Regional Water Quality Control Board
North Coast Region
Staff Summary Report
October 8, 2025

ITEM: 1

SUBJECT:

Update on Water Quality Monitoring Results, Community Engagement, and Lily Bulb Order Development in the Smith River Plain (Ben Zabinsky, Brenna Sullivan, Chris Watt, and David Kuszmar)

BOARD ACTION:

This is an informational item; no action will be taken by the Board.

BACKGROUND:

The Smith River Plain is a coastal plain located at the lower end of the Smith River watershed near the mouth of the mainstem Smith River. The drainage network of the Smith River Plain is comprised of several small coastal tributaries and the Smith River estuary, which provides high quality habitat for salmonids and other aquatic and riparian species, and which holds deep cultural and subsistence significance for the Tolowa Dee-ni' Nation. The Smith River Plain produces about 80% of the world's Easter lily bulbs on roughly 1,000 total acres of farmland. Lily bulbs are farmed on a multi-year rotation, such that only a portion of these total acres are planted with bulbs each year; no more than about 200-250 acres are planted to Easter lilies in a given year, with a similar amount prepared in the spring for the following year's crop. Cultivation of lily bulbs involves soil disturbance and agricultural chemical use that can generate discharges of sediment, nutrients, and pesticides to surface waters and groundwater. Without proper management, these discharges may degrade water quality, contribute to pollution or nuisance conditions, and impair beneficial uses of state waters.

The North Coast Regional Water Quality Control Board's (North Coast Water Board's) efforts to address potential impacts of lily bulb agricultural discharges in the Smith River Plain began in 2011 with a series of stakeholder meetings to inform the development of a region-wide Agricultural Lands Discharge Program. In 2013, the Board shifted to a

commodity- and subregion-specific regulatory approach and directed staff to conduct water quality monitoring in the Smith River Plain to guide the next steps for regulating lily bulb agricultural discharges. A Surface Water Ambient Monitoring Program (SWAMP) study conducted from 2013-2015 found pesticide concentrations – including copper fungicides – in surface waters that exceeded US EPA aquatic life benchmarks. (Smith River Plain Surface Water and Sediment Monitoring Report 2013-2015, issued January 2018 (2018 SWAMP Report))[1].

In response, the North Coast Water Board directed staff to develop a targeted, collaborative water quality management strategy. The Smith River Plain Water Quality Management Plan (Management Plan)[2] was developed and finalized in 2021 by a Watershed Stewardship Team composed of the lily bulb growers, regulatory agencies (e.g., NOAA Fisheries, CA Department of Fish and Wildlife, CA Department of Pesticide Regulation), local stakeholders (e.g., Del Norte Resource Conservation District, Agricultural Commissioner, the Smith River Alliance), academic partners, and the Tolowa Dee-ni' Nation. The Management Plan outlines voluntary grower participation in annual management practice reporting, North Coast Water Board inspections, ongoing surface water quality monitoring, and an adaptive management framework to guide iterative improvement based on monitoring results.

As part of the Adaptive Management Monitoring Program outlined in the Management Plan, a new Smith River Plain Water Quality Study (monitoring study) was initiated in 2021 to better understand surface water quality conditions and to help inform development of a regulatory order for lily bulb agricultural discharges. The main objectives of the monitoring study were to:

- Determine agricultural practice effectiveness in meeting water quality objectives,
- Determine water quality/pesticide status and trends in surface waters,
- Determine seasonal and agricultural associations/correlations (if any) within the water quality data set,
- Collect data necessary for running the Biotic Ligand Model (BLM) to inform adaptive management thresholds for dissolved copper, and
- Inform development of the General Waste Discharge Requirements for Commercial Lily Bulb Operations in the Smith River Plain (Lily Bulb Order).

Analytes were selected based on their known use in lily bulb production, toxicity profiles, prior study results[3], and input data needs for the US EPA endorsed Biotic Ligand Model (BLM) – a metal bioavailability model that uses receiving water body characteristics and

[1] https://www.waterboards.ca.gov/northcoast/water_issues/programs/agricultural_lands/pdf/180116/180101-FINAL%20SWAMP%20REPORT_Smith%20River.pdf

[2] https://www.waterboards.ca.gov/northcoast/water_issues/programs/agricultural_lands/lily/pdf/2021/smithmgmttplan.pdf

[3] Visit the North Coast Lily Bulb page to access prior studies: https://www.waterboards.ca.gov/northcoast/water_issues/programs/agricultural_lands/lily/

monitoring data to develop site-specific water quality criteria. The North Coast Water Board partnered with Dr. Matthew Hurst of Cal Poly Humboldt to implement the monitoring study between 2021-2024. Field crews collected water samples and measured in-situ physical parameters (e.g., temperature, DO, pH, salinity, conductivity) during both wet and dry seasons. Chemical analyses targeted current-use pesticides, dissolved copper, and BLM input variables such as pH, major cations and anions (e.g., calcium, sodium, chloride, sulfate), and dissolved organic carbon.

The Smith River Plain Surface Water Monitoring Report 2021-2024, issued September 2025 (2025 SWAMP Report) presents findings from the most recent monitoring study, with comparative context drawn from the 2018 SWAMP Report, which shared analytes, sampling locations, and objectives. Together, these datasets provide a scientifically robust foundation for regulatory decision-making and ongoing adaptive management in the Smith River Plain.

In addition to presenting monitoring data, the 2025 SWAMP Report includes analyses conducted by North Coast Water Board staff to assess pesticide toxicity risk relative to pesticide application rates/timing and precipitation patterns. Staff's analysis of water quality data from the monitoring study suggests a strong association between both rate/timing of pesticide application and occurrence of major storm events with predicted bioavailability of dissolved copper and synthetic pesticide exceedances of water quality criteria.

In April 2025, North Coast Water Board staff sampled 9 private domestic wells within the current and historic lily bulb cultivation area in the Smith River Plain. Drinking water samples were analyzed for 94 pesticide residues utilizing a domestic well sampling program offered by the CA Department of Pesticide Regulation. North Coast Water Board staff worked with the lily bulb growers, the Technical Advisory Group for the Lily Bulb Order development, and local community groups to identify volunteers for domestic well sampling.

DISCUSSION:

Synthetic pesticide chemicals (diuron, ethoprop, and imidacloprid) were detected at all downstream monitoring stations with only Lower Delilah Creek (8 exceedances) and Tillas Slough (2 exceedances) recording water quality criteria exceedances (See Figure 1 for monitoring station locations). The pattern of synthetic pesticide concentrations seems to align with typical environmental fate and transport.

- At Lower Delilah Creek, ethoprop (a volatile, low persistence, and moderately mobile organophosphate insecticide applied between August and November) was only detected three times and only after significant early season storms.
- At downstream monitoring stations, elevated concentrations of diuron (a persistent and moderately mobile herbicide used to control weeds between November and May) and imidacloprid (a slow degrading, persistent, highly water soluble, and low soil binding insecticide applied between February and August) are positively associated with the typical storm season (October - May).

- Although the dataset is limited, it appears imidacloprid and diuron concentrations may sharply peak during early stages of overland flow from larger storms (>2 inches in 3 days) prior to dilution from increasing overland flow and a rise in streamflow. With cessation of overland flow and a presumed drop in streamflow, diuron and imidacloprid concentrations appear to transition to moderate levels, possibly associated with shallow groundwater flow to streams which may continue for weeks following larger storms. Persistent lower-level detections outside the typical storm season suggest diuron and imidacloprid transport via shallow groundwater baseflow to streams.
- Imidacloprid threshold exceedances are strongly associated with normalized pesticide application rates and both diuron and imidacloprid concentrations are strongly correlated to large storm events.

Either chronic or acute potential copper toxicity (toxicity unit >1) was predicted by the BLM for all downstream monitoring stations at least once and in nearly 40% of all downstream samples collected. Potential chronic toxicity was predicted twice as often as acute toxicity.

- Lower Deliah Creek (54% of downstream dissolved copper samples) and Tillas Slough (33% of downstream dissolved copper samples during freshwater conditions) displayed the most frequently predicted copper toxicity. Upstream dissolved copper concentrations ranged between no detection above the method detection limit and 1.13 ug/L. Downstream copper concentrations ranged from 0.16 to 14.8 ug/L during freshwater conditions and up to 319 ug/L during periods of high salinity in Tillas Slough.
- By early summer, salinity at the Tillas Slough monitoring station exceeded the freshwater limit and was accompanied by sharp increases in dissolved copper and predicted toxicity. These copper increases show a strong, direct association with salinity levels, prompting staff to initiate a data verification exercise. Verification sampling was conducted in September 2025.
- At Lower Delilah Creek and Lower Ritmer Creek, potential copper toxicity predicted by the BLM is associated with elevated dissolved copper concentrations and depressed pH during the storm season.
- In Tillas Slough, Lower Delilah Creek, and Lower Ritmer Creek, predicted potential copper toxicity appear to follow a similar pattern as imidacloprid and diuron concentrations during the storm season.
- Outside the storm season and with the marked exception of Tillas Slough, predicted copper bioavailability typically drops below the level of potential toxicity (although typically above background) in the downstream monitoring stations.
- Predicted potential chronic copper toxicity is also strongly and directly associated with normalized copper application rates (lbs/acre/year). For example, Delilah Creek has the largest normalized copper application rate and the highest and most frequent predictions of potential chronic copper toxicity.

Pesticides were detected in 6 of the 9 domestic wells sampled in April 2025 within the lily bulb cultivation area of the Smith River Plain. Of the eight pesticides detected, all but one – used in forestry and highway rights-of-way – had been applied on lily bulbs between 2012 and 2023. Four pesticides (diuron, imidacloprid, napropamide, and mefenoxam) were reported as being used on lily bulbs in the most recent Pesticide Use Reports from 2023. Three quarters of all pesticide detections (75%) were reported at trace concentrations[4], and none exceeded established human health levels[5].

Findings from the 2025 SWAMP Report and recent domestic well sampling are informing the development of the Lily Bulb Order, which will incorporate adaptive management strategies to prevent or minimize water quality impacts from lily bulb agricultural discharges. Development of the Lily Bulb Order was initiated in 2023 with the formation of a Technical Advisory Group (TAG). The TAG met five times between 2024-2025 to review and provide input on elements of an Administrative Draft of the Lily Bulb Order. TAG membership includes all Management Plan Watershed Stewardship Team members, with additional environmental nonprofit groups, partnering agencies, community organizations, and interested members of the public.

In addition to TAG meetings, staff have participated in multiple community meetings in Del Norte County to provide updates on the Lily Bulb Order development. Because many community concerns expressed to staff extend beyond the North Coast Water Board's regulatory purview, staff referred these concerns to the appropriate CalEPA agencies, including the Office of Environmental Health Hazard Assessment and the CA Department of Pesticide Regulation.

Through a Management Agency Agreement established in 2019, the North Coast Water Board has also drawn on the CA Department of Pesticide Regulation's expertise to help develop science-based recommendations for the Lily Bulb Order. In parallel, staff have coordinated with NOAA Fisheries, the CA Department of Fish and Wildlife, the CA Coastal Commission, and the US Fish and Wildlife Service through a natural resource agency workgroup to address technical questions related to Order development.

The Draft Lily Bulb Order and an accompanying Draft Environmental Impact Report are scheduled to be released to the public in January 2026 with a public workshop to follow in February 2026. The Proposed Lily Bulb Order is scheduled to be considered by the North Coast Water Board for adoption in Fall 2026.

[4] Trace concentrations are concentrations between the Method Detection Limit and the Reporting Limit.

[5] Established health levels are drinking water standards developed by the CA Department of Pesticide Regulation, the CA State Water Board, and the US EPA. Concentrations below these levels are considered protective against both acute and chronic human health impacts from pesticide exposure.

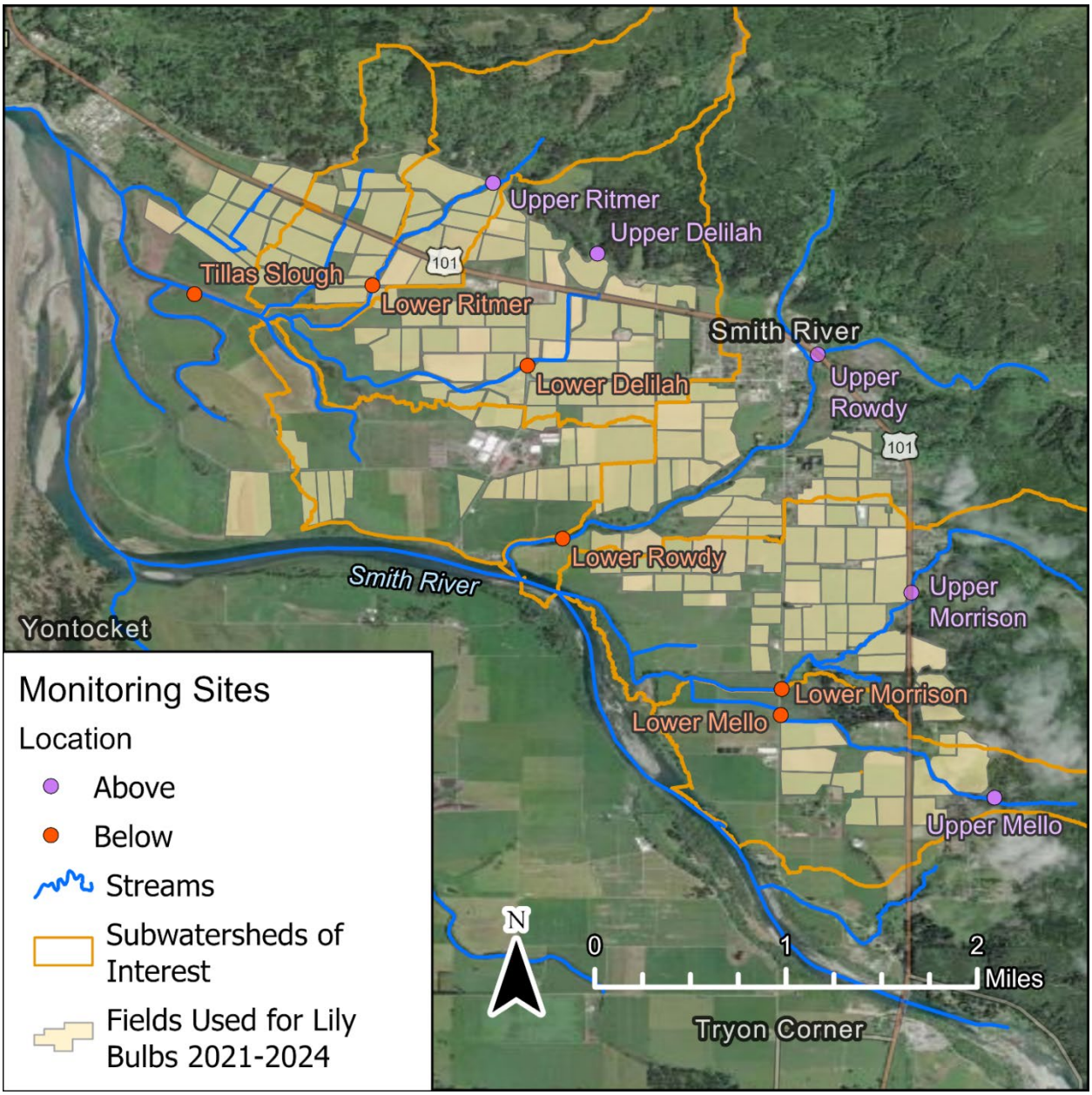

Figure 1: Monitoring station locations from the Smith River Plain Water Quality Study, October 2021 to September 2024.

RECOMMENDATION:

Not applicable.

SUPPORTING DOCUMENTS:

Smith River Plain Surface Water Monitoring Report 2021-2024, issued September 2025 (2025 SWAMP Report)[6]

Appendix A[7]: Smith River Plain Surface Water Monitoring Results (Tables)

Appendix B: Pesticide Concentrations and Cumulative Rainfall by Water Year (Charts)

Appendix C: Normalized Pesticide Application Intensity by Monitoring Station (Charts)

Appendix D: Monthly Pesticide Application Mass by Tributary Area (Tables)

Appendix E: Major Storm Events (Table)

Appendix F: Pesticide Concentrations and Storm Events (Charts)

Appendix G: Acute and Chronic Copper Toxicity by Monitoring Station (Charts)

[6] Visit the North Coast Water Board's Smith River Lily Bulb webpage for access to the 2025 SWAMP Report. https://www.waterboards.ca.gov/northcoast/water_issues/programs/agricultural_lands/lily/

[7] All 2025 SWAMP Report appendices are available upon request. Contact Ben Zabinsky at ben.zabinsky@waterboards.ca.gov.