Department of Pesticide Regulation

Brian R. Leahy
Director

Edmund G. Brown Jr.
Governor

M E M O R A N D U M

TO: Chris Reardon
Chief Deputy Director

FROM: Chuck Andrews *Original Signed By*
Associate Director
916-445-3984

Marylou Verder-Carlos *Original Signed By*
Assistant Director
916-445-3984

DATE: February 18, 2014

SUBJECT: RECOMMENDED AIR MONITORING FOR 2014

Attached is the memo from David Duncan outlining the recommendation for the Air Monitoring for 2014. After reviewing the comments from the Pesticide Registration and Evaluation Committee and public, and reviewing additional data we recommend that DPR continue the air monitoring network, with minor revisions based on the evaluation described in the attached memorandum. We also agree that the Air Resources Board should conduct the Air Contaminant Monitoring for 2014.

We would like to request your approval on the above mentioned recommendations.

APPROVED:

Original Approved By *02/24/14*
Chris Reardon, Chief Deputy Director Date

Department of Pesticide Regulation

Brian R. Leahy
Director

MEMORANDUM

Edmund G. Brown Jr.
Governor

TO: Charles M. Andrews
Associate Director
Pesticide Programs Division

FROM: David Duncan *Original Signed By*
Environmental Program Manager II
916-445-3870

DATE: January 30, 2014

SUBJECT: RECOMMENDED AIR MONITORING FOR 2014

The Department of Pesticide Regulation (DPR) established a network to sample ambient air for multiple pesticides in several communities. DPR samples on a regular schedule and uses the data to evaluate health risk and, as necessary, improve protective measures against pesticide exposure. DPR began the Air Monitoring Network project in February 2011, following the plan finalized in May 2010. By the end of 2013, DPR will have collected nearly three years of monitoring data. DPR discussed the need for possible revisions to the May 2010 plan at the Pesticide Registration and Evaluation Committee (PREC) meetings on August 16, 2013 and September 20, 2013. Most, if not all commenters recommended continuing the air monitoring network, with some revisions. After considering comments from the PREC and public, and evaluating additional data, branch staff recommend few changes to the monitoring plan. I recommend that DPR continue the air monitoring network, with minor revisions based on the evaluation described in the attached memorandum. All major elements of the plan, including monitoring at the current sites in Ripon, Salinas, and Shafter should remain unchanged.

At DPR's request, the Air Resources Board (ARB) is conducting complementary monitoring, including multi-year ambient monitoring for 1,3-dichloropropene and methyl bromide at sites in Oxnard/Camarillo, Santa Maria, and south of Watsonville. Monitoring began in August 2010 in Oxnard/Camarillo and Santa Maria, and in January 2012 south of Watsonville. I recommend ARB continue this monitoring in 2014, as well as monitor for chloropicrin during the peak use season at each of these three sites.

As we discussed several weeks ago, the air network requires most if not all of the branch's air monitoring resources. Several people commented, and we agreed, that verifying the effectiveness of DPR's buffer zones for methyl isothiocyanate is also a high priority for monitoring. Therefore, I recommend we include this study in our monitoring request to ARB for 2014. The complete request to ARB for toxic air contaminant monitoring is also enclosed for your review and approval.

Attachment

Department of Pesticide Regulation

Brian R. Leahy
Director

MEMORANDUM

Edmund G. Brown Jr.
Governor

TO: David Duncan
Environmental Program Manager II
Environmental Monitoring Branch

FROM: Randy Segawa *Original Signed By*
Environmental Program Manager
Environmental Monitoring Branch
916-324-4137

Pam Wofford *Original Signed By*
Senior Environmental Scientist, Supervisory
Environmental Monitoring Branch

Rosemary Neal, Ph.D. *Original Signed By R. Segawa For*
Senior Environmental Scientist, Specialist
Environmental Monitoring Branch

Edgar Vidrio *Original Signed By*
Environmental Scientist
Environmental Monitoring Branch

DATE: January 30, 2014

SUBJECT: RECOMMENDED AIR MONITORING NETWORK PLAN FOR 2014

The Department of Pesticide Regulation (DPR) established a network to sample ambient air for multiple pesticides in several communities. DPR samples on a regular schedule and uses the data to evaluate health risk and, as necessary, improve protective measures against pesticide exposure. DPR began the project in February 2011, following the plan finalized in May 2010 (<http://www.cdpr.ca.gov/docs/emon/airinit/air_network_plan_final.pdf >. By the end of 2013, DPR will have collected nearly three years of monitoring data. DPR discussed the need for possible revisions to the May 2010 plan at the Pesticide Registration and Evaluation Committee (PREC) meetings on August 16, 2013 and September 20, 2013. Most, if not all commenters recommended continuing the air monitoring network, with some revisions. After considering comments from the PREC and public, and evaluating additional data, DPR staff recommend few changes to the monitoring plan. If DPR decides to continue the air monitoring network, we recommend minor revisions to the plan in the following sections: including objectives, pesticides monitored, and communities included in the monitoring network. All major elements of the plan, including monitoring at the current sites in Ripon, Salinas, and Shafter should remain unchanged. Other details, particularly on sampling, laboratory, and data analysis methods are described in the monitoring protocol <http://www.cdpr.ca.gov/docs/emon/airinit/protocol_final.pdf>.

Other pesticide air monitoring is conducted in California in addition to the air monitoring network. DPR, the Air Resources Board (ARB), university researchers, and others conduct short-term air monitoring studies for pesticides. For example, DPR and ARB coordinate monitoring for pesticides under California's Toxic Air Contaminant Act. In this program, two types of samples are collected. Air is monitored next to applications of specific pesticides for several days (application-site monitoring) to estimate acute exposures. Samples are also collected for several weeks in communities near high-use regions and during high-use periods (ambient monitoring) to estimate seasonal exposures. DPR extrapolates the short-term concentrations detected during several days or weeks of monitoring to estimate concentrations associated with annual and lifetime exposures. Additionally, both the application-site and ambient monitoring usually sample for single pesticides.

While similar to current ambient monitoring, the air monitoring network supplements the toxic air contaminant monitoring by providing data for long-term exposures over several years to multiple pesticides. In addition, at DPR's request, ARB is conducting multi-year ambient monitoring for 1,3-dichloropropene and methyl bromide at sites in Oxnard/Camarillo, Santa Maria, and south of Watsonville. Monitoring began in August 2010 in Oxnard/Camarillo and Santa Maria, and in January 2012 south of Watsonville. ARB collects a single 24-hour sample every six days at each site. ARB was scheduled to end monitoring in December 2013, but DPR will request an extension until at least December 2014. DPR will also request that ARB conduct monitoring for chloropicrin during the peak use season at each of these three sites during 2014.

Air monitoring network objectives

The objectives define the scope of the project. The air monitoring network includes these scientific objectives:

1) Identify common pesticides in air and determine seasonal, annual, and multiple-year concentrations.
2) Compare concentrations to subchronic and chronic health screening levels.
3) Track trends in air concentrations over time.
4) Estimate cumulative exposure to multiple pesticides with common modes of action for health effects (e.g., cholinesterase inhibition).
5) Attempt to correlate concentrations with use and weather patterns.

Except for clarifying Objective 4 to add common modes of action, these remain the same as the May 2010 plan.

Sampling plan

DPR will monitor one location in each community selected, collecting one 24-hour sample each week. DPR based this sampling plan on its evaluation of results from the department's one-year study in Parlier that included air monitoring at three locations, three days each week. The Parlier data indicated that monitoring a single location once a week will provide adequate data to

estimate long-term concentrations DPR describes other details, particularly on sampling, laboratory, and data analysis methods in a monitoring protocol <http://www.cdpr.ca.gov/docs/emon/airinit/protocol_final.pdf>.

Monitoring is conducted at locations that meet U.S. Environmental Protection Agency (U.S. EPA) siting criteria, are secure from tampering, provide electricity, and grant permission.

Several people suggested more frequent sampling, or reorganizing the sampling with more frequent sampling during peak use periods and less frequent sampling during low use periods. A related suggestion was to change the pesticides monitored over time and/or by site, only monitoring a particular pesticide during its peak use period or if it has high use near a monitoring site. Resources still limit the sampling to one day each week, and this should provide adequate data to evaluate seasonal and chronic exposures. Approximately 90 percent of the sample sets so far contained at least one detectable pesticide, so a single peak period for all pesticides does not occur. Additionally, laboratory costs would increase by changing the pesticides monitored over time or by site. Several commenters appeared to prefer increasing seasonal monitoring by decreasing long-term monitoring. DPR staff do not recommend decreasing long-term monitoring to increase seasonal monitoring. Seasonal air monitoring data is commonly available for individual pesticides from other DPR or ARB monitoring. One of the key objectives for the air network is to provide data to estimate long-term air concentrations over several years. This data has never been available and DPR must normally estimate chronic exposures from seasonal monitoring data.

Pesticides included in the monitoring

DPR monitors for 32 pesticides and several breakdown products, selected based on the following criteria:

1) Use (indicator of exposure)
2) Volatility (indicator of exposure)
3) DPR risk assessment priority (indicator of toxicity)
4) Feasibility of including in multi-residue monitoring method

Almost all the pesticides can be monitored by collecting and analyzing two samples, one for semi-volatile (nonfumigant) pesticides, and one for volatile (mostly fumigant) pesticides using a volatile organic compound (VOC) method. Based on the four criteria above, DPR monitors for:
Pesticides included in the multi-residue method:

1) Acephate (Orthene)
2) Bensulide (Prefar)
3) Chlorothalonil (Bravo)
4) Chlorpyrifos (Lorsban) and oxygen analog breakdown product
5) Chlorthal-dimethyl (Dacthal)
6) Cypermethrin
7) Diazinon and oxygen analog breakdown product

8) Dicofol (Kelthane)
9) Dimethoate (Cygon) and oxygen analog breakdown product
10) Diuron (Karmex)
11) Endosulfan (Thiodan)
12) EPTC (Eptam)
13) Iprodione (Rovral)
14) Malathion and oxygen analog breakdown product
15) Methidathion (Supracide)
16) Naled as dichlorvos (DDVP) breakdown product
17) Norflurazon (Solicam)
18) Oryzalin (Surflan)
19) Oxydemeton-methyl (Metasystox-R)
20) Oxyfluorfen (Goal)
21) Permethrin
22) Phosmet (Imidan)
23) Propargite (Omite)
24) S,S,S-tributyl phosphorotrithioate (DEF)
25) Simazine (Princep)
26) S-metolachlor (Dual)
27) Trifluralin (Treflan)

Pesticides included in the VOC method:

28) 1,3-dichloropropene (Telone, Inline)
29) Methyl bromide
30) Sodium tetrathiocarbonate (Enzone) as carbon disulfide breakdown product

DPR collects additional samples to analyze for these pesticides:

31) Chloropicrin
32) Methyl isothiocyanate (MITC), the pesticidal breakdown product of
    a. Dazomet (Basamid)
    b. Metam-sodium (Vapam, Sectagon)
    c. Potassium N-methyl dithiocarbamate (metam-potassium, K-Pam)

Acrolein and methyl iodide were included in the May 2010 plan as part of the VOC method, but they have been dropped. Information provided by ARB indicates that the monitoring method for acrolein may not provide accurate results. Methyl iodide is no longer registered for sale or use in California.

DPR staff considered dropping additional pesticides. Results to date indicate that fumigants and organophosphate pesticides have higher risk in comparison to the other pesticides monitored. However, the cost savings by dropping the other pesticides would be minimal, and unlikely to provide enough resources to increase the sampling frequency or number of communities. Most

people who commented on the plan recommended no changes to the pesticides monitored. Suggestions for additional pesticides included:

- Paraquat
- Maneb
- Captan
- Mancozeb
- Methomyl
- Glufosinate-ammonium

DPR staff do not recommend including these because none can be incorporated into the current monitoring methods. The sampling frequency or number of communities would need to be decreased to include them.

Communities included in the air monitoring network

DPR has resources to monitor three communities. The May 2010 plan describes how DPR evaluated 226 candidate communities in three regions, and selected the communities based on the following criteria:

1) Use of the pesticides included in the monitoring
    a. Use within the community ("community zone")
    b. Use between the community boundary and 1 mile of the community ("local zone")
    c. Use within 1 to 5 miles of the community ("regional zone")
2) Demographic criteria
    a. Population density of people under age 18
    b. Population density of people older than 65
    c. Population density of people older than 5, with disabilities
    d. Population density of people employed in farming, fishing, or forestry
3) Other desirable community characteristics, such as an existing air monitoring station or complementary studies
4) Geographic distribution

DPR selected communities with higher use of the pesticides within the zones listed above because they will likely have higher air concentrations. The demographic groups noted above represent subpopulations DPR considers in its risk assessments. Table 1 shows the highest rated communities in the May 2010 plan, and the following three communities were selected for the air monitoring network:

- Ripon (San Joaquin County, approximately 20 miles south of Stockton)
- Salinas (Monterey County, approximately 60 miles south of San Jose)
- Shafter (Kern County, approximately 20 miles northwest of Bakersfield)

These communities were selected based on pesticide use data for 2006-2008 and 2000 Census data. DPR staff have reassessed the community selections based on 2011 pesticide use data, 2010 Census data (including changes to community boundaries), PREC comments, and public comments.

DPR expanded the number of candidate communities from 226 to 1,267, including all communities in California except those in the urban counties (Los Angeles, Orange, San Diego, San Francisco). Using the same methodology as the May 2010 plan, each of the 1,267 communities was assigned an overall pesticide rating, based on 2011 pesticide use data. 2011 pesticide use data is the most recent year available, plus it was the first year of the air monitoring network and the data verifies that the selected communities were high use areas at the time of monitoring. (NOTE: The 2012 pesticide use data currently contains errors and will not be available for at least several weeks.) The overall pesticide rating was calculated from 96 subcategories (32 pesticides x 3 use zones). For each subcategory, the 1,267 communities were ranked, with the community with the highest use ranked 1,267 and the lowest community ranked 1. DPR assigned a quartile rating of 1 to 4 to each community based on its ranking for each subcategory (i.e., each pesticide and zone combination), with 4 representing the highest priority for monitoring. The overall rating for each community is the average quartile rating for the 96 pesticide subcategories.

Figures 1 and 2 show that communities in the Central Coast area and San Joaquin Valley have the highest pesticide use ratings, based on 2011 data. Tables 2 and 3 list the communities and community groups with the highest pesticide ratings. The same three regions as the May 2010 plan remain highly rated, but there are some differences in pesticide use and ratings between 2006-2008 and 2011. The highest rated community based on 2011 pesticide use data is Stockton, with a rating of 3.16 (Table 2). In comparison, the three communities currently monitored are rated 3.08 (Ripon), 3.02 (Shafter), and 2.75 (Salinas). Since the monitoring for 2011 showed similar results for all three communities, it appears that rating differences less than 0.3 have minimal effect on pesticide air exposures.

Alternatives to the Salinas site

The North Central Coast group, including Salinas, was the third highest group based on 2006-2008 pesticide use data (Table 1), and is the top rated group based on 2011 data (Table 3). Gilroy, Hollister, Prunedale, and San Martin are rated slightly higher than Salinas. (NOTE: San Benito and Santa Clara Counties, including Gilroy, Hollister, and San Martin were not included as candidate communities in the May 2010 plan and were not previously rated for pesticide use.) Figure 3 shows that these communities are within 20 miles of each other. Ideally, the monitored community is highly rated for both fumigants and nonfumigants. Table 2 shows that Hollister and San Martin are not highly rated for fumigants. Figure 4 shows that Gilroy is highly rated for fumigants due to applications near Watsonville, just inside the 5-mile use radius, and with part of the Santa Cruz Mountains separating Gilroy from those fumigation locations. Moreover, Figure 6 shows that the predominant wind direction is from the northwest, and Gilroy is upwind from the

higher use areas to the southeast. Prunedale is located in a hilly area, and selecting a single representative site is problematic. Additionally, Prunedale was not highly rated in the May 2010 plan, and the increased pesticide use may be temporary.

The Salinas site is unusual because high fumigant use occurs to the north and high nonfumigant use occurs to the south (Figures 4 and 5). Additional fumigant monitoring data is available for a site north of Salinas. At DPR's request, ARB began conducting ambient air monitoring for 1,3-dichloropropene and methyl bromide at a site south of Watsonville in January 2012. This is one of the highest fumigant use areas in the state. Monitoring was due to end in December 2013, but ARB will continue monitoring at this site, and include chloropicrin during the peak use season.

DPR staff considered moving the Salinas site further south, to a location with higher nonfumigant use. Table 2 shows that King City (2.98 rating) is the only community in the region south of Salinas (2.86 rating) that is rated higher for nonfumigants, but only by a slight amount. The small difference in pesticide use is unlikely to lead to differences in air concentrations. Additionally, the higher use for King City is likely offset by differences in weather conditions. Figure 6 shows that Salinas has more frequent periods of lower wind speeds and calm conditions than King City. All other factors being equal, lower wind speeds will cause higher air concentrations. Also, the high use areas near King City are not in the predominant upwind direction.

Air monitoring network data shows that the diazinon screening levels were not exceeded, but it is one of the highest risk pesticides included in the monitoring. ARB previously conducted ambient air monitoring for diazinon and its oxygen analog breakdown product in the North Central Coast area, and evaluation of their data provides additional information for selecting the appropriate community for this region. ARB collected 24-hour samples three days each week between July 1 and August 20, 2009, at sites in Chualar, Gilroy, Hollister, King City, Salinas, and Soledad (Figure 7). This region and time period were monitored because diazinon use was highest based on data available at the time. The complete report is available at <http://www.cdpr.ca.gov/docs/emon/pubs/tac/tacpdfs/diamapl_rep09.pdf>.

Table 6 and Figures 7-9 summarize the air concentrations measured and diazinon use during ARB's monitoring, and compares the results to the air monitoring network sites. Diazinon was not detected at sites in Hollister and King City. For the other four ARB sites, the maximum 4-week air concentration varied by less than 2x, ranging from 3.5 to 6.1 ng/m^3, with Salinas as the highest site. The maximum 4-week air concentrations from DPR's air network sites in Salinas and Shafter during 2011 were higher than those at ARB's sites in 2009, even with lower use levels (Table 6 and Figures 7-9). However, the higher air network concentrations are due in part to the higher quantitation limit for the air network samples and higher assumed concentration for samples with trace detections. The ARB and air network data indicate that the current air network sites, including Salinas, are likely in areas of high diazinon air concentrations. Also, the 4-week concentrations from the air network are similar or higher than the ARB 4-week

concentrations even though the air network samples were collected once per week and the ARB samples were collected three times per week.

In conclusion, ARB's Watsonville site provides fumigant monitoring in one of the highest use areas. For nonfumigant pesticides, use patterns, weather patterns, and previous monitoring indicate that the current Salinas site is appropriate for this region and remains the recommended community.

Alternatives to the Ripon site

The San Joaquin/Stanislaus group was the highest rated group based on 2006-2008 pesticide use data (Table 1), and is the second highest group based on 2011 data (Table 3). Modesto, Stockton, and Salida are rated slightly higher than Ripon. All four communities are highly rated for both fumigants and nonfumigants (Tables 4 and 5). Figure 10 shows higher use areas closer to Ripon and Salida than Stockton and Modesto. Additionally, Stockton and Modesto are relatively large communities, with few pesticide applications within the community boundaries, and selecting an appropriate site within large communities is problematic. Ripon and Salida are adjoining communities (Figure 10), with very similar use patterns. There is no compelling reason to move the monitoring site less than five miles. Ripon remains the recommended community.

Alternatives to the Shafter site

The Kern group was the second rated group based on 2006-2008 pesticide use data (Table 1), and is tied for the third highest group based on 2011 data (Table 3). Fresno and Shafter have the same rating (Table 2). Both communities are highly rated for both fumigants and nonfumigants, with Shafter slightly higher for fumigants, and Fresno slightly higher for nonfumigants (Table 2). Fresno was not a highly rated community in the May 2010 plan, so the increased pesticide use may be temporary. Additionally, selecting an appropriate site within large communities is problematic. Shafter remains the recommended community.

Evaluation of demographic factors

Table 2 shows the overall demographic rating for top candidate communities. Similar to the pesticide use category and the same methodology as the May 2010 plan, the demographic category has four subcategories. For each subcategory, the 1,267 communities are ranked, with the community with the highest value ranked 1,267 and the lowest community ranked 1. For each of the four demographic factors, the 1,267 communities are divided into four groups (quartiles). The top quartile with the highest values are rated 4, the second highest quartile are rated 3, and so forth. The quartile rating for the four demographic subcategories are averaged to determine an overall demographic rating. The ratings ranged from one to four, with approximately one-half of the communities rated 2.50 or higher. Of the top 40 communities for pesticide ratings, only Linden, Prunedale and San Martin have overall demographic ratings less

than 2.50 (Table 2). Consistent with the PREC recommendation, the demographic ratings are not needed for selecting monitoring communities.

Other regions and locations

Nipomo and Santa Maria are highly rated communities that were not evaluated as part of the May 2010 plan. Camarillo and Oxnard are also highly rated both in the May 2010 plan, and based on 2011 pesticide use data. These communities are rated lower than Ripon and Shafter based on 2011 pesticide use data, so these are alternative regions to the North Central Coast. ARB is monitoring for fumigants in Santa Maria and Oxnard as described earlier. The nonfumigant pesticide ratings for these communities and the North Central Coast communities are similar, ranging from 2.8 to 3.1 (Table 5). Monitoring in Nipomo/Santa Maria or Camarillo/Oxnard would incur greater sampling costs due to the distance from DPR's offices in Sacramento and Fresno. ARB minimizes sampling costs by using automatic systems with timers for their VOC samplers. Timers cannot be used with nonfumigant samples, so ARB would also incur additional costs by conducting the sampling. Other sampling may need to be decreased to include Nipomo/Santa Maria or Camarillo/Oxnard. Since the pesticide use ratings are similar to the North Central Coast, and sampling costs are greater, these communities are not recommended.

Communities in Tulare County were suggested because that county was the third highest in the state for total pesticide use in 2010 and 2011 (<http://www.cdpr.ca.gov/docs/pur/pur11rep/chmrpt11.pdf>). Figure 2 shows that the Tulare group is the seventh highest, with Visalia as the highest rated community in the group. While Tulare County is the third highest for reported use of all pesticides, it is the ninth highest county for use of the 32 monitored pesticides (Table 7). All of the other candidate communities are rated higher than Visalia or other Tulare County communities.

Some commenters suggested that DPR consider monitoring in "unincorporated communities, or the incorporated but populated areas surrounding very small towns." DPR included these locations in its evaluation because pesticide use was compiled for all "census designated places." These are defined as "statistical geographic entities representing closely settled, unincorporated communities that are locally recognized and identified by name. They are the statistical equivalents of incorporated places, with the primary differences being the lack of both a legally defined boundary and an active, functioning governmental structure, chartered by the state and administered by elected officials."

Another suggestion is to "assess the potential for occupational pesticide exposure in industrial park 'islands' that are found throughout California's agricultural landscape. In these locations, land is used for non-agricultural work, but is completely surrounded by land used for agriculture." This suggestion is not feasible because occupational exposure is beyond the scope of the air monitoring network, data on the locations of all the industrial sites described is not available, and it is unlikely that an industrial site would give permission for DPR to monitor.

Some commenters were dissatisfied with some of the locations of the monitoring sites within the communities, saying that "Ripon is in the center of town and no chloropicrin was detected at the Salinas site even though it is located in a high use area." DPR staff do not recommend moving any of the sites within the communities for several reasons.

- All monitoring sites have minimum qualifications, including meeting U.S. EPA siting criteria, are secure from tampering, provide electricity, and grant permission. Whenever possible, DPR selects sites near potential pesticide applications, usually near the perimeter of communities and with a preference for schools or other public facilities.
- All three monitored communities are 1.5 – 5 miles across. Therefore, it is impossible to select a single location that is less than one mile from all community boundaries. All monitoring sites are one-half mile or less than from the nearest community border. This includes the Ripon site which is approximately one-quarter mile from the west border and approximately 1.5 miles from the other borders (Figure 11).
- Previous community monitoring in Lompoc and Parlier showed sites separated by one mile or less have similar seasonal air concentrations. <http://www.cdpr.ca.gov/docs/specproj/lompoc/exec_sum_march2003.pdf > <http://www.cdpr.ca.gov/docs/envjust/pilot_proj/parlier_final.pdf >
- Moving sites within the same communities now will make year-to-year comparisons more difficult.
- Chloropicrin was not detected at the Salinas site in 2012, but it was detected in 2011 and there have been several detections so far in 2013. Additionally, ARB will monitor for chloropicrin in Oxnard/Camarillo, Santa Maria, and south of Watsonville during the peak use season in 2014.
- Two school districts denied permission for monitoring, eliminating several potential monitoring sites.

At least one commenter suggested moving sites annually. This is not feasible due to the lag of several months in analyzing samples and reporting results. A complete year of results would not be available before needing to make a decision to move sites. Moving sites every other year is feasible, but since samples are only collected one day each week, the highest 4-week or annual average concentrations could be missed. In addition, monitoring for several years at the same sites provides data to estimate trends.

Measuring relative trends is particularly important for fumigants due to changes in regulatory requirements. Methyl bromide use continues to decline due to its phaseout under the Montreal Protocol and Clean Air Act, and use of other fumigants has increased. Major changes to fumigant label requirements went into effect in 2013, including buffer zones. This has led to changes in fumigation methods, and increased use of tarpaulins with lower permeability. DPR may implement more stringent requirements for chloropicrin in 2014. Measuring any changes in air concentrations with these regulatory changes is more conclusive if monitoring continues at the same sites.

Conclusions

The air network supplements other monitoring for individual pesticides. Monitoring for individual pesticides is conducted in regions and periods of highest use. The air monitoring network focuses on sites that are located in high use areas for many pesticides because one of the objectives is to estimate cumulative exposure to multiple pesticides. Similarly, monitoring for individual pesticides is conducted during the peak use season. The air monitoring network is a long-term project to estimate lifetime exposure, so monitoring is needed year-round.

If the air monitoring network continues, DPR staff recommend the same monitoring sites in Ripon, Salinas, and Shafter. These communities remain high use areas for many of the monitored pesticides, and other communities do not have significantly higher pesticide use ratings. DPR will request that ARB continue their monitoring for 1,3-dichloropropene and methyl bromide at sites in or near Oxnard, Santa Maria, and Watsonville. DPR will also request that ARB conduct seasonal monitoring for chloropicrin during 2014 at these sites.

Table 1. Communities with the highest average ratings for 2006-2008 use of all selected pesticides combined. Communities within a few miles of each other are grouped together.

Community(ies)	Area (County)	Pesticide Rating
Linden, Ripon, Salida, Escalon, Manteca, Del Rio, Riverdale Park, Lathrop, Modesto, Stockton, Hickman	San Joaquin Valley (San Joaquin, Stanislaus)	3.23-2.71
Shafter, Wasco, Arvin, Rosedale, Mettler	San Joaquin Valley (Kern)	3.01-2.77
Greenfield, Soledad, Salinas, Gonzales, King City, Castroville	North Central Coast (Monterey)	2.96-2.62
Patterson, Westley	San Joaquin Valley (Stanislaus)	2.93
Camarillo, Oxnard	Ventura (Ventura)	2.89-2.86
Cantua Creek, Huron, Mendota	San Joaquin Valley (Fresno)	2.85-2.71
Reedley, Parlier	San Joaquin Valley (Fresno)	2.77-2.62
Poplar	San Joaquin Valley (Tulare)	2.71

Table 2. Communities with the highest 2011 use ratings for 32 monitored pesticides, and their demographic rating.

Rank	Community	County	Demographic Rating	Fumigants Rating	Nonfumigants Rating	Overall Pesticide Rating
1	Stockton	San Joaquin	3.75	3.00	3.20	3.16
2	Gilroy	Santa Clara	3.00	2.71	3.25	3.13
3	Salida	Stanislaus	3.00	3.00	3.17	3.13
4	Modesto	Stanislaus	3.75	3.00	3.14	3.11
5	Ripon	San Joaquin	3.25	2.75	3.18	3.08
6	Fresno	Fresno	3.50	2.75	3.10	3.02
7	Shafter	Kern	2.75	2.88	3.06	3.02
8	Lathrop	San Joaquin	2.75	2.63	3.12	3.01
9	Manteca	San Joaquin	3.50	2.88	3.05	3.01
10	Prunedale	Monterey	2.25	2.50	3.10	2.96
11	Nipomo	San Luis Obispo	3.00	2.88	2.96	2.94
12	Santa Maria	Santa Barbara	3.50	3.00	2.92	2.94
13	Camarillo	Ventura	3.00	2.88	2.92	2.91
14	Oxnard	Ventura	3.25	3.25	2.81	2.91
15	Lodi	San Joaquin	3.50	2.50	3.01	2.90
16	Hollister	San Benito	3.25	2.38	2.96	2.83
17	Bakersfield	Kern	3.25	3.00	2.75	2.81
18	Keyes	Stanislaus	3.50	2.75	2.81	2.80
19	San Martin	Santa Clara	2.25	2.33	2.92	2.79
20	Linden	San Joaquin	2.25	2.21	2.92	2.76
21	King City	Monterey	3.00	1.96	2.98	2.75
22	Salinas	Monterey	3.25	2.38	2.86	2.75
23	Turlock	Stanislaus	3.50	2.46	2.83	2.75
24	Wasco	Kern	3.00	2.25	2.89	2.75
25	Ceres	Stanislaus	3.75	2.63	2.77	2.74
26	Orcutt	Santa Barbara	3.25	3.00	2.67	2.74
27	Visalia	Tulare	3.50	2.25	2.88	2.74
28	Arvin	Kern	3.00	2.50	2.79	2.72
29	Hughson	Stanislaus	3.75	2.50	2.77	2.71
30	Waterloo	San Joaquin	2.00	2.25	2.83	2.70
31	Castroville	Monterey	3.50	2.25	2.81	2.69
32	Morada	San Joaquin	2.75	2.13	2.81	2.66
33	Greenfield	Monterey	3.25	1.50	2.98	2.65
34	Lompoc	Santa Barbara	3.50	2.08	2.81	2.65
35	Patterson	Stanislaus	3.25	2.04	2.82	2.65
36	Riverdale Park	Stanislaus	2.75	2.58	2.67	2.65
37	Guadalupe	Santa Barbara	3.75	2.50	2.68	2.64
38	Morgan Hill	Santa Clara	3.00	2.50	2.67	2.63
39	Interlaken	Santa Cruz	2.75	2.50	2.67	2.63
40	Gonzales	Monterey	3.25	1.83	2.85	2.62
41	Soledad	Monterey	3.00	1.50	2.94	2.62
42	Watsonville	Santa Cruz	3.50	2.38	2.69	2.62
43	Dogtown	San Joaquin	2.25	1.63	2.88	2.60
44	Woodlands	San Luis Obispo	1.75	2.38	2.67	2.60

45	Boronda	Monterey	3.25	2.25	2.69	2.59
46	French Camp	San Joaquin	2.75	2.46	2.63	2.59
47	Escalon	San Joaquin	3.50	2.50	2.61	2.58
48	Oakdale	Stanislaus	3.75	2.50	2.61	2.58
49	Rosedale	Kern	2.25	2.88	2.50	2.58
50	Selma	Fresno	3.50	2.00	2.75	2.58

Table 3. Communities with the highest average ratings for 2011 use of all monitored pesticides. Communities within a few miles of each other are grouped together.

Community(ies)	Area (County)	Pesticide Rating
Gilroy, Prunedale, Hollister, San Martin, Salinas, King City	North Central Coast (Santa Clara, Monterey, San Benito)	3.16-2.77
Modesto, Stockton, Salida, Ripon, Lathrop, Manteca, Lodi, Keyes, Ceres	San Joaquin, Stanislaus	3.13-2.78
Shafter, Bakersfield	Kern	3.02-2.77
Fresno, Selma	Fresno	3.02-2.63
Nipomo, Santa Maria	San Luis Obispo, Santa Barbara	3.00-2.77
Camarillo, Oxnard	Ventura	2.97-2.94
Visalia	Tulare	2.74

Table 4. Communities with the highest average ratings for 2011 fumigant use (1,3-dichloropropene, chloropicrin, methyl bromide, MITC pesticides, and sodium tetrathiocarbonate).

Community(ies)	Area (County)	Pesticide Rating
Oxnard, El Rio, Camarillo, San Buenaventura, Saticoy	Ventura	3.25-2.50
Stockton, Salida, Modesto, Manteca, Ripon, Keyes, Empire, Lathrop, Ceres	San Joaquin, Stanislaus	3.00-2.63
Santa Maria, Orcutt, Nipomo, Garey, Guadalupe	Santa Barbara, San Luis Obispo	3.00-2.50
Bakersfield, Shafter, Rosedale, Delano,	Kern	3.00-2.88
Fresno	Fresno	2.75
Gilroy, Prunedale, Elkhorn, Salinas, Watsonville	North Central Coast (Santa Clara, Monterey, San Benito)	2.71-2.38

Table 5. Communities with the highest average ratings for 2011 nonfumigant use. Communities within a few miles of each other are grouped together.

Community(ies)	Area (County)	Pesticide Rating
Gilroy, Prunedale, King City, Greenfield, Hollister, Soledad, Salinas, Gonzales	North Central Coast	3.25-2.85
Stockton, Ripon, Salida, Modesto, Lathrop, Manteca, Lodi, Linden	San Joaquin/Stanislaus	3.20-2.92
Fresno	Fresno	3.10
Shafter, Wasco	Kern	3.06-2.89
Nipomo, Santa Maria	Santa Barbara/San Luis Obispo	2.96-2.92
Camarillo, Oxnard	Ventura	2.92-2.81

Table 6. ARB diazinon (diazinon + oxygen analog combined) air monitoring results and use in 2009 and comparison to 2011 air network data.

Monitoring Site	Max 4-week Concentration (ng/m^3)	Diazinon Use Within 5 mi During Monitoring (lbs/mi^2)	Diazinon Use Within 5 mi During Entire Year (lbs/mi^2)
Jul-Aug 2009 ARB			
Chualar	5.5	24.6	93.6
Gilroy	4.5	2.1	22.4
Hollister	ND*	6.1	31.5
King City	ND*	7.1	47.7
Salinas	6.1	20.2	72.6
Soledad	3.5	11.8	47.1
Feb-Dec 2011 Air Network			
Ripon	2.8	---	3.9
Salinas	8.6	---	26.0
Shafter	28.6	---	3.4

* None Detected – detection limit 0.77 and 1.8 ng/m^3 for diazinon and its oxygen analog, respectively.

Table 7. Top 20 counties for 2011 use of 32 monitored pesticides.

Rank	County	Total Pounds
1	Fresno	7,851,206
2	Kern	7,764,617
3	Monterey	4,530,441
4	Ventura	3,932,987
5	Santa Barbara	3,171,480
6	Kings	1,879,646
7	Stanislaus	1,871,666
8	Imperial	1,842,761
9	Tulare	1,781,984
10	San Joaquin	1,507,206
11	San Luis Obispo	1,356,912
12	Santa Cruz	1,320,677
13	Merced	1,241,045
14	Madera	1,224,414
15	Siskiyou	1,133,364
16	Riverside	921,166
17	Sutter	428,883
18	Butte	341,609
19	Yolo	336,062
20	Tehama	311,365

Figure 1. Locations and pesticide use ratings (2011 data) for the air monitoring network's 1,267 candidate communities.

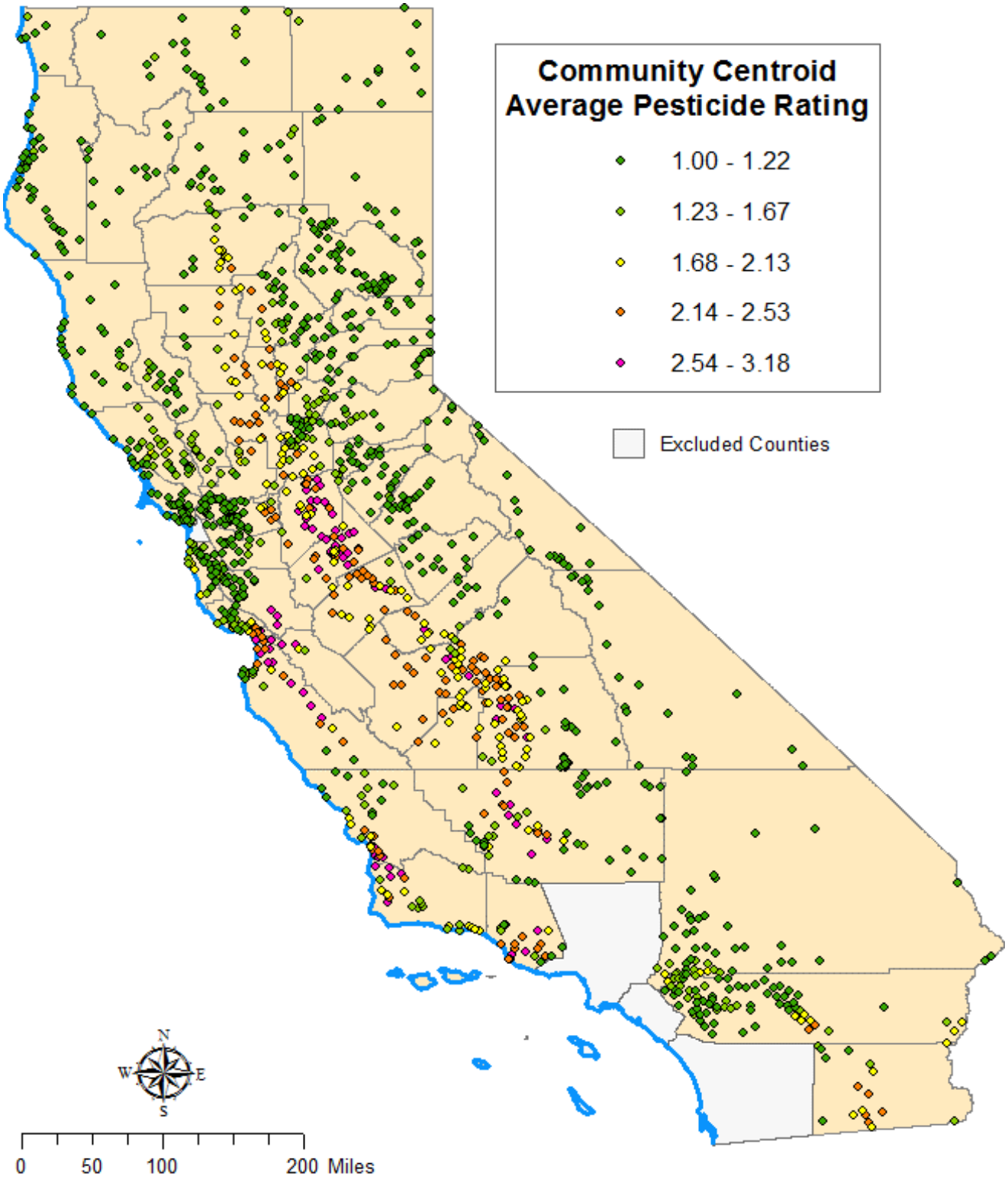


Figure 2. Community groups with the highest pesticide use ratings (2011 data).

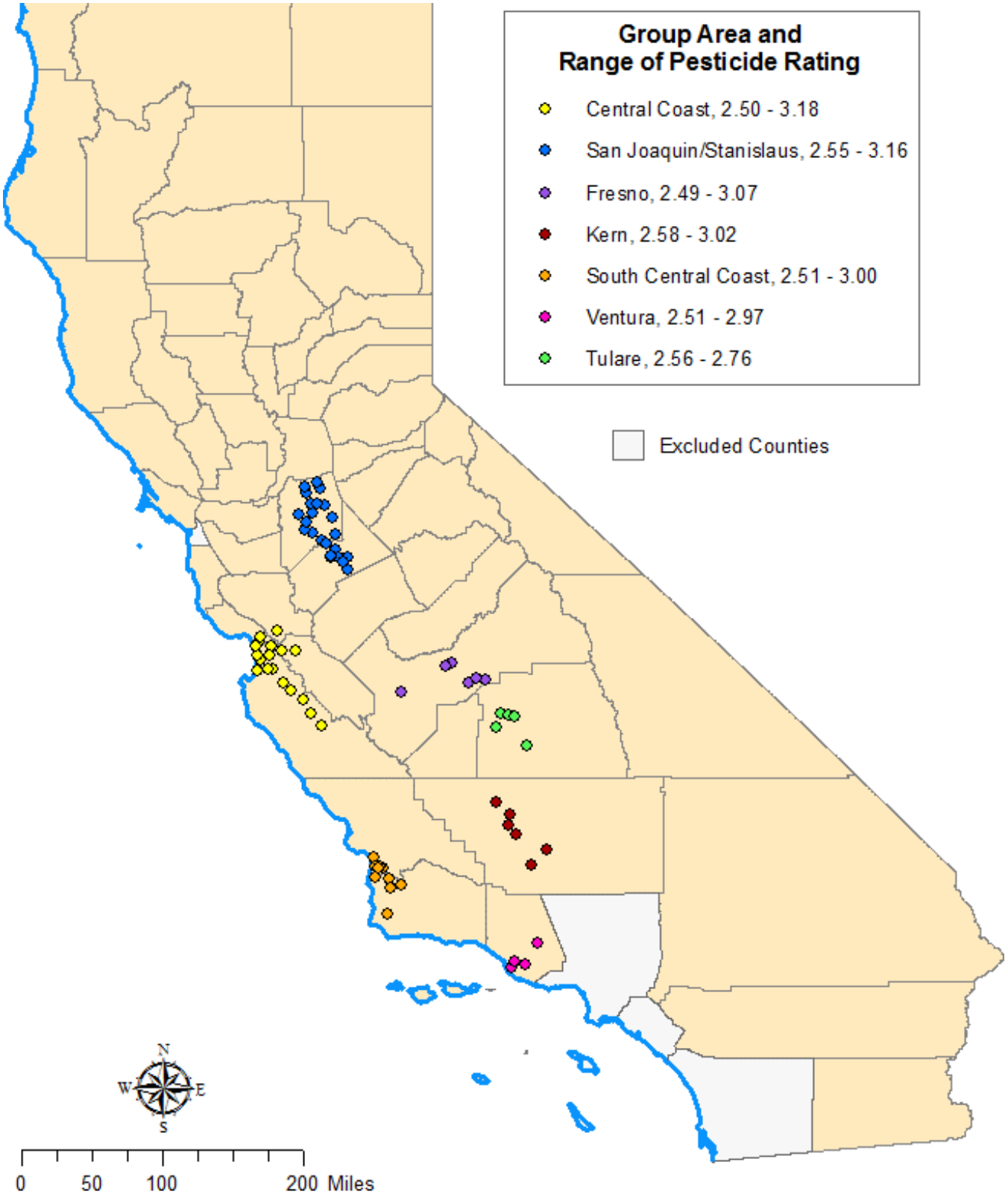


Figure 3. 2011 use of 32 monitored pesticides in the North Central Coast region.

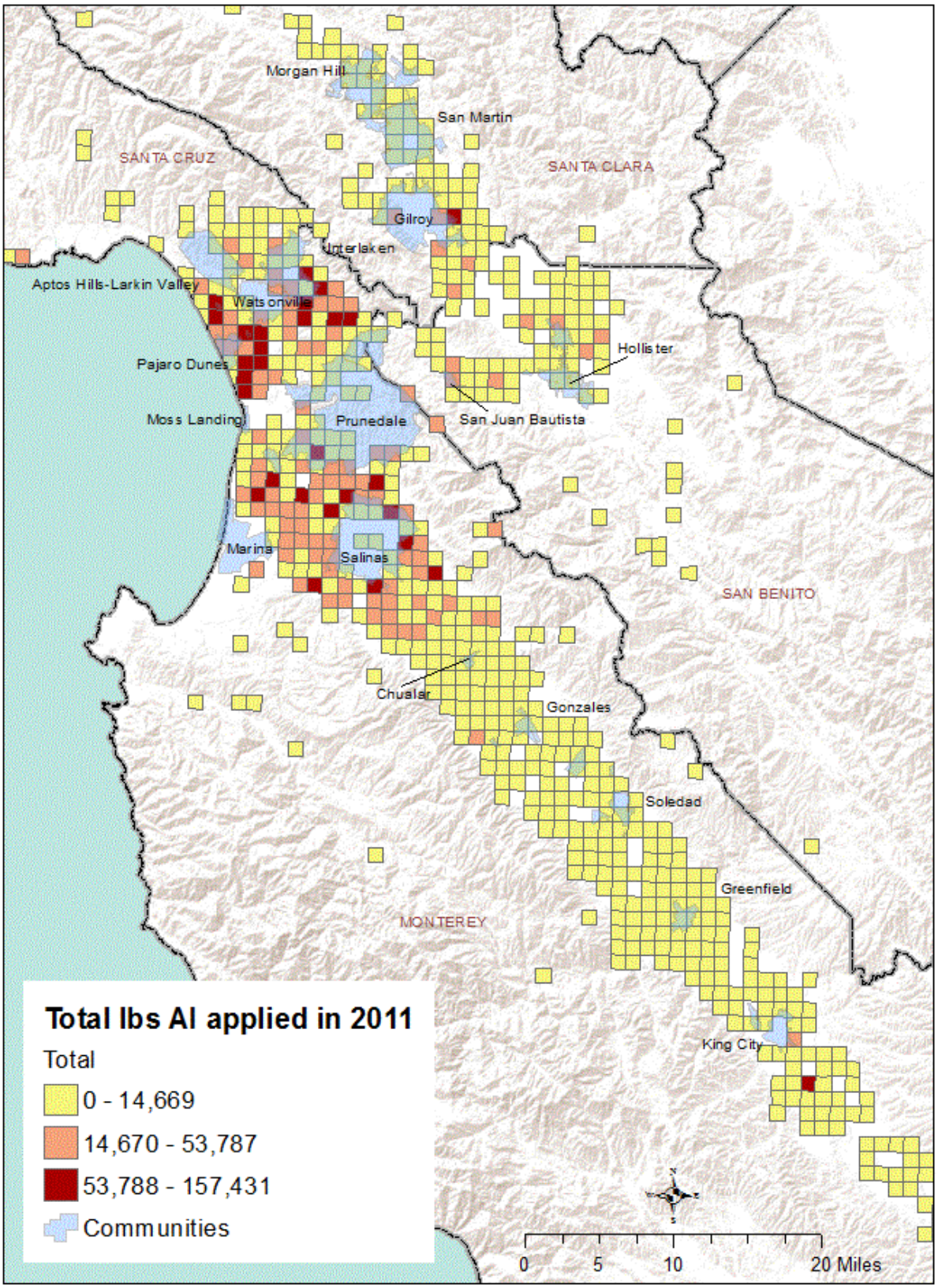


Figure 4. 2011 use of monitored fumigant pesticides in the North Central Coast region.

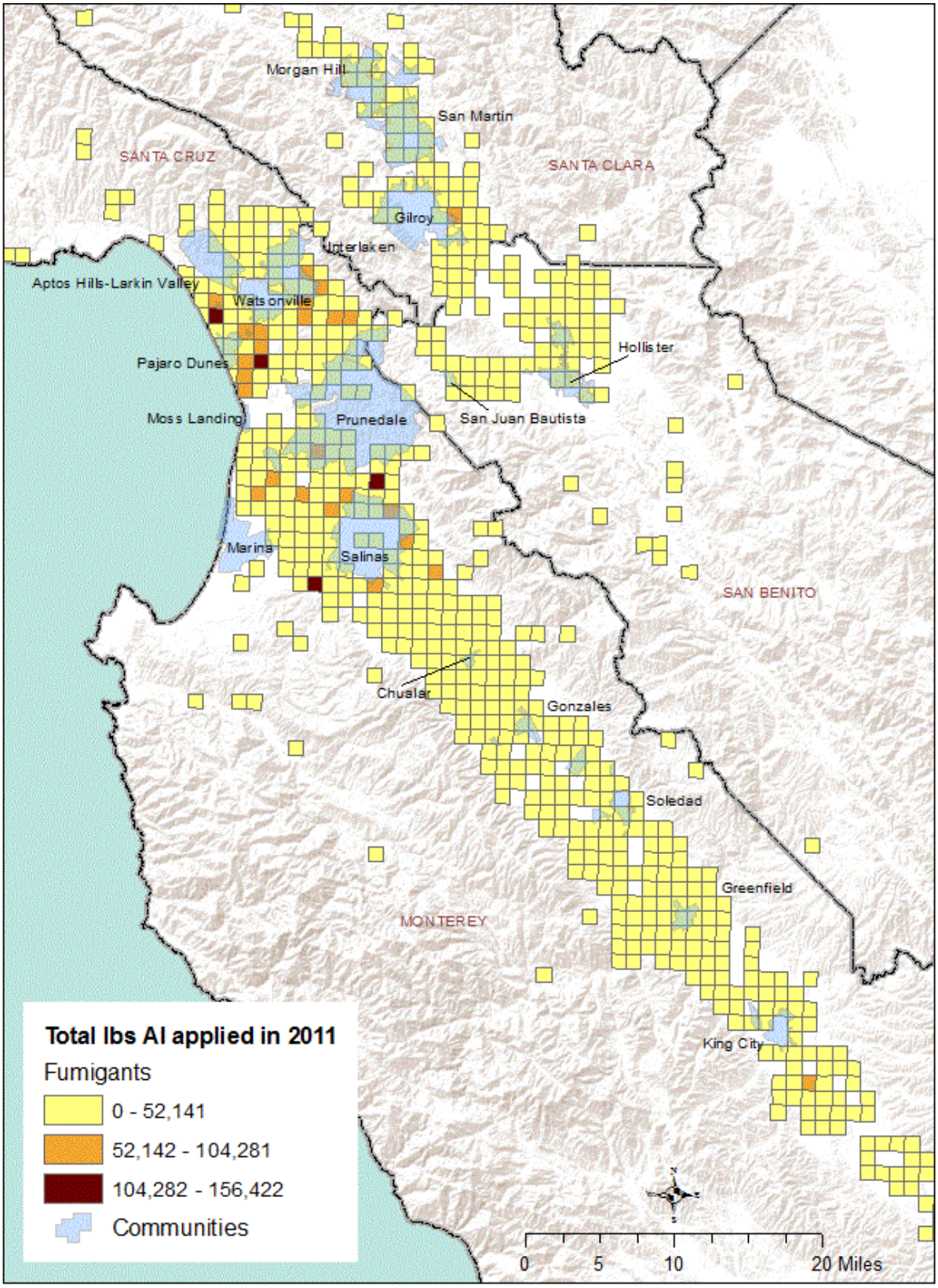


Figure 5. 2011 use of monitored nonfumigant pesticides in the North Central Coast region.

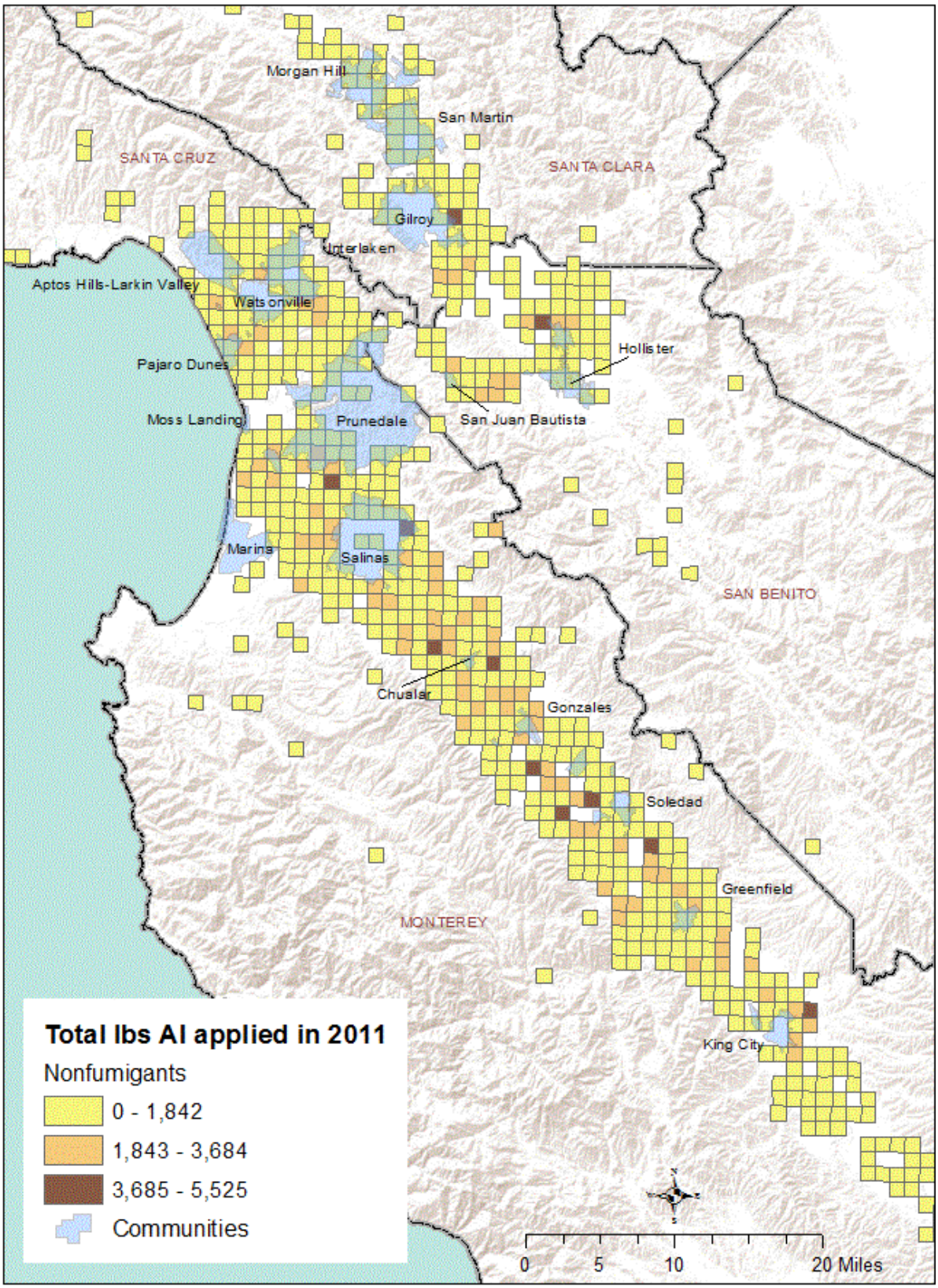
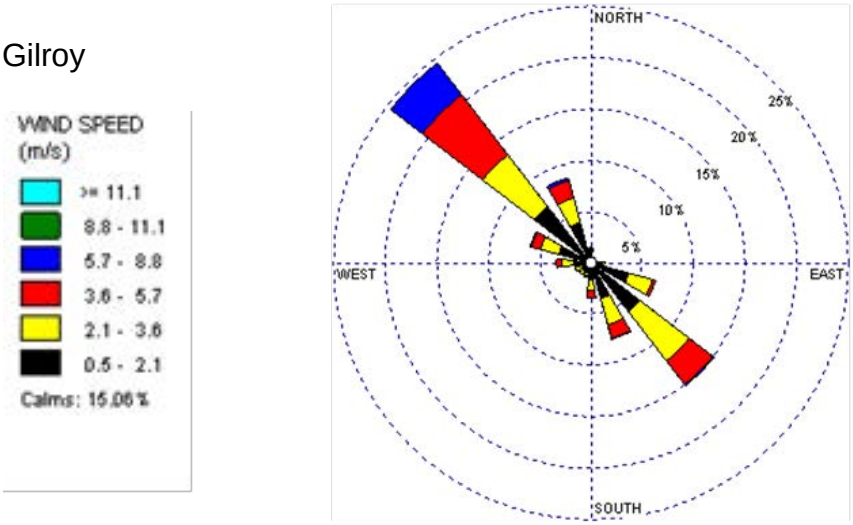
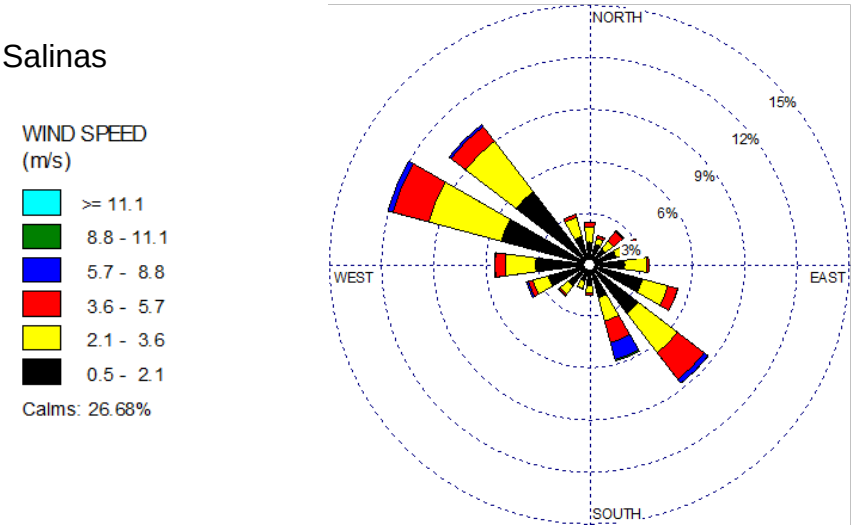


Figure 6. Wind speed and direction for the North Central Coast region.

Gilroy



Salinas



King City

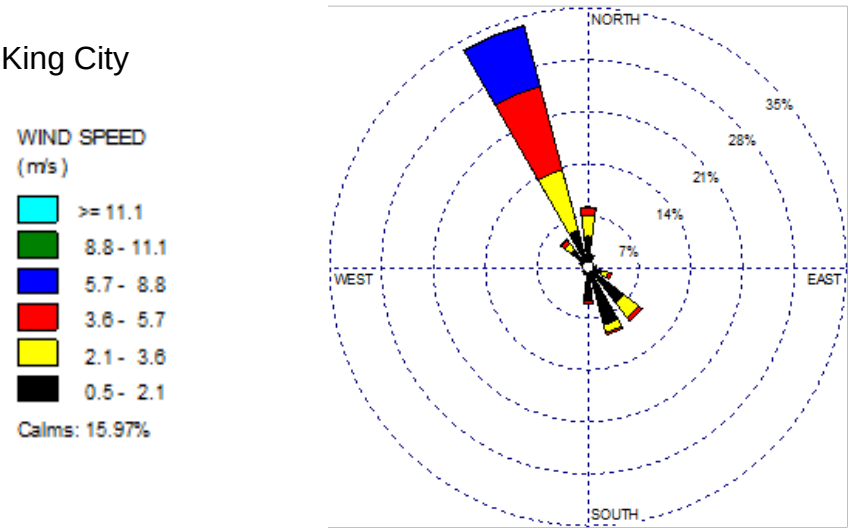


Figure 7. Maximum 4-week diazinon (diazinon + oxygen analog combined) air concentrations and diazinon use during ARB's monitoring, July 1 to August 20, 2009. ND indicates none detected, with a detection limit of 0.77 and 1.80 ng/m^3 for diazinon and its oxygen analog, respectively.

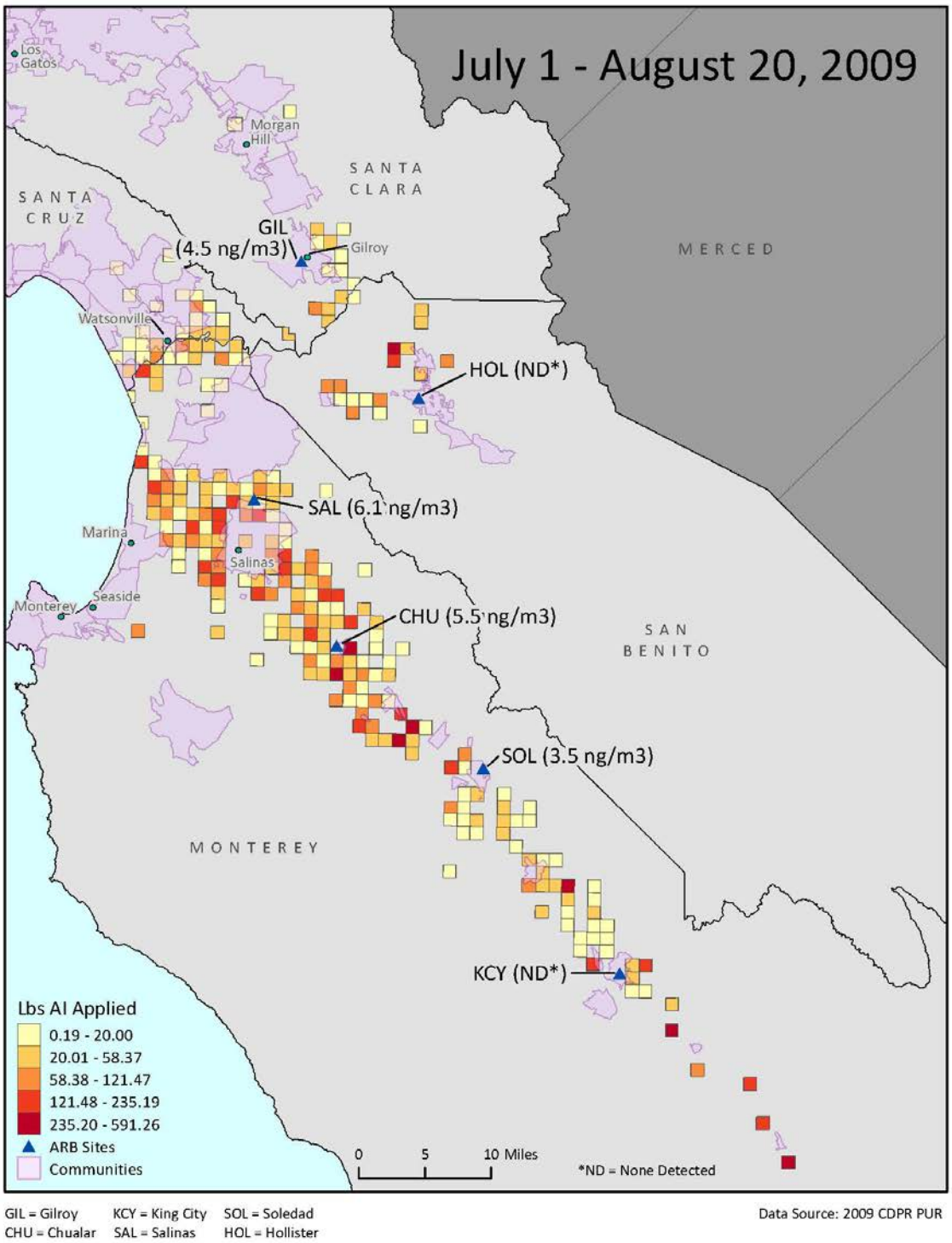
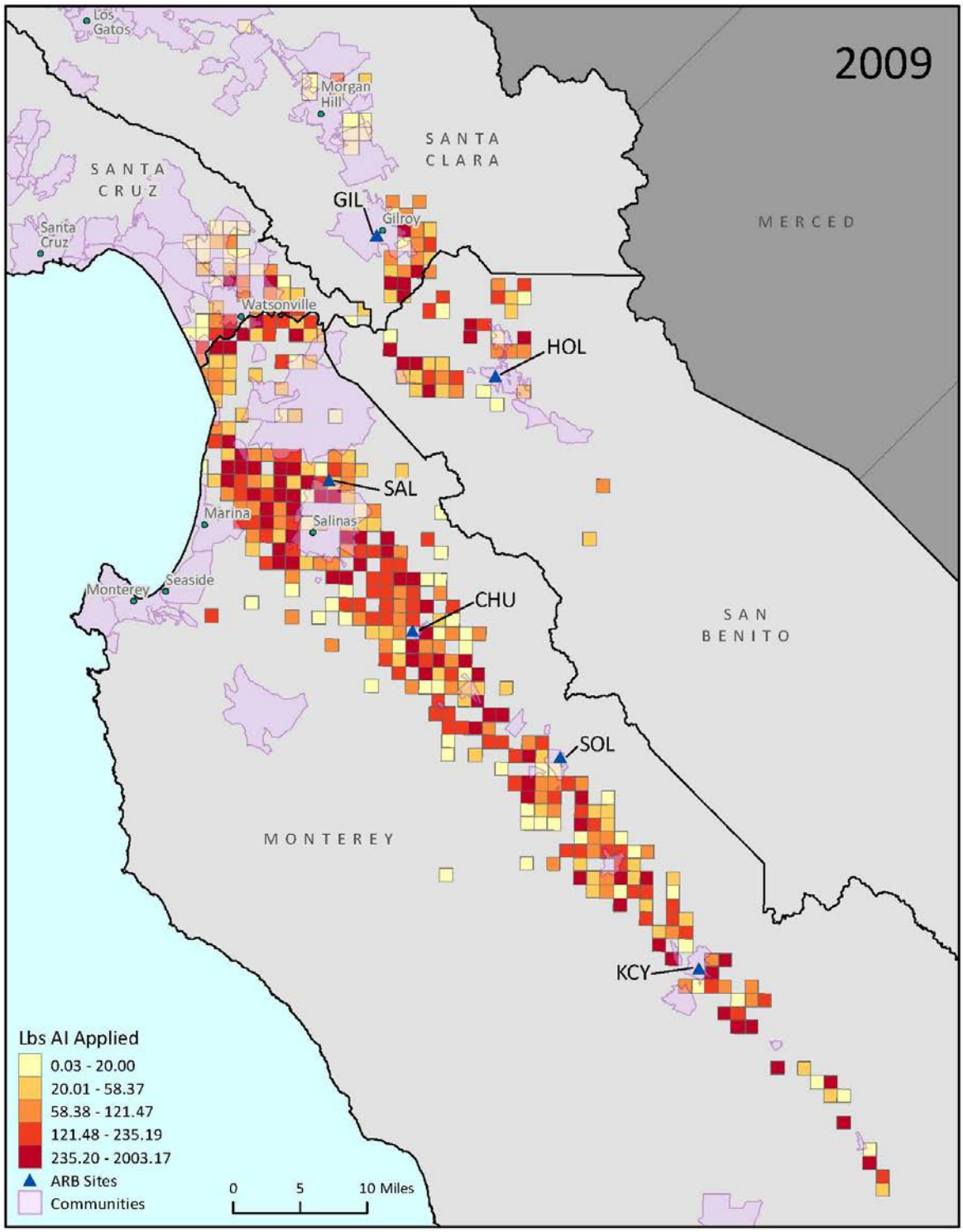


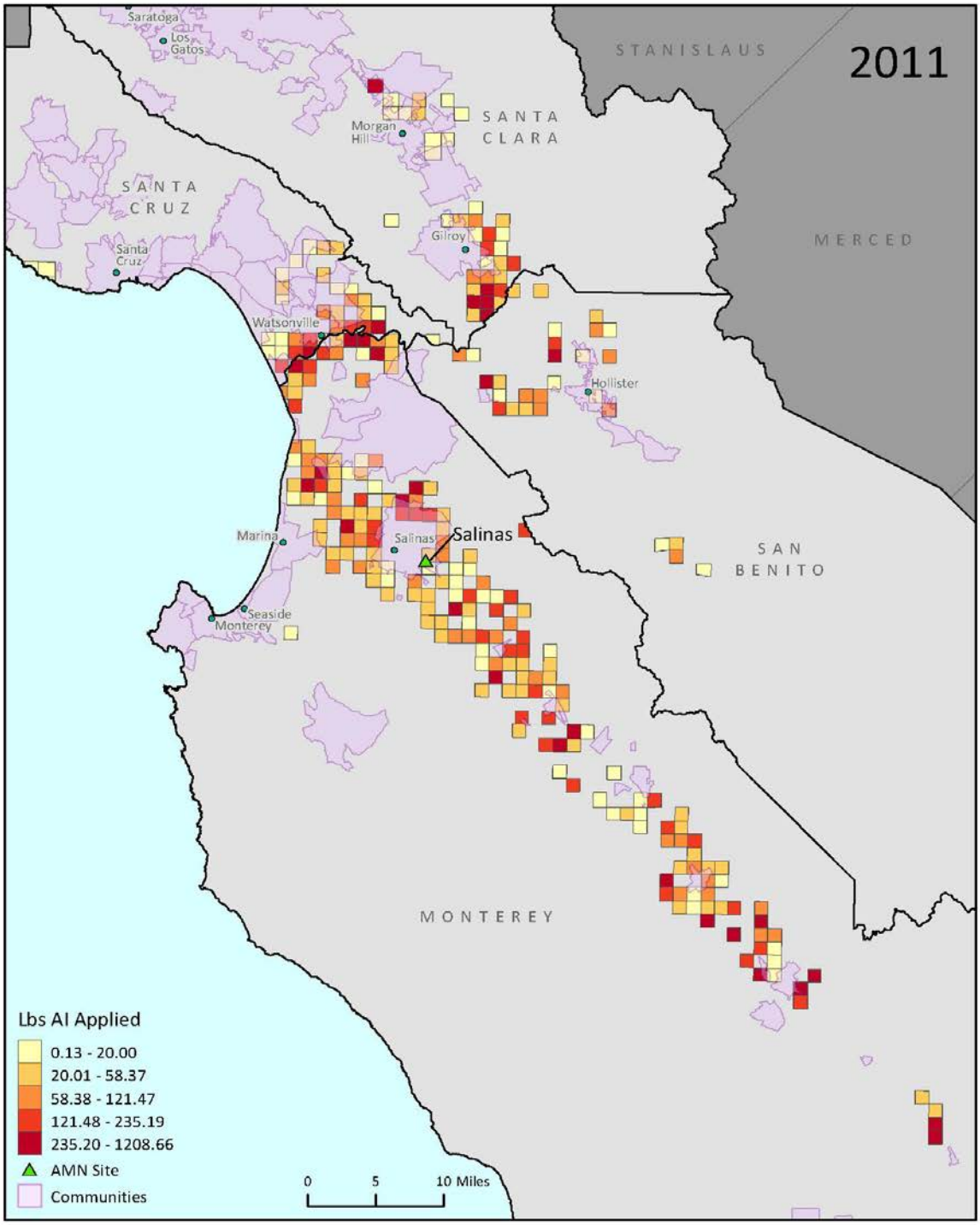
Figure 8. Diazinon use for all of 2009.



GIL = Gilroy KCY = King City SOL = Soledad
CHU = Chualar SAL = Salinas HOL = Hollister

Data Source: 2009 CDPR PUR

Figure 9. Maximum 4-week diazinon (diazinon + oxygen analog combined) air concentrations and diazinon use during the air monitoring network for all of 2011.



Data Source: 2011 CDPR PUR

Figure 10. 2011 use of 32 monitored pesticides in the San Joaquin/Stanislaus region.

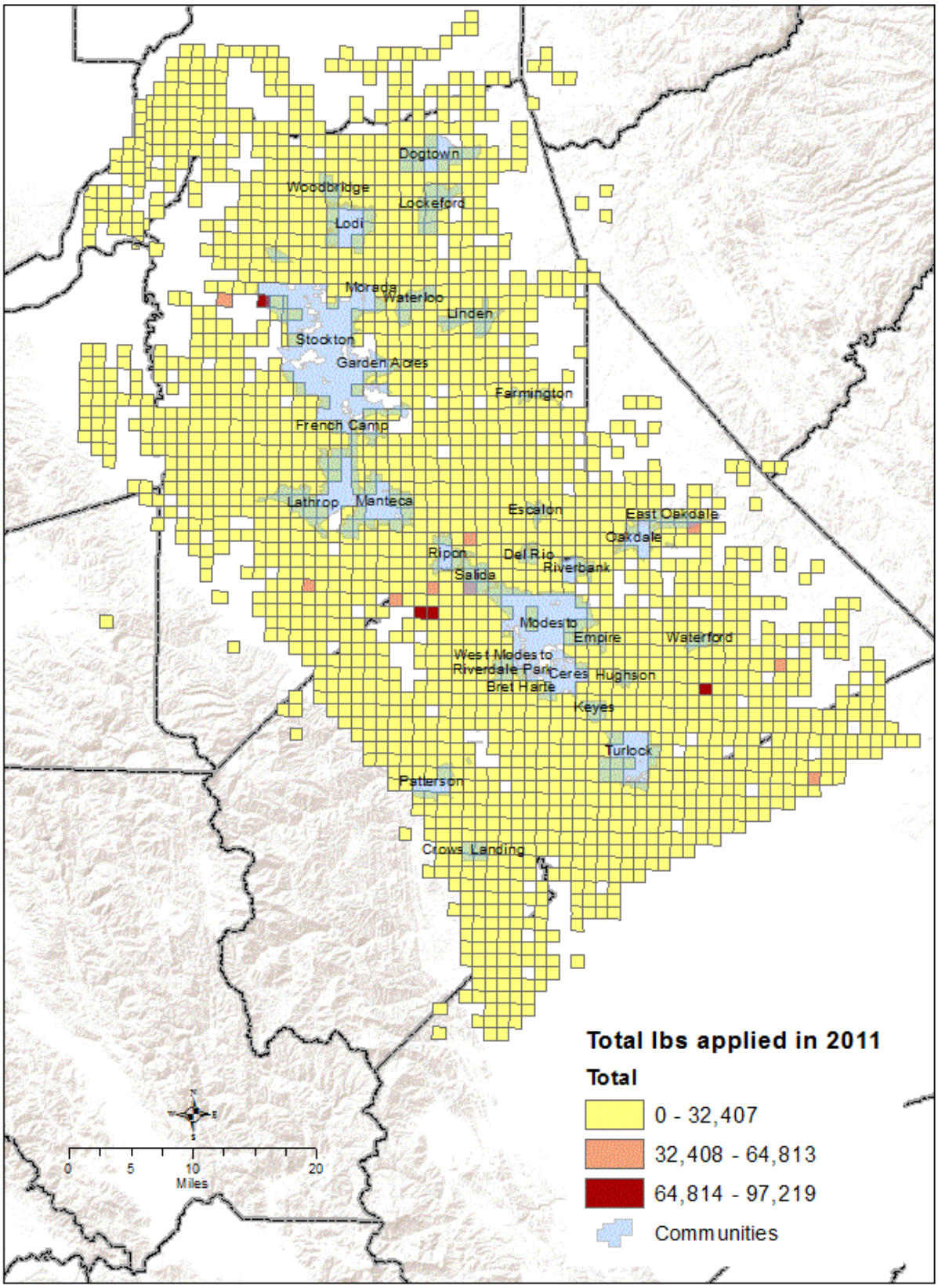


Figure 11. Wind speed and direction for Modesto.

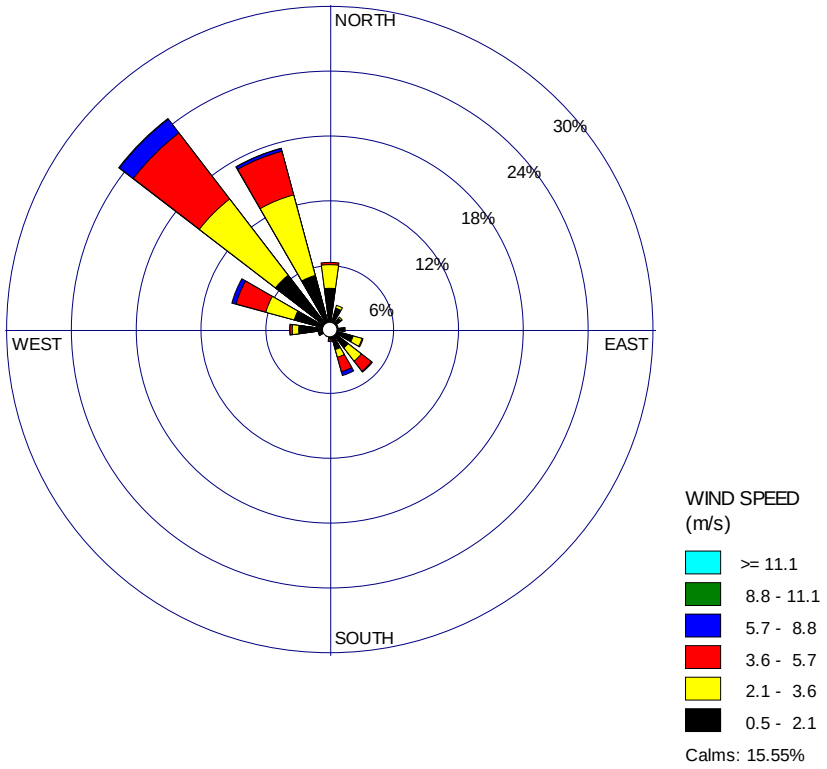
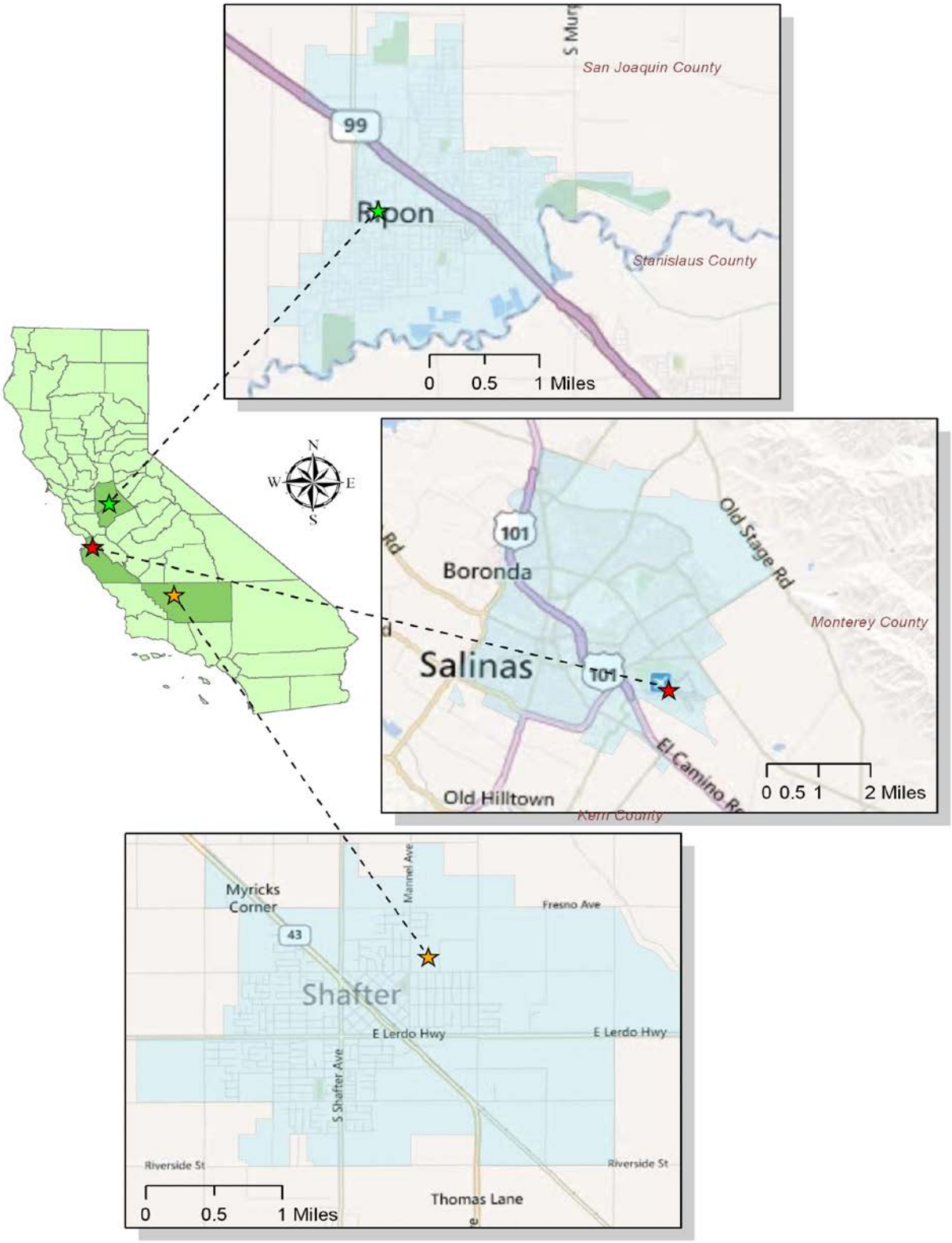



Figure 12. Locations of air monitoring network sites.