Smith River Dissolved Copper Monitoring

NOAA FISHERIES
West Coast Region

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Smith River

- Fairly pristine watershed

- Stronghold for salmonids
  - essential fish habitat for Pacific salmon and
  - critical habitat for coho salmon

- Fishes
  - Tidewater goby
  - Coastal cutthroat trout
  - steelhead
  - Chinook salmon
  - coho salmon

Southern Oregon Northern CA Coasts (SONCC) coho salmon

- Federally and State listed
- Core population
- Need this population to be viable for recovery
- Smith River plain critical
- Pesticides in Smith River plain high threat

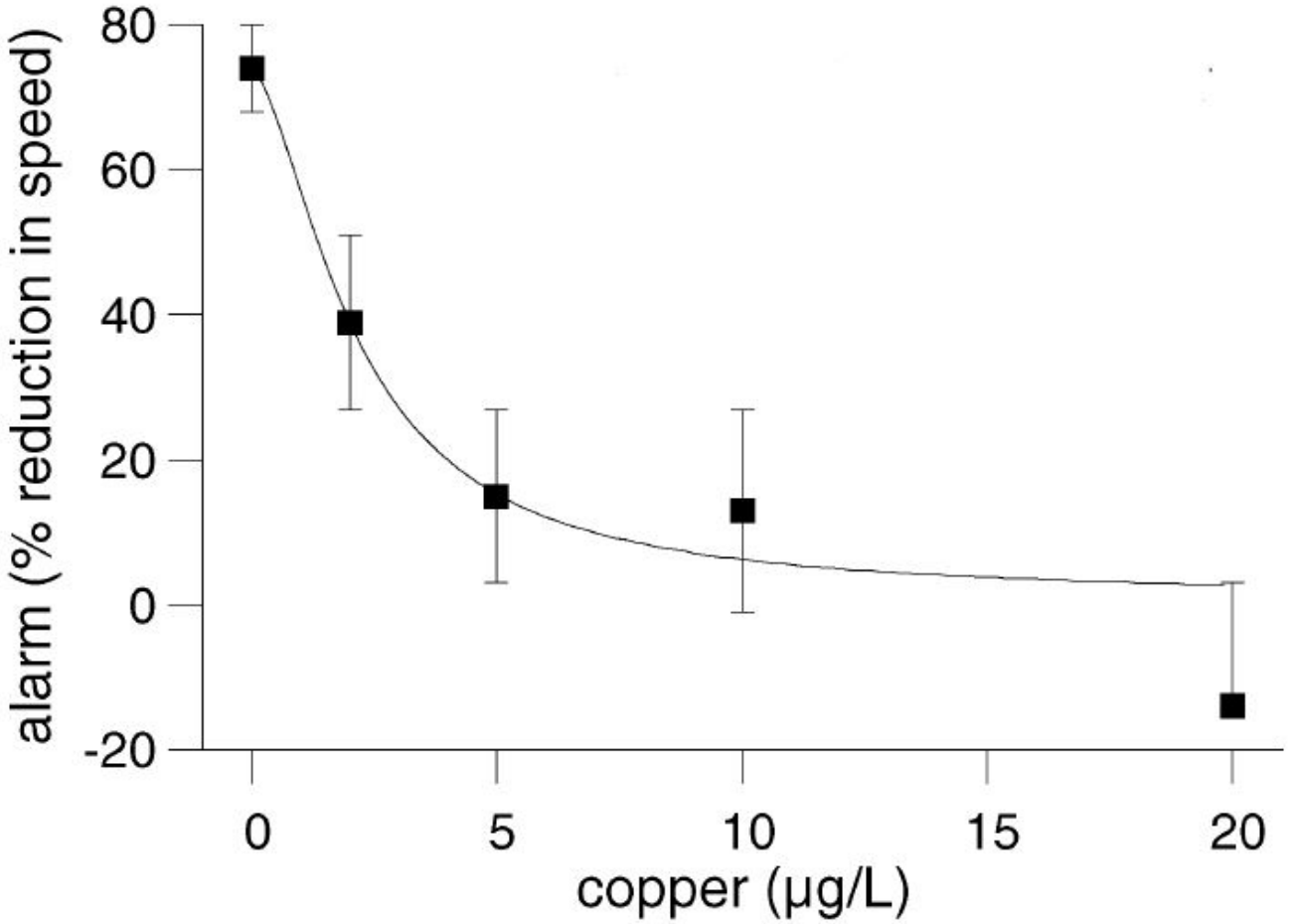
Toxicity of dissolved copper on salmonids

Copper is a neurobehavioral toxicant

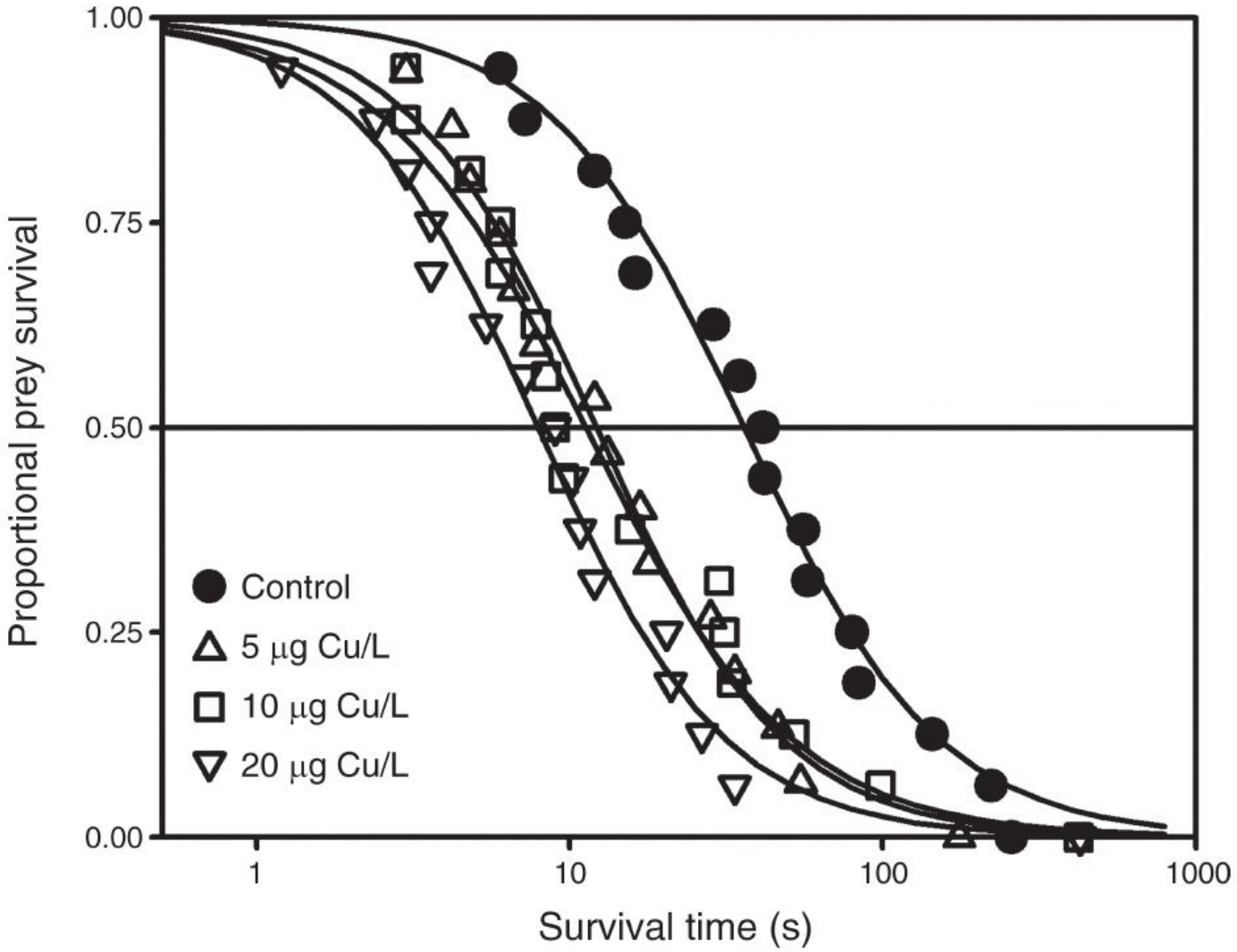
Species (lifestage)	Effect	Effect concentration (µg/L)[b]	Effect statistic	Hardness (mg/L)[c]	Exposure duration	Source
	Sensory and behavioral effects					
Coho salmon (juvenile)	Reduced olfaction and compromised alarm response	0.18–2.1	EC_{10} to EC_{50}	120	3 hours	Sandahl et al. 2007

There may be no salmonid safe levels of dissolved copper above background

Dissolved Copper Effects on Behavior



Dissolved Copper Concentration vs Survival Time



Summary of Dissolved Copper Effects

A general sensory inhibition

Behaviors dependent on sensory systems are muted

Survival likely to decrease

Why follow up monitoring for copper?

- Copper is the 2nd most pesticide used in Del Norte County

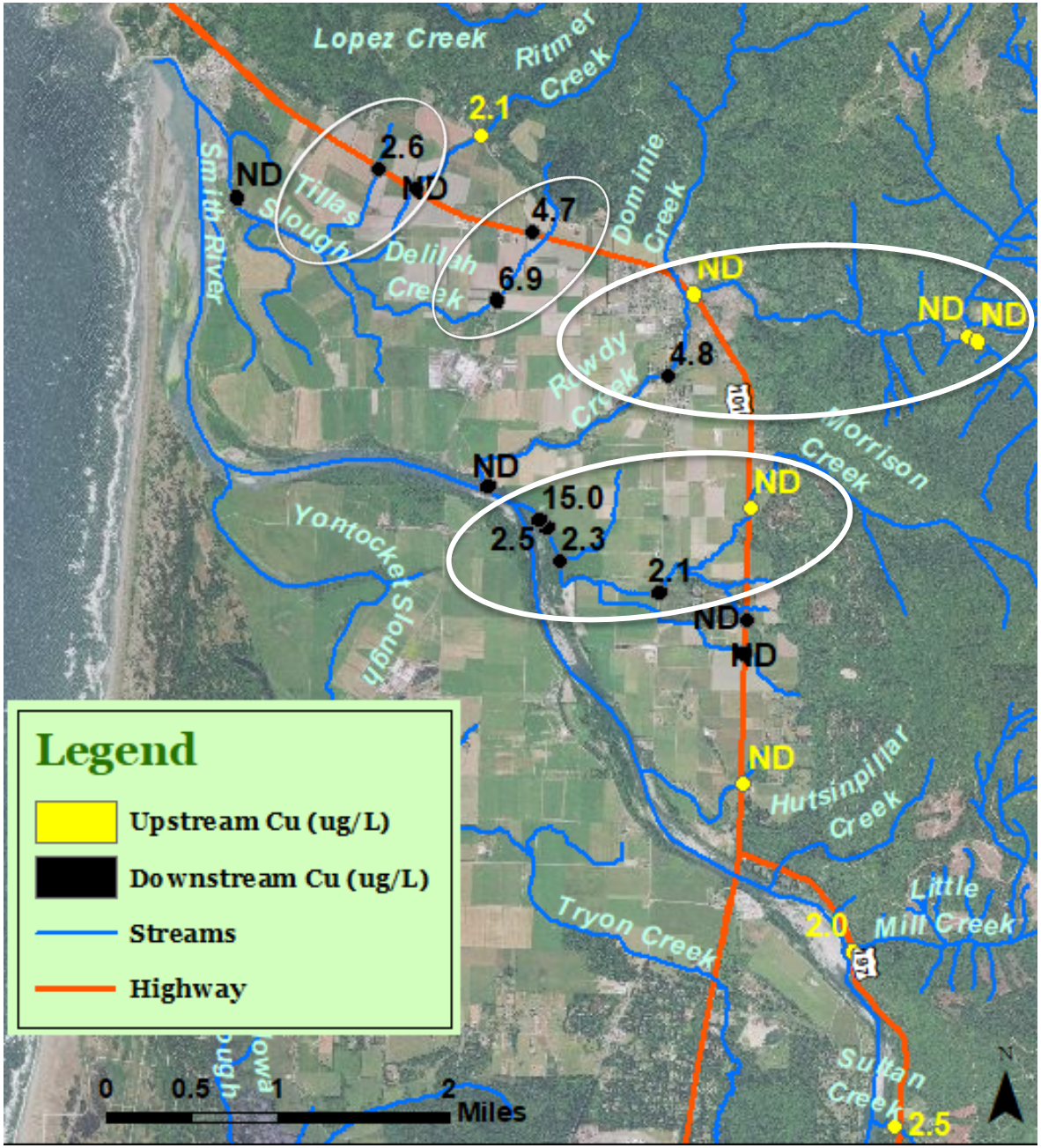
- Regional Water Board's monitoring shows dissolved copper in Smith River tributaries

- **Key Question: Are lily bulb farms contributing to dissolved copper in the tributaries?**

2017-2018 Dissolved Copper Sampling

- Sampled upstream and downstream of lily bulb fields in flowing water after rain (first flush)
- Nov 2017 samples only included hardness and dCu
  - 21 samples
- Spring 2018 sampling event included DOC
  - pending analysis

2017 Sampling results



Dissolved Copper Sampling Results

- Results are similar to Regional Water Board's monitoring results
- Background copper levels were detected above lily bulb fields at some sites
- Many sites below lily bulb fields indicate dCu levels that adversely affect survival of salmonids

How is Dissolved Copper Reaching Streams?

Summary

- Smith River plain key area for salmonids.
- Regional Water Board found copper and other pesticides in Smith River tributaries
- Copper has sublethal effects that reduce survival and reproduction of salmonids
- NMFS-CDFW found high likelihood of lily farms contributing to copper in the Smith River plain tributaries.

NMFS Recommendations for Regional Water Board

- Reconvene the Bulb Cultivation Advisory Group.
- Continue to work with growers, NMFS, and CDFW to immediately implement BMPs.
- Fund monitoring copper and other pesticides to assess effectiveness of BMPs.

Acknowledgements and Questions?

Acknowledgements:
CDFW
Regional Water Board