



Department of Pesticide Regulation



Brian R. Leahy
Director

MEMORANDUM

Edmund G. Brown Jr.
Governor

TO: George Farnsworth
Assistant Director

FROM: Rosemary Neal
Senior Environmental Scientist (Specialist)
951-680-9714

Original signed by P. Wofford

Randy Segawa
Special Advisor
916-324-4137

Original signed by R. Segawa

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SUBJECT: ESTIMATED ECONOMIC AND FISCAL IMPACT OF THE PROPOSED
REGULATION TO ADDRESS PESTICIDE APPLICATIONS NEAR
SCHOOLSITES

Summary

The Department of Pesticide Regulation (DPR) is proposing a regulation to address agricultural pesticide applications near public K-12 schools and licensed child day care facilities, except family day care homes (schoolsites¹). The proposed regulation prohibits certain applications within ¼ mile of a schoolsite, and requires growers to provide a two-part notification of other pesticide applications within ¼ mile of a schoolsite. Most of the requirements pertain to pesticide applications made Monday through Friday, between 6:00 am and 6:00 pm. This memorandum describes the estimated economic and fiscal impacts of the proposed regulation.

DPR's estimates relied on a report entitled "Draft Regulation Regarding Pesticide Applications near Schoolsites: Potential Economic Effects for Agriculture" (Goodhue, et al. 2016) by the Department of Agricultural & Resource Economics at the, University of California, Davis (UCD). UCD evaluated 13 major agricultural counties, and three key provisions of the proposed regulation described above.

Using similar methodology, DPR extrapolated the costs determined by UCD for the 13 target counties to all counties statewide. Using pesticide use report data for July 2013 through June 2014, DPR estimated the following would have been affected by the proposed regulation:

¹ As specified in Education Code section 17609(f), "schoolsites" means any facility used as a child day care facility, as defined in Section 1596.750 of the Health and Safety Code, or for kindergarten, elementary, or secondary school purposes. The term includes the buildings or structures, playgrounds, athletic fields, vehicles, or any other area of property visited or used by pupils.



- 3,499 schoolsites ¼ mile or less from an agricultural field, a site where pesticide applications are made for the production of an agricultural commodity² (13 percent of all schoolsites)
- 4,821 agricultural fields ¼ mile or less from a schoolsite (10 percent of all fields)
- 2,519 growers operating these fields (3 percent of all growers)
- 2,312 small businesses (91.8 percent of the affected growers)
- 137,483 pesticide applications to these fields (11 percent of all applications)
- 9,933 acres of almonds (0.9 – 1.2 percent of almond acreage)
- 10,158 acres of grapes (0.9 – 1.3 percent of all grape acreage)

DPR estimated the cost to make both parts of the notifications required by the proposed regulation during this one-year period would have been \$3.9 million, and the loss due to the proposed prohibitions would have been \$1.2 million. Total grower cost would have been \$3.3-\$4.5 million for an average cost of \$1,328-\$3,480 for each affected grower, with the same cost per grower whether or not the grower was a small business. DPR assumed that the indirect costs were the same as the direct costs, for a total economic impact ranging from \$7.8-\$9.0 million. Table 1 (Attachment page A-1) summarizes of these estimates.

The proposed regulation has no state fiscal impact to DPR or other state agencies, but there is a fiscal impact to local agencies – county agricultural commissioners (CACs). DPR estimated the fiscal impact to CACs based on the 24,527 notifications estimated for July 1, 2013 through June 30, 2014. DPR estimated the cost for five activities by CACs: additional investigations, compliance actions, and enforcement actions triggered by the notifications; outreach to growers and schoolsites; and maintenance of Geographic Information Systems (GIS) data for schoolsites. DPR estimated that 56 of the 58 counties would have been affected during this one-year period and a total cost of \$0.83 million, with the annual cost ranging from \$155,986 for Santa Barbara to \$33 for Mono. Table 2 (Attachment page A-2) summarizes of these estimates.

² As defined in the California Code of Regulations, Title 3, section 6000, “agricultural commodity” means an unprocessed product of farms, ranches, nurseries and forests (except livestock, poultry and fish). Agricultural commodities include fruits and vegetables; grains, such as wheat, barley, oats, rye, triticale, rice, corn and sorghum; legumes, such as field beans and peas; animal feed and forage crops; rangeland and pasture; seed crops; fiber crops such as cotton; oil crops, such as safflower, sunflower, corn and cottonseed; trees grown for lumber and wood products; nursery stock grown commercially; Christmas trees; ornamentals and cut flowers; and turf grown commercially for sod.

Introduction – Proposed Regulation

To address concerns regarding pesticide applications near schools, DPR is proposing a regulation that includes the following minimum distances to a schoolsite for applications to agricultural commodities made between Monday through Friday 6:00 a.m. - 6:00 p.m. : ¼ mile distance for applications using

- Aircraft
- Airblast sprayer
- Sprinkler chemigation
- Dust/powder, but no distance requirement if applied using field soil injection equipment
- Fumigant

25 foot distance for applications using

- Ground-rig sprayer, but ¼ mile distance if applying dust/powder or fumigant
- Field soil injection equipment, but ¼ mile if applying fumigant; no distance restriction if applying a dust/powder
- Other equipment (e.g. drip chemigation)

No distance restriction when

- No classes are scheduled or day care facility is closed
- Application is within an enclosed space (e.g. greenhouse)
- Applying using bait stations
- Using backpack or hand-pump sprayer, but ¼ mile distance if applying a dust/powder or fumigant
- Applying granule, flake, pellet, but ¼ mile distance if applying using aircraft

DPR proposes a two-part notification. The first part is an annual general notification required for all expected pesticide applications to agricultural commodities within ¼ mile of a schoolsite. The grower provides the annual notification to the schoolsite and CAC by April 30, including locations of the fields and list of pesticides expected to be used during the upcoming July 1 – June 30 period. The second part is an application-specific notification provided to schoolsites and CACs at least 48 hours prior to all applications that require a 25-foot distance from a schoolsite.

The proposed regulation includes an option for a written agreement between a grower, schoolsite, and CAC that provides the same or greater protection as the minimum distances specified by the regulation, and/or alternative notification requirements.

Introduction – UCD’s Analysis

These estimates relied on a report entitled “Draft Regulation Regarding Pesticide Applications near Schoolsites: Potential Economic Effects for Agriculture” (Goodhue, et al. 2016) prepared for the California Department of Food and Agriculture (CDFA) by the Department of Agricultural & Resource Economics, UCD. UCD evaluated 13 major agricultural counties (Fresno, Imperial, Kern, Kings, Madera, Merced, Sacramento, San Joaquin, Santa Barbara, San Luis Obispo, Stanislaus, Ventura, and Yolo), and three key provisions of the proposed regulation described above. UCD used GIS analysis of schoolsite locations and pesticide use report³ data for July 1, 2013 through June 30, 2014 to estimate the number of annual and 48-hour notifications required, and the number of acres affected by the prohibitions for almonds and grapes. UCD’s analysis required locating sites with “pesticide applications made for the production of an agricultural commodity” (PAPAC fields) located within ¼ mile of schoolsites. UCD obtained these field locations from each of the 13 CACs through their CalAgPermits database. UCD also relied on cost data from U.S. EPA and U.S. Department of Labor to estimate the notification costs; and county crop reports, discussions with UC and USDA specialists, and a weather analysis by CDFA and DPR to estimate the losses due to the prohibitions. Much of this remaining section is excerpted from UCD’s report.

NOTE: While UCD’s analysis only included 13 counties, they developed geographic boundaries for all schoolsites statewide. DPR used these data for its statewide estimates.

UCD’s notification cost estimates for 13 counties

UCD identified the following notifications costs for growers with one or more PAPAC fields: the preparation of the annual notification of pesticides that may be used for each site, the delivery of the annual list to schoolsites and the CAC for each site, and the grower’s time for reviewing and understanding the requirements in general. Applications subject to the notification requirement incur the additional cost of the 48-hour notification, which must be provided to each schoolsite and the CAC.

Time estimates for specific activities were obtained by utilizing information for similar activities used by the U.S. EPA in its “Supporting Statement for an Information Collection Request” regarding its risk mitigation measures adopted as part of its 2009 Reregistration Eligibility Decisions for a group of fumigant chemicals (U.S. Environmental Protection Agency 2013). The preparation of the annual notification of pesticides that may be used was assumed to be

³ People (growers and applicators) who apply pesticides to agricultural commodities are required to submit a pesticide use report to the CAC that includes the product applied, the amount applied, acres treated, crop treated, date treated, location by section, and other information. Sections are 1x1 mile areas designated by the Public Lands Survey System. DPR maintains a database of the pesticide use reports.

equivalent to the preparation of an initial fumigation plan, the cost per schoolsite of delivering that notification was the same as the cost of filing and disclosing a fumigant management plan, and the cost of reviewing and understanding the requirements was the cost of understanding requirements. The time per 48-hour notification was assumed to be the same as the time per notice to the State Lead Agency.

The cost of each activity was calculated by updating the wage information from the U.S. Department of Labor source used by the U.S. EPA to the 2014 values. Grower cost per hour was the average hourly wage for occupation code 11-9013, Farmers, Ranchers, and Other Agricultural Managers, drawn from the North American Industry Classification System (NAICS) 115100-Support Activities for Crop Production (U.S. Department of Labor 2014). The wage was then “loaded” with the average benefit rate for all U.S. civilian workers: 46% (U.S. Department of Labor 2015). The loaded hourly wage was \$51.69. The estimated costs of the annual and 48-hour notifications for 13 counties were:

- *Understanding requirements*: \$25.85 per affected grower; \$37,198 total
- *Preparation of annual notification*: \$620.32 per affected field; \$1,594,843 total
- *Delivery of annual notification*: \$2.58 per affected schoolsite; \$17,787 total
- *48-hour notification*: \$11.37 per affected application; \$127,071 total
- *Total*: \$1,776,899

UCD’s prohibition cost estimates for 13 counties

Weather and field conditions are not always suitable for applying pesticides. For example, rain can prevent applications and result in fields too wet to treat with ground rig applied air blast methods after the rain itself stops. Forecasted rain events can in themselves prohibit certain pesticide applications. Thus, growers may sustain losses as a result of the draft regulation because they lose the option of treating during the weekday 6:00 a.m. - 6:00 p.m. schoolsite window.

The analysis included potential yield loss with and without the regulation by integrating weather data, soils data, bloom data, and number of fungicide sprays that could not be completed within a multi-spray program for the top two affected crops as measured by buffer acreage in the thirteen counties: almond (7,245 acres) and grape (5,319 acres). The majority of the state’s production of the two crops is in the counties examined: almond production value represents 81% of the statewide almond production and grape 55% of statewide production. Based on information from UC and USDA personnel, fungicide applications during late winter/early spring, when rain is relatively common, are some of the most sensitive components of pest management programs in these crops. For this component of the analysis the critical late winter/spring growth periods

were analyzed over a ten-year period (1996-2005). A ten-year period accounts for variations in precipitation across years. This specific ten-year period was chosen given the availability of bloom dates for almonds in the Central Valley. Soil hydrologic data and weather data were necessary because ground applications are possible only if the soil is not too wet from precipitation, which is a function of the amount and duration of precipitation and hydrologic soil type. Weather data included the day of the week, time of day, amount of precipitation, and duration of rain events. Rules were developed to determine the potential for spraying after rain events given particular soil types. Probabilities that one or more fungicide sprays could not be completed were calculated by applying these rules to each year in the historical weather dataset (1996-2005) and actual soil hydrologic type data for schoolsite buffers. Another set of rules was developed for grape, which was analyzed for the same ten-year period for consistency with almond. Aerial applications were not considered as an alternative to missed ground sprays for either crop.

- Estimated direct losses averaged across years for almond in the Central Valley counties examined were \$173,547.
- Estimated direct losses averaged across years for grape in the Central Valley counties examined were \$21,840.

DPR's Materials and Methods – Estimated Statewide Cost of Notifications

At the time of this analysis, DPR did not have access to CAC field boundaries for counties not included in the UCD study. As a result, it was determined that section-based pesticide applications would be used as a surrogate data source, and a simple ratio between the number of section-based applications and the number of field-based applications calculated by UCD would be used to estimate counts for the remaining 45 counties.

A query of DPR's pesticide use report database returned 23,560 sections with reported locations for pesticide applications between July 1, 2013 and June 30, 2014. A subset of 3,260 sections within ¼ mile of the school and licensed daycare facility boundaries developed by UCD was identified using GIS. The use of section-based pesticide use data results in significant over counting of applications compared to the field-based applications because all applications within a section are included in the section-based calculations, whereas in the UCD study, only the applications to fields that fall within ¼ mile of the schoolsite were included. An example of the sections included in DPR's calculations is shown in Figure 1 (Attachment, page A-11).

In order to estimate the number of applications that would generate a 48-hour notification, certain pesticide applications were removed from the resulting dataset. Applications of products with granular, flake, or pellet formulations are exempt from most requirements, as are applications made in greenhouses, so these use reports were removed from the dataset. All aerial

applications, fumigations and dust applications within ¼ mile will be prohibited under the proposed regulation and so these records were also removed.

Pesticide applications using air blast sprayers would also be prohibited. Since pesticide use report data do not differentiate between the various ground-based application methods, UCD developed rules of thumb in order to identify air blast applications. These rules state that 1) only orchards and vineyards use air blast sprayers; 2) all insecticide and fungicide applications on orchards and vineyards use air blast sprayers; and 3) no herbicide applications on orchards and vineyards use air blast sprayers (UCD Report, page 20). Use reports with either citrus/deciduous orchard or grape/raisin “site codes” combined with a product-based type designation of fungicide or insecticide were removed.

To calculate the number of applications that would generate a 48-hour notification, it is also necessary to account for the use of “tank mixes” and multi-product single applications. Pesticide use reports identify each product applied by assigning the variable “use_no”, but do not capture any information as to whether the products were applied singly or in a mixture. In some situations as many as six products may be included in a single application. Since a different “use_no” value is used for each product it cannot be used to determine the number of applications. A reasonable way to determine whether two or more products were applied together can be made by comparing the variables that identify the grower, the field location, the date and time of application, the commodity and the number of acres treated (Larry Wilhoit, pers. comm.) Replicate use reports were identified based on the commonality of these variables and for the purpose of counting the number of applications all but one were removed.

Finally, applications that were made on weekends or before 6:00 a.m. or after 6:00 p.m. on weekdays were removed. No correction for applications made on official holidays or potential school vacation days was made.

DPR used the following UCD estimates of the tasks and cost to prepare and provide the annual and 48-hour notifications (UCD report, page 22):

- *Understanding requirements*: \$25.85 per affected grower
- *Preparation of annual notification*: \$620.32 per affected field
- *Delivery of annual notification*: \$2.58 per affected schoolsite
- *48-hour notification*: \$11.37 per affected application

DPR's Materials and Methods – Estimated Statewide Cost of Prohibitions

As described above, UCD determined that almonds and grapes would incur the greatest losses due to the proposed aerial and airblast prohibitions, so they estimated the average annual revenue loss for these two crops in 13 counties. To extrapolate the almond and grape losses to the remaining counties and other crops, DPR used the following similar process.

- 1) The appropriate pesticide use reports were used to estimate the acreage of the affected fields statewide for almonds and grapes (i.e. acreage within $\frac{1}{4}$ mile of a schoolsite). As with the notification estimates, DPR had to rely on section-level pesticide use data because the field-level data used by UCD were not available for other counties. DPR estimated the affected acreage using the following process for pesticide applications between July 2013 and June 2014:
 - a. The pesticide use data used for the notifications estimates were also used for the prohibitions estimates (i.e. data from 3,260 sections that contained a schoolsite, or were within $\frac{1}{4}$ mile of a schoolsite).
 - b. For the applications within the 3,260 sections, almonds and grapes were selected using the “site_code” variable. There were 39,303 almond records and 71,406 grape records selected.
 - c. Individual almond and grape fields were identified by grower (“grower_id” variable) and site location (“site_loc_id” variable) for each individual field site.
 - d. The acreage of each field was determined by identifying the pesticide use report with the maximum number of reported acres using the variable “acre_planted”. In theory, for multiple applications to a field site the maximum planted acreage should be the same, but as this is not always the case it was deemed appropriate to identify the maximum reported value of this variable.
 - e. The maximum value for planted acreages for sites identified by unique “grower id” and “site_loc_id” were summed for each county.
 - f. The ratio between the GIS-calculated acreages within the $\frac{1}{4}$ mile buffer provided by UCD and the acreages within sections less than $\frac{1}{4}$ mile from schoolsites was used to estimate the affected acres in counties outside the purview of UCD’s study. The ratio of UCD’s acreage within $\frac{1}{4}$ mile to the acreage for the entire section ranged from 0.066 to 0.137 with an average of 0.104 for almonds, and ranged from 0.024 to 0.163 with an average 0.090 for grapes. In other words, DPR estimated that 10.4 percent of the almond acreage in a section was within $\frac{1}{4}$ mile of a schoolsite, and that 9.0 percent of the grape acreage in a section was within $\frac{1}{4}$ mile of a schoolsite.

- g. Seventeen counties had almond acreage and 47 counties had grape acreage that would be affected by prohibitions. For each of these counties, except those evaluated by UCD, DPR multiplied the section-level almond acreage determined in Step e by the 0.104 ratio determined in Step f. Similarly, the section-level grape acreage determined in Step e was multiplied by the 0.090 ratio determined in Step f.
- 2) DPR analyzed 10 years of weather data from each of the stations listed in Table 3 (Attachment page A-2) to estimate the frequency of missed applications for each region with almond orchards and grape vineyards. This was the same weather analysis used for the counties evaluated by UCD, except that UCD's analysis included the frequency of missed applications by county and soil type. To simplify the analysis, DPR assumed that all soils were the one that resulted in worst-case for losses for each affected county.
- 3) DPR used the acreage determined in Step 1, the revenue losses per acre determined by UCD (UCD Report, pages 56 and 60), and the frequency the losses would occur determined in Step 2 to estimate the statewide average annual revenue losses for almonds and grapes.
- 4) DPR assumed that the statewide loss for all other crops was the same as almond and grape combined. DPR estimated the statewide cost of the proposed prohibitions for all crops by multiplying the statewide almond and grape losses by two.

DPR's Materials and Methods – Estimated Cost to Small Businesses and Indirect Cost

DPR estimated the cost to small businesses (no more than \$1,000,000 annual gross receipts, as defined by Government Code, Title 2, section 11342.610) using the USDA, National Agricultural Statistics Service's 2012 Census of Agriculture (USDA 2014). Table 4 (Attachment page A-3) in the report shows that 77,857 farms operated in California during 2012, and had a total market value of agricultural products sold and government payments of \$43 billion. There were 6,367 farms (8.2 percent of all farms) that had a market value of agricultural products sold and government payments exceeding \$1,000,000, and a combined value of \$37 billion. Therefore, DPR estimated that 91.8 percent of the farms statewide were small businesses. The number of farms is inconsistent with the number of growers estimated by DPR for several reasons. For example, the USDA definition of farm likely differs from DPR's definition of grower. Also, the USDA census includes animal production, but DPR's estimates do not.

Using the Department of Finance's default assumption, DPR estimated the indirect cost as being equal to the direct cost. The total direct plus indirect costs were estimated as 2 times of the direct cost.

DPR's Materials and Methods – Estimated Statewide Fiscal Cost to Counties

The proposed regulation has no fiscal impact to DPR or other state agencies, but there is a fiscal impact to CACs. DPR estimated the cost to CACs based on the number of 48-hour notifications, using the methodology described above. DPR anticipates that the 48-hour notifications will increase the number of inquiries and complaints by school/day care staff and parents, with a corresponding increase in the number of investigations, compliance actions, and enforcement actions by CACs. Additionally, CACs will need to provide outreach and training to growers, applicators, schools, and day care facilities. In order to check compliance with the regulation, CACs will need to maintain GIS and other data for schoolsites.

The following eight CACs estimated the annual workload and cost of the proposed regulation, including estimated number of tasks, time for each task, and salary rates for the tasks: Kern, Mendocino, Monterey, San Diego, Santa Clara, Santa Cruz, Sonoma, and Tulare. Consistent with the average cost of each task for the eight CACs shown in Table 4 (Attachment page A-3), DPR used the following data to estimate the statewide fiscal cost:

- *Investigations*: the estimated number of investigations is 1.8 percent of the 48-hour notifications, and cost is 15 hours per investigation at a rate of \$61/hour.
- *Compliance actions*: the estimated number of compliance actions is 0.6 percent of the 48-hour notifications, and cost is 6 hours per action at a rate of \$61/hour.
- *Enforcement actions*: estimated number of enforcement actions is 0.2 percent of the 48-hour notifications, and cost is 15 hours per action at a rate of \$62/hour.
- *Outreach and training sessions*: the number of outreach and training sessions is 1 percent of the 48-hour notifications, and cost is 6 hours per session at a rate of \$68/hour.
- *Supervision, clerical support, and operating expenses*: cost is 30 percent of total cost.

Separate from the information provided by the eight CACs, DPR discussed the cost to maintain GIS and other data for schoolsites with staff from three CACs. These data are also shown in Table 4 (Attachment page A-3).

Results – Estimated Number and Cost of Notifications

Using the exclusion criteria discussed in the Materials and Methods section, between July 1, 2013 and June 30, 2014, a total of 86,414 individual applications statewide were made to fields that were reported to be in sections within ¼ mile of a schoolsite. Table 5 (Attachment page A-3)

compares the number of applications in the 13 target counties with the values for 48-hour notifications reported by UCD.

To develop a meaningful ratio that could then be used to extrapolate the data reported for the 13 target counties to the remaining 45 counties outside the study's purview, it was determined that the comparison should be between the values for 48-hour notifications provided by UCD and the number of applications in the PUR, accounting for excluded and prohibited products. There were 40,573 applications made to sections within ¼ mile of schools and daycare facilities compared to 11,176 48-hour notifications, resulting in an average ratio of 0.29 (Table 5, Attachment page A-2). Table 6 (Attachment page A-4) lists the estimated number of applications (minus the exclusions discussed above) for all counties in California (based on the ratio of 0.29) that would be subject to a 48-hour notification. Using this extrapolation method, the total number of statewide applications subject to 48-hour notification was estimated to be 24,527.

Consistent with UCD's methodology to estimate the cost of the notifications, DPR estimated the cost of the annual notifications based on the cost for growers to understand the requirements (\$25.85 per grower), plus the cost to prepare the annual notification (\$620.32 per field), plus the cost to deliver the annual notification (\$2.58 per schoolsite). As shown in Table 6 (Attachment page A-4), the estimated statewide cost for the annual notifications is \$3,065,001. DPR estimated the cost of the 48-hour notifications based on \$11.37 to prepare and deliver each notification. As shown in Table 6 (Attachment page A-4), the estimated statewide cost for the 48-hour notifications is \$278,872. The average cost per grower for the annual notifications was \$1,217, and \$111 for the 48-hour notifications, for a total of \$1,328. The cost for a small business was the same as other businesses.

Results – Estimated Cost of Prohibitions

During July 2013 – June 2014, almonds were grown in 18 counties. Sixteen of the counties were potentially affected by the proposed regulation because they had almond orchards in sections that also included schoolsites, or were within ¼ mile of a schoolsite. DPR estimated that 9,933 acres of almonds were within ¼ mile of a schoolsite. This was 0.9 – 1.2 percent of the statewide almond acreage, based on three different estimates of total almond acreage. UCD estimated the crop loss due to the proposed prohibitions for eight of the counties, and DPR estimated the loss for the other eight counties. Almond crop loss can occur if one or more of three fungicide applications do not occur during the critical bloom period. The analysis of weather data for 1996-2005 indicates that depending on location, 0 to 20 percent of the years had weather conditions in combination with the proposed prohibitions that would have prevented one fungicide application (Table 3, Attachment page A-2)). The percentage of years varies depending on the county and soil type. As shown in Table 7 (Attachment page A-6) the statewide estimate is an average annual loss of \$356,840 for the 9,933 almond acres within ¼ mile of a schoolsite, based on the combined UCD and DPR estimates. DPR estimated that a maximum of 1,084

almond growers would be affected because they had orchards in sections with revenue losses, with an average annual loss of \$329 per grower.

During July 2013 – June 2014, grapes were grown in 47 counties. Forty-one of the counties were potentially affected by the proposed regulation because they had grape vineyards in sections that also included schoolsites, or were within ¼ mile of a schoolsite. DPR estimated that 10,158 acres of grapes were within ¼ mile of a schoolsite. This was 0.9 – 1.3 percent of the statewide grape acreage, based on three different estimates of total grape acreage. UCD estimated the crop loss due to the proposed prohibitions for ten of the counties, and DPR estimated the loss for the other 31 counties. The analysis of weather data for 1996-2005 indicates that the following five counties had weather conditions in combination with the proposed prohibitions that would have prevented one of the four to 16 fungicide applications needed during the critical period following bud break: Fresno, Kings, Madera, Riverside, and Tulare. In these five counties, 10 to 20 percent of the years were affected depending on the county and soil type (Table 3, Attachment page A-2). As shown in Table 8 (Attachment page A-7), the statewide estimate is an average annual loss of \$231,568 for the 10,158 grape acres within ¼ mile of a schoolsite, based on the combined UCD and DPR estimates. DPR estimated that 127 grape growers would be affected because they had orchards in sections with revenue losses, with an average annual loss of \$1,823 per grower.

UCD selected almonds and grapes because they would likely have the highest losses due to the high acreage and sensitivity of the crops at certain time periods. Their estimated combined loss was \$588,408. DPR estimated that the range of loss for all other crops would be zero to the combined loss for almonds and grapes. DPR estimated the maximum loss for all crops combined as 2 times of the almond and grape losses, an average annual loss of \$1,176,816. Some growers have both almond orchards, grape vineyards, and other crops. However, it's unlikely that growers would incur losses to all crops due to the proposed prohibitions. DPR estimated the maximum annual loss per grower would be almond and grape combined \$2,153.

The revenue loss due to the prohibitions may appear low. One reason for this is that adverse weather conditions can cause significant crop losses, but UCD and DPR only examined relative losses – the difference in losses with and without the proposed prohibitions. In this analysis, losses only occur when pesticide applications cannot be made during the five 12-hour periods each week that the prohibitions are in effect: Monday through Friday, 6:00 a.m. – 6:00 p.m. The proposed regulation allows applications during the other nine 12-hour periods each week. Additionally, this analysis only includes losses when weather conditions in combination with the proposed prohibitions prevent pesticide applications, not when weather conditions alone prevent applications.

A second reason that the loss may appear low is because UCD and DPR calculated the average annual revenue loss, but the loss varies greatly from year-to-year due to the variation in weather. The proposed regulation allows all needed applications in most years and counties. However, for

some counties one critical fungicide application cannot be made for 10 to 20 percent of the years. For example, Table 7 (Attachment page A-6) shows that for a year in which a critical fungicide application cannot be made for almonds in Madera County, the loss would be \$997,295. The maximum loss for this one county exceeds the average total statewide loss for almonds of \$379,110. Tables 7 and 8 (Attachment pages A-6 – 8) show statewide losses for a year affected by the prohibitions of \$5,023,009 for almonds and \$2,099,077 for grapes. However, there is a low probability (less than 10 percent) of these maximum losses occurring because the weather analysis showed that missed critical applications occurred in different years for different counties.

Results – Estimated Total Direct Cost, Small Business Cost, and Indirect Cost

As shown in Table 1 (Attachment page A-1), the estimated statewide total direct cost to growers for the notification requirements and prohibitions combined was \$3,932,280 – \$4,520,688, with an average cost to the affected growers of \$1,328 – \$3,480. The minimum average cost per grower of \$1,328 was the cost of notifications because some growers incurred no losses due to the prohibitions. For growers affected by the prohibitions, the average cost of the prohibitions was \$329 per almond grower, \$1,823 per grape grower, and \$2,153 per grower for almonds and grapes combined. The initial and ongoing costs were the same, so the total statewide dollar costs that businesses will incur over the lifetime for this proposed regulation is \$39,322,802 – \$45,206,883, and the lifetime cost per grower was \$6,639 – \$17,401.

Based on USDA's 2012 agricultural census, DPR estimated that 91.8 percent of the growers were small businesses (no more than \$1,000,000 annual gross receipts), and their direct cost was \$3,609,833 – \$4,149,992 or 91.8 percent of the total direct cost. However, the cost per grower for small businesses was the same as the cost as other growers.

Using the Department of Finance's default assumption, DPR estimated that the indirect cost was the same as the direct cost, and the annual combined direct plus indirect cost was \$7,864,560 – \$9,041,377.

Results – Estimated Fiscal Cost to Counties

The proposed regulation has no fiscal impact to DPR, but there is a fiscal impact to CACs. DPR estimated the cost to CACs based on the estimated number of 48-hour notifications. The 48-hour notifications will increase the number of inquiries and complaints by school staff and parents, with a corresponding increase in the number of investigations, compliance actions, and enforcement actions by CACs. Additionally, CACs will need to provide outreach and training to growers, applicators, and schools. In order to check grower compliance with the regulation, CACs will need to maintain GIS and other data for schoolsites.

DPR estimated the total workload and cost for all CACs using the data for eight CACs (Table 4, Attachment page A-3), and the estimated number of 48-hour notifications (Table 6, Attachment page A-4). Table 9 shows that 56 of the 58 counties (all except Alpine and San Francisco) were affected because at least one schoolsite was within a section or within ¼ mile of a section with an agricultural pesticide application during July 2013 – June 2014. DPR estimated that the total CAC workload associated with 24,527 notifications costs \$826,260, or an average cost of \$34 for each 48-hour notification. The cost by county ranged from \$155,986 for Santa Barbara to \$33 for Mono, with an average cost of \$14,755 per county.

Discussion – Uncertainties

UCD's report discussed uncertainties in their analysis of 13 counties, and those uncertainties were carried over into DPR's statewide extrapolation. Additionally, there are many caveats, assumptions and generalizations when considering the viability of the extrapolated values. Most importantly, the analysis reported here was performed on whole square-mile sections compared to the individual growers, fields, and applications identified in the UCD study. Use of section-level data obviously results in a significant over-counting of use reports because all applications with a section are included compared just to those used on individual fields. DPR attempted to account for the over-counting based on the ratio of UCD's field level data to DPR's section level data. Another important consideration is that the two studies used different quantitative approaches. The UCD study was based largely on spatial analysis, whereas the DPR study used SAS programs to compile pesticide use report data. In addition, the variables used to determine the various exclusions and prohibitions, such as the selection of site (commodity) codes, may not completely overlap. Extrapolating use patterns from counties with the highest agricultural output to other counties may be questionable as agricultural practices vary widely from county to county due to cropping patterns, geography, climate, etc. Third, UCD and DPR did not account for year-to-year variability because a single year of pesticide use reports was used.

Neither UCD nor DPR attempted to estimate the cost increase or decrease resulting from pest management changes. It's possible that some changes could increase or decrease the cost, such as switching to non-prohibited applications, growing different crops, or developing alternative requirements through written agreements.

UCD estimated the loss in revenue due to the proposed prohibitions for two crops in 13 counties. DPR is uncertain whether its extrapolation of these data to all crops for all counties overestimates or underestimates the cost for the prohibitions. However, three assumptions overestimated the cost. First, UCD estimated the loss by soil type, with higher losses for soil types C and D than A and B, even though soil types A and B had greater acreage. DPR's extrapolation assumed all affected acreage was the worst-case soil type for loss estimates. Second, losses were estimated for airblast applications to orchards and vineyards. It's possible that some of these losses can be lessened by switching to aerial applications when field

conditions prevent applications using airblast spray rigs. UCD and DPR did not account for a potential switch to aerial applications. Third, UCD and DPR assumed that schools were in session year-round, with no winter, spring, or summer breaks. The proposed regulation allows applications within ¼ mile at any time when schools do not have classes for the entire day. The overestimation of the revenue losses for school breaks is likely slight because the weather analysis indicates that most of the losses occur during February and March, when most schools are in session.

DPR did not estimate potential costs due to the other prohibitions because they are likely negligible, but this could underestimate the cost of the proposed regulation. In addition to the prohibition of aerial and airblast applications within ¼ mile of a schoolsite, the regulation also proposes to prohibit sprinkler chemigation applications, dust/powder applications, and field fumigations within ¼ mile of a schoolsite during Monday – Friday, 6:00 am – 6:00 pm. Sprinkler chemigation applications cannot be identified from pesticide use reports, so any costs from this prohibition cannot be estimated. However, it's likely that growers will change the timing of sprinkler applications or switch to other applications methods with minimal additional cost. Most of the cost of the dust prohibition is included in the grape estimates. More than 90 percent of dust applications in the affected sections are sulfur applications to grapes, and the remaining dust applications have more flexibility to change product formulation or application timing. Field fumigations occur prior to planting, and the date of fumigation for a field can usually vary by several days or weeks with no additional cost or revenue loss. Moreover, U.S. EPA labels require a 1/8 or ¼ mile distance between most fumigations and “difficult to evacuate” sites, including schoolsites. The impact of increasing the distance to ¼ mile for all fumigations and changing the timing of fumigation is likely negligible. The proposed regulation prohibits most other applications within 25 feet of a schoolsite, Monday through Friday, 6:00 a.m. – 6:00 p.m. The cost associated with this prohibition is likely negligible due to the minimal distance and flexibility in application timing. If the cost for these other prohibitions is not negligible, the overall cost of the proposed regulation was underestimated.

Another uncertainty in the revenue loss due to the proposed prohibitions is DPR's estimates of the affected acreage. The use of the 'acre_planted' variable has been shown to be problematic, especially for truck crops and rotational cropping patterns in high turnover counties such as Monterey and Santa Barbara (DeMars and Zhang, 2015). DeMars and Zhang's report indicates that the accuracy of the 'acre_planted' data reported is far less reliable than that reported for 'acre_treated', and they demonstrate that a maximum value of the latter corresponds more closely to other datasets such as county crop reports and USDA's cropland data layer. The negative aspect of using the maximum value of 'acre_treated' is that, one, this value may not equal the total amount of planted acres and, two, the treated acreage may overlook acreages such as young plantings are not included in a treatment area but have the potential to be impacted at a future date. It should be noted that the value of “acre_planted”, particularly for permanent crops

such as almonds and grapes, is included on permits against which pesticide use reports are verified.

The number of almond and grape growers with revenue losses due to the proposed prohibitions is overestimated. DPR totaled all almond and grape growers in sections that included one or more schoolsites and sections within ¼ mile of a schoolsite. It's likely that only a fraction of the growers within these sections are actually within ¼ mile of a schoolsite. Therefore, the estimate of the number of almond and grape growers affected is overestimated, and the revenue loss per grower due to the proposed prohibitions is underestimated.

Lastly, many CACs currently have prohibitions of certain pesticide applications (e.g., restricted materials) near schools. DPR's estimates do not account for existing CAC requirements, so the loss due to DPR's proposed prohibitions may be overestimated.

Discussion – Benefits

DPR was unable to quantify the benefits. The notifications and prohibitions should help avoid school evacuations or other response measures when they are not needed, but DPR cannot quantify the frequency that these events can be avoided. Any health benefits of the prohibitions are unknown. DPR has a process to evaluate and mitigate unacceptable pesticide exposures, including exposures to children and other bystanders. For example, U.S. EPA, DPR, and CACs have restrictions, including buffer zones, for fumigant applications. DPR has not identified any scenarios where a non-negligible exposure currently occurs at schoolsites. However, DPR continuously evaluates the health risk from pesticides. It's possible that future evaluations may identify some unacceptable exposures, and the proposed prohibitions will reduce the exposures. If this benefit occurs, it cannot be quantified at this time.

Discussion – Alternatives

As described in the Initial Statement of Reasons, DPR has not identified any feasible alternatives to the proposed regulatory action that would lessen any adverse impacts, including any impacts on small businesses.

Conclusions

DPR's extrapolation from 13 counties may be uncertain and may overestimate costs, particularly for counties with lower agricultural output. However, it provides useful information that can be used to assess the impact of the proposed regulation.

George Farnsworth
July 25, 2016
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Acknowledgements

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Attachment: Schools Reg Cost Tables

Table 1. Summary of estimated economic impact of proposed regulation.

		Annual Amount		5-Year Amount	
		Total	Per Grower	Total	Per Grower
Number of Schoolsites and Ag Operations Affected - 1/4 mi or Less Separation	Number of Schoolsites (schools + day care) Within 1/4 mi of Ag Field	3,499	1.4	3,499	1.4
	Number of Growers Within 1/4 mi of Schoolsite	2,519	Not applicable	2,519	Not applicable
	Number of Small Businesses (91.8% of growers)	2,312	Not applicable	2,312	Not applicable
	Number of Ag Fields Within 1/4 mi of Schoolsite	4,821	1.9	4,821	1.9
	Number of Ag Applications Within 1/4 mi of Schoolsite	137,483	54.6	687,415	273
Notifications (Annual and 48-hr) Cost	Number of Annual Notifications (# of fields)	4,821	1.91	24,107	10
	Number of 48-hr Notifications (# of apps - prohibitions - exceptions)	24,527	9.74	122,635	49
	Cost of Annual Notifications (\$26/grower + \$620/field + \$3/schoolsite)	\$3,065,001	\$1,217	\$15,325,003	\$6,085
	Cost of 48-hr Notifications (\$11.37/notification)	\$278,872	\$111	\$1,394,358	\$554
	Total Direct Cost of Notifications (annual + 48-hr)	\$3,343,872	\$1,328	\$16,719,361	\$6,639
Prohibitions - Loss for Almonds	Acres Within 1/4 mi of Schoolsite	9,933	Not estimated	9,933	Not estimated
	Number of Growers in Sections With Loss	1,084	Not applicable	1,084	Not applicable
	Loss for a Year Affected by Prohibitions	\$5,023,009	\$4,634	\$25,115,045	\$23,169
	Percent of Years Affected By Prohibitions (varies by county)	0-20%	0-20%	0-20%	0-20%
	Average Net Loss Due to Prohibitions	\$356,840	\$329	\$1,784,199	\$1,646
Prohibitions - Loss for Grapes	Acres Within 1/4 mi of Schoolsite	10,158	Not estimated	10,158	Not estimated
	Number of Growers in Sections With Loss	127	Not applicable	127	Not applicable
	Loss for a Year Affected by Prohibitions	\$2,099,077	\$16,528	\$10,495,383	\$82,641
	Percent of Years Affected By Prohibitions (varies by county)	0-20%	0-20%	0-20%	0-20%
	Average Net Loss Due to Prohibitions	\$231,568	\$1,823	\$1,157,841	\$9,117
Prohibitions - Loss for All Crops	Minimum Average Net Loss Due to Prohibitions (almond + grape loss)	\$588,408	\$0	\$2,942,040	\$0
	Maximum Average Net Loss Due to Prohibitions (2x [almond + grape loss])	\$1,176,816	\$2,153	\$5,884,081	\$10,763
Economic Impact - Total Direct + Indirect Cost	Minimum Total Direct Cost of Notifications + Prohibitions	\$3,932,280	\$1,328	\$19,661,401	\$6,639
	Maximum Total Direct Cost of Notifications + Prohibitions	\$4,520,688	\$3,480	\$22,603,442	\$17,401
	Minimum Total Direct + Indirect Cost (2x direct cost)	\$7,864,560	Not applicable	\$39,322,802	Not applicable
	Maximum Total Direct + Indirect Cost (2x direct cost)	\$9,041,377	Not applicable	\$45,206,883	Not applicable

Table 2. Summary of estimated fiscal impact of proposed regulation to all counties combined.

Activity	Estimated Annual Amount
Number of Investigations (1.8% of notifications)	441
Number of Compliance Actions (0.6% of notifications)	147
Number of Enforcement Actions (0.2% of notifications)	49
Number of Outreach and Training Events (1% of notifications)	245
Cost of Investigations (15 hrs x \$61/hr each)	\$403,959
Cost of Compliance Actions (6 hrs x \$61/hr each)	\$53,861
Cost of Enforcement Actions (15 hrs x \$62/hr each)	\$45,620
Cost of Outreach and Training (6 hrs x \$68/hr each)	\$100,070
Cost of GIS data updates (10 min x \$55/hr per schoolsite)	\$32,074
Total Cost (including 30% supervision/clerical/operational expenses)	\$826,260

Table 3. Analysis of weather data, 1996 – 2005. Except as noted below, UCD evaluated the San Joaquin Valley and Southern Sacramento Valley.

Region	Counties in Region	Representative Weather Station	Percent of Years Affected by Prohibitions	
			Almond	Grape
Bay Area	Marin, San Benito, San Mateo, Santa Clara	San Benito (San Benito County)	NA ¹	0%
Cascade-Sierra	Amador, Calaveras, El Dorado, Nevada, Placer, Shasta	Camino (El Dorado County)	NA	0%
Central Coast	Monterey, San Luis Obispo, Santa Cruz	King City (Monterey County)	NA	0%
North Coast	Lake, Mendocino, Napa, Sonoma	Windsor (Sonoma County)	NA	0%
Northern Sacramento Valley	Butte, Colusa, Glenn, Tehama, Yolo, Yuba	Colusa (Colusa County)	10%	0%
Northern San Joaquin Valley	Solano ²	Modesto (Stanislaus County)	NA	0%
South Coast	Los Angeles, San Bernardino, San Diego, Santa Barbara	Santa Ynez (Santa Barbara County)	NA	0%
Southeast Interior	Mariposa, Riverside	UC Riverside (Riverside County)	NA	20%
Southern San Joaquin Valley	Tulare ³	Parlier (Fresno County)	10%	10%

¹ Not applicable because almonds are not grown in the region² UCD evaluated the other counties in the Northern San Joaquin Valley region³ UCD evaluated the other counties in the Southern San Joaquin Valley region

Table 4. Average workload and cost per county estimated by eight CACs. Bolded values were used to estimate statewide cost shown in Table 9.

Activity	Number of Events	Number of Applications Affected ¹	Percent of Applications Causing Event	Personnel Hourly Rate (\$/hour)	Estimated Hours Per Event	Total Cost
Investigations	49.7	2,193	1.77%	\$61.25	14.97	\$32,722
Compliance Actions	15.3	2,193	0.56%	\$61.49	5.49	\$4,908
Enforcement Actions	3.3	2,193	0.17%	\$61.97	15.14	\$4,606
Outreach and Training	25.3	2,193	1.03%	\$67.83	5.96	\$12,071
Supervision and Support						\$19,695
Total						\$66,385
GIS Data Updates ²				\$55.00	0.17	

¹ Number of Applications Affected was estimated by CACs. DPR relied on its estimate of number of 48-hour notifications to estimate statewide costs.

² GIS Data Updates cost was estimated from discussion with staff from three CACs.

Table 5. Comparing 48-hr notifications to the calculated number of use reports.

County	UCD 48-hr Notifications ^{1,2}	DPR Number of Applications Within Affected Sections (minus exclusions) ¹	Ratio Between UCD and DPR
Fresno	994	6,895	0.14
Imperial	59	579	0.10
Kern	247	1,900	0.13
Kings	242	1,086	0.22
Madera	328	1,192	0.28
Merced	449	1,809	0.25
Sacramento	102	145	0.70
San Joaquin	637	3,513	0.18
San Luis Obispo	221	2,485	0.09
Santa Barbara	4,838	4,275	1.13
Stanislaus	580	4,615	0.13
Ventura	2,344	11,489	0.20
Yolo	135	590	0.23
Total	11,176	40,573	Average = 0.29

¹ Monday through Friday, 6:00 am to 6:00 pm, and weekends

² Excludes Holidays.

Table 6. Estimated number and cost of notifications.

County	Estimated Number Affected – Separated by ¼ mile or Less				Estimated Number of Notifications		Estimated Cost of Notifications		
	Schoolsites	Growers	Ag Fields	Applications	Annual ¹	48-hour ²	Annual ³	48-hour ⁴	Total
Alameda	93	8.2	21	740	21	158	\$13,235	\$1,795	\$15,029
Alpine	0	0.0	0	0	0		\$0	\$0	\$0
Amador	8	3.9	4	58	4	10	\$2,460	\$119	\$2,580
Butte	47	54.5	77	1,409	77	235	\$49,056	\$2,669	\$51,725
Calaveras	6	3.9	3	28	3	6	\$2,096	\$66	\$2,162
Colusa	14	15.2	24	402	24	64	\$15,190	\$729	\$15,918
Contra Costa	106	22.1	45	1,065	45	227	\$28,927	\$2,576	\$31,503
Del Norte	1	1.7	4	387	4	67	\$2,387	\$762	\$3,149
El Dorado	25	10.4	10	197	10	25	\$6,454	\$285	\$6,738
Fresno	184	302.6	548	10,729	548	994	\$348,355	\$11,302	\$359,657
Glenn	17	38.1	52	848	52	130	\$33,433	\$1,474	\$34,907
Humboldt	12	2.2	3	765	3	35	\$2,246	\$397	\$2,644
Imperial	36	29.9	61	755	61	59	\$38,669	\$671	\$39,340
Inyo	5	1.3	1	3	1	1	\$588	\$10	\$597
Kern	73	76.6	158	2,921	158	247	\$100,460	\$2,808	\$103,269
Kings	43	59.7	126	1,547	126	242	\$79,965	\$2,752	\$82,717
Lake	19	8.7	10	249	10	37	\$6,573	\$424	\$6,997
Lassen	9	1.3	1	9	1	2	\$596	\$20	\$616
Los Angeles	414	36.4	44	4,844	44	1,080	\$29,371	\$12,279	\$41,649
Madera	41	57.1	97	1,907	97	328	\$61,889	\$3,729	\$65,618
Marin	14	0.4	1	28	1	1	\$407	\$7	\$414
Mariposa	1	0.9	1	25	1	7	\$566	\$83	\$649
Mendocino	22	15.2	22	680	22	63	\$13,951	\$712	\$14,663
Merced	86	116.0	183	2,474	183	449	\$116,993	\$5,105	\$122,098
Modoc	6	1.7	3	27	3	3	\$1,681	\$30	\$1,711
Mono	2	0.4	0	1	0	0	\$196	\$3	\$200
Monterey	82	74.5	652	10,512	652	1,890	\$406,283	\$21,495	\$427,778
Napa	42	49.8	85	1,842	85	357	\$53,962	\$4,060	\$58,022
Nevada	12	2.2	4	117	4	12	\$2,608	\$136	\$2,744
Orange	195	20.8	24	2,507	24	654	\$15,802	\$7,438	\$23,239
Placer	49	12.6	12	264	12	45	\$8,011	\$513	\$8,524

County	Estimated Number Affected – Separated by ¼ mile or Less				Estimated Number of Notifications		Estimated Cost of Notifications		
	Schoolsites	Growers	Ag Fields	Applications	Annual ¹	48-hour ²	Annual ³	48-hour ⁴	Total
Plumas	3	0.4	0	1	0	0	\$200	\$3	\$203
Riverside	130	48.5	86	3,516	86	745	\$55,235	\$8,467	\$63,702
Sacramento	58	13.4	18	283	18	102	\$11,477	\$1,160	\$12,636
San Benito	27	17.7	41	1,011	41	203	\$26,090	\$2,308	\$28,398
San Bernardino	142	44.6	91	2,652	91	628	\$57,686	\$7,136	\$64,822
San Diego	178	84.8	122	15,694	122	2,667	\$78,262	\$30,323	\$108,585
San Francisco	0	0.0	0	0	0		\$0	\$0	\$0
San Joaquin	163	179.2	342	5,935	342	637	\$216,937	\$7,243	\$224,180
San Luis Obispo	64	42.4	81	6,695	81	221	\$51,487	\$2,513	\$53,999
San Mateo	50	6.1	7	2,034	7	109	\$4,426	\$1,238	\$5,665
Santa Barbara	103	75.8	90	9,733	90	4,838	\$58,211	\$55,008	\$113,219
Santa Clara	125	22.1	55	2,740	55	428	\$35,277	\$4,861	\$40,139
Santa Cruz	59	38.5	53	2,658	53	522	\$33,912	\$5,934	\$39,846
Shasta	34	8.7	9	97	9	13	\$5,712	\$146	\$5,858
Sierra	3	0.9	3	19	3	5	\$2,010	\$53	\$2,063
Siskiyou	12	11.7	16	128	16	28	\$10,414	\$321	\$10,735
Solano	28	20.3	45	724	45	129	\$28,321	\$1,470	\$29,791
Sonoma	119	77.9	130	3,520	130	622	\$83,151	\$7,077	\$90,228
Stanislaus	122	260.6	406	5,989	406	580	\$259,081	\$6,595	\$265,676
Sutter	40	79.2	88	1,295	88	207	\$56,698	\$2,358	\$59,056
Tehama	25	31.6	50	725	50	153	\$31,845	\$1,742	\$33,587
Trinity	2	0.4	1	4	1	1	\$556	\$13	\$570
Tulare	126	280.1	526	8,919	526	1,710	\$333,763	\$19,445	\$353,208
Tuolumne	6	1.7	1	22	1	3	\$780	\$36	\$817
Ventura	149	98.3	201	14,488	201	2,344	\$127,320	\$26,651	\$153,971
Yolo	45	28.1	59	831	59	135	\$37,567	\$1,535	\$39,102
Yuba	24	17.3	25	430	25	69	\$16,172	\$788	\$16,961
TOTAL	3,499	2,518.5	4,821	137,483	4,821	24,527	\$3,065,001	\$278,872	\$3,343,872

¹ Estimated number of annual notifications is the number of fields.

² Estimated number of 48-hr notifications is the number of applications, minus prohibitions and exceptions

³ Cost of annual notifications is \$25.85/grower, plus \$620.32/field, plus \$2.58/schoolsite

⁴ Cost of 48-hr notifications is \$11.37/notification

Table 7. Estimated affected acreage and loss for almonds due to proposed prohibitions.

County	Growers in Affected Sections ¹	Acres in Affected Sections	Estimated Acres Within ¼ mi of Schoolsite ²	Annual Net Revenue Loss Per Acre for a Year Affected by Prohibitions ³	Annual Loss for a Year Affected by Prohibitions ⁴	Percent of Years Affected By Prohibitions ⁵	Average Annual Net Loss Due to Prohibitions ⁶	Average Annual Loss Per Grower
Alameda		0					\$0	
Butte	51	3,482	361	\$1,318	\$475,330	10%	\$47,533	\$932
Colusa	16	1,386	144	\$1,128	\$161,905	10%	\$16,191	\$1,012
Fresno	157	10,453	834	\$916	\$763,944	0-20%	\$56,423	\$359
Glenn	36	3,037	315	\$967	\$304,194	10%	\$30,419	\$845
Kern		13,588	895	\$899	\$804,605	0%	\$0	
Kings		2,719	283	\$1,012	\$286,396	0%	\$0	
Madera	78	8,372	1,145	\$871	\$997,295	0-20%	\$77,514	\$994
Merced	216	14,686	1,249	\$1,007	\$1,257,743	0-10%	\$13,997	\$65
Sacramento		0					\$0	
San Joaquin		11,695	1,120	\$1,286	\$1,440,320	0%	\$0	
Solano	3	539	56	\$439	\$24,508	10%	\$2,451	\$817
Stanislaus	432	22,539	2,408	\$1,054	\$2,538,032	0%	\$8,432	\$20
Sutter	15	586	61	\$824	\$49,970	10%	\$4,997	\$333
Tehama	25	2,382	247	\$907	\$223,769	10%	\$22,377	\$895
Tulare	44	5,239	543	\$1,087	\$589,796	10%	\$58,980	\$1,340
Yolo	10	1,761	272	\$629	\$171,088	10%	\$17,180	\$1,718
Yuba	1	27	3	\$1,240	\$3,468	10%	\$347	\$347
TOTAL	1,084		9,933		\$5,023,009		\$356,840	Average \$329

¹ Only growers in counties with losses are included.

² DPR estimated the acres for eight counties by multiplying the Acres in Affected Sections by 0.104, the average ratio of the affected acres estimated by UCD using GIS to the total almond acres in the section.

³ Revenue losses from UCD report, page 56

⁴ The Annual Loss for a Year Affected by Prohibitions is the Estimated Acres multiplied by the Revenue Loss Per Acre.

⁵ The percent of years affected by the prohibitions is from Table 2 and varies with soil type within the county.

⁶ Average Annual Net Loss is the Annual Loss for a Year Affected by Prohibitions multiplied by the Percent of Years Affected.

Table 8. Estimated affected acreage and loss for grapes due to proposed prohibitions.

County	Growers in Affected Sections ¹	Acres in Affected Sections	Estimated Acres Within ¼ mi of Schoolsite ²	Net Revenue Loss Per Acre For 2 Missed Sprays ³	Annual Loss for a Year Affected by Prohibitions ⁴	Percent of Years Affected By Prohibitions ⁵	Average Annual Net Loss Due to Prohibitions ⁶	Average Annual Loss Per Grower
Alameda		624	56	\$802	\$44,834	0%	\$0	
Amador		284	25	\$548	\$13,945	0%	\$0	
Butte		0	0		\$0	0%	\$0	
Calaveras		64	6	\$345	\$1,962	0%	\$0	
Colusa		200	18	\$649	\$11,688	0%	\$0	
Contra Costa		1,228	110		\$0	0%	\$0	
El Dorado		225	20	\$458	\$9,267	0%	\$0	
Fresno	6	29,612	77 ⁷	\$625	\$48,156	10%	\$4,816	\$803
Glenn		0	0	\$781	\$0	0%	\$0	
Humboldt		17	2		\$0		\$0	
Imperial		0	0		\$0	0%	\$0	
Kern		6,815	598	\$2,975	\$1,778,930	0%	\$0	
Kings	4	458	41	\$885	\$36,259	10%	\$3,626	\$906
Lake		864	80	\$1,198	\$95,504	0%	\$0	
Los Angeles		111	10	\$328	\$3,258	0%	\$0	
Madera	11	6,954	269 ⁷	\$633	\$170,385	10%	\$17,038	\$1,549
Marin		45	4	\$542	\$2,167	0%	\$0	
Mariposa		0	0		\$0	20%	\$0	
Mendocino		4,563	412	\$848	\$349,400	0%	\$0	
Merced		536	88	\$257	\$22,598	0%	\$0	
Monterey		12,384	1,123	\$814	\$914,260	0%	\$0	
Napa		7,074	641	\$3,018	\$1,934,761	0%	\$0	
Nevada		59	6	\$775	\$4,441	0%	\$0	
Orange		3	0		\$0	0%	\$0	
Placer		111	10	\$454	\$4,504	0%	\$0	
Riverside	14	988	89	\$2,447	\$216,605	20%	\$43,321	\$3,094
Sacramento		885	34	\$611	\$20,788	0%	\$0	
San Benito		485	43	\$425	\$18,463	0%	\$0	
San Bernardino		22	2		\$0	0%	\$0	
San Diego		350	31	\$1,162	\$36,404	0%	\$0	

County	Growers in Affected Sections ¹	Acres in Affected Sections	Estimated Acres Within ¼ mi of Schoolsite ²	Net Revenue Loss Per Acre For 2 Missed Sprays ³	Annual Loss for a Year Affected by Prohibitions ⁴	Percent of Years Affected By Prohibitions ⁵	Average Annual Net Loss Due to Prohibitions ⁶	Average Annual Loss Per Grower
San Joaquin		11,294	736	\$683	\$502,688	0%	\$0	
San Luis Obispo		2,193	361	\$829	\$299,197	0%	\$0	
San Mateo		66	6	\$1,078	\$6,362	0%	\$0	
Santa Barbara		774	53	\$1,211	\$64,162	0%	\$0	
Santa Clara		242	22	\$785	\$16,982	0%	\$0	
Santa Cruz		69	6	\$1,231	\$7,939	0%	\$0	
Shasta		10	1	\$397	\$337	0%	\$0	
Solano		896	81	\$544	\$44,164	0%	\$0	
Sonoma		12,958	1,163	\$1,773	\$2,061,879	0%	\$0	
Stanislaus		2,641	162	\$588	\$95,321	0%	\$0	
Sutter		0	0		\$0	0%	\$0	
Tehama		8	1	\$754	\$675	0%	\$0	
Tulare	92	8,518	764	\$2,131	\$1,627,672	10%	\$162,767	\$1,769
Tuolumne		3	0		\$0	0%	\$0	
Ventura		5	0		\$0	0%	\$0	
Yolo		298	7	\$834	\$5,835	0%	\$0	
Yuba		0	0		\$0	0%	\$0	
TOTAL	127		10,158		2,099,077		\$231,568	Average \$1,823

¹ Only growers in counties with losses are included.

² DPR estimated the acres for 37 counties by multiplying the Acres in Affected Sections by 0.090, the average ratio of the affected acres estimated by UCD using GIS to the total grape acres in the section.

³ Revenue losses from UCD report, page 60

⁴ The Annual Loss for a Year Affected by Prohibitions is the DPR/UCD Acres multiplied by the Revenue Loss Per Acre.

⁵ The Percent of Years Affected by the Prohibitions is from Table 2 and varies with soil type within the county.

⁶ Average Annual Net Loss is the Annual Loss for a Year Affected by Prohibitions multiplied by the Percent of Years Affected.

⁷ UCD estimated that 77 of 2,239 affected acres in Fresno County and 269 of 1,107 affected acres in Madera County had soil types impacted by the prohibitions.

Table 9. Total CAC workload and cost estimated by DPR and CAC data from Table 4. Alpine and San Francisco have no workload.

County	Estimated Number of Events					Cost Estimated by DPR					
	48-hr Notifications ¹	Investigations ²	Compliance Actions ³	Enforcement Actions ⁴	Outreach Training ⁵	Investigations ⁶	Compliance Actions ⁷	Enforcement Actions ⁸	Outreach Training ⁹	Data Updates ¹⁰	Total Cost ¹¹
Alameda	158	2.8	0.9	0.3	1.6	\$2,600	\$347	\$294	\$644	\$854	\$6,160
Amador	10	0.2	0.1	0.0	0.1	\$173	\$23	\$20	\$43	\$69	\$425
Butte	235	4.2	1.4	0.5	2.3	\$3,866	\$515	\$437	\$958	\$429	\$8,067
Calaveras	6	0.1	0.0	0.0	0.1	\$96	\$13	\$11	\$24	\$52	\$254
Colusa	64	1.2	0.4	0.1	0.6	\$1,055	\$141	\$119	\$261	\$133	\$2,222
Contra Cos	227	4.1	1.4	0.5	2.3	\$3,732	\$498	\$421	\$924	\$969	\$8,508
Del Norte	67	1.2	0.4	0.1	0.7	\$1,103	\$147	\$125	\$273	\$8	\$2,153
El Dorado	25	0.5	0.2	0.1	0.3	\$413	\$55	\$47	\$102	\$228	\$1,098
Fresno	994	17.9	6.0	2.0	9.9	\$16,371	\$2,183	\$1,849	\$4,056	\$1,682	\$33,983
Glenn	130	2.3	0.8	0.3	1.3	\$2,135	\$285	\$241	\$529	\$156	\$4,348
Humboldt	35	0.6	0.2	0.1	0.3	\$576	\$77	\$65	\$143	\$106	\$1,256
Imperial	59	1.1	0.4	0.1	0.6	\$972	\$130	\$110	\$241	\$328	\$2,314
Inyo	1	0.0	0.0	0.0	0.0	\$14	\$2	\$2	\$4	\$50	\$92
Kern	247	4.4	1.5	0.5	2.5	\$4,068	\$542	\$459	\$1,008	\$665	\$8,765
Kings	242	4.4	1.5	0.5	2.4	\$3,986	\$531	\$450	\$987	\$397	\$8,257
Lake	37	0.7	0.2	0.1	0.4	\$614	\$82	\$69	\$152	\$174	\$1,419
Lassen	2	0.0	0.0	0.0	0.0	\$29	\$4	\$3	\$7	\$83	\$163
Los Angele	1,080	19.4	6.5	2.2	10.8	\$17,787	\$2,372	\$2,009	\$4,406	\$3,790	\$39,472
Madera	328	5.9	2.0	0.7	3.3	\$5,402	\$720	\$610	\$1,338	\$373	\$10,977
Marin	1	0.0	0.0	0.0	0.0	\$10	\$1	\$1	\$2	\$128	\$185
Mariposa	7	0.1	0.0	0.0	0.1	\$120	\$16	\$14	\$30	\$12	\$248
Mendocino	63	1.1	0.4	0.1	0.6	\$1,031	\$138	\$116	\$255	\$205	\$2,270
Merced	449	8.1	2.7	0.9	4.5	\$7,395	\$986	\$835	\$1,832	\$784	\$15,381
Modoc	3	0.0	0.0	0.0	0.0	\$43	\$6	\$5	\$11	\$55	\$155
Mono	0	0.0	0.0	0.0	0.0	\$5	\$1	\$1	\$1	\$18	\$33
Monterey	1,890	34.0	11.3	3.8	18.9	\$31,136	\$4,151	\$3,516	\$7,713	\$752	\$61,449
Napa	357	6.4	2.1	0.7	3.6	\$5,881	\$784	\$664	\$1,457	\$385	\$11,922
Nevada	12	0.2	0.1	0.0	0.1	\$197	\$26	\$22	\$49	\$114	\$530
Orange	654	11.8	3.9	1.3	6.5	\$10,774	\$1,436	\$1,217	\$2,669	\$1,788	\$23,248
Placer	45	0.8	0.3	0.1	0.5	\$744	\$99	\$84	\$184	\$445	\$2,022
Plumas	0	0.0	0.0	0.0	0.0	\$5	\$1	\$1	\$1	\$30	\$49
Riverside	745	13.4	4.5	1.5	7.4	\$12,265	\$1,635	\$1,385	\$3,038	\$1,192	\$25,371
Sacramento	102	1.8	0.6	0.2	1.0	\$1,680	\$224	\$190	\$416	\$527	\$3,948
San Benito	203	3.7	1.2	0.4	2.0	\$3,343	\$446	\$378	\$828	\$248	\$6,815

County	Estimated Number of Events					Cost Estimated by DPR					
	48-hr Notifications ¹	Investigations ²	Compliance Actions ³	Enforcement Actions ⁴	Outreach Training ⁵	Investigations ⁶	Compliance Actions ⁷	Enforcement Actions ⁸	Outreach Training ⁹	Data Updates ¹⁰	Total Cost ¹¹
San Bernar	628	11.3	3.8	1.3	6.3	\$10,337	\$1,378	\$1,167	\$2,561	\$1,306	\$21,775
San Diego	2,667	48.0	16.0	5.3	26.7	\$43,924	\$5,857	\$4,960	\$10,881	\$1,634	\$87,433
San Joaqui	637	11.5	3.8	1.3	6.4	\$10,491	\$1,399	\$1,185	\$2,599	\$1,491	\$22,315
San Luis O	221	4.0	1.3	0.4	2.2	\$3,640	\$485	\$411	\$902	\$583	\$7,827
San Mateo	109	2.0	0.7	0.2	1.1	\$1,794	\$239	\$203	\$444	\$458	\$4,080
Santa Barb	4,838	87.1	29.0	9.7	48.4	\$79,682	\$10,624	\$8,999	\$19,739	\$945	\$155,986
Santa Clara	428	7.7	2.6	0.9	4.3	\$7,042	\$939	\$795	\$1,744	\$1,150	\$15,172
Santa Cruz	522	9.4	3.1	1.0	5.2	\$8,596	\$1,146	\$971	\$2,129	\$541	\$17,398
Shasta	13	0.2	0.1	0.0	0.1	\$211	\$28	\$24	\$52	\$307	\$809
Sierra	5	0.1	0.0	0.0	0.0	\$77	\$10	\$9	\$19	\$27	\$184
Siskiyou	28	0.5	0.2	0.1	0.3	\$465	\$62	\$53	\$115	\$110	\$1,047
Solano	129	2.3	0.8	0.3	1.3	\$2,130	\$284	\$241	\$528	\$252	\$4,464
Sonoma	622	11.2	3.7	1.2	6.2	\$10,251	\$1,367	\$1,158	\$2,539	\$1,093	\$21,329
Stanislaus	580	10.4	3.5	1.2	5.8	\$9,553	\$1,274	\$1,079	\$2,366	\$1,120	\$20,009
Sutter	207	3.7	1.2	0.4	2.1	\$3,415	\$455	\$386	\$846	\$369	\$7,113
Tehama	153	2.8	0.9	0.3	1.5	\$2,523	\$336	\$285	\$625	\$228	\$5,197
Trinity	1	0.0	0.0	0.0	0.0	\$19	\$3	\$2	\$5	\$18	\$61
Tulare	1,710	30.8	10.3	3.4	17.1	\$28,167	\$3,756	\$3,181	\$6,978	\$1,156	\$56,208
Tuolumne	3	0.1	0.0	0.0	0.0	\$53	\$7	\$6	\$13	\$55	\$174
Ventura	2,344	42.2	14.1	4.7	23.4	\$38,606	\$5,147	\$4,360	\$9,564	\$1,370	\$76,761
Yolo	135	2.4	0.8	0.3	1.4	\$2,223	\$296	\$251	\$551	\$408	\$4,849
Yuba	69	1.2	0.4	0.1	0.7	\$1,142	\$152	\$129	\$283	\$224	\$2,508
TOTAL	24,527	441.5	147.2	49.1	245.3	\$403,959	\$53,861	\$45,620	\$100,070	\$32,074	\$826,260

¹ Estimated number of 48-hour notifications is number of applications, minus prohibitions and exceptions

² Estimated number of investigations is 1.8% of notifications (Table 4)

³ Estimated number of compliance actions is 0.6% of notifications (Table 4)

⁴ Estimated number of enforcement actions is 0.2% of notifications (Table 4)

⁵ Estimated number of outreach and training events is 1% of notifications (Table 4)

⁶ Estimated cost of investigations is 15 hours x \$61/hour each (Table 4)

⁷ Estimated cost of compliance actions is 6 hours x \$61/hour each (Table 4)

⁸ Estimated cost of enforcement actions is 15 hours x \$62/hour each (Table 4)

⁹ Estimated cost of outreach and training is 6 hours x \$68/hour each (Table 4)

¹⁰ Estimated cost of schoolsite GIS data updates is 10 min x \$55/hour per schoolsite (Table 4)

¹¹ Estimated total cost includes 30% for supervision, clerical support, and operating expenses (Table 4)

Figure 1. Example of sections affected by the proposed regulation in the West Modesto area of Stanislaus County. Schools are shown in orange with the ¼ mile distance outlined. Day care facilities are shown in pink with the ¼ mile distance outlined. Sections with pesticide applications are shown in green cross-hatching. Sections affected are outlined in blue and contain a schoolsite or are within ¼ mile of a schoolsite. Pesticide applications in the affected sections outlined in blue are included in the calculations.

