EPA/600/R-14/364| September 2014| www.epa.gov/ord

United States
Environmental Protection
Agency

R9 RARE Final Project Report Title:

Partnering with Environmental Agencies and Communities to Pilot Use of the Environmental Justice Screening Method (EJSM) Cumulative Impacts Tool

Prepared by Eric S. Hall, James Sadd,
Rachel Morello-Frosch, and Manuel Pastor

Office of Research and Development
National Exposure Research Laboratory

EPA/600/R-14/364| September 2014| www.epa.gov/ord

United States
Environmental Protection
Agency

R9 RARE Final Project Report Title:

Partnering with Environmental Agencies and Communities to Pilot Use of the Environmental Justice Screening Method (EJSM) Cumulative Impacts Tool

Prepared by Eric S. Hall, James Sadd,
Rachel Morello-Frosch, and Manuel Pastor

Office of Research and Development
National Exposure Research Laboratory

R9 RARE Final Project Report

Title: Partnering with Environmental Agencies and Communities to Pilot Use of the Environmental Justice Screening Method (EJSM) Cumulative Impacts Tool

US EPA ORD Project Officer:

Eric S. Hall

US EPA R9 Technical Advisors:

Debbie Lowe Liang, Jacquelyn Hayes, and Charles Swanson

EPA Region 9 QA Program Manager:

Eugenia McNaughton

Prepared by:

Eric S. Hall, James Sadd, Rachel Morello-Frosch, Manuel Pastor

Principal Investigators:

James Sadd, Manuel Pastor, Rachel Morello-Frosch

Project QA Manager:

James Sadd

University Collaborators/Organizations:

Occidental College, University of Southern California (USC), University of California at Berkeley (UC Berkeley)

Cooperative Agreement Number:

AE 8352800-01

Project Period:

September 1, 2012 to September 30, 2014

Disclaimer:

Summary

This is the final report of a 24-month research project. This project was awarded as a $75,000.00 cooperative agreement to Occidental College. The project began on 1 September 2012, following final approval of the funding request package by the EPA Grants Office (US EPA/GIAMD). This project is a component of EPA's Sustainable and Health Communities Research Program (SHCRP) and is a deliverable FY2014 research product.

Project Description

This research project was designed to assist EPA Region 9 (R9) and EPA ORD in identifying and acquiring information, tools, and collaborative community-based processes to help address the concerns and goals expressed by certain California communities overburdened with the cumulative impacts of exposures to multiple air pollutants. The EPA R9 Regional Science Plan describes the need for better methodologies to help EPA evaluate risks and impacts in overburdened communities. This project also responds to requests from a number of California communities wanting to address their concerns with respect to the impact of community cumulative impact effects on local, regional, and statewide regulatory decision-making.

Specifically, this project explored the application of the Environmental Justice Screening Method (EJSM), including its data sources, analytical procedures and design, and validation procedures, to help regulators and policy makers efficiently target their efforts to remediate cumulative impacts, environmental inequities, and re-focus regulatory action at the neighborhood level. The EJSM was developed and applied in a previous R9 RARE Project, which ended in July 2010 (Hall, E.S., Morello-Frosch, R.A., et al., 2011). The initial use of EJSM was in determining if certain socio-economic (vulnerability) indicators had an impact on the association between ambient air pollution exposure and certain adverse birth outcomes (e.g., low birth weight [< 2500 grams] and pre-term birth [<37 weeks]).

Currently, the burden of proof is placed on communities to demonstrate the cumulative impacts of environmental and social stressors. Cumulative Impact (CI) screening tools such as the EJSM provide environmental policy and program decision makers with a more proactive approach towards removing this burden from vulnerable communities so that those communities, usually without the history of or capacity for civic engagement, can obtain regulatory relief for the environmental exposures they experience. The EJSM can also advance regulatory evaluation and the implementation of environmental policies. As a proof-of-concept of the EJSM capabilities, and to develop guidelines about how it can/should be used, this project applied the EJSM to two pilot applications in two different California pilot communities/regions. Each region was chosen so that the EJSM could act in a supporting role to address and resolve policy relevant questions. The goal was to influence projects of local importance facing cumulative impacts and vulnerability considerations due to community exposures to environmental hazards and pollution.

In this project, there were two completely different approaches used when applying EJSM to each pilot study region in California. In the Pilot Application 1, EJSM was used in the City of Commerce. In this pilot study, EJSM was the sole Environmental Justice (EJ) Cumulative Impacts (CI) tool used to assist the City of Commerce Green Zone Working Group in developing policy recommendations for: a) creating buffer zones between environmental hazards and sensitive populations, and; b) developing land use strategies to create economic development zones for attracting new businesses and 'green' jobs for community residents.

In the Pilot Application 2, EJSM was used in the eight county region of the San Joaquin Valley (SJV). Ultimately, three cities were chosen within the SJV as the locations where ESJM would be applied: Arvin, Huron, and Stockton. The SJV is a focus area for environmental justice activity and it is a geographically diverse region that can benefit from the application of a variety of CI screening approaches to inform policymakers on: a) the local and regional patterns of where high cumulative impact "hot spots" are located and which communities are disproportionately impacted; b) determining which policy questions different CI screening approaches are best suited to answer (i.e., map each approach to the specific policy[ies] it was designed to address).

In the SJV, EJSM analysis results were compared with two additional CI screening methods that were developed by the Center for Regional Change at the University of California Davis (Cumulative Environmental Vulnerability Assessment or "CEVA") and the California Environmental Protection Agency (CalEPA) Office of Environmental Health and Hazard Assessment (OEHHA) (California Communities Environmental Health Screening Tool [CalEnviroScreen or "CES"]). This allowed the pilot communities to target areas where the three methods agreed on where the cumulative impacts were the most 'intense'.

Acronyms

AB2588	Air Toxics "Hot Spots" Information and Assessment Act – Note: the objective of the AB2588 legislation is to collect emission data from air toxics sources, identify facilities with localized impacts, assess health risks and notify affected individuals
AFSCME	American Federation of State, County, and Municipal Employees
AQMD	Air Quality Management District
AVSS	Automated Vital Statistics System
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CASIL	California Spatial Information Laboratory
CBPR	Community-Based Participatory Research
CCA	Coalition for Clean Air
CCEJN	Central California Environmental Justice Network
CDPH	California Department of Public Health
CEIDARS	California Emission Inventory Development and Reporting System
CEJA	California Environmental Justice Alliance
CES	California Communities Environmental Health Screening Tool (aka: CalEnviroScreen)
CEVA	Cumulative Environmental Vulnerability Assessment
CHAPIS	Community Health Air Pollution Information System
CI	Cumulative Impact(s)
CUGU	Clean Up Green Up
CVAQ	Central Valley Air Quality Coalition
DTSC	California Department of Toxic Substance Control
EJ	Environmental Justice
EJA	Environmental Justice Analytics
EJAF	Environmental Justice Analytics/Analytical Framework
EJSM	Environmental Justice Screening Method
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute'
EYCEJ	East Yard Communities for Environmental Justice
FOI	Facilities of Interest
FTP	File Transfer Protocol
GEP	Google Earth Pro
GIAMD	Grants and Interagency Agreement Management Division (EPA)
GIS	Geographic Information System
GPS	Global Positioning System
KML	Keyhole Markup Language
NAICS	North American Industrial Classification System
NATA	National Scale Air Toxics Assessment
NERL	National Exposure Research Laboratory
NTAD	National Transportation Atlas Database
OEHHA	Office of Environmental Health and Hazard Assessment (CalEPA)
OPR	(the Governor of California's) Office of Planning and Research
ORD	Office of Research and Development
PERE	Program for Environmental and Regional Equity (USC)
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
R9	Region 9 (EPA)

RARE	Regionally Applied Research Effort
RSEI	Risk Screening Environmental Indicators
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SHCRP	Sustainable and Health Communities Research Program
SJV	San Joaquin Valley
SJV-APCD	San Joaquin Valley Unified Air Pollution Control District
SJV-CHIP	San Joaquin Valley Cumulative Health Impacts Project
TIGER	Topologically Integrated Geographic Encoding and Referencing system
TRI	Toxic Release Inventory
UC	Berkeley University of California at Berkeley
USC	University of Southern California
USGS	United States Geological Survey
ZCTA	Zip Code Tabulation Area(s)

Table of Contents

1.0 Introduction 1

2.0 Project Details 5

3.0 Pilot Application 1: City of Commerce 7

4.0 Pilot Application 2: San Joaquin Valley (SJV) Pilot Community 9

5.0 Pilot Application 1: City of Commerce Working Group Meetings (Recap) 19

6.0 Pilot Application 2: San Joaquin Valley (SJV) Pilot Community Interactions 25

7.0 Pilot Application 1: City of Commerce Working Group Recommendations 29

8.0 Pilot Application 2: San Joaquin Valley (SJV) Site Selection Process 31

9.0 Pilot Application 2: San Joaquin Valley (SJV) Detailed Region/Site Maps 35

9.5 Summary 53

10.0 References 55

APPENDIX A: SJV (Pilot 2 Application) Webinar A-1

APPENDIX B:City of Commerce Planning Commission Green Zone Policy Report B-1

APPENDIX C: Response to Comments – R9 RARE Project Comparing Three Screening Methods win the San Joaquin Valley C-1

APPENDIX D: City of Commerce Green Zones Working Group Opportunity Areas (Map) D-1

Appendix E: Conference Agenda – Central California Environmental Justice Network: Roots of Resilience, 2014 . . . . . E-1

List of Figures

Figure 1. Distribution of screening CI scores for the SJV region by population and area: EJSM. 11

Figure 2. Distribution of screening CI scores for the SJV region by population and area: CES.. 11

Figure 3. Distribution of screening CI scores for the SJV region by population and area: CEVA. 11

Figure 4. CES Score (SJV and Statewide) Versus Population (ZCTA) 26

Figure 5. CEVA Score (SJV) versus Population (Census Block Group) and EJSM Score Versus Population (Census Tract) 27

List of Maps

Map 1. Land Use in the City of Commerce classified by aggregating standard Anderson Land Use urban classes into groups that reflect the pilot application. 7

Map 2. Proposed buffers surrounding sensitive land uses as a land use planning tool to ensure separation from air pollution point and area sources. Area inside inset rectangle shown in Map 3, below. 8

Map 3. Proposed buffers surrounding sensitive land uses in the Washington/Atlantic Blvd. corridors, a special focus area recognized by the Working Group both for protection/separation of residential and sensitive land uses from air pollution sources, but also for business development and "green design" amenities. 8

Map 4a. EJSM scores for the SJV: Mapped using census tracts to allow comparison with other screening methods. 10

Map 4b. CEVA scores for the SJV: Mapped using census block groups for comparison with other screening methods. 10

Map 4c. CES group scores for the SJV: Mapped using 2010 zip code tabulation areas (ZCTAs) for comparison with other screening methods. ZCTAs that extend outside the eight SJV counties have been clipped so that colored polygons do not extend outside the boundaries of the defined comparison area. 10

Map 5a. Top Population Quantile - Kern Co. 12

Map 5b. Top Population Quantile Central SJV. 13

Map 5c. Top Pupulation Quantile Northern SJV 13

Map 6a "High Decile" - Kern Co. 15

Map 6b. "High Decile" - Central SJV. 16

Map 6c. "High Decile" - Northern SJV 16

Map 7a_1. Fresno and Selma, CA 17

Map 7b_1. Stockton, CA. 17

Map 7a_2. Bakersfield 17

Map 7b_2. Modesto, CA. 17

Map 7c. Merced (all 3 methods overlap/agree) 18

Map 8. City of Commerce (2013). 21

Map 9. EFFECTIVENESS OF CURRENT CITY ZONING PRACTICE IN SEPARATING AIR QUALITY HAZARDS FROM SENSITIVE LAND USES [Facilities of Concern – 300 foot Buffer in the City of Commerce] 22

Map 10. EFFECTIVENESS OF CURRENT CITY ZONING PRACTICE IN SEPARATING AIR QUALITY HAZARDS FROM SENSITIVE LAND USES [Facilities of Concern – 1000 foot Buffer in the City of Commerce] 23

Map 11. EJSM Ground-Truthing Locations in the SJV 31

Map 12. Map of San Joaquin Valley Region. 32

Map 13. Map of San Joaquin Valley showing three areas where ground-truth validation was completed. 33
Map 14. Map of San Joaquin Valley Region. 35
Map 15. Map of San Joaquin Valley showing three areas where ground-truth validation was completed. 37
Map 16. Arvin study area showing location and types of facilities identified from standard public databases. 38
Map 17. Arvin study area showing location and types of facilities validated using ground-truthing. . . . 39
Map 18. Huron study area showing location and types of facilities identified from standard public databases. 40
Map 19. Huron study area showing location and types of facilities validated using ground-truthing. Locational error shown as black lines connecting original and corrected positions. 42
Map 20. Huron study area showing location and types of new facilities (not part of original standard public databases) discovered during ground-truthing. 42
Map 21. Stockton study area showing location and types of facilities identified from standard public databases. Note locations of duplicate and missing facility records. 43
Map 22. Stockton study area showing location and types of facilities validated using ground-truthing. New facilities are shown in yellow. 43
Map 23. EJSM total score for San Joaquin Valley prior to ground-truth correction. 45
Map 24. Locational error for California DTSC permitted hazardous waste handling facilities and generators located in the San Joaquin Valley.. 46
Map 25. California DTSC permitted hazardous waste handling facilities and generators in San Joaquin County showing locational error in reported positions. Facility boundaries are shown as violet-colored polygons. 47
Map 26. California Air Resources Board “Facilities of Interest” (FOI) locations in the San Joaquin Valley, showing location corrections. 47
Map 27. EJSM total CI score for San Joaquin Valley prior to ground-truth correction. 48
Map 28. EJSM Hazard Proximity CI Scores (Arvin, Huron, and Stockton) before and after ground-truth correction of facility location and status. 48
Map 29. EJSM Total CI Scores (Arvin, Huron, and Stockton) before and after ground-truth correction of facility location and status. 49

List of Tables

Table 1. Land Use and Hazard Proximity Indicators 2

Table 2. Air Pollution Exposure and Health Risk Indicators (all at Census tract levels) 3

Table 3. Social and Health Vulnerability Indicators (all at Census tract levels). 3

Table 4. Project Schedule 5

Table 5. Project Budget. 5

Table 6. Participants in November 1, 2012 Meeting of Project Partners 10

Table 7. Screening Scores by Aggregate Population 12

Table 8. Screening Scores by Aggregate Population 14

Table 9. Facilities in Huron study area with location correction greater than 100 meters.. 41

Table 10. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers.. 44

Table 11. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers.. 49

Table 12. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers (continued). 50

Table 13. PowerPoint Presentation - Webinar Agenda A-2

Table 14. PowerPoint Presentation - Webinar Goals A-2

Table 15. PowerPoint Presentation - Project Goals A-2

Table 16. PowerPoint Presentation - Project Team and Partners A-3

Table 17. PowerPoint Presentation - Project Timeline A-3

Table 18. PowerPoint Presentation - Project Timeline (continued) A-4

Table 19. PowerPoint Presentation - Title. A-4

Table 20. PowerPoint Presentation - Summery of Presentation A-4

Table 21. PowerPoint Presentation - Abbreviations A-4

Table 22. PowerPoint Presentation - EJSM A-5

Table 23. PowerPoint Presentation - CEVA A-5

Table 24. PowerPoint Presentation - CES. A-6

Table 25. PowerPoint Presentation - Difference Among Methods A-6

Table 26. PowerPoint Presentation - Comparison Table of Indicators A-7
Table 27. PowerPoint Presentation - How comparison was done A-7
Table 28. PowerPoint Presentation - How comparison was done A-8
Table 29. PowerPoint Presentation - How comparison was done A-8
Table 30. PowerPoint Presentation - Q/A Process used A-9
Table 31. PowerPoint Presentation - Preliminary Result A-9
Table 32. PowerPoint Presentation - EJSM Scores A-9
Table 33. PowerPoint Presentation - Distribution of scores A-9
Table 34. PowerPoint Presentation - CES SJV Distribution of Group by area and population A-10
Table 35. PowerPoint Presentation - CEVA Scores - San Joaquin Valley A-10
Table 36. PowerPoint Presentation - Summary - Distribution of scores A-11
Table 37. PowerPoint Presentation - Location of “hot spots” A-11
Table 38. PowerPoint Presentation - Screening Scores by Aggregate Population “ Top Quantile” A-12
Table 39. PowerPoint Presentation - Map 6a “High Decile” - Kern Co. A-12
Table 40. PowerPoint Presentation - Map 6b “High Decile” - Central SJV A-13
Table 41. PowerPoint Presentation - Map 6c A-13
Table 42. PowerPoint Presentation Summary - High Quantile. A-14
Table 43. PowerPoint Presentation - Areas Identifies by all Three Methods A-14
Table 44. PowerPoint Presentation - Areas Identifies by all Three Methods A-15
Table 45. PowerPoint Presentation Areas - Identifies by all Three Methods A-15
Table 46. PowerPoint Presentation - Areas Identifies by all Three Methods A-16
Table 47. PowerPoint Presentation - Areas Identifies by all Three Methods A-16
Table 48. PowerPoint Presentation - Areas Another way to examine areas identified by all three methods A-17
Table 49. PowerPoint Presentation - Areas Northern SJV, Stockton Area A-17
Table 50. PowerPoint Presentation - Northern SJV, Modesto Area A-18
Table 51. PowerPoint Presentation - Central SJV, Fresno A-18
Table 52. PowerPoint Presentation - Central SJV, Tulare Area A-19
Table 53. PowerPoint Presentation - Southern SJV, Bakersfield A-19

1.0 Introduction

In this final report, we discuss, describe, present and/or explain the following key elements of this research project:

1. Pilot Application Areas (California)
    a. City of Commerce (and Green Zones Working Group)
    b. San Joaquin Valley (SJV)
        i. Arvin
        ii. Huron
        iii. Stockton
2. Cumulative Index (CI) Screening Methods
    a. Environmental Justice Screening Method (EJSM)
    b. California Communities Environmental Health Screening Tool (CES)
    c. Cumulative Environmental Vulnerability Assessment (CEVA)
3. Comparison of the three CI Screening Methods
    a. Distribution of screening CI scores (focusing on population and area)
    b. Determining how to define 'extreme' CI scores
    c. Assess statistical regions (decile, quintile) where 'extreme' CI scores are comparable
    d. Determining the geographic areas where 'extreme' CI scores are comparable
4. Impact of ZCTA/Census Tracts/Census Block Groups on CI Scoring
5. Community Interactions and Organizational Partnerships
6. Webinar to Explain the three CI Screening Methods to the SJV Community

This research project represents first major step forward in the development of an approach towards the assessment and characterization of Environmental Justice (EJ) communities known as Environmental Justice Analytics or Environmental Justice Analysis (EJA). EJA is defined as the application of models, tools, databases, and information resources in a coordinated, organized, well-defined process to analyze the multiple risks from air pollutants and hazards (including those caused by land use/land use policies) and the resultant cumulative impacts (CI) that influence the environmental exposures experienced by vulnerable individuals and communities. The EJA approach provides a procedure and guidance on how to apply a single CI screening methodology/tool/approach to assess the impact of environmental (air pollution) hazards on what is termed 'sensitive receptors' (CARB, 2005). There are a number of data and information resources from local, regional, state and national sources that can be used in an EJA assessment, but the most useful (and common) ones include as a minimum: a) land use and land use databases (e.g., SCAG [derived from Anderson], USGS Land Cover Database, California Department of Education, etc.); b) facility databases (e.g., CASIL); c) commercial {business} databases (e.g., Dunn and Bradstreet [NAICS Codes], ESRI Business Analyst, etc.); d) toxicity databases/models; e) hazard proximity/exposure information; f) traffic proximity/exposure information; g) air pollution exposure and health risk information (e.g., from models and air pollution monitors [air pollution concentration data]); h) social and health vulnerability information (e.g. from US Census data); i) birth outcome data (e.g., California Department of Public Health AVSS) ; j) aerial imagery; k) street maps; l) GIS spatial/geospatial analysis (e.g., ESRI ArcGIS); n) Google Earth resources (e.g., Google Earth Pro, *.kml files, etc.); m) GPS (i.e., GPS receivers used to validate location [GPS coordinates] of facilities during "ground truthing" [verification of facility location] activity; n) webpage (i.e., to view/compare areas of low, moderate, and high cumulative impacts). The use of mathematical and statistical analysis tools and techniques to quantify CI on various communities, along with the resultant analysis and assessment, is the final and most important component of EJA (Hall, E.S., Morello-Frosch, R. A., et al., 2011).

Communities are exposed simultaneously to physical environmental hazards or risks (e.g., air pollution), socioeconomic influences (e.g., education, family income), and psychosocial risks (e.g., linguistic isolation), resulting in cumulative impacts which can exacerbate health outcomes for vulnerable individuals and subpopulations (CARB, 2005). Application of an EJA approach is designed to provide an objective way to quantify and characterize the CI effects and potential vulnerabilities experienced by communities and to provide information, which can be used to inform local, regional, and state-level policymakers on the potential impacts of land use changes and decisions on affected communities. This is accomplished through the calculation of the CI score for a specified geographic region(s) where a vulnerable community is located. The size/extent of geographic regions that can be assessed through EJA includes but is not limited to: a) ZCTA (Zip Code Tabulation Areas); b) US Census Blocks; c) US Census Block Groups; d) US Census Tracts; e) real estate tax parcel, etc. The TIGER system is used to define the boundary of US Census Tract and US Census Block files. ESJM was developed to

Table 1. Land Use and Hazard Proximity Indicators

Indicator	Indicator Subtopic	Indicator Subtopic	GIS Spatial Unit	Information Source
Land Use and Hazard Proximity	Sensitive Land Uses	Childcare Facilities	Land Use Polygons	SCAG 2008
			Buffered Points	Dunn and Bradstreet (by NAICS code)
		Heath Care Facilities	Land Use Polygons	SCAG 2008; CASIL
		Schools	Land Use Polygons	SCAG 2008
			Buffered Points	CA Dept of Education
		Urban Playgrounds	Land Use Polygons	SCAG 2008
	Air Quality Hazards	CHAPIS Facilities	Point Locations	CARB
		Chrome-Plating Facilities	Point Locations	CARB
		Hazardous Waste	Point Locations	DTSC
	Hazardous Land Uses	Railroad Facilities	Land Use Polygons	SCAG 2008
			Line Features	NTAD
		Ports	Land Use Polygons	SCAG 2008
		Airports	Land Use Polygons	SCAG 2008
			Line Features	NTAD
		(Petrochemical) Refineries	Land Use Polygons	SCAG 2008
		Intermodal Distribution	Land Use Polygons	SCAG 2008
			Line Features	NTAD

implement the EJA approach and accomplishes this through the procedure used to apply ESJM in specific CI community assessment scenarios.

EJSM is applied using the following general steps when conducting a CI community assessment: i) data resources a) through m) listed above [excluding l)] are used as inputs to the GIS spatial assessment; ii) ESRI Arc GIS is used to conduct the GIS spatial assessment; iii) the outputs of i) and ii) are incorporated into a GIS map (process: land use is provided [in m^2] and the land use polygons [e.g., facility, school, etc., location and extent] are 'intersected' with the Census polygons [blocks, block groups, tracts], and the Census polygons are used to obtain the CI score, which determines the degree of adverse exposure[s] experienced by a community). The CI score is obtained through the CI scoring algorithm, which is implemented as follows: 1) [Land Use and Hazard Proximity Indicators] points are allocated to Census polygons and sensitive land use areas (1 point for each); 2) a proximity analysis (distance-weighted) is performed by counting the number of hazards within each distance band/buffer (determined by 2005 CARB Handbook), where the hazards are weighted, based on which buffer they reside in, as follows: 0-1000 feet (100% - [multiple: 1.0]); 1000 – 2000 feet (50% - [multiple: 0.5]); 2000 – 3000 feet (10% - [multiple: 0.1]); 3) hazard proximity indicators are calculated by inserting the distance-weighted hazards into the appropriate Census polygon; 4) an estimate of the population in each CI polygon (by Census block: for eventual CI score) is aggregated to the Census tract level (Note: there are approximately 3500 Census tracts in California, [Hall, E.S., Morello-Frosch, R. A., et al., 2011]); 5) each CI polygon receives a score of 1 [low] to 5 [high], which is area-weighted to the population and then population-weighted to the appropriate Census tract; 6) the same algorithm described in 1) through 5) above is applied to: a) [Air Pollution Exposure and Health Risk Indicators] and, b) [Social and Health Vulnerability Indicators]; 7) the Land Use and Hazard Proximity Indicator Scores, Air Pollution Exposure and Health Indicator Scores and Social and Health Vulnerability Indicator Scores are added together (each CI polygon receives a score of 1 [low] to 5 [high]), meaning that a CI polygon can obtain a minimum CI score of 3 (1 for each of the three indicators) to a maximum CI score of 15 (5 for each of the three indicators). The Land Use and Hazard Proximity Indicators are shown in Table 1. The Air Pollution Exposure and Health Risk Indicators are shown in Table 2. The Social and Health Vulnerability Indicators are shown in Table 3.

An EJ cumulative risk framework was developed during the implementation phase of the Pilot Application 2 (SJV Community) to facilitate the comparison of two or more different CI screening methods being applied to the same geographic area(s). The Environmental Justice Analysis Framework (EJAF) is used in a scenario where different CI screening methods are normalized (harmonized) in their implementation details to: a) determine geographic areas containing locations where there is a high level of mutual agreement or correlation of CI scores (especially where 'high-end' cumulative impacts [e.g., "hot-spots"] are indicated by multiple CI screening methodologies); b) indicate the specific geographic regions where each CI screening method is optimal or provides the information best suited to the community and/or policy issue; c) apply the

Table 2. Air Pollution Exposure and Health Risk Indicators (all at Census tract levels)

Indicator	Indicator Subtopic	Information Source
Air Pollution Exposure and Health Risk	RSEI toxic concentration hazard source (from TRI information)	US EPA 2007
	NATA respiratory hazard, air toxics, mobile/stationary	US EPA 2002
	CARB estimated cancer risk, air toxics, mobile/stationary (from CEIDARS information)	CARB 2001
	$PM_{2.5}$ estimated concentration from monitoring	CARB 2009
	Ozone (O_3) estimated concentration from monitoring	CARB 2009

Table 3. Social and Health Vulnerability Indicators (all at Census tract levels)

Indicator	Indicator Subtopic	Information Source
Social and Health Vulnerability	% minorities (in the total population of non-Hispanic whites)	US Census 2010
	% below 2X national poverty level	US Census 2010
	% living in rented households (**Home Ownership**)	US Census 2010
	% > age 24 with < high school diploma (**Educational Attainment**)	US Census 2010
	% < age 5 (**Age of Residents**)	US Census 2010
	% > age 60 (**Age of Residents**)	US Census 2010
	% > age 4 years when no one in the household > age 15 speaks English well (**Linguistic Isolation**)	US Census 2010
	% votes cast in 2008 general election (**Voter Turnout**)	UC Berkeley Statewide Database

output of multiple CI screening methods in a coordinated fashion to inform and guide specific policy decision scenarios (e.g., land use planning/zoning, new residential, commercial, and/or transportation planning, environmental remediation, etc.); d) develop a standard process for implementing an EJ analysis using multiple CI screening methodologies to ensure that the CI scores (for the same geographic region) obtained from each method can be compared and provide the same general indications (i.e., yield an 'apples-to-apples' comparison). The complete details of the implementation of the EJAF in this research project are provided in the section describing Pilot Application 2 (SJV Community).

2.0
Project Details

The programmatic details of this project are presented in this section. The project was funded and managed by EPA's Office of Research and Development (ORD), through its National Exposure Research Laboratory (NERL) located in Research Triangle Park North Carolina. This research is implemented under EPA's RARE (Regionally-Applied Research Effort) Project initiative, where ORD works in collaboration with technical experts in the EPA Regions (1 through 10) to develop and implement research projects focused on providing scientific assistance and solutions for high-priority regional issues. This project was designed as a cooperative agreement (awarded to Occidental College with UC Berkeley and USC as additional university collaborators) where EPA personnel contribute substantive effort towards the implementation of the research in conjunction with the university collaborators, unlike a research grant where the grantees do not work jointly on research with government personnel. The research tasks as outlined in the project workplan (research plan) are provided below.

Task 1. Develop work plan

Task 2. Scoping Meeting; Select pilot application sites

Task 3. Pilot Application Planning and Design meetings and training workshops

Task 4. Ground truth field work and data collection, location, verification

Task 5. Analyze Data

Task 6. Hold Community meetings to review results and policy implications

Task 7 Prepare revisions based upon feedback and review; draft journal article preparation; draft report preparation

Task 8. Submit journal article; Submit final report

Project Workplan and Schedule

Development of the project (research) work plan was completed, and the work plan was approved in its final form on 23 October 2012, with a signed EPA Cooperative Agreement issued on that date. The schedule for this project is provided in Table 4 below.

Summary of Project Budget

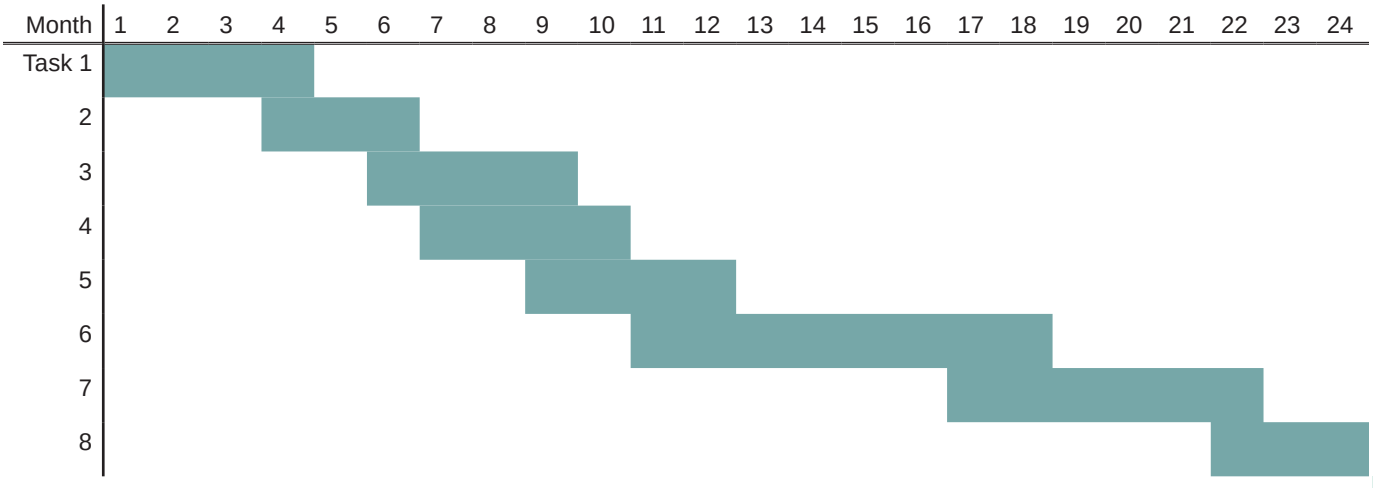
The approved budget for this research project, as listed on the SF424A budget summary form, is shown in Table 5 below.

The process of determining pilot applications and environmental questions was initiated with a project research team "kickoff" conference call in mid-February (2013). During this call, the community attributes and logistics for a variety of possible pilot communities were discussed. This

Table 5. Project Budget

Budget Categories	Approved Budget
Personnel	$25,000.00
Fringe Benefits	$6,930.00
Travel	$5,750.00
Equipment	$0.00
Supplies	$702.00
Contractual	$29,800.00
Total Direct Charges	$68,182.00
Indirect Charges	$6,818.00
Totals	$75,000.00

Table 4. Project Schedule – Note: Month 1 = Oct 2012, and subsequent months follow to Month 24 = Sept 2014



project was carried out in two different “focus areas” within Region 9, specified in the research work plan as: the San Joaquin Valley region, and; the Los Angeles area along the Interstate 710 corridor linking the ports of Los Angeles/Long Beach with inland markets. The process of determining the environmental question for each pilot application was handled differently for the two focus areas. Each focus area had its own pilot application and associated activities. The project team communicated during the project to review progress, troubleshoot analytical and logistical questions, discuss a variety of analytical and data issues, and to solicit feedback.

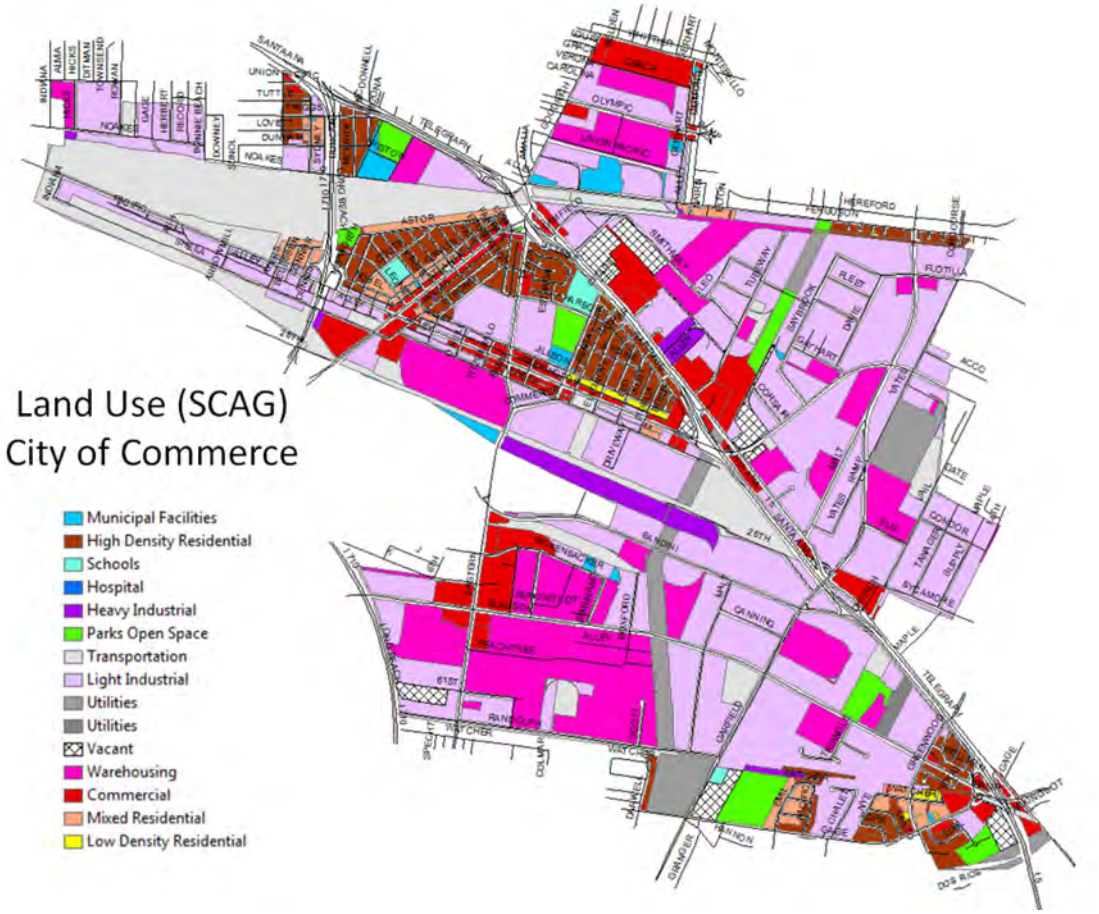
3.0
Pilot Application 1: City of Commerce

The pilot location for Los Angeles is the City of Commerce, with a pilot application to apply EJSM tools, data and techniques to an ongoing process of creating policy actions that reduce cumulative air pollution exposure among the highly impacted residential communities in the City. In 2005, responding to the leadership of East Yard Communities for Environmental Justice (EYCEJ), the City of Commerce formed an environmental justice task force to examine and improve non-occupational environmental hazards and exposure citywide. The most prominently identified issues by the task force were the connection between cumulative impacts from air pollution the juxtaposition of incompatible land uses, and also declines in business and job opportunities for local residents.

Following a task force report, the City Council called for a Working Group to be established that would draft policy recommendations to (a) create a buffer zones to provide a safe distance between hazards and sensitive receptors, using buffer and land use recommendations in the California Air Resources Board's 2005 Air Quality and Land Use Handbook for guidance, and (b) to develop economic development zone strategies as an overlay to attract new developments, using the lever of the green economy.

This Working Group was tasked to complete the policy recommendations by summer, 2013 for consideration by the City Council. Subsequent decisions of the City Council may lead to changes in City policy documents such as a General Plan Amendment, Overlay Zone, or other policy and/or planning tools. This pilot project seemed particularly well suited to this project because of its clear and focused environmental question and anticipated use of the EJSM, as well as the fact that Co-PI James Sadd served as one of the original 2005 task force members and introduced the EJSM to the task force as a tool for both data exploration and strategy design.

The Working Group, labeled the City of Commerce Green Zone Working Group, was formally constituted in September 2012 to include a variety of local stakeholders representing the local residential, organized labor and business



Map 1. Land Use in the City of Commerce classified by aggregating standard Anderson Land Use urban classes into groups that reflect the pilot application.

communities. In addition, non-voting advisors to the Working Group include Carlin Hafiz and Deldi Reyes of EPA R9, and Alex Hamilton and Mathew Martinez of the City of Commerce planning staff. The Working Group met six times at roughly monthly intervals beginning 3 October 2012 at the City of Commerce City Hall Emergency Operations Center, with meetings facilitated by a third party service contracted by EPA R9. The Working Group made significant progress and completed its work as described below.

Phase 1: Identify Issues, Opportunities, and Existing Conditions

During this phase, a process for how the Group operates and makes decisions, as well as timeline and framework for developing a set of policy recommendations were established. In addition, the key issues to be addressed through the recommendations were identified during this phase.

Phase 2: Strategy and Policy Framework Development

The second phase of the project included presentations and review of the results provided by outside experts, in order to better understand the entire landscape of problems and wopportunities that bear on the two goals of the Working Group policy recommendations, and to identify strategies and opportunities based upon this understanding.

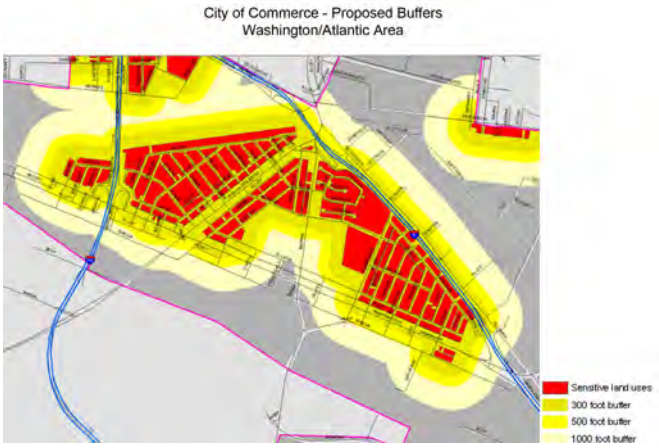
During this phase, the Working Group engaged in a process to identify the specific hazards and pollution sources that would be the subject of the eventual policy recommendations and its associated products and tools. After studying different ways in which this question has been addressed by other groups with a similar purpose, the Working Group agreed to specific types of facilities and land uses that, for the purposes of the policy, represented both hazards and sensitive receptors. The EJSM methodology was largely used as the blueprint for this final agreement.

The EJSM methodology was also used to explore the spatial distribution of land uses as pollution sources, and the location and adjacency of residential and sensitive (schools, parks and playgrounds, daycare and childcare centers, healthcare facilities, senior housing facilities) to these sources, as well as to test the impact of various buffer options as suggested in the CARB Handbook (CARB, 2005). The EJSM was also used in conjunction with business information service databases to examine these patterns with respect to the individual businesses present on a real estate tax parcel level.

Examples of the cartographic output of this process (**Land Use**: Southern California Association of Governments [SCAG] and City of Commerce) are shown, below:

The geography of the EJSM and other mapping results were exported to .kml format (keyhole markup language files) readable by the Google Earth web application, to better allow Working Group members and other constituencies to examine these patterns and datasets in the context of Google Earth's high-resolution aerial imagery at their leisure and outside of Working Group meetings. As part of this part of the project, the research team made an offer to provide the City of Commerce with a library of GIS spatial data that they can use for any initiatives that arise from this process, and for other

Map 2. Proposed buffers surrounding sensitive land uses as a land use planning tool to ensure separation from air pollution point and area sources. Area inside inset rectangle shown in Map 3, below.



Map 3. Proposed buffers surrounding sensitive land uses in the Washington/Atlantic Blvd. corridors, a special focus area recognized by the Working Group both for protection/separation of residential and sensitive land uses from air pollution sources, but also for business development and "green design" amenities.

work that the City Planning Department needs. The Planning Department does not currently use GIS, but is interested in leveraging this opportunity to do so.

Phase 3: Policy Recommendations Development

This phase was dedicated to creation of detailed and specific (a) Draft Proposed Amendment to City of Commerce Zoning Ordinance, which included specific land use recommendations and buffers derived from the EJSM methodology, and (b) Draft Proposals for a Voluntary Business Retrofit Program. These drafts were rewritten and reviewed during the next four scheduled meetings. Key stakeholders used them to further, support, and/or validate the work of this pilot application. This phase began in March 2013, and was completed in July 2013.

4.0
Pilot Application 2: San Joaquin Valley (SJV) Pilot Community

In contrast to pilot application 1, which was well defined and progressed to an advanced stage fairly quickly, Pilot Application 2 used a different process, and proceeded more slowly. This pilot application was more difficult to define, both in geographic and policy terms, because of its greater complexity, wider variety of stakeholders, wider array of policy options, and the challenge of communications among stakeholders who are located from Los Angeles to San Francisco and Sacramento. During the February 2013 project kick off conference call, a March 2013 SJV (Pilot Application 2) Webinar was planned to introduce the project to various EPA R9 and State agency partners, including the EPA R9 Air and Waste Programs, and the Office of Environmental Review. Also present for the SJV (Pilot Application 2) Webinar were representatives from the California Environmental Protection Agency (CalEPA) Office of Environmental Health and Hazard Assessment (OEHHA) and California Air Resources Board (CARB), the San Joaquin Valley Air Pollution Control District (SJV-APCD) as well as San Joaquin Valley Cumulative Health Impacts Project (SJV-CHIP), a community organization collaborative, and the Center for Regional Change at the University of California Davis.

The San Joaquin Valley has become a key focus region for environmental justice screening approaches in California. The state of California, through CARB and CalEPA, has funded the development of three different environmental justice-screening tools to assess the cumulative impacts of multiple air pollutants on vulnerable communities at the neighborhood, community, and regional scale. This provides California with a range of environmental justice screening tools that can be applied in situations where decisions must be made to ensure that the (negative) cumulative impacts of local planning and land use changes on vulnerable communities is minimized. In addition to EJSM, which was jointly funded by CARB and the US EPA (through a previous EPA R9 RARE Research Project), two other screening tools were used to produce a detailed study and screening products in 2011 with funding from CalEPA. The two additional screening methods were developed by the Center for Regional Change at the University of California Davis (Cumulative Environmental Vulnerability Assessment or "CEVA"), and OEHHA (California Communities Environmental Health Screening Tool (CalEnviroScreen or "CES"). The research team is very familiar with both of these methods, and has served as technical advisors and reviewers for both screening groups as they developed their methods using the EJSM as a template.

Among SJV stakeholders, there has been a particular interest in comparing the three methods to better understand their similarities and differences, the strengths and weaknesses and various trade-offs inherent to each method, requirements for updating each as new data becomes available and new methods are developed.

The initial pilot application consisted of several steps. First, a detailed comparison of the three CI screening methods became an integral and defining part of this project, and had the following goals: (a) explore the regional pattern of CI score by the three methods; (b) compare results of the three CI screening methods for the eight county SJV region to identify areas of agreement/disagreement in relative CI scores as a means to select areas for ground truthing under this cooperative agreement; (c) define and identify impact/vulnerability CI "hot spots" for each method and determine the degree to which the methods agree/disagree; (d) summarize differences in data and metrics used, and CI scoring methods for each of the three methods.

In order to use the entire San Joaquin Valley (SJV) for a study region for this comparison, the research team expanded EJSM mapping and CI scoring to include an additional three SJV counties (Merced, Stanislaus, San Joaquin) to add to the five southern SJV counties (Madera south to Kern County). The resulting region is shown in Maps 4a through 4c, below. This approach allowed us to prepare a series of comparison metrics among the three methods, and a series of comparison scoring and mapping procedures that allowed us to address the concerns stated above. This comparison effort was slightly delayed due to the delayed release of the CES data, which underwent public comment and OEHHA refinement.

The next step in the pilot application called for agency partners to develop a series of policy relevant questions, which the screening methods would address along with suggestions on how each method and its maps could be made more useful in informing the policy questions. These elements were discussed at a Nov 1, 2012 meeting of project partners. Participants at that meeting, whether in-person or by teleconference or videoconference are shown in Table 3 below.

A variety of policy relevant questions were presented and discussed at this meeting. It was decided that once the operative policy relevant questions that could be addressed by EJSM were finalized, we would develop a case study report done in collaboration with the agency, which had proposed that policy relevant question.

At the November 1, 2012 meeting of project partners, the research team presented a first draft comparison of screening methods, focusing only on EJSM and CEVA owing to the

Table 6. Participants in November 1, 2012 Meeting of Project Partners

Organization	Participant
EPA R9	Debbie Lowe Liang
	Mike Bandrowski
	Charles Swanson
	Jim Polek
EPA ORD	Eric S. Hall
SJV-APCD	David Lighthall
SJV-CHIP	Sarah Sharpe
CCA	Shankar Prasad
CalEPA/OEHHA	Arsenio Mataka
	Malinda Dumisani
	John Faust
	Laura August
CARB	Alvaro Alvarado
UC Davis	Johnathan London
	Tara Zagofsky
DTSC	Ignacio Dominguez
	Brian Johnson
OPR	Debbie Davis
Occidental College	James Sadd
USC	Manuel Pastor

fact that CES was still under development at the time. It was agreed that the comparison would be revised, with the CES data incorporated into the next comparison, and the final comparison of all three methods that would take place when the complete version of the CES data was available.

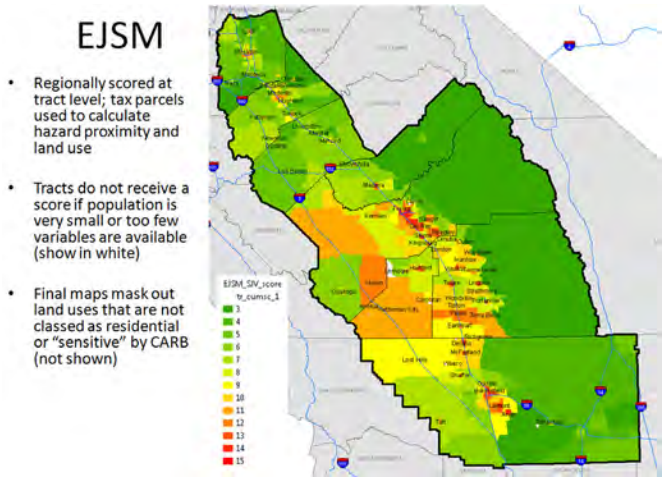
In collaboration with EPA R9 and ORD and using the meeting discussion along with input from project partners, we developed a flexible structure for this pilot project. An initial draft summary of efforts to complete data was accomplished using a draft release of the CES data, and it is summarized briefly below.

Comparison of Screening Methods in the SJV Region

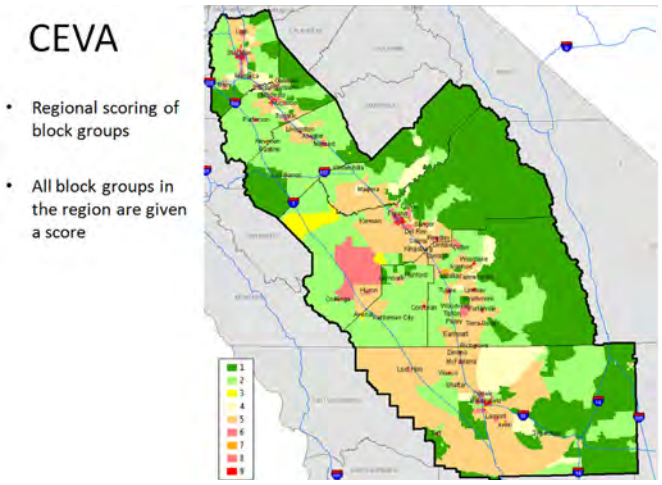
The three screening methods (EJSM, CEVA, and CES) have similar goals, anticipated uses, and use many of the same data sets. However, they also differ, in some cases substantially, in many ways, including:

1. Spatial unit of analysis (or spatial resolution) of results: Each Method uses a different spatial unit for both analysis and mapping. EJSM uses real estate tax parcels that are edited to reflect that land use (termed "CI polygons") and CI score are done at the census tract level. CEVA uses census block groups for both analysis and scoring, and CES uses zip code tabulation areas (ZCTA) from the US Census.

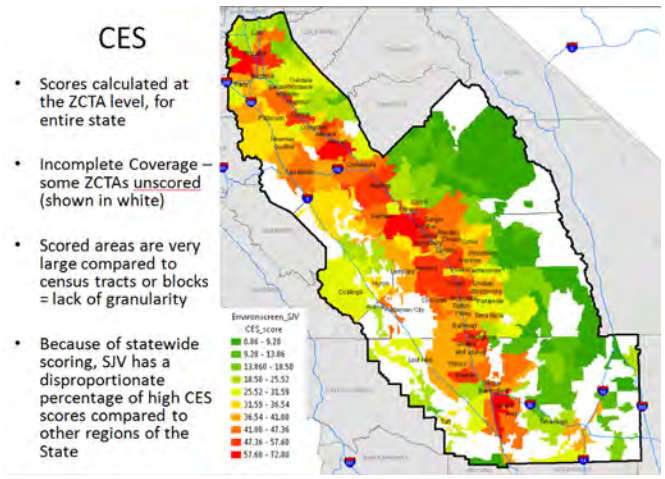
2. Different "base maps": Differences in spatial units used, as described above, results in a different level of spatial resolution on maps of results that, in turn, reflects the



Map 4a. EJSM CI scores for the SJV: Mapped using census tracts to allow comparison with other screening methods.



Map 4b. CEVA CI scores for the SJV: Mapped using census block groups for comparison with other screening methods.



Map 4c. CES group CIscores for the SJV: Mapped using 2010 zip code tabulation areas (ZCTAs) for comparison with other screening methods. ZCTAs that extend outside the eight SJV counties have been clipped so that colored polygons do not extend outside the boundaries of the defined comparison area.

map pattern differently, significantly complicating comparison of results in an objective "apples to apples" manner. There are also differences in geographic extent, making different map patterns that do not overlay one another well. It also complicates estimating the distributional impacts of the various CI scores, as different spatial units represent different populations

These differences are most manageable when comparing EJSM census tracts with CEVA census block groups, as there is a logical manner in which block groups aggregate to tracts. It is more difficult when comparing to CES scores at the ZCTA level. ZCTAs are much larger spatial units than either blocks or tracts, and do not share boundaries with either; they also cross county boundaries. As for distributional impacts, tract or block group level metrics and demographics must be imputed and aggregated to the ZCTA level. The larger ZCTAs can mask small areas of concentrated impact and vulnerability, as they are "averaged in" to the larger ZCTA area

3. Different metrics: The three methods share many metrics in common, but also use different metrics to represent a specific indicator. Some common metrics include: estimated cancer risk from air pollution vs. reported cancer mortality; RSEI metrics vs. TRI site location, use of % poverty vs. 200 % poverty as a threshold definition.

4. How CI scores are calculated: The three screening methods use different ways of grouping indicators together for scoring, resulting in different implicit weighting of certain metrics. Also, the methods each use a different numerical range of CI scores; however, for each method, a higher score indicates a greater cumulative impact of air pollutants on a vulnerable community. The EJSM CI scores range from 3-15, where 3 represents the minimum cumulative impact score and 15 indicates the maximum cumulative impact score for a given community, but the EJSM scoring algorithm is open-ended and does not limit the value of the high end in order to accommodate additional indicators as future data or tools allow for improvements. CES CI score values are continuous, ranging from 0.86 to 72.80 statewide. These continuous CI scores are aggregated into nine classes (1-9) called "CES group CI scores". CEVA CI scores also range from 1-9, but this method uses a two-dimensional scoring matrix resulting in some low CI score numbers indicating higher impact/vulnerability and eliminating a one-to-one comparison of CI scores among these two methods (CES and CEVA).

5. Region over which CI scores are calculated: Both EJSM and CEVA score regionally, so that the CI scores compared, below reflect only the 8-county SJV region as defined. However, CES scoring is currently done statewide. Maps 4a-c, abovet show the CI scores for the three screening methods using their respective mapping units.

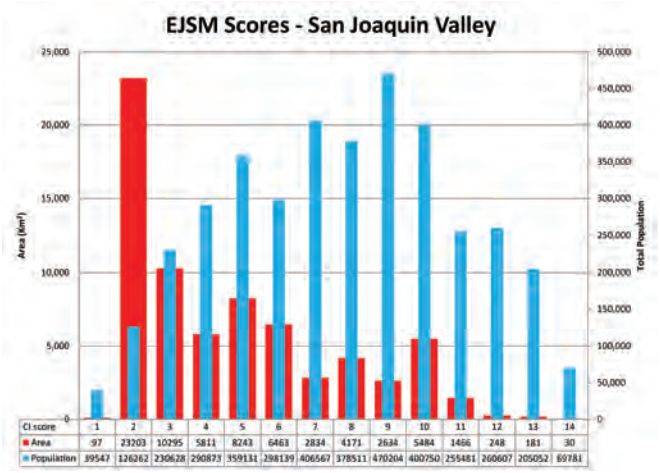


Figure 1. Distribution of CI screening scores for the SJV region by population and area: EJSM.

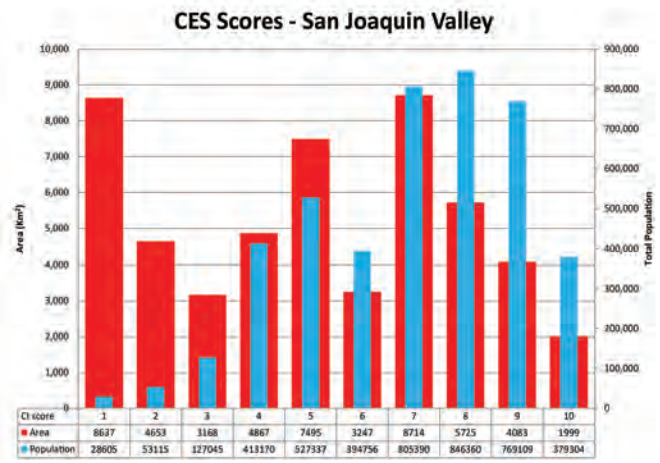


Figure 2. Distribution of CI screening scores for the SJV region by population and area: CES.

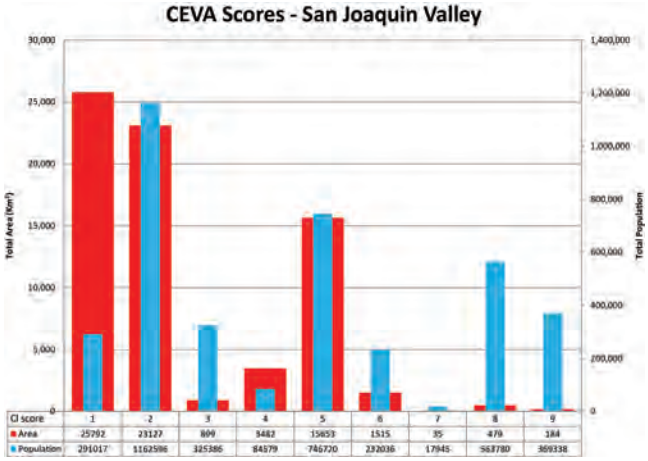


Figure 3. Distribution of CI screening scores for the SJV region by population and area: CEVA.

Table 7. Screening Scores by Aggregate Population

Table 1. Screening Scores by Aggregate Population

- The highest scores for the three methods represent census polygons hosting 8.7% to 9.7% of the total SJV residential population
- EJSM 14 and 15 = 9%
- CEVA 9 = 9.7%
- CES 10 = 8.7%

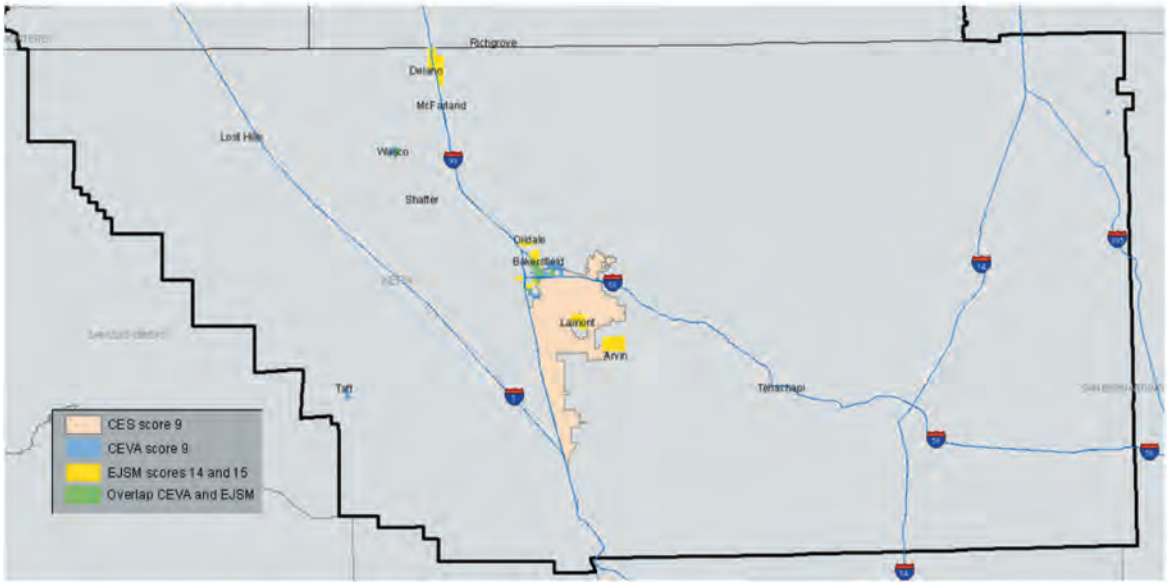
EJSM_Score	Population	Cumulative Population	Cumulative % Population
0	39,547	3,791,533	100.0%
3	126,262	3,751,986	99.0%
4	230,628	3,625,724	95.6%
5	290,873	3,395,096	89.5%
6	359,131	3,104,223	81.9%
7	298,139	2,745,092	72.4%
8	406,567	2,446,953	64.5%
9	378,511	2,040,386	53.8%
10	470,204	1,661,875	43.8%
11	400,750	1,191,671	31.4%
12	255,481	790,921	20.9%
13	260,607	535,440	14.1%
14	205,052	274,833	7.2%
15	69,781	69,781	1.8%

CEVA_Score			
1	291,017	3,793,397	100.0%
2	1,162,596	3,502,380	92.3%
3	325,386	2,339,784	61.7%
4	84,579	2,014,398	53.1%
5	746,720	1,929,819	50.9%
6	232,036	1,183,099	31.2%
7	17,945	951,063	25.1%
8	563,780	933,118	24.6%
9	369,338	369,338	9.7%

CES_Score			
1	28605	4,344,191	100.0%
2	53115	4,315,586	99.3%
3	127045	4,262,471	98.1%
4	413170	4,135,426	95.2%
5	527337	3,722,256	85.7%
6	394756	3,194,919	73.5%
7	805390	2,800,163	64.5%
8	846360	1,994,773	45.9%
9	769109	1,148,413	26.4%
10	379304	379,304	8.7%

Map 5a. Top Population Quantile – Kern Co.

- All three methods identify Bakersfield
  - CES only identifies greater Bakersfield (one ZCTA), and is not as area-specific as CEVA and EJSM
  - EJSM and CEVA agree on North Bakersfield, Wasco (see overlap color)
- EJSM solely identifies Delano, Oildale, Lamont, Arvin
- CEVA solely identifies Taft



Map 5a. Top Population Quantile - Kern Co.

Map 5b. Top Population Quantile Central SJV

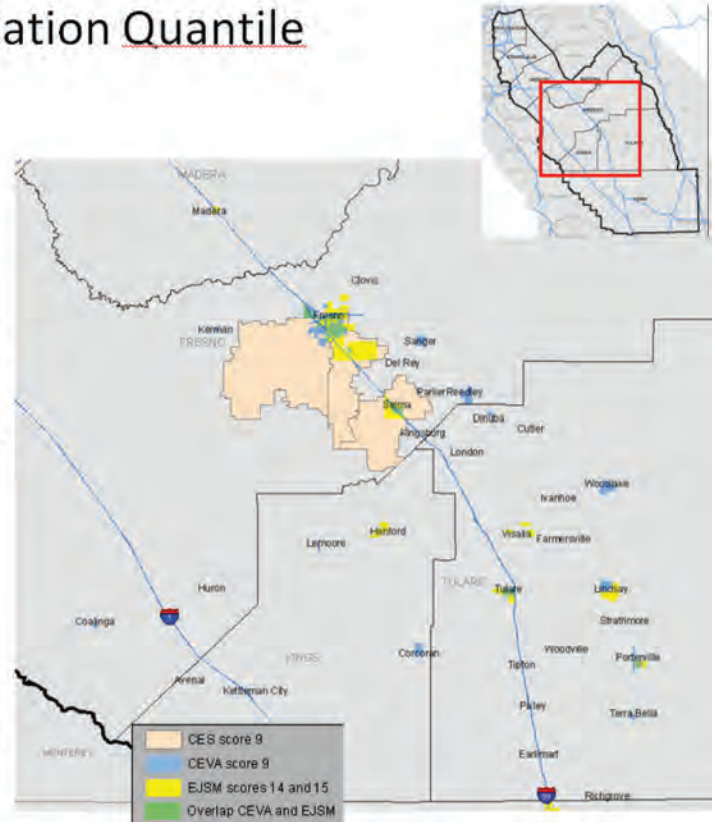
All three methods identify Fresno

- CES identifies greater Fresno (three ZCTAs)
- CEVA and EJSM have more specificity and show significant overlap

CEVA and EJSM also agree on Selma, Tulare, Lindsay and Porterville

EJSM solely identifies Hanford, Madera, Visalia

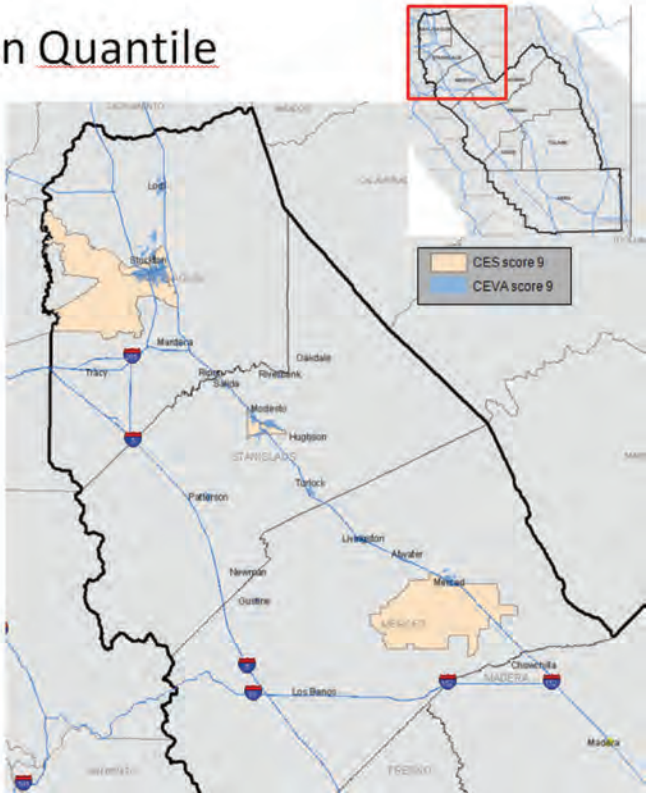
CEVA solely identifies Woodlake, Corcoran, Sanger, Parlier Reedley, Dinuba, Coalinga



Map 5b. Top Population Quantile Central SJV

Map 5c. Top Population Quantile Northern SJV

- CES identifies three cities - greater Stockton (three ZCTAs), Modesto, and Merced; CEVA agrees but with much more specificity
- No EJSM high scores in these three counties
- CEVA solely identifies several other small towns – Lodi, Turlock, Tracy, Livingston, Atwater, Gustine, Patterson.



Map 5c. Top Pupulation Quantile Northern SJV

We next compared the three methods in terms of the distribution of cumulative impact scores region wide. The goal was to determine how common and where "high" cumulative impact scores are located for each method, and to examine the distributional impact, by population and by area, of each cumulative impact score for each method. This overall pattern of scores is summarized in Figures 1-3 on Page 11. Note that the pattern of EJSM and CES scores are reasonably regular and near Gaussian in their distribution, with EJSM showing a symmetrical pattern. In contrast, CES shows a pattern clearly skewed toward high CI score, probably due to the fact that CES scoring is done statewide and much of the impact and vulnerability in California is concentrated in the SJV. CEVA cumulative impact scores display a non-standard (multi-modal) statistical distribution.

When the distribution of cumulative impact scores are evaluated by area and by population, other significant patterns emerge. Most of SJV area has low CI scores in all three methods, and this pattern is clearest for CEVA and EJSM. The greatest variation of CI scores amongst the three methods can be observed when each CI score is mapped to the total number of people in each CI 'score/scoring range' (i.e., experiencing each level of cumulative impact) for each method. Most of the SJV area population is subject to middle value EJSM scores. This pattern is similar but weaker for CES CI scores. CEVA CI scores have no regular pattern. Overall, in spite of their differences, EJSM and CES scores appear more similar to one another, and less similar to CEVA scores, in the SJV region.

In order to use these distributional patterns as a means of comparing of the three screening methods, each method was evaluated to identify CI "hot spots" based on the aggregate population represented by each scoring class. This allowed us to explore the questions "What defines a CI "hot spot" in each method?" and, "What is a "high" CI score for each method?" The first attempt used the highest CI scores: EJSM CI scores 14 and 15 represent an aggregate population of 9% of SJV, and for a CEVA score of 9 this value is 8.7%. Because the 1-9 range of CES group CI scores were calculated statewide, we instead used the CES continuous CI score for this part of the analysis; all ZCTAs with CES CI scores >55.75 represent an aggregate 9.8% of the SJV population. Distribution of CI scores by aggregate population and these results are shown in Table 7 on Page 12. The yellow bands in Table 7 are used to highlight the

Table 8. Screening Scores by Aggregate Population

Table 2. Screening Scores by Aggregate Population

- A larger sample of high scores for the three methods represent census polygons hosting 26.4% to 31.4% of the total SJV residential population
- EJSM 11-15 = 31.4%
- CEVA 6*, 8, 9 = 30.7%
- CES 9. 10 = 26.4%

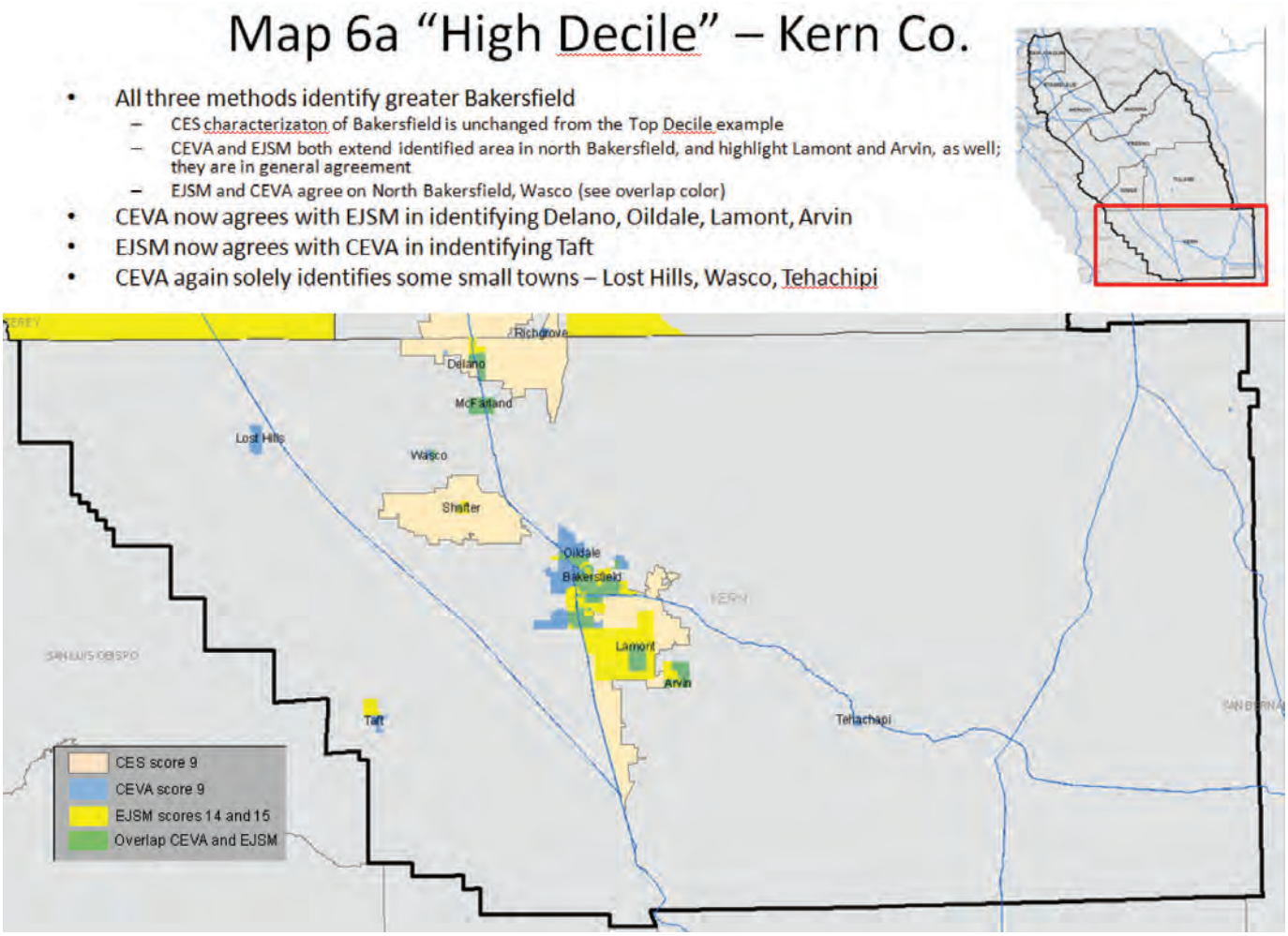
- *Note: because of the way CEVA scores are calculated, census blocks with a score of 6 have a higher impact than score of 7.

EJSM_Score	Population	Cumulative Population	Cumulative % Population
0	39,547	3,791,533	100.0%
3	126,262	3,751,986	99.0%
4	230,628	3,625,724	95.6%
5	290,873	3,395,096	89.5%
6	359,131	3,104,223	81.9%
7	298,139	2,745,092	72.4%
8	406,567	2,446,953	64.5%
9	378,511	2,040,386	53.8%
10	470,204	1,661,875	43.8%
11	400,750	1,191,671	31.4%
12	255,481	790,921	20.9%
13	260,607	535,440	14.1%
14	205,052	274,833	7.2%
15	69,781	69,781	1.8%
CEVA_Score			
1	291,017	3,793,397	100.0%
2	1,162,596	3,502,380	92.3%
3	325,386	2,339,784	61.7%
4	84,579	2,014,398	53.1%
5	746,720	1,929,819	50.9%
7	17,945	1,183,099	31.2%
6	232,036	1,165,154	30.7%
8	563,780	933,118	24.6%
9	369,338	369,338	9.7%
CES_Score			
1	28605	4,344,191	100.0%
2	53115	4,315,586	99.3%
3	127045	4,262,471	98.1%
4	413170	4,135,426	95.2%
5	527337	3,722,256	85.7%
6	394756	3,194,919	73.5%
7	805390	2,800,163	64.5%
8	846360	1,994,773	45.9%
9	769109	1,148,413	26.4%
10	379304	379,304	8.7%

percentages of the total SJV population with the highest CI scores as calculated by each of the three methods. Using ESJM, approximately 9% of the total SJV population has the highest CI scores. With CEVA and CES, approximately 9.7% and 8.7% of the total SJV population respectively has the highest CI scores. Despite the differences between the three EJ screening methods, they each reliably and consistently indicate that approximately somewhere between 9% (8.7%) to 10% (9.7%) of the SJV population experiences the maximum CI from air pollutants in their communities (only a 1% difference). This demonstrates that there is a degree of harmonization and correlation between the three methods with respect todetermining high-end cumulative impacts for vulnerable SJV communities.

Using these CI scores as a basis to define screening CI "hot spots" is a reasonable first approximation; these areas are mapped for the three methods across the SJV study area, as shown in Maps 6a-c below.

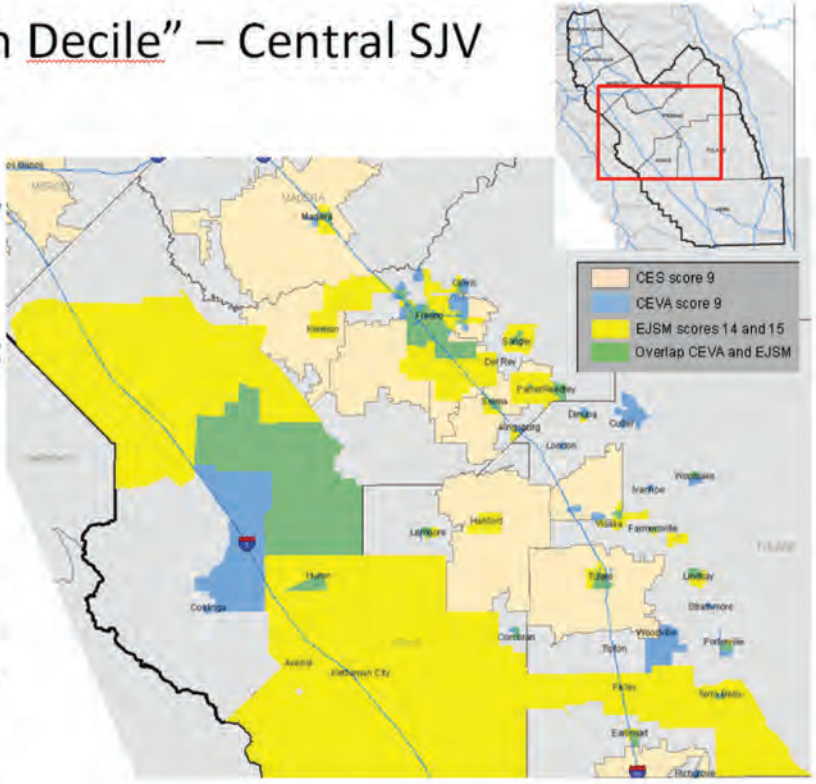
All three methods agree only on CI "hot spots" in Bakersfield and Fresno. EJSM and CEVA agree with far greater geographic specificity, and are in overall agreement. CEVA and EJSM identify a number of smaller, relatively isolated towns that are not detected by CES because of the averaging effects of using the large ZCTAs, described above. However, although they both identify smaller towns missed by CES, differences in metrics and scoring between CEVA and EJSM result in more disagreement than agreement in which towns are identified.



Map 6a "High Decile" - Kern Co.

Map 6b "High Decile" – Central SJV

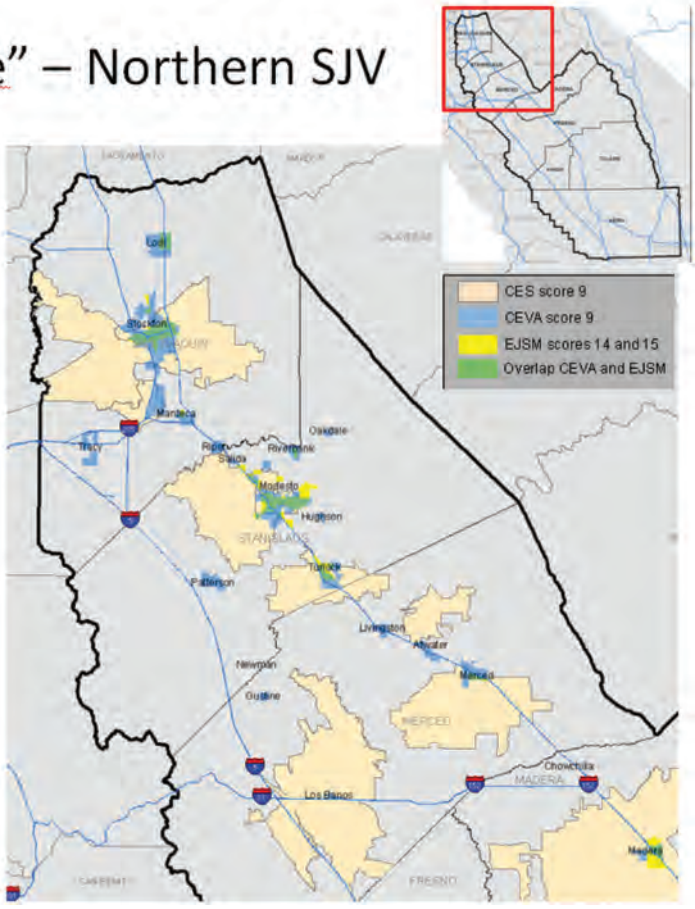
- CES expands identification of the entire Hwy 99 corridor, but still does not pick up north Fresno or any areas along Interstate 5
- The problem of large census polygon size making those identified by CEVA and EJSM appear more prominent on the map is even more pronounced.
- EJSM and CEVA generally agree, but a few locations are only identified by one method
  - CEVA: Cutler, Woodlake, and Coalinga as before; also Woodville, Ivanhoe, London
  - EJSM: large, sparsely populated areas along I5, Parley, Hanford, Kerman



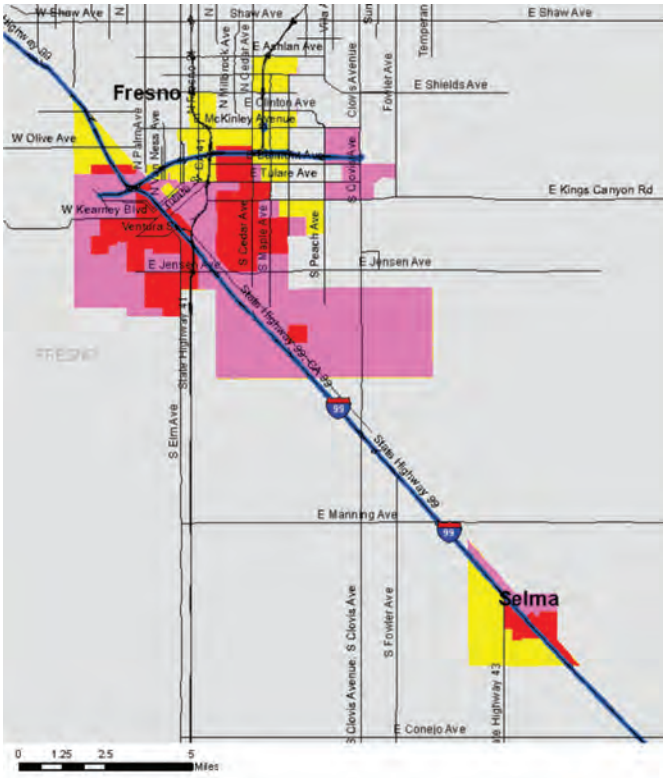
Map 6b. "High Decile" - Central SJV

Map 6c "High Decile" – Northern SJV

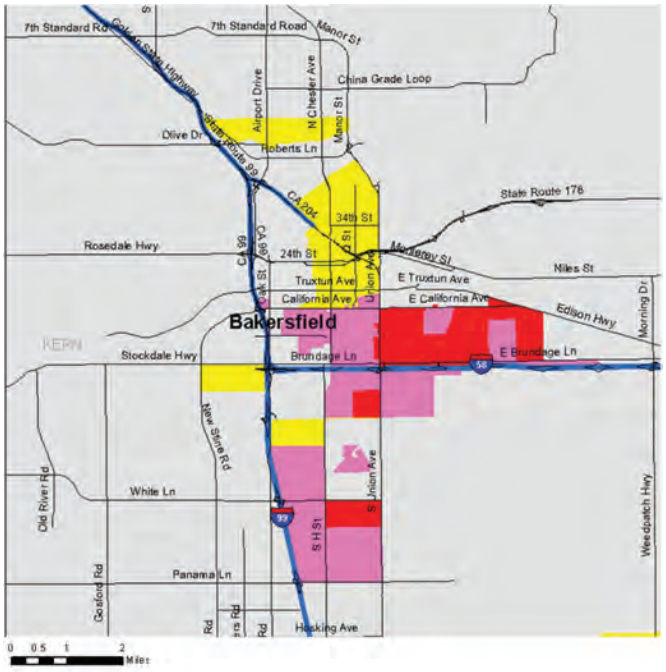
- As before, CES identifies large population centers also identified by CEVA and EJSM, but they do so with much greater specificity
- CEVA again solely identifies several small towns not identified by EJSM – Tracy, greater Manteca, Ripon, Oakdale, Patterson, Livingston, Atwater, Gustine, Patterson.
- EJSM identifies fewer areas, and more geographically focused areas, than both other screening methods



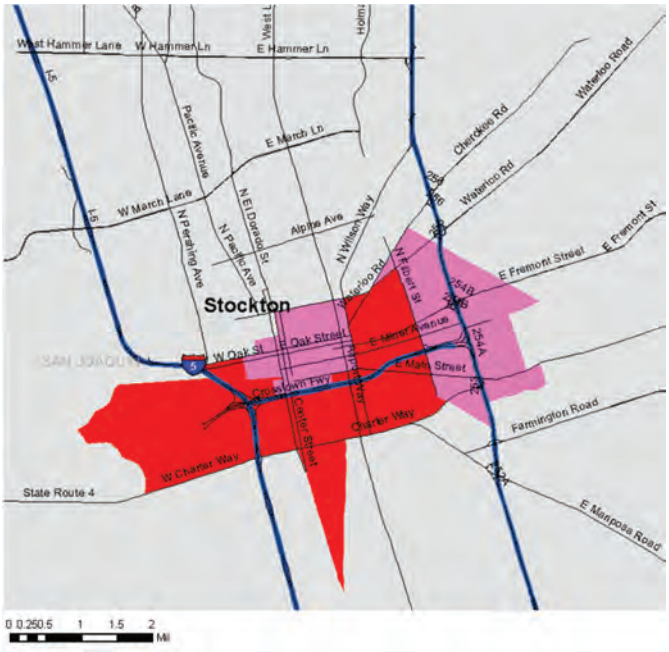
Map 6c. "High Decile" - Northern SJV



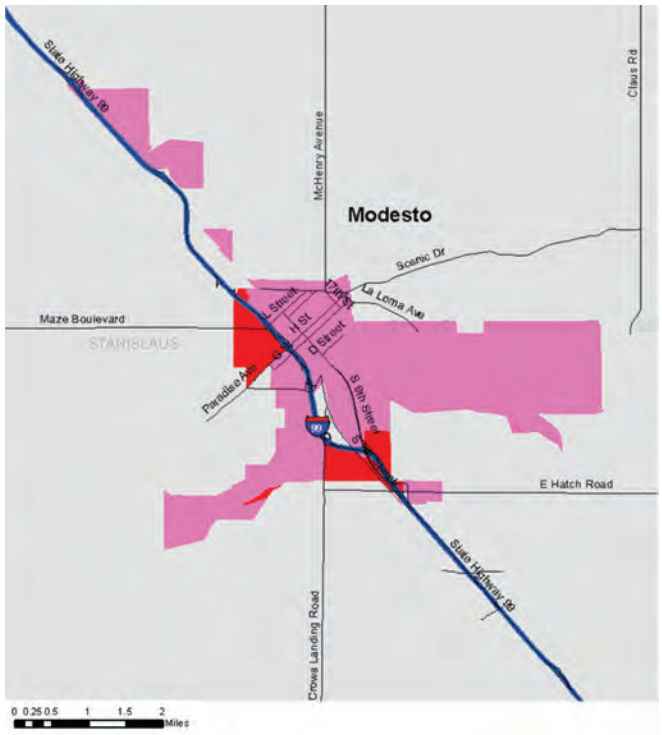
Map 7a_1. Fresno and Selma, CA



Map 7a_2. Bakersfeild



Map 7b_1. Stockton, CA



Map 7b_2. Modesto, CA

If CI "hot spots" are defined more broadly, is agreement among methods better? In examining the distribution of high CI scores for a broader population sample, the range of high CI scores for each screening method apply to a similar proportion of the total SJV population as follows: EJSM CI scores 14 and 15 (31.4% of SJV population), CES CI scores >45.56 (26.4% of SJV population), and CEVA CI scores 6, 8, and 9 (30.7%). Distribution of CI scores by aggregate population and these results are shown in Table 8 on Page 14. The yellow bands in Table 8 are used to highlight the percentages of the total SJV population with the highest CI scores as calculated by each of the three methods when the definition of CI "hot spots" is more broadly defined (i.e., lower CI scores are included [widening the CI score range at the 'high-end'] when determining the percentages of the population experiencing high-end CI {potential exposures}). Using ESJM under this scenario, approximately 31.4% of the total SJV population has the highest CI scores. With CEVA and CES, approximately 30.7% and 26.4% of the total SJV population respectively has the highest CI scores. Even when range of high-end CI scoring criteria is expanded, the three EJ screening methods, still agree within a narrow (population percentage) range. The three methods indicate that approximately 26.4% to 31.4% of the SJV population experiences the maximum CI from air pollutants in their communities (only a 5% difference). There is a tremendous amount of agreement between these methods, and they could be used either individually or in combination when overburdened SJV communities need to determine areas that experience high-end cumulative impacts.

A final way to compare these three methods is to map the areas where all agree on a CI "hot spot" location. These areas are shown in Maps 6a-c. In these maps, areas that score in the "top decile" of population, in Maps 4 a-c, those areas are shown in red, and areas that overlap in the "High Decile" region, shown in Maps 7 a-c, are displayed in pink. Additional areas nearby with high EJSM CI scores are shown in yellow.

The results of the comparison of CI screening methods summarized, above, are consistent with the considerable differences among these three CI screening approaches. However, there is agreement among the methods that is somewhat surprising given the degree of difference in methods and data used. We believe that this suggest two things. First, in spite of their differences, the process of CI screening is robust and meaningful as a technique for identifying areas that represent the "high end" of a spectrum of metrics. Second, the existence of a pattern of inequitable exposure to environmental hazards and their attendant risks, and vulnerability to those risks, are real and quite stark in SJV.

As this comparison process continued, we repeated these analysis steps and developed additional approaches to the comparison, as better data was made available for CES, such as regional scoring at the tract level. We also aggregated and rescored using the CEVA method by tract (from block groups). Comparing tract level CI scores for the three

Map 7c. Merced (all 3 methods overlap/agree)

methods significantly reduces the methodological differences that hampered this effort. This comparison, combined with filtering the map results using land use information from EJSM was expected to be far more useful in defining the specific areas for ground truthing.

The results of the final comparison will be shared with agency partners, and include .pdf maps and Google Earth .kml files to allow partners to provide the best review of the results and input based upon their experience with various parts of the SJV. A webinar/conference call was held to answer any questions about the comparison and revised maps. Partner agencies and SJV CHIP were invited to share their observations and questions about the strengths, weaknesses and data gaps associated with each of the three methods as well as provide suggestions for a location(s) where ground truthing would be helpful in better understanding the strengths and weaknesses of each method. That information is contained in this report.

Based on the input provided, EPA worked with the three screening groups (EJSM, CEVA, and CES) and SJV CHIP to select one location for ground truthing. The location was selected based on the following criteria: (a) community capacity to engage in ground truthing, (b) will help answer questions about whether the three screening methods are able to inform the policy relevant questions, (c) will help inform future development of the three screening methods, and (d) includes a range of CI scores, from low to high, to help us get an idea how ground truth validation relates to highly impacted areas vs. areas with lower impact and vulnerability.

5.0
Pilot Application 1: City of Commerce Working Group Meetings (Recap)

The pilot location for the Los Angeles area was the City of Commerce, where EJSM tools, data and techniques were applied to an ongoing process of creating policy actions that reduce cumulative air pollution exposure among the highly impacted residential communities in the City. From the beginning of this project, the project team was engaged in the process of providing policy advice as part of the City of Commerce Green Zones Working Group. This group has been meeting monthly since July 2012 at the City of Commerce headquarters.

The Working Group began as a partnership between the community organization East Yards Community for Environmental Justice (EYCEJ), EPA Region 9, and the City of Commerce in early 2012. At the first meeting, the project team joined representatives from the City of Commerce Environmental Justice Advisory Task Force, City Planning staff in an organizational meeting facilitated by Esmeralda Garcia, who was contracted separately by EPA R9 for this role. As directed by the City Council, the Working Group identified additional stakeholders to include in the process. This process continued over several subsequent meetings due to the difficulty of obtaining commitments from individuals representing the stakeholder group. The final composition of the organizations participating in the Working Group is as follows:

- Business Community - small business representative
- Business Community - large business representative
- City of Commerce Industrial Council – the "chamber of commerce" for this city
- Environmental Justice Advisory Task Force
- A representative for organized labor
- Member of the City of Commerce Planning Commission
- A community resident
- The USC Program for Environmental and Regional Equity (PERE)

The representatives (voting members) of the Working Group participating organizations included:

- Jose Bojorquez, (Officer of 99¢ Only Stores, Inc. and representing large business)
- Doug Ashmore (Officer of Amvac, Inc and representing small business)
- Eddie Tafoya, Executive Director of the City of Commerce Industrial Council
- Angelo Logan, East Yard Communities for Environmental Justice representing the City of Commerce Environmental Justice Advisory Task Force
- Jason Stinnette, (American Federation of State, County and Municipal Employees (AFSCME)
- Nancy Barragan, (Planning Commission)
- Kristina Santana (resident)
- James Sadd, (representing USC PERE)

The decision to have James Sadd serve as the voting member from the project research team was made because of his geographic proximity, and because he was one of the original 2005 task force members and introduced the EJSM to the task force as a tool for both data exploration and strategy/ policy design.

At various meetings, there were a number of non-voting attendees that attended either regularly or occasionally. Most were City of Commerce business owners and community residents, but others were there to provide technical guidance and opinion. Regular non-voting attendees included:

- Alex Hamilton and Mathew Martinez of the City of Commerce planning staff Donald Spivack, a planning consultant and retired professional planner with the City of Los Angeles.
- Carlin Hafiz and Deldi Reyes of EPA R9

The goals specified for the Working Group by the City Council were to draft policy recommendations to: (a) create separation to provide a safe distance between hazards and sensitive receptors, using buffer and land use recommendations in the California Air Resources Board's 2005 Air Quality and Land Use Handbook for guidance, and; (b) to develop economic development zone strategies as an overlay to attract new developments, using the general philosophy of the "green economy".

This Working Group completed its work and decisions on recommendations at the September 23, 2013 meeting. The Working Group final report and recommendations with documentation were delivered to the City of Commerce Planning Commission in October 2013 and to the City Council in early November 2013.

The Working Group continued its work on defining the framework of the recommendations that were planned for completion, and refining the details of the policy options. In terms of "framing", the Working Group agreed on several guiding principles:

1. **Balance** – Recognizing the fact that the City of Commerce has a large industrial base with a relatively small residential population and area, it was important to maintain a balance between the needs and quality of life of the residential community and successful economic development.
2. **Community Health** – A commitment to practices that that result in improved quality of life and health for residents and local workforce.
3. **Improving distance relationships between Industrial Uses that represent air toxics hazards and Sensitive Receptors** – The goal is to understand and monitor the present pattern, and make improvements that will improve this pattern over time. These improvements will be guided by the recommendations in the 2005 CARB Air Quality and Land Use Handbook, and the Working Group agreed by vote to adopt the definition of "sensitive land uses" used in that document.
4. **"Green" Practices** – Look for ways to bring ideas associated with what are generally identified as "green" practices of urban planning and development.
5. **Image** – Design actions that would maintain, and even enhance, the City image as a business friendly city, with strong community amenities.
6. **Infrastructure** – Design with appropriate and sufficient infrastructure to meet the current and future needs of the community and business.
7. **Local Workforce** – Design with ways in which to improve workforce opportunities for local residents in light of anticipated changes in types business and industry within the City
8. **Connectivity/Mobility** – Design improved transportation-related elements that consider all transit modes, capitalize on existing successful transit issue, and improve opportunities for the City of Commerce community and workforce.

The framing piece of this process also included analysis of challenges/barriers and opportunities that are relevant to the anticipated policy recommendations. They included the following considerations:

1. Although the City has a successful tax base generated by local business, the City of Commerce is relatively small compared to other cities in the region, resulting in certain limitations. For example, the City relies heavily on outside contracting for services.
2. The permitting process is not particularly efficient or streamlined, complicating implementation of new practices or requirements needed to address the goals of the Working Group. For example, the City does not use modern geospatial data and analytical practices, and although the City is a member of the Southern California Association of Governments (SCAG), they do not take advantage of the broad and highly accurate geospatial resources available to member cities and, in some cases, appear to be unaware of what is available. City planning staff also reported that they are understaffed and lack certain types of training.
3. The City planning staff reports that the City is in some respects relatively isolated from some resources that would ease or enhance progress toward Working Group goals. For example, utility companies and other permit issuing agencies do not have offices close to the City of Commerce, reducing accessibility for the City planning staff, and the City has no control over utility rates and permitting processes.
4. Rail is concentrated within the City of Commerce, more so than any other city in the region (with the exception of Vernon, located adjacent to the City of Commerce), and the City has relatively high exposure to high volume traffic corridors. Both of these land uses are a major source of air quality hazard, but the City has no does not have jurisdictional oversight or control over either.
5. Existing commercial land uses need improvement and/or redevelopment to improve both air quality and economic vitality.
6. Although the City lacks control of highways or rail, they are aware of local land use planning tools that can address some impacts on sensitive land uses. For example, adaptive re-use might be useful in transition areas to address problems of proximity of harmful land uses near sensitive receptors, as well as to attract new businesses.
7. The City of Commerce wants to attract artisanal and cottage industry as new business clusters, and to encourage entertainment and other attractions to provide a greater sense of place for residents and as a means of institutionalizing improved amenities. The City also favors beautification projects as a means to reinforce a stronger community image.

The Working Group agreed on a set of recommendations that were organized into four issue areas, with considerable detail in terms of strategies and option for each area. The areas are:

- **Prevention** – Provide separation of facilities and land uses of concern that represent air toxics hazards from sensitive land uses
- **Reduction** – Ways to reduce pollution from existing businesses and industry
- **Revitalization** – Opportunities that could contribute to a "green economy"
- **Reinvestment** – Provide infrastructure to support economic growth and protection of community health

The primary focus of this R9 RARE project on the Working Group activities has been the first goal of the original City Council directive - separation to provide a safe distance between hazards and sensitive receptors, using buffer and land use recommendations in the California Air Resources Board's 2005 Air Quality and Land Use Handbook for guidance. The Working Group developed two different approaches to this goal.

The first was initiated by Angelo Logan, EYCEJ, who chaired the original City of Commerce Environmental Justice Advisory Task Force. This approach was a set of proposed amendments to City of Commerce Zoning Ordinance, which includes specific land use recommendations derived from the CARB Handbook. Each recommendation takes an existing City land use ordinance and amends it to fit the requirements of the Working Group's charge, and all were developed in close consultation with Donald Spivack, acting as a consultant to EYCEJ. A former professional planner with the City of Los Angeles, he has the longest and most relevant experience of anyone in the Working Group meetings and is working in a similar capacity on the City of Los Angeles Green Zones ordinance (a project referred to as "Clean Up, Green Up" [CUGU]). This approach is referred to below as the "zoning amendments". The zoning amendments were introduced very early in the Working Group process, discussed and amended during (and between) several Working Group meetings as members suggested changes and posed challenges. The research team performed several types of analyses to provide analytical evidence in support of the proposed amendments and to help the Working Group in envisioning how and where the proposed changes would be applied, and to help them answer specific questions posed during meetings about the proposed changes. There were concerns about the number of business that would be affected by the proposed zoning amendments, and we developed a series of three metrics to assess the impact of the proposed zoning amendments on City of Commerce businesses as shown below:

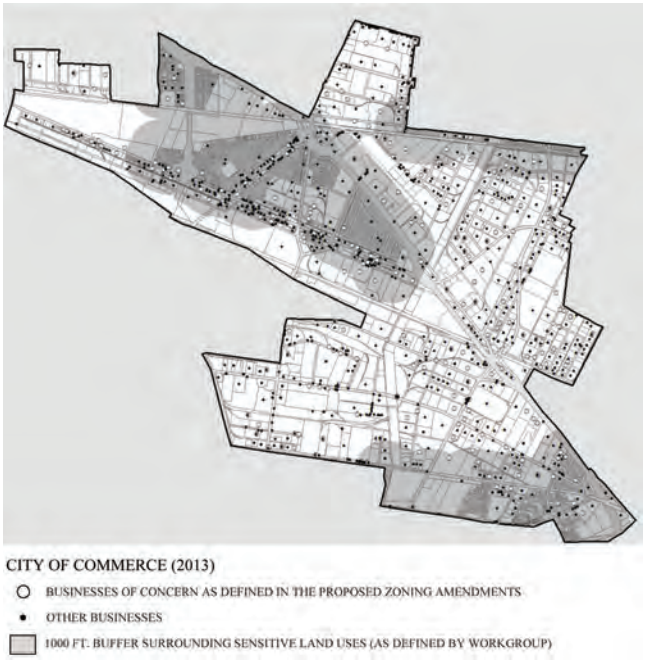
1. **Parcels affected by the proposed buffers**: Source: LA County Assessor's Office Parcel database, 2012
   TOTAL 4050 TAX PARCELS LOCATED WITHIN THE CITY OF COMMERCE BOUNDARY AS PER ASSESSOR'S RECORDS

   2481 PARCELS ARE COMPLETELY WITHIN THE 300 FOOT BUFFER (11.9 % by area) 2593 PARCELS ARE COMPLETELY WITHIN THE 500 FOOT BUFFER (19.8% by area) 2951 PARCELS ARE COMPLETELY WITHIN THE 1000 FOOT BUFFER (26.4% by area)

   AN ADDITIONAL 203 PARCELS ARE PARTIALLY WITHIN THE 300 FOOT BUFFER

   AN ADDITIONAL 264 PARCELS PARTIALLY WITHIN 500 FOOT BUFFER

   AN ADDITIONAL 152 PARCELS PARTIALLY WITHIN 1000 FOOT BUFFER.



Map 8. City of Commerce (2013)

2. **Businesses affected by the proposed buffers:**
   Source: Dun and Bradstreet Business database, 2013

   TOTAL BUSINESSES LOCATED WITHIN CITY BOUNDARY: 1797

   NUMBER OF BUSINESSES INSIDE 300 FT BUFFER: 116 (6.5% OF TOTAL FOR CITY)

   PARTIALLY INSIDE 300 FT – 76

   NUMBER OF BUSINESSES INSIDE 500 FT BUFFER. 175 (9.7%)

   PARTIALLY INSIDE 500 FT – 76

   NUMBER OF BUSINESSES INSIDE 1000 FT BUFFER. 284 (15.8%)

   PARTIALLY INSIDE 1000 FT – 58

3. **Businesses of Concern:** THE BUSINESSES AFFECTED BY THE PROPOSED ZONING AMENDMENTS ARE SHOWN AS OPEN CIRCLES ON THE MAP BELOW. ALL OTHER BUSINESSES ARE SHOWN AS BLACK DOTS.

Development of and changes to the zoning amendments were accomplished over several months and a major object of the Working Group meeting objectives to ensure a transparent and "good faith" process. However, some throughout this process, several Working Group members (and non-voting members) regularly expressed their opposition to any land use or zoning changes on the basis of their fear that land use or zoning changes would "hurt business", "limit reinvestment and expansion of existing businesses", and "result in businesses not wanting to locate in the City of Commerce". This 'opposition bloc' did not support their position with fact, analysis, statistics, or anecdotal evidence. In fact, during one meeting, a Working Group member of the 'opposition bloc'

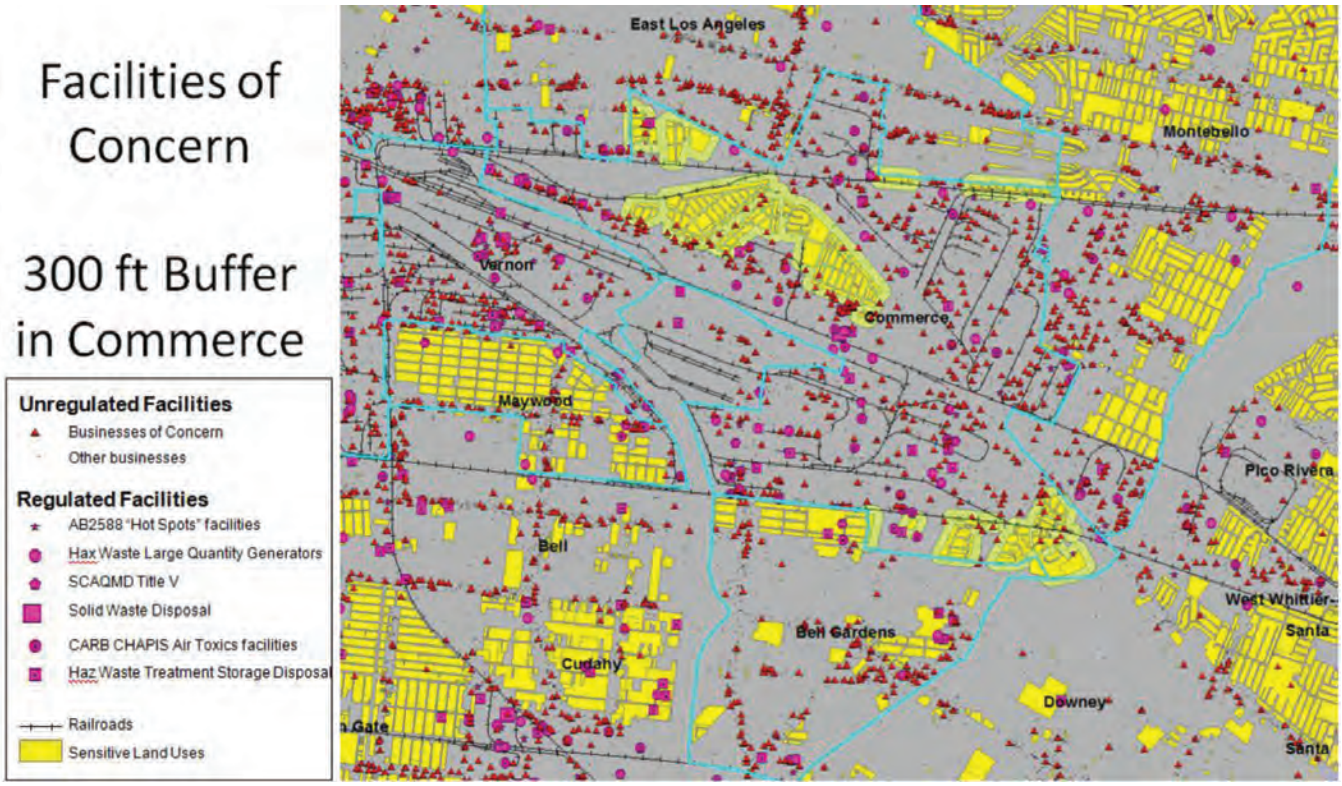
was critical of the use of "science" in our policy deliberations because, "Scientists always change their mind, like with global warming". It is difficult for professional scientists to defuse an intense and vocal opposition to the use of science. A full discussion of this impasse did not occur and, a number of Working Group members who stated their opposition to the proposed zoning amendments seldom attended the Working Group meetings.

It is also worth noting that one voting member who aggressively supported the 'opposition bloc' position is a real estate broker with a private company and regularly explained his personal financial interest in marketing the City of Commerce to prospective business and industrial customers as a place with business-friendly land use practices. Naturally, each stakeholder has a different "stake" in the process, but a person working on behalf of the City of Commerce government has a responsibility to do what is best for the overall good of the City of Commerce, over and above his own individual interest. This was an obvious conflict of interest situation.

The Working Group faction opposed to the proposed zoning amendments retained a land use attorney to evaluate the zoning amendments and during the 12th (August 7, 2013) of the 14 monthly meetings of the Working Group and presented a letter from their attorney. At that meeting and the two subsequent meetings, no time was provided to discuss this letter, despite requests to do so. The attorney's letter presented a series of legal theories describing their clients' opposition to the zoning amendments, and the letter did not contain any factual information or scientific analysis to demonstrate that the zoning amendments would be unreasonably burdensome to existing businesses, or would be otherwise injurious to the City of Commerce. The letter also contained this concluding clause (italics added):

> *"In rendering this letter, as to the relevant factual matters we have examined the reference materials described herein and such other documents as we have deemed necessary including, where we have deemed appropriate, representations and certifications of industry leaders and public officials. We have made no inquiry, have conducted no investigation, and assume no responsibility with respect to, the accuracy of statements made by industry leaders and public officials, or factual matters contained in any reference materials."*

The opinions and statements in this letter raised certain questions among Working Group members, and there were two questions that were neither aired nor discussed because the facilitator would not allow time for it or allow a discussion to take place during the August 7th meeting when requested. The two most noteworthy issues revealed by the letter are: (a) the opinion that the proposed zoning amendments would result in large and burdensome negative impacts (delays, costs and uncertainty) on existing and new businesses in the City of Commerce, and; (b) the fact that the letter contains no supporting evidence that current zoning regulations are inadequately protective. The research team attempted to address these two issues using the analytical means at our disposal (EJ screening approaches). The first issue noted in the letter is an opinion and cannot be objectively tested or quantified. To address the second issue, the research team presented maps to the Working Group and calculated CI scores using EJSM and CES. This



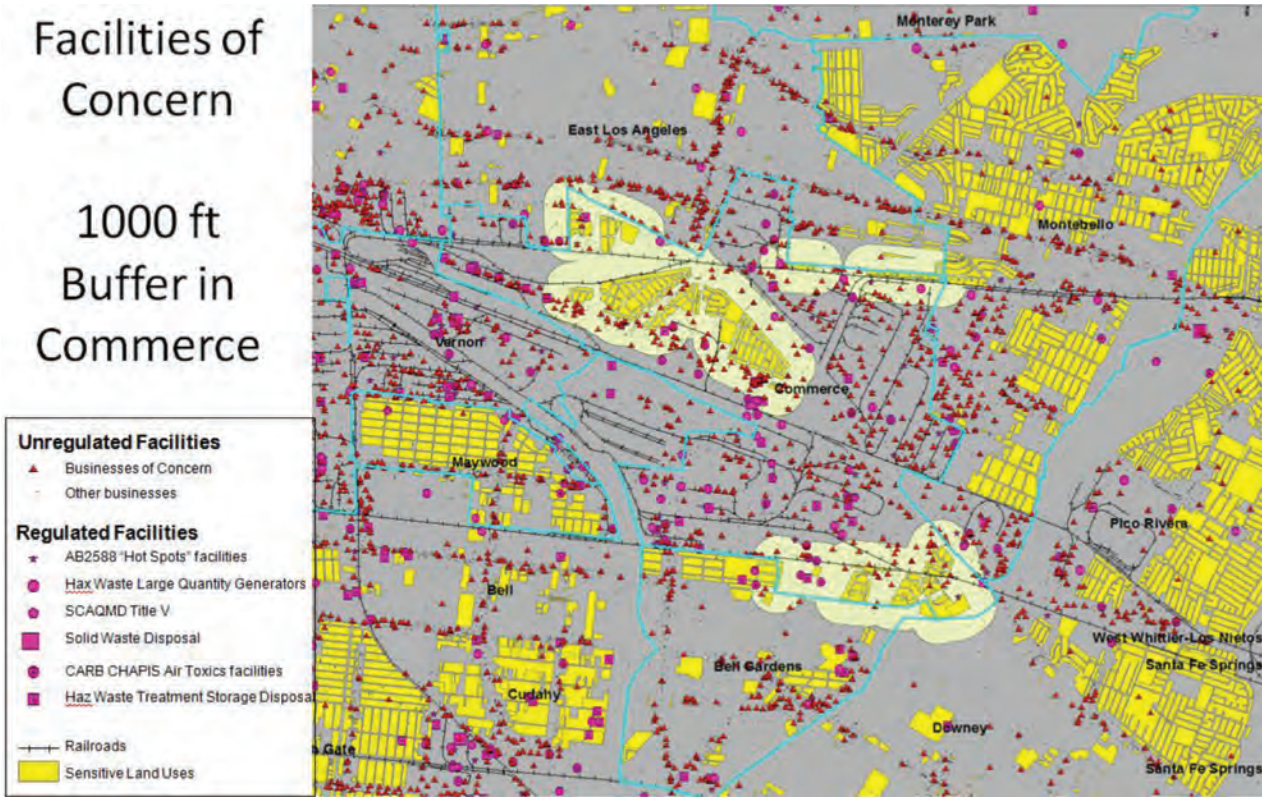
Map 9. EFFECTIVENESS OF CURRENT CITY ZONING PRACTICE IN SEPARATING AIR QUALITY HAZARDS FROM SENSITIVE LAND USES [Facilities of Concern – 300 foot Buffer in the City of Commerce]

demonstrated that hazard exposure and overall cumulative impacts in the entire City of Commerce rank among the highest both regionally and statewide, and fall well above the CalEPA action level. We also conducted an industrial analysis of existing businesses in the City of Commerce (as shown in the 2013 City of Commerce map on page 21 of this report), which shows that there are a significant number of business that pose a hazard to the surrounding community because of toxic air emissions located within the two buffer distances recommended by CARB for separation of sensitive land uses from air quality hazards. Some of these facilities are regulated by State regulatory agencies but most are not regulated. The maps on page 22 (Facilities of Concern – 300 foot Buffer in the City of Commerce) and page 23 (Facilities of Concern – 1000 foot Buffer in the City of Commerce) of this report summarize this analysis. The City of Commerce Green Zones Working Group Opportunity Areas (Map), which displays the areas in the city that are available for specific types of land use/development, is provided in Appendix D.

There were no alternatives to the proposed zoning amendments offered by any Working Group members until the last of the 14 monthly meetings of the Working Group on September 23, 2013. This new alternative, offered by the Industrial Council and Jon Reno, was in the form of a letter proposing a specific plan with the goal of ensuring that no new sensitive land uses were allowed to encroach upon or be sited too close to industrial and commercial land and facilities. This alternative simply proposed an idea on how the Working Group might recommend a solution to the problem of separation of these two land use types, with no detail, analysis, or supporting evidence or documentation. It also lacked any definition of "encroachment" or of specific industrial/commercial land uses or facilities that would be subject to this plan. In fact, this letter also contained a critique of the CARB Handbook recommendations, and the methodology that was used to develop the recommended distance of separation buffers.

After a very brief discussion of this new alternative, there was an amendment suggested by the small business representative, Doug Ashmore (Officer of Amvac, Inc), to have the proposed specific plan also operate to not allow new facilities with toxic air emissions to encroach upon existing sensitive land uses. At that point, the facilitator suspended the meeting briefly at the request of several Working Group members who asked to have a private discussion so that they could "decide how to vote". At the conclusion of the meeting, the vote of the eight Working Group members was 5-3 in favor of the amended specific plan alternative. There were no plans or process for building this idea into a detailed recommendation that is useful to the City, nor to evaluate it.

Although we can describe the Working Group process, it is difficult to understand the motivations that explain the actions of some of the Working Group members. The original proposed zoning amendments are geographically limited to the areas inside CARB-recommended buffers surrounding existing sensitive land uses in the City of Commerce. This area constitutes about a tenth to a quarter of the area of the City of Commerce (see above maps). In our view, Working Group members who did not support the proposed changes in the zoning ordinance, may have taken this position



Map 10. EFFECTIVENESS OF CURRENT CITY ZONING PRACTICE IN SEPARATING AIR QUALITY HAZARDS FROM SENSITIVE LAND USES [Facilities of Concern – 1000 foot Buffer in the City of Commerce]

because the ordinance is a citywide document, and all property owners would have to be notified of the changes. Those Working Group members probably feared that some community members would not understand the geographic limits to the proposed ordinance changes, so the response to the proposed changes would come from a larger audience. A specific ordinance/zoning modification plan can be written to be applicable to a limited geographical area, and to add (land) 'uses' or 'options' not generally available in the general land use plan and zoning. This can be accomplished, in effect, by writing modified "zoning" rules that apply only to parcels within the specified boundary. Normal municipal practice, however, usually changes zoning rules to add restrictions, while plans for specific areas are more liberalizing. In this case, the normal practice is reversed.

In our view, it is not at all clear how, in this case, a specific plan differs in practical terms from the geographically limited zoning amendments, unless the intent is to use less protective buffers or to mandate changes that are not in accordance with separation of uses as recommended by CARB. What we suspect is that some of the Working Group members only want to direct their focus onto two selected areas inside the City of Commerce – the Washington-Atlantic corridors, and perhaps the area near the MetroLink station. This could leave some sensitive land use areas, land uses that were identified and agreed upon by vote, without any protection.

Unlike the situation in the second pilot application region (SJV), there has been significant ground truth data collection and field work of various types (including air pollution monitoring) performed over the past several years in the City of Commerce, so typical ground truthing activities such as verification of facilities, community identification of undocumented hazards, etc., was not required for the SJV pilot.

During our collaboration with the Working Group, we noticed that the City Planning Department did not maintain a geospatial data library or use geographic information systems (GIS) as a tool. The Working Group found that GIS data and analysis was valuable in answering questions and validating data requirements that were encountered during our meetings. Representatives of the City of Commerce Planning Department (Alex Hamilton and Matt Marquez) confirmed the utility of geospatial data and training for their uses, and a desire to use this tool. Discussions with Angelo Logan and Isella Ramirez confirmed that EYCEJ also found this data and technology useful and would like to have in-house geospatial capabilities.

After discussions with EPA R9, ORD and a recommendation from Deldi Reyes, the "ground truth" aspect of the City of Commerce pilot application was redesigned to help the City of Commerce stakeholders improve their access to and analytical capabilities with geospatial information to assist them in understanding land use and zoning, environmental risk and exposure, and other issues of local importance to both the municipality and the community. We developed a data library to be shared with both the City of Commerce and EYCEJ, and offered training in data exploration, cartography, and spatial analysis of this data using both ArcGIS and Google Earth. ArcGIS is the professional standard for working with this type of information and is a standard geospatial analysis tool, and is available to both groups on their internal computers. Google Earth is useful primarily for data exploration and cartography, but it also has tremendous advantages in cartography, adding geographic context by using the aerial imagery of the chosen location(s) and the integrated search capabilities of the Google applications suite. It also has the obvious advantage of requiring less training to make it usable by a wide variety of users. We worked to develop a comprehensive geospatial data library of the City of Commerce and surrounding neighborhoods, and also to provide relevant training in both ArcGIS (for the City of Commerce and higher-level EYCEJ staff) and Google Earth (for other users). Included in the training package developed for the City of Commerce are techniques for automation and error checking for new data, and specific procedures for updating the datasets to keep them current. The university collaborators plan to populate and maintain updated data on an ftp site for a reasonable period after expiration of this cooperative agreement. Geospatial data in the data library includes:

1. Land use and land cover information from various sources
2. Automated land use and zoning information from the City of Commerce files
3. Real estate tax parcel information from the LA County Assessor
4. Facility location and information on environmental hazards from various government databases
5. The Topologically Integrated Geographic Encoding and Referencing system (TIGER) and American Community Survey information from the US Census
6. Various types of information on boundary files (County and State government administrative districts, Air Quality Management District (AQMD) designations, street files with address-matching capacity, mass transit and other transportation infrastructure, etc.)
7. Information and location of businesses and non-business (sensitive land use) facilities (schools, healthcare facilities, childcare facilities, parks, managed care facilities, etc.) by tax parcel.
8. Aerial imagery
9. Other data sets as identified during work on this part of the project

6.0
Pilot Application 2: San Joaquin Valley (SJV) Pilot Community Interactions

San Joaquin Valley stakeholders were and are interested in understanding the similarities and differences, and various trade-offs among the three environmental justice screening methods used in the SJV – our EJSM, CEVA (Cumulative Environmental Vulnerability Assessment) developed by the Center for Regional Change at the University of California Davis, and CES (California Communities Environmental Health Screening Tool or CalEnviroScreen) developed by CalEPA OEHHA.

We completed a detailed comparison of the three CI screening methods. This comparison was done to: (a) explore the regional pattern of CI scores by the three CI screening methods for the eight county SJV region; (b) compare results of the three CI screening methods to identify areas of agreement/disagreement in relative CI scores as a means to select areas for ground truthing under this cooperative agreement; (c) define and identify impact/vulnerability CI "hot spots" for each method and determine the degree to which the methods agree/disagree; (d) summarize differences in data and metrics used, and CI scoring algorithms for each of the three methods.

Due to the complex nature of the inter-comparison between ESJM, CEVA, and CES, along with the need to fully explain to the SJV community partners the implications inherent in the analysis results, a decision was made to develop and present two separate webinars to provide information on the analysis results to the SJV community. The two webinar presentations were identical and allowed everyone in the large SJV community stakeholder group to review the analysis and to pose questions for the research team to answer. Some questions from the SJV community could be answered during the two webinars, but more in-depth questions were answered by the research team in writing and sent to the entire SJV community stakeholder group after the second webinar. The research team reviewed and answered each question in a PDF document that was distributed to the entire SJV community stakeholder group.

The comparison effort between ESJM, CEVA, and CES was completed, and the results of the subsequent analysis reported to the SJV stakeholder group in webinars on June 27 and July 11. The PowerPoint used in that SJV project partner webinar is included in Appendix A of this report. Following the webinar sessions with the SJV community partners, the geospatial data layers, detailing the comparison of the three CI screening methods, was posted on an EPA R9 website to allow stakeholders to examine and explore the map patterns and CI screening scores during the comment period. Successful posting of the data was completed on August 30, 2013 with the comment period extending from that date until September 13, 2013. There were only two responses. One respondent suggested Tulare as a desirable ground truthing location, but provided no justification or connection to a policy relevant question.

Following the webinars, the geospatial data layers detailing the comparison of the three methods was posted on an EPA R9 website to allow stakeholders to examine and explore the map patterns and screening scores during the comment period. Successful posting of the data was completed on August 30, 2013 with the comment period extending from that date until September 13, 2013. There were only two responses. One respondent suggested Tulare as a desirable ground truthing location, but provided no justification or connection to a policy relevant question.

The web viewer for examining the maps was made available to stakeholders in an improved version, with side-by-side viewing capability, and a comment period that extended to September 30, 2013. During the extended comment period, we received two additional comments. We agreed on a schedule that called for all comments to be delivered to the project team on October 4, 2013 and a conference call on October 8, 2013 to discuss all comments. Editorial suggestions were then collected from the project team and compiled into a final version, which was discussed in a research team conference call on October 23, 2013 and finalized October 25, 2013.

The detailed comparison of the three screening methods that was presented during the June 2013 and July 2013 webinars addressed the following questions:

1. What is the distribution of final CI screening scores throughout the SJV area in terms of population and area?
2. A principal purpose of CI screening is to find the areas of highest impact and vulnerability – the areas with the extreme CI scores. How should this extreme be defined using these three methods, and how does the map pattern of these extreme CI scores compare among the methods when viewed region-wide?
3. Comparing these maps of extreme CI scores among the three methods, where is there agreement?
4. Because ground truthing validates and explores the location and distribution of hazards, an element that is only one part of each screening method, where are the locations with high extremes for hazard/pollution exposure, using each method, and how do they compare?

After an introduction to how the comparison was done, the webinar PowerPoint was organized to answer these four questions:

1. *What is the distribution of final screening scores throughout the SJV area in terms of population and area [refer to slides 21-25 (Appendix A pages A-9 – A-10)]*

   All three methods characterize the majority of SJV area with low CI scores. The EJSM shows high CI scores for a very small portion of the SJV, and there is a smooth pattern of variation in area vs. score. The CEVA pattern is similar, but far more irregular with a distinct "peak" in middle of scoring range. CES has an irregular (multi-modal distribution) pattern, with several "peaks" throughout the range of CI scores.

   Differences in CI screening scores vs. population are affected by variations in the CI scoring procedure among the methods, but also by the size of the area scored. The EJSM, which scores at the tract level, shows most of the population with middle range scores, a pattern that approximates a "bell curve". CES shows a pattern of increasing population with higher CI scores, while CEVA has a very irregular distribution of CI scores.

   The Gaussian ("bell curve") distribution best describes the nature of the data. The low population density and highly clustered nature of population in SJV suggests this distribution, and any CI screening method that identifies extremes (CI "hot spots") should score most areas in the middle of the range. The EJSM has this distribution in other areas of the state where it has been applied.

2. *A principal purpose of screening is to find the areas of highest impact and vulnerability – the areas with the extreme scores. How should this extreme be defined using these three methods, and how does the map pattern of these extreme scores compare among the methods when viewed region-wide? [Refer to slides 26-37 (Appendix A pages A-12 – A-13)]*

   We evaluated the range of CI scores that define the high extreme, or CI "hot spot", in each method, and found that the distribution of CI scores was best examined in terms of population represented by the "high score" class for each method to mitigate the complication of differences in scoring methods. We did two different comparisons, each defining the high extreme differently. The first comparison used the very highest CI scores for each method (referred to as "top quantile"), that represents about one tenth of SJV population (from 7.2 (EJSM) to 11.24% (CES)). A second comparison used a more broad definition ("high quantile"), that represents about one fifth of SJV population (20.7 (CES) to 24.6% (CEVA)). This second definition has greater policy relevance as OEHHA designates the top 10% of all

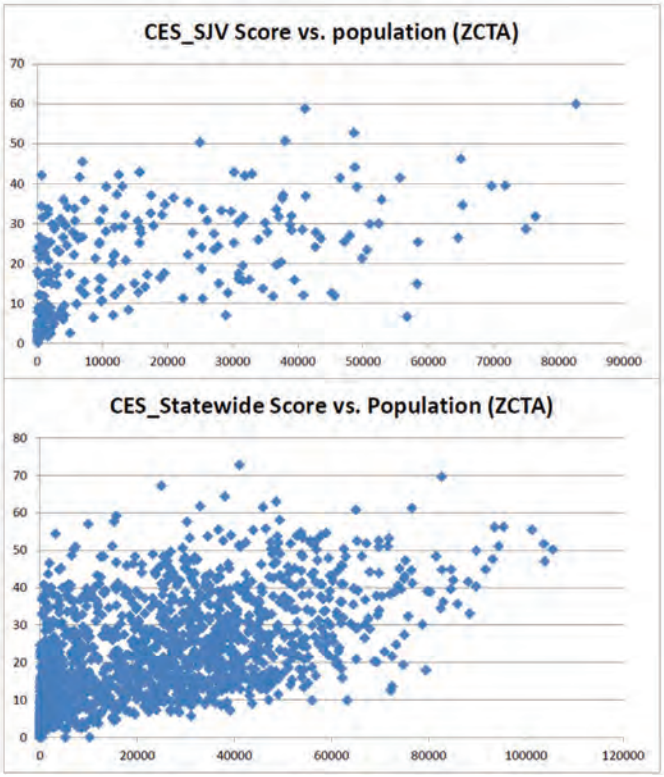


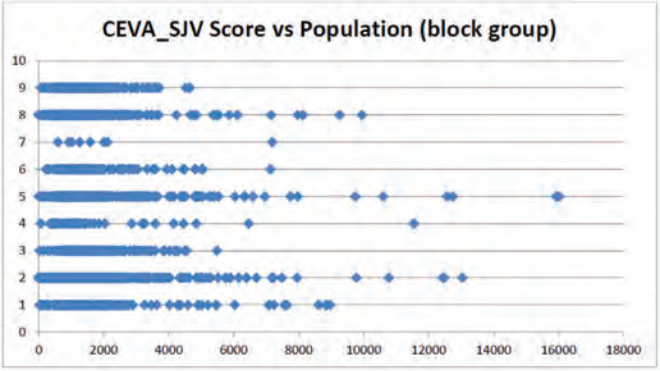
Figure 4. CES Score (SJV and Statewide) Versus Population (ZCTA)

ZCTAs as above the action threshold for application to legislation; and example is its role in SB535, which determines allocation of money to disadvantaged communities from the greenhouse gas reduction fund.

Generally, all three methods agree on large, dense population centers, including Bakersfield, the Fresno/Selma area, Stockton, Modesto, Tulare and Madera. EJSM and CEVA do so with greater geographic specificity than does CES because of the limits of ZCTAs, and they are in general agreement on these more geographically specific parts of those large populated areas. EJSM and CEVA also identify numerous small population centers and towns, but usually not the same ones. Smaller spatial unit of analysis (EJSM and CEVA) makes identification of small towns more likely. The greater focus on census-based metrics in CEVA scoring increases likelihood for small towns to receive high scores, when compared to EJSM and CES. Overall, EJSM identifies fewer areas, and more geographically focused areas, than the other two screening methods.

3. *Comparing these maps of extreme scores among the three methods, where is there agreement? (Appendix A pages A-14 and A-16) are a series of maps, which zoom into the areas where all three methods agree. The areas of best agreement are:*

- East Bakersfield, particularly the area east of Interstate 99 and between Highways 58 and 204 (Appendix A page A-14])



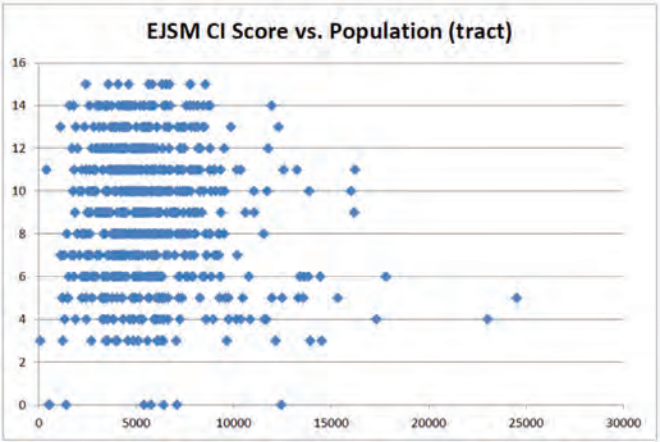


Figure 5. CEVA Score (SJV) versus Population (Census Block Group) and EJSM Score Versus Population (Census Tract)

- South central Bakersfield in the area east of Interstate 99 and west of the Bakersfield Municipal Airport ([Appendix A page A-15])
- Downtown Fresno, and extending southwest across Interstate 99 to Hyde Park ([Appendix A page A-16])
- A large area of southeast Fresno between Interstate 99 and Highway 180 ([Appendix A page A-16])
- Selma, a town about 15 miles south of Fresno downtown, along Interstate 99 ([Appendix A page A-16])

4. *Because ground truthing will be validating and exploring the location and distribution of hazards, an element that is only one part of each screening method, where are the locations with high extremes for hazard/pollution exposure, using each method, and how do they compare?* [Refer to (Appendix A pages A-17– A-19)]

   A number of areas in the SJV showed agreement in hazard/pollution scores used by the three methods. Most of these are located in the areas as those mentioned above for agreement regarding high total scores. When considered in terms this comparison for agreement among the three methods, there are several areas where the methods agree that hazard/pollution scores are high, but where the overall score is not in the high extreme. The most prominent of these are Stockton ([Appendix A page A-17]), Modesto ([Appendix A page A-18]), Clovis, northeast of Fresno ([Appendix A page A-18]), and portions of greater Bakersfield ([Appendix A page A-19])

The results of the comparison of CI screening methods and map patterns of CI scores, summarized, above, show reasonable agreement among the methods in spite of the many differences in methodology and data sources. This gives us additional confidence in the process of CI screening as a robust and meaningful technique for identifying areas that represent the "high end" extreme of vulnerability and impact/exposure. It also underscores the prevailing conclusions by many working in the SJV of a pattern of inequitable exposure to environmental hazards and their attendant risks, and vulnerability to those risks.

It is worth mentioning that during the webinar, while trying to explain some of the reasons for the patterns among the three screening methods, there was a discussion about a disagreement in interpretation that deserves a thoughtful examination. CES identifies ZCTAs mostly associated with large population centers, while CEVA and (to a lesser extent) EJSM identify small towns as isolated population concentrations not picked up by CES - at least using the "extreme" CI scores values. In the webinar, we suggested that CES uses "population weighting" which, strictly speaking, is incorrect because it seems to refer to the CES CI scoring method itself. However, this comment was meant to try to make sense of the mapping results. Looking at the data closely, it is clear that CES CI scores are skewed by population in a way that appears like weighting, as the graphs on page 26 and page 27 of this report demonstrate.

As can be seen in the graphs, on page 27 for both SJV and Statewide, CES tends to give higher CI scores to more populated areas, while EJSM and CEVA clearly do not. See the graphs on page 27 displaying the same relationships for CEVA and EJSM.

One possible reason is that ZCTAs have very different sizes and populations, ranging up to over 110,000 statewide. This is also true for the full US sample and of SJV. Tracts and block groups, on the other hand, are defined specifically to sample population and efforts are made to ensure they are not too large or small. For example, tracts have a population range where the least populated tracts are about 500 persons, but they quickly go to 5,000 and stay at that level (with some much larger at the extreme end). ZCTAs are not established to ensure a fair amount of uniformity in population size so, while CES does not population weight per se, scoring using ZCTAs has the potential for some non-standard statistical distributions, which is what we may be observing here.

In addition, since ZCTAs are physically larger in terms of their area, they can make outlier tracts and/or small towns that lie within them literally "disappear". We found in our SJV mapping analysis and comparisons that there were several ZCTAs that were not high scorers on CES, but within

some of the lower scoring ZCTAs (by overlaying EJSM results) that there were tracts that were “hot spots” according to EJSM.

EPA R9 and ORD worked with the university collaborators (Occidental College, UC Berkeley, and USC) and others to incorporate stakeholder comments into the decision for the location for ground truthing. This decision addressed the following criteria: (a) community capacity to engage in ground truthing, (b) anticipated value in determining whether and how screening CI methods can inform the policy relevant questions, (c) capacity to improve future development of the CI screening methods, and (d) selection of an area that includes a range of CI scores, from low to high, to help us get an idea how ground truth validation relates to highly impacted areas vs. areas with lower impact and vulnerability.

The complete PowerPoint slide presentation comparing the CI methods (CEVA, CES, and EJSM) presented to the stakeholder group in webinars on June 27, 2013 and July 11, 2013 is provided in Appendix A Pages A-2 – A-19.

7.0
Pilot Application 1: City of Commerce Working Group Recommendations

The Working Group authored and finalized its final report, and delivered that report to the City of Commerce City Council for review and further action. The Executive Summary of that report, a Planning Commission Staff report on the proposed Green Zones policy recommended by the Working Group, and City Council agenda for the meetings where the decisions were reached is included in Appendix B of this report.

In mid-November 2013, the City approved three of the four major recommendations of the Working Group in its Green Zone Policy. Below is a news media report summarizing the City of Commerce City Council decisions on this policy (http://egpnews.com/2013/11/commerce-approves-three-prongs-of-green-zone-policy/).

Commerce Approves Three-Prongs of Green Zone Policy

A policy that would protect residents from toxic exposures and will create job opportunities.

By Jacqueline Garcia, EGP Staff Writer

A local city with a large industrial base, crossed by freeways and railyards that is often cited as having some of the most polluted air in the region, has adopted a policy environmental advocates hope will make the city healthier for its residents.

At the Nov. 5th City of Commerce council meeting, elected officials voted to approve a Green Zones Policy supported by a city task force and local activists. Supporters said not only will the policy bring a healthier community; it will also create more local job opportunities in manufacturing, specifically in food production and artisan businesses.

Railyards, freeways and other industrial lands uses cause highly concentrated levels of pollution that affect the health of Commerce residents, workers and visitors, according to East Yard Communities for Environmental Justice (EYCEJ), an environmental health and justice organization backing the policy. Ongoing exposure to these toxins can aggravate asthma, cause pre-term births, low birth-weight babies, lung disease, heart attacks, cancer and premature death, according to East Yards, according to the Green Zones executive summary.

In a study by the California Environmental Protection Agency, Commerce was identified in the top 5 percent of communities in California with the highest pollution burdens and vulnerabilities.

Members of East Yard and Commerce residents were at the Nov. 5 council meeting to push for passage of the Green Zones Policy, a four-pillar plan that according to East Yard's website will prevent toxic exposure to residents from new land uses; reduce the level of existing impacts through voluntary business collaborations, allowing participants to utilize less polluting equipment; revitalize local economic opportunities to contribute in a vibrant economy and increase of jobs, and reinvest in key boulevards to bolster business and quality of life opportunities."

At the meeting, Commerce resident and East Yard member Toña Lupercio presented a petition with hundreds of signatures from community residents supporting the policy to the council. "This policy is critical and we need your leadership," she told council members.

Three of the Green Zone policy initiatives were developed and sponsored by the city's Green Zones Policy Working Group. The fourth, dealing with the issue of "prevention," was added by East Yard, stating it is needed in order to stop the exposure of residents to toxic and harmful pollutants.

"The reason that the council did not include the [fourth] element that amends the zoning ordinance to create buffer zones, from my understanding, is that they did not fully understand the recommendation," said Angelo Logan, member of East Yards.

The new green policy will amend city-zoning law to restrict new toxic land-uses close to homes, schools, churches and senior centers.

After much deliberation, the council voted unanimously to approve the working group's three original recommendations, but decided to conduct study sessions on East Yards recommended ordinance. This element is aimed to prevent new hazards that range from truck idling at truck stops and warehouses to chemical handling facilities.

"[East Yards] members are very excited that the council has decided to adopt three of the four elements and will consider the 4th one in the coming months." Said Logan.

The approval of the Green Zone Policy will help reduce environmental dangers in the community, prevent pollution and revitalize neighborhoods through targeted economic development strategies, according to East Yard.

As part of its goal, the policy aims to create a protected zone around sensitive land use areas such as schools, playgrounds, homes, and daycare and senior centers to improve public health.

The policy has been years in the making. In June 2011, Commerce's Environmental Justice Advisory Task Force urged city officials to hold workshops to explore ways to maintain the city's focus on businesses and industry, while also protecting the health of its nearly 13,000 residents.

8.0
Pilot Application 2: San Joaquin Valley (SJV) Site Selection Process

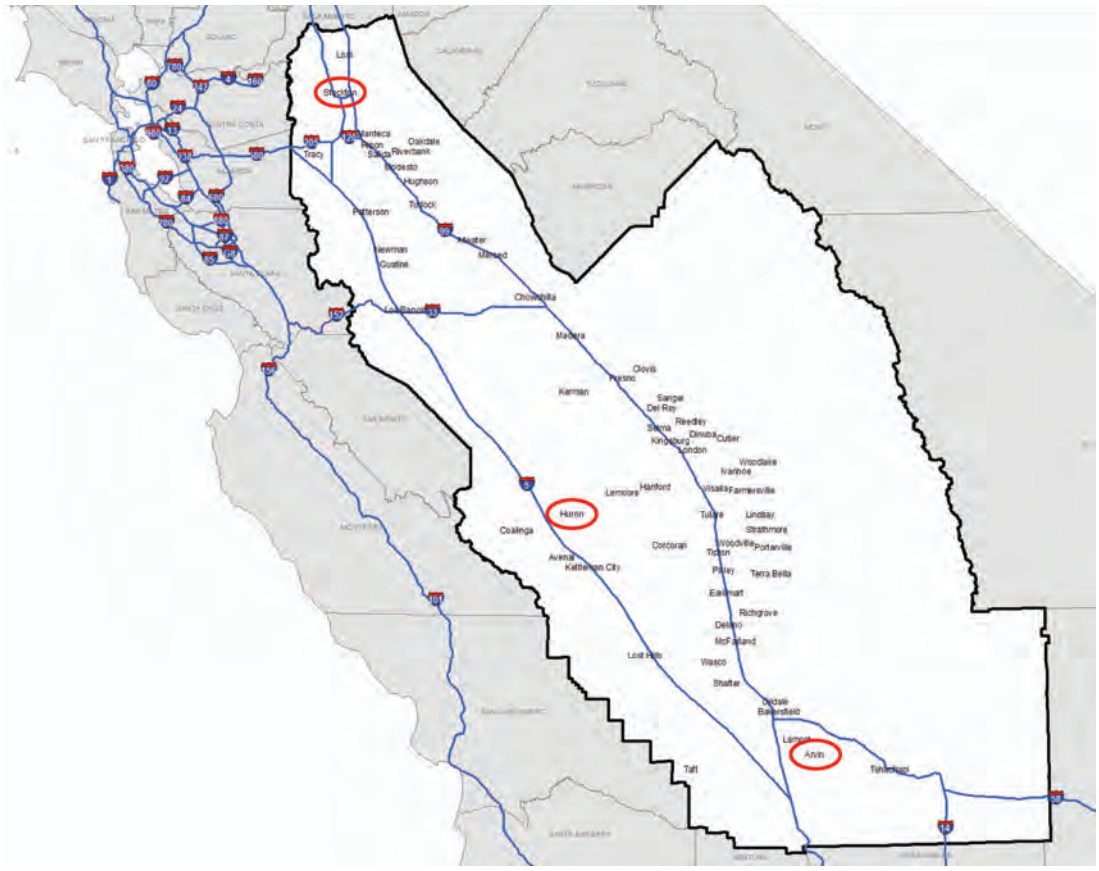
We defined the goals of the ground truthing part of this project by selecting locations for ground truth data collection in the SJV, and completing the community-based data collection and analysis phase of the project. The conceptual framework for the ground truthing selection reflected the results of a detailed comparison of the three screening methods, and their agreement/disagreement in identifying areas of environmental justice concern. This comparison focused on defining and identifying specific areas for each method where impact/vulnerability was highest, and to compare these locations among the three methods to determine the degree to which the methods agree/disagree.

An initial comparison revealed that the most significant reason for differences in scoring between CES and the other two screening methods was the fact that CES CI metrics are scored only on a statewide basis, unlike EJSM and CEVA, which score for a predefined region. It was important to remove this difference for the purposes of our comparison study in order to make comparisons of the results meaningful.

We reviewed the numerous responses from project partners. The responses varied significantly in their interpretation of the comparison results, and in suggestions on how to proceed with ground truthing. EPA R9 and ORD thought it important that the core group develop responses to the comments, and distribute them to the project partners. They also asked the university collaborators to add some additional analysis and maps to the comparison in order to clarify some important conclusions, and to directly address specific commenter's concerns.

Telephone meetings by the research team on October 23, 2013 and October 25, 2013 accomplished a review of the responses to comments and an agreement to do some additional analysis to clarify some questions posed by some of the commenters. A summary of these responses, and the project team's comments on the responses, were distributed to the project partners in mid-November 2013, and is located in Appendix C of this report.

Because of concern about how the slow pace of decision-making on ground truthing goals and locations was affecting the project, the research team took the initiative



Map 11. EJSM Ground-Truthing Locations in the SJV

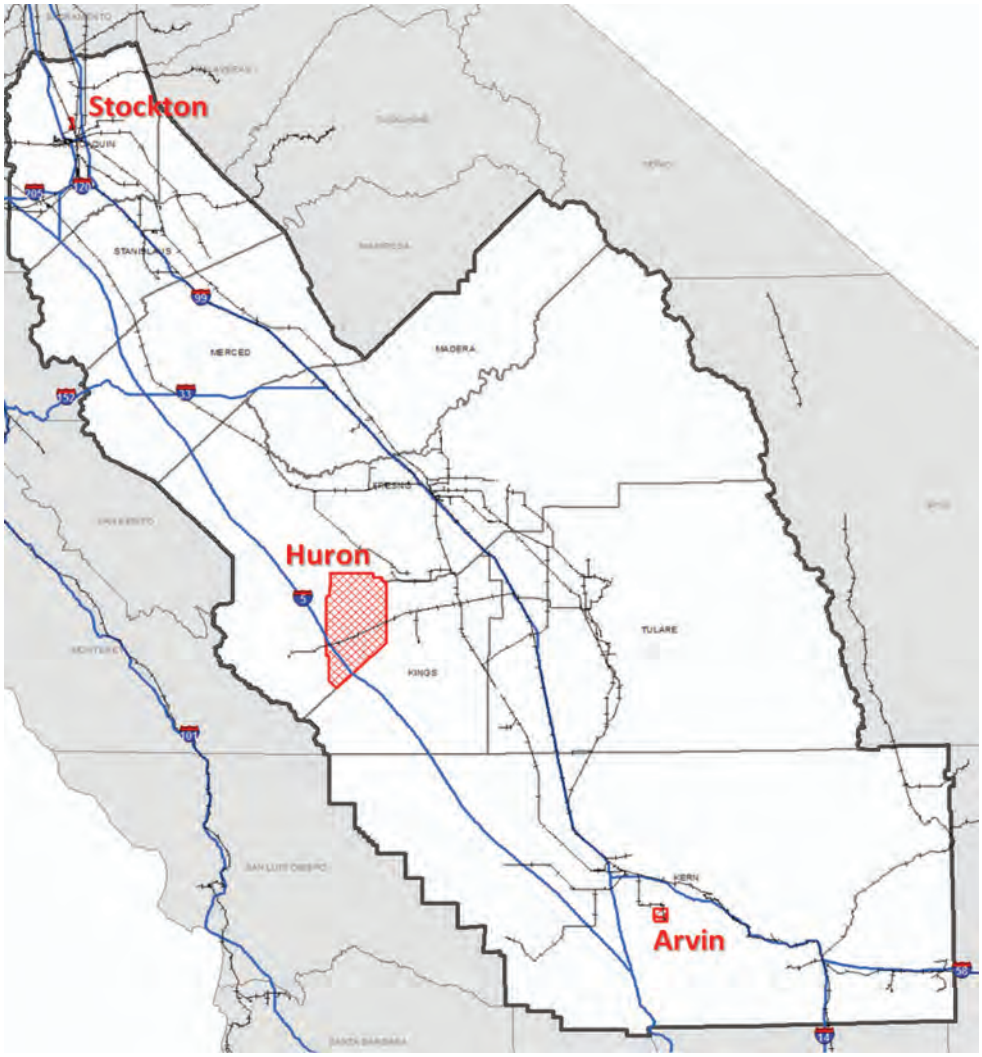
Map 12. Map of San Joaquin Valley Region.

to systematically detail the options available, and created a set of specific recommendations on goals and ground truth locations, including a ranking of the options. The late November 2013 holiday period and travel by some of the core group delayed a meeting on these recommendations until early December 2013. The decision was made to use the ground truthing results to (a) test for "false positives" among areas with the highest total CI screening scores, as well as those areas with high CI scores for pollution/hazard exposure, and (b) determine how data corrected by the ground truthing affected EJSM CI scores.

Three CI analysis sites were chosen as the best candidates to address these goals, and to provide some reasonable geographic variation within the very large and diverse SJV area, which spans eight counties. Although the original project workplan specified ground truthing in only one location, we had the resources to be a bit more ambitious as a result of our efficient use of the budget on fieldwork for the City of Commerce Pilot Application. These locations – the town of Arvin located southeast of population and commerce center, Bakersfield; Huron, a somewhat isolated community almost completely dependent on agriculture, and a historically persistent environmental justice community; and central Stockton, where the EJSM finds very high pollution/hazard exposure cumulative impacts where the other two tools do not – are shown in the map location above: Map 11. EJSM Ground-Truthing Locations in the SJV.

Following the December 2013 holiday period, the project was affected by change of EPA R9 personnel. Jacqueline Hayes transitioned off of the project as EPA R9 lead Technical Advisor. Jacqueline originally took on the role of technical advisor for EPA R9 during the second six-month period of the project. Charles Swanson, who had been assisting Jacqueline Hayes for several months, became the EPA R9 lead Technical Advisor, and Jacqueline Hayes continued to assist the project for several weeks into mid-February 2014 before formally leaving the project.

We received the anticipated comments from OEHHA in January 2014, which were valuable and substantive, and prepared a detailed response. These comments informed the project significantly, but did not change the decisions made previously on ground truthing goals and CI analysis sites.



Map 13. Map of San Joaquin Valley showing three areas where ground-truth validation was completed.

With the goals and locations for ground truthing finalized, and informed by the thoughtful OEHHA input, EPA R9 began the process of working with community leaders from the project partners to identify community groups who would receive the training for data collection, and accomplish the field portion of the ground truthing effort. The decision to ground truth in three locations depends on community capacity to engage in ground truthing, and we originally anticipated including SJV Cumulative Health Impacts Project and their community partners in this process. The two project partner members representing community groups - Sarah Sharpe, Co- Director of Fresno Metro Ministry, and Cesar Campos, Coordinator for the Central California Environmental Justice Network (CCEJN) were identified by EPA R9 to aid in identifying and enlisting community groups for the ground truthing training and fieldwork.

Both of these community leaders are based in Fresno, where the patterns of environmental justice and vulnerability are clear and unambiguous, and where all three screening method largely agree. For this reason, no ground truthing was planned for that part of the San Joaquin Valley. However, this made it difficult to find community members to engage the fieldwork in the three CI analysis sites identified for this project, and further progress on ground truthing was again delayed. Eventually, Sarah Sharpe was unable to continue her supportive role in this process, and Cesar Campos worked hard to find community partners in Arvin, Huron and Stockton to work with us.

At this time, Cesar had tentatively identified groups interested in helping us with the ground truthing effort, but had not obtained a final commitment or dates for the group training necessary to proceed. The ground truthing activity for the Arvin, Huron, and Stockton communities was ultimately completed on July 19, 2014.

In preparation for the field data collection, we collected and accomplished initial error checking on all geospatial and facility data for the three ground truthing areas in preparation for our field technician to do the data collection outlined in the QA/QC plan for this cooperative agreement. This fieldwork occurred May 7-10, 2014 and July 17-19, 2014.

9.0
Pilot Application 2: San Joaquin Valley (SJV) Detailed Region/Site Maps

The study area for Pilot Application 2 is the eight county southern San Joaquin Valley (SJV) region, as shown in Map 14 below.

During the Planning and Design process for this pilot application, the Project Partners clearly identified their desire to better understand the similarities, differences, and the various trade-offs among the three environmental justice screening methods used in the SJV: a) our Environmental Justice Screening Method (EJSM); b) the Cumulative Environmental Vulnerability Assessment (CEVA), developed by the Center for Regional Change at the University of California Davis, and; c) the California Communities Environmental Health Screening Tool or CalEnviroScreen (CES), currently under development by CalEPA OEHHA. The possibility of making a comparison between these three methods was anticipated in the Planning and Design section of the research workplan and integrated into the project, to apply ground-truthing to validate and correct the facility-level data used by these three screening methods.

One key element of this pilot application is using ground-truthing to validate (and correct, as necessary) the location accuracy and activity of hazardous facilities and sensitive land uses used in Environmental Justice (EJ) screening. This process began with an activity to identify the specific areas for ground-truthing. The conceptual framework for the ground-truthing was designed to reflect the results of a detailed comparison of the three CI screening methods, and their agreement/disagreement in identifying specific areas of high EJ cumulative impact scores. This comparison focused on defining and identifying areas for each method where impact/vulnerability was highest, and comparing these locations among the three methods to determine the degree of agreement/disagreement between them. This information was then used to select the specific areas for ground-truthing.

Our initial comparison revealed that the most significant reason for differences in the CES CI scores, as compared to the other two screening methods (EJSM and CEVA), was

Map 14. Map of San Joaquin Valley Region.

the fact that CES CI metrics are scored only on a statewide basis. Both EJSM and CEVA score for a pre-defined region determined by common data availability and quality, common pattern of impact and vulnerability factors, and the geography of decision-making. It makes sense to score the SJV as a region, as these eight counties share a broad concern about pesticide exposure, water quality, ozone and particulate matter pollution, impacts from agriculture and the petroleum industry, and social factors that act as effect modifiers. There is no transportation planning agency or regional authority that monitors land use, so this information was extracted from real estate parcel data from each county's tax assessor's office.

It was important to remove this difference to make the comparison results meaningful, so final comparison and ground-truth site selection was delayed to allow time for the California Office of Environmental Health Hazard Assessment (OEHHA) to calculate scoring metrics using only data for the San Joaquin Valley region. Although it took time to receive this data, we felt it was very important to compare the most current CI screening scores possible, and to ensure that the comparison was meaningful by using the CI scores for the three methods in the same (SJV) region.

After the webinars were held in 2013, the review of the project partner comments was completed in 2014 and the results of the updated comparison were shared with the project partners. At this time, it was decided that in addition to distributing the PowerPoint presentation summarizing the comparison, project partners would also be able to examine the details of the comparison of the three methods using geospatial data layers in an online GIS mapping application. These data were posted on to an ESRI-Online map viewer imbedded in the EPA R9 website (during the comment period).

The numerous responses and suggestions from project partners were collected and reviewed, prior to being incorporated into the decision-making aspect of the project. The responses varied significantly in their interpretation of the compared results, and in suggestions on how to proceed with ground-truthing. We spent considerable time developing responses to all comments. The responses were helpful in guiding the research team to add additional analyses and maps to the comparison activity to directly address specific commenter concerns and clarify the meaning of some important conclusions. A summary of these responses, and the project team's comments on the responses, were distributed to the project partners and are included in Appendix C.

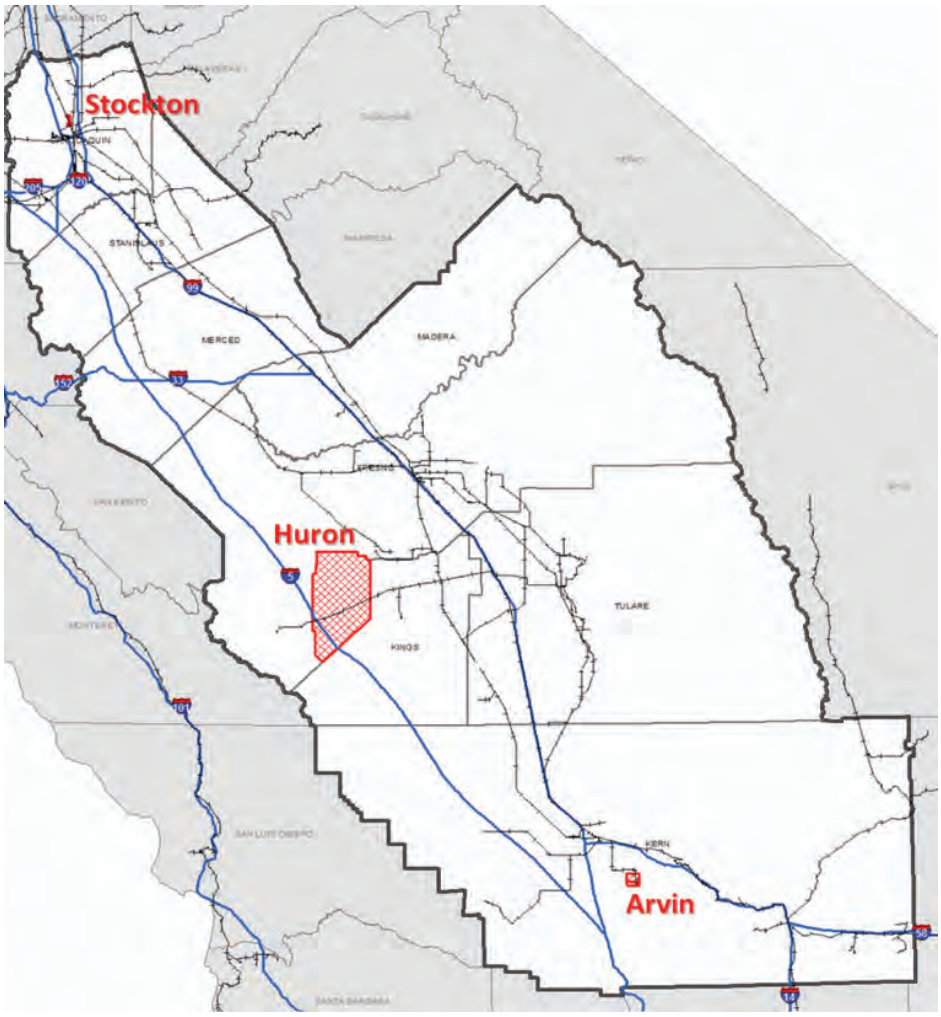
The research team took the initiative to systematically detail the options available, and created a set of specific recommendations on goals and ground-truth locations, including a ranking of the options. In consultation with EPA R9 and ORD, the decision was made to use the ground-truthing results to (a) test for "false positives" among areas with the highest total screening scores, as well as those areas with high scores for pollution/hazard exposure, and (b) determine how data corrected by the ground-truthing affected EJSM scores.

Three CI analysis sites were chosen as the best candidates to address these goals, and to provide some reasonable geographic variation within the very large and diverse San Joaquin Valley area, which spans eight counties. The SJV locations selected were: a) the town of Arvin, located southeast of the population and commerce center, Bakersfield; b) Huron, a somewhat isolated community almost completely dependent on agriculture, and a historically persistent environmental justice community, and; c) central Stockton, where the EJSM finds very high pollution/hazard exposure where the other two tools (CES and CEVA) do not.

Once the goals and locations for ground-truthing were finalized, and the OEHHA input incorporated, we worked with EPA R9 and community leaders from the project partners to identify community groups who would receive the training for the ground-truthing data collection effort. The two project partner members representing community groups, Sarah Sharpe, Co- Director of Fresno Metro Ministry, and Cesar Campos, Coordinator for the Central California Environmental Justice Network (CCEJN) were identified by EPA R9 to assist in identifying and enlisting community group members.

In preparation for the community based participatory research (CBPR) portion of this pilot application via public participation in ground-truth data collection, we collected and accomplished initial error checking on all geospatial and facility data for the three ground-truthing areas. This preparatory work was done so that the field technician could perform the data collection as outlined in the QA/QC portion of the research workplan. A CBPR project depends on community capacity to engage in the field work, and we originally anticipated including SJV Cumulative Health Impacts Project and their community partners in this process. Both of these community leaders are based in Fresno, where the patterns of environmental justice and vulnerability are clear and unambiguous, and where all three screening method largely agree. For this reason, no ground-truthing was planned for that part of the San Joaquin Valley, but the time and distance involved in training and fieldwork made it difficult to find community members to implement the fieldwork in the three CI analysis sites identified for this project. Cesar Campos worked hard to find community partners in Arvin, Huron and Stockton to work with us, but with the project timeline approaching deadlines, we were ultimately unable to solidify community participation as originally planned. The SJV community groups were supportive and enthusiastic about this project, but they just could not make arrangements to complete the training and fieldwork within the time limits of the project.

Given the time limitations of the SJV community groups, we devised an alternative plan to complete the requirements of this pilot application and still accomplish the stated goals in



Map 15. Map of San Joaquin Valley showing three areas where ground-truth validation was completed.

the approved research workplan. The revised approach also responded to the changes and improvements in the CalEPA screening tool CalEnviroScreen (CES). These changes in CES occurred during the second year of this project, and had an obvious impact on the comparison between methods. This revised approach was also endorsed by our SJV stakeholder partner, Cesar Campos, who consulted with the community groups on the proposed changes.

The ground-truthing part of this project was designed to: a) validate accuracy of established facilities and land uses from professional sources and available databases as a way to check the accuracy of their use in screening tools; b) determine the impact on CI screening scores using unchecked (with location and other errors) hazard and facility data as a test of the EJSM's susceptibility to identifying false positives, and; c) involve community members in the process of evaluating what should be included in a screening method or tool, and how screening results affects their role, positively and/or negatively, in decision-making and policy development.

This plan was accomplished by: 1) completing field-based ground-truthing validation of all facility information for the three selected test areas by Occidental College/UC Berkeley/ University of Southern California staff; 2) reviewing and correcting all facility data for the entire SJV region using Google Earth Pro, and; 3) rescoring the SJV region using validated and corrected facility data to look for differences resulting from using unchecked (error filled) vs. validated (errors corrected) information. This approach is in some ways superior to the original approach, in that it is a more comprehensive test of false positives/negatives involving the entire eight (8) county area and not just the three neighborhoods/localities identified for ground-truthing.

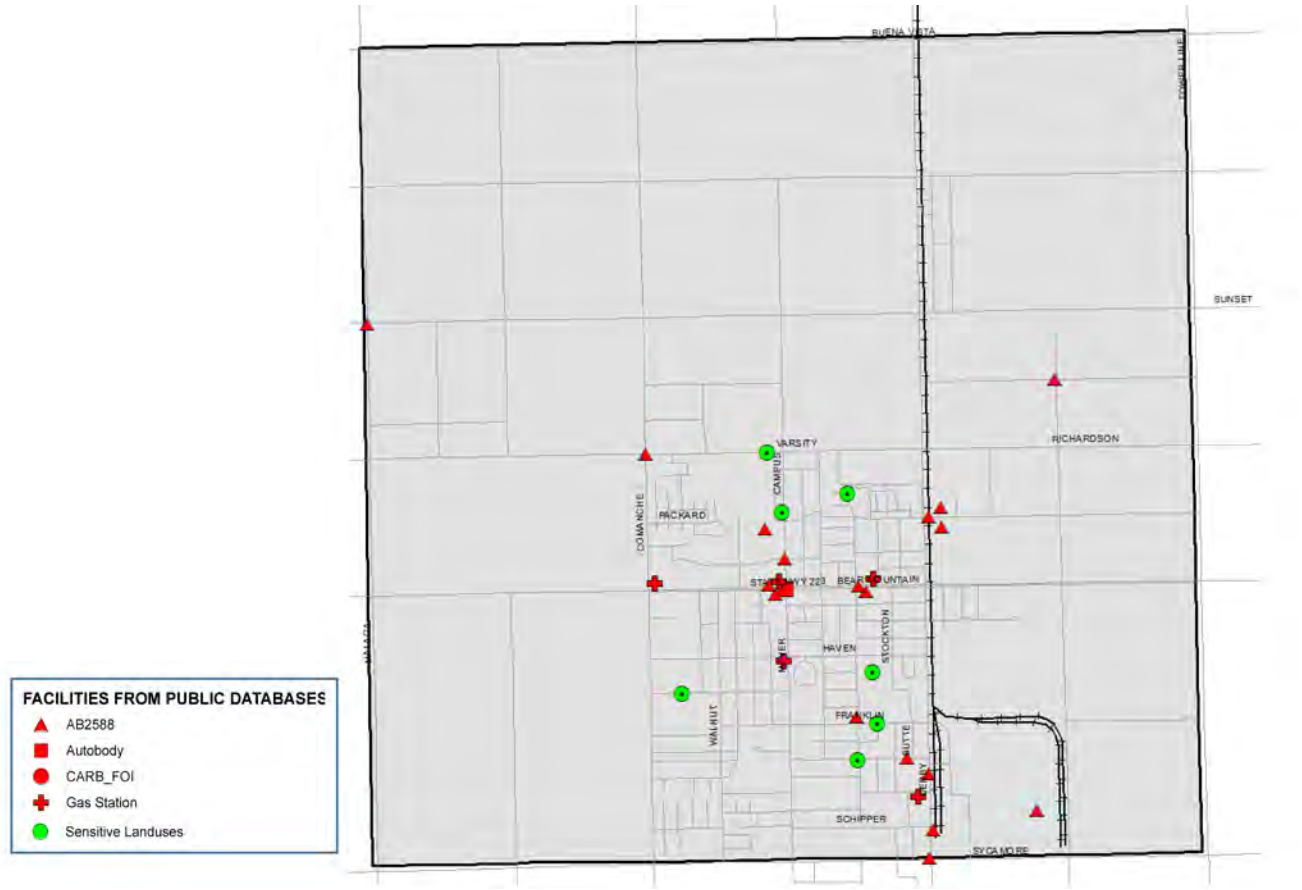
The results of this work was presented at a regional EJ meeting (the Central California Environmental Justice Network [CCEJN] conference in Fresno, CA on Saturday September 6, 2014) to: a) explain to the community members the results of our work; b) engage them in a conversation about the way it was done and why; c) solicit their ideas and input on which types of hazards should be included, what is missing, and what does their experience suggest we should include that we may have excluded. This provided a means to incorporate the community perspective into the process, including their ideas on hazards and EJ issues, and their reactions to our attempts to create and improve screening tools to guide decision makers.

Community Engagement - Central California Environmental Justice Network (CCEJN) Conference: The community engagement component for this research project culminated in our participation in the annual conference of San Joaquin Valley (SJV) environmental justice community organizations, "**Roots of Resilience, 2014**", sponsored by the Central California Environmental Justice Network (CCEJN) on September 6, 2014 in Fresno, CA. The agenda of the meeting is attached as an addendum, which is provided in Appendix E. The conference attendance included more than 100 attendees from community organizations throughout the eight county SJV region. Also in attendance were our two community partners associated with this (SJV) ESJM pilot application, Cesar Campos, Coordinator for the Central California Environmental Justice Network and Sarah Sharpe, Co- Director of Fresno Metro Ministry, as well as other project partners and EPA R9 staff who took part in the planning and design of this pilot application.

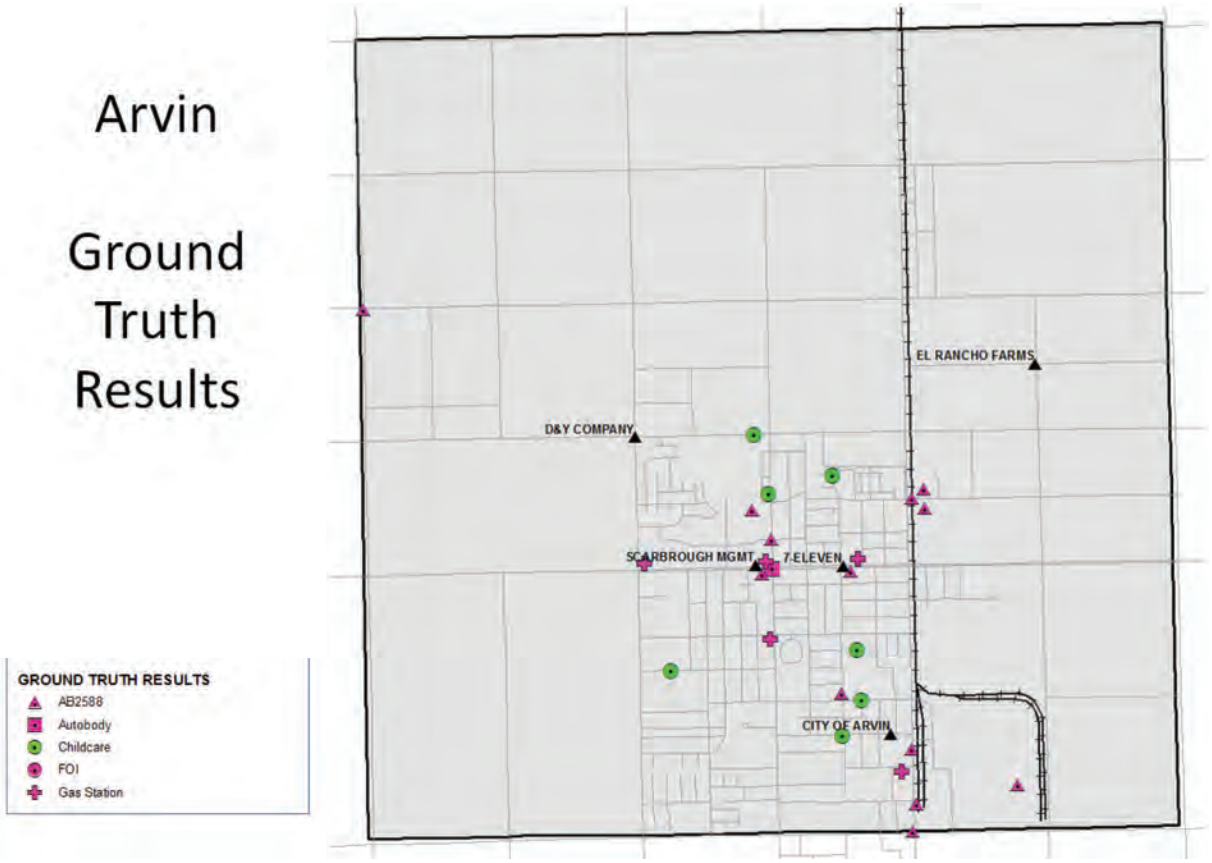
We presented our work in an afternoon workshop titled "**Partnering with Environmental Agencies and Communities to evaluate the Environmental Justice Screening Method**". We estimated attendance at this presentation and following discussion, which took place over a two-hour period, at approximately seventy five persons. The following description of the event was included in the conference documentation:

We will summarize work on a project funded by EPA R9 to apply the Environmental Justice Screening Method (EJSM) to help regulators and policy makers more efficiently target their efforts to remediate cumulative impacts, environmental inequities, and focus regulatory action at the neighborhood level. Currently, the burden of proof is usually placed on communities to demonstrate the cumulative impacts of environmental stressors. CI screening such as the EJSM provides a more proactive approach, removing this burden from vulnerable communities so that those without the history or capacity for civic engagement can also receive regulatory attention, and has potential to advance regulatory evaluation and the implementation of environmental policies. We will also report on how the accuracy of agency databases affects the reliability of screening by comparing it with "ground truthing" verification study in three key areas of the Central Valley – Arvin, Huron and Stockton.

Dr. Manuel Pastor, USC PERE, presented a summary of the EJSM to familiarize everyone with the general process of environmental justice screening, with particular emphasis on the indicators used and reasoning associated with the choice of those indicators. This was followed by Dr. James Sadd, Occidental College, who presented an overview of the ground truthing and location validation process, and results for both the entire San Joaquin Valley, and the three communities where more intensive work was accomplished (Arvin, Huron, and Stockton). Based on the questions and discussion that followed, we felt that the presentation was clear and understood by the participants, and that they came to the meeting with some familiarity of EJ screening and its influence on policy and decision-making. The presentation



Map 16. Arvin study area showing location and types of facilities identified from standard public databases.



Map 17. Arvin study area showing location and types of facilities validated using ground-truthing.

was aided by a language interpreter who translated the content into Spanish, and it seemed to us that the Spanish-language speakers also understood the presentation quite well.

Following the presentation, and some questions to clarify some of its content, we led a discussion on screening indicators and the role of screening in addressing community concerns. The responses and discussion primarily focused on the following topics:

1. Indicators appropriate for urban vs. rural/agricultural communities:

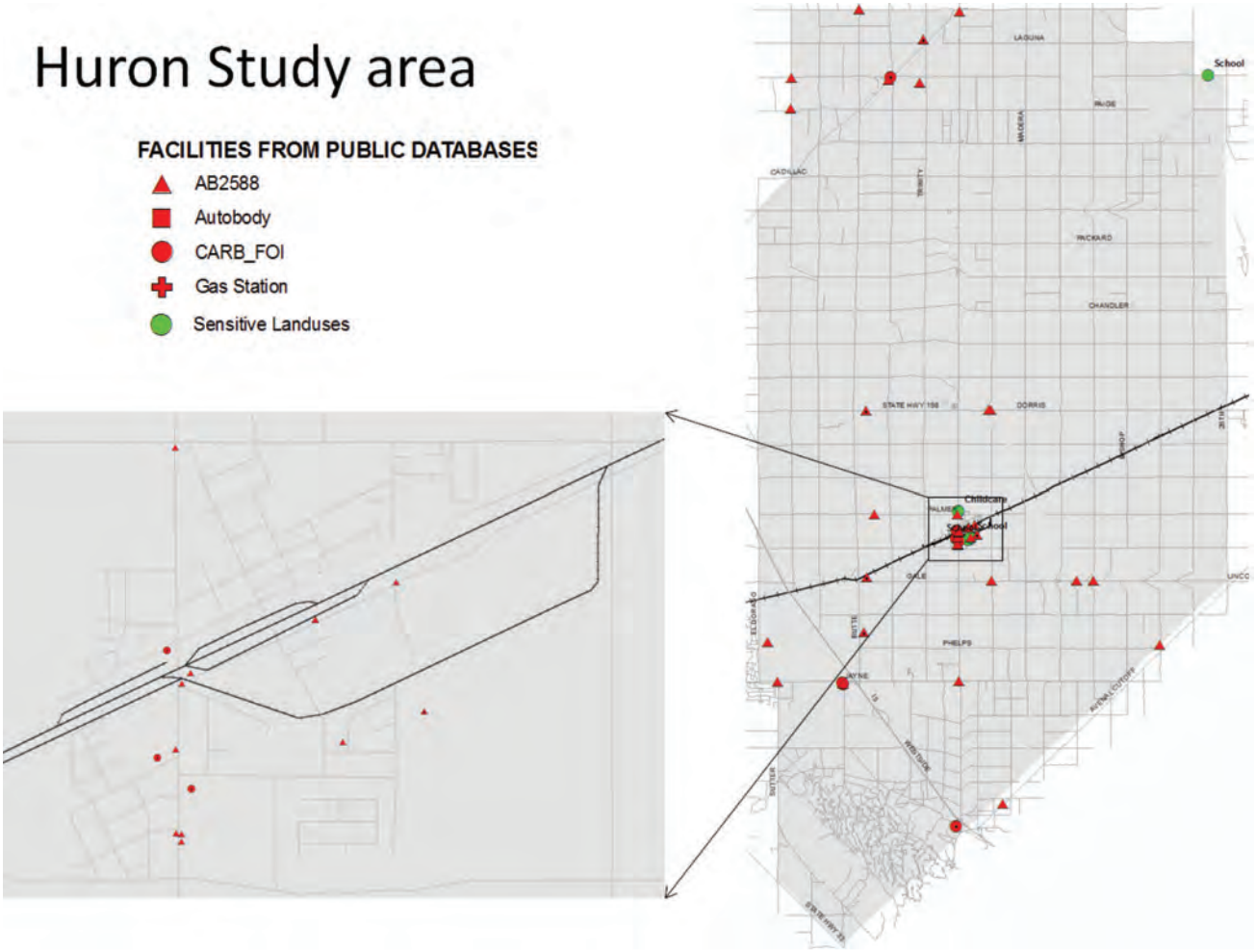
   Participants brought up questions about specific indicators that are more important to residents of these rural/agricultural communities than urban areas. Examples include pesticide use and water quality. There was considerable discussion about how the sources of these data are obtained, how the associated metrics are developed, and whether they represent a fair and accurate measure of the issue of exposure (e.g., does the estimated exposure impact match that experienced by [the 'lived experience' of] people in the SJV).

   An example that was discussed in some detail is pesticide use. The fact that pesticide use comes from a State (California) regulatory database of self-reports by users, as per State environmental regulations, they are subject to error by estimation, under-reporting, etc. However, the penalties for purposeful misreporting are substantial, and the negative impact of over-reporting is very low, so we consider the data to be reasonably accurate. There was concern that the pesticide data is aggregated by census tract, which does not take into account movement of airborne pesticide by wind, or the fact that some classes of people (e.g., agricultural field workers) suffer greater exposure. Participants also raised the concern that pesticides are, to them, a more serious problem and health threat than some of the other indicator metrics in the screening methods that are weighted equally.

   The EJSM does allow for differential weighting of indicators in scoring, but we do not apply weights because there is no scientific basis to determine how the various measures should be weighted relative to one another. However, it is certainly appropriate for different groups to weight indicators in using the EJSM for various purposes of data exploration, or to address specific environmental or health/vulnerability concerns, which is that capability was built into the methodology.

2. Water quality:

   Participants were intensely interested in, and passionate in their discussions about, water quality. We discussed at length how the water quality indicator metrics are



Map 18. Huron study area showing location and types of facilities identified from standard public databases.

developed, the data types used, and the fact that the EJSM indicators were developed in coordination with CalEPA OEHHA as part of the CalEnvironScreen (CES) process, and that both CI screening tools (EJSM and CES) use the same indicators. Participants noted that the ways in which the data is reported can contribute considerable error to the original measures in the State database. For example, when water wells are tested for contaminant levels, the reported levels are often averaged for some number of wells to characterize contaminant concentrations for an entire aquifer. This averaging process can hide the presence of one well with a very high concentrations in a group of cleaner wells (with much lower concentrations), allowing a small but significant plume of contaminated groundwater to "appear" cleaner in the reporting than in reality. This would "undercount" water quality as in indicator in the screening scores, and decrease the level of apparent impact for that area.

Some community members also shared significant and detailed personal accounts of the water quality in their particular neighborhood, reporting that in some cases use of purchased and bottled water is required. This is an economic and convenience burden, but also deeply disturbing to them in terms of perceived fairness of environmental regulatory practice, and it obviously affects their trust in government and in any process of making improvements. This part of the community engagement session underscores two important points. First, water quality, like pesticide use, is a much more important problem to SJV residents and careful consideration of weighting them appropriately should be considered in using CI screening for analysis and informing decision-making. Second, qualitative information of this type is valuable and validating, but tremendously difficult to collect and incorporate into CI screening tools. In its efforts to listen and respond to community input, and engage communities in the process of their work, EPA might consider ways in which to solicit and collect this type of information in a systematic manner. Environmental justice CI screening might help in that effort, by allowing people to see and understand how their communities are scored, and then by asking them to respond to note our error or inaccuracy in the metrics used (using their own local knowledge and experience). Some sort of web-based presentation of CI screening results and maps with the ability for user to provide comments is one way such an effort might be attempted.

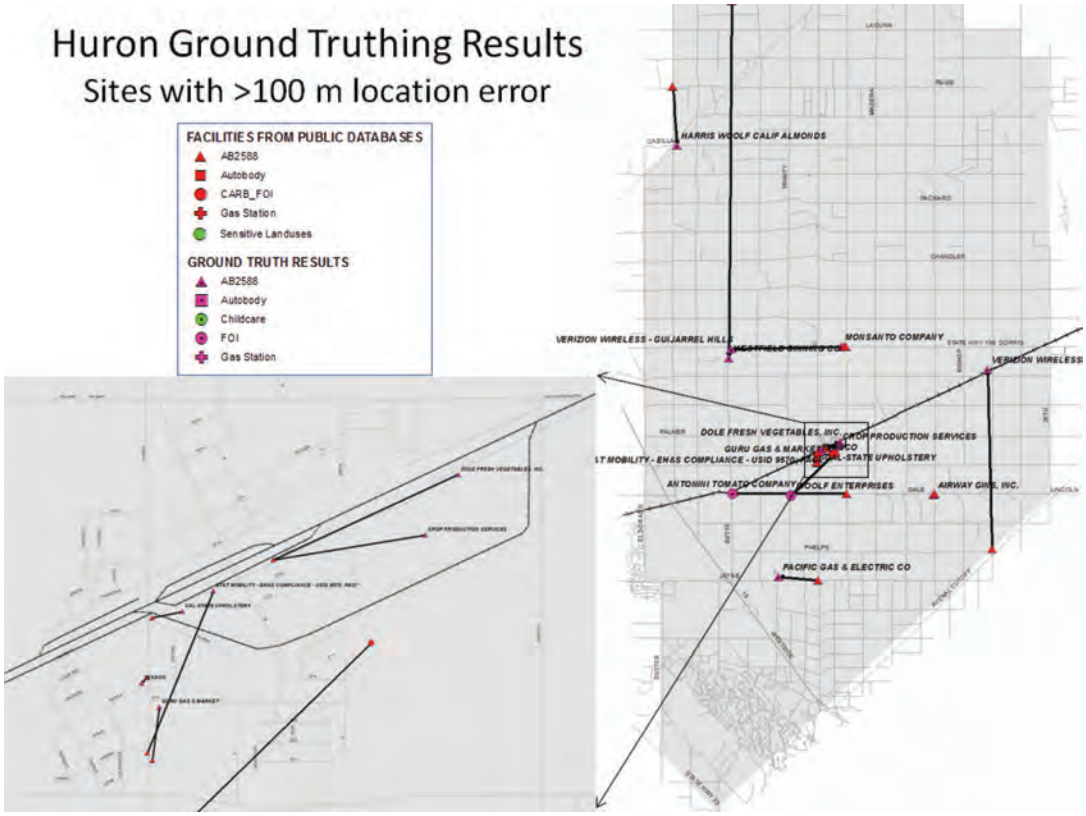
Table 9. Facilities in Huron study area with location correction greater than 100 meters.

Facility Name	Type	Result	Error (m)
WESTFIELD GINNING CO.	AB2588	Location error corrected	19,969
VERIZION WIRELESS (VANGUARD)	AB2588	Location error corrected	10,036
VERIZION WIRELESS - GUIJARREL HILLS	AB2588	Location error corrected	6,386
LOS GATOS TOMATO PRODUCTS	CARB FOI	Location error corrected; now "Antonini Tomato Company"	6,364
WOOLF ENTERPRISES	CARB FOI	Location error corrected	3,331
HARRIS WOOLF CALIF ALMONDS	AB2588	Location error corrected	3,327
PACIFIC GAS & ELECTRIC CO	AB2588	Location error corrected	2,234
DOLE FRESH VEGETABLES, INC.	AB2588	Location error corrected	836
AT&T MOBILITY - EH&S COMPLIANCE	AB2588	Location error corrected; duplicate facility	718
WESTERN FARM SERVICE	AB2588	Unable to locate; closest "Crop Production Services"	631
ANGKOR AUTO BODY AND PAINT	AB2588	Location error corrected	423
CANEPAS CAR WASH	Gas Station	Location error corrected; new name "Pacific Car Wash	391
COMCAST CABLE COMMUNICATIONS	AB2588	Location error corrected	350
GURU GAS & MARKET	AB2588	Location error corrected	222
PACIFIC BELL TELEPHONE (DBA AT&T CA)	AB2588	Location error corrected	185
MONSANTO COMPANY	AB2588	Location error corrected	162
TELETECH CUSTOMER CARE CALIFORNIA	AB2588	Location verified; currently vacant	142
CAL-STATE UPHOLSTERY	AB2588	Location error corrected	126

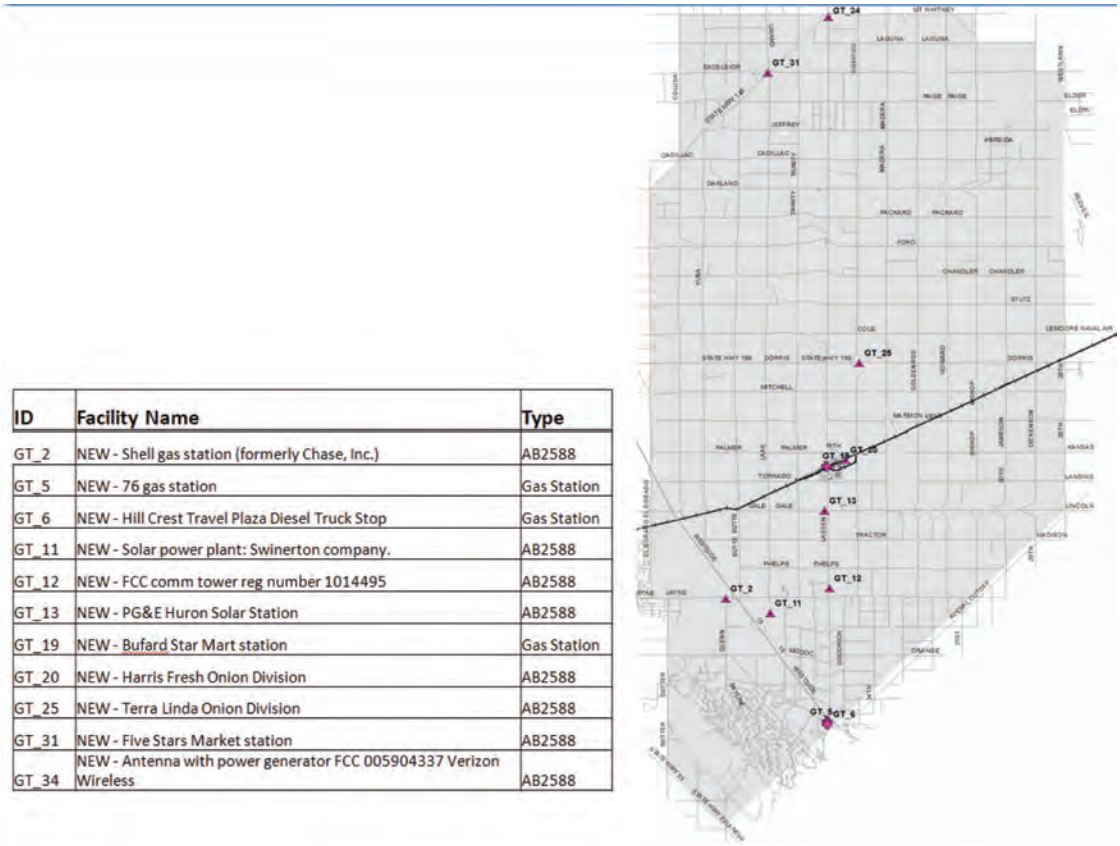
3. Inaccuracy discovered in ground truthing:

   There was general agreement that the degree and type of error and inaccuracy we found in the standard databases used in CI screening was significant, mystifying, and disheartening. As we demonstrated, correcting those errors has some effect on regional CI scoring, but on a local level the impact of corrected CI scores can be much greater. Correcting the data will change CI scores in some census tracts, and which tracts are the "winners" and "losers" matters greatly to the residents of those tracts. All agreed that correcting the data is vital to good process and practice but they were, frankly, incredulous at the degree of error in many cases. One particular example is the mislocation of the Lawrence Livermore National Laboratories hazardous waste facility by nearly **13 kilometers**, and the Forward Landfill in the Stockton area by nearly **12 kilometers**.

   Errors like this can usually be traced to a reporter using an administrative office address as a location, rather than the location of the actual facility. As bad as this practice is, it is equally problematic that regulatory agencies do not have data quality assurance procedures in place to prevent or correct such errors. For many



Map 19. Huron study area showing location and types of facilities validated using ground-truthing. Locational error shown as black lines connecting original and corrected positions.

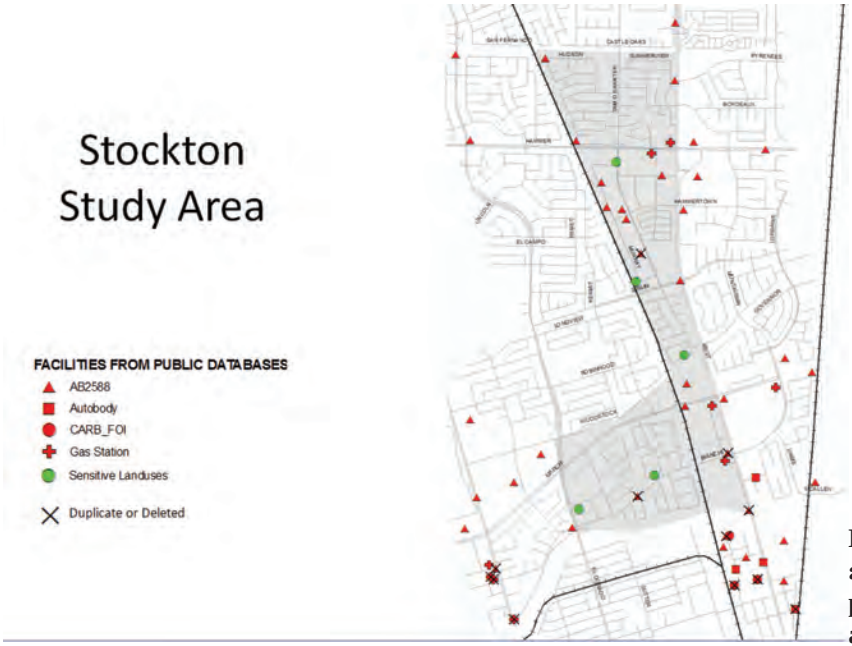


ID	Facility Name	Type
GT_2	NEW - Shell gas station (formerly Chase, Inc.)	AB2588
GT_5	NEW - 76 gas station	Gas Station
GT_6	NEW - Hill Crest Travel Plaza Diesel Truck Stop	Gas Station
GT_11	NEW - Solar power plant: Swinerton company.	AB2588
GT_12	NEW - FCC comm tower reg number 1014495	AB2588
GT_13	NEW - PG&E Huron Solar Station	AB2588
GT_19	NEW - Bufard Star Mart station	Gas Station
GT_20	NEW - Harris Fresh Onion Division	AB2588
GT_25	NEW - Terra Linda Onion Division	AB2588
GT_31	NEW - Five Stars Market station	AB2588
GT_34	NEW - Antenna with power generator FCC 005904337 Verizon Wireless	AB2588

Map 20. Huron study area showing location and types of new facilities (not part of original standard public databases) discovered during ground-truthing.

years, the US EPA was criticized for this type of error in the Toxic Release Inventory (TRI) program and it responded with a well-executed effort to find and correct such errors, and to regularly report its progress to the public. The current TRI data is very reliable and accurate, and state agencies should consider adopting EPA's practice. In most cases, these errors only have to be corrected once, because facilities move or close down relatively infrequently and the number of new facilities each year that must be checked and verified is not large. This type of error checking could be accomplished internally by the State agency, or contracted out, but community confidence and trust in the State agency would be bolstered if they were to take on this responsibility themselves. Ground truthing by the public in the form of community based participatory research (CBPR), is another way in which to contribute to this error checking effort.

Overall, we were very pleased by the community response to our EJSM workshop, and pleased with the quality of the input we received from the community members. Many of the participants have since contacted us by email or phone to add additional information or suggestions, which we greatly appreciate, as we work to improve the EJSM and contribute even more to the use of CI screening methodology.



Map 21. Stockton study area showing location and types of facilities identified from standard public databases. Note locations of duplicate and missing facility records.

Map 22. Stockton study area showing location and types of facilities validated using ground-truthing. New facilities are shown in yellow.

Field-based ground-truthing validation of all facility information for the three selected test areas, Huron, Arvin and Stockton (see Map 15), were accomplished in two phases, on May 7-10 and July 17-19, 2014 by Occidental College/UC Berkeley/USC staff members. These study areas differ from one another in various ways, including size. Note: Stockton has an area of 3.4 km^2; Arvin has an area of 24 km^2, and; Huron has an area of 816 km^2.

The standard public databases that are used for EJ screening tools, and to characterize hazard proximity were queried for all environmental hazard facilities and sensitive land uses located within 3000 ft of the boundaries of the three study areas. This (3000 ft) buffer distance was used to account for the EJSM hazard proximity analysis, which evaluates hazards within three annular 1000 ft buffers.

These locations were first examined for locational accuracy using Google Earth Pro (GEP), and all were geocoded to further check facility location. These included:

- California Air Resources Board (CARB) "Facilities of Interest" (FOI) – consists of a subset of facilities from the California Emission Inventory Development and Reporting System (CEIDARS) statewide air toxics emissions inventory of greatest concern to regulators because of amounts, toxicity, possible impacts of emissions
- California Department of Toxic Substances Control (DTSC) permitted hazardous waste handling facilities and generators
- Auto paint and body shops from the Dun and Bradstreet Business Locator Service
- Facilities reporting to the AB2588 Air Toxics "Hot Spots" Information and Assessment Act Program – Note: the objective of the AB2588 legislation is to collect emission data from air toxics sources, identify facilities with localized impacts, assess health risks and notify affected individuals

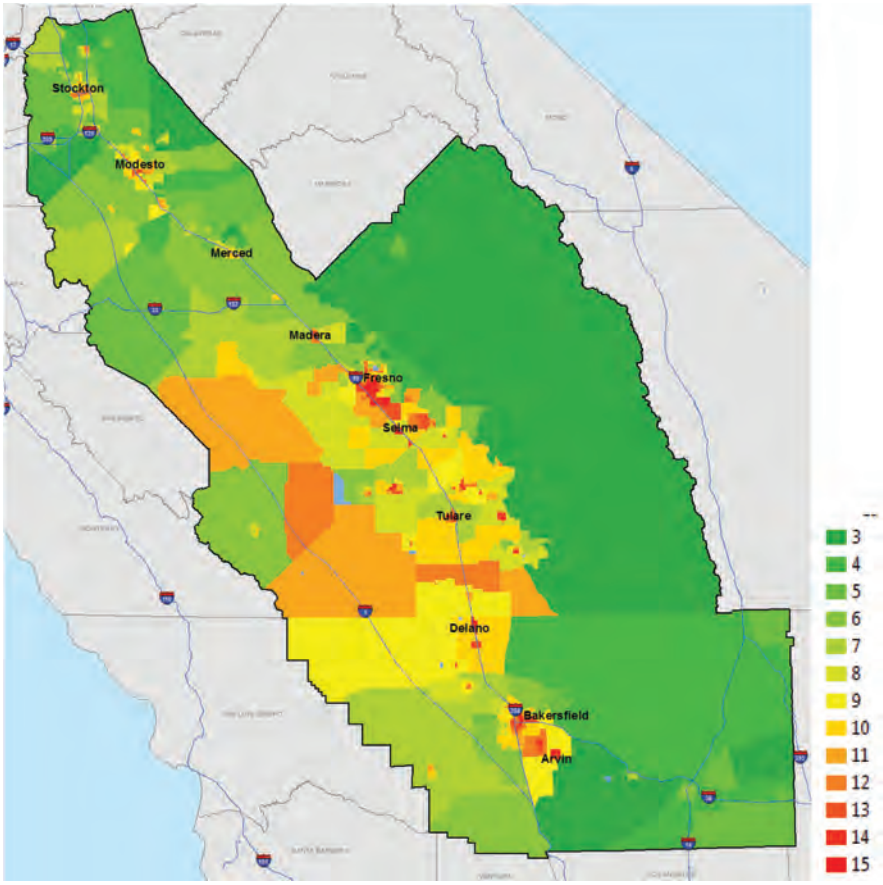
Table 10. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers.

EPA_ID	PROJECT NAME	ADDRESS	CITY	Error (m)
CA2890090002	LAWRENCE LIVERMORE NATIONAL LAB - SITE 300	CORRAL HOLLOW RD	TRACY	12,764
CAD990794133	FORWARD LANDFILL	9999 S AUSTIN RD	STOCKTON	11,705
CA1570024504	EDWARDS AIR FORCE BASE	5 E POPSON AVE	EDWARDS	1,519
CA4170024414	OCCIDENTAL OF ELK HILLS INC	28590 HIGHWAY 119	TUPMAN	1,500
CAD980813950	CRANE'S WASTE OIL INC	16095 HIGHWAY 178	WELDON	614
CAT000646117	CHEMICAL WASTE MANAGEMENT INC KETTLEMAN	KETTLEMAN HILLS LDFL HWY 41	KETTLEMAN CITY	478
CAL000190816	RIVERBANK OIL TRANSFER, LLC	5300 CLAUS RD	RIVERBANK	238
CAL000282598	BAKERSFIELD TRANSFER INC	1620 E BRUNDAGE LN	BAKERSFIELD	231
CA2170023152	NAVAL AIR WEAPONS STATION CHINA LAKE	1 ADMINISTRATION CIR	RIDGECREST	188
CAD982446882	EVERGREEN OIL INC FRESNO	4139 N VALENTINE AVE	FRESNO	144
CAD066113465	SAFETY-KLEEN	3561 S MAPLE AVE	FRESNO	115
CAD981429715	KEARNEY-KPF	1624 E ALPINE AVE	STOCKTON	107

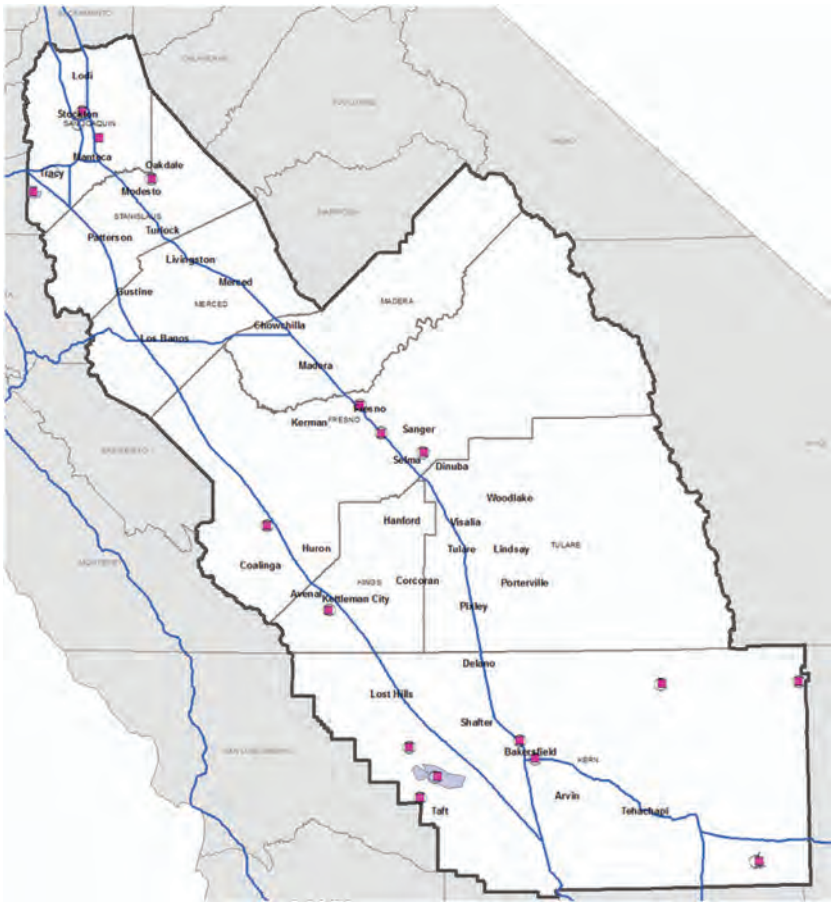
EPA_ID	PROJECT NAME	ADDRESS	CITY	Error (m)
CAL000102751	WORLD OIL - SAN JOAQUIN LLC	14287 E MANNING AVE	PARLIER	99
CAT080010606	BIG BLUE HILLS PESTICIDE CONT DISPOSAL	10 MILES NORTH OF COALINGA	COALINGA	76
CAD982435026	KW PLASTICS OF CALIFORNIA	1861 SUNNYSIDE CT	BAKERSFIELD	34
CAT080010283	EPC WESTSIDE DISPOSAL FACILITY	26251 HIGHWAY 33	FELLOWS	33
CAD980675276	CLEAN HARBORS BUTTONWILLOW LLC	2500 WEST LOKERN RD	BUTTONWILLOW	21

These facilities were mapped using the 'best-known' location, either geographic coordinates as reported in a standard public database, or the geocoded address of the facility. This data was then taken into the field in the form of geospatial data layers loaded into ArcMap GIS software, running on a laptop computer in a vehicle. The laptop was attached to an external GPS receiver (Garmin Montana 600), with software allowing the GPS locator to position the cursor in the ArcMap session so that observer location could be tracked on the map containing the facility locations in real-time. With this system configuration, the GPS position could be used to correct these facility locations or add new features (i.e., new facilities), as needed.

Each study area was systematically searched in the field by driving the public roadway network, to locate and validate facilities. In each case, locational accuracy was verified and corrected if necessary, as was facility name and whether it appeared active/inactive or vacant. In some cases, new facilities were found that were of the same type as those previously recorded in an agency/regulatory or public database. These "new" facilities were mapped, as well. For example, the field researcher would use the road network to confirm presence and activity of an AB2588 "Hot Spot" facility or childcare facility, and compare its "real-world" location to the reported location, correcting the location if necessary. If similar facilities were found, their locations and



Map 23. EJSM total score for San Joaquin Valley prior to ground-truth correction.



Map 24. Locational error for California DTSC permitted hazardous waste handling facilities and generators located in the San Joaquin Valley.

attribute information were added to the geospatial data layer. The results of field-based ground-truthing were revealing and significant, but differed among the three study areas. These differences are probably caused by various latent factors that affect accuracy of the facility databases, and provide us insight on how to think about and use this type of data in screening and other analysis of exposure and vulnerability.

Arvin:

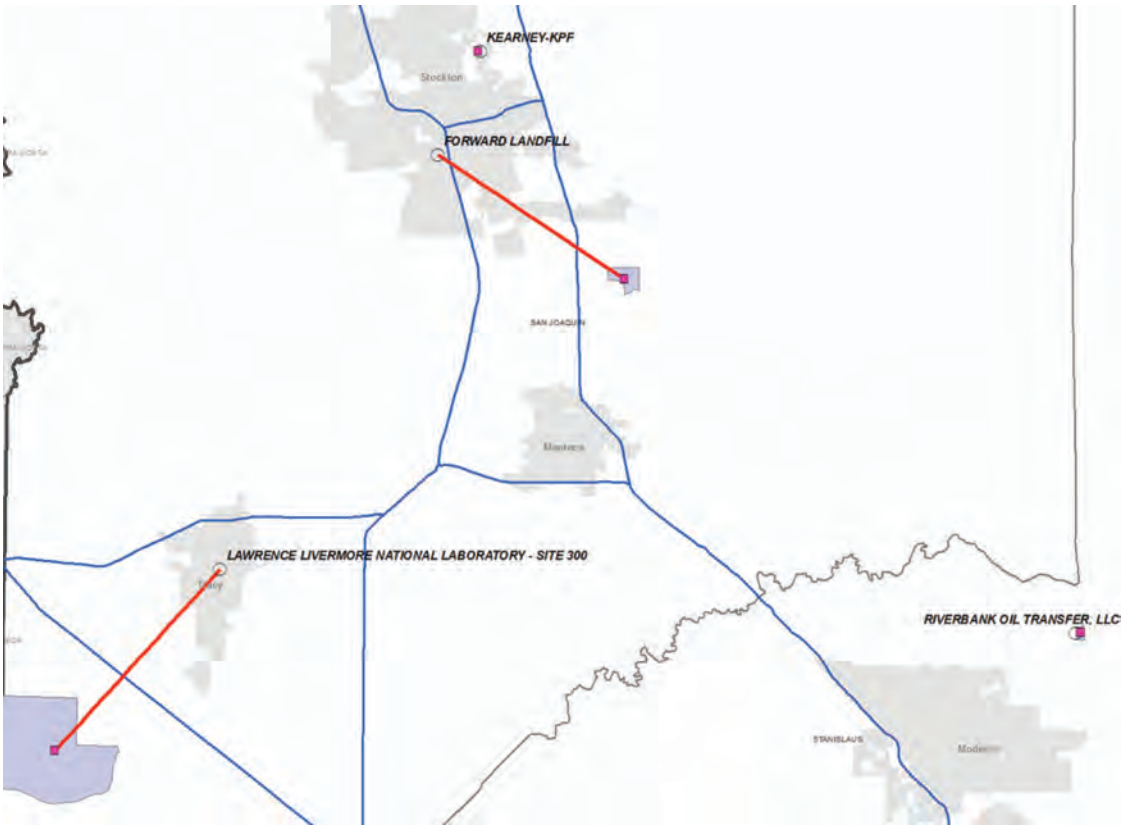
Arvin is a small city of 19,304 residents located about 15 miles southeast of Bakersfield. Historically, Arvin has long been a destination for immigrants, including Basques and "okies" in the early 1900s, Mexicans and Central Americans in the late 20th century, and several waves of Asian and European immigrants throughout the 20th century. The city currently has a very high proportion of Latino residents (92.7% reporting "Hispanic or Latino of any race" in 2010 Census). In 2007, the EPA listed Arvin as having the highest levels of air pollution of any community in the United States. The city's level of ozone exceeded the EPA acceptable limits an average of 73 days per year between 2004 and 2006. The study area chosen is the census tract includes the entire town area, as well as some surrounding agricultural land. Standard public databases showed this study area to contain 31 facilities of interest. This equates to about one hazardous facility per square kilometer, although most are concentrated in the most densely populated "town" portion of the study area (see Map 16).

- 18 AB2588 "Hot Spots" facilities
- 1 auto paint/body shop
- 5 gas stations
- 7 sensitive land uses (schools, childcare, healthcare)

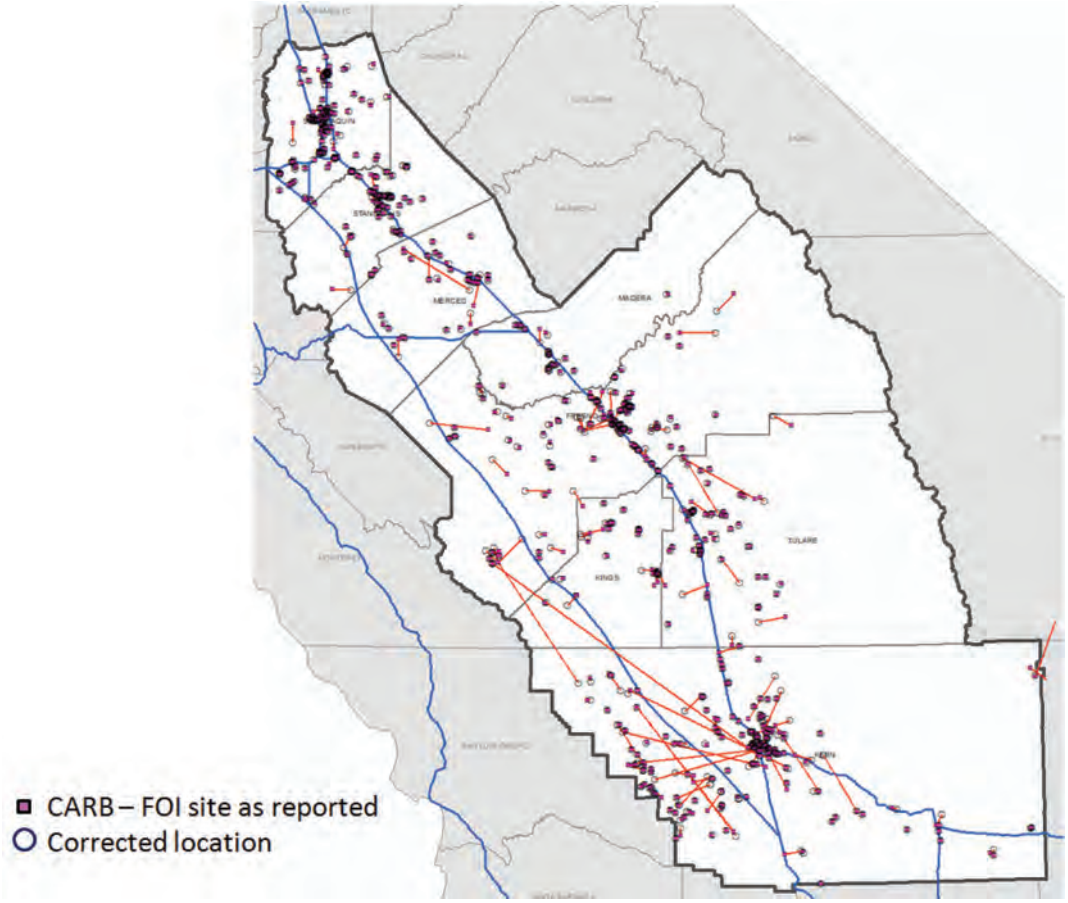
Ground-truth validation showed that all auto facilities and gas stations were accurately located and active. However five (5) of the 18 AB2588 facilities are either vacant or inactive and another 5 were incorrectly located from their nominal locations by large distances (see Map 17):

Huron:

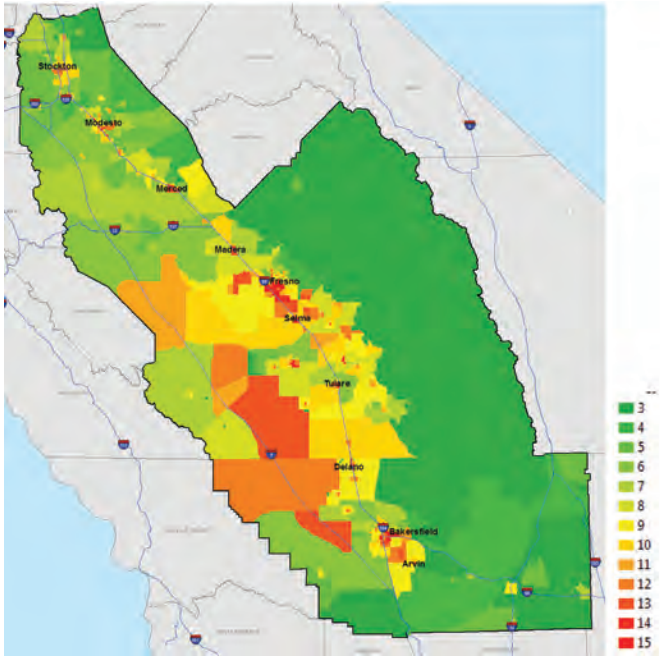
Huron is a small city located about 15 miles east of Coalinga, with a population of 6754 (2010 Census). The population swells to over 15,000 during the harvest season due to an influx if migrant farm workers who work the farmlands surrounding Huron, which is primarily devoted to the production of lettuce, onions and tomatoes. Huron has the highest proportion of Latino residents of any city in California (with 96% reporting "Hispanic or Latino of any race"). Over the past few decades, it has also been characterized by high levels of poverty, but very low levels of



Map 25. California DTSC permitted hazardous waste handling facilities and generators in San Joaquin County showing locational error in reported positions. Facility boundaries are shown as violet-colored polygons



Map 26. California Air Resources Board "Facilities of Interest" (FOI) locations in the San Joaquin Valley, showing location corrections.



Map 27. EJSM total CI score for San Joaquin Valley prior to ground-truth correction.

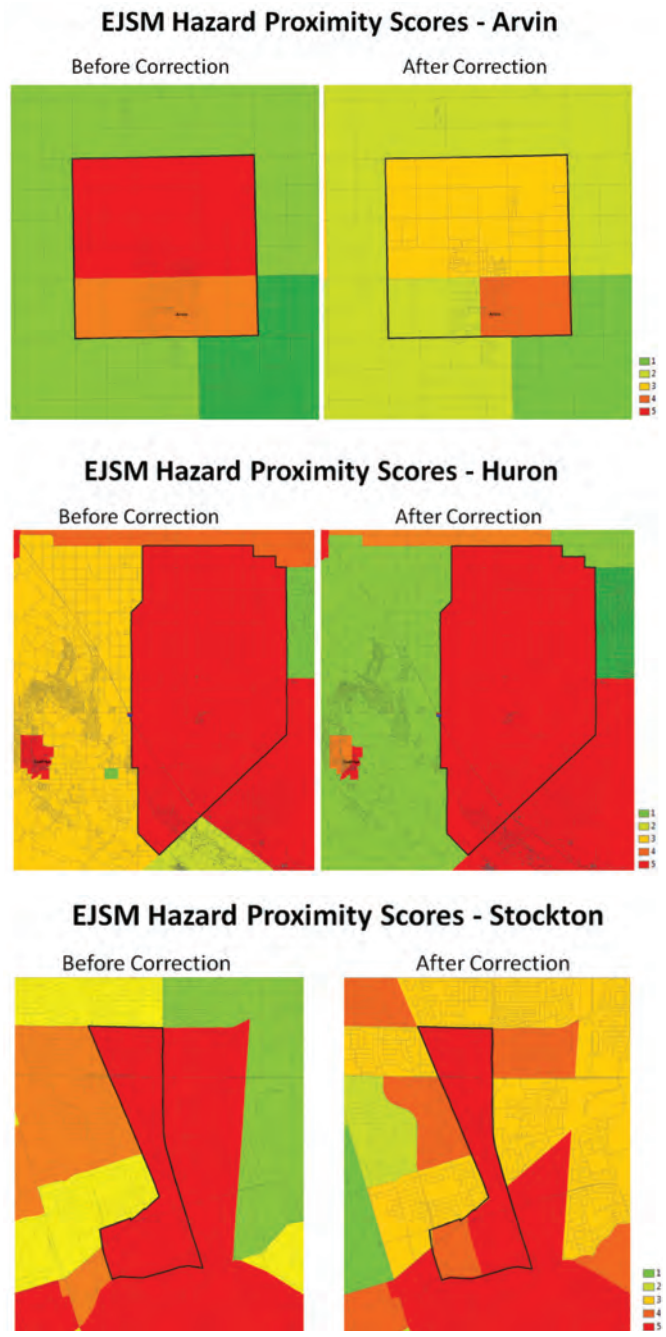
unemployment. Standard public databases showed this study area to contain 47 facilities of interest. This equates to a very low relative density of hazardous facilities (see Map 18).

- 31 AB2588 "Hot Spots" facilities
- 5 CARB - FOI facilities
- 7 gas stations
- 4 sensitive land uses (3 schools and one childcare facility)

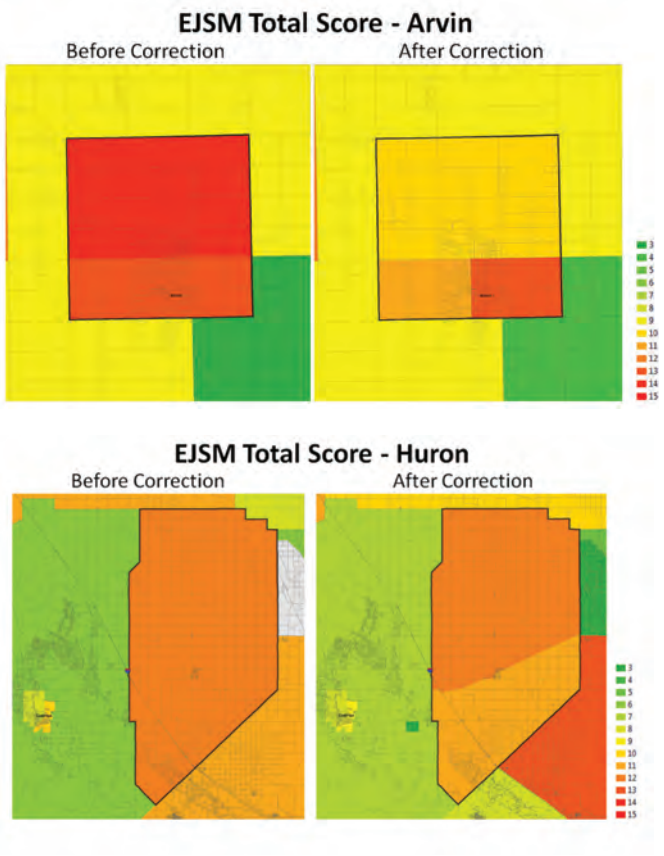
Ground-truth validation showed that 13 sites were significantly mislocated (13 AB2588 and 2 CARB-FOI facilities) as shown in Map 19 and Table 5. In addition, seven of the AB2588 facility entries listed/reported in the facility database are actually associated with only three facilities, the rest of the entries (4) are duplicate records in the facility database. Ten new facilities that are not included in standard public databases were discovered by field validators (3 gas stations and 7 AB2588 facilities) as shown in Map 20. All sensitive land uses are present, but all were significantly mislocated, with the recorded distance errors ranging from 100 meters to 15 kilometers

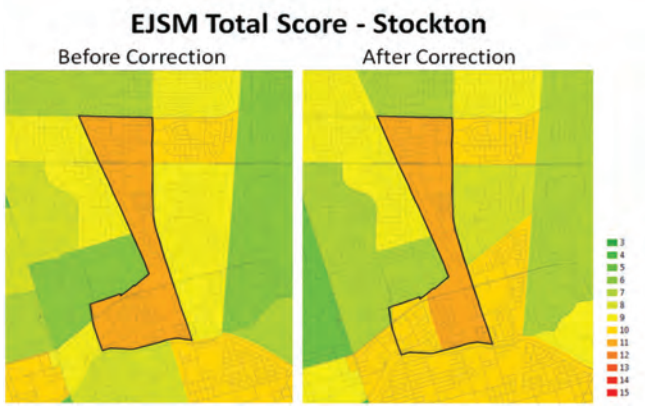
Stockton:

Stockton is a major city in the San Joaquin Valley. It is the county seat for San Joaquin County, and is the 13th largest city in California by population (291,707; 2010 Census). The economy of Stockton is firmly grounded in Central Valley agriculture as well as the city's inland seaport, and an intricate network of canals, waterways and rivers, which comprise the California Delta. Stockton has also suffered from very significant economic shocks due to the 2007 subprime mortgage financial crisis, its violent crime rate, and its public financing and subsequent 2012 bankruptcy



Map 28. EJSM Hazard Proximity CI Scores (Arvin, Huron, and Stockton) before and after ground-truth correction of facility location and status





Map 29. EJSM Total CI Scores (Arvin, Huron, and Stockton) before and after ground-truth correction of facility location and status

Table 11. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers.

Name	Address	City	Error_m
SHELL WESTERN E & P INC.	P.O. BOX 11164	BAKERSFIELD	148,490
CHEVRON U S A INC	WEST OF LOST HILLS GAS PLANT	LOST HILLS	79,994
VINTAGE PRODUCTION CALIFORNIA LLC	LIGHT OIL WESTERN		73,874
SENECA RESOURCES	LIGHT OIL WESTERN		71,932
AERA ENERGY LLC	MAIN CAMP ROAD	BAKERSFIELD	66,831
PHILLIPS 66 PIPELINE LLC	JUNCTION PUMP STATION, 14	COALINGA	65,786
MCKITTRICK LIMITED	4905 REWARD RD, HEAVY OIL WESTERN	BAKERSFIELD	58,750
BERRY PETROLEUM COMPANY	HEAVY OIL WESTERN	BAKERSFIELD	48,263
KAWEAH RIVER ROCK CO.	P.O. BOX 515	WOODLAKE	37,558
GRANITE CONSTRUCTION COMPANY	ARVIN	BAKERSFIELD	35,757
HILMAR CHEESE COMPANY	9001 NORTH LANDER AVE	HILMAR	35,316
CRES INC DBA DINUBA ENERGY	6929 AVENUE 430	REEDLEY	29,644
CALIFORNIA CORRECTIONAL INST	PO BOX 1031	TEHACHAPI	29,381
TTTI PANOCHE PUMP STATION	SEC. 18-T 14S/R/12E	FRESNO COUNTY	26,828

Table 12. CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers (continued).

Name	Address	City	Error_m
NAVAL AIR WEAPONS STATION GB	1 ADMINISTRATION CIRCLE	CHINA LAKE	26,690
THREE BRAND CATTLE CO	34377 LERDO HWY	BAKERSFIELD	23,014
EXXON MOBIL CORPORATION	18271 HWY. 33	MCKITTRICK	22,604
GOLDEN STATE VINTNERS	7409 W CENTRAL	FRESNO	19,897
LIVE OAK LIMITED	7001 GRANITE ROAD	BAKERSFIELD	19,815
WEST KERN WATER DISTRICT	HWY 119 & CA AQUEDUCT	TAFT	19,015
CHEVRON RIO BRAVO STATION	ENOS LANE 2 MI SO OF STOCKDALE	BAKERSFIELD	18,618
MACPHERSON OIL COMPANY	HEAVY OIL CENTRAL	BAKERSFIELD	16,747
NAVAL PETROLEUM RESERVE #1	ELK HILLS FIELD-GAS PLANT	TUPMAN	16,239
NAVAL PETROLEUM RESERVE #1	ELK HILLS FIELD-PRDTN FACILITY	TUPMAN	16,239
HAZEL H HEUSSER TRUST	41990 RADIO LN	AUBERRY	16,012
CONOCO PHILLIPS PIPE LINE CO.	34960 AMADOR AVE	COALINGA	15,128
MERCED POWER, LLC	30 W SANDY MUSH ROAD	EL NIDO	14,609
WASCO HARDFACING	2660 S EAST	FRESNO	14,021
LIVE OAK LIMITED	7001 GRANITE RD., HEAVY OIL	BAKERSFIELD	13,650
CALIFORNIA DAIRIES, INC.	755 F ST	FRESNO	13,235
CAMBRIAN ENERGY WOODVILLE ENERGY LLC	WOODVILLE LANDFILL		13,091
GRANITE CONSTRUCTION CO	6950 OLD STAGE RD	DUCOR	12,495
BADGER CREEK LIMITED	535 FANO RD., HEAVY OIL CENTRAL	BAKERSFIELD	12,337
MEADOWLAKE WEST DAIRY	6802 AVENUE 120	TIPTON	12,007
GUSMER ENTERPRISES INC	124 M STREET	FRESNO	11,930
ATAPCO OFFICE PRODUCTS GROUP	2851 E FLORENCE ST	FRESNO	11,638
WEST COAST CHROME	451 SONORA AVE, #J & D	MODESTO	11,532
SIERRA SUMMIT	59265 HIGHWAY 168	LAKESHORE	11,015
J G BOSWELL COMPANY	31500 SOUTH LAKE ROAD	BAKERSFIELD	10,915
BRITZ GIN PARTNERSHIP II	25500 W MT WHITNEY	FIVE POINTS	10,785
KINGS RIVER COMMODITIES	27498 HIGHWAY 198	LEMOORE	10,535
FOSTER POULTRY FARMS-KOPRO	12997 W HWY 140	LIVINGSTON	10,365
NEO TULARE LLC/TULARE COUNTY	VISALIA LANDFILL	VISALIA	10,327
SHELL OIL WASCO PUMP STATION	MERCED AND WILDWOOD	WASCO	10,088

of Stockton's city government. The Stockton census tract study area is the smallest of those receiving ground-truth validations. Standard public databases showed this study area to contain 61 facilities of interest, including 56 hazardous facilities (see Map 21).

- 40 AB2588 "Hot Spots" facilities
- 3 CARB - FOI facilities
- 4 Auto paint and body shops
- 9 gas stations
- 5 sensitive land uses (3 childcare, and 2 healthcare facilities)

Ground-truth validation showed that the majority of sites were very close to the location recorded in standard public databases, with only two facilities significantly mislocated (see Map 22). Twelve reported facilities either were duplicates or not found during field checking (8 AB2588, 1 auto paint/body, and 3 gas stations) as shown in Map 21. Five facilities have business names different from those in the standard public database records. Ground-truthing shows 6 total sensitive land uses to be present, four are childcare facilities, one senior residential facility, and one major healthcare facility.

Ground-truth validation also addressed location accuracy of four facility types used in EJ screening for the entire eight-county SJV region. This was done by comparing the location reported in the standard public database with information available with subscription-based Google Earth Pro. This tool allows geographic searches and validation information by facility name or address, provides parcel-based geocoding, and allows verification of locations using high quality aerial imagery.

These locations were first examined for locational accuracy using Google Earth Pro (GEP), and all were geocoded to further check facility location. These included:

- California Air Resources Board (CARB) "Facilities of Interest" (FOI) – consists of a subset of facilities from the California Emission Inventory Development and Reporting System (CEIDARS) statewide air toxics emissions inventory of greatest concern to regulators because of amounts, toxicity, possible impacts of emissions
- California Department of Toxic Substances Control (DTSC) permitted hazardous waste handling facilities and generators
- Auto paint and body shops form the Dun and Bradstreet Business Locator Service

Next, each facility location was compared visually with the aerial imagery and parcel boundaries available in Google Earth Pro to verify accurate location, or to correct the location if necessary. These three datasets showed that significant locational error is a common characteristic of this type of information.

The California DTSC lists 17 permitted hazardous waste handling facilities and generators located in the San Joaquin Valley (see Map 23). Ground-truth validation demonstrated significant locational error for most of these sites, with most locations off by well over 100 meters (see Table 6). Table 6. Locational error for California DTSC permitted hazardous waste handling facilities and generators located in the San Joaquin Valley.

Visual comparison also shows that many sites occupy a large area. This is important to environmental screening and hazard proximity calculations because using a point location may not be an adequate way to characterize a hazardous facility, and can introduce considerable error in the hazard proximity calculation used in the EJSM. The largest locational/positional errors were concentrated in San Joaquin County (see Map 24), although most facilities are located in Kern County.

Significant locational error was also found in ground-truth validation of California Air Resources Board "Facilities of Interest" (FOI). Of the 730 total CARB – FOI facilities located in the study area, nearly half (n=343 or 47%) were in error by at least 100 meters, and 151 were in error by at least one kilometer. The facilities with the highest degree of locational error (at least 10 km) are listed in Table 7. There is no clear geographic pattern to the locational errors, but sites in the sparsely populated regions of west Kern, Kings and Fresno counties contained many of these very poorly located facilities (see Map 25) CARB – FOI facilities in the San Joaquin Valley found by ground-truthing to have been mislocated by at least 10 kilometers.

We also determined by ground-truthing that 60 of total 317 auto paint and body shops in the study area were improperly located (mislocated) by at least 100 meters. The positional locations for 16 of these facilities were in error by more than a kilometer. These facilities tend to be concentrated in more densely population areas of the SJV.

As a test of the fundamental goal of this ground-truth validation work, we rescored the SJV study area with the EJSM methodology, using the location corrected facility information to look for differences resulting from using unchecked (error filled) vs. validated (errors corrected) information to assess the degree to which CI score metrics changed both regionally, as well as in the three CI analysis sites where field work was done. Municipalities and regional governments do not always have the resources to update facility databases on a regular schedule, so ground truthing is required to ensure that correct facility location data is used in the EJSM to properly assign CI scores.

Comparison of total EJSM CI scores prior to, and after the ground-truth corrections are shown in the two maps below (Figures Map 26 and Map 27). The pattern of CI scores on the two maps is similar, but with some visible differences between the two regions. In the first map, higher CI scores are displayed for the very large census tracts located along Interstate 5, west of Delano. This area is sparsely populated

and mostly agricultural, but with substantial oil and gas production. The other obvious difference is the higher CI scores for the area surrounding Fresno.

The three ground-truth CI analysis sites where field observations were used had been originally identified, in part, because of their high EJSM hazard proximity scores. Map 28 and 29 show comparisons of the EJSM hazard proximity scores and total CI screening scores for those three CI analysis sites prior to and after ground-truth correction. If the EJSM was subject to false positives, these results would be significantly different. The hazard proximity scores for both Huron and Stockton are identical, and the total EJSM CI scores for these two CI analysis sites are nearly the same. However, both CI scores appear quite different for Arvin. The explanation for a greater difference in Arvin after ground-truthing is probably related to two causes. First, a larger percentage of the hazards recorded in standard public databases turned out to be vacant or inactive, than was the case for the other two study CI analysis sites. In addition, the hazards in the Arvin study CI analysis sites are mostly concentrated in the southeast portion, where the town of Arvin is located. That part of the study CI analysis sites shows no change in either hazard proximity or total score.

9.5 Summary

The completion of this research project has resulted in a number of accomplishments including: a) successful application of EJSM, developed in a previous R9 RARE Research Project, in two pilot communities in California - the City of Commerce and the SJV (three cities - Arvin, Huron, and Stockton); b) maturation of the EJA approach as an objective way to numerically quantify and characterize the CI of air pollution exposures, psycho-social and health vulnerabilities, along with land use/hazard proximity experienced by vulnerable communities; c) successful implementation of EJAF EJ cumulative risk framework in the SJV in comparing 3 different CI screening methods (in the same geographic area) in a systematic way to provide correlated information on the impact of policy decisions on vulnerable communities; d) development of an EJ cumulative risk framework and CI screening method that can serve as an adjunct to (or an initial input to) local, regional, or statewide planning, including land use planning/zoning, transportation planning, or environmental remediation. Although the EJSM was developed to perform CI screening for California communities, the tool is not strictly limited to application in California. Most of the input data sources used by EJSM are national in scope, and so would be applicable outside of California by using the local values from those sources. Other states would need to have the following state-specific data sources in order to apply EJSM outside of California: a) vital statistics database (birth outcomes); b) land use databases; c) hazardous waste/hazard proximity databases; d) air pollution monitor data/database; e) voter participation database; f) inhalable cancer risk information/database; g) state emission inventory; h) 'facility database[s] (e.g., locate businesses, schools, 'polluters' of interest, etc.). Since a number of states may have these state-specific information resources, EJSM would be a tool that could be used in various locations.

10.0
References

Adler, N. E., Rehkopf, D. H., (2008). "U.S. disparities in health: descriptions, causes, and mechanisms." Annual Review of Public Health, 29: 235-252

Boer, T. J., Pastor, M., et al., (1997). "Is there environmental racism? The demographics of hazardous waste in Los Angeles County." Social Science Quarterly, 78(4): 793-810.

Bullard, R. (1983). "Solid Waste Sites and the Black Community." Sociological Inquiry 53: 273-288.

Burke, L. (1993). "Race and Environmental Equity: A Geographic Analysis in Los Angeles." Geo-Info Systems October: 44-50.

CARB (2005). "Air Quality and Land Use Handbook: A Community Health Perspective." Available at: http://www.arb.ca.gov/ch/handbook.pdf; Last Accessed: September 26, 2014

Available at: http://www.arb.ca.gov/ch/handbook.pdf; Last Accessed: September 16, 2014

Centers for Disease Control and Prevention (2003). Second National Report on Human Exposure to Environmental Chemicals. Atlanta, Georgia, US Department of Health Service, Centers for Disease Control and Prevention: 257 Pages.

Commission for Racial Justice, U. C. o. C. (1987). Toxic Wastes and Race in the U.S.: A National Report on the Racial and Socio-economic Characteristics of Communities with Hazardous Waste Sites, UCC.

DeFur, P. L., Evans, G. W., et al. (2007). "Vulnerability as a function of individual and group resources in cumulative risk assessment." Environmental Health Perspectives 115(5): 817-824.

EPA's Risk Screening Environmental Indicators (RSEI) Methodology, Office of Pollution Prevention and Toxics, Washington, DC 20460, (RSEI Version 2.3.0), June 2010

Gee, G. C., Payne-Sturges, D. C., (2004). "Environmental health disparities: a framework integrating psychosocial and environmental concepts." Environmental Health Perspectives 112(17): 1645-1653.

Gelobter, M. (1986). The Distribution of Air Pollution, By Income and Race. Energy and Resources Group, University of California, Berkeley.

Gelobter, M. (1992). Toward a Model of Environmental Discrimination. Race and the Incidence of Environmental Hazards: A Time for Discourse. B. Bryant and P. Mohai. Boulder, CO, Westview Press: 164-235.

Hall, E.S., Morello-Frosch, R.A., Pastor, M., Sadd, J.L. (2011). "R9 RARE Final Project Report: How Vulnerability Indicators Affect the Association Between Adverse Birth Outcomes, Air Pollution and Traffic Burden.", EPA Office of Research and Development, EPA/600/R-12/014, October 13, 2011, 80 Pages

Hersh, R. (1995). Race and Industrial Hazards: An Historical Geography of the Pittsburgh Region, 1900-1990. Washington, DC, Resources for the Future.

Huynh, M., J. Parker, et al. (2005). "Contextual effect of income inequality on birth outcomes." International Journal of Epidemiology, 34(4): 888-895.

Krieger, N., Chen, J., et al., (2003). "Choosing area based socioeconomic measures to monitor social inequalities in low birth weight and childhood lead poisoning: The Public Health Disparities Geocoding Project (US)." Journal of Epidemiology and Community Health, 57(3): 186-199.

Kraft, M., Scheberle, D., (1995). "Environmental Justice and the Allocation of Risk - The Case of Lead and Public Health." Policy Studies Journal 23(1): 113-122

LaVeist, T. A. (1992). "The Political Empowerment and Health Status of African-Americans: Mapping a New Territory." The American Journal of Sociology 97(4): 1080-1095.

Lavelle, M., Coyle, M., (1992). "Unequal Protection – The Racial Divide in Environmental Law: A Special Investigation." The National Law Journal, Volume 15, Number 3, (7 pages); Copyright © 1992, The New York Law Publishing Company; Copyright © 1999, The New York Law Publishing Company

Lazarus, R. (1993). "Pursuing 'Environmental Justice': The Distributional Effects of Environmental Protection." Northwestern University Law Review 87(3): 787-845.

Mohai, P., Bryant, B., (1992). Environmental Racism: Reviewing the Evidence. Race and the Incidence of Environmental Hazards: A Time for Discourse. B. Bryant and P. Mohai. Boulder, CO, Westview: 164-175.

Morello-Frosch RA, Pastor M., Porras C, Sadd, J (2002). "Environmental Justice and Regional Inequality in Southern California: Implications for Future Research." Environmental Health Perspectives, 110 (Supplement 2): 149-154.

Morello-Frosch, R. and E. Shenassa (2006). "The Environmental 'Riskscape' and Social Inequality: Implications for Explaining Maternal and Child Health Disparities.", Environmental Health Perspectives 114(8): 1150-1153.

Morello-Frosch, R. A. (2002). "Discrimination and the political economy of environmental inequality." Environment and Planning C: Government and Policy 20: 477-496.

Morello-Frosch RA, Pastor M., Porras C, Sadd J (2002). "Environmental Justice and Regional Inequality in Southern California: Implications for Future Research.", Environmental Health Perspectives 110 ((Supplement 2).): 149-154.

Morello-Frosch, R., Woodruff, T., et al., (2000). "Air Toxics and Health Risks in California: The Public Health Implications of Outdoor Concentrations." Risk Analysis, 20(2): 273-291.

Moses, M., Johnson, E., et al. (1993). "Environmental Equity and Pesticide Exposure." Toxicology and Industrial Health 9(5): 913-959.

National-Scale Air Toxics Assessment (NATA), Issues in the 1999 Inventory/Changes in Assessment Results: http://www.epa.gov/ttn/atw/nata1999/99pdfs/changelistingfeb06.pdf; (Table of Changes: Last Accessed: September 16, 2014)

O'Campo, P., Xue, X., et al., (1997). "Neighborhood Risk Factors for Low Birthweight in Baltimore: A Multilevel Analysis." American Journal of Epidemiology, 87(7): 1113-1118.

Olshan, A. F., Anderson, L., et al., (2000). "Workshop to identify critical windows of exposure for children's health: cancer work group summary." Environmental Health Perspectives, 108: 595-597.

Osmond, C., Barker, D., (2000). "Fetal, infant, and childhood growth are predictors of coronary heart disease, diabetes, and hypertension in adult men and women." Environmental Health Perspectives 108(Suppl 3): 545-553.

Pastor, M., Sadd J., et al. (2001). "Which came first? Toxic facilities, minority move-in, and environmental justice." Journal of Urban Affairs 23(1): 1-21.

Pollock, P., Vittas, M. (1995). "Who Bears the Burden of Environmental Pollution? Race, Ethnicity, and Environmental Equity in Florida." Social Science Quarterly, 76(2): 294-310.

Ponce, N. A., Hoggatt, K. J., et al., (2005). "Preterm birth: the interaction of traffic-related air pollution with economic hardship in Los Angeles neighborhoods." American Journal of Epidemiology, 162(2): 140-148.

Pulido, L., Sidawi, S., et al., (1996). "An Archeology of Environmental Racism in Los Angeles." Urban Geography, 17(5): 419-439.

Sadd, J.L., Morello-Frosch, R.A., Pastor, M., Matsuoka, M., Prichard, M., Carter, V., (2013). "The Truth, the Whole Truth, and Nothing but the Ground-Truth: Methods to Advance Environmental Justice and Researcher-Community Partnerships", Health Education and Behavior, Dec 16 2013, 41 (3), pp 281 - 290

Sadd, J. L., Pastor, M., et al., (1999). "'Every Breath You Take...': The Demographics of Toxic Air Releases in outhern California." Economic Development Quarterly, 13(2): 107-123..

Sadd, J. L., Pastor M., Morello-Frosch, R., Hall, E. S., Lowe, D. L., McNaughton, E., (2012). "Workplan and QAPP for EPA R9 RARE Cooperative Agreement: Partnering with Environmental Agencies and Communities to Pilot Use of the Environmental Justice Screening Method (EJSM) Cumulative Impacts Tool", 37 Pages

Sadd, J. L., Pastor M., Morello-Frosch, R., Scoggins, J., Jesdale, W. M., (2011). "Playing It Safe: Assessing Cumulative Impact and Social Vulnerability through an Environmental Justice Screening Method in the South Coast Air Basin, California."International Journal of Environmental Research and Public Health, 8: 1441 – 1459.

Wernette, D., Nieves, L., (1991). Minorities and Air Quality Non-Attainment Areas: A Preliminary Geo-Demographic Analysis. Socioeconomic Energy and Research Conference, Baltimore, MD, United States Department of Energy.Wilcox, A.J., (2001). "On the importance-and the nimportance-of birthweight". International Journal of Epidemiology 30 (6): 1233 – 1241.

Woodruff, T., Parker J., et al., (2009). "Methodological issues in studies of air pollution and reproductive health." Environmental Research, 109(3): 311-320.

Zimmerman, R. (1993). "Social Equity and Environmental Risk." Risk Analysis 13(6): 649-666.

APPENDIX A:
SJV (Pilot 2 Application) Webinar

Table 13. PowerPoint Presentation - Webinar Agenda

Webinar Agenda		
Time	**Agenda topic**	**Lead**
3:00 - 3:10 p.m.	Introduction - Goals of the project - Goals of Today's webinar - Project team and partners	Debbie Lowe Liang, EPA
3:10 - 3:20 p.m.	Project timeline	Jacquelyn Hayes, EPA
3:20 - 3:35 p.m.	Process used to compare the three screening tools	James Sadd, Occidental College
3:35 - 4:10 p.m.	Preliminary maps that compare the three screening tools	James Sadd, Occidental College
4:10 - 4:25 p.m.	Feedback on the comparison and Q&A	All
4:25 - 4:30 p.m.	Next steps	Jacquelyn Hayes, EPA

Table 14. PowerPoint Presentation - Webinar Goals

Webinar Goals
• Provide an overview of the project goals, project partners and project team.
• Discuss the process used to compare the three tools.
• Share preliminary comparison maps/tables with project partners.
• Keeping in mind the policy relevant questions, receive feedback from project partners on the process used to make comparisons and the comparison maps

Table 15. PowerPoint Presentation - Project Goals

Project Goals		
Compare three cumulative impacts screen tools.	Conduct ground truthing at two location in partnership with community partners.	Develop a report discussing lesson learned, how the tool can be applied , and how they can be improved.
• Enironmental Justice screening method (EJSM) • Cumulative Environmental Vulnerabilities Assessment (CEVA) • California Communities Enveronmental Health Screening Tool (CalEnviroScreen) Version 1.0	• Ground truthing will help elucidate the strengths and weaknesses of the methods with respect to the policy relevant questions posed by the project partners.	• What lessons were learned from the ground truthing efforts? • Do the three screening methods inform the policy relevant questions? If so, how? • How can the methods be furthered developed to better inform the policy relevant questions?

Table 16. PowerPoint Presentation - Project Team and Partners

Project Team and Partners	
Community Partners	**Agency Partners**
SJV CHIP members	OPR - Debbie Davis
CVAQ members	DTSC - Brian Johnson, Ignacio Dominguez
CEJA members	Cal/EPA - Arsenio Mataka, Malinda Dumisani
Project Team	ARB - Alvaro Alvarado
Eric Hall, EPA	SIV Air District - David Lighthall
Jacquelyn Hayes, EPA	**Research Partners**
Charles Swanson, EPA	UC Davis - Jonathan London, Tara Zagofsky
Debbie Lowe Liang, EPA	OEHHA - John Faust, Laura August, Shankar Prasad
James Sadd, Occidental College	
Rachel Morello Frosch, UC Berkeley	
Manuel Pastor, USC	

Table 17. PowerPoint Presentation - Project Timeline

Project Timeline
Step 1 - Review EJSM, CEVA, CalEniroScreen information • Provide basic information about the EJSM, CEVA, and CalEnviroScreen to project partners • Status: Completed in November 2012
Step 2 - Develop and Share Preliminary Comparison Maps • Develop preliminary comparison maps/tables. Share with project partners. • Status: Will share with project partners via webinars on June 26 and July 11, 2013
Step 3 - Provide Feedback on Methods • Project partners provide feedback detailing the ways that the results from each method were useful or less useful in informing their policy questions. Project partners provide feedback on potential improvements to data choices, metrics, analysis, and scoring methodology, and/or the form of presentation will be included. • Status: Please privide feedback to Debbie and Jackie by July 26, 2013.
Step 4 - Discuss Feedback, Revise Methods • The research teams will consider the suggestions from the project partners and identify possible ways the methods could be revised. A conference call or webinar will be held to discuss the comments and possible revisions. The EJSM maps will be revised, if necessary, and provided to the project partners. OEHHA and CEVA maps will only be revised if funding and timing allows. • Status: Aim to complete within two months of Step 3

Table 18. PowerPoint Presentation - Project Timeline (continued)

Project Timeline

Step 5 - Disuss Potential Ground Truthing Locations

- Project partners discuss their observations, questions and comcerns about the three methods and associated maps. Project partners suggest one or two locations for ground truthing that would help provide a better understanding of the strengths and weaknesses of each method with reqards to answering the policy questions.
- Status: Please provide suggestions to Debbie and Jackie by July 26, 2013.

Step 6 - Select Ground Truthing Location(s)

- Select the location(s) for ground truthing activities based on the feedback from project partners and community capacity to engage in ground truthing.
- Status: Aim to complete within one month of Step 5

Step 7 - Conduct Ground Truthing

- Inpartnership with SJV CHIP and community partners, conduct community ground truthing at the selected location(s).
- Status: Aim to complete within three months of Step 6

Step 8 - Develop Report on Lessons Learned, Use of Screening Tools, and Suggested Improvements

- Discuss lessons learned from ground truthing efforts.
- Project partners work with the project team to develop case studies that demonstrate how the tools were useful in answering policy questions. For questions where the tools are inadequate, the project partners will provide suggestions for improving the tools.
- Status: Aim to complete withing two months of Step 7

Table 19. PowerPoint Presentation - Title

Comparison of EJ Screening Methods

CEVA, CES AND EJSM

Data and Metrics, Mapping and Scores

San Joaquin Valley

Table 20. PowerPoint Presentation - Summery of Presentation

Summary of Presentation

- Background on the three screening methods
- How comparison was done
- Break for Q/A
- Comparison results
  - Distribution of scores by population and area
  - Mapping the extremes (“top quantile”)
  - Mapping the extremes more broadly defined (“high”)
  - Areas where all three methods agree
  - Mapping high hazard/pollution exposure scores

Table 21. PowerPoint Presentation - Abbreviations

Abbreviations

- **EJSM** - Environmental Justice Screening Method - developed by James Sadd (Occidental College), Manuel Pastor (USC), and Rachel Morello-Frosch (UC Berkeley) under CARB, CEC and CalEPA research contracts.
- **CES** - California Communities Environmental Health Screening Tool - developed by Cal/EPA Office of Environmental Health Hazard Assessment (OEEHA) to identify disproportionately burdened communities
- **CEVA** - Cumulative Environmental Vulnerability Assessment; developed by Jonathan London and colleagues at the Center for Regional Change at UC Davis
- **SJV** - San Joaquin Valley Stady area (Kern, Kings, Tulare, Fresno, Madera, Merced, Stanislaus, San Joaquin)
- **ZCTA** - Zip Code Tabulation Area from the US Census (used by CES)

Table 22. PowerPoint Presentation - EJSM

EJSM

- Regionally scored at tract level; tax parcels used to calculate hazard proximity and land use
- Tracts do not receive a score if population is very small or too few variables are available (show in white)
- Final maps mask out land uses that are not classed as residential or "sensitive" by CARB (not shown)

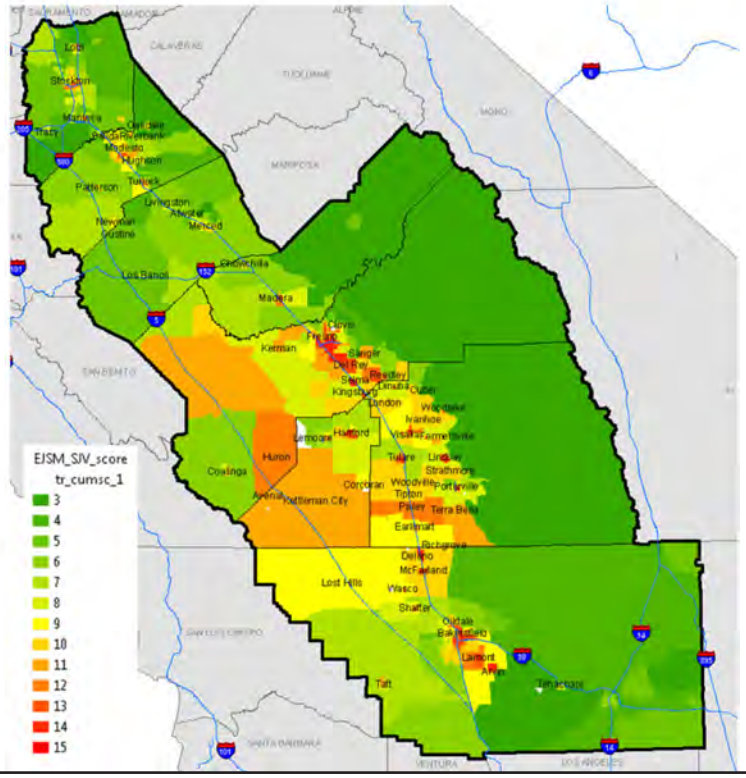


Table 23. PowerPoint Presentation - CEVA

CEVA

- Regional scoring of block groups
- All block groups in the region are given a score

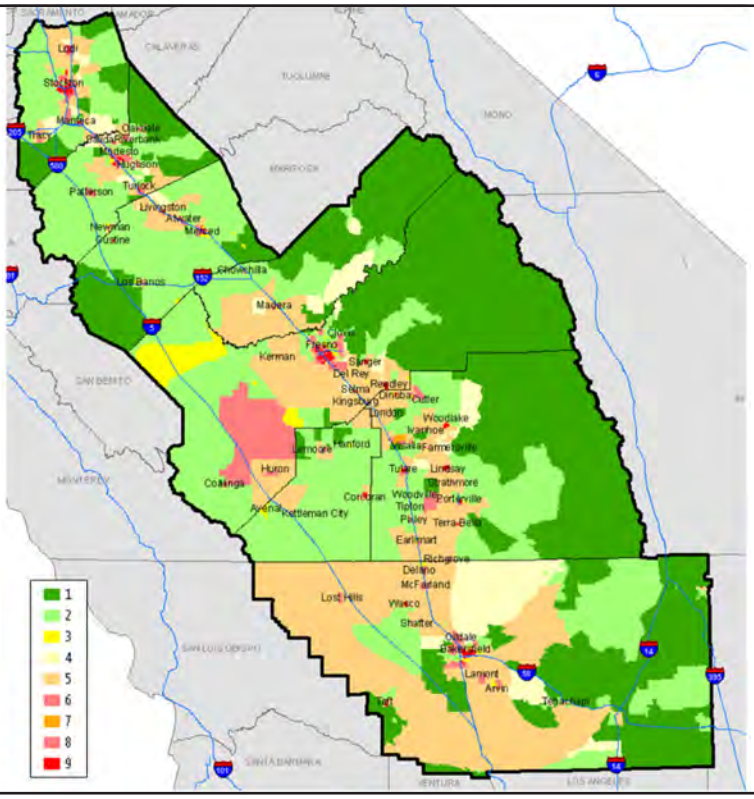


Table 24. PowerPoint Presentation - CES

CES

- Scores calculated at the ZCTA level, for entire state
- Incomplete Coverage – some ZCTAs unscored (shown in white)
- Scored areas are very large compared to census tracts or blocks = lack of granularity
- Because of statewide scoring, SJV has a disproportionate percentage of high CES scores compared to other regions of the State

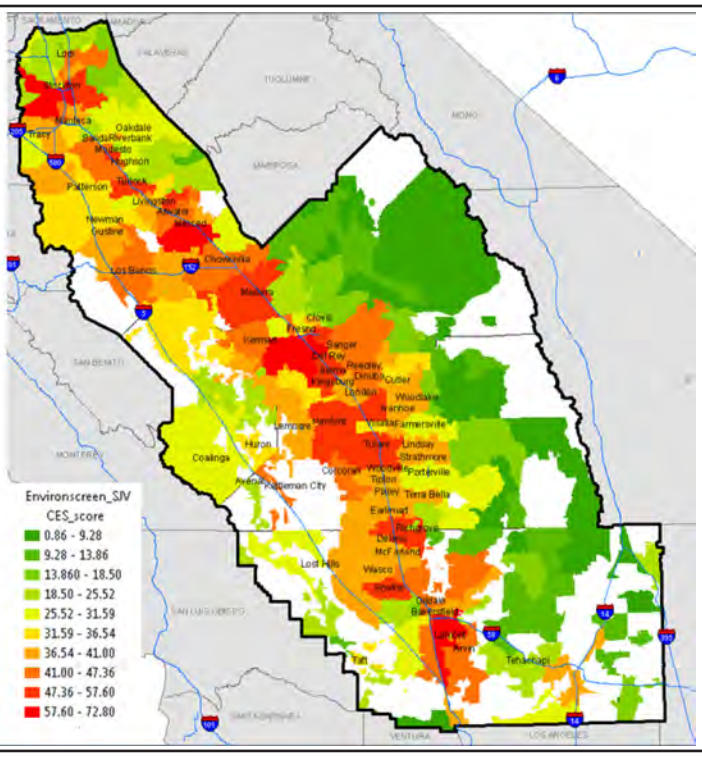


Table 25. PowerPoint Presentation - Difference Among Methods

Difference Among Methods

- Different "base maps"
  - Each methods uses a different spatial unit for both analysis and mapping.
    - Tax parcels/tracts (EJSM)
    - Census block groups (CEVA)
    - ZCTAs (CES)
- Each method also has a different way to merge their "base map" spatial units with information reported at the census tract level.
    - Different levels of aggregation and spatial resolution results in map pattern differences controlled by the method, not the data.
  - Distributional effects: different spatial units represent different populations.
- The methods use many of the same datasets, but with different metrics to represent a specific indicator.
  - NATA: estimated cancer risk, respiratory hazard, diesel $PM_{2.5}$ estimates
  - RSEI hazard-weighted emissions vs. TRI site location
  - % poverty vs. 2X% federal poverty level
- How scores are calsulated
  - Different ways indicators are grouped together for scoring results in different implicit "weighting" of certain metrics.
  - Different range of scores among methods
    - EJSM: linear ranks, open-ended to accommodate additional indicators (3-15)
    - CES: continuous linear, with scores grouped by percentile (1-20)
    - CEVA: two-dimensional (3X3) scoring matrix with separate axes for impact and vulnerability (1-9)

Table 26. PowerPoint Presentation - Comparison Table of Indicators

Comparison Table of Indicators

- EJSM is built on a base map of land use
- CES and CEVA use Census polygons

INDICATOR	EJSM	CEVA	CES
Sensitive Land Uses/Populations			
Childcare facilities	X		
Healthcare facilities	X	X	
Schools	X		
Urban Parks Playgrounds	X		
Senior Residential	X		
Hazard Proximity			
Chrome plating facilities	X	X	
Air toxics facilities (AB2588)	X		
Hazardous/solid waste facilities, cleanup sites	X	X	X
Railroad facilities	X		
Port facilities	X		
Refineries	X	X	
Intermodal Distribution	X		
Traffic exposure	X		X
TRI facilities		X	X
Health Risk and Exposure			
Toxic releases – TRI/RSEI	X		X
National Air Toxics Assessment (respiratory hazard, cancer risk, diesel PM)	X	X	X
$PM_{2.5}$ (CARB monitors)	X		X
Ozone (CARB monitors)	X		X
Pesticide use	X	X	X
Water pollution (impaired water bodies, groundwater)			X
Vulnerability			
Race/ethnicity	X	X	X
Poverty level	X	X	X
Educational attainment	X	X	X
Age (young children and elderly)	X	X	X
Linguistic isolation	X	X	X
% Renters	X		
Median house value	X		
Voter participation	X		
Birth outcomes	X	X	X
Asthma hospitalization		X	X

Table 27. PowerPoint Presentation - How comparison was done

How the comparison was done

1. Comparison of distribution of scores
   - By population
   - By area

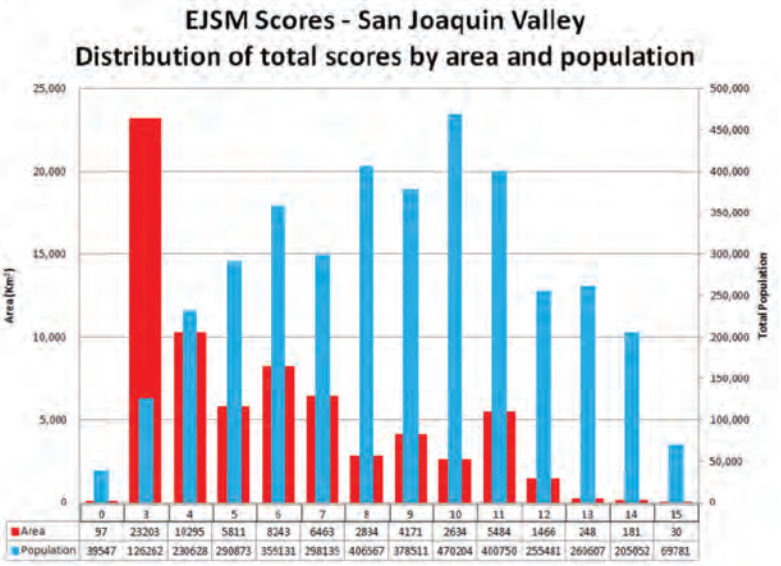


Table 28. PowerPoint Presentation - How comparison was done

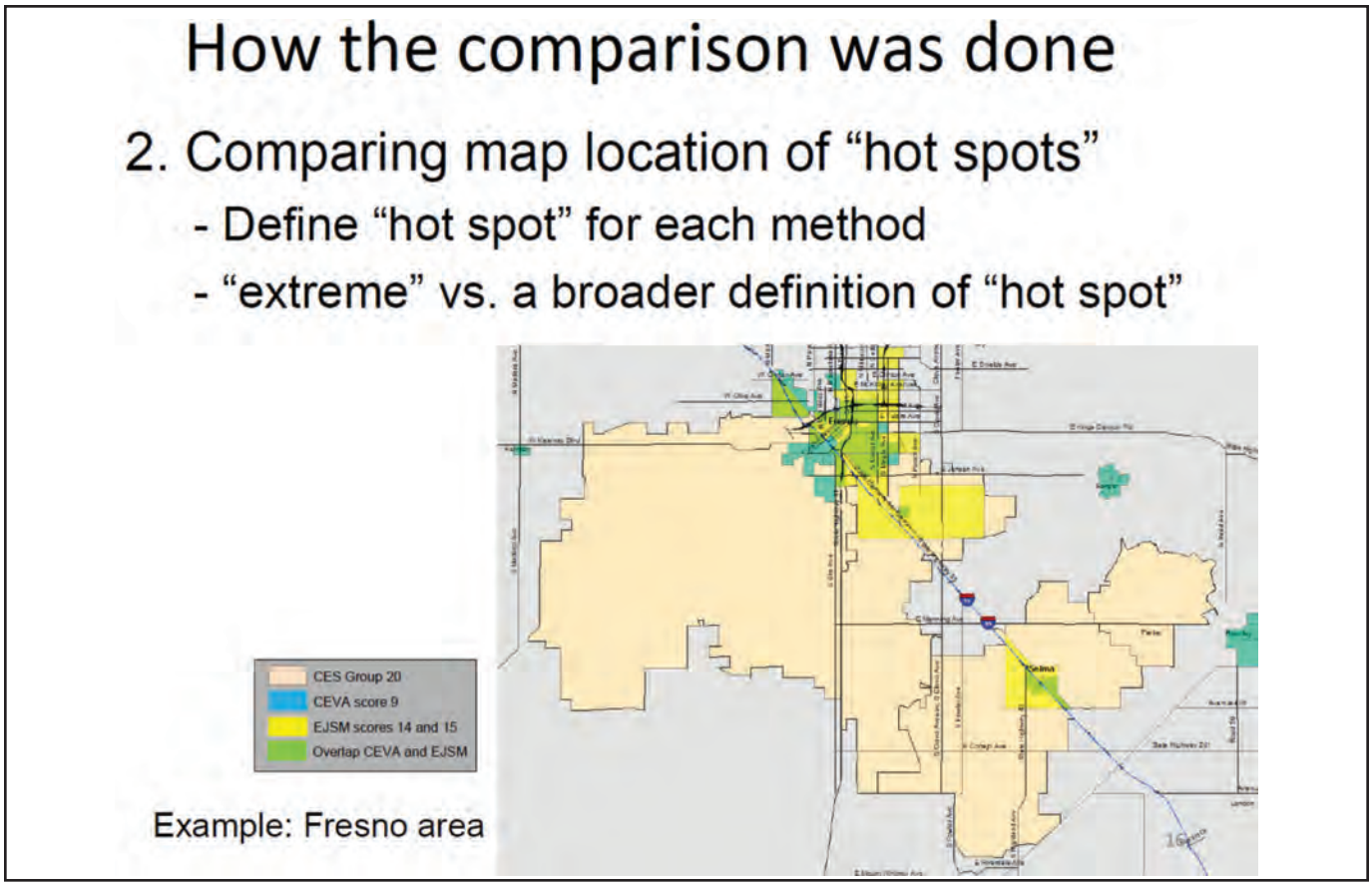


Table 29. PowerPoint Presentation - How comparison was done

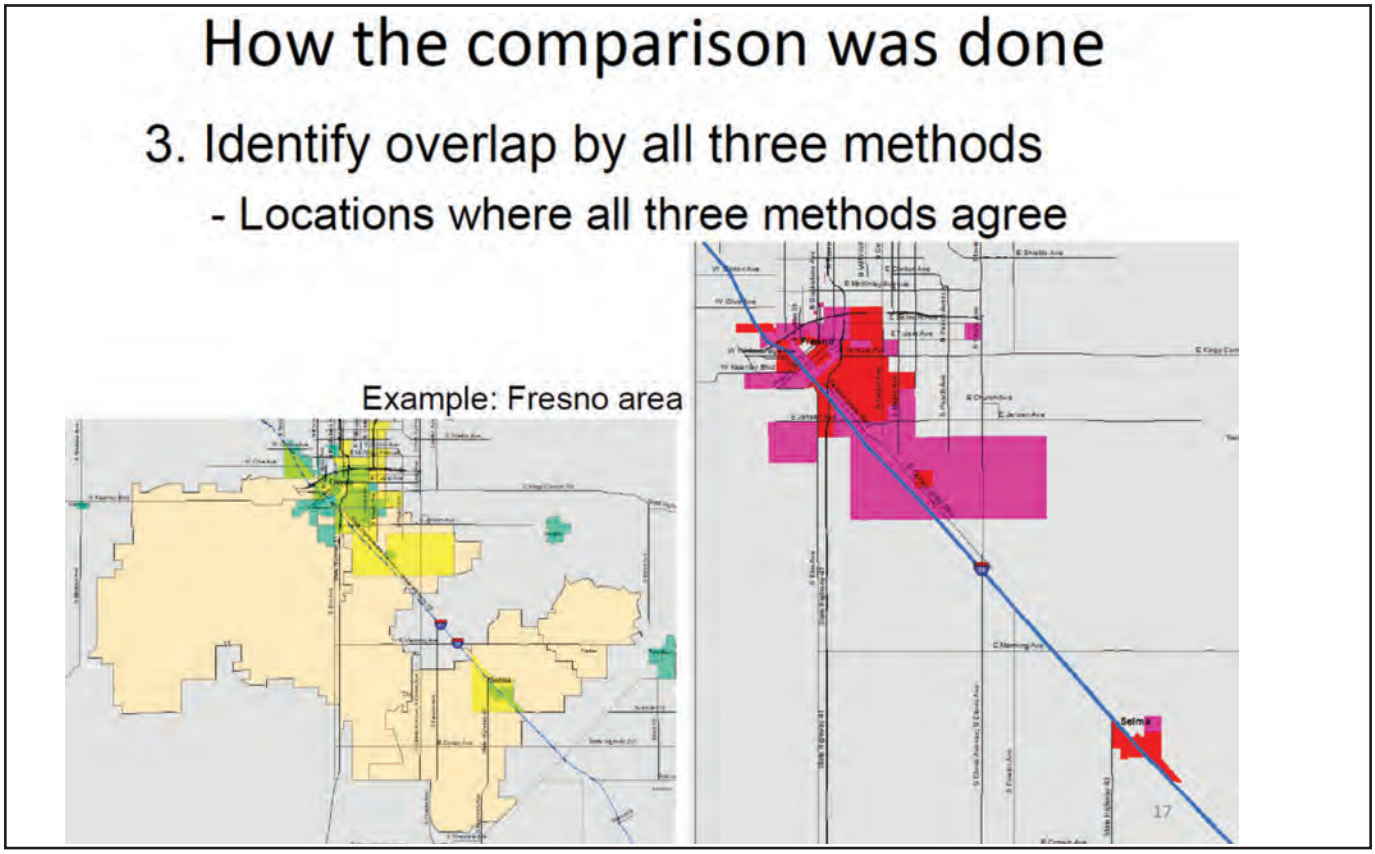


Table 30. PowerPoint Presentation - Q/A Process used

Q/A on Process used to compare the three screening tools

Table 31. PowerPoint Presentation - Preliminary Result

Preliminary Results
Comparison of the tools

Table 33. PowerPoint Presentation - Distribution of scores

Distribution of scores

- How does the pattern of high scores compare between these three methods ?
  - By area
  - By population
- How does the pattern of hazard and pollution proximity/exposure compare among the methods?

Table 32. PowerPoint Presentation - EJSM Scores

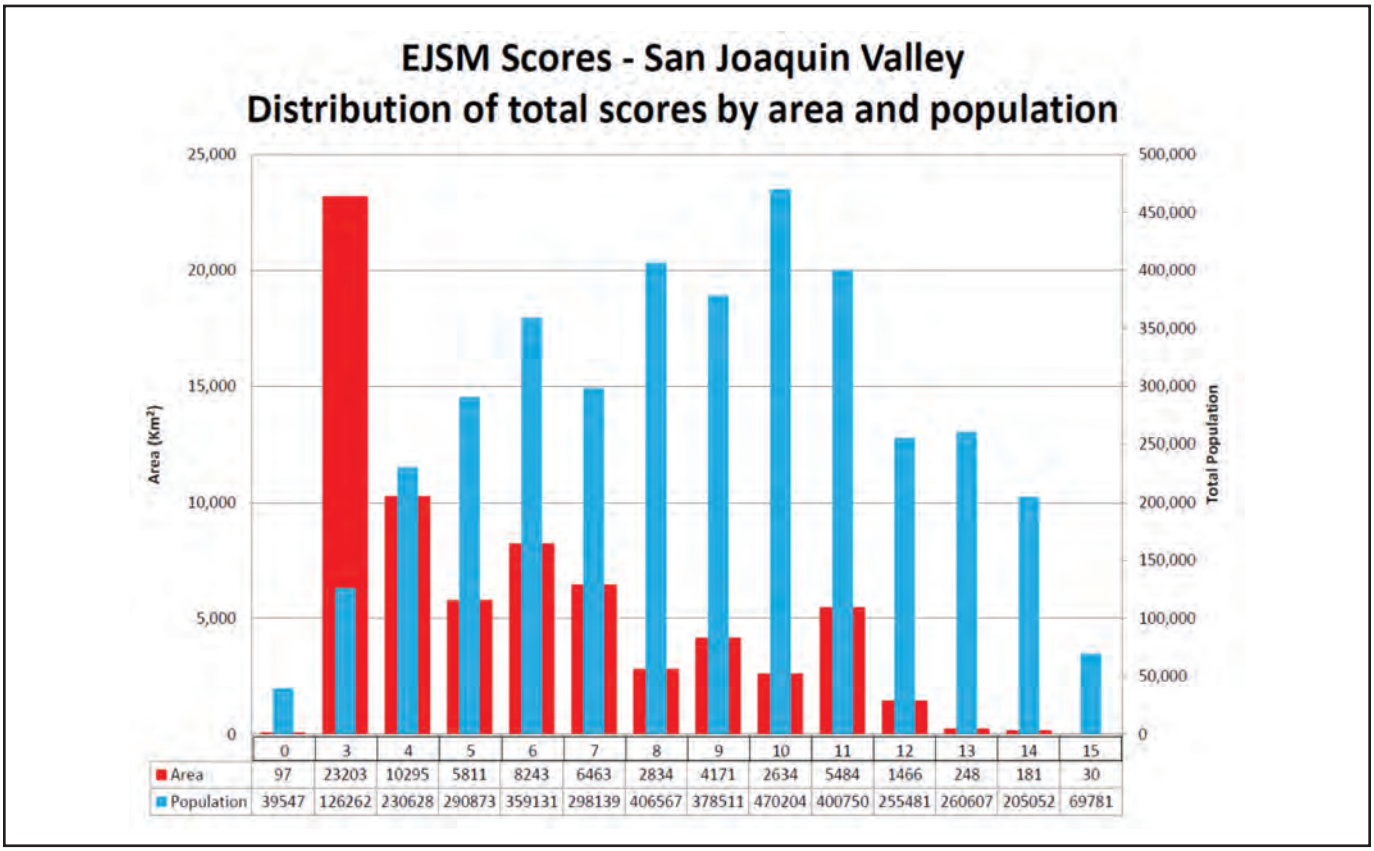


Table 34. PowerPoint Presentation - CES SJV Distribution of Group by area and population

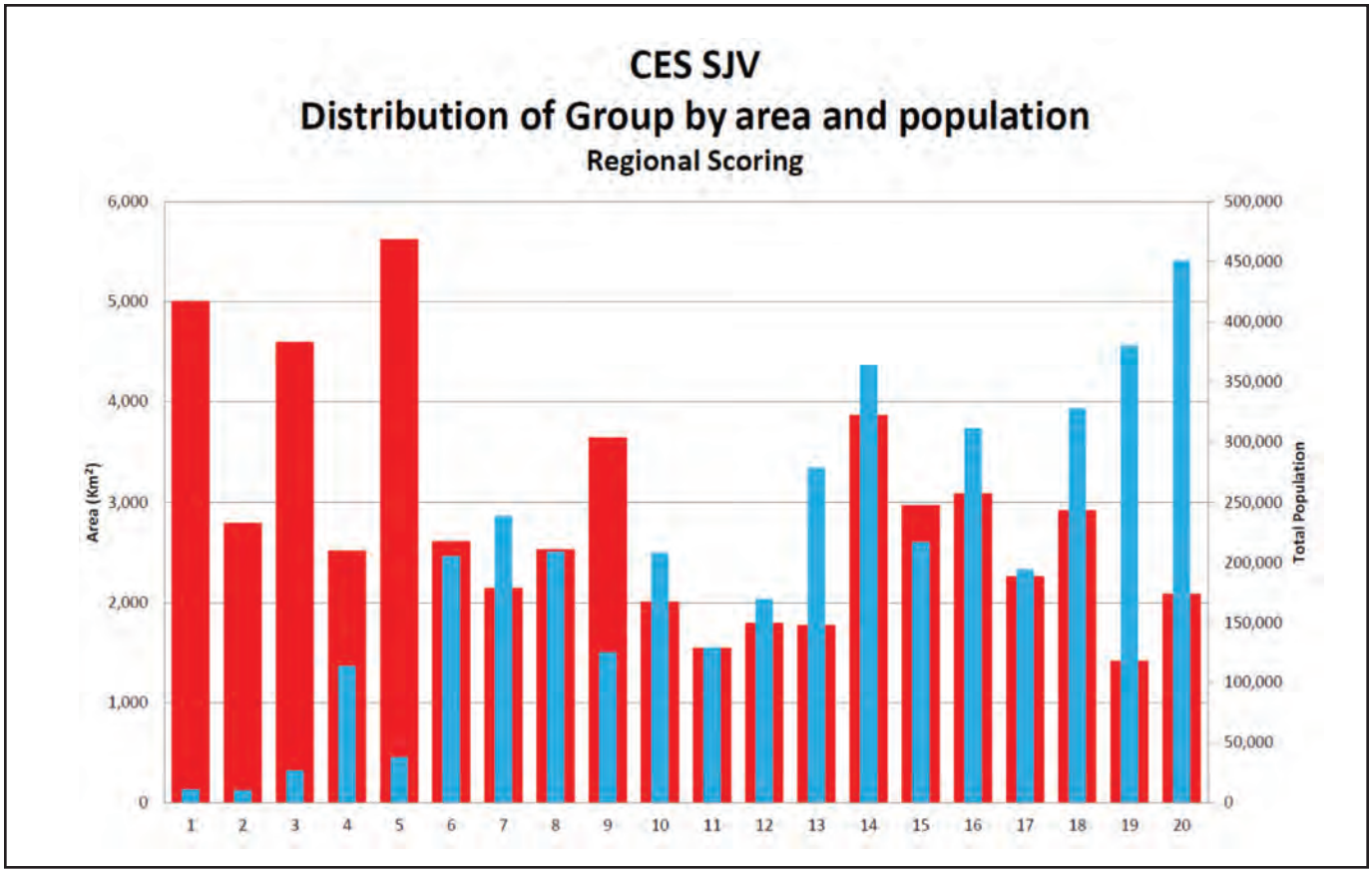


Table 35. PowerPoint Presentation - CEVA Scores - San Joaquin Valley

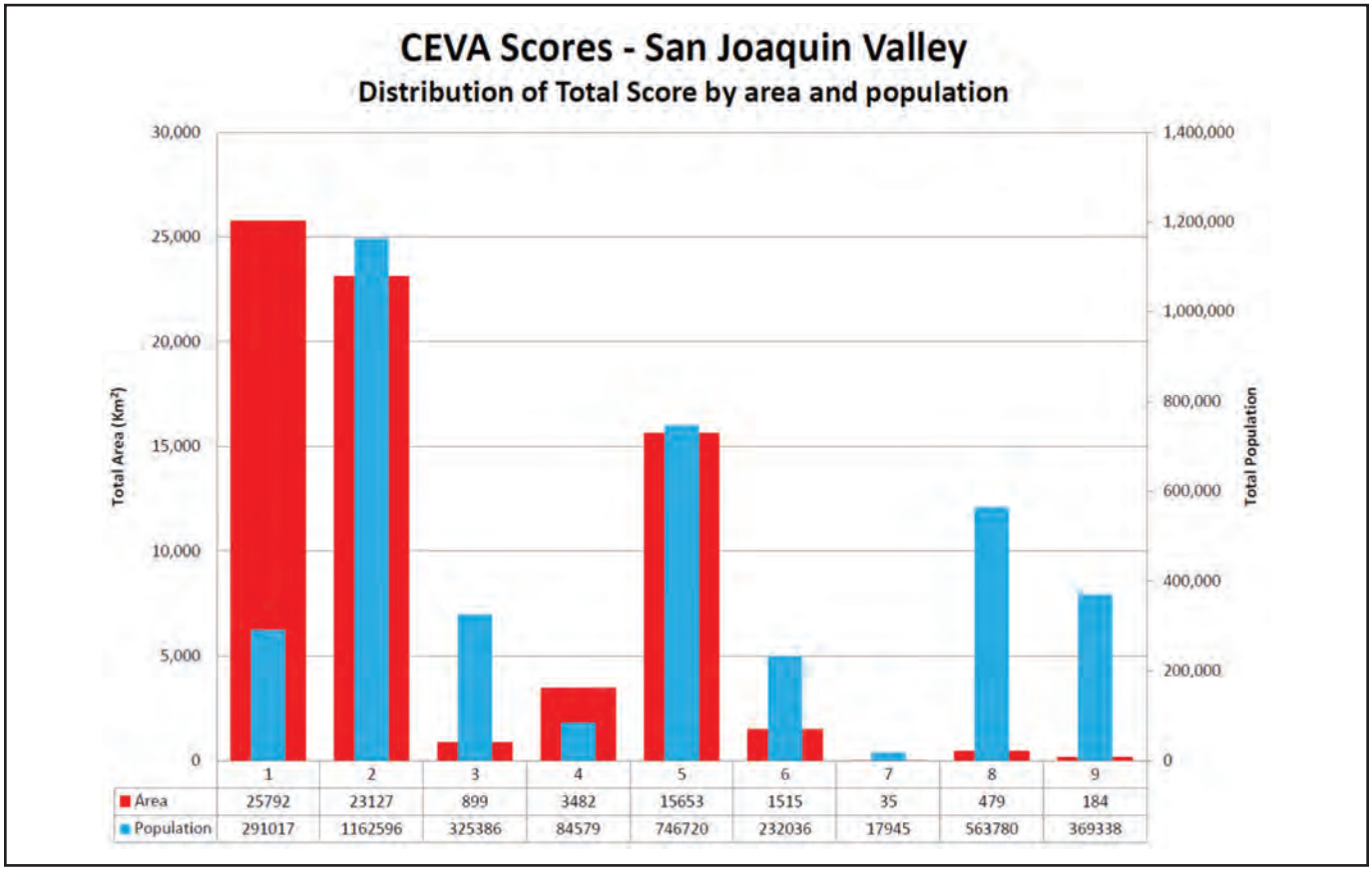


Table 36. PowerPoint Presentation - Summary - Distribution of scores

Summary - Distribution of Scores

- Scores vs. Area
  - All three methods characterize the majority of SJV area with low scores.
    - EJSM - high scores account for a very small portion of the SJV; smooth pattern of variation in area vs. score.
    - CEVA pattern is similiar, but far more irregular with a distinct “peak” in middle of scoring range.
    - CES does not show the same pattern;
      - irregular, with several “peaks” throughout the range of scores
- Scores vs. Population
    - EJSM -most of the population has middle range scores; pattern nearly approximates a “bell curve.”
    - CES shows pattern of increasing population with higher scores.
    - CEVA has a very irregular distribution.
- We feel the “bell curve” distribution makes sense.
  - The low population density and highly clustered nature of population in SJV suggests this distribution.
  - A screening method that indentifies extremes (“hot spots”) should place most areas in the middle of the range.
  - The EJSM has this distribution in other areas of the state where it has been applied,

Table 37. PowerPoint Presentation - Location of “hot spots”

Location of “hot spots”

- What range of scores define a “hot spot” in each method?
- Distribution of scores was examined in terms of population represented by the “high score” class for each method.
  - This was complicated by differences in scoring method.
- Two comparisons:
  - Very highest scores (“top quantile”)
    - Represents about one tenth of SJV population (7.2 - 11.24%)
  - More broad definition (“high quantile”)
    - About one fifth of SJV population (20.7 - 24.6%)

Table 38. PowerPoint Presentation - Screening Scores by Aggregate Population " Top Quantile"

Screening Scores by Aggregate Population "Top Quantile"

- Selected the highest scores for the three methods that represent a similar portion of total SJV residential population
  - EJSM scores 14 and 15
    - 7.2% of population
  - CEVA score 9
    - 9.7 % of population
  - CES Group 20
    - highest 5% of ZCTAs in SFV
    - 11.24% of population

EJSM_Score	Population	Cumulative Pop	Cumulative % Pop
0	39,547	3,791,533	100.0%
3	126,262	3,751,986	99.0%
4	230,628	3,625,724	95.6%
5	290,873	3,395,096	89.5%
6	359,131	3,104,223	81.9%
7	298,139	2,745,092	72.4%
8	406,567	2,446,953	64.5%
9	378,511	2,040,386	53.8%
10	470,204	1,661,875	43.8%
11	400,750	1,191,671	31.4%
12	255,481	790,921	20.9%
13	260,607	535,440	14.1%
14	205,052	274,833	7.2%
15	69,781	69,781	1.8%
CEVA_Score			
1	291,017	3,793,397	100.0%
2	1,162,596	3,502,380	92.3%
4	84,579	2,339,784	61.7%
3	325,386	2,255,205	59.5%
5	746,720	1,929,819	50.9%
7	17,945	1,183,099	31.2%
6	232,036	1,165,154	30.7%
8	563,780	933,118	24.6%
9	369,338	369,338	9.7%
CES Group			
1	11,137	4,009,611	100.00%
2	10,492	3,998,474	99.72%
3	26,709	3,987,982	99.46%
4	113,788	3,961,273	98.79%
5	37,979	3,847,485	95.96%
6	205,232	3,809,506	95.01%
7	238,842	3,604,274	89.89%
8	209,194	3,365,432	83.93%
9	125,152	3,156,238	78.72%
10	207,948	3,031,086	75.60%
11	129,418	2,823,138	70.41%
12	169,585	2,693,720	67.18%
13	278,987	2,524,135	62.95%
14	363,760	2,245,148	55.99%
15	212,803	1,881,388	46.92%
16	311,356	1,664,442	41.51%
17	194,139	1,353,086	33.75%
18	327,951	1,158,947	28.90%
19	380,283	830,996	20.73%
20	450,713	450,713	11.24%

27

Table 39. PowerPoint Presentation - Map 6a "High Decile" - Kern Co.

Map 6a "High Decile" – Kern Co.

- All three methods identify greater Bakersfield
  - CES characterizaton of Bakersfield is unchanged from the Top Decile example
  - CEVA and EJSM both extend identified area in north Bakersfield, and highlight Lamont and Arvin, as well; they are in general agreement
  - EJSM and CEVA agree on North Bakersfield, Wasco (see overlap color)
- CEVA now agrees with EJSM in identifying Delano, Oildale, Lamont, Arvin
- EJSM now agrees with CEVA in indentifying Taft
- CEVA again solely identifies some small towns – Lost Hills, Wasco, Tehachipi

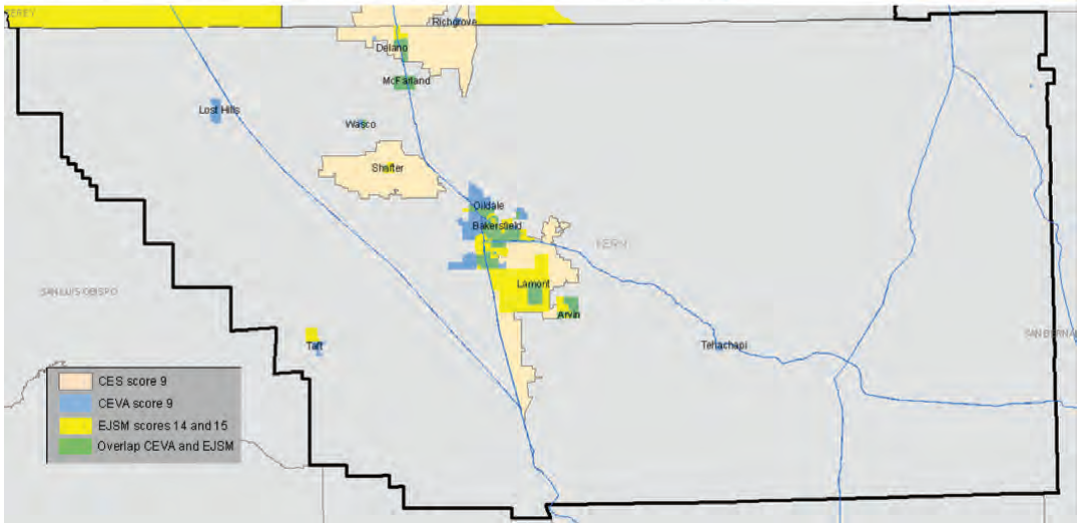


Table 40. PowerPoint Presentation - Map 6b "High Decile" - Central SJV

Map 6b "High Decile" – Central SJV

ES expands identification
f the entire Hwy 99
orridor, but still does not
ick up north Fresno or any
reas along Interstate 5

he problem of large
ensus polygon size making
ose identified by CEVA
nd EJSM appear more
rominent on the map is
ven more pronounced.

ISM and CEVA generally
gree, but a few locations
re only identified by one
ethod

- CEVA: Cutler, Woodlake, and Coalinga as before; also Woodville, Ivanhoe, London
- EJSM: large, sparsely populated areas along I5, Parley, Hanford, Kerman

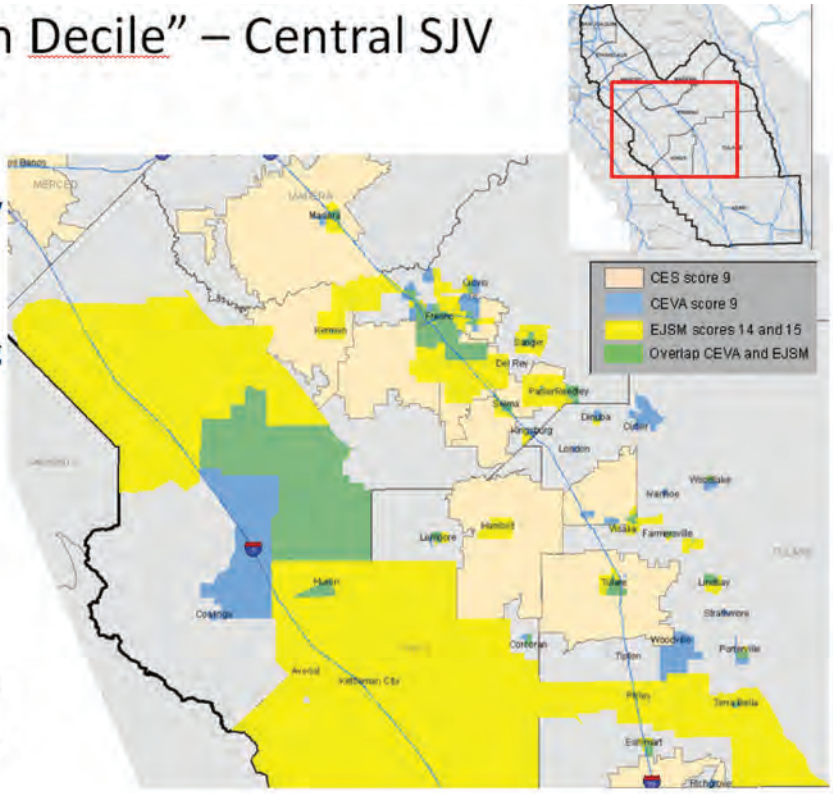


Table 41. PowerPoint Presentation - Map 6c

Map 6c "High Decile" – Northern SJV

- As before, CES identifies large population centers also identified by CEVA and EJSM, but they do so with much greater specificity
- CEVA again solely identifies several small towns not identified by EJSM – Tracy, greater Manteca, Ripon, Oakdale, Patterson, Livingston, Atwater, Gustine, Patterson.
- EJSM identifies fewer areas, and more geographically focused areas, than both other screening methods

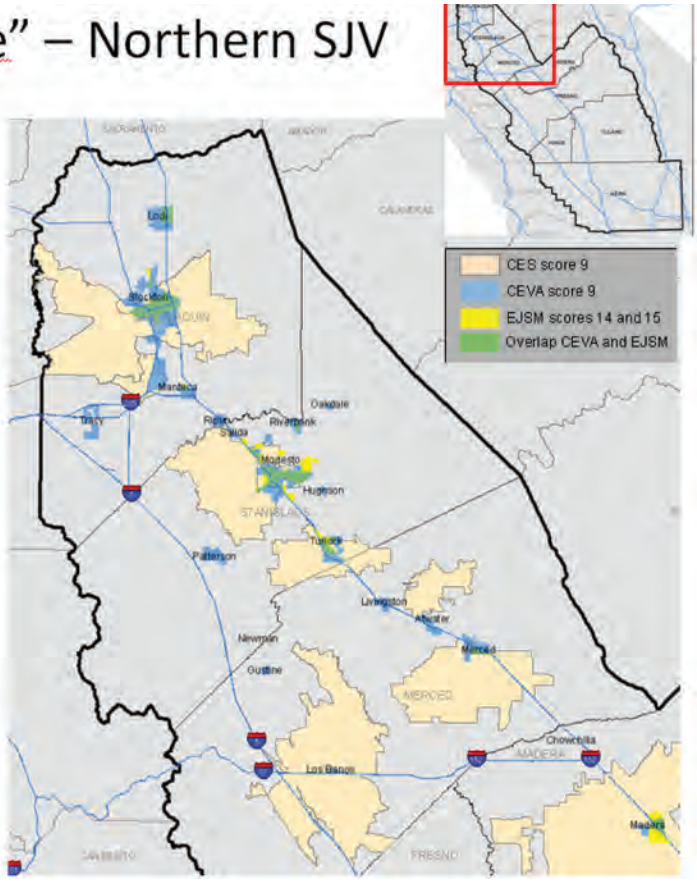


Table 42. PowerPoint Presentation Summary - High Quantile

Summary - High Quantile

- All three methods again agrain agree on Bakersfield and Fresno/Selma
  - The broader definition of "high" scores results in EJSM and CEVA highlighting additional portions of ZCTAs identified by CES
- All three methods also agree on Stockton, Modesto, Tulare and Madera
- EJSM and CEVA identify numerous small population centers and towns, but usually not the same ones

Table 43. PowerPoint Presentation - Areas Identifies by all Three Methods

Areas Identified by all Three Methods

– All methods agree: Top Population Quantile in **RED**

– All methods agree: High Population Quantile in **Pink**

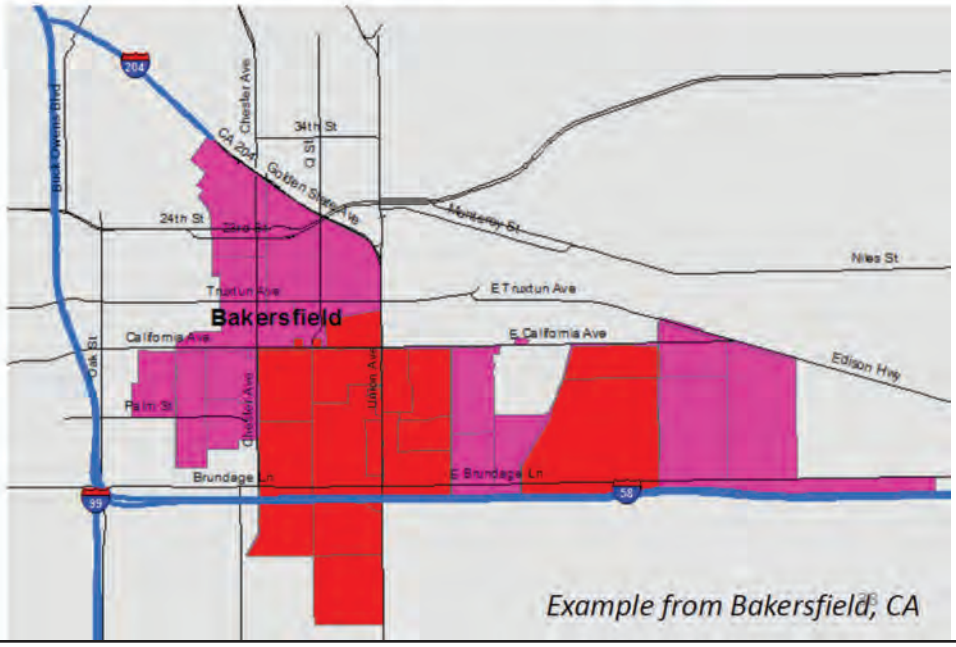


Table 44. PowerPoint Presentation - Areas Identifies by all Three Methods

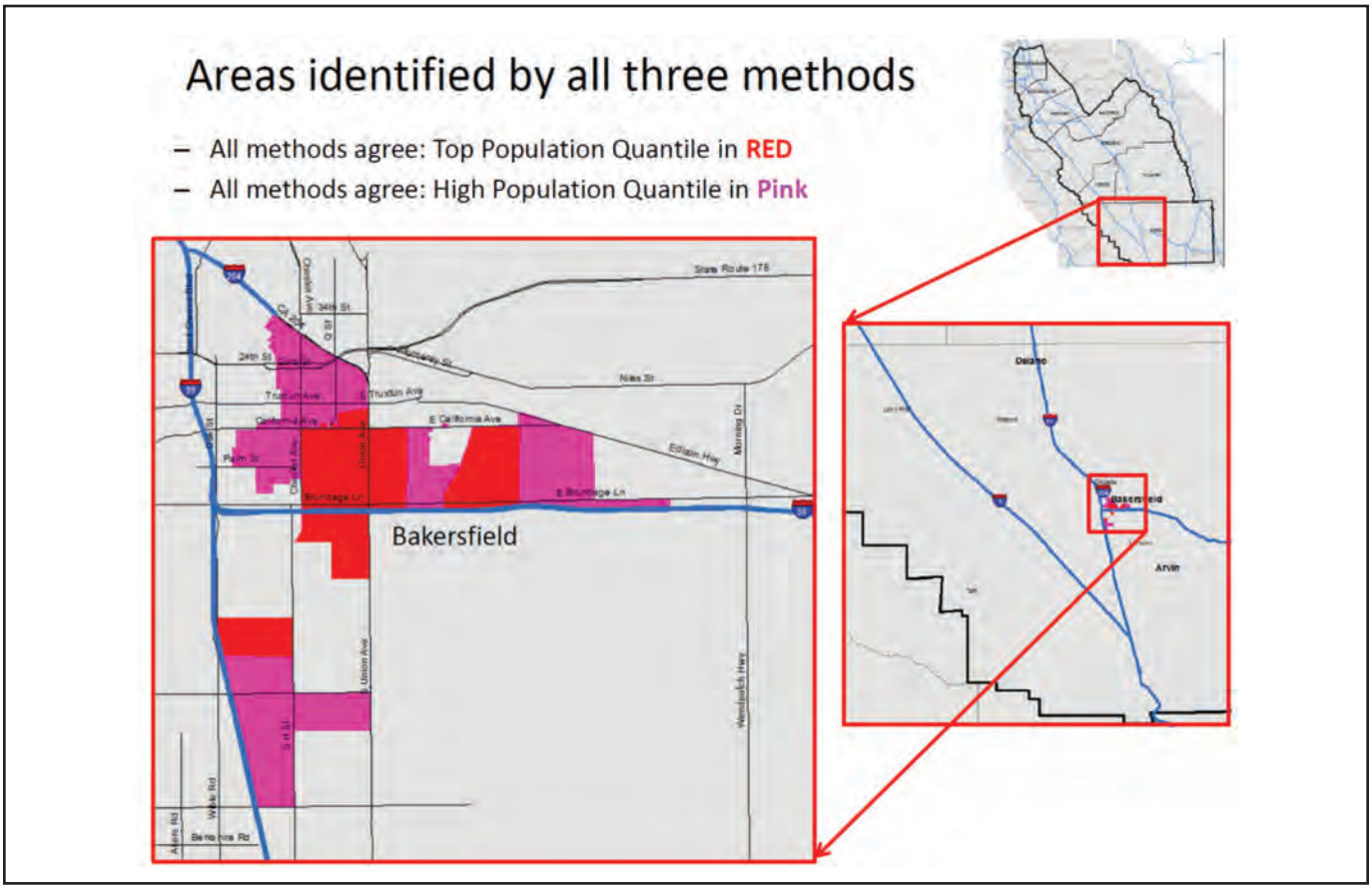


Table 45. PowerPoint Presentation Areas - Identifies by all Three Methods

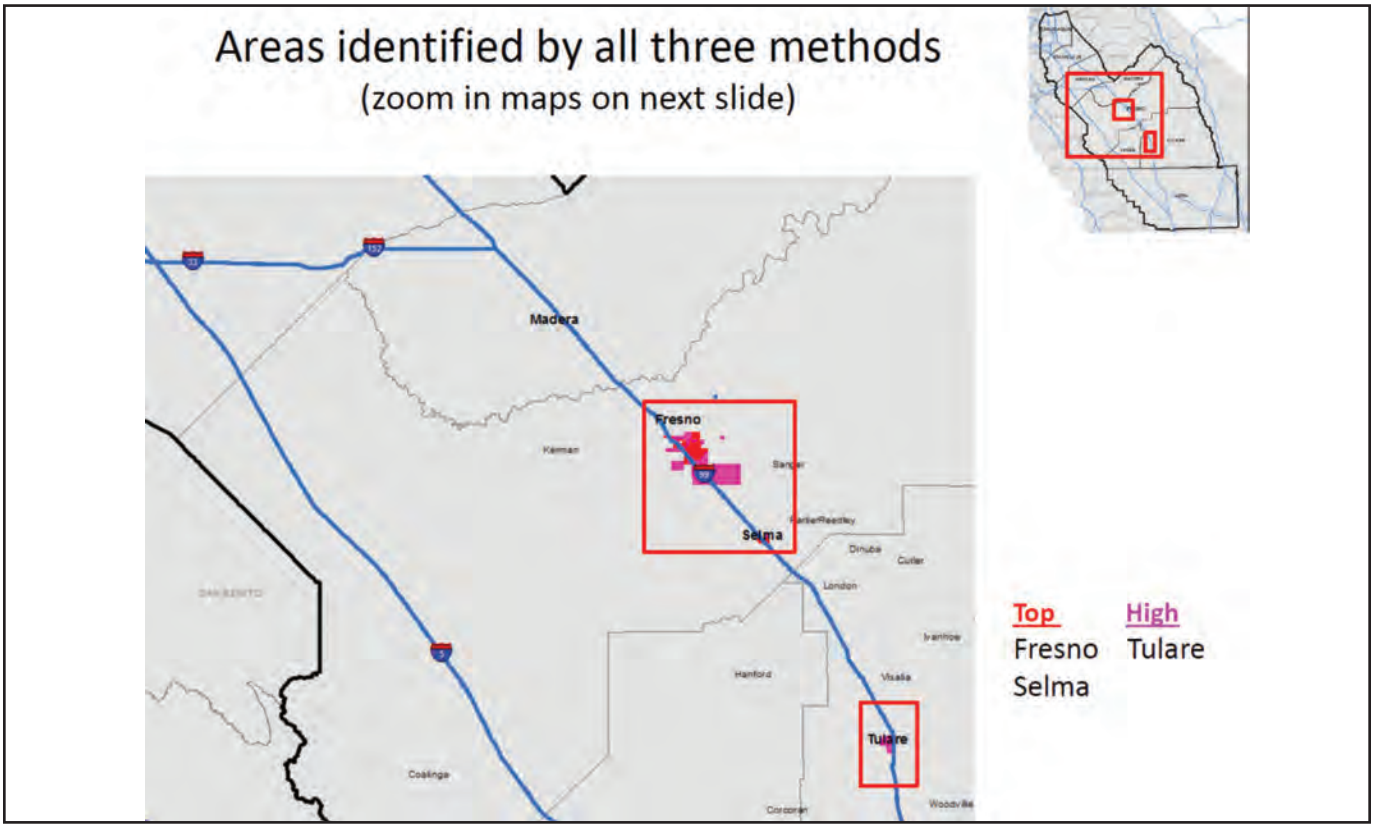


Table 46. PowerPoint Presentation - Areas Identifies by all Three Methods

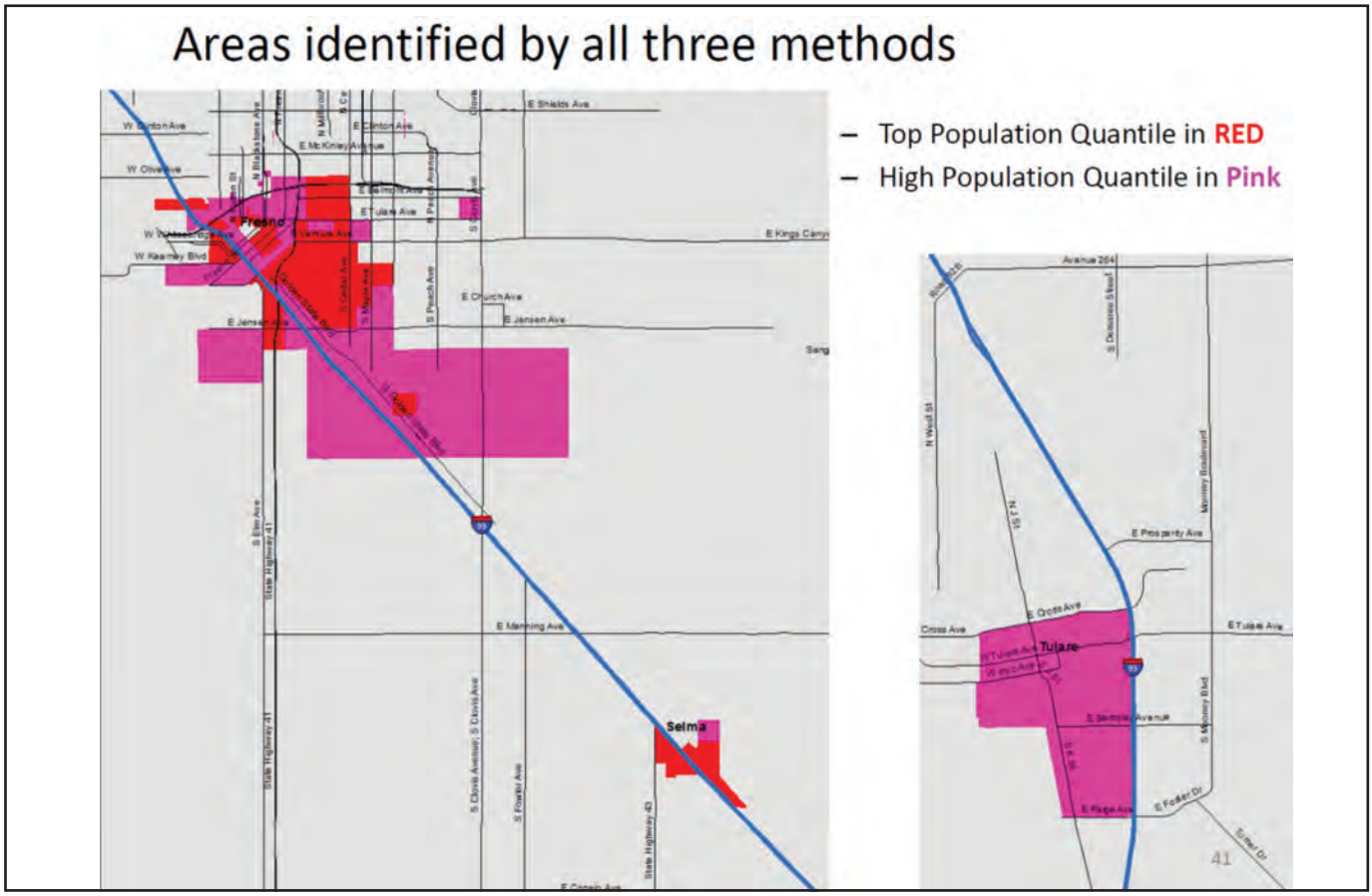


Table 47. PowerPoint Presentation - Areas Identifies by all Three Methods

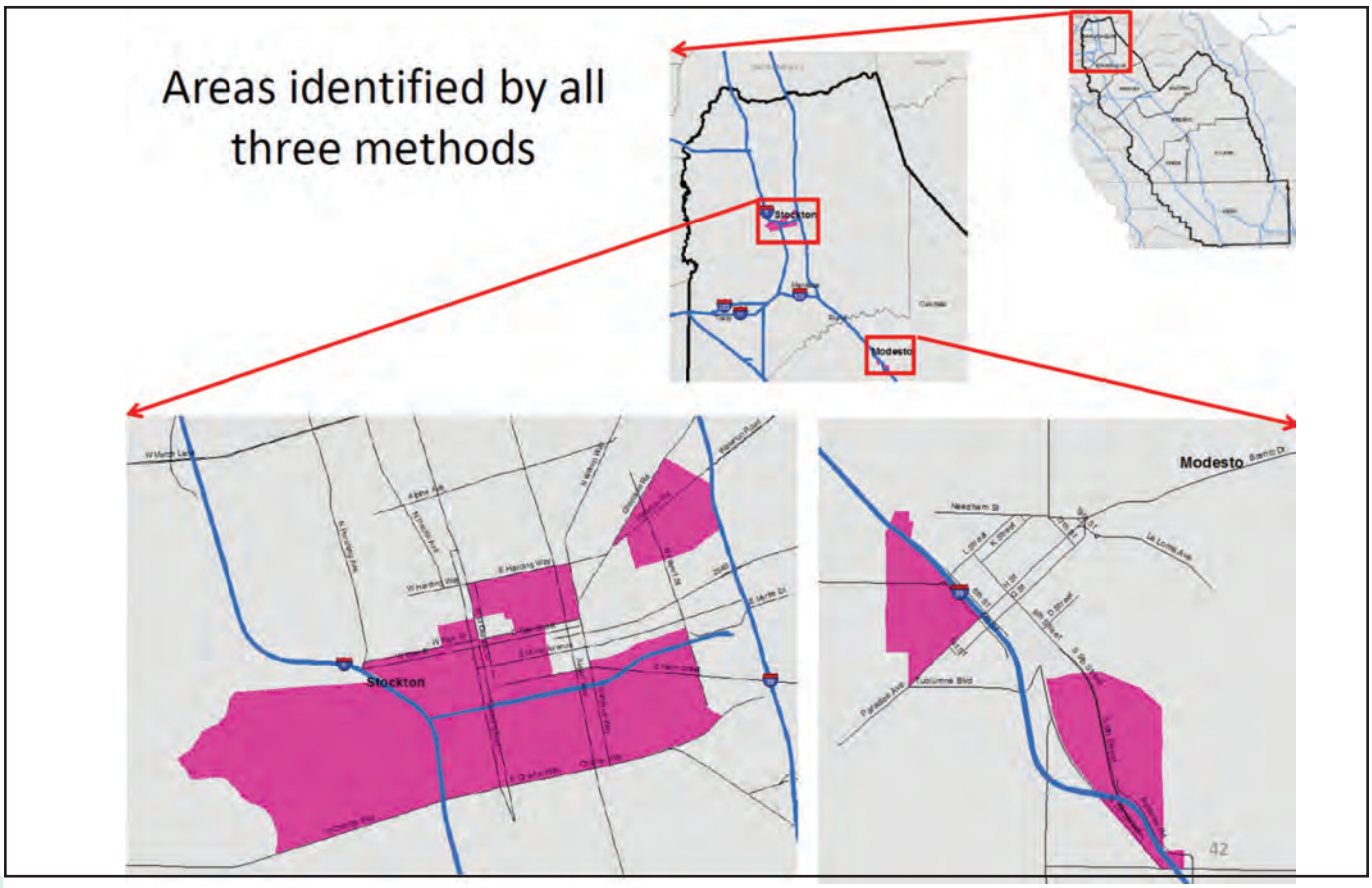


Table 48. PowerPoint Presentation - Areas Another way to examine areas identified by all three methods

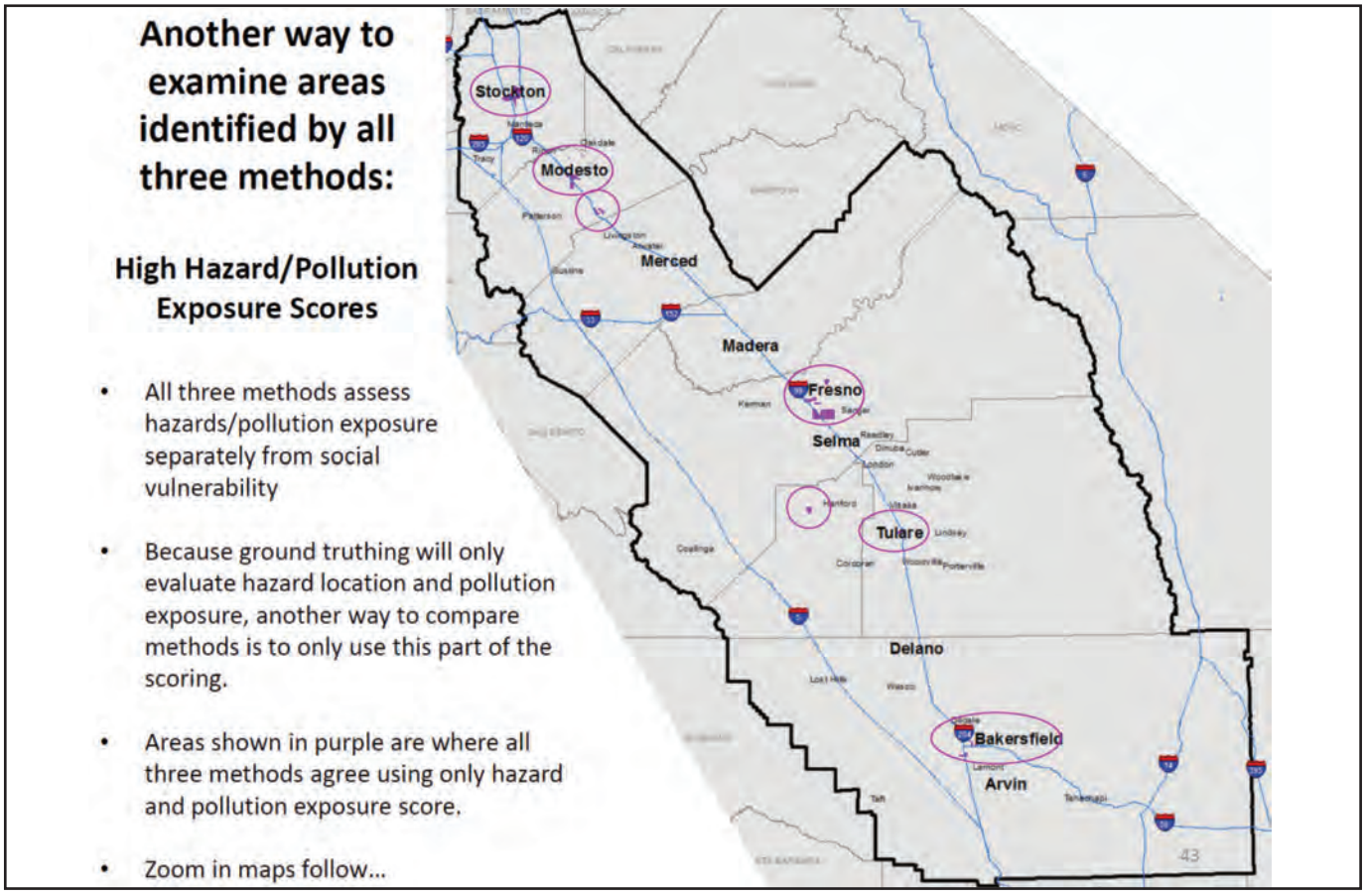


Table 49. PowerPoint Presentation - Areas Northern SJV, Stockton Area

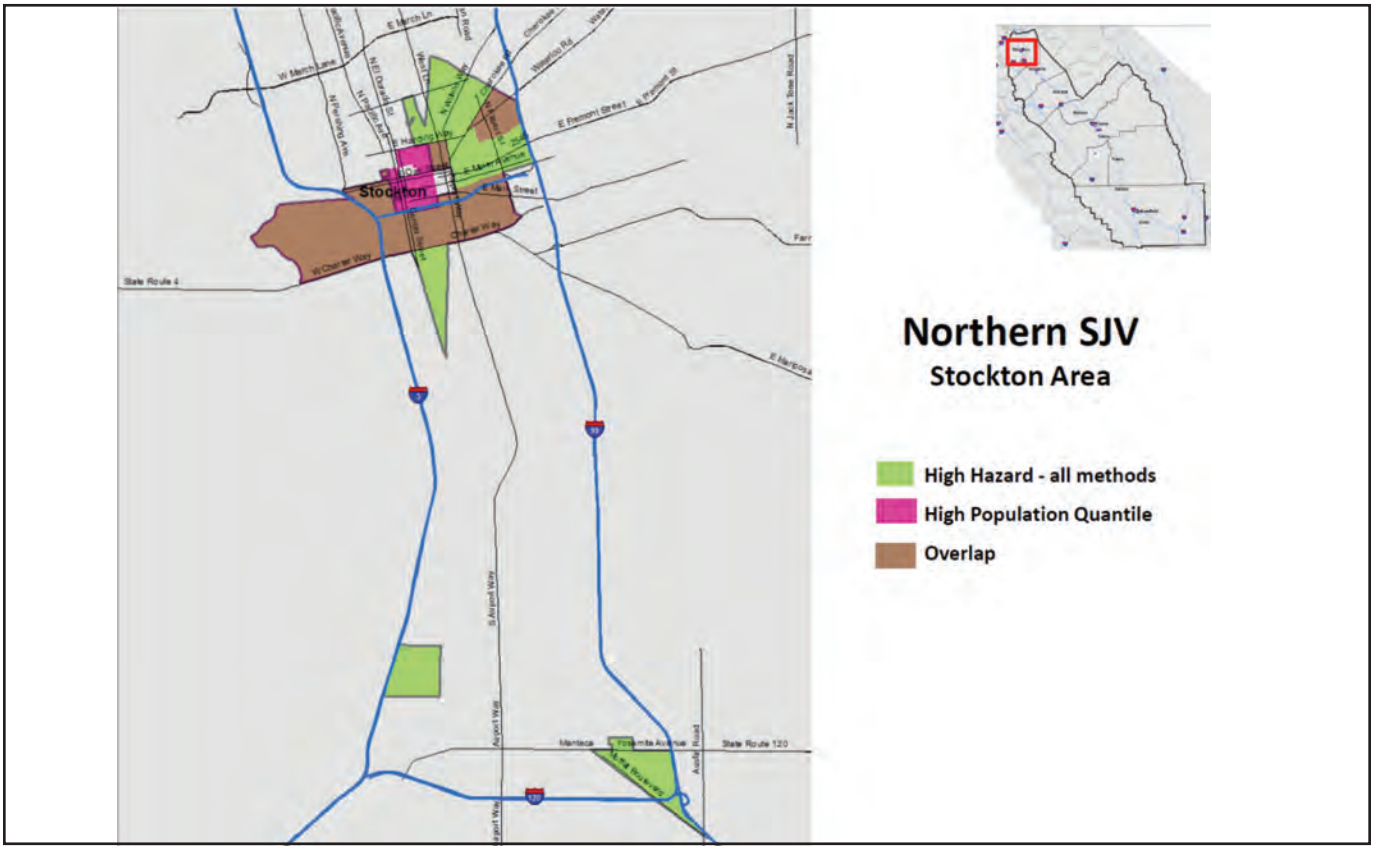


Table 50. PowerPoint Presentation - Northern SJV, Modesto Area

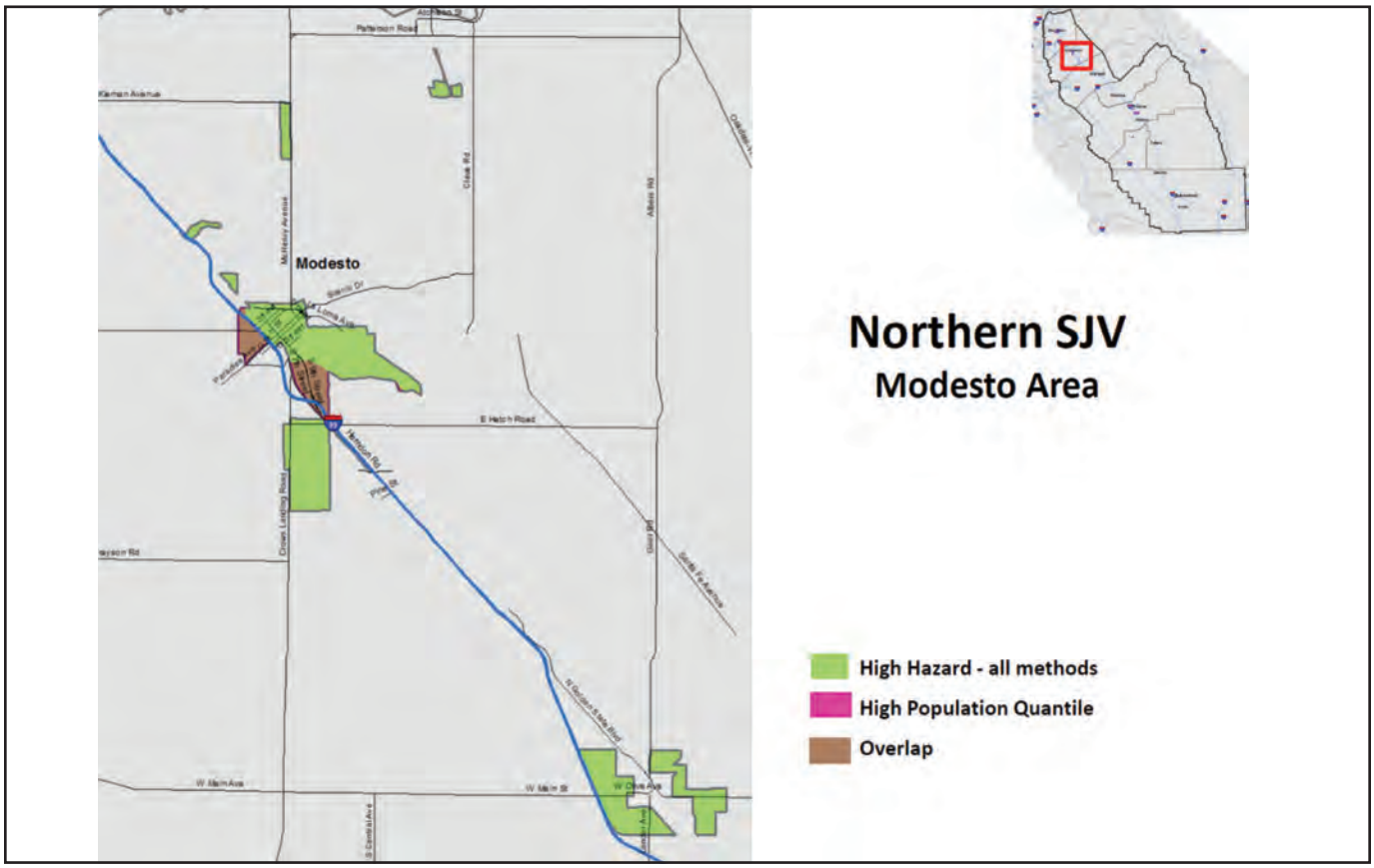


Table 51. PowerPoint Presentation - Central SJV, Fresno

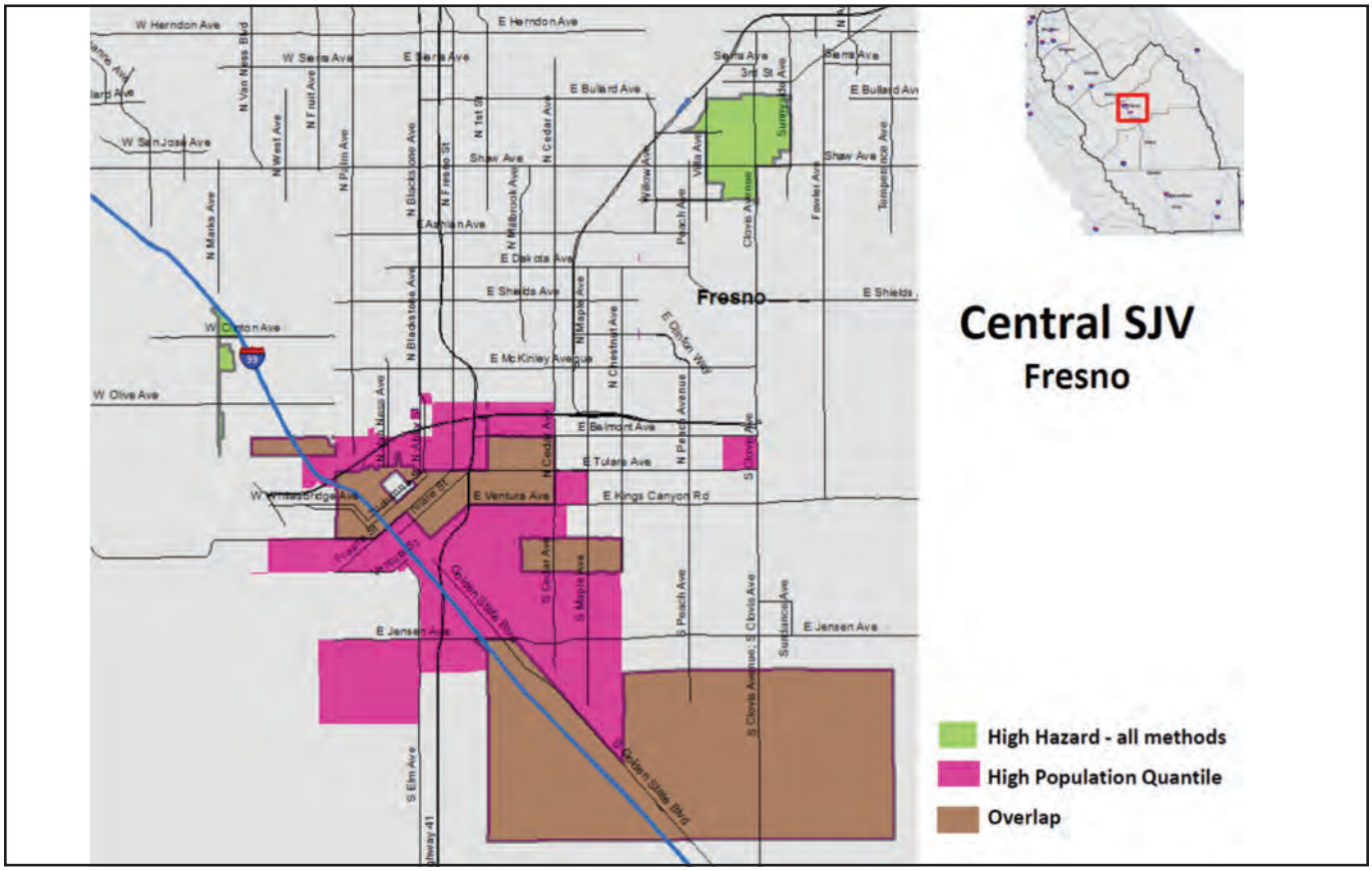


Table 52. PowerPoint Presentation - Central SJV, Tulare Area

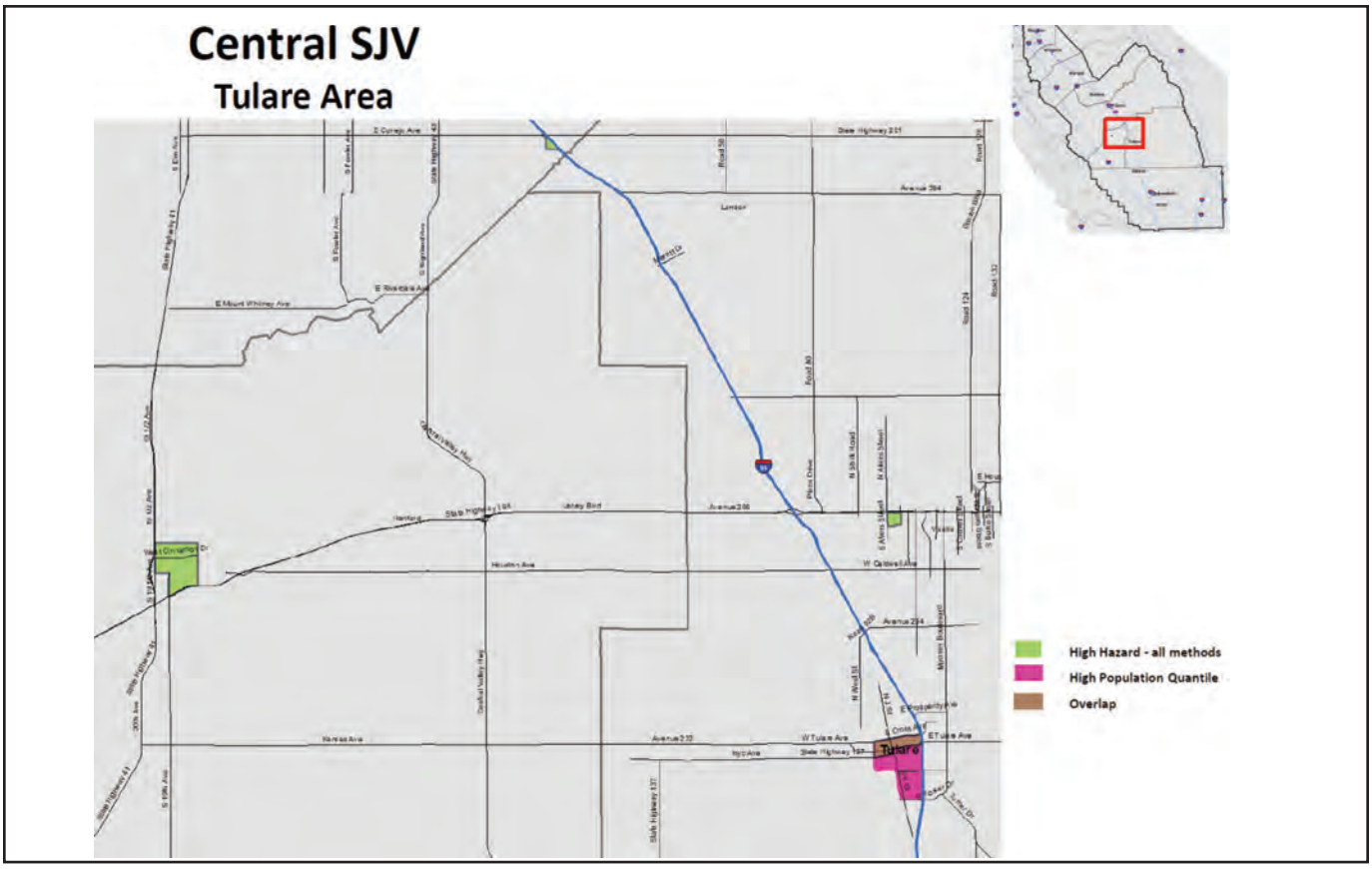
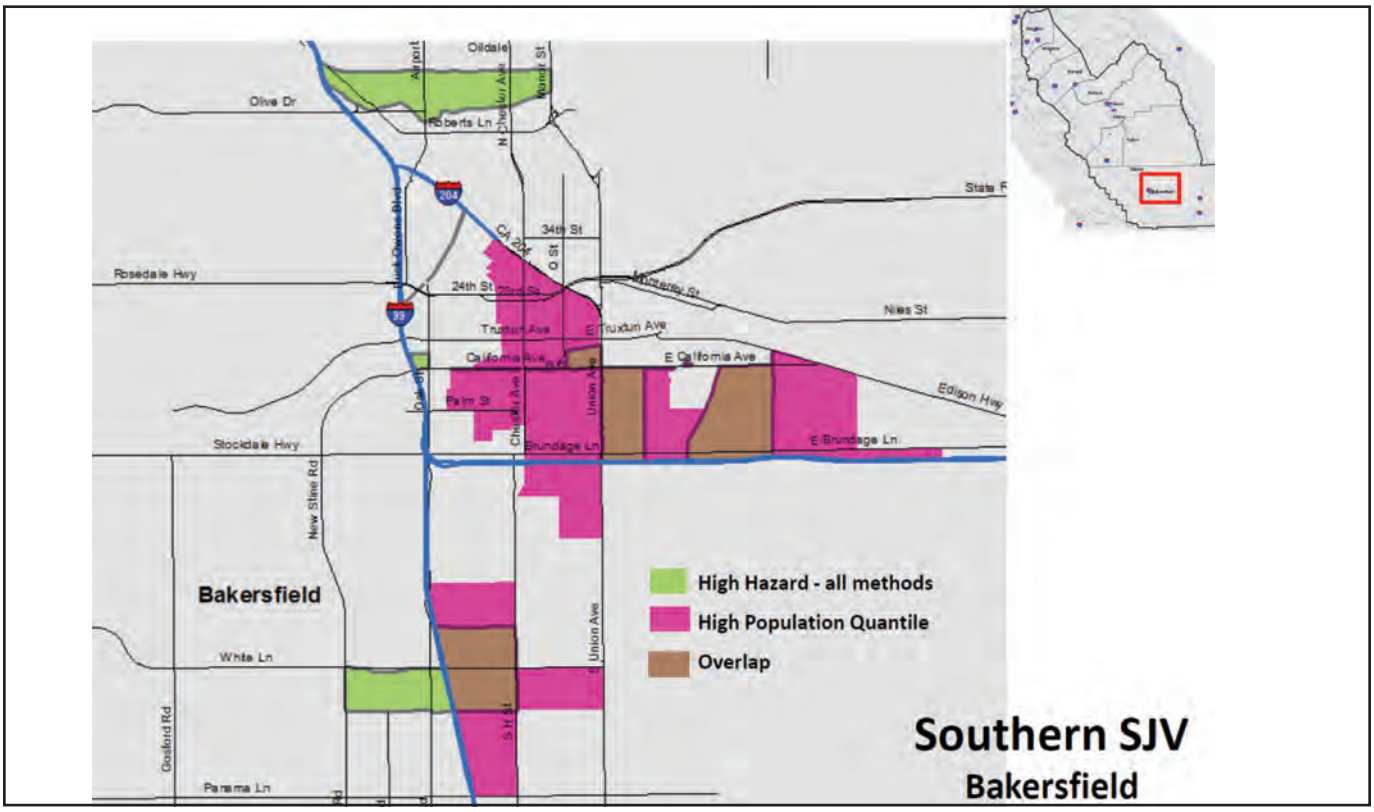


Table 53. PowerPoint Presentation - Southern SJV, Bakersfield



APPENDIX B:
City of Commerce Planning Commission Green Zone Policy Report

STAFF REPORT
GREEN ZONES WORKING GROUP

TO: Planning Commission

FROM: Public Works and Development Services Department

DATE: October 23, 2013

CASE NO.: Green Zones Working Group

APPLICANT REQUEST:

Receive and file a report updating the Planning Commission on the work of the Green Zones Working Group.

LOCATION: Citywide
Commerce, CA 90040

APPLICANT: City of Commerce
2535 Commerce Way
Commerce, CA 90040

ATTACHMENTS: 1) Green Zones Working Group Report
2) Documents Reviewed By Green Zones Working Group

INTRODUCTION

The Green Zones Working Group was initiated because of concerns raised by the City's Environmental Justice Advisory Task Force to the Commerce City Council regarding proximity of hazardous sources to sensitive land uses such as homes, schools and churches. In June 2011 the Commerce City Council directed city staff to convene a workshop between the City Council, Planning Commission, Environmental Justice Advisory Task Force, and Commerce Industrial Council Chamber of Commerce to "discuss land use recommendations on Buffer Zones/Sensitive Receptors and Green Zones". The workshop was intended to allow participants to discuss innovative approaches to create separation of hazardous sources and sensitive uses as well as economic development strategies with a focus on "green" practices and objectives". This convening would be a work session between representatives from these four groups and would not require the existing formal structure applied to City of Commerce commissions

and task forces. Resources secured through partnerships between the Commerce Environmental Task Force and organizations such as the University of California and the United States Environmental Protection Agency would be used to inform and facilitate the process. The Commerce City Council further directed staff to work with the Commerce Environmental Task Force to further refine the approach and process to facilitate the workshop(s).

Upon review of the scale and scope of work that would be addressed in the workshop(s)the Commerce Environmental Justice Advisory Task Force and city staff determined that a more comprehensive process would be required. The process would now include a series of meetings between participants that would make up the Commerce Green Zones Working Group. A consultant would be retained to facilitate the meetings through resources provided by the United States Environmental Protection Agency. In February 2012 city staff presented this approach to the Commerce City Council. The City Council directed staff to convene a meeting of an initial group of stakeholders that included representatives from the Environmental Justice Advisory Task Force, Commerce Planning Commission, Commerce Industrial Council Chamber of Commerce Board and membership, and University of Southern California Program for Environmental and Regional Equity (PERE). In July 2012 the process was launched with an initial meeting.

The consulting firm of MIG was hired to assist the group, with staff member Esmeralda Garcia facilitating the Group meetings. As directed by the City Council, at its first meeting the Working Group identified additional stakeholders to involve in the process. The final composition of the Working Group included representatives from the residential and business community, advocacy organizations and technical experts. These include:

- Business Community - Small Business
- Business Community - Large Business
- Commerce Industrial Council Chamber of Commerce
- Environmental Justice Advisory Task Force
- Labor/Jobs
- Commerce Planning Commission
- Commerce Residential Community
- USC PERE

Please note that the majority of information provided in this report was taken from a larger report which is attached to this document

GREEN ZONES WORKING GROUP TOPICS

Overview of Topics Discussed

Over the course of 14 months, the Commerce Green Zones Working Group collectively dedicated many hours to reviewing data and discussing technical information related to economic factors, regulatory tools, and policy for the City of Commerce. The purpose for this review was to establish a draft policy framework that will guide the Commerce City Council in establishing land use planning policies and processes that address the proximity of hazardous sources and sensitive land uses while encouraging green economic development.

The Green Zones Working Group defined a set of guiding principles that provided direction the design of recommendations and crafting of policy options:

1. **Balance** –The City of Commerce has a large industrial base with a relatively small residential population and area. Seek to maintain a balance between the needs and quality of life of the residential community while still fostering economic development.
2. **Community Health** –Support practices that enhance the quality of life and health for residents and the local workforce.
3. Uses that pose a harmful threat to health in close proximity to sensitive receptors - Promote an environment that safeguards the wellbeing of sensitive land uses and viability of businesses through careful planning and phasing of future improvement activities guided by applicable laws and regulations (i.e. 2005 CARB Air Quality and Land Use Handbook).
4. **"Green" Practices** – Incorporate "green" practices of urban planning and development when formulating recommendations on land use and policy directions.
5. **Image** – Advocate the City as business-friendly with strong community amenities.
6. **Infrastructure** – Ensure adequate infrastructure to meet the current and future needs of the community and business.
7. **Local Workforce** – Support activities that improve workforce opportunities for local residents in light of new industry clusters locating within the City
8. **Connectivity/Mobility** – Enhance the existing transportation system to consider all transit modes, capitalize on existing successful transit, and improve opportunities for the Commerce community and workforce.

Issues and Opportunities

Analysis of challenges/barriers and opportunities relevant to the anticipated policy recommendations also framed this process. They include:

1. Although the City has a successful tax base generated by local business, Commerce is relatively small compared to other cities in the region, resulting in certain limitations. For example, the City relies heavily on outside contracting for services.
2. The City's existing permitting process sometimes poses challenges for new and existing business. The City is knowledgeable of numerous resources that can improve the process. However, due to lack of staff and other City resources, they have not been implemented.
3. The City is in some respects relatively isolated from some resources that would ease or enhance progress toward Working Group goals. For example, utility companies and other permit issuing agencies do not have offices close to the City of Commerce, so agency staff is less accessible, and the City has no control over utility rates and permitting processes.
4. The City of Commerce has within its boundaries existing rail yards and two (2) major State highways, both land uses considered to be a major source of air quality concerns. However, the City does not have jurisdictional oversight or control over either.
5. Existing commercial buildings need redevelopment to improve both air quality and economic vitality.

6. Adaptive re-use might be useful in transition areas to address problems of proximity of harmful land uses near sensitive receptors, as well as to attract new businesses.
7. Attracting artisanal and cottage industry as new business clusters provides a unique opportunity to encourage entertainment and other attractions to provide a greater sense of place for residents and as a means of institutionalizing improved amenities. Beautification projects are also a means to reinforce a stronger community image.

General Areas of Agreement

As early in its formation, and as early as its second working group meeting on October 3, 2012, the Green Zones Working Group discussed, confirmed, and ultimately established the key decision-making process that included building consensus during the process and required a fifty-percent (50%) plus one (1) requirement for decision-making on final recommendations transmitted to the Commerce City Council.

Other methods for consensus building, included providing the post-meeting summary by email to all Working Group members following the meeting for their review. This allowed group members who could not attend the meeting to provide feedback on direction, perspectives, ideas or concurrence presented by the Working Group. Comments were provided to MIG via email and documented in a revised meeting summary. Meeting summaries were reviewed during the following meeting. All Working Group meeting summaries are included as appendices to this report.

The Working Group reached numerous points of agreement before making its final recommendations.

- Establish a community identity for the City of Commerce
- Place special focus on Atlantic Boulevard and Washington Boulevard corridors
- Develop a City of Commerce marketing strategy to attract new business
- Incentives and business attraction are key to creating a new green economy
- The Working Group will use a framework to develop its recommendations:
    - **Prevention** – provide separation of harmful uses from sensitive receptors.
    - **Reduction** – apply methods to reduce pollution from businesses and industry
    - **Revitalization** – pursue opportunities that could contribute to a "green economy"
    - **Reinvestment** – provide infrastructure to support economic growth and protection of community health
- Any recommendation on uses includes siting of any "new" uses
- Definition for sensitive receptors from the CARB Air Quality and Land Use Handbook (Residences, schools, childcare and daycare centers, urban parks and playgrounds, or medical facilities, senior residential facilities.)
- Exclude freeways and high traffic roads from land use discussion

Areas of Dissent

Potential recommendations affecting land use policy require careful review and thoughtful discussion. The Green Zones Working Group dedicated many hours to review topics and

considerations that would be included in a draft land use policy framework. This task required that the Group, with representation from different stakeholder groups with differing perspectives and opinions, arrive at recommendations agreed to by more than half of the group. While the majority of the strategies described in the Recommendations Matrix represent agreement from the group based on the decision-making process developed by the group, there were some areas where there was dissention.

Zoning

As stated in the Overview of Topics Discussed item #3, there was agreement by the group that the issue of uses that pose a harmful threat to health in close proximity to sensitive receptors is extremely important and should be a priority. However, the Working Group had divergent opinions about the tools that it should recommend to the City Council to address this issue. Over the course of several meetings the Working Group discussed changes to the existing City of Commerce Zoning Code. As directed by the City Council in its motion to proceed with the Working Group process with additional resources provided by community partners, the Working Group leveraged resources made available through East Yards Communities for Environmental Justice to review proposed draft changes to the existing Zoning Code. After careful review of these proposed changes to the Zoning Code by all stakeholders represented on the Working Group the participants considered trade-offs and implications of implementation. During this phase of the process the Working Group's discussion informed other strategy recommendations. However, there were some areas that the Group continued to deliberate.

Those in agreement that revising the city's Zoning Code would be a good tool to address the issue of proximity between hazardous source and sensitive uses primarily believed that the proposed changes would provide greater certainty for business and the community that which/certain uses are permitted near sensitive receptors. Those with the perspective that the existing Zoning Code should not be revised believed that existing Federal and State regulations and the City's Zoning Ordinance include policies and regulations that address provide issues resulting from uses that pose a harmful threat to health in close proximity to sensitive receptors. The focus should not be on creating more regulation but on identifying and attracting business that will not pose future hazards to the community.

At the last meeting of the Commerce Working Group, four recommendations were proposed to address the issue of zoning.

- Update the City's Zoning Code to prevent the intrusion of sensitive land uses into industrial areas and prevent intrusion of new harmful uses into sensitive uses. Use the proposed language developed for the Commerce Green Zones Working Group.
- Develop a Specific Plan in designated area (or areas) to prevent the intrusion of sensitive land uses into industrial areas.
- Develop a Specific Plan in designated area (or areas) to prevent the intrusion of sensitive land uses into industrial areas and industrial uses into sensitive uses.
- Do not recommend any of the proposed zoning tools listed above. There are potentially other tools beyond those listed that the Group did not discuss.

Since there was dissention on these recommendations the Working Group agreed to designate a preference for each of the proposals. Each designated stakeholder representative voted on its preference for each of the alternatives. The results of the vote are noted in the chart below.

Alternative	EJTask Force	Planning Commission	Industrial Council	USC PERE	Resident	Small Business	Large Business	Jobs Labor
Update Zoning Code	**Yes**			**Yes**	**Yes**			
Develop Specific Plan v1								
Develop Specific Plan v2		**Yes**	**Yes**			**Yes**	**Yes**	**Yes**
None								

NEXT STEPS

In November of 2013, the City Council will be reviewing the subject matter.

STAFF RECOMMENDATION:

Staff recommends that the Planning Commission 1) Receive and file the subject report.

Prepared by: Matt Marquez
City Planner

Reviewed by: Alex Hamilton
Assistant Director of Development Services

Reviewed by: Eduardo Olivo
City Attorney

APPENDIX C:
Response to Comments – R9 RARE Project Comparing Three Screening Methods in the San Joaquin Valley

This document provides responses to comments received by project partners for the EPA RARE project comparing three cumulative impacts screening methods in the San Joaquin Valley. Comparison maps were provided to project partners, and they were asked to provide feedback on the following:

1) *The process used to make comparisons and the comparison maps;*
2) *Whether the results from each method are useful or less useful in informing/answering your policy questions;*
3) *Any potential improvements to tools' data choices, metrics, analysis, and scoring methodology; and*
4) *Potential locations for ground truthing that would help provide a better understanding of the strengths and weaknesses of each method with regards to answering the policy questions.*

General Response to Comments

We appreciate the time project partners have taken to provide guidance and feedback on this research project. This project has evolved based on feedback we received early on in the project. Originally, the intent of this project was to apply the Environmental Justice Screening Method (EJSM) to the San Joaquin Valley. After considering feedback from our partners, we decided to broaden the scope of this project to examine how existing screening tools can help inform stakeholders' questions about cumulative impacts or environmental justice in the San Joaquin Valley. The purpose of the comparison is not to identify which tool or methodology is "better." Rather, the purpose is to identify the strengths of the tools in hopes of informing the development of new or refinement of existing environmental justice or cumulative impacts screening tools. The main objective of the project is to develop case studies demonstrating how existing screening tools can answer policy relevant questions.

Screening tools cannot fully measure or capture all the burdens and vulnerabilities of communities. Field validation (commonly referred to as ground truthing) can help us better understand the limitations of the tools and/or the datasets that support them. For example, field validation can help verify the location of sensitive receptors or facilities, and can also help identify places that communities are concerned about but are not identified by the screening tools. Community partners will be heavily involved in field validation for this project.

Specific Comments and Responses

Commenter: Jonathan London, UC Davis Center for Regional Change

Verbatim Comments with Responses Italicized:

> Thank you for this opportunity to contribute to the US EPA/ Region 9 RARE pilot program on environmental justice mapping approaches. The UC Davis Center for Regional Change is pleased to have our Cumulative Environmental Vulnerability Assessment (CEVA) included in this project. I am very encouraged to see US EPA engaging in enhancing the development and application of socio-spatial environmental justice analysis in such a thoughtful and inclusionary way. I offer these comments in the interests of mutual learning and on-going improvements of the field.
>
> Before addressing the specific questions posed by the RARE team, it is important to make several observations about the intended applications of the web-based platform. While the two websites provide a useful means to visually compare the three methods, there is little guidance to a visitor, not

Specific Comments and Responses

associated with the RARE project, about how to use the site or why they might chose one tool or another. Since a tool is only "good" to the extent that it does the job intended, without specifying this job, there is little basis to evaluate the relative merits of the tools in question. This makes it difficult to comment on the RARE review questions "whether the results from each method are useful or less useful in informing/answering your policy questions." I would imagine that any of the tools could be useful for identifying the people and places confronting the highest degrees of environmental hazards with the lowest level of social, economic and political resources to avoid, mitigate, or adapt to these hazards. In general, users looking for a state-wide comparison would clearly gravitate to the CES. Those with a very broad range of target issues would be best served by the EJSM, which has an extensive set of indicators. Users interested specifically in the San Joaquin Valley and committed to using a tool developed with extensive community engagement would likely benefit most from the CEVA.

The original intention of this project was to apply the EJSM in the San Joaquin Valley. After hearing from project partners in 2012, however, we decided to broaden the scope of the project even though the research contract was already put in place. Currently, the intent of this project is to elucidate how currently available screening tools can help inform stakeholder questions about cumulative impacts in the San Joaquin Valley. Because different stakeholders may have different questions or concerns, the research project looks to the project partners, who represent various stakeholder groups in the Valley, to provide policy relevant questions that they hope screening tools in general can answer. If any of the tools, as they exist, are able to inform the policy questions, we will ask the project partner to work with the research team to develop a case study of how the tool(s) informed the policy relevant question(s). For some of the policy relevant questions, the project partners might find that these tools are not sufficient, as they currently exist, to inform the policy questions. In this case, we would ask the project partners for specifics about how the tools could be improved to be useful for their policy relevant purposes. The overall outcome is to inform the development of new or refinement of existing environmental justice or cumulative impacts screening tools. Funding for this project can only support improvements/changes to the EJSM.

Designing a "welcome page" with an orientation for potential users would be a critical improvement if these are to be a public-access sites. Even setting aside the issue of public access, there is not a sufficient framework for your technical advisors to make their own judgments about the tools. While it is interesting to review how the methods vary in their identification of environmental justice communities, it is not clear about the implications to be drawn from this analysis. On a more practical basis, since the CalEnviroScreen is now the "law of the land" one approach is to use the comparisons with the EJSM and the CEVA as a means to improve the CES. Another approach would be to differentiate circumstances in which the CEVA and/or the EJSM would be more appropriate than the CES (and vice versa). Either approach is reasonable, but without some guidance on the intended use of this side by side analysis, it is not clear what practical value it has.

The web-based platforms were developed solely for this research project and the intended audience is the project partners. Our intention was to provide easy access to the maps so that project partners could compare the results of the tools. We currently do not have plans to maintain the web-based platforms after this project is completed. One of the web viewers currently provides a brief description of the access and use constraints. This is contained in the metadata and is pasted below. We are currently checking whether we can add this information to the second web viewer.

Specific Comments and Responses

"This web viewer has been made available to visually compare the results of three environmental justice or cumulative impacts screening tools applied to the San Joaquin Valley. This web viewer was developed as part of an EPA research project to pilot the application of the Environmental Justice Screening Method. The results of the screening tools displayed in this web viewer and the web viewer itself do not represent EPA's official views or positions on environmental justice screening. This web viewer has been developed solely for research purposes under the EPA Regional Applied Research Effort (RARE) Program. More information about the RARE Program is available at http://www.epa.gov/osp/regions/rare.htm."

Taking on the content of the websites themselves, there are several points to be made about the treatment of the CEVA. First, a point of terminology: in some places the website refer to our work incorrectly as the *California* Environmental Vulnerability Assessment, instead of the *Cumulative* Environmental Vulnerability Assessment. More significantly, I am concerned that your team may have misapplied the CEVA categories. Unlike the EJSM and CES, which use a linear ranking from low to high, because the CEVA uses a 3x3 matrix, the "top" three categories that represent the Cumulative Environmental Vulnerability Action Zones are categories 6, 8, and 9. These correspond to the census tracts that are ranked highest in both Cumulative Environmental Hazards and Social Vulnerability (category 9) or high in one and medium in the other (categories 6 and 8). Category 7, in contrast, is ranked as high in environmental hazards and low in social vulnerability and is not considered one of our Cumulative Environmental Vulnerability Action Zones (CEVAZ).

7=High CEHI/ Low SVI	**8**= High CEHI/ Med SVI	**9**= High CEHI/ High SVI
4=Med CEHI/ Low SVI	**5**= Med CEHI/ Med SVI	**6**= Med CEHI/ High SVI
1=Low CEHI, Low SVI	**2**=Low CEHI/ Med SVI	**3**=Low CEHI/ High SVI

If the comparison included category 7 in the set of highest EJ scores, it would significantly misrepresent the CEVA and problematize the comparison. This was a point made by the CRC Director of Informatics during the RARE webinar in July but it is not clear whether this was incorporated into the final analysis. If the cross-tool analysis does indeed use category 7 as a "high" quantile, I would strongly recommend that US EPA rerun the comparison between the three tools before going public with the website.

We apologize for incorrectly referring to CEVA as the California Environmental Vulnerability Assessment. We are working to correct this.

Specific Comments and Responses

The analysis and comparison reported in the June and July 2013 webinars did not include CEVA scores 6 or 7 in either definition of total cumulative vulnerability score "hot spot". This can be seen if you refer to the webinar PowerPoint, slides 27 and 33 define the "top quantile" and "high quantile," respectively.

During the webinar, three different ways of comparing the results of the tools were provided. Two of the methods were based on what percentage of the San Joaquin Valley population is located in the "high score" areas of each screening tool. The first comparison method compares the highest scores from each method that represent about one tenth (7.2 - 11.24%) of the San Joaquin Valley population. For CEVA, we included areas that have a score of 9. (Please see slide 27 of the presentation for a breakdown of the scores and population.) The second comparison method compares the highest scores from each tool that capture about one-fifth to one-quarter (20.7 – 24.6%) of the Valley's population. For CEVA, we included areas that have a score of 8 or 9. (Please see slide 33 of the presentation for a breakdown of the scores and population.) The third comparison method addresses a different question, that of agreement among screening methods for identifying high hazard/pollution exposure. It focuses on the hazard/pollution exposure scores and does not consider social vulnerability. Therefore, CEVA scores 7, 8, and 9, those scores which CEVA identifies with the highest hazard/pollution exposure, were used in this comparison.

As our primary response to the question of "potential improvements to tools' data choices, metrics, analysis, and scoring methodology", I would direct you to the CRC's new version of CEVA, as developed for an EJ mapping project in the Coachella Valley. In this version of the CEVA, we added a number of new data sets (including drinking water contamination) improved the use of several indicators (including selecting regionally-relevant and high-concern pesticide) corrected many of the index construction shortcomings, and drew on some of the more recent innovations from the EJSM and the CES. Like the San Joaquin Valley CEVA project, this tool was developed in a collaborative partnership with key local and regional stakeholders, resulting in a regionally-specific tool with numerous practical applications. Please see: http://regionalchange.ucdavis.edu/ourwork/projects/ceva-coachella-valley

Comment noted.

I would make the more general point about improvements to the EJ tools, that this RARE pilot project is an excellent affirmation of the value of developing regionally-specific approaches. While the CES has clear benefits in being state-wide and ideally adopted by a wide range of state agencies, a regional approach allows for selection of indicators that are relevant to the issues, concerns, and policy initiatives in that region. As I have recommended to OEHHA, I believe that California would be better served by a state-wide framework that was built up from a set of regionally-specific tools. This could still be used to allocate state funds and other resources, but on a stratified basis that identifies the highest vulnerability communities in each region. Such an approach will also encourage greater community participation and buy in, especially among the stakeholders that are most affected by environmental injustices and under-represented in public policy.

Comment noted.

Specific Comments and Responses

The question of "ground-truthing" is an important one, both as a means to better engage environmental justice stakeholders and to improve the methodologies themselves. However, without a clearer definition of what is meant by ground-truthing in this context, it is difficult to recommend locations to carry this out. Ground truthing could include fact-checking the specific data sets (e.g., verifying the location and operations of specific TRI sites); the collection of primary data in target locations (e.g., drinking water contamination testing); the implementation of community-based workshops to compare the tool outputs with local knowledge and experiences, among others. All of these are worthwhile activities, but each call for a very different level of investments and organizational capacity, and result in very different outcomes. My recommendation to US EPA is to convene a group of key stakeholders from the research, agency, and advocacy sectors to develop a strategic framework for ground truthing before doing any site identification. This stakeholder engagement process can then begin to generate specific policy initiatives that one or more of the EJ tools can address, and which can become the basis of case studies. Once this is accomplished, US EPA will be well positioned to initiative and document a set of implementation pilot projects.

Field validation for this project will include verifying locations of sensitive land uses and facilities – those that may or may not be included in publicly available databases. In addition, community members will have the opportunity to identify additional hazards in their communities that are not captured in the databases that the screening tools draw data from. Field validation and feedback from community members will be used to enhance the utility of the EJSM, and hopefully inform other methodologies. (Funding for this project can only support improvements to the EJSM.)

Given the limited resources and timeframe for this project, we are unable to convene a large meeting of key stakeholders to develop a strategic framework for field validation. Project partners were provided with an opportunity to inform field validation during the comment period following the webinars. Some comments we received included recommendations for field validation, and we are considering these comments as we develop the field validation strategy. Community members are an essential part of field validation because of their knowledge of their community. Community partners will help finalize locations for field validation.

Thank you again for this opportunity to comment on the RARE project. It has been a pleasure interacting with US EPA staff and I am very enthusiastic about deepening this partnership over time. Please let me know if you have any questions about my comments or if we can be of any other assistance.

Commenter: David Lighthall, San Joaquin Valley Air Pollution Control District

Verbatim Comments with Responses Italicized:

I would like to add some comments that I believe are in consonance with Kevin's. Clearly the CES lacks sufficient spatial resolution. Regarding the other two models, after looking at some sample locations in Fresno that I am familiar with, my sense is that CEVA has the best resolution for demographic factors (and perhaps a scoring bias that overemphasizes demographic factors) with EJSM having a superior capacity to factor in land uses into the scoring. As a result, you see EJSM giving higher scores in parts of Fresno that are middle class but adjacent to high emission sources such as SH 41.

Specific Comments and Responses

Comment noted. Compared to the EJSM, CEVA places a higher weight on demographic factors in the final score. CEVA uses Census block groups for scoring. EJSM uses block group demographic information, but aggregates up to the Census tract level because other datasets used in the tool are available at the tract level or a larger level.

Commenter: Amy Vanderwarker

Verbatim Comments with Responses Italicized:

Hi Debbie - this viewing version is great! Really helpful and much easier to use than the other one. Is there capacity/plans to do a similar comparison for EJSM and CES throughout the state? Obviously CEVA is only for the Central Valley but it would be so nice to have this for other areas to look at EJSM vs CES.

Given the limited resources for this project, EPA is unable to develop a web viewer for the entire state.

Commenter: Kevin Hamilton, Clinica Sierra Vista, Inc.

Verbatim Comments with Responses Italicized:

With regard to the CES. Unfortunately ZCTA's make targeting specific populations and communities in the SJV difficult as many are quite large. An example of this if Fresno's 93706. While the economic profile for the area is fairly homogenous, its social/demographic makeup is not. It contains densely populated core urban centers, fairly dense suburban, light/heavy commercial and industrial, and rural/agricultural. Part of it is within the City of Fresno but there are three unincorporated cities. This would make risk assessment, planning, policy making and resource allocation very challenging. It also limits individual neighborhoods ability to be specific about the hazards and challenges they face on a daily basis.

We agree that using spatial areas smaller than the zip code is preferable. OEHHA has previously stated that CalEnviroScreen will eventually move from using zip codes to Census tracts. However, the spatial resolution is limited by the indicator data used, and some data are only available at a relatively coarse level of spatial resolution, limiting the granularity of any method dependant on that data.

CEVA. This tool has the highest level of resolution for valley communities where health and social vulnerability are the main considerations. It is also the only tool to integrate "ground truthing" allowing residents to feel the results truly reflect the challenges they are experiencing day-to-day. However, the data background is missing water related health and social impact data and so would need to be updated with that information.

CEVA maps or reports at the Census block group level, but it also conflates data that is only available at a coarser spatial resolution to the smaller

Specific Comments and Responses

Census blocks. EJSM uses Census blocks for its demographic information, but in all cases aggregates up to the level of spatial resolution that is coarsest for all data used (e.g., Census tracts). EJSM development also included significant and sustained input from community partners throughout the State to ensure community concerns are reflected in the method and its results, which is why land use and hazard proximity figure so prominently in the EJSM. Community members will have the opportunity to provide feedback on the EJSM during field validation.

CI. This tool has the design methodology that would allow it to be most useful. In fact, combining the data pool from the first two into this one-including ground truthing-would probably make it the most useful to the community, agencies and policy makers.

Comment noted.

Commenter: Cesar Campos, Central California Environmental Justice Network

Verbatim Comments with Responses Italicized:

1) First of all, I think that once CalEnviroScreen moves to census tracts it will make it so that some of the smaller isolated towns are picked up, much like CEVA and EJSM agreed on. This was a problem with CES to begin with because zip codes are very large and sometimes the differences between two areas in one zip code are enormous. I find that the process of overlaying all three maps together and finding "hot spots" is geographically sound. The problem is the scoring metrics and the fact that EJSM used many more variables than CEVA or CES. I know that all of those variable only factor to 1 score, but I'd be interested in seeing how different the CES and CEVA maps would look if all of those variables were taken into account. For the time being, I understand the use of the overlaying method and I think that it does provide good information in terms of finding areas that are specially affected and vulnerable. Moving forward I think that it will be important to protect the variables that were originally used and continue to be effective in telling a story. I know that CES recently dropped race as a variable and feel that that neglecting variables that were originally used in data acquisition will ultimately be more hurtful to the models than effective. I'd like to see CES and the other screening tools implement a variable that accounts for how far a person has to travel to the nearest clinic, pediatrician, emergency room, etc.

Comment noted. Access to healthcare could be used as a vulnerability metric, and the EJSM researchers are considering that suggestion. The best immediately available dataset for this is available from the California Geospatial Data Library (CalAtlas). In considering whether and/or how to use this data, we first need to understand how the data was automated and how "medically underserved" is defined.

2) I find that all of these screening methods are very useful as they provide concrete examples of areas in the state that obviously need more attention. In talking with policymakers, and forming positions on legislature, I find that CES and CEVA have helped me a lot to understand the situation in a place based way. I am not as familiar with EJSM but will give it a try because I like it's extensive use of variables. Moving forward, I think that if you are able to identify "hot spots" or "top quantile" of overlap, this will help CCEJN advocate for more resources and attention to overburdened communities.

Specific Comments and Responses

One of the web viewers (http://bit.ly/143UGkq) maps areas of overlap. As part of this project, we are looking for case studies of how any of the tools assist stakeholders with answering their policy relevant questions.

3) I would like for this comparison efforts to bring about a true map of hot spots that takes into account the differences in variables used for each method, but still finds the top quantile areas of overlap. I imagine that in order to ground truth one should look at areas in which two of the methods coincide in respect to areas in which they all coincide. If an area around a "top quantile" shares similar demographics to the "top quantile" area and was identified by at least two of the screening tool--I imagine those would be the best places to ground-truth.

We will consider this feedback as we develop the field validation strategy.

Thank you for letting us participate in this process. I imagine your team has put in a vast amount of work...

Commenter: Alvaro Alvarado, California Air Resources Board

Verbatim Comments with Responses Italicized:

I don't have many comments. I like the way the map shows areas where the three methods agree. My concern with the mapping is figuring out a way to minimize false positives and false negatives. False positives leave us with too many areas to investigate, while false negatives means we are focusing our efforts in the wrong areas. Where multiple mapping methods agree seems to me to give areas with no false positives, but probably many false negatives. It seems a like focusing on these areas and comparing to areas that show up on only one map is good place to think about ground trothing. I am still not sure the best way to do it, but at least this mapping narrows down the possible areas.

The false positives/negatives problem is why ground truthing is done. We will consider this feedback as we develop the field validation strategy.

Commenter: Randy Segawa, California Department of Pesticide Regulation

Verbatim Comments with Responses Italicized:

Thanks for the opportunity to comment on the cumulative impacts methods comparison. I think the methods and presentation of the results are fine, but I have a few suggestions about the ground truthing. I think someone mentioned that the candidate communities are the five with the highest hazard scores. If so, I suggest that you include Tulare as one of the communities for the ground truthing. The other four communities have the highest populations and are the most urbanized of the SJV communities. Tulare is the only one that might be considered similar to other SJV rural communities.

Specific Comments and Responses

We are still in the process of identifying candidate communities for ground truthing. We will consider the suggestion of including Tulare as we develop the ground truthing strategy.

One concern that I have with these screening methods is the need or desire to assign scores to small areas, such as census blocks. Unfortunately, much of the hazard and exposure data do not have this resolution, requiring estimates or extrapolations. While it would be prohibitively expensive to measure ozone or PM in each of several census blocks to check their estimation methods, the methods to estimate pesticide use can be checked. The pesticide scores rely on the Department of Pesticide Regulation's database of pesticide use reports. The finest spatial resolution in this database is section (1 x 1 mile area). County agricultural commissioners have the same data, but they can identify the location of application by field. More accurate pesticide scores can be determined using the ag commissioner data, and compared to the scores determined with the three screening methods.

The methods do not include scores for Census blocks. Some of the spatial resolution of the data metrics used in the EJSM are not sufficiently granular to allow scoring or mapping at the block level, and we follow good geospatial practice to aggregate up to tracts, the level of the coarsest data we use. It is possible to express the ozone and PM data at the block level; however it would be less accurate given the characteristics of the original data (CARB air monitor network locations). The EJSM uses data from the Department of Pesticide Regulation's Pesticide Use Reports. It is aggregated at the census tract level, and we currently have data from 1991 through 2009. It was processed and made available from the California Environmental Health Tracking Program (CA Dept of Public Health).

Processing field level pesticide use data would require more time and resources than this project can support. Although we cannot utilize these data for this specific project, we are interested to better understand pesticide use at the field level. Please let us know if the Department of Pesticide Regulation could assist us with obtaining field level data.

This may outside the scope of your ground truthing, but at least two of the three methods use static data. This is probably fine for certain pollution sources such as waste sites that don't change location or emissions much over time. However, ozone, pesticide use, and other hazards may change significantly. You may want to evaluate year to year changes and how these changes impact the scores of some of the hazard parameters.

The tools use multi-year averages for some of the hazard/pollution burden indicators from static monitors. This is the only data available for these indicators.

Commenter: Catherine Garoupa White, UC Davis

Verbatim Comments with Responses Italicized:

Hi Debbie and Jacquelyn, I haven't heard whether the web viewer is up yet, and wanted to submit my general comments while there is still time. I would be

Specific Comments and Responses

interested in looking more closely at the maps presented on the web viewer whenever it's available. In the meantime, here are my thoughts on the July webinar I participated in:

Thank you for the time and resources put into reviewing these three methodologies for analyzing/capturing issues in the San Joaquin Valley. As a brief background (which Debbie knows well already!), I was born and raised in the valley and have worked there on social and environmental justice issues for over a decade now. I'm currently a doctoral student in Geography at UC Davis, and I enjoy checking out all these maps! In full disclosure I work on a mapping project related to promoting equity in the valley at UCD's Center for Regional Change currently, and I was an active participant in the group that helped develop the CEVAZ index. However, I am submitting these comments on my own behalf, not with any organizational affiliation. These methods, as you've noted, have serious policy implications for addressing environmental justice in the Valley, so I'm glad to be able to participate in this conversation.

With all due respect to Jim Sadd, it felt skewed to have one presenter, who is a collaborator in developing 1 of the 3 methods, representing all three different methodologies. Several times errors were raised that the presenter made in representing these methodologies, and these issues were not fully addressed during the meeting. Overall, this could have been a more productive dialogue if each team presented their own methodology, and then representatives of those methodologies were able to have a constructive discussion with stakeholders about the pros and cons of each, and their limitations. These methodologies were tailored to specific needs, based on a variety of factors such as who the teams were that developed them, who the collaborators and/or funders were, etc. who had a specific use in mind. Discussing these tools without the context they arose from also felt disorienting. The closing conversation seem to center on which method was superior, rather than which tool is appropriate for which context. Not fully being a part of this process, I'm not sure what additional communication may have taken place before or after, so perhaps some of these side conversations and shared knowledge already exist.

The research contract for this project was granted to Dr. James Sadd and his team, which is why Dr. Sadd was the main presenter during the webinar. We will ask the OEHHA and UC Davis research teams to participate as presenters in future webinars/presentations, if necessary.

Corrections were made during the webinar and the presentation was subsequently modified to correct any errors. The modified presentation was provided to the project partners.

The purpose of the webinars was to compare the results of the three methods and not examine the methodologies in detail. We held a meeting in November 2012 with project partners and a discussion of the methodologies was provided then. Reports that discuss the tools' methodologies and limitations are publicly available. We have asked project partners to familiarize themselves with these reports.

It has never been our goal to show one method is better than another, and this was not discussed in the webinar. The main objective of the project is to develop case studies demonstrating how existing screening tools can answer policy relevant questions. The overall outcome of the project is to inform the development of new or refinement of existing environmental justice or cumulative impacts screening tools. This project can only support improvements/changes to the EJSM.

Specific Comments and Responses

In addition to what was presented during the webinar, there are several standard issues that come up with capturing and manipulating data spatially that I feel should also be a part of the discussion. These include issues such as edge effects, meaning that because of a political boundary such as county lines, related issues just across the border may not be captured yet may have a significant influence on the factors being examined. A related issue is often referred to as the modifiable areal unit problem, meaning that the unit of analysis that data is available in, such as census tracts, are often arbitrary units which do not directly correlate to the communities being looked at. As was lightly touched on during the call, there are also limitations that must be considered in terms of weaknesses and/or gaps in the data being used, whether it is census data or parcel data etc., especially in a predominantly rural region like the Valley, which I've found often does not lend itself to easy or fully accurate analysis when working with aggregated data like the census. The statistical methods used can also contribute to oversimplification or error. Of course many researchers are already well versed in these constraints but in a conversation that includes advocates, I find it important to at least briefly touch on potential limitations to applying ANY of the methods presented.

Comment noted. The limitations of the methodologies are reviewed in the papers and reports that the different research teams have published.

The idea of "groundtruthing" is laudable; however I'm concerned that it might set the tone of the conversation to be about which method is better overall rather than which method is appropriate for what use. Before going directly to communities to ground truth, I would recommend spending more time looking at the sources of data, etc. for explanations as to why there may be different results between the different methodologies. Ground truthing also implies that there is a truth to find, when differences may be related to other factors already mentioned such as data sources, unit of analysis, etc.

The purpose of ground truthing is not to demonstrate which method is better than the other. Field validation can help us better understand the limitations of the tools and/or the datasets that support them. Field validation for this project will include verifying locations of sensitive land uses and facilities – those that may or may not be included in publicly available databases. In addition, community members will have the opportunity to identify additional hazards in their communities that are not captured in the databases that the screening tools draw data from. Field validation and feedback from community members will be used to enhance the utility of the EJSM, and hopefully inform other methodologies. (Funding for this project can only support improvements to the EJSM.)

From a general process perspective, offering an in person location might have made engaging with such detailed subject matter more feasible. These tools do have important policy implications and applications, which there was not much room to discuss with a focus on methodology - is this going to be a future conversation or is it outside the scope of this effort? Perhaps it's because I haven't been a part of the entire process, but I'm still unclear on what the ultimate goal of these conversations is, and what EPA is hoping to achieve?

Compared to webinars and conference calls, in-person meetings are generally better for many reasons. Given the funding constraints, we were unable to provide an in-person meeting to discuss the comparison maps and methodology.

Thanks for the opportunity to provide feedback, and don't hesitate to contact me with questions or if there are future meetings.

Specific Comments and Responses

Commenter: Catherine Garoupa White, UC Davis

Verbatim Comments with Responses Italicized:

Hello, Thanks for the detailed response and background info, and for letting me weigh in though I was not formally a part of the ongoing process. I can definitely relate to timing, funding, and capacity constraints. It has been a crazy busy month preparing for the start of school and I have not been able to use the web viewers yet, but I did want to reply to your feedback, and so will limit my comments now to the topic of ground truthing. If the funding is available I think it's a worthwhile component, but given the shifting nature of the project and ultimate outcomes it seems like calling it something other than ground truthing would honor the validity of each method and the process each underwent in development and focus more toward the question of which method for what purpose, which seems like the central focus. As mentioned previously, my concern with the term ground truthing is that it implies there is one truth to be teased out.

Ground truthing was a part of the CEVA and EJSM processes. We agree that the term ground truthing can be confusing, and thus we will be using the term field validation instead. Field validation for this project will heavily rely on community participation.

Will the web viewers be up beyond the comment period? I would still like to take a look at the maps when I have time.

The web viewers will be available online until the end of the project period (September 2014). Due to limited funding for this project, the web viewers will not be updated to reflect any changes to CEVA or CalEnviroScreen.

APPENDIX D:
City of Commerce Green Zones Working Group Opportunity Areas (Map)

Appendix E

Conference Agenda – Central California Environmental Justice Network: Roots of Resilience, 2014

Central California Environmental Justice Network

Roots of Resilience, 2014

AGENDA

Welcome — 10:00-10:15 AM

Current State of Environmental Justice — 10:00-10:45 AM
(Panel Discussion)

Break
10:45-11:00 AM

11:00-12:45 PM — Workshops--Block A

11:00-12:45PM

The Future of Fracking Activism
--Madeline Stano (CRPE), Tia Lebherz (FWW)

11:00-11:45PM

Rural Opportunity Index
--Jonathan London (CRC)

Environmental Racism, Mass Incarceration and Immigration -- *Debbie Reyes (CPMP)*

Using Arts & Culture for Organizing
--Isabel Arrollo (EQS)

11:45-12:00 PM — Break — 11:45-12:00 PM

12:00-12:45PM

Community Monitoring Networks
--Luis Olmedo (CCV), Jessica Hendricks (GCM)

Air Pollution Regulator Accountability
--Dolores Weller (CVAQ), Tom Frantz (Air)

Lunch
12:45 - 2:00PM

Workshops--Block B — 2:00-3:45 PM

2:00-3:45PM

Partnering with Environmental Agencies and Communities to Evaluate the Environmental Justice Screening Method (EJSM)
--Manuel Pastor (USC), James Sadd (Occi)

2:00-2:45PM

Shifting Gears Fresno: Increasing Bike Ridership from 1% to 30%

Current State of Kettleman City
--Maricela Mares-Alatorre (El Pueblo)

Video Voices & Youth Organizing
--Youth, Greenfield Walking Group

2:45-3:00 PM — Break — 2:45-3:00 PM

3:00-3:45PM

Community Resiliency in the Face of a Drought
-- Ryan Jensen (CWC)

Land Use and Environmental Justice
--Leadership Counsel for Justice & Accountability

Closing — 3:45-4:00 PM

SCIENCE