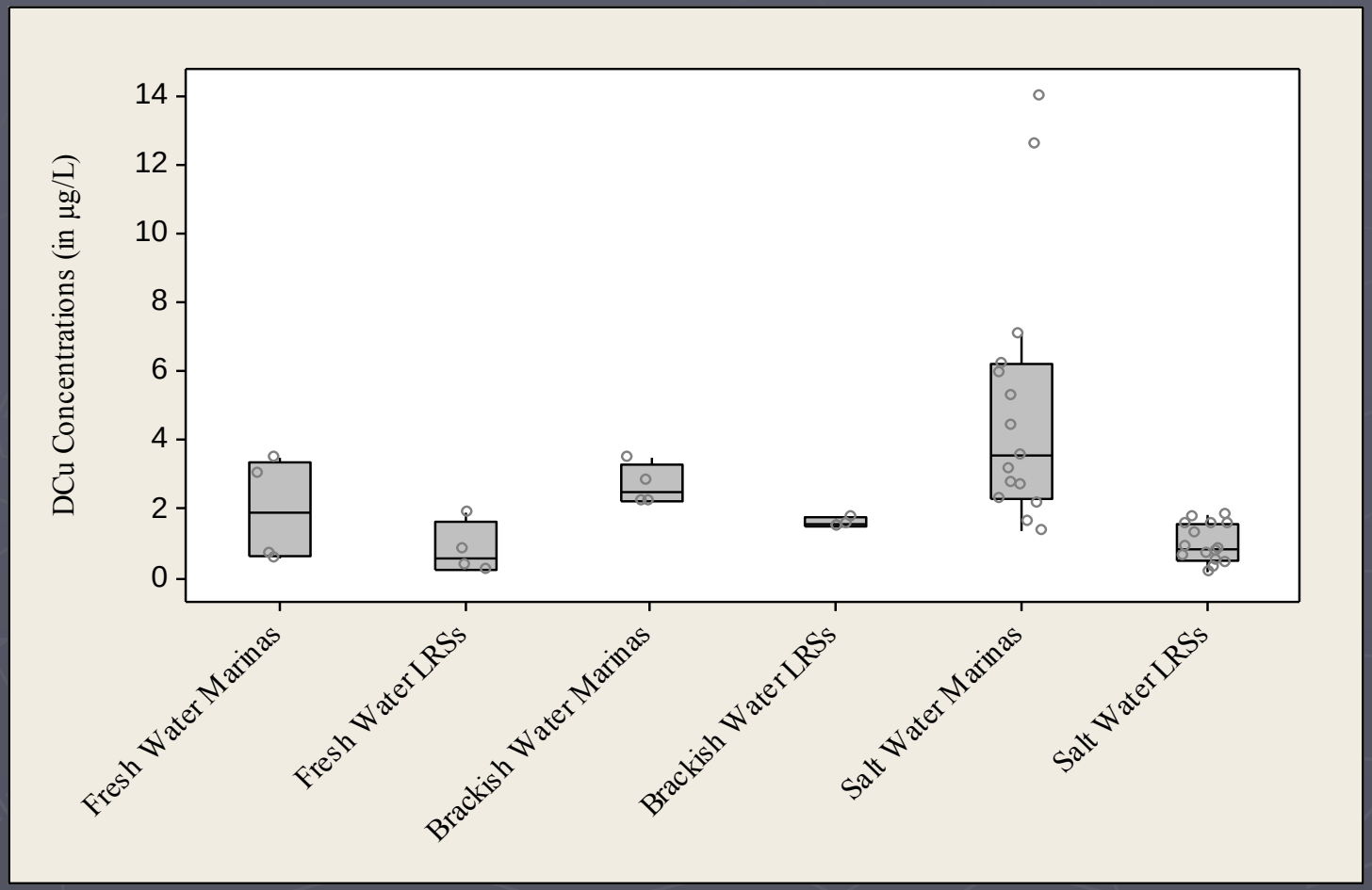
Marina	Marina Median in ug/L (ppb)	LRS Median in ug/L (ppb)	Estimated Number of Slips
Folsom Lake Marina	0.5	0.3	675
Tahoe Keys Marina	0.6	0.2	250
San Francisco Marina	1.1	0.4	700
Alamitos Bay Marina	1.2	0.3	1,191
Coyote Point Marina	2.1	1.3	565
Antioch Marina	2.2	1.5	310
Pittsburg Marina	2.1	1.5	486
South Beach Harbor	2.2	0.7	700
Clipper Yacht Harbor	2.4	0.8	735
Marina Bay Yacht Harbor	2.6	1.7	850
Benicia Marina	2.7	1.7	320
Sacramento Marina	3.0	0.7	547
Ballena Isle Marina	2.8	1.4	504
Village West Marina	3.4	1.8	700
Vallejo Marina	3.4	1.5	800
Berkeley Marina	3.3	0.7	1,052
Santa Cruz Harbor	4.3	0.3	1,000
Monterey Harbor	4.9	0.2	413
Santa Barbara Harbor	5.7	0.1	1,133
Loch Lomond Marina	5.8	1.7	517
Downtown Shoreline Marina	6.6	0.7	1,800
Marina del Rey Front Basins	12.4	1.0	~ 4500
Marina del Rey Back Basins	13.6	1.0	~2500

fresh water

brackish water

salt water

Marina Median Dissolved Cu Concentrations by Water Types



Study Summary

- 51% of marina samples > CTR 3.1 ppb chronic
- 16 of 19 salt/brackish marinas had at least 1 samples > 3.1 ppb
- Boat AFPs are a significant source of Cu & other biocides in salt & brackish water marinas during dry periods
- Ecological impacts from DCu are unlikely in fresh water marinas (CTR & BLM)
- However, high DCu could adversely impact sensitive marine species (CTR & BLM & toxicity)
- Cu toxicity at MdR (salt water BLM predicted <u>more</u> Cu toxicity)
- Predicted toxicity in 18% of total salt/brackish samples - all marina samples (BLM)

Other Studies

- Several other studies have been done by other researchers since the DPR study
  - DCu – SCCWRP, SDRWQCB, SARWQCB
    - DPR median ~ 4 ppb, NPB mean ~ 4, SCCWRP mean ~ 7
  - Cu Toxicity – SARWQCB & SCCWRP
    - SCCWRP study shows normal mussel embryo development ↓ @ ~ 10 ppb DCu, DPR study ~ 11
- Findings from these studies are similar to those from the DPR 2006 study
- Biological impact study in SIYB → elevated Cu in sediment reduced biomass, body size, and diversity

Intensive assessment appears to confirm elevated Cu in coastal marinas & that boat AFPs are sources

Now What…?

DPR Regulatory Dilemmas

- Sources are mobile
  - Traditional DPR regulatory tools not well-suited to mitigate
- Alternatives were very limited
  - Alternatives have to work & should be affordable!
- Appears to mainly be a CA issue
  - Limited federal assistance + recreational boats exempted
- In-water hull cleaning vs. passive leaching
  - DPR can only regulate product leaching

More Dilemmas…

- Water Quality Laws vs. Pesticide Laws
  - Water Board W.Q. standards are protective
  - DPR action trigger is significant adverse effects
- CTR vs. BLM
  - BLM considers site-specific conditions & bioavailability
- New biocide-based products take years to get to market
  - Artifact of dual & rigorous registration requirements under FIFRA
  - Biocide-free products faster since not regulated but impacts?

Not Done Yet…

- CWA 303d Listings & TMDLs must go on!
  - Can DPR help Water Boards address these?
  - Can DPR solution be fast enough for TMDL compliance timeframes?
- Impacts on Aquatic Invasive Species (AIS)
  - If shift away from Cu occurs, how will this impact control of AIS?
- Can solutions be sustainable?
  - Are we simply substituting another pollutant down the road? Difficult to control what market chooses
  - This is not just a "BIOCIDE" issue…

Addressing Dilemmas

- Sources are mobile
  - We focused on statewide fixes & regulatory tools
- Alternatives were very limited
  - We worked w/ stakeholders to encourage development & testing of alternatives
- Appears to mainly be a CA issue
  - We reeled back expectations & tighten up CA collaborations
- In-water hull cleaning vs. passive leaching
  - Filled data gaps - focused studies & understand practices

Addressing Dilemmas

- Water Quality Laws vs. Pesticide Laws
  - Broader disconnect
  - But must act - interagency agreement & assist dischargers
  - View W.Q. standards as reduction goals instead
- CTR vs. BLM
  - Touchy subject. We leaned on conservative side but support development & implementation of BLM
- New biocide-based products take years to get to market
  - Considering concurrent registration w/ U.S. EPA

Addressing Dilemmas

- CWA 303d Listings & TMDLs must go on!
  - Recognize Water Board primacy on regulating discharges & support
  - Factor compliance schedules (as best as possible) into mitigation
- Impacts on Aquatic Invasive Species
  - Maintain understanding of AIS impacts
  - Rely on experts at UC ANR & SLC
- Can solution be sustainable?
  - Consider longer-term solutions
  - Address use pattern & non pesticide-specific factors

Oh… & a Few Curve Balls…

- Federal Clean Boating Act 2008 – management practices for recreational boats
- S.F. Bay Area Site-Specific Objectives (6.0 ppb chronic)
- Salt water BLM not adopted by U.S. EPA yet
- SB 623 (Kehoe) – Set leach rate & more…
- AB 425 (Atkins) – Set leach rate & recommendations
- Marina del Rey 10-year compliance schedule

Where is DPR's Mitigation Today?

- DPR Reevaluation (initiated 2010)
  - Data Call-In Process
  - Work w/ registrants to gather data: product leach rates, paint types, mitigation ideas, in-water hull cleaning contributions
- Complied w/ AB 425
  - Set max. leach rate (MLR) @ 9.48 µg/cm2/day using MAM-PEC
  - Made recommendations to protect aquatic environments from the effects of exposure

Where is DPR's Mitigation Today?

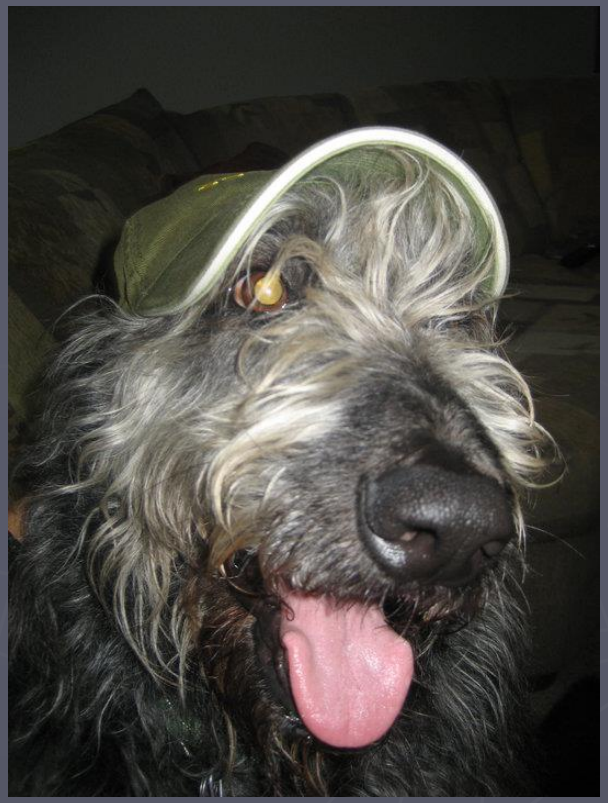
- DPR Recommendations:

1) Reformulate existing paints higher than MLR
2) Establish program to manage in-water hull cleaning
3) Consider capping cleaning frequency to once/month
4) Include hull maintenance info on AFP labels
5) Develop hull maintenance brochures for boatyards
6) Increase boater awareness & acceptance of alternatives
7) Foster new & support existing incentive programs to convert
8) Consideration of SSOs for extreme cases

Where is DPR's Mitigation Today?

- Represents culmination of years of collaborations & collective problem-solving
- Mitigation within DPR's AFP reevaluation
- Mitigation outside of reevaluation
- General Timeline
  - Ultimately years to complete reformulation, but…
  - Low leaching products exist now!
  - Reduction from in-water hull cleaning will be more immediate
- Will need to also continue monitoring in marinas to determine progress

Thank You…



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