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MEMORANDUM

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SUBJECT: 2017 UPDATE IN THIOBENCARB CONTAMINATION IN SACRAMENTO VALLEY

SUMMARY

High exceedance of thioencarb signal over performance goal (1.5 ppb) has been observed in waterways in the rice-growing regions of the Sacramento Valley in the past few years (Wang, 2017). In order to reduce its pollution in the waterways, new permit conditions have been implemented in 2017. This update contains Surface Water Program (SWPP) staff's analysis of monitoring results and use data from 2017 with the conclusion that with the current management practices and use amounts, the pollution level in the waterways is at a level that is not expected to adversely affect drinking water quality at City of West Sacramento and Sacramento intakes.

1. 2017 Grounding Permit

In 2017, a special permit condition on thioencarb use was applied to rice farms stating that emulsifiable concentrate (EC) products in the grounding region cannot be applied aerially. The grounding rule is applied to the region west of the Sacramento River and North of Highway 20 (Figure 1), including the majority of the rice fields in Glenn County and about half of the fields in Colusa County. This region was selected because it has the potential to contribute to the thioencarb concentration at sampling site Colusa Basin Drain North End or CBD5 (Figure 1), the most polluted ambient monitoring site in the region (Wang, 2017).

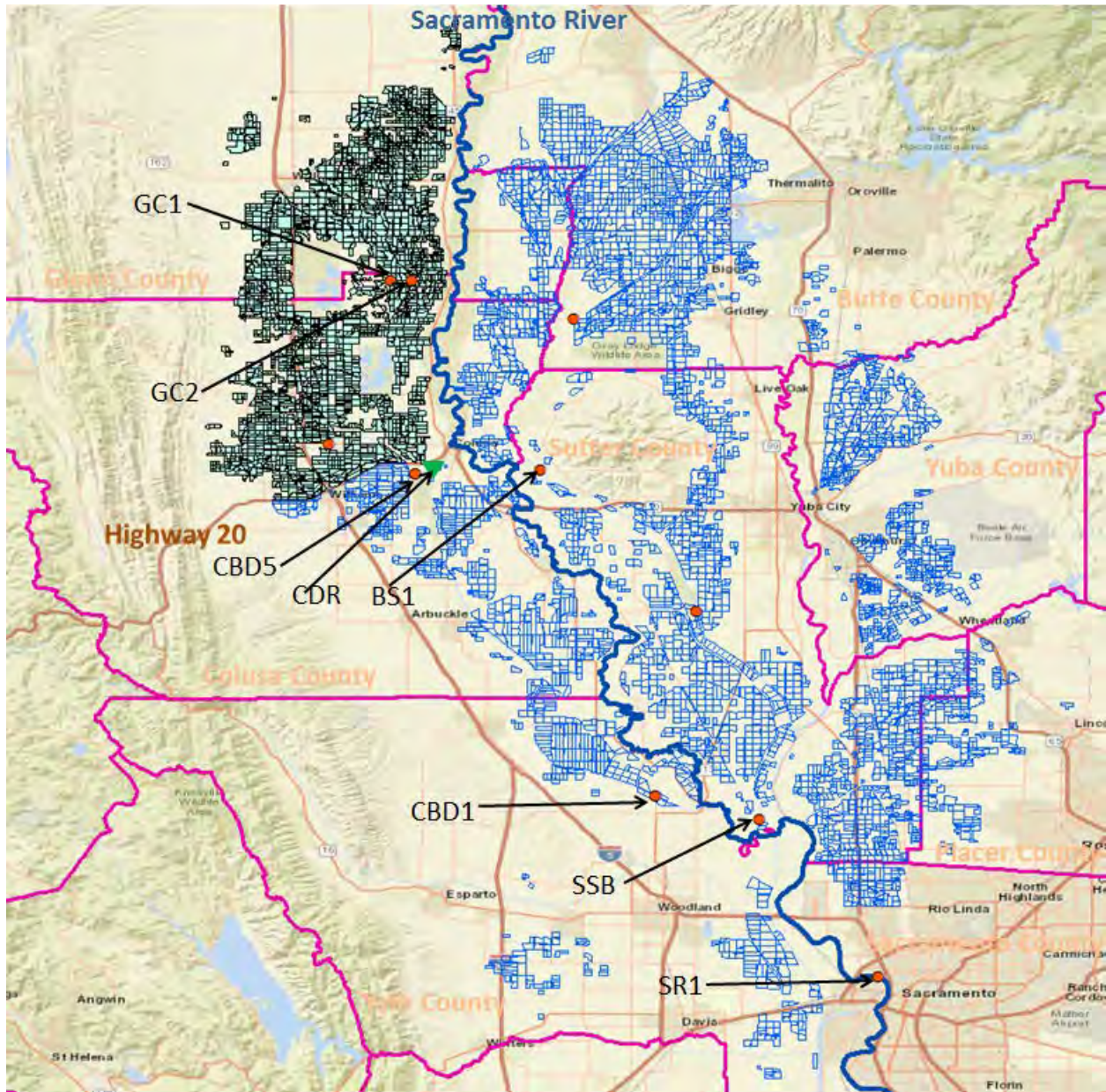


Figure 1 Map of rice fields in the Sacramento Valley.

(The fields under the 2017 grounding permit are highlighted in green (West of Sacramento River and North of Highway 20). The ambient monitoring sites are indicated by red dots with labels for those sampled in 2017 (GC1, GC2, CBD5, BS1, CBD1, SSB and SR1). The flowrate monitoring station is on the Colusa Drain near Highway 20 as indicated by green triangle (CDR).

2. Monitoring Results

Seven ambient monitoring sites have been sampled in the 2017 thiobencarb application season May–July (Figure 1). The two sites near the boundary of Glenn and Colusa counties (GC1 and GC2) are located on small drainage creeks immediately adjacent to rice fields. GC1 had one exceedance (1.7 ppb) while GC2 had three exceedances (2.5–2.8 ppb) over 14 sampling dates. They could exhibit peak concentrations caused by an overflow from a single field nearby

and thus may not represent the average condition in the region. Colusa Basin Drain North End (CBD5), Butte Slough (BS1), Colusa Basin Drain South End (CBD1), and Sacramento Slough Basin (SSB) are on relatively large drainage systems that integrate the signals over bigger area; their signals are more representative. Of these large sites, SSB had no exceedance over the performance goal of 1.5 ppb since its inclusion in the monitoring program in 2007; BS1 had one exceedance (1.8 ppb) in 2017 while the last exceedance at this site occurred in 2008. CBD1 had one exceedance while CBD5 had four exceedances in 2017 (Figure 2). The receiving water site SR1 had no exceedance over water quality objective of 1.0 ppb in the past 15 years. The drinking water intake sites for the cities of West Sacramento and Sacramento have not exhibited thiobencarb concentrations higher than the detection limit of 0.1 ppb, which is 10× lower than the WQO of 1.0 ppb. Therefore, the focus of the data analyses will be on site CBD5. Although the exceedance frequency at CBD5 in 2017 is comparable to that in 2014–2016 (Figure 2), the detected concentrations are not as high (Figure 3 middle panel). The peak concentration observed in 2017, 1.8 ppb, is right above the performance goal and lower than those observed in 2013–2016.

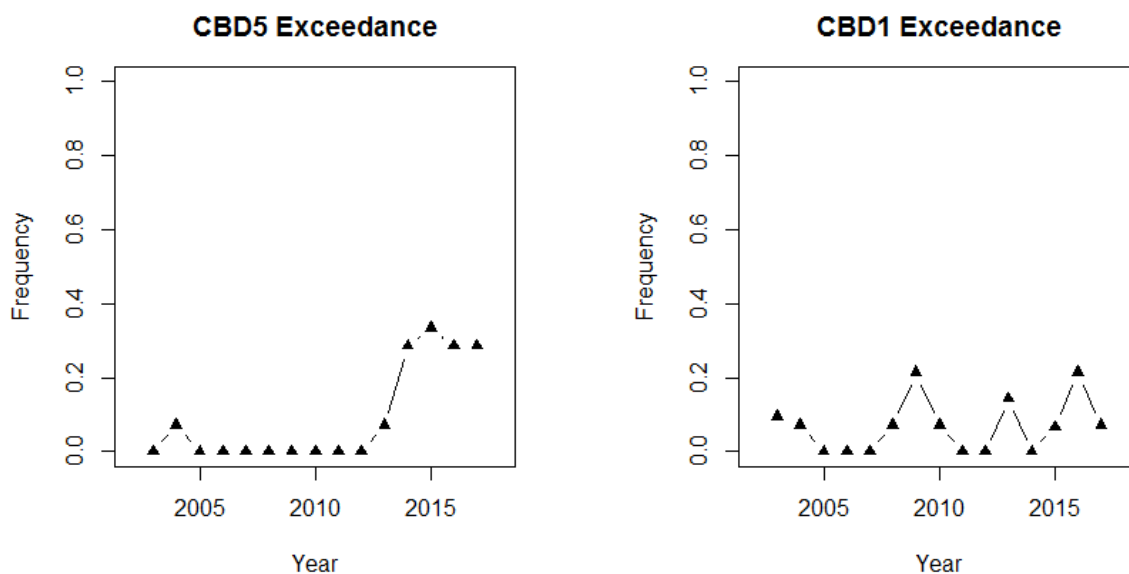


Figure 2 Exceedance frequencies at CBD5 and CBD1.

3. Thiobencarb Use

As shown in Figure 1, CBD5 receives water from Glenn and Colusa counties. The use data from those two counties were downloaded on September 8th, 2017 from DPR’s Pesticide Use Reporting Database (PUR) (<http://www.cdpr.ca.gov/docs/pur/purmain.htm>). This preliminary dataset is still going through QA/QC and editing (e.g., new records may be added and erroneous records maybe corrected after the download date). Due to the urgent need to consider changes to next year’s permit condition, we conducted this data assessment using the preliminary PUR dataset and acknowledged the uncertainty in the values (e.g., the original dataset we obtained from Colusa County Agricultural Commissioner’s Office has a higher total use than what had been reported to PUR by September 8th 2017).

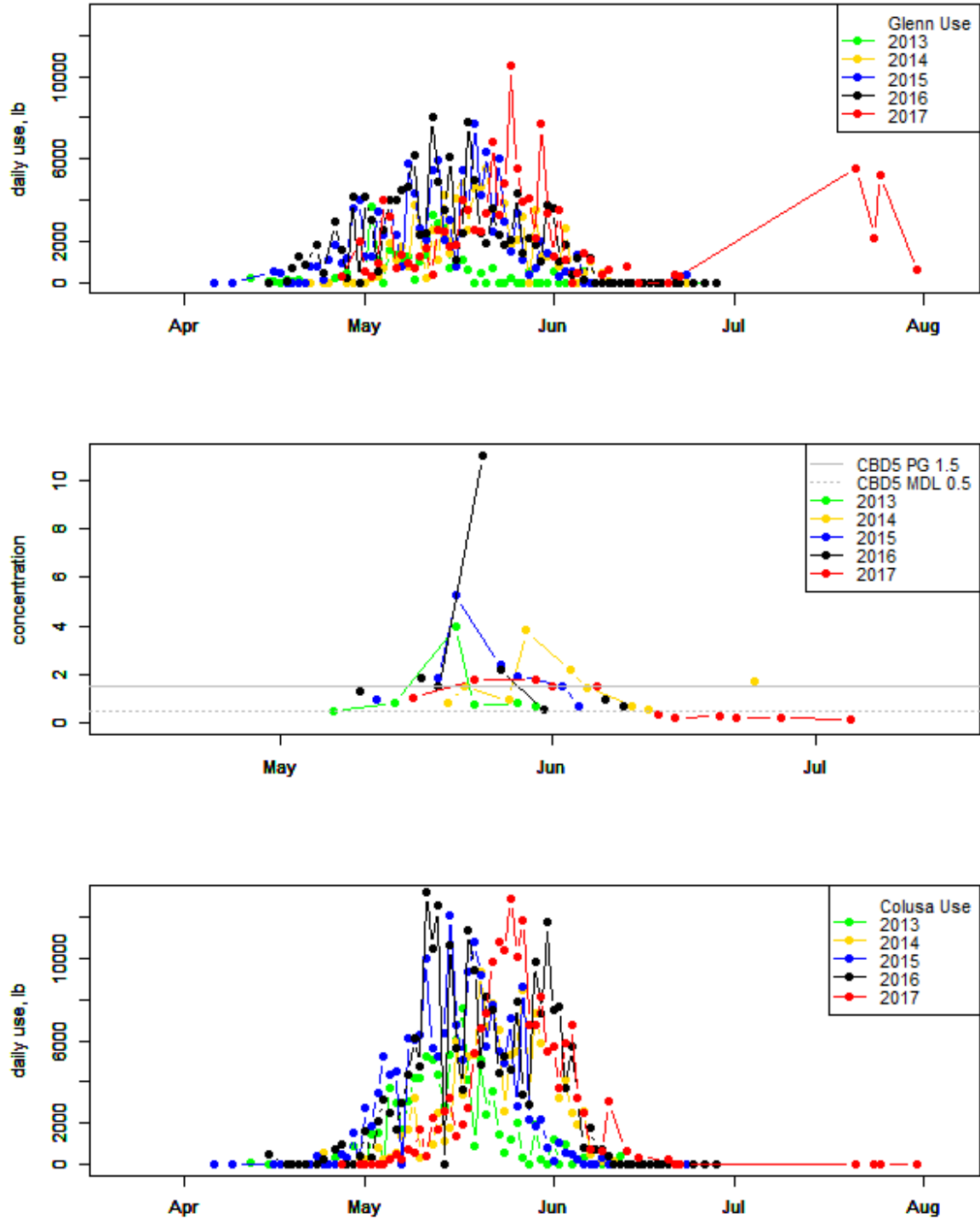


Figure 3 The timing of thiobencarb application in Glenn and Colusa Counties and detection at CBD5.

The overall uses of thiobencarb in Glenn and Colusa counties in 2017 are comparable to the use in 2015 and 2016 (Figure 4). Detailed analyses in the use amount of various thiobencarb pesticide products indicate that the permit condition has been effectively followed such that the aerial application of EC product is nearly zero in the grounding region (Figure 5). The small amount of aerial application of EC product in Glenn County (399 pounds thiobencarb) is from the same farm located on the north edge of the region, which could be a reporting error. In Glenn County, <50% of the EC product has been applied aerially in 2015 and 2016 and that portion has been replaced by ground application of EC product in 2017. In Colusa County, the majority of the EC product has been applied aerially; that portion seems to be replaced by aerial application of granular product in the grounding region in 2017. In addition, there is no obvious difference in the timing of thiobencarb application in the grounding region versus in the entire county of Glenn and Colusa (Figure 6). When the application timing is compared across recent years, the timing in 2017 is similar to that in 2014 and are delayed compared to year 2013, 2015 and 2016 (Figure 3, top and bottom panels).

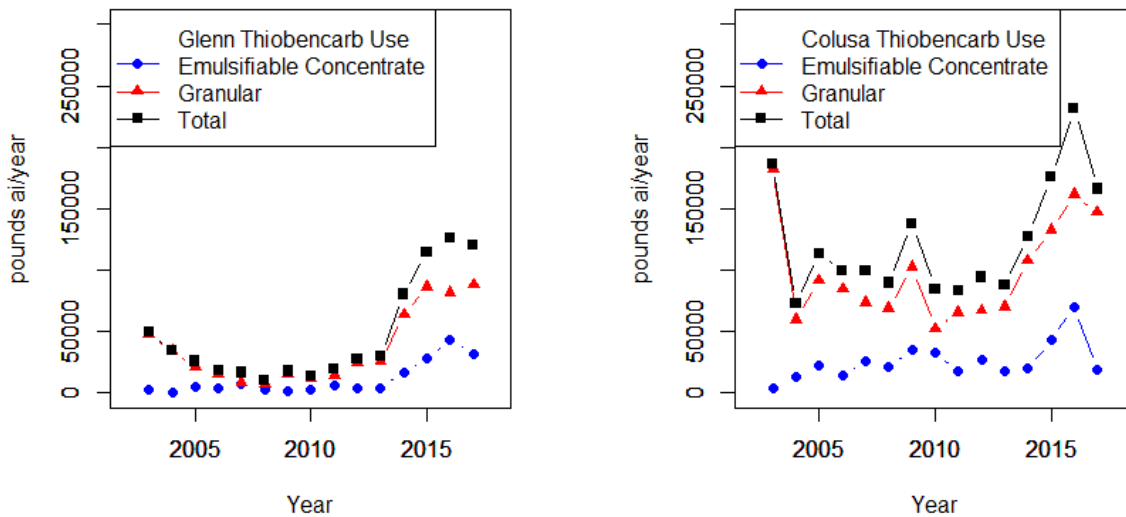


Figure 4 Thiobencarb use in Glenn and Colusa counties.

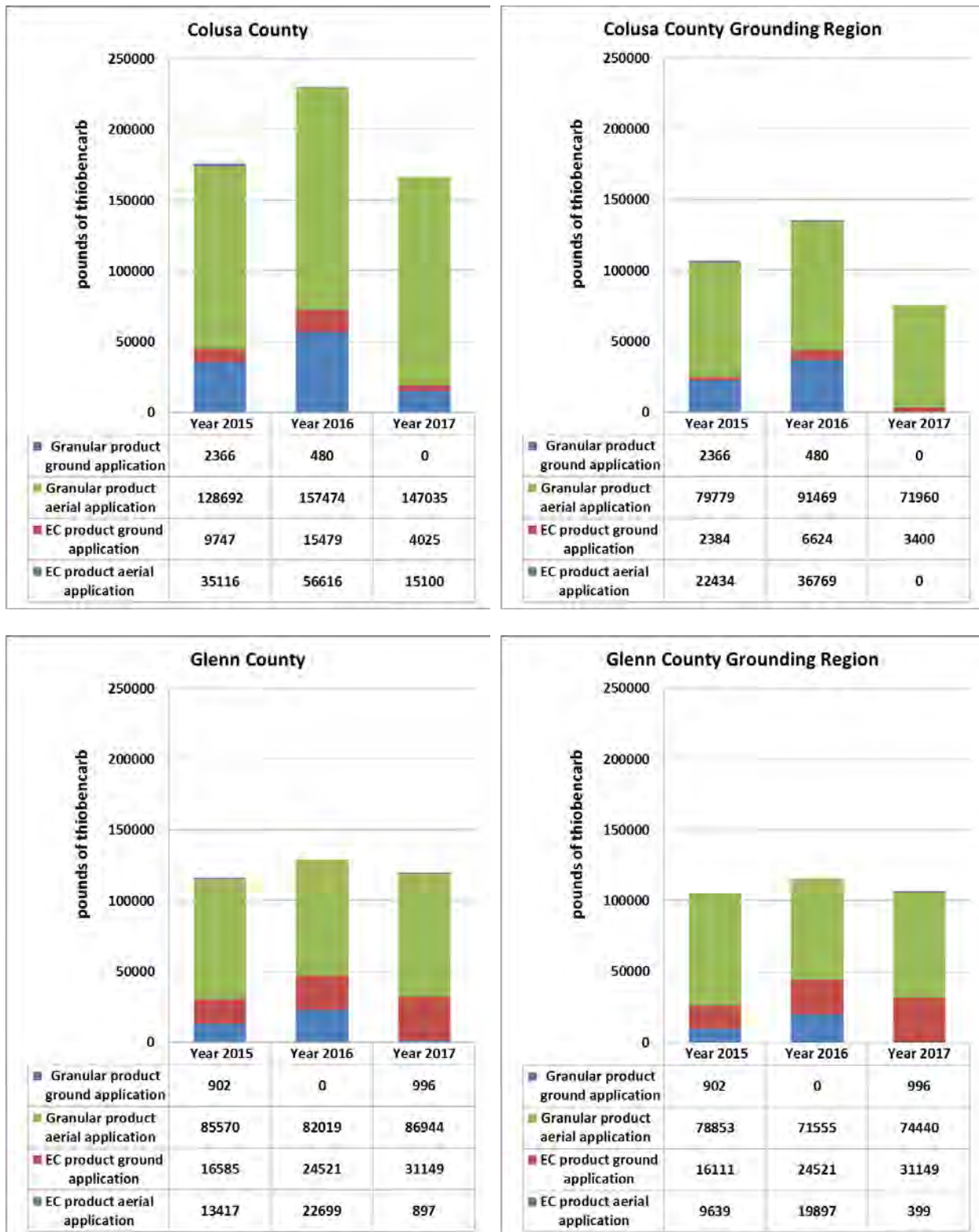


Figure 5 Use of various thiobencarb pesticide products in Glenn and Colusa counties in 2015–2017. (EC: emulsifiable concentrate)

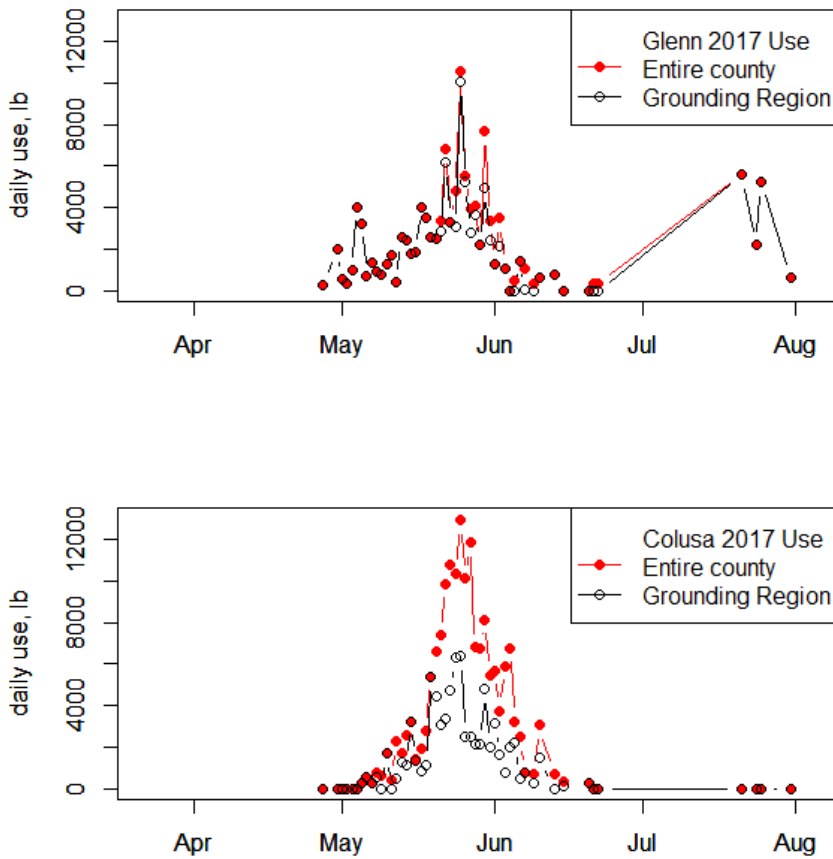


Figure 6 The 2017 application timing of thiobencarb in Glenn and Colusa counties.

4. Water Flowrate at the Colusa Drain near Highway 20 (Site CDR)

We have shown that the flowrate at CDR negatively correlated with the water quality at CBD5 for the period of 2003–2016, i.e., low flow at CDR, an indication of draught, coincides with high thiobencarb concentration at CBD5 (Wang, 2017). The hypothesis is that the flowrate at CDR can indicate the amount of dilution water available at CBD5. Hourly discharge data at CDR were downloaded from the California Department of Water Resources’ California Data Exchange Center (http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=CDR). Average flowrate over the thiobencarb sampling period (April 24th – July 14th) was calculated for 2017 and added to historical values in Figure 7. Although the Sacramento River Valley had extremely wet weather in early 2017, the flowrate at CDR in late spring and early summer is not high. Its value is between the values in 2013–2016 but much lower than historical highs.

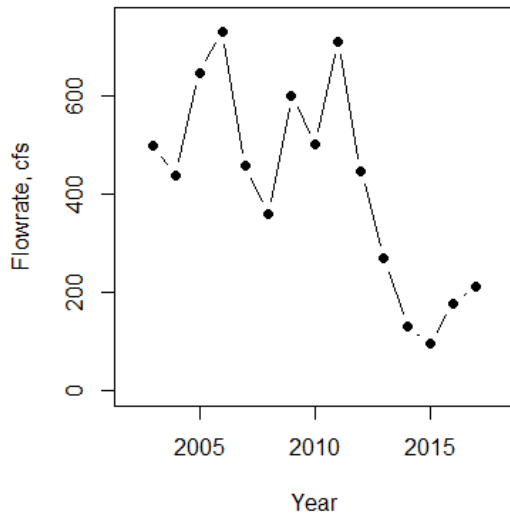


Figure 7 Average Flowrate at Station CDR over April 24–July 14.

5. Conclusion

In 2017, although the uses of thiobencarb in Colusa and Glenn counties were as high as those in 2015 and 2016 and the exceedance frequency of thiobencarb at the most polluted site CBD5 is as high as in 2014–2016, the actual detected concentrations at CBD5 were much lower than those from previous years and the peak concentration is just 0.3 ppb above the performance goal of 1.5 ppb. In addition, the water at the drinking water intakes for the cities of West Sacramento and Sacramento had thiobencarb concentrations at least 10× lower than the WQO. Namely, there is a safety factor of at least 10. We conclude that with all the management practices in place in 2017, the system is currently able to digest the amount of thiobencarb used and maintain relatively safe levels of water concentration that do not pose a threat to drinking water quality. However, with the limited data, we are not able to determine if the improvement in water quality is the result of a specific management practice or the hydrological condition.

6. References

Wang D. 2017. Memorandum to Nan Singhasemanon from Dan Wang. An Investigation in Thiobencarb Contamination in Sacramento Valley during 2003–2016. California Department of Pesticide Regulation.