INVESTING IN COMMUNITIES

NOTICE OF REGULAR MEETING
Sacramento Housing and Redevelopment Commission
Wednesday, May 7, 2014 – 6:00 pm
801 12th Street Sacramento, CA

ROLL CALL

APPROVAL OF AGENDA

APPROVAL OF MINUTES

1. Minutes – April 16, 2014

CITIZENS COMMENTS

2. While the Commission welcomes and encourages participation in the Commission meetings, it would be appreciated if you would limit your comments to three minutes so that everyone may be heard. Please fill out a speaker card and present it to the Agency Clerk if you wish to speak under Citizen Comments or on a posted agenda item. Matters under the jurisdiction of the Commission, and not on the posted agenda, may be addressed by the general public at this time. Commission attendees are requested to silence any electronic devices that they have in their possession.

PUBLIC HEARING

3. Authorization to Execute a Long Term Revocable License with New Cingular Wireless PCS to place Cell Towers at 1725/1731 K Street, Sacramento, CA

WORKSHOP/INFORMATIONAL ITEMS

4. Multi-Family Lending Guidelines Overview

5. Report on Cap and Trade Program

6. Marshall Hotel update

EXECUTIVE DIRECTOR REPORT

COMMISSION CHAIR REPORT

ITEMS AND QUESTIONS OF COMMISSION MEMBERS

ADJOURNMENT

Staff reports are available for public review on the Agency's website www.shra.org and include all attachments and exhibits. Hard copies are available at the Agency Clerk's office (801 12th Street) for 10 cents per page. A copy of materials for this agenda will be available at the meeting for public review. **Assistance for the Disabled**: Meeting facilities are accessible to persons with disabilities. If you require special assistance to participate in the meeting, notify the Agency Clerk at (916) 440-1363 at least 48 hours prior to the meeting.

MINUTES

Sacramento Housing and Redevelopment Commission (SHRC)
Regular Meeting
April 16, 2014

Meeting noticed on April 11, 2014

ROLL CALL

The Sacramento Housing and Redevelopment Commission meeting was called to order at 6:00 p.m. by Vice Chair Jeanne LeDuc. A quorum of members was present.

MEMBERS PRESENT: Chan, Creswell, Griffin, Le Duc, Macedo, Morgan, Morton, Raab,

MEMBERS ABSENT: Alcalay, Johnson Stivers,

STAFF PRESENT: Cindy Parker, LaShelle Dozier, Tia Patterson, Jim Shields, Don Cavier, MaryLiz Paulson, Sarah Thomas, Angie Cantrill

APPROVAL OF AGENDA Agenda approved as submitted.

APPROVAL OF MINUTES

1. The minutes for April 2, 2014 were approved.

CITIZENS COMMENTS

2. none

PUBLIC HEARING

3. Approval of Public Housing Lease for Medicaid Waiver Program

MaryLiz Paulson presented the item.

Public comment in support of program: Angie Cantrill and Sandra Strong

The Commission recommended approval of the staff recommendation for the item listed above. The votes were as follows

AYES: Chan, Creswell, Griffin, LeDuc, Macedo, Morgan, Morton, Raab

NOES: none

ABSTAIN: none

ABSENT: Alcalay, Johnson, Stivers

BUSINESS ITEMS

4. Report Back on City and County Biannual Residual Distributions from Redevelopment Property Tax Trust Fund "Boomerang funds: - discussion and possible action

LaShelle Dozier presented the item.

Motion was made to present approved resolution to the City Council and Board of Supervisors.

Moved by Commissioner Morgan and seconded by Commissioner Griffin.

AYES: Chan, Creswell, Griffin, LeDuc, Macedo, Morgan, Morton, Raab

NOES: none

ABSTAIN: none

ABSENT: Alcalay, Johnson, Stivers

EXECUTIVE DIRECTOR REPORT

LaShelle Dozier announced the following:

- Next meeting would be May 7th
- Attended groundbreakings for streetscapes at Franklin Boulevard and Old Florin Town
- May 9th at 11am – Opening of Louise Perez Community Center
- Talked about the announcement by Senator Steinberg of a long term investment strategy for Cap and Trade Revenue

COMMISSION CHAIR REPORT

Vice Chair LeDuc announced the following

- Thanked Commissioners Stivers and Creswell for their leadership on the boomerang fund issue.
- Requested that Cap and Trade discussion be placed on next commission agenda

ITEMS AND QUESTIONS OF COMMISSION MEMBERS

None

ADJOURNMENT

As there was no further business to be conducted, Vice Chair LeDuc adjourned the meeting at 7:00 p.m.

_____
AGENCY CLERK

May 2, 2014

Sacramento Housing and
Redevelopment Commission
Sacramento, CA

Honorable Members in Session:

SUBJECT:

Authorization to Execute a Long Term Revocable Permit with New Cingular Wireless PCS to place Cell Towers at 1725/31 K Street, Sacramento CA

SUMMARY

The attached report is submitted to you for review prior to consideration by the City of Sacramento.

RECOMMENDATION

Staff recommends approval of the recommendations outlined in this report.

Respectfully submitted,

LA SHELLE DOZIER
Executive Director

Attachment

REPORT TO HOUSING AUTHORITY
City of Sacramento
915 I Street, Sacramento, CA 95814-2671
www.CityofSacramento.org

Consent
May 13, 2014

Honorable Mayor and Members of the City Council

Title: Authorization to Execute a Long Term Revocable Permit with New Cingular Wireless PCS to place Cell Towers at 1725/1731 K Street, Sacramento, CA

Location/Council District: 1725/31 K Street; Council District Four

Issue: Currently, the Executive Director is authorized to execute easement agreements with public agencies and utility companies for Housing Authority properties. This report authorizes the Executive Director to execute a non-exclusive revocable permit with New Cingular Wireless PCS, a for-profit mobile voice and data communication service provider, for the property at 1725/31 K Street.

Recommendation: Adopt a **Housing Authority Resolution**: 1) authorizing the Executive Director to execute a non-exclusive Agreement for Issuance of Revocable Permit with New Cingular Wireless PCS (as set forth in Exhibit A) for the installation and servicing of equipment necessary for the provision of mobile voice and data communication services for a term not to exceed five (5) years with the option to extend for four (4) renewable terms of five (5) years each for a possible total of twenty five (25) years at the1725/1731 K Street, Sacramento, CA property; 2) authorizing the Executive Director to amend the Housing Authority budget to receive and allocate the first year revenue from the revocable permit of $21,600 and the three percent (3%) annual increase over the most recent 12 months' payment level received in consideration of the Agreement to 1725/1731 K Street, Sacramento, California for which this Agreement generated revenue. The funds shall be expended from an approved or amended property-level budget, approved by the Executive Director or her designee; and 3) and making other related findings.

Contact: MaryLiz Paulson, Assistant Director of Housing, 449-6302; Cecette Hawkins, Management Analyst, 916-449-6218

Presenters: Not Applicable

Department: Sacramento Housing and Redevelopment Agency

New Cingular Wireless PCS Permit for 1725/1731 K Street

Description/Analysis

Issue: In 1991 the City Housing Authority adopted resolution # 91-036 authorizing the Executive Director to grant easements to public agencies and utility companies. Significant advances in technology over the past 22 years have made private enterprise demand for easements more valuable. New Cingular Wireless PCS is requesting an Agreement for five (5) years with the option to extend for four (4) renewable terms of five (5) years each for a total of twenty five (25) years for access to 1725/1731 K Street, Sacramento, CA. The Agreement provides assurance to the mobile voice and data communication provider that they will have rightful access to the property for equipment installation and routine maintenance services. It also provides for minimal disturbance to our residents and staff when access is needed. New Cingular Wireless PCS is willing to compensate the property owner for this access. Revenues generated under this agreement will be used for improvements to living conditions for residents at 1725/1731 K Street, Sacramento, CA which generated the revenue.

Policy Considerations: The New Cingular Wireless PCS Service Agreement is non-exclusive, giving the Housing Authority flexibility to receive offers from other vendors requiring property permits and possibly providing other opportunities for revenue. In addition, California law requires a Public Hearing to be held prior to executing a revocable permit for use of public property. A Public Hearing was held before the Sacramento Housing and Redevelopment Commission on May 7, 2014.

Environmental Considerations:

California Environmental Quality Act (CEQA): The recommended action is categorically exempt from CEQA review pursuant to CEQA Guidelines Section 15301 (a) and (b) as minor alterations to the interior and exterior of buildings for fiber optic, other cabling, and supporting equipment in existing facilities.

Sustainability Considerations: Not Applicable

Other: The National Environmental Policy Act (NEPA) does not apply.

Commission Action: It is anticipated that, at its meeting of May 7, 2014, the Sacramento Housing and Redevelopment Commission will approve the staff recommendation for this item. Staff will notify the Board in the event this does not occur.

Rationale for Recommendation: By authorizing the Executive Director to execute the Agreement with New Cingular Wireless PCS, the Housing Authority incurs minimal inconvenience and gains resources it would not have otherwise.

New Cingular Wireless PCS Permit for 1725/1731 K Street

Financial Considerations: New Cingular Wireless PCS's first year annual rent is $21,600, and a three percent (3%) annual increase over the most recent 12 months' rent level. The Agreement will be a five (5) year term with the option to extend for four (4) renewable terms of five (5) years each for a total of twenty five (25) years at 1725/1731 K Street, Sacramento, CA.

M/WBE and Section 3 Considerations: The activities recommended in this staff report do not involve federal funding, therefore, there are no M/WBE or Section 3 requirements.

Respectfully Submitted by: _____
LA SHELLE DOZIER
Executive Director

Table of Contents

RESOLUTION NO. 2014 -

Adopted by the Housing Authority of the City of Sacramento

on date of

AUTHORIZATION TO EXECUTE A LONG TERM REVOCABLE PERMIT WITH NEW CINGULAR WIRELESS PCS TO PLACE CELL TOWERS AT 1731/1725 K STREET, SACRAMENTO, CA; ENIVRONMENTAL FINDINGS

BACKGROUND

A. The Housing Authority of the City of Sacramento adopted Resolution HA91-036 in 1991 to authorize the Executive Director to grant easements to Utility Companies and Public Agencies.

B. Over the past 22 years significant advancements in technology and changes in the legal environment have given private sector businesses incentive to pay for use of roof space or other easements to place and service their equipment.

C. New Cingular Wireless PCS, a for-profit mobile voice and data communication service provider, has initiated discussions regarding a non-exclusive five (5) year revocable permit agreement, with the option to extend for four (4) renewable terms of five (5) years each for a possible total of twenty five (25) years.

D. The Executive Director's delegated authority only applies to public utility companies and public agencies. Authorization is needed from the Board to execute the New Cingular Wireless PCS Agreement for Issuance of Revocable Permit.

E. A duly noticed Public Hearing was held on May 7, 2014 at the Sacramento Housing and Redevelopment Agency Commission meeting to solicit public input.

F. The recommended action to approve and grant a permit to place equipment in the elevator penthouse with antennas on the roof of the elevator penthouse on an existing facility located at 1725/1731 K Street is categorically exempt from California Environment Quality Act (CEQA) review pursuant to CEQA Guidelines Section 15303 (a) and (b) as minor alterations to the interior and exterior of buildings roof and Section 15303(d) and (e) for the utility extension and the construction of small accessory structure. The National Environmental Policy Act (NEPA) does not apply.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE HOUSING AUTHORITY OF THE CITY OF SACRAMENTO RESOLVES AS FOLLOWS:

Section 1. The above declarations set forth in the above recitals including the environmental findings, are found to be true and correct.

Section 2. The Executive Director is authorized to execute a non-exclusive Agreement for Issuance of Revocable Permit with New Cingular Wireless PCS (as set forth in Exhibit A) for the installation and servicing of equipment necessary for the provision of mobile voice and data communication services for a term not to exceed five (5) years with the option to extend for four (4) renewable terms of five (5) years each for a possible total of twenty five (25) years at the1725/1731 K Street, Sacramento, CA property.

Section 3. The Executive Director is authorized to amend the Housing Authority budget to receive and allocate the first year revenue from the revocable permit of $21,600 and the three percent annual increase over the most recent 12 months' payment level received in consideration of the Agreement to 1725/1731 K Street, Sacramento, California for which this Agreement generated revenue. The funds shall be expended from an approved or amended property-level budget, approved by the Executive Director or her designee.

Table of Contents:

Exhibit A

AGREEMENT FOR ISSUANCE OF REVOCABLE PERMIT
(UTILITIES)

THIS AGREEMENT FOR ISSUANCE OF REVOCABLE PERMIT ("Agreement"), dated _____, 2014, is made by and between New Cingular Wireless PCS, LLC, a Delaware limited liability company ("Permittee") and the HOUSING AUTHORITY OF THE CITY OF SACRAMENTO ("Housing Authority") with respect to the following facts:

RECITALS

WHEREAS, Housing Authority owns and maintains certain real property currently located at 1731 K Street, in the City of Sacramento, County of Sacramento, State of California 95811 [Assessor's Parcel Number 006-0125-014], commonly known as "1725 K Street" and which is more fully described in Exhibit "A" hereof, (the "Property"); and

WHEREAS, Permittee is a private entity which provides mobile wireless communications services through the use of WTF (as defined in Section 1 below) located within the City of Sacramento and elsewhere; and

WHEREAS, Permittee desires to locate WTF in and on the Property owned by Housing Authority; and

WHEREAS, Housing Authority is willing to allow Permittee to do so on the basis of a revocable permit, and upon the terms and conditions set forth in this Agreement;

NOW, THEREFORE, the parties agree as follows:

1. ISSUANCE OF REVOCABLE PERMIT

Upon the terms and conditions set forth in this Agreement, Housing Authority hereby agrees to issue to Permittee a non-exclusive revocable permit ("Revocable Permit") for installation and maintenance of a wireless telecommunications facility consisting of communications fixtures and related equipment, cables, accessories and improvements, which may include a suitable support structure, associated antennas, I beams, equipment shelters or cabinets and fencing and any other items necessary to the successful and secure use of the Premises ("WTF"), with associated structures and equipment. Additionally, at all times throughout the Term (as defined in Section 2, below) of this Agreement and at no additional charge to Permittee, Permittee and its employees, agents, and subcontractors, will have twenty-four (24) hours per day, seven (7) days per week pedestrian and vehicular access ("Access") to and over the Property, from an open and improved public road to the location of the WTF on the Property specified in Exhibit "B" hereof (the "Premises") for the installation, maintenance and operation of the structures and equipment and any utilities serving the

Premises. Housing Authority agrees to provide to Permittee such codes, keys, and other instruments necessary for such access at no additional cost to Permittee. This Agreement and all of its terms and conditions shall remain in effect during the entire Term of the Revocable Permit. This Agreement is expressly agreed to be non-exclusive, and, subject to the covenants in Paragraph 4 below, Housing Authority shall be free to enter into agreements or permits with other parties, including related or non-related providers, for revocable permits or similar arrangements. Housing Authority and Permittee agree that the Revocable Permit will not be issued until and unless Permittee has obtained all entitlements required by Paragraph 5 herein, Permittee has paid such fees to the Housing Authority as are required by Paragraph 3 herein, and Permittee is in compliance with Sacramento City Code Section 3.76.050.

2. TERM OF REVOCABLE PERMIT

A. Initial Term

The initial term ("Initial Term") of the Revocable Permit issued pursuant to this Agreement shall be for a period of five (5) years, commencing on the Effective Date of this Agreement as defined in Paragraph 10 herein.

B. Renewal Term

Upon expiration of the Initial Term, Permittee shall have the right to renew this Agreement and the Revocable Permit issued pursuant to this Agreement upon the same terms and conditions for four (4) additional five (5) year terms ("Renewal Term") except as to the fee to be paid by Permittee to Housing Authority during the Renewal Term, which fee shall be determined pursuant to subparagraph 3(d) of this Agreement. Permittee and Housing Authority agree that the Renewal Term shall occur automatically and without the need for Permittee to provide Housing Authority with written notice of its intent to exercise its right to the Renewal Term. Should Permittee choose not to exercise its right to the Renewal Term, Permittee shall provide written notice to Housing Authority no less than thirty (30) days prior to the termination of the Initial Term or then existing Renewal Term. Permittee shall have no other right to extend the term beyond the Renewal Term. The Initial Term and Renewal Term are collectively referred-to as the "Term".

C. Termination & Revocation

(1) Discretionary Termination. Each party shall have the right to terminate this Agreement by giving the other party not less than eighteen (18) months advance notice in writing to terminate, which notice shall state the exact date of termination, provided that the Housing Authority may not institute discretionary termination for the first five (5) years unless revocation is required under Subparagraph C(2) and C(3). Termination of this Agreement pursuant to this subparagraph 2(c)(1) shall constitute revocation of the Revocable Permit issued pursuant to this Agreement.

Any portion of the Annual Fee paid in advance pursuant to paragraph 3 of this Agreement shall be prorated to the date of termination.

Housing Authority shall immediately provide Permittee with written notice in the event that Housing Authority contemplates any construction, rehabilitation or other work on the Property that may in any way affect the WTF or the Premises. In the event Housing Authority requires the Premises during the Term due to required construction, rehabilitation or other work of improvement on the Premises in furtherance of Housing Authority's primary purpose, Permitee shall be given the right to temporarily relocate its WTF on the Property, subject to the following conditions: (a) Permittee reasonably consents to the new location, (b) Permitee will be able, with reasonable efforts, to maintain or obtain all necessary licenses, permits or approvals, (c) no material interference or degradation to Permitee's use of the Premises will result, (d) Permitee shall be able to locate a temporary communications facility on the Property, (e) Housing Authority shall only have the right to require relocation once during the Term and not until the expiration of the Initial Term, (f) such relocation shall be at Housing Authority's sole cost and expense, (g) Housing Authority shall provide Permittee with as much advance written notice as reasonably possible prior to requiring that Permittee temporarily relocate. Upon relocation of all or a portion of Permittee's Equipment to the alternate site, all references in this Agreement to the Premises shall be deemed to include the alternate site, and this Agreement shall be amended to include an Exhibit "B-1" showing the relocation Premises on the Property.

(2) Termination for Cause. Each party shall have the right to terminate this Agreement immediately for breach by the other party ("Breaching Party") of any material term or condition of this Agreement, by giving the Breaching Party written notice of default specifying the exact cause or causes for the default and specifying that the breaching party shall have thirty (30) days to cure the default; provided, however, that no default will be deemed to exist if the Breaching Party has commenced to cure such default within such thirty (30) day period and thereafter diligently prosecutes such cure to completion. Except with respect to Permittee's obligation to pay any sums payable by Permittee hereunder, the time for performance by Housing Authority or Permittee of any term, provision, or covenant of this Agreement shall be deemed extended by time lost due to delays resulting from acts of God, strikes, civil riots, floods, material or labor restrictions by governmental authority, and any other cause not within the control of Housing Authority or Permittee, as the case may be. The notice shall also state that in the event the default is not so cured, this Agreement is terminated effective retroactively to the earlier of date of mailing of the notice as specified herein, or the date of personal delivery of the notice to an employee or agent of the Breaching Party at the location specified in this Agreement. Termination of this Agreement pursuant to this subparagraph 2(c)(2) shall constitute revocation of the Revocable Permit issued pursuant to this Agreement.

(3) Homeland Security. The Housing Authority may terminate the Revocable Permit at any time if it is determined by the Housing Authority in its sole discretion that national or local security emergency requires the revocation of the Revocable Permit. If such determination is made by the Housing Authority the Permittee will be required to remove the structures and equipment as indicated in this Agreement. Access to structures and equipment may be denied by the Housing Authority pending arrangements for removal.

(4) Removal of Structures and Equipment on Termination. Unless otherwise directed by Housing Authority in writing (and subject to the provisions of subparagraph 4(g) herein), within thirty (30) days of the termination of this Agreement and at Permittee's sole cost and expense, Permittee shall remove all structures and equipment from the Premises, and shall restore the Premises to their original condition prior to the issuance of the Revocable Permit normal wear and tear excepted. In the event that the Premises or any portion thereof are damaged by Permittee in the process of removal, such damage shall be repaired forthwith by Permittee at Permittee's sole cost and expense. Upon termination of this Agreement, but only to the extent that the termination results from an uncured default by Permittee under this Agreement, Housing Authority shall have the option, in its sole discretion, of retaining those structures (including, without limitation, tower(s), monopole(s), buildings), vault(s), equipment shed(s), and pad(s), but excluding antenna(s)) installed by Permittee on the Premises, which structures shall then become the property of the Housing Authority in "as is, whereis" condition, and otherwise without warranty of any kind either expressly or by implication. Housing Authority shall exercise its option of retaining such structures by providing written notice to Permittee prior to the termination of this Agreement.

(5) Return of Removal Bond. In the event Permittee removes those structures and equipment from the Premises as required by the Housing Authority, and restores the Premises to the condition existing immediately prior to the issuance of the Revocable Permit as required by this Agreement, Housing Authority shall release the Removal Bond. In the event Permittee does not remove any structures or equipment from the Premises as required by this Agreement, or does not restore the Premises to the condition existing immediately prior to the issuance of the Revocable Permit as required by this Agreement, Housing Authority may use the Removal Bond for such purposes.

(6) [Intentionally Omitted].

3. FEES

A. Annual Fee. For the first year of the Initial Term of this Agreement, Permittee shall pay to the Housing Authority an annual fee of Twenty One Thousand Six Hundred Dollars ($21,600) ("Annual Fee").

B. Removal Bond. Permittee shall provide to Housing Authority a bond, letter of credit, or other security instrument, of a type and in such an amount reasonably satisfactory to the Housing Authority, but in no event to exceed Thirty Thousand and No/100 Dollars ($30,000.00), that is adequate to pay for the removal of the WTF installed on the Premises by Permittee ("Removal Bond"). Permittee shall keep the Removal Bond in effect for the duration of this Agreement, including any extensions or renewals hereof. Permittee may meet its Removal Bond obligations by providing to the Housing Authority a monetary payment adequate to pay for the removal of the WTF installed on the Premises by Permittee. Upon a Surety's written notice to Housing Authority of cancellation of a Removal Bond, Permittee must submit written notice and proof of a replacement Removal Bond within thirty (30) days.

C. Annual Adjustment. The Annual Fee shall be adjusted annually on each annual anniversary of the Effective Date as referenced in Paragraph 10 of this Agreement according to the Consumer Price Index (CPI) for all Urban Consumers: San Francisco, Oakland, San Jose index, not to exceed three percent (3%) annually.

D. Renewal Period.

(1) As the Renewal Term shall occur automatically, as provided in subparagraph 2(b) herein, unless otherwise terminated by either party as provided in Subsection 2(C) the Annual Fee during the Renewal Term shall be "Fair Market Rate" as of the first day following the termination of the Initial Term or any applicable Renewal Term ("Renewal Term Effective Date"), unless the Agreement is otherwise terminated pursuant to the terms and conditions expressly set forth herein.

(2) As used in this Agreement, "Fair Market Rate" shall be deemed to mean the fee that would typically be paid by a permittee under a similar permit for a City of Sacramento site of a similar type, design, and quality in the same or similar geographic area (including park sites) in which the Premises are situated under market conditions existing as of the Renewal Term Effective Date.

(3) [Intentionally Omitted].

(4) If Permittee and Housing Authority cannot agree on the Fair Market Rate within thirty (30) days after the Renewal Term Effective Date, the amount

payable during the Renewal Term of the Agreement shall continue to be adjusted according to the provisions of subparagraph 3(c) herein.

E. Manner of Payment of Fees. Permittee shall pay the full first year Annual Fee in advance, with payment due and payable within forty-five (45) days following the date the Housing Authority issues the Revocable Permit to Permittee. Payment of the full Annual Fee for subsequent years shall be due and payable on the anniversary date of the Effective Date as described in paragraph 10 herein. The Removal Bond shall be provided to the Housing Authority within forty-five (45) days following the date the Housing Authority issues the Revocable Permit to Permittee. All fees and the Removal Bond shall be delivered to Housing Authority at the address specified in Paragraph 12 herein for the giving of notices.

4. USE OF THE PREMISES

A. Nature of the Use Allowed. Permittee shall use the Premises strictly in accordance with the terms of this Agreement and the Revocable Permit, solely for the purpose of installation and maintenance of a WTF, including, without limitation, related antenna equipment and fixtures. Permittee shall have reasonable rights of ingress and egress to the Premises to conduct, at the sole expense of Permittee, surveys, structural strength analyses, subsurface boring tests, and other similar activities with the written consent of Housing Authority, which consent shall not be unreasonably withheld, conditioned or delayed. Permittee may, at its sole expense, make such improvements on the Premises as it deems necessary from time to time for the operation of a transmitting and receiving site for wireless voice and data communications; provided, however, that any alteration other than replacing equipment with equipment of like kind will require written approval of the Housing Authority, which approval shall not be unreasonably withheld, conditioned or delayed. In no event shall Permittee be required to obtain Housing Authority's approval for any changes, alterations or improvements within the footprint of the Premises, or for any other changes, alterations or improvements which do not materially and adversely affect the aesthetic appearance of the WTF initially approved by Housing Authority hereunder, when viewed by the general public with the naked eye from areas which are readily accessible to the general public at street level and in the immediate vicinity of the Premises. For those alterations or improvements requiring Housing Authority's reasonable approval, in no event shall Housing Authority condition any such approval on any increase in the Annual Fee or any other direct or indirect costs or fees to Permittee under this Agreement.

B. Non-interference with Housing Authority Use. Permittee shall use the Premises in a manner which is at all times subordinate to and consonant with Housing Authority's use of the Property and the Premises. Notwithstanding the foregoing, Housing Authority acknowledge and agree that Permittee's use of the Premises in accordance with entitlements issued to Permittee shall be deemed to be a use which is consonant with Housing Authority's use of the Property and the Premises.

Permittee shall not have access to nor disturb the property or its residents after 9:00pm and before 7:00am, provided, however, that notwithstanding the foregoing, Permittee shall have twenty-four (24) hours a day, seven (7) days a week for unscheduled repairs and other emergency purposes (which shall be conclusively deemed to include any failure of the WTF). In the event Permittee needs access after between 9:00PM and 7:00AM, Permittee will endeavor to give Housing Authority prior notice, if feasible, by contacting Housing Authority at (916)449-6301, and shall otherwise comply with any and all emergency access rules and regulations adopted and applied by Housing Authority during the Term, provided that any such rules and regulations are adopted and applied in a reasonable, uniform and non-discriminatory manner.

C. Non-interference with Housing Authority Communications and Other Uses. Permittee agrees and understands that Housing Authority maintains a communications system, including associated installations and equipment, which provides routine and emergency communications with its officers and employees, as well as officers and employees of other jurisdictions, and that it is imperative that there be no interference with that system by virtue of Permittee's use of the Premises. At all times during the Term, Permittee will only operate its WTF within (i) effective radiated power levels and (ii) frequencies which Permittee is authorized to utilize by the Federal Communications Commission ("FCC"). Permittee agrees to resolve technical interference problems with other equipment located at the Premises as of the Effective Date. Permittee agrees to resolve any such technical interference problems associated with any future equipment that Permittee adds or attaches to the Premises during the Term of this Agreement. Permittee agrees to resolve technical interference problems with other equipment located at the Premises as of the Effective Date. Permittee agrees to resolve any such technical interference problems associated with any future equipment that Permittee adds or attaches to the Premises during the term of this Agreement.

D. Nuisance. Permittee shall at all times conduct its use of the Premises in such a manner that it shall not constitute a public or private nuisance.

E. Damage to Housing Authority Property. Permittee shall at all times conduct its use of the Premises in such a manner so as not to damage Housing Authority property. Permittee shall be liable to Housing Authority for any damage to any Housing Authority property, including but not limited to, the roof, the building, trees, sprinklers, lawn, other landscaping, fixtures, equipment, structures, vehicles, or other Housing Authority property, arising out of or in any way directly related to or resulting from the installation, maintenance or operation of Permittee's structures and equipment on the Premises, or any action or activity of Permittee, or its employees, agents, or contractors.

F. Non-interference with Permittee's Use. Housing Authority agrees that, subject to all other provisions of this Agreement, and subject to Housing Authority's right to grant other or additional permits, Permittee is entitled to reasonable access to

the Premises at all times throughout the Term. If Housing Authority desires to permit another communications provider to install equipment on the Premises with the potential to cause interference problems with Permittee's then-existing equipment, then prior to entering into an agreement with such proposed communications provider, Housing Authority will give written notice to Permittee of such proposed installation. Such notice shall include technical information from the proposed provider which is sufficient to determine whether the proposed use will interfere with Permittee's operation of the WTF. Permittee agrees to cooperate with the proposed provider to resolve any such interference problem(s). Housing Authority agrees that any future agreement which permits the installation of communications equipment on the Premises shall be conditioned upon not interfering with Permittee's then-existing operation of the WTF. Permittee shall not be required to modify Permittee's then-existing WTF to prevent interference with any new communications use of the Premises so long as Permittee operates the WTF within its assigned frequencies and in compliance with all applicable FCC Rules and Regulations.

G. Co-location. Permittee will use reasonable efforts to make its WTF available for co-location provided that future co-locators enter into reasonable co-location agreements with Permittee including, but not limited to customary provisions for payment to Permittee of a reasonable portion of Permittee's installation costs, on-going maintenance and repair costs and rent for the use of the WTF. Permittee acknowledges and agrees that the Housing Authority may allow other providers of communications facilities to locate on the same Premises and/or on the same WTF as Permittee, including such WTF as may be constructed by Permittee. In the event any other facilities are co-located on WTF constructed and/or used by Permittee, Permittee agrees not to dismantle or otherwise alter the WTF being used by Permittee for as long as the WTF are being used by any other permittee(s). At the expiration of all uses on the WTF used by Permittee, Permittee agrees, at Housing Authority's option, either to remove the WTF used by Permittee or leave the WTF used by Permittee in its then current condition.

H. Reservation for Public Use. Subject to the commitments which Permittee may have made or is in the process of making at the time of a Housing Authority request, Permittee shall use reasonable efforts to provide a reasonable allowance of space on its WTF for public communications use by public agencies in such location(s) and in such manner(s) as may be reasonably requested by Housing Authority. Such space shall be provided at no cost if used by Housing Authority.

I. Existing Radio Frequency Users. Where there are existing radio frequency user(s) on the Property, Housing Authority will provide Permittee, upon execution of this Agreement, with a list of all existing radio frequency user(s) on the Property to allow Permittee to evaluate the potential for interference. Permittee warrants that its use of the Premises will not interfere with existing radio frequency user(s) on the Property so disclosed by Housing Authority, as long as the existing radio frequency user(s) operate and continue to operate within their respective frequencies

and in accordance with all applicable laws and regulations.

J. Non-interference with Permittee Communications and Other Uses. Housing Authority will not use, nor will Housing Authority permit its employees, tenants, licensees, invitees, agents or independent contractors to use, any portion of the Property in any way which interferes with the structures or equipment, the operations of Permittee or the rights of Permittee under this Agreement. Housing Authority will cause such interference to cease within twenty-four (24) hours after receipt of notice of interference from Permittee. In the event any such interference does not cease within the aforementioned cure period, Housing Authority shall cease all operations which are suspected of causing interference (except for intermittent testing to determine the cause of such interference) until the interference has been corrected.

K. Interference. For the purposes of this Agreement, "interference" may include, but is not limited to, any use on the Property that causes electronic or physical obstruction with, or degradation of, the communications signals from the structures or equipment.

5. ENTITLEMENTS

Prior to the issuance of the Revocable Permit, Permittee shall at its sole and exclusive expense, obtain all necessary local land use entitlements, building permits, and other Housing Authority, County, State or Federal permits as may be necessary to operate the WTF contemplated by Permittee. Housing Authority authorizes Permittee to prepare, execute and file all required applications to obtain all necessary local land use entitlements, building permits, and other City, County, State or Federal permits for Permittee's permitted use under this Agreement and agrees to reasonably assist Permittee with such applications and with obtaining and maintaining all necessary local land use entitlements, building permits, and other City, County, State or Federal permits. These Permits shall not be construed as a waiver of any requirement, fee, or procedure required to obtain any such entitlement or permit. By accepting the Revocable Permit, Permittee warrants and represents that it has obtained all necessary local land use entitlements, building permits, and other City, County, State or Federal permits to operate the WTF contemplated by Permittee.

6. CONSTRUCTION REQUIREMENTS

A. Location of Structures and Equipment. The initial location of the structures and equipment to be installed by Permittee shall be in the sole and exclusive discretion of the Housing Authority, as detailed on Exhibit "B". In the event Housing Authority thereafter determines that structures or equipment need to be moved to accommodate Housing Authority's paramount use of the Property, which use also reasonably requires the relocation of the structures or equipment, Housing Authority shall meet and confer with Permittee to discuss the necessary relocation of structures or equipment; provided, however, that the determination that said structures and equipment need to be moved shall be in the sole and exclusive discretion of the Housing Authority. The ultimate location of Permittee's structures and equipment shall

be mutually agreeable to both parties; provided, however, that in no event shall Permittee be required to relocate its antennas to a different place on a tower, or to pay for the relocation of its base station equipment, in order to accommodate another telecommunications provider.

B. Housing Authority Approval of Plans, Specifications and Design. Permittee shall submit to Housing Authority prior to commencing any construction on the Premises complete plans and specifications, including detailed site plans, for the structures and equipment to be installed on the Premises. Housing Authority shall have absolute discretion to specify design requirements, aesthetic requirements, and specifications excepting those technical requirements relating to operation of the WTF. The plans and specifications and site plan shall also be part of Exhibit "B" hereof. Permittee shall not commence any construction on the Premises until and unless the Housing Authority has approved all plans and specifications for that construction. Any damage to Housing Authority facilities during construction shall be promptly repaired by Permittee. Permittee shall complete construction and installation of structures and equipment within ninety (90) days of issuance of the Revocable Permit.

C. Seismic Safety. Because Permittee's equipment will, in part, be located above ground level in areas where falling heavy equipment would likely result in personal injury or death, and property damage, Permittee shall employ the professional services of qualified engineers for the purpose of investigating the seismic risks at the Premises related to attaching Permittee's equipment to the Premises, and for recommendations concerning measures required to strengthen the methods and equipment used to attach the Permittee's equipment to the Premises. Permittee shall consult with Housing Authority prior to selecting an engineer, and shall furnish to Housing Authority a copy of all reports and recommendations of the engineer, together with any supporting data, calculations or studies upon which the engineer has based conclusions and/or findings. Housing Authority shall have the right to approve or disapprove the report and recommendations prior to construction by Permittee. No such construction shall commence prior to delivery to Housing Authority of a report and recommendations approved by Housing Authority.

D. Contact Requirement. Permittee shall inform Housing Authority in writing in the manner designated in paragraph 12 herein at least twenty-four (24) hours prior to any intended excavation on or around the Premises.

E. Temporary Relocation of Structures and Equipment. In the event that construction or renovation of Housing Authority property requires removal of Permittee's structures and/or equipment, the Housing Authority may agree to temporary relocation in lieu of removal. At the conclusion of the construction or renovation, the Permittee's structures and/or equipment shall be returned to its previous location within a reasonable amount of time unless the parties agree to a different location in writing. All costs related to temporary relocation shall be paid by Permittee.

7. MAINTENANCE & REPAIR

Permittee shall at all times during the term of this Agreement maintain its structures, equipment, and required landscaping on the Premises, in good and safe operating order and condition, reasonable wear, tear and damage from the elements excepted.

8. INSURANCE; LIABILITY; INDEMNIFICATION

A. Insurance Requirements. During the entire term of this Agreement, Permittee shall maintain the following noted insurance:

(1) Minimum Scope of Insurance.

Coverage shall be at least as broad as:

a. Insurance Services Office Form No. CG 001 (Broad Commercial General Liability);

b. Insurance Services Office Form Number CA 0001 (Automobile Liability, Code 1 "any auto");

c. Workers' Compensation as required by the Labor Code of the State of California, and Employers' Liability insurance.

B. Limits of Insurance. Permittee shall maintain limits:

(1) Commercial General Liability: $1,000,000 combined single limit per occurrence and $2,000,000 in the aggregate for bodily injury, personal injury and property damage.

(2) Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

(3) Worker's Compensation and Employers' Liability: Workers' compensation limits as required by the Labor Code of the State of California and Employers' Liability limits of $1,000,000 per accident.

C. Self-Insured Retention. Any amounts that Permittee (rather than its insurance carrier) must pay directly to any third party as compensation for any insured loss or liability described as a self-insured retention must be declared to by Housing Authority.

D. Other Insurance Provisions. All policies are to contain, or be endorsed to contain, the following provisions:

(1) General Liability and Automobile Liability Coverages:

a. Housing Authority, its officials, employees and volunteers are to be covered as additional insured with respect to: liability arising out of activities performed by or on behalf of Permittee; products and completed operations of Permittee; premises owned, leased or used by Permittee; or automobiles owned, leased, hired or borrowed by Permittee. The coverage shall contain no special limitations on the scope of the protection except claims arising out of sole negligence of the additional insureds, afforded to Housing Authority, its officials, employees or volunteers, with respect to Permittee's operations of and on the Premises.

b. Permittee's required insurance coverage shall be primary insurance with respect to Housing Authority, its officials, employees and volunteers. Any insurance or self-insurance maintained by Housing Authority, its officials, employees or volunteers shall be excess of Permittee's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to Housing Authority, its officials, employees, or volunteers.

d. Coverage shall state that Permittee's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

(2) Permittee shall provide at least thirty (30) days prior written notice to Housing Authority of any cancelation or non renewal of any required coverage that is not replaced.

E. Acceptability of Insurers. Insurance is to be placed with insurers with a Bests' rating of no less than A minus:VII. Notwithstanding the forgoing, Permittee may, in its sole discretion, self insure any of the required insurance under the same terms as required by this Agreement. In the event Permitee elects to self-insure its obligation under this Agreement to include Housing Authority as an additional insured, the following conditions apply:

(i) Housing Authority shall promptly and no later than thirty (30) days after notice thereof provide Permittee with written notice of any claim, demand, lawsuit, or the like for which it seeks coverage pursuant to this Section and provide Permittee with copies of any demands, notices, summonses, or legal papers received in connection with such claim, demand, lawsuit, or the like;

(ii) Housing Authority shall not settle any such claim, demand, lawsuit, or the like without the prior written consent of Permittee; and

(iii) Housing Authority shall fully cooperate with Permittee in the defense of the claim, demand, lawsuit, or the like.

F. Verification of Coverage. Permittee shall furnish Housing Authority with certificates of insurance showing compliance with the above requirements and with copies of endorsements effecting all coverages required by this clause, or other similar documentation acceptable to the Housing Authority's Risk Manager within thirty (30) days of the Effective Date of this Agreement and shall attach documents hereto as Exhibit "C". The certificates, endorsements and/or other acceptable documents shall set forth a valid policy number for Housing Authority, and shall indicate the Issue Date, Effective Date and Expirations Date. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf.

G. Insurance. In any required commercial general liability policy covering personal injury or property damage, Housing Authority shall be included as an additional insured at no cost to Housing Authority. Additional insured status shall (i) be limited to bodily injury, property damage or personal and advertising injury caused, in whole or in part, by Permittee, its employees, agents or independent contractors; (ii) not extend to claims for punitive or exemplary damages arising out of the acts or omissions of additional insured, its employees, agents or independent contractors or where such coverage is prohibited by law or to claims arising out of the gross negligence of additional insured, its employees, agents or independent contractors; and, (iii) not exceed Permittee's indemnification obligation under this Agreement, if any.

H. No Housing Authority Liability for Loss or Damage to Permittee's Structures or Equipment. In the event that Permittee's structures or equipment installed on the Premises are damaged in any way, irrespective of the cause, excepting Housing Authority's willful misconduct or gross negligence, Housing Authority shall not be liable therefore and Permittee shall have no claim or right against Housing Authority for the costs of repair or replacement. This clause is intended as a complete release of liability in favor of Housing Authority, including without limitation all claims whether known or unknown, liquidated or unliquidated, contingent or absolute. Permittee has knowledge of and understands the terms and effect of California Civil Code Section 1542, and voluntarily waives the benefits of the terms of that statute. California Civil Code Section 1542, states in full:

> *A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR.*

Initials: HOUSING AUTHORITY: _____ PERMITTEE: _____

l. **Indemnification and Defense of Housing Authority.** Permittee shall indemnify, defend and hold harmless Housing Authority and its officers, employees and agents, from and against any and all claims, losses, liabilities, or damages, including payment of attorneys' fees, whether for personal injury or property damage, rising out of or in any way directly or indirectly related to or resulting from the installation, maintenance or operation of Permittee's structures and equipment on the Premises, or any action or activity of Permittee or its officers, employees, or agents relating to the performance of the terms of this Agreement or the Revocable Permit, irrespective of whether caused in part by Housing Authority, its officers, agents or employees, except where Housing Authority's actions constitute willful misconduct or Housing Authority's negligence.

9. TAXES

Permittee shall pay all personal property and other taxes assessed upon its structures and equipment, and any possessory interest or other property tax imposed on Permittee or Housing Authority by virtue of or relating to the installation, maintenance or operation of Permittee's structures and equipment on the Premises. In the event that the Sacramento County Assessor requires preparation and filing of any form of tax exemption application due to the existence on the Premises of Permittee's structures or equipment, Permittee shall pay the entire cost of preparation and processing of such applications, including reasonable attorneys' fees associated therewith. Pursuant to Section 107.6 of the California Revenue and Taxation Code, Housing Authority hereby informs Permittee that there may be a possessory interest tax levied by virtue of this Agreement.

10. EFFECTIVE DATE

The effective and operative date of this Agreement shall be upon approval of Housing Authority (the "Effective Date"). However, this Agreement shall be of no force or effect and shall be deemed terminated without liability to Housing Authority if Permittee fails to provide valid proof of insurance acceptable to Housing Authority's Risk Manager within the time period specified in subparagraph 8(f) herein. This Agreement further shall be of no force or effect and shall be deemed terminated without liability to Housing Authority if Permittee fails to obtain and maintain any entitlement, permit or approval required for the installation, operation, or maintenance of its structures or equipment after Permittee's receipt of written notice followed by a reasonable amount of time to acquire same, or if Permittee fails to obtain final Housing Authority approval of the installation, within one hundred eighty (180) days of the Effective Date.

11. ASSIGNMENT AND SUBLETTING

Permittee shall not have the right to transfer, assign or sublet its Revocable Permit, or any of its rights under this Agreement, in whole or in part, without the prior

written consent of Housing Authority, which consent shall not be unreasonably withheld, conditioned or delayed ; provided, however, that Permittee may assign or sublet without Housing Authority's prior written consent to its general partner or to any party controlling, controlled by or under common control with Permittee or to any party which acquires substantially all of the assets of Permittee in Sacramento County. Any other attempt to so assign or sublet without the prior reasonable consent of Housing Authority when such consent is required under this Section 11 shall be void. Housing Authority covenants to provide reasonable cooperation to Permittee to encourage co-location of other wireless service providers on the WTF installed by Permittee and to provide reasonable assistance with agreements for user of Housing Authority ground space in furtherance of such co-location opportunities. The prohibition on assignment and subletting pursuant to this Agreement specifically includes, without limitation, the subleasing, licensing, or granting of other rights to use all or any portion of the WTF (including towers) constructed or used by Permittee on the Premises. Any revenue obtained by Permittee from any such assignment or subletting authorized hereunder shall be the property of the Housing Authority.

12. NOTICES

Any notice that either party may or is required to give the other shall be in writing, and shall be either personally delivered or sent by regular U.S. Mail certified and postage prepaid. All notices must be in writing and are effective upon receipt or the refusal to accept receipt, to the addresses set forth below:

A. To: The Housing Authority of the City of Sacramento:

Housing Authority of the City of Sacramento
801 12th Street
Sacramento, CA 95814
Attn: Assistant Director of Housing
Telephone: 916-440-1334
Facsimile: 916-442-3718

B. To Permittee:

New Cingular Wireless PCS, LLC
Attn: Network Real Estate Administration
Re: Cell Site #: CNU1271
Search Ring Name: D Street & 11th Street
Cell Site Name: D Street & 11th Street (CA)
Fixed Asset #: 10150789
575 Morosgo Drive NE
Suite 13F, West Tower
Atlanta, GA 30324

With a copy to:

New Cingular Wireless PCS, LLC
Attn: AT&T Legal Dept - Network Operations
Re: Cell Site #: CNU1271
Search Ring Name: D Street & 11th Street
Cell Site Name: D Street & 11th Street (CA)
Fixed Asset #: 10150789
208 S. Akard Street
Dallas, TX 75202

13. NO AGENCY RELATIONSHIP

Nothing in this Agreement or the application thereof shall be construed to create any relationship between the parties other than that of a permitting agency and a permittee as to the premises. Permittee is not an agent of Housing Authority in performing the terms of this Agreement or in operating under this Agreement.

14. SEVERABILITY

Should any part, term, portion or provision of this Agreement or the application thereof to any person or circumstance be held to be illegal or in conflict with any law of the State of California, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms, portions or circumstances, shall be deemed severable and shall not be affected thereby, provided that said remaining portions or provisions can be construed in substance to constitute the full Agreement that the parties intended to enter into in the first instance.

15. AMENDMENTS

No alteration, modification, or variation of the terms of this Agreement shall be valid unless made in writing and executed by both parties.

16. WAIVER

Waiver by either party of any default, breach, or condition precedent shall not be construed as a waiver of any other default, breach, or condition precedent or any other right hereunder.

17. INTERPRETATION

The headings herein are for convenience only and shall not affect construction or interpretation of the Agreement. Construction and interpretation of this Agreement and the Revocable Permit issued pursuant to this Agreement shall be governed by California law. Venue for any action concerning this Agreement or the Revocable Permit issued pursuant to this Agreement shall be Sacramento County, California. This Agreement and the Revocable Permit issued pursuant to this Agreement shall at all times be subject to the provisions of Sacramento City Code Chapter 12.04, as such chapter may be amended from time to time.

18. UTILITIES

A. Acceptance of Utilities. Permittee agrees to inspect the Premises prior to the issuance of the Revocable Permit to verify the adequacy and availability of utilities to the Premises. By accepting the Revocable Permit, Permittee agrees and acknowledges that it is satisfied with utility service to the Premises, and that such utilities are adequate for the operations of Permittee on the Premises. Permittee shall pay for all utilities used by it at the Premises. Housing Authority agrees to cooperate with Permittee in Permittee's efforts to obtain utilities from any location provided by Housing Authority or the servicing utility. The cost of improving or constructing any utility service to the Premises for Permittee's use shall be the sole and exclusive expense of Permittee. Housing Authority acknowledges that Permittee provides a communication service which requires electrical power to operate and must operate twenty-four (24) hours per day, seven (7) days per week. If any interruption in power is for an extended period of time, in Permittee's reasonable determination, Housing Authority agrees to allow Permittee the right to bring in a temporary source of power for the duration of the interruption.

B. Relocation. Where utility relocation is required either because of the Permittee's construction or installation of its WTF, or by virtue of a subsequent Housing Authority issued permit(s), the entire utility relocation cost shall be payable by the permittee whose telecommunication facilities required the relocation. At no additional cost to Permittee or the applicable public utility, Housing Authority hereby grants to any utility company providing utility services to Permittee rights over the Property, from an open and improved public road to the Premises, and upon the Premises, for the purpose of constructing, operating and maintaining such lines, wires, circuits, and conduits, associated equipment cabinets and such appurtenances thereto, as such utility companies may from time to time require in order to provide such services to the Premises.

19. HAZARDOUS MATERIALS

A. Housing Authority represents that (i) it has no knowledge of any substance, chemical or waste (collectively, "Substance") on the Premises identified as hazardous, toxic or dangerous in any applicable federal, state, or local law or regulation. Permittee shall not introduce or use any such Substance on the Premises in violation of any applicable law, the Property has never been subject to any contamination or hazardous conditions resulting in any environmental investigation, inquiry or remediation. Housing Authority and Permittee agree that each will be responsible for compliance with any and all applicable governmental laws, rules, statutes, regulations, codes, ordinances, or principles of common law regulating or imposing standards of liability or standards of conduct with regard to protection of the environment or worker

health and safety, as may now or at any time hereafter be in effect, to the extent such apply to that party's activity conducted in or on the Property.

B. Housing Authority and Permittee agree to hold harmless and indemnify the other from, and to assume all duties, responsibilities and liabilities at the sole cost and expense of the indemnifying party for, payment of penalties, sanctions, forfeitures, losses, costs or damages, and for responding to any action, notice, claim, order, summons, citation, directive, litigation, investigation or proceeding ("**Claims**"), to the extent arising from that party's breach of its obligations or representations under Section 19(a). Housing Authority agrees to hold harmless and indemnify Permittee from, and to assume all duties, responsibilities and liabilities at the sole cost and expense of Housing Authority for, payment of penalties, sanctions, forfeitures, losses, costs or damages, and for responding to any Claims, to the extent arising from subsurface or other contamination of the Property with hazardous substances prior to the effective date of this Agreement or from such contamination caused by the acts or omissions of Housing Authority during the Term. Permittee agrees to hold harmless and indemnify Housing Authority from, and to assume all duties, responsibilities and liabilities at the sole cost and expense of Permittee for, payment of penalties, sanctions, forfeitures, losses, costs or damages, and for responding to any Claims, to the extent arising from hazardous substances brought onto the Property by Permittee.

C. The indemnifications of this Section 19 specifically include reasonable costs, expenses and fees incurred in connection with any investigation of Property conditions or any clean-up, remediation, removal or restoration work required by any governmental authority. The provisions of this Section 19 will survive the expiration or termination of this Agreement.

D. In the event Permittee becomes aware of any hazardous materials on the Property, or any environmental, health or safety condition or matter relating to the Property, that, in Permittee's sole determination, renders the condition of the Premises or Property unsuitable for Permittee's use, or if Permittee believes that the leasing or continued leasing of the Premises would expose Permittee to undue risks of liability to a government agency or third party, Permittee will have the right, in addition to any other rights it may have at law or in equity, to terminate this Agreement upon written notice to Housing Authority.

E. Permittee shall be responsible for the complete cost of removal and/or remediation of any such Substance introduced by Permittee as may be required by any applicable federal, state, or local law or regulation.

20. ATTORNEYS' FEES

The prevailing party in any action or proceeding in court or mutually agreed upon arbitration proceeding to enforce the terms of this Agreement is entitled to receive

its reasonable attorneys' fees and other reasonable enforcement costs and expenses from the non-prevailing party.

21. ENTIRE AGREEMENT

This Agreement, and the Revocable Permit issued pursuant to this Agreement, and the attachments hereto, constitute the entire Agreement between the parties concerning the subject matter thereof.

22. BINDING ON SUCCESSORS

The provisions of this Agreement shall inure to the benefit of and be binding upon the respective successors, heirs, and assigns of the parties hereto.

23. RELOCATION ASSISTANCE

Permittee acknowledges it is not entitled to any relocation assistance payments at the conclusion of this Agreement, or the conclusion of the Revocable Permit issued pursuant to this Agreement, under State or federal law (California Government Code Section 7260 et seq. and 42 USC 4601 et seq, respectively) and Permittee further agrees that it will not file or pursue any such claim.

24. PUBLIC RECORDS

Permittee acknowledges that this Agreement and the Revocable Permit, and all exhibits or attachments hereto, are public records and thus may be disclosed to members of the public pursuant to the Public Records Act (California Government Code Section 6250 et seq.) as such act may be amended from time to time.

25. AUTHORITY

By executing this Agreement, Permittee and Housing Authority warrant and represent that it has the right, power and legal authority to enter into this Agreement. Within thirty (30) days of the Effective Date, Permittee shall provide to Housing Authority a certificate executed by the Permittee's corporate secretary, or equivalent authorized person, stating that Permittee is an entity in good standing in its state of origin licensed to do business in California and that Permittee has obtained all necessary local, state, and federal licenses as may be necessary to operate the WTF and business operations contemplated by this Agreement. The person signing this Agreement for Permittee or Housing Authority hereby represents and warrants that he or she is authorized to sign this Agreement on behalf of that party.

26. CONDEMNATION. In the event Housing Authority receives notification of

any condemnation proceedings affecting the Property, Housing Authority will provide notice of the proceeding to Permittee within forty-eight (48) hours. If a condemning authority takes all of the Property, or a portion sufficient, in Permittee's sole determination, to render the Premises unsuitable for Permittee, this Agreement will terminate as of the date the title vests in the condemning authority. The parties will each be entitled to pursue their own separate awards in the condemnation proceeds, which for Permittee will include, where applicable, the value of its WTF, moving expenses, prepaid Annual Fee, and business dislocation expenses. Permittee will be entitled to reimbursement for any prepaid Annual Fee on a pro rata basis.

27. CASUALTY. Housing Authority will provide notice to Permittee of any casualty or other harm affecting the Property within forty-eight (48) hours of the casualty or other harm. If any part of the structures and equipment or Property is damaged by casualty or other harm as to render the Premises unsuitable, in Permittee's sole determination, then Permittee may terminate this Agreement by providing written notice to Housing Authority, which termination will be effective as of the date of such casualty or other harm. Upon such termination, Permittee will be entitled to collect all insurance proceeds payable to Permittee on account thereof and to be reimbursed for any prepaid Annual Fee on a pro rata basis. Housing Authority agrees to permit Permittee to place temporary transmission and reception facilities on the Property, but only until such time as Permittee is able to activate a replacement transmission facility at another location; notwithstanding the termination of this Agreement, such temporary facilities will be governed by all of the terms and conditions of this Agreement, including Annual Fee. If Housing Authority or Permittee undertakes to rebuild or restore the Premises and/or the structures and equipment, as applicable, Housing Authority agrees to permit Permittee to place temporary transmission and reception facilities on the Property at no additional Annual Fee until the reconstruction of the Premises and/or the structures and equipment is completed. If Housing Authority determines not to rebuild or restore the Premises, Housing Authority will notify Permittee of such determination within thirty (30) days after the casualty or other harm. If Housing Authority does not so notify Permittee, then Housing Authority will promptly rebuild or restore the Premises to substantially the same condition as existed before the casualty or other harm. Housing Authority agrees that the Annual Fee shall be abated until the Premises are rebuilt or restored, unless Permittee places temporary transmission and reception facilities on the Property.

28. WAIVER OF HOUSING AUTHORITY'S LIENS. Housing Authority waives any and all lien rights it may have, statutory or otherwise, concerning the structures and equipment or any portion thereof. The structures and equipment shall be deemed personal property for purposes of this Agreement, regardless of whether any portion is deemed real or personal property under applicable law; Housing Authority consents to Permittee's right to remove all or any portion of the structures and equipment from time to time in Permittee's sole discretion and without Housing Authority's consent.

29. WARRANTIES. Housing Authority represents, warrants and agrees that: (i) Housing Authority solely owns the Property as a legal lot in fee simple (ii) the Property is

not and will not be encumbered by any liens, restrictions, mortgages, covenants, conditions, easements, leases, or any other agreements of record or not of record, which would materially and adversely affect Permittee's use and enjoyment of the Premises under this Agreement; (iii) as long as Permittee is not in default then Housing Authority grants to Permittee sole, actual, quiet and peaceful use, enjoyment and possession of the Premises; (iv) Housing Authority's execution and performance of this Agreement will not violate any laws, ordinances, covenants or the provisions of any mortgage, lease or other agreement binding on Housing Authority.

30. **COMPLIANCE WITH LAWS**. Permittee agrees to comply with all federal, state and local laws, orders, rules and regulations ("Laws") applicable to Permittee's use of the WTF on the Property. Housing Authority agrees to comply with all laws relating to Housing Authority's ownership and use of the Property and any improvements on the Property in a manner sufficient to provide to Permittee continued use of the Premises and all of the other rights expressly granted to Permittee herein.

[SIGNATURES APPEAR ON FOLLOWING PAGE]

PERMITTEE:

New Cingular Wireless PCS, LLC,
a Delaware limited liability company

By: AT&T Mobility Corporation
Its: Manager

By: _____
Print Name: _____
Title: _____
Dated: _____

HOUSING AUTHORITY:

HOUSING AUTHORITY OF THE CITY OF SACRAMENTO

_____
LaShelle Dozier, Executive Director

Dated: _____

APPROVED AS TO FORM:

By: _____
Agency Counsel

EXHIBIT A

Legal Description

THE LAND DESCRIBED HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF SACRAMENTO, CITY OF SACRAMENTO, AND IS DESCRIBED AS FOLLOWS:

LOTS 5 AND 6 IN THE BLOCK BOUNDED BY 17TH AND 18TH, "J" AND "K" STREETS OF THE CITY OF SACRAMENTO, ACCORDING TO THE OFFICIAL PLAT THEREOF.

APN: 006-0125-014

EXHIBIT B

Final Site Plans

[100% Construction Drawings, Dated April 4, 2014, Created By Streamline Engineering and Design, Inc. Consisting Of Fifteen (15) Pages]

EXHIBIT C

Certificates of Insurance

[To Be Attached]

May 7, 2014

Sacramento Housing and Redevelopment Commission
Sacramento, California

Honorable Members in Session:

SUBJECT Report on Cap and Trade Program

RECOMMENDATION None

CONTACT PERSONS

La Shelle Dozier, Executive Director, 440-1319
Tia Boatman Patterson, General Counsel, 440-1389
Geoffery Ross, Program Manager, 440-1357

SUMMARY

At the April 16, 2014 SHRA Commission meeting, the Chair requested that an item be placed on the agenda to allow the Commission to review the State of California Cap and Trade program and possible funds that may be available for affordable housing. The following contains background information on the program.

Background on Cap and Trade Program

Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006 set a target for reducing California's greenhouse gas (GHG) emissions to 1990 levels by 2020. As part of implementing that goal, the California Air Resources Board (ARB) put in place a Cap and Trade system. At the first quarterly auction of allowances under that system, on November 14, 2012, a total of $288 million was raised. California's cap-and-trade program implementation has been somewhat controversial. The program is estimated to generate $5 billion annually and is governed by a pair of bills that Governor Jerry Brown signed in September 2012.

The first bill, AB 1532 (Perez), requires the Department of Finance, in consultation with ARB, to prepare a three-year investment plan that ensures that Cap and Trade proceeds reduce GHG emissions while maximizing job creation, public health and other so-called "co-benefits", and directing investment toward the most disadvantaged communities and households in the state.

The companion bill, Senate Bill 535 (de Leon), quantified the minimum benefits that Cap and Trade revenues must deliver to disadvantaged communities. After the California Environmental Protection Agency (Cal/EPA) identifies disadvantaged communities based on geographic, socioeconomic, public health, and environmental hazard criteria, the bill requires that the investment plan ensure that at least 25 percent of auction revenues be set aside for projects that provide benefits to disadvantaged communities, with at least 10 percent in projects located within these communities. The communities being identified in Sacramento under the various criteria being applied to comply with SB 535 are similar to the communities identified as priority areas as part of the 2014-17 Consolidated Plan for community planning and development funds originating from the US Department of Housing and Urban Development (HUD).

Under the Consolidated Plan, census tracts that are predominantly low- and moderate-income (a tract where more than half of the population are 80-percent of the Area Median Income or less) and where existing facilities suffer from heavy use or deferred maintenance leading to disrepair, are being targeted for capital improvement funding. By targeting capital improvements to these communities the goal is to concentrate efforts for maximum leveraging opportunities to provide the greatest impact to the largest number of residents. Coupled with Sacramento Housing and Redevelopment Agency (SHRA) housing programs, the totality of activity covered under the Consolidated Plan seeks to increase economic opportunities, access to jobs and services, and create strategic and visible impacts that promote positive changes in the community. Cap and Trade funding would significantly bolster and complement these efforts.

Governor's Proposal

The Governor's 2014-2015 budget includes the first expenditure plan for Cap and Trade revenues. For Fiscal Year 2014-2015 the Governor proposes allocating $850 million in Cap and Trade auction proceeds. The Governor proposes using 31 percent of the $850 million to fund high speed rail and, thereafter, 33 percent of all Cap and Trade auction proceeds be continuously appropriated to the High-Speed-Rail-Authority (HSRA) for the state's high speed rail project. The independent legislative analyst has questioned whether this is appropriate as this activity may not meet state GHG reduction requirements. Funding the high speed rail project is the Governors top priority.

Of the $850 million, the Governor also proposed allocating $100 million over the next two years to the Strategic Growth Council (SGC) to establish a grant program to implement Chapter 728, Statutes of 2007 (SB 375, Steinberg), commonly referred to as SB 375, which incorporates sustainable community development into transportation planning. The SGC is comprised of eight members representing six state agencies (1. California Heath and Human Services; 2. California Natural Resource Agency; 3.

California State Transportation Agency; 4. Business, Consumer Services, and Housing Agency; 5. California Environmental Protection Agency; and 6. California Department of Food and Agriculture), as well as the Governor's Office of Planning and Research (OPR), and a public member appointed by the Governor. The SGC is responsible for coordinating a variety of newly created state demonstration programs and activities related to sustainable communities and the environment, including the implementation of SB 375.

While details of the program have not been developed, OPR has indicated that grants could be available for local government sponsored projects that implement a regional Sustainable Communities Strategy (SCS) plan as required by SB 375. Specifically, funding could support transit capital and operating costs, bicycle facilities, development near transit stations, and other projects intended to reduce vehicle miles traveled. According to the administration, priority would be given for activities serving disadvantaged communities. Under the Governor's budget, $800,000 of the proposed $100 million would be used to support the continued operations of the SGC and relocate it from the Natural Resources Agency to OPR.

Senator Steinberg's Proposal

The largest pool of funds in Senator Steinberg's plan to allocate Cap and Trade revenue is a 40 percent allocation for affordable housing and sustainable communities, half of which will be aimed at creating and subsidizing affordable housing near transit. Of the total revenue, 30 percent would go towards expansions and operations for rail and rapid bus improvements, 20 percent would go towards construction of California High-Speed Rail and 10 percent for transportation projects (highways, roads and complete streets). Senator Steinberg's plan allocates dollar amounts for several small programs, with the rest allocated by percentage. Because it is unclear how much revenue Cap and Trade will produce, the percentages reported may be slightly different. The funds allocated to sustainable communities and housing under the Steinberg proposal would be allocated by either the State SGC to regions or Metropolitan Planning Organizations (MPO's) who would select individual projects based on a competitive GHG reduction performance goals. Funding the implementation of SB 375 is Steinberg's top priority. His proposal has gained a broad coalition in support of its framework but stakeholders are continuing to have discussion on the mechanisms used to allocate funding.

Regional and Local Government's proposal and initiatives on Cap and Trade

Assembly Bill 1970 (Gordon) seeks to establish the Community Investment and Innovation Program to require moneys to be available from the Greenhouse Gas Reduction Fund, upon appropriation by the Legislature, for award to eligible applicants to implement integrated community-level greenhouse gas emissions reduction projects in their region. The bill would require the SGC to administer the program. The form of that administration is as yet to be determined. There is the potential to develop an

entitlement and non-entitlement framework similar to the Community Development Block Grant program now celebrating its 40th anniversary since being launched by HUD in 1974. Under this framework, SGC could pass though funding from the Greenhouse Gas Reduction Fund directly to jurisdictions that have a Community Investment and Innovation Program Plan certified by the MPO to be consistent with the Regional SCS, similar to entitlement jurisdictions defined under the federal Housing and Community Development Act of 1974. Those jurisdictions that need additional assistance, or that are not represented by a MPO, could work with the SGC directly to access their allocations similar to how non-entitlement jurisdictions work with the States to access federal funds.

To date, the League of California Cities, the California State Association of Counties, and the Local Government Commission, to name but a few are in support of Assembly Bill 1970. In addition, local agencies have begun to work together to position Sacramento to receive its fair-share of funding. Supervisor Phil Serna, who also serves as the Sacramento Metropolitan Air Quality Management District (SMAQMD) Chairman, has already begun coordinating a regional partnership to help direct potential future funding towards a coherent, well-thought-out set of programs that are integrated into various plans. Supervisor Serna is looking to convene a series of meetings later this year that will serve to accomplish that objective.

Local Government advocates (primarily the League of California cities) want to ensure that enough funding for transportation and transit is allocated because it is predicted that gas taxes (formerly used to fund local transportation projects) will no longer be available under the Cap and Trade system and local governments want meaningful permanent funding for transportation type projects in their communities. The City of Sacramento was an early supporter of the transportation coalition's proposal for Cap and Trade funding which integrates livable community infrastructure, maintenance, and operations of the transportation system to maximize GHG reductions from combinations of strategies rather than single purpose investments.

Additionally, because local governments control planning for housing and land use, it is their land use decisions that are more likely to change development patterns that will reduce GHG. Thus, if local governments are allocated ongoing funding for affordable housing and sustainable communities in a flexible way that ensures local control, efficiency in program implementation and ability to leverage with other funding sources while meeting the goals of SB 375 reduction in GHG will be more likely to occur.

<u>Considerations for Legislature in implementing Cap and Trade</u>

When making decisions related to Cap and Trade Implementation, the Legislature should consider the following:

- Evaluate the most efficient mechanism to allocate Cap and Trade auction proceeds for affordable housing and sustainable communities that will ensure that the expenditure of funds is consistent with AB 32 and its implementing

legislation, funds projects that are consistent with sustainable community strategies to reduce GHG, and recognizes the critical role of local government in setting priorities and implementing the projects because of its role in land use decisions.

- Before creating or funding any new state program or office to administer housing and sustainable community funds, evaluate federal and/or state programs with proven results that currently exist which could be utilized. This will allow funds to flow quickly and transparently and aid in stimulating the local economy.
- Evaluate the role that cities, counties, and housing authorities play in administering affordable housing and sustainable community funding for disadvantaged communities. The Legislature has declared that housing authorities are the local entities with primary responsibility for providing housing for low-income and very low income households within their jurisdictions.
- Consider allocating the first round of funding on a competitive basis and thereafter the funds would be allocated via formula. The formula would include GHG performance goals established by Strategic Growth Council (SGC) in coordination with MPOs and the State Housing policy team. Local governments that appropriately plan for affordable housing and sustainable community activities and align those activities to their strategic community strategy will be incentivized to implement its strategy with flexible funding. It is envisioned that if funds are received on a regular, formula basis that local government entities will be able to implement projects and programs more effectively with certainty. This is similar to the process for Federal Community Development Block Grant (CDBG) planning and funding. Initially created in 1974, the federal CDBG program requires that communities meet nationally established program objectives - the primary of which is to create viable urban communities principally for low and moderate income persons. This is an extremely successful program, which has a strong administrative framework that has been in place for 40 years.

Respectfully submitted,

LA SHELLE DOZIER
Executive Director

California Communities Environmental Health Screening Tool, Version 1 (CalEnviroScreen 1.0)

Guidance and Screening Tool

April 2013

Matthew Rodriquez, Secretary
California Environmental Protection Agency

George V. Alexeeff, Ph.D., Director
Office of Environmental Health Hazard Assessment

OEHHA Authors:

John Faust

Laura Meehan August

George Alexeeff

Rose Cendak

Lara Cushing

Tamara Kadir

Carmen Milanes

Karen Randles

Robbie Welling

Walker Wieland

Lauren Zeise

OEHHA Editors:

Allan Hirsch

Shankar Prasad

Cal/EPA Reviewers:

Miriam Barcellona Ingenito

Julian Leichty

Arsenio Mataka

Gina Solomon

Acknowledgements:

Cumulative Impacts and Precautionary Approaches Work Group

Cal/EPA Boards and Departments who provided comments and data; California Department of Public Health and the Public Health Institute

Residents and stakeholders who participated in our regional workshops; Tara Zagofsky, consultant and facilitator, University of California, Davis, Common Ground: Center for Cooperative Solutions

Dr. Rachel Morello-Frosch and academic colleagues at the University of California, Berkeley

Academic expert panel who provided comments at a workshop in September 2012

Graduate students assisting in the project, including Christopher Carosino, Laurel Plummer and Jocelyn Claude

GUIDANCE FROM THE SECRETARY

During the past three years, one of our top priorities has been to integrate environmental justice principles throughout the California Environmental Protection Agency's (Cal/EPA's or Agency's) boards, departments and office. State law defines environmental justice to mean "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies." This definition should not just be words or an illusory concept; rather, it must be a goal to strive for and achieve. Cal/EPA's mission is to restore, protect and enhance the environment, and to ensure public health, environmental quality and economic vitality. Environmental justice and investment in communities burdened by pollution are critical to accomplishing this mission.

Despite the best efforts of many segments of society, a large number of Californians live in the midst of multiple sources of pollution and some people and communities are more vulnerable to the effects of pollution than others. In order to respond to this situation, it is important to identify the areas of the state that face multiple pollution burdens so programs and funding can be targeted appropriately toward improving the environmental health and economic vitality of the most impacted communities. For this reason, the Agency and the Office of Environmental Health Hazard Assessment (OEHHA) have developed a science-based tool for evaluating multiple pollutants and stressors in communities, called the California Communities Environmental Health Screening Tool (CalEnviroScreen).

To ensure that the first version of this tool, CalEnviroScreen 1.0, is properly understood and utilized, we are providing the following guidance to the Agency, its boards, departments, and office, as well as the public and stakeholders.

CalEnviroScreen should be used primarily to assist the Agency in carrying out its environmental justice mission: to conduct its activities in a manner that ensures the fair treatment of all Californians, including minority and low-income populations. The tool is the next step in the implementation of the Agency's 2004 Environmental Justice Action Plan, which called for the development of guidance to analyze the impacts of multiple pollution sources in California communities.

The tool shows which portions of the state have higher pollution burdens and vulnerabilities than other areas, and therefore are most in need of assistance. In a time of limited resources, it will provide meaningful insight into how decision makers can focus available time, resources, and programs to improve the environmental health of Californians, particularly those most burdened by pollution. The tool uses existing environmental, health, demographic and socioeconomic data to create a screening score for communities across the state. An area with a high score would be expected to experience much higher impacts than areas with low scores.

Cal/EPA and OEHHA are committed to revising the tool in the future, using an open and public process, as new information becomes available in order to make the tool as meaningful and as current as possible. Over the next several years, we plan to refine the tool by considering additional indicators, modifying the geographic scale, enhancing the current indicators, and reassessing the tool's methodology. In addition, we will look for new ways to ensure the tool is accessible and comprehensible to the public.

Background

Cal/EPA released the first draft of CalEnviroScreen for public review and comment in July 2012. This draft built upon a 2010 report[1] that described the underlying science and a general method for identifying communities that face multiple pollution burdens. It further developed and explained the methodology described in the 2010 report. After releasing the first draft, Cal/EPA and OEHHA conducted 12 public workshops in seven regions throughout the state. At these workshops, the methodology and our conclusions were discussed with the public and a wide range of stakeholders, including community, business, industry, academic and governmental groups. These regional workshops yielded over 1000 oral and written comments and questions. A subsequent draft was released in January 2013. Cal/EPA and OEHHA solicited additional comments and suggestions, and considered them in making additional changes to the tool.

Potential Uses

Potential uses of the tool by Cal/EPA and its boards, departments, and office include administering environmental justice grants, promoting greater compliance with environmental laws, prioritizing site-cleanup activities, and identifying opportunities for sustainable economic development in heavily impacted neighborhoods. Other entities and interested parties may identify additional uses for this tool and the information it provides.

Implementation of SB 535

CalEnviroScreen will inform Cal/EPA's identification of disadvantaged communities pursuant to Senate Bill 535 (De León, Chapter 830, Statutes of 2012). SB 535 requires Cal/EPA to identify disadvantaged communities based on geographic, socioeconomic, public health, and environmental hazard criteria. It also requires that the investment plan developed and submitted to the Legislature pursuant to Assembly Bill 1532 (John A. Pérez, Chapter 807, Statutes of 2012) allocate no less than 25 percent of available proceeds from the carbon auctions held under California's Global Warming Solutions Act of 2006 to projects that will benefit these disadvantaged communities. At least 10 percent of the available moneys from these auctions must be directly allocated in such communities. Since CalEnviroScreen has been developed to identify areas that are disproportionately affected by pollution and those areas whose populations are socioeconomically disadvantaged, it is well suited for the purposes described by SB 535.

Environmental Justice Activities

CalEnviroScreen will be useful in administering the Agency's Environmental Justice Small Grant Program, and may guide other grant programs as well as environmental education and community programs throughout the state. It will also help to inform Agency boards and departments when they are budgeting scarce resources for cleanup and abatement projects. Additionally, CalEnviroScreen will help to guide boards and departments when planning their community engagement and outreach efforts. Knowing which areas of the state have higher relative environmental burdens will not only help with efforts to increase compliance with environmental laws in disproportionately impacted areas, but also will provide Cal/EPA and its boards, departments, and office with additional insights on the potential implications of their activities and decisions.

Local and Regional Governments

Local and regional governments, including regional air districts, water districts, and planning and transit agencies, may also find uses for this tool. Cal/EPA will continue to work with local and regional

[1] OEHHA and Cal/EPA (2012) *Cumulative Impacts: Building a Scientific Foundation*, Sacramento, CA. Available online at: http://www.oehha.ca.gov/ej/cipa123110.html

governments to further explore the applicability of CalEnviroScreen for other uses. This includes the possibility of helping to identify and plan for opportunities for sustainable development in heavily impacted neighborhoods. These areas could also be targeted for cleaning up blight and promoting development in order to bring in jobs and increase economic stability. As an example, the tool could assist efforts to develop planning and financial incentives to retain jobs and create new, sustainable business enterprises in disproportionately impacted communities.

Of course, it will be important to work with organizations such as economic development corporations, workforce investment boards, local chambers of commerce, and others to develop strategies to help businesses thrive in the identified areas and to attract new businesses and services to those areas. CalEnviroScreen may also assist local districts and governments with meeting their obligations under certain state funding programs. Finally, it is important to remember that CalEnviroScreen provides a broad environmental snapshot of a given region. While the data gathered in developing the tool could be useful for decision makers when assessing existing pollution sources in an area, more precise data are often available to local governments and would be more relevant in conducting such an examination.

General Notes and Limitations

CalEnviroScreen was developed for Cal/EPA and its boards, departments, and office. Its publication does not create any new programs, regulatory requirements or legal obligations. There is no mandate express or implied that local governments or other entities must use the tool or its underlying data. Planning, zoning and development permits are matters of local control and local governments are free to decide whether the tool's output or the information contained in the tool provide an understanding of the environmental burdens and vulnerabilities in their localities.

While CalEnviroScreen will assist Cal/EPA and its boards, departments, and office in prioritizing resources and help promote greater compliance with environmental laws, it is important to note some of its limitations. The tool's output provides a relative ranking of communities based on a selected group of available datasets, through the use of a summary score. The CalEnviroScreen score is not an expression of health risk, and does not provide quantitative information on increases in cumulative impacts for specific sites or projects. Further, as a comparative screening tool, the results do not provide a basis for determining when differences between scores are significant in relation to public health or the environment. Accordingly, the tool is not intended to be used as a health or ecological risk assessment for a specific area or site.

Additionally, the CalEnviroScreen scoring results are not directly applicable to the cumulative impacts analysis required under the California Environmental Quality Act (CEQA). The statutory definition of "cumulative impacts" contained in CEQA is substantially different than the working definition of "cumulative impacts" used to guide the development of this tool. Therefore, the information provided by this tool cannot be used as a substitute for an analysis of the cumulative impacts of any specific project for which an environmental review is required by CEQA.

Moreover, CalEnviroScreen assesses environmental factors and effects on a regional or community-wide basis and cannot be used in lieu of performing an analysis of the potentially significant impacts of any specific project. Accordingly, a lead agency must determine independently whether a proposed project's impacts may be significant under CEQA based on the evidence before it, using its own discretion and judgment. The tool's results are not a substitute for this required analysis. Also, this tool considers some social, health, and economic factors that may not be relevant when doing an analysis under CEQA. Finally, as mentioned above,

the tool's output should not be used as a focused risk assessment of a given community or site. It cannot predict or quantify specific health risks or effects associated with cumulative exposures identified for a given community or individual.

Conclusion

We are proud of the collaborative work of OEHHA and the input of the departments and boards in Cal/EPA as well as the level of public participation and level of input we received in the development of CalEnviroScreen. This project represents the largest public screening tool effort in the nation – both in geographic scope and level of detail. It is an achievement that could not have been realized had it not been for the tireless efforts of OEHHA and the invaluable input of all of our stakeholders.

The development of CalEnviroScreen involved many residents, community-based organizations, nongovernmental organizations, local officials, state agencies and representatives from business, industry and academia. The release of the CalEnviroScreen 1.0 is just the first step. If CalEnviroScreen is to succeed, that cooperative effort must continue. I welcome your active participation as we move forward with future versions of CalEnviroScreen and work to advance environmental justice and economic vitality.

Matthew Rodriquez
Secretary for Environmental Protection

TABLE OF CONTENTS

INTRODUCTION

Californians are burdened by environmental problems and sources of pollution in ways that vary across the state. Some Californians are more vulnerable to the effects of pollution than others. This document describes a science-based method for evaluating multiple pollution sources in a community while accounting for a community's vulnerability to pollution's adverse effects. Factors that contribute to a community's pollution burden or vulnerability are often referred to as stressors. The CalEnviroScreen tool can be used to identify California's most burdened and vulnerable communities. This can help inform decisions at the California Environmental Protection Agency's (Cal/EPA) boards and departments by identifying places most in need of assistance.

Statewide Evaluation

Using CalEnviroScreen, a statewide analysis has been conducted that identifies communities in California most burdened by pollution from multiple sources and most vulnerable to its effects, taking into account their socioeconomic characteristics and underlying health status. In doing so, CalEnviroScreen

- Produces a *relative*, rather than absolute, measure of impact.
- Provides a baseline assessment and methodology that can be expanded upon and updated periodically as important additional information becomes available.
- Demonstrates a practical and scientific methodology for evaluating multiple pollution sources and stressors that takes into account a community's vulnerability to pollution.

Community impact assessment from multiple sources and stressors is complex and difficult to approach with traditional risk assessment practices. Chemical-by-chemical, source-by-source, route-by-route risk assessment approaches are not well suited to the assessment of community-scale impacts, especially for identifying the most impacted places across all of California. Although traditional risk assessment may account for the heightened sensitivities of some groups, such as children and the elderly, it has not considered other community characteristics that have been shown to affect vulnerability to pollution, such as socioeconomic factors or underlying health status.

Given the limits of traditional risk assessment, the Office of Environmental Health Hazard Assessment (OEHHA) and Cal/EPA developed a workable approach to conduct a statewide evaluation of community impacts. It built upon the general method and a description of the underlying science published in Cal/EPA's and OEHHA's 2010 report, *Cumulative Impacts: Building A Scientific Foundation*. The method emerges from basic risk assessment concepts and is sufficiently expansive to incorporate multiple factors that reflect community impacts that have not been included in traditional risk assessments. The tool presents a broad picture of the burdens and vulnerabilities different areas confront from environmental pollutants.

Stakeholder Involvement

Transparency and public input into government decision making and policy development are the cornerstones of environmental justice. In that spirit, the framework for the CalEnviroScreen was developed with the assistance of the Cumulative Impacts and Precautionary Approaches (CIPA) Work Group, consisting of representatives of business and non-governmental organizations, academia and government. The CIPA Work Group also reviewed draft versions of this report and provided critical feedback and input that guided the development of this tool. We appreciate the considerable time and effort that the Work Group has devoted to this project since 2008. We also appreciate the input from the general public we heard during the Work Group meetings.

Cal/EPA also received input on a previous draft of this document at a series of regional and stakeholder-specific public workshops and an academic workshop.[2] Input from California communities, businesses, local governments, California tribes, community-based organizations, and other stakeholders as well as academia was critical in the development of this project and is reflected in changes made to the final document.

Work in this field continues and presents opportunities to refine the tool. Thus, over the next several years we plan to release new versions of the tool that include improvements to the indicators used, the geographic scale, the methodology employed and the accessibility of the tool to the public. Cal/EPA remains committed to an open and public process in developing future versions of the tool.

This report describes CalEnviroScreen's methodological approach, which relies on the use of indicators to measure factors that affect pollution impacts in communities. The report describes the indicators and the criteria used to select them as well as the geographic scale used to define communities. Data representing the indicators for the different areas of the state were obtained and analyzed and are presented here as statewide maps.[3] All the indicators for a locale are combined to generate a score for the community. The report concludes by providing general results for the statewide evaluation, presented as maps showing the top 5 and10 percent of the most impacted communities in California.

[2] Additional information on these workshops as well as the CIPA Work Group meetings and the development of the tool are available at www.oehha.ca.gov/ej/index.html.

[3] The community scores for individual indicators are available online at http://www.oehha.ca.gov/ej/index.html.

METHOD

Definition of Cumulative Impacts

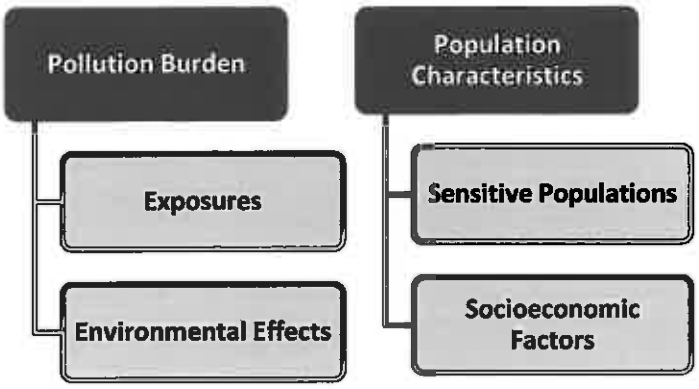
Cal/EPA adopted the following working definition of cumulative impacts[4] in 2005:

> *"Cumulative impacts means exposures, public health or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts will take into account sensitive populations and socioeconomic factors, where applicable and to the extent data are available."*

CalEnviroScreen Model

The CalEnviroScreen model is based on the Cal/EPA working definition in that:

- The model is place-based and provides information for the entire State of California on a geographic basis. The geographic scale selected is intended to be useful for a wide range of decisions.
- The model is made up of multiple components cited in the above definition as contributors to cumulative impacts. The model includes two components representing pollution burden – exposures and environmental effects – and two components representing population characteristics – sensitive populations (e.g., in terms of health status and age) and socioeconomic factors.



[4] This definition differs from the statutory definition of "cumulative impacts" contained in the California Environmental Quality Act (CEQA). While the term is the same, they cannot be used interchangeably. For a detailed discussion of this issue, please see the Guidance from the Secretary.

Model Characteristics

The model:

- Uses a suite of statewide indicators to characterize both pollution burden and population characteristics.
- Uses a limited set of indicators in order to keep the model simple.
- Assigns scores for each of the indicators in a given geographic area.
- Uses a scoring system to weight and sum each set of indicators within pollution burden and population characteristics components.
- Derives a CalEnviroScreen score for a given place relative to other places in the state, using the formula below.

Formula for Calculating CalEnviroScreen Score

After the components are scored, the scores are combined as follows to calculate the overall CalEnviroScreen Score:

Rationale for Formula

The mathematical formula for calculating scores uses multiplication. Scores for the pollution burden and population characteristics categories are multiplied together (rather than added, for example). Although this approach may be less intuitive than simple addition, there is scientific support for this approach to scoring.

Multiplication was selected for the following reasons:

1. *Scientific Literature*: Existing research on environmental pollutants and health risk has consistently identified socioeconomic and sensitivity factors as "effect modifiers." For example, numerous studies on the health effects of particulate air pollution have found that low socioeconomic status is associated with about a 3-fold increased risk of morbidity or mortality for a given level of particulate pollution (Samet and White, 2004). Similarly, a study of asthmatics found that their sensitivity to an air pollutant was up to 7-fold greater than non-asthmatics (Horstman *et al.*, 1986). African-American mothers of low-socioeconomic status exposed to traffic-related air pollution were twice as likely to deliver preterm babies (Ponce *et al.*, 2005). The young can be 10 times more sensitive to environmental carcinogen exposures than adults (OEHHA, 2009). Studies of increased

risk in vulnerable populations can often be described by effect modifiers that amplify the risk. This research suggests that the use of multiplication makes sense based on the existing scientific literature.

2. *Risk Assessment Principles*: Some members of the general population (such as children) may be 10 times more sensitive to some chemical exposures than others. Risk assessments, using principles first advanced by the National Academy of Sciences, apply numerical factors or multipliers to account for potential human sensitivity (as well as other factors such as data gaps) in deriving acceptable exposure levels (US EPA, 2012).
3. *Established Risk Scoring Systems*: Priority-rankings done by various emergency response organizations to score threats have used scoring systems with the formula: Risk = Threat × Vulnerability (Brody *et al.*, 2012). These formulas are widely used and accepted.

Maximum Scores for Combined Components

Component Group	Maximum Score*
Pollution Burden	
Exposures and Environmental Effects	10
Population Characteristics	
Sensitive Populations and Socioeconomic Factors	10
CalEnviroScreen Score	**Up to 100 (= 10 × 10)**

* The scores for each group were rounded to one decimal place before multiplying to calculate the CalEnviroScreen Score (for example, 6.5 out of a possible 10)

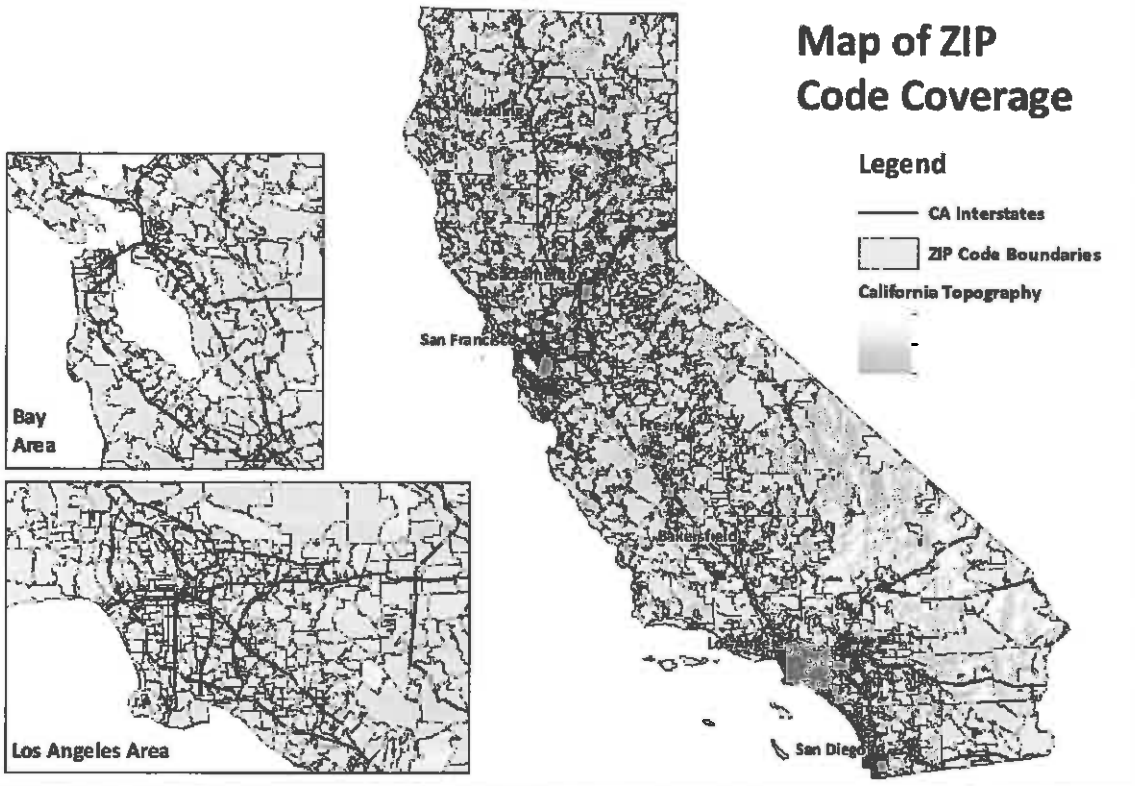
Notes on Scoring System

In the CalEnviroScreen scoring model, the Population Characteristics are considered to be a modifier of the Pollution Burden. In mathematical terms, the Pollution Burden is the multiplicand and Population Characteristics is the multiplier, with the CalEnviroScreen Score as the product. Because the final CalEnviroScreen score represents the product of two numbers, the final ordering of the communities is independent of the magnitude of the scale chosen for each (without rounding scores). That is, the communities would be ordered the same in their final score if the Population Characteristics were scaled to 3, 5, or 10, for example. Here, a scale up to 10 was chosen for convenience.

Selection of Geographic Scale

For this version of CalEnviroScreen, the ZIP code scale is the unit of analysis. A representation of ZIP codes, called ZCTAs (ZIP Code Tabulation Areas), is available from the Census Bureau. These were updated in 2010.[5] For simplicity, these areas are referred to as ZIP codes throughout this report.

The census ZIP codes cover areas where people live, but do not include many sparsely populated places, like national parks. There are approximately 1,800 census ZIP codes in California, representing a relatively fine scale of analysis.[6]



[5] Additional information on the U.S. Census Bureau's ZIP Code Tabulation Areas may be found on their website: http://www.census.gov/geo/ZCTA/zcta.html.

[6] In a future version of the tool, results will also be available at the census tract scale.

The following map shows the relationship between census-derived ZIP codes (ZCTAs) and approximate postal service ZIP codes for an area in San Bernardino. For many ZIP codes they are similar.

* Postal service ZIP code approximations were obtained from Esri, Inc.

References

Brody TM, Di Bianca P, Krysa J (2012). Analysis of inland crude oil spill threats, vulnerabilities, and emergency response in the midwest United States. *Risk Analysis* **32**(10):1741-9. [Available at URL: http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2012.01813.x/pdf].

Horstman D, Roger L, Kehrl H, Hazucha M (1986). Airway Sensitivity of Asthmatics To Sulfur Dioxide *Toxicol Ind Health* **2**: 289-298.

OEHHA (2009). Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. May 2009. Available at URL: http://www.oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf.

Ponce NA, Hoggatt KJ, Wilhelm M, Ritz B (2005). Preterm birth: the interaction of traffic-related air pollution with economic hardship in Los Angeles neighborhoods. *Am J Epidemiol* **162**(2):140-8.

Samet JM, White RH (2004) Urban air pollution, health, and equity. *J Epidemiol Community Health*, **58**:3-5 [Available at URL: http://jech.bmj.com/content/58/1/3.full].

US EPA (2012). Dose-Response Assessment [Available at URL: http://www.epa.gov/risk/dose-response.htm].

INDICATOR SELECTION AND SCORING

The overall CalEnviroScreen community scores are driven by indicators. Here are the steps in the process for selecting indicators and using them to produce scores.

Overview of the Process

1. Identify potential indicators for each component.
2. Find sources of data to support indicator development (see Criteria for Indicator Selection below).
3. Select and develop indicator, assigning a value for each geographic unit.
4. Assign a percentile for each indicator for each geographic unit, based on the rank-order of the value.
5. Generate maps to visualize data.
6. Derive scores for pollution burden and population characteristics components (see Indicator and Component Scoring below).
7. Derive the overall CalEnviroScreen score by combining the component scores (see below).
8. Generate maps to visualize overall results.

The selection of specific indicators requires consideration of both the type of information that will best represent statewide pollution burden and population characteristics, and the availability and quality of such information at the necessary geographic scale statewide.

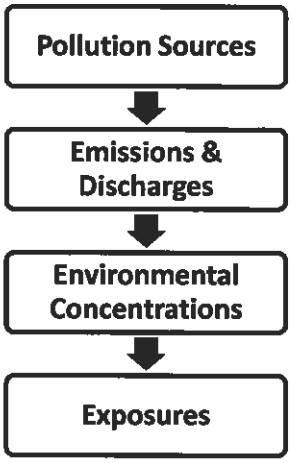
Criteria for Indicator Selection

- An indicator should provide a measure that is relevant to the component it represents, in the context of the 2005 Cal/EPA cumulative impacts definition.
- Indicators should represent widespread concerns related to pollution in California.
- The indicators taken together should provide a good representation of each component.
- Pollution burden indicators should relate to issues that may be potentially actionable by Cal/EPA boards and departments.
- Population characteristics indicators should represent demographic factors known to influence vulnerability to disease.
- Data for the indicator should be available for the entire state at the ZIP code level geographical unit or translatable to the ZIP code level.
- Data should be of sufficient quality, and be:
  - Complete
  - Accurate
  - Current

Exposure Indicators

People may be exposed to a pollutant if they come in direct contact with it, by breathing contaminated air, for example.

No data are available statewide that provide direct information on exposures. Exposures generally involve movement of chemicals from a source through the environment (air, water, food, soil) to an individual or population. For purposes of the CalEnviroScreen, data relating to pollution sources, releases, and environmental concentrations are used as indicators of potential human exposures to pollutants. Six indicators were identified and found consistent with criteria for exposure indicator development. They are:



- Ozone concentrations in air
- PM2.5 concentrations in air
- Diesel particulate matter emissions
- Use of certain high-hazard, high-volatility pesticides
- Toxic releases from facilities
- Traffic density

Environmental Effect Indicators

Environmental effects are adverse environmental conditions caused by pollutants.

Environmental effects include various aspects of environmental degradation, ecological effects and threats to the environment and communities. The introduction of physical, biological and chemical pollutants into the environment can have harmful effects on different components of the ecosystem. Effects can be immediate or delayed. In addition to direct effects on ecosystem health, the environmental effects of pollution can also affect people by limiting the ability of communities to make use of ecosystem resources (e.g., eating fish or swimming in local rivers or bays). Also, living in an environmentally degraded community can lead to stress, which may affect human health. In addition, the mere presence of a contaminated site or high-profile facility can have tangible impacts on a community, even if actual environmental degradation cannot be documented. Such sites or facilities can contribute to perceptions of a community being undesirable or even unsafe.

Statewide data on the following topics were identified and found consistent with criteria for indicator development:

- Toxic cleanup sites
- Groundwater threats from leaking underground storage sites and

cleanups
- Hazardous waste facilities and generators
- Impaired water bodies
- Solid waste sites and facilities

Sensitive Population Indicators

Sensitive populations are populations with biological traits that result in increased vulnerability to pollutants.

Sensitive individuals may include those undergoing rapid physiological change, such as children, pregnant women and their fetuses, and individuals with impaired physiological conditions, such as the elderly or people with existing diseases such as heart disease or asthma. Other sensitive individuals include those with lower protective biological mechanisms due to genetic factors.

Pollutant exposure is a likely contributor to many observed adverse outcomes at the population level, and has been demonstrated for some outcomes such as asthma, low birth weight, and heart disease. People with these health conditions are also more susceptible to health impacts from pollution. With few exceptions, adverse health conditions are difficult to attribute solely to exposure to pollutants. High quality statewide data related to these and other health conditions that can be influenced by toxic chemical exposures were identified and found consistent with criteria for development of these indicators:

- Prevalence of children and elderly
- Asthma
- Low birth-weight infants

Socioeconomic Factor Indicators

Socioeconomic factors are community characteristics that result in increased vulnerability to pollutants.

A growing body of literature provides evidence of the heightened vulnerability of people of color and lower socioeconomic status to environmental pollutants. For example, maternal exposure to particulate pollution is associated with reduced birth weight; this effect is greater among African-American mothers compared to white mothers. Here, socioeconomic factors that have been associated with increased population vulnerability were selected.

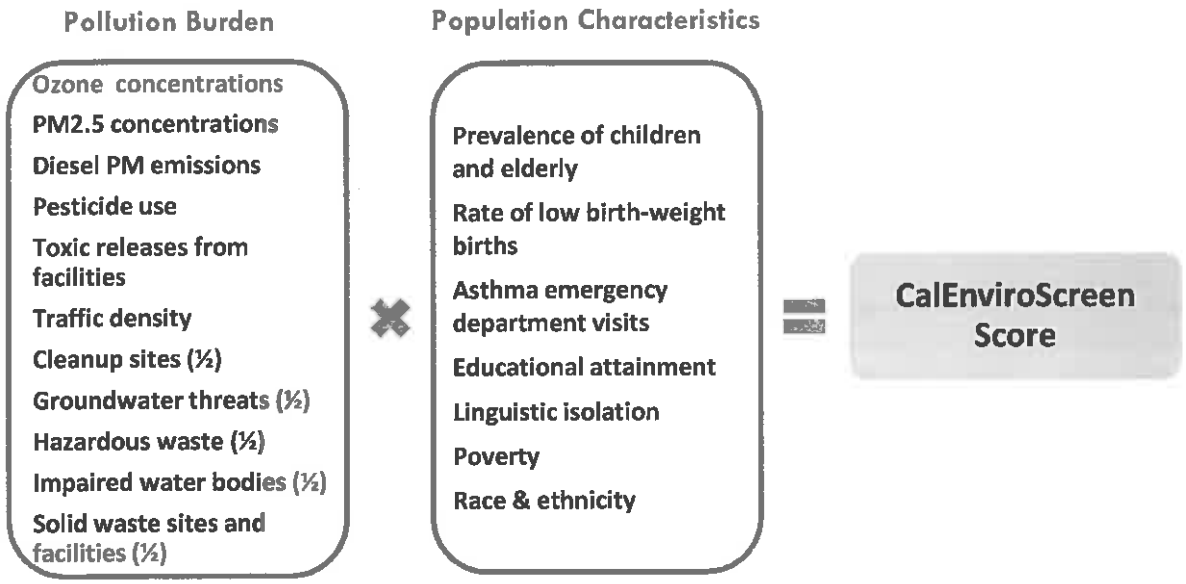
Data on the following socioeconomic factors were identified and found consistent with criteria for indicator development:

- Educational attainment
- Linguistic isolation
- Race and ethnicity
- Poverty

Indicator and Component Scoring

- The indicator values for the entire state are ordered from highest to lowest. A percentile is calculated from the ordered values for all areas that have a score.* Thus each area's percentile rank for a specific indicator is relative to the ranks for that indicator in the rest of the places in the state.
  - The indicators used in this analysis have varying underlying distributions, and percentile rank calculations provide a useful way to describe data without making any potentially unwarranted assumptions about those distributions.
  - A geographic area's percentile for a given indicator simply tells the percentage of areas with lower values of that indicator.
  - A percentile cannot describe the magnitude of the difference between two or more areas. For example, an area ranked in the 30th percentile is not necessarily three times more impacted than an area ranked in the 10th percentile.
- Indicators from Exposures and Environmental Effects components were grouped together to represent Pollution Burden. Indicators from Sensitive Populations and Socioeconomic Factors were grouped together to represent Population Characteristics (see figure below).
- Scores for the Pollution Burden and Population Characteristics groups of indicators are calculated as follows:
  - First, the percentiles for all the individual indicators in a group are averaged. Each indicator from the Environmental Effects component was weighted half as much as those indicators from the Exposures component. This was done because the contribution to possible pollutant burden from the Environmental Effects indicators was considered to be less than those from sources in the Exposures indicators. Thus the score for the Pollution Burden category is a weighted average, with Exposure indicators receiving twice the weight as Environmental Effects indicators.
  - Second, Pollution Burden and Population Characteristics group percentile averages are assigned scores from their defined ranges (up to 10) by dividing by 10 and rounding to one decimal place (e.g., 5.4).

* When a geographic area has no indicator value (for example, the area has no facilities with toxic releases present), it is excluded from the percentile calculation and assigned a score of zero for that indicator. When data are unavailable or missing for a geographic area (for example, the area is greater than 50 kilometers from an air monitor), it is excluded from the percentile calculation and is not assigned any score for that indicator. Thus the percentile score can be thought of as a comparison of one geographic area to other localities in the state where the hazard effect or population characteristic is present.



CalEnviroScreen Score and Maps

- The overall CalEnviroScreen score is calculated from the Pollution Burden and Population Characteristics groups of indicators by multiplying the two scores. Since each group has a maximum score of 10, the maximum CalEnviroScreen Score is 100.
- The geographic areas are ordered from highest to lowest, based on their overall score. A percentile for the overall score is then calculated from the ordered values. As with the percentiles for individual indicators, a geographic area's overall CalEnviroScreen percentile equals the percentage of all ordered CalEnviroScreen scores that fall below the score for that area.
- Maps are developed showing the percentiles for all the ZIP codes of the state. Maps are also developed highlighting the ZIP codes scoring the highest.

Uncertainty and Error

There are different types of uncertainty that are likely to be introduced in the development of any screening method for evaluating pollution burden and population vulnerability in different geographic areas. Several important ones are:

- The degree to which the data that are included in the model are correct.
- The degree to which the data and the indicator metric selected reflect meaningful contributions in the context of identifying areas that are impacted by multiple sources of pollution and may be especially vulnerable to their effects.
- The degree to which data gaps or omissions influence the results.

Efforts were made to select datasets for inclusion that are complete, accurate and current. Nonetheless, there are uncertainties that may arise because environmental conditions change over time, large databases may contain errors, or there are possible biases in how complete the

data sets are across the state, among others. Some of these uncertainties were addressed in the development of indicators. For example:

- Clearly erroneous place-based information for facilities or sites has been removed.
- Low incidences or small counts (e.g., health outcomes) have been excluded from the analysis.
- Highly uncertain measurements (for example, >50 kilometers from an air monitor) have been excluded from the analysis.

Other types of uncertainty, such as those related to how well indicators measure what they are intended to represent in the model, are more difficult to measure quantitatively. For example:

- How well data on chemical uses or emission data reflect potential contact with pollution.
- How well vulnerability of a community is characterized by demographic data.

Generally speaking, indicators are surrogates for the characteristic being modeled, so a certain amount of uncertainty is inevitable. That said, this model comprised of a suite of indicators is considered useful in identifying places burdened by multiple sources of pollution with populations that may be especially vulnerable. Places that score highly for many of the indicators are likely to be identified as impacted. Since there are tradeoffs in combining different sources of information, the results are considered most useful for identifying communities that score highly using the model. Using a limited data set, an analysis of the sensitivity of the model to changes in weighting showed it is relatively robust in identifying more impacted areas (Meehan August *et al.*, 2012). Use of broad groups of areas, such as those scoring in the highest 5 and 10 percent, is expected to be the most suitable application of the CalEnviroScreen results.

Reference

Meehan August L, Faust JB, Cushing L, Zeise L, Alexeeff, GV (2012). Methodological Considerations in Screening for Cumulative Environmental Health Impacts: Lessons Learned from a Pilot Study in California. *Int J Environ Res Public Health* **9**(9): 3069-3084.

INDIVIDUAL INDICATORS: DESCRIPTION AND ANALYSIS

AIR QUALITY: OZONE

Exposure Indicator

Ozone pollution causes numerous adverse health effects, including respiratory irritation and lung disease. The health impacts of ozone and other criteria air pollutants (particulate matter (PM), nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead) have been considered in the development of health-based standards. Of the six criteria air pollutants, ozone and particle pollution pose the most widespread and significant health threats. The California Air Resources Board maintains a wide network of air monitoring stations that provides information that may be used to better understand exposures to ozone and other pollutants across the state.

Indicator

Portion of the daily maximum 8-hour ozone concentration over the federal 8-hour standard (0.075 ppm), averaged over three years (2007 to 2009).

Data Source

Air Monitoring Network,
California Air Resources Board (CARB)

CARB, local air pollution control districts, tribes and federal land managers maintain a wide network of air monitoring stations in California. These stations record a variety of different measurements including concentrations of the six criteria air pollutants and meteorological data. In certain parts of the state, the density of the stations can provide high-resolution data for cities or localized areas around the monitors. However, not all cities have stations.

The information gathered from each air monitoring station audited by the CARB includes maps, geographic coordinates, photos, pollutant concentrations, and surveys.

http://www.arb.ca.gov/aqmis2/aqmis2.php
http://www.epa.gov/airquality/ozonepollution/
http://www.niehs.nih.gov/health/topics/agents/ozone/

Rationale

Ozone is an extremely reactive form of oxygen. In the upper atmosphere ozone provides protection against the sun's ultraviolet rays. Ozone at ground level is the primary component of smog. Ground-level ozone is formed from the reaction of oxygen-containing compounds with other air pollutants in the presence of sunlight. Ozone levels are typically at their highest in the afternoon and on hot days (NRC, 2008).

Adverse effects of ozone, including lung irritation, inflammation and exacerbation of existing chronic conditions, can be seen at even low exposures (Alexis *et al.* 2010, Fann *et al.* 2012, Zanobetti and Schwartz 2011). A long-term study in southern California found that rates of asthma hospitalization for children increased during warm season episodes of high ozone concentration (Moore *et al.* 2008). Additional studies have shown that the increased risk is higher among children under 2 years of age, young males, and African American children (Lin *et al.*, 2008, Burnett *et al.*, 2001). Increases in ambient ozone have also been

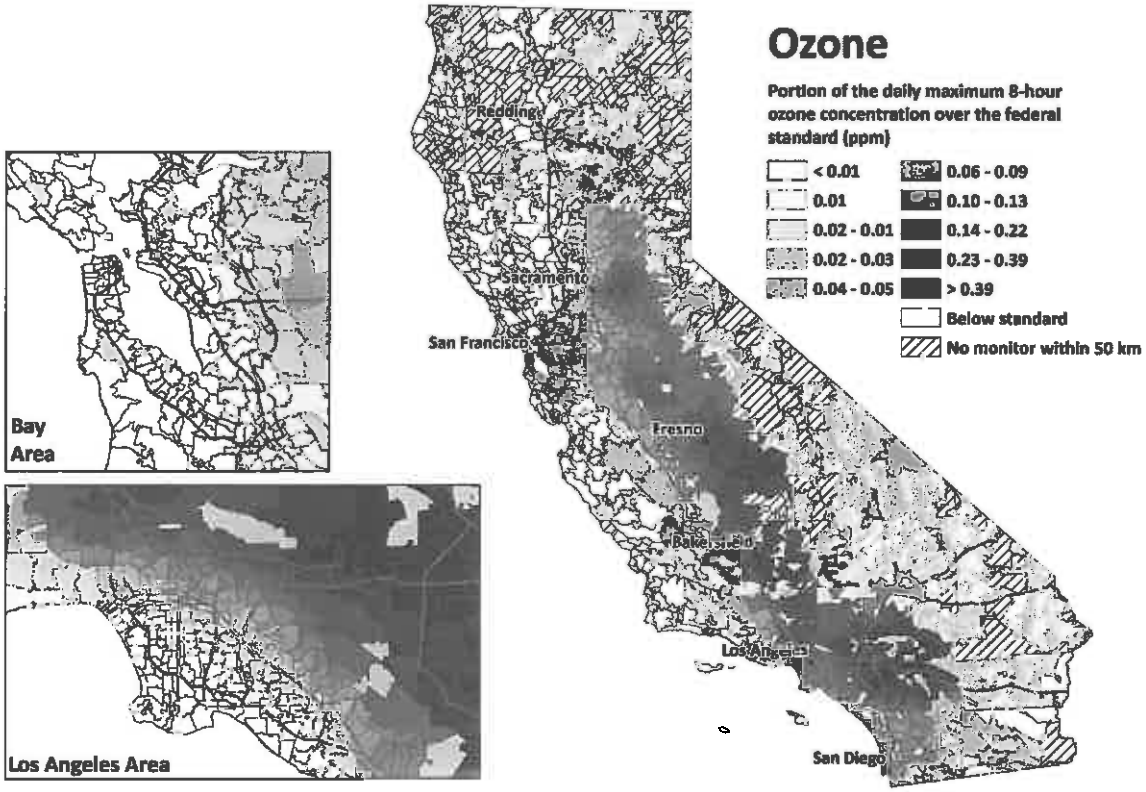
associated with higher mortality, particularly in the elderly, women and African Americans (Medina-Ramon, 2008). Together with PM2.5, ozone is a major contributor to air pollution-related morbidity and mortality (Fann *et al.* 2012).

Method

- Daily maximum 8-hour average concentrations for all monitoring sites in California were extracted from CARB's air monitoring network database for the years 2007-2009.
- The federal 8-hour standard (0.075 ppm) is subtracted from the monitoring data to arrive at the portion of the 8-hour concentration above the federal standard. Only concentrations over the federal standard from 2007-2009 were used.
- For each day in the 2007-2009 time period, the 8-hour ozone concentrations over the standard were estimated at the geographic center of the ZIP code using a geostatistical method that incorporates the monitoring data from nearby monitors (ordinary kriging).
- The estimated daily concentrations over the standard were averaged to obtain a single value for each ZIP code.
- ZIP codes were ordered by ozone concentration values and assigned a percentile based on the statewide distribution of values.

Indicator Map

Note: Values at ZIP codes with centers more than 50km from the nearest monitor were not estimated (signified by cross-hatching in the map below).



References

Alexis NE, Lay JC, Hazucha M, Harris B, Hernandez ML, Bromberg PA, *et al.* (2010). Low-level ozone exposure induces airways inflammation and modifies cell surface phenotypes in healthy humans. *Inhal Toxicol* **22**(7):593-600.

Burnett RT, Smith-Doiron M, Stieb D, Raizenne ME, Brook JR, *et al.* (2001). Association between Ozone and Hospitalization for Acute Respiratory Diseases in Children Less than 2 Years of Age. *American Journal of Epidemiology* **153**(5):444-452.

Fann N, Lamson AD, Anenberg SC, Wesson K, Risley D, Hubbell BJ (2012). Estimating the National Public Health Burden Associated with Exposure to Ambient PM2.5 and Ozone. *Risk Analysis* **32**(1):81-95.

Lin S, Liu X, Le, LH, Hwang, S (2008). Chronic Exposure to Ambient Ozone and Asthma Hospital Admissions among Children. *Environ Health Perspect* **116**(12):1725-1730.

Medina-Ramón M, Schwartz J (2008). Who is more vulnerable to die from ozone air pollution? *Epidemiology* **19**(5):672-9.

Moore K, Neugebauer R, Lurmann F, Hall J, Brajer V, Alcorn S, *et al.* (2008). Ambient ozone concentrations cause increased hospitalizations for asthma in children: an 18-year study in Southern California. *Environ Health Perspect* **116**(8):1063-70.

NRC (2008). National Research Council Committee on Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure (2008). *Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution.* The National Academies Press.

Zanobetti A, Schwartz J (2011). Ozone and survival in four cohorts with potentially predisposing diseases. *Am J Respir Crit Care Med* **184**(7):836-41.

AIR QUALITY: PM2.5

Exposure Indicator

Particulate matter pollution, and fine particle (PM2.5) pollution in particular, has been shown to cause numerous adverse health effects, including heart and lung disease. PM2.5 contributes to substantial mortality across California. The health impacts of PM2.5 and other criteria air pollutants (ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead) have been considered in the development of health-based standards. Of the six criteria air pollutants, particle pollution and ozone pose the most widespread and significant health threats. The California Air Resources Board maintains a wide network of air monitoring stations that provides information that may be used to better understand exposures to PM2.5 and other pollutants across the state.

Indicator

Annual mean concentration of PM2.5 (average of quarterly means), over three years (2007-2009).

Data Source

Air Monitoring Network,
California Air Resources Board (CARB)

CARB, local air pollution control districts, tribes and federal land managers maintain a wide network of air monitoring stations in California. These stations record a variety of different measurements including concentrations of the six criteria air pollutants and meteorological data. The density of the stations is such that specific cities or localized areas around monitors may have high resolution. However, not all cities have stations.

The site information gathered from each air monitoring station audited by CARB includes maps, locations coordinates, photos, pollutant concentrations, and surveys.

http://www.arb.ca.gov/aqmis2/aqmis2.php
http://www.epa.gov/airquality/particlepollution/

Rationale

Particulate matter (PM) is a complex mixture of aerosolized solid and liquid particles including such substances as organic chemicals, dust, allergens and metals. These particles can come from many sources, including cars and trucks, industrial processes, wood burning, or other activities involving combustion. The composition of PM depends on the local and regional sources, time of year, location and weather. The behavior of particles and the potential for PM to cause adverse health effects is directly related to particle size. The smaller the particle size, the more deeply the particles can penetrate into the lungs. Some fine particles have also been shown to enter the bloodstream. Those most susceptible to the effects of PM exposure include children, the elderly, and persons suffering from cardiopulmonary disease, asthma, and chronic illness (US EPA, 2012a).

PM2.5 refers to particles that have a diameter of 2.5 micrometers or less. Particles in this size range can have adverse effects on the heart

and lungs, including lung irritation, exacerbation of existing respiratory disease, and cardiovascular effects. The US EPA has set a new standard for ambient PM2.5 concentration of 12 $\mu g/m^3$, down from 15 $\mu g/m^3$. According to EPA's projections, by the year 2020 only 7 counties nationwide will have PM2.5 concentrations that exceed this standard. All are in California (US EPA, 2012b).

In children, researchers associated high ambient levels of PM2.5 in Southern California with adverse effects on lung development (Gauderman *et al.*, 2004). Another study in California found an association between components of PM2.5 and increased hospitalizations for several childhood respiratory diseases (Ostro *et al.*, 2009). In adults, studies have demonstrated relationships between daily mortality and PM2.5 (Ostro *et al.* 2006), increased hospital admissions for respiratory and cardiovascular diseases (Dominici *et al.* 2006), premature death after long-term exposure, and decreased lung function and pulmonary inflammation due to short term exposures (Pope, 2009). Exposure to PM during pregnancy has also been associated with low birth weight and premature birth (Bell *et al.* 2007; Morello-Frosch *et al.*, 2010).

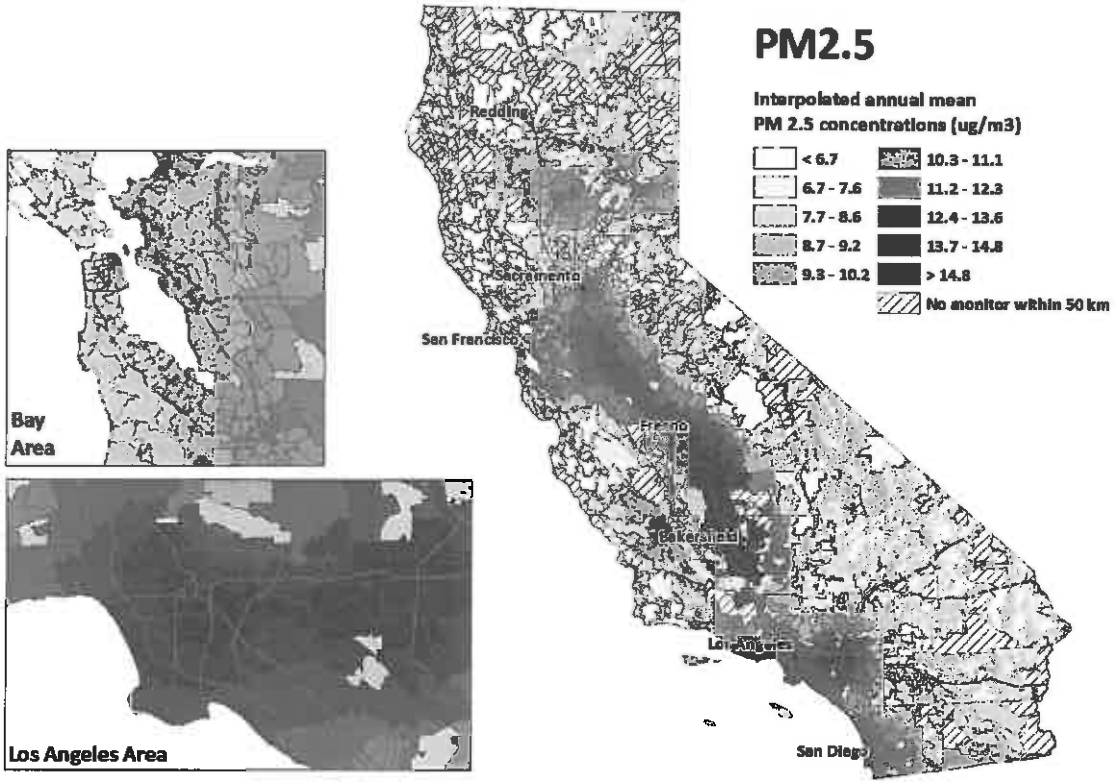
An additional source of PM2.5 in California is wildfires. Fires are not uncommon during dry seasons, particularly in Southern California and the Central Valley. Smoke particles fall almost entirely within the size range of PM2.5. Although the long term risks from exposure to smoke during a wildfire are relatively low, sensitive populations are more likely to experience severe symptoms, both acute and chronic (Lipsett *et al.* 2008). During the wildfires that spread throughout the state in June 2008, PM2.5 concentrations at a site in the northeast San Joaquin Valley were far above air quality standards and approximately ten times more toxic than normal ambient PM (Wegesser *et al.* 2009).

Method

- PM2.5 annual mean monitoring data for was extracted all monitoring sites in California from CARB's air monitoring network database for the years 2007-2009.
- Monitors that reported fewer than 75% of the expected number of observations, based on scheduled sampling frequency, were dropped from the analysis.
- For all measurements in the time period, the quarterly mean concentrations were estimated at the geographic center of the ZIP code using a geostatistical method that incorporates the monitoring data from nearby monitors (ordinary kriging).
- Annual means were then computed for each year by averaging the quarterly estimates and then averaging those over the three year period.
- ZIP codes were ordered by the PM2.5 concentration values and assigned a percentile based on the statewide distribution of values.

Indicator Map

Note: Values at ZIP codes with centers more than 50km from the nearest monitor were not estimated (signified by cross-hatching in the map below).



References

Bell ML, Ebisu K, Belanger K (2007). Ambient air pollution and low birth weight in Connecticut and Massachusetts. *Environmental Health Perspectives* **115**(7):1118.

Dominici F, Peng RD, Bell ML, Pham L, McDermott A, Zeger SL, *et al.* (2006). Fine particulate air pollution and hospital admission for cardiovascular and respiratory diseases. *JAMA: The Journal of the American Medical Association* **295**(10):1127-34.

Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, *et al.* (2004). The effect of air pollution on lung development from 10 to 18 years of age. *New England Journal of Medicine* **351**(11):1057-67.

Lipsett M, Materna B, Stone SL, Therriault S, Blaisdell R, Cook J (2008). Wildfire Smoke: A Guide for Public Health Officials (pp. 53). California Department of Public Health, www.ehib.org/paper.jsp?paper_key=wildfire_smoke_2008 [accessed Feb 7, 2013].

Morello-Frosch R, Jesdale BM, Sadd JL, Pastor M (2010). Ambient air pollution exposure and full-term birth weight in California. *Environmental Health* **9**:44.

Ostro B, Broadwin R, Green S, Feng WY, Lipsett M (2006). Fine particulate air pollution and mortality in nine California counties: results from CALFINE. *Environmental health perspectives* **114**(1):29.

Ostro B, Roth L, Malig B, Marty M (2009). The effects of fine particle components on respiratory hospital admissions in children. *Environmental health perspectives* **117**(3):475.

Pope III CA (2009). The expanding role of air pollution in cardiovascular disease: Does air pollution contribute to risk of deep vein thrombosis? *Circulation* **119**(24):3050-2.

US EPA. The National Ambient Air Quality Standards for Particle Pollution: Particle Pollution and Health. Washington, DC:U.S. Environmental Protection Agency (14 Dec 2012). Available: http://www.epa.gov/pm/2012/decfshealth.pdf [accessed March 12, 2013].

US EPA. Projected Fine Particle Concentrations for Counties with Monitors in 2020. Washington, DC: U.S. Environmental Protection Agency. Available: http://www.epa.gov/pm/2012/2020table.pdf [accessed March 12, 2013].

Wegesser TC, Pinkerton KE, Last JA (2009). California wildfires of 2008: coarse and fine particulate matter toxicity. *Environ Health Perspect* **117**(6):893-7.

DIESEL PARTICULATE MATTER

Exposure Indicator

Diesel particulate matter (diesel PM) occurs throughout the environment from both on-road and off-road sources. Major sources of diesel PM include trucks, buses, cars, ships and locomotive engines. Diesel PM is concentrated near ports, rail yards and freeways where many such sources exist. Exposure to diesel PM has been shown to have numerous adverse health effects including irritation to the eyes, throat and nose, cardiovascular and pulmonary disease, and lung cancer.

Indicator

Spatial distribution of gridded diesel PM emissions from on-road and non-road sources for a 2010 summer day in July (kg/day).

Data Source

California Air Resources Board (CARB)

The CARB produces grid-based emission estimates for a variety of pollutants by emissions category on a 4km by 4km statewide Cartesian grid system to support specific regulatory and research programs. Diesel PM emissions from on- and off-road sources were extracted for a July 2010 weekday from the latest grid-based emissions. This data source does not account for meteorological dispersion of emissions at the neighborhood scale, which can have local-scale and year-to-year variability, or significant local-scale spatial gradients known to exist within a few hundred meters of a high-volume roadway or other large source of diesel PM. Nevertheless it is a reasonable *regional* metric of exposure to diesel PM emissions.

http://www.arb.ca.gov/diesel

Rationale

Diesel PM is the particle phase of diesel exhaust emitted from diesel engines such as trucks, buses, cars, trains, and heavy duty equipment. This phase is composed of a mixture of compounds, including sulfates, nitrates, metals and carbon particles. The diesel particulate matter indicator is distinct from other air pollution indicators in CalEnviroScreen, PM2.5 in particular. Diesel PM includes known carcinogens, such as benzene and formaldehyde (Krivoshto *et al.*, 2008) and 50% or more of the particles are in the ultrafine range (USEPA, 2002). As particle size decreases, the particles may have increasing potential to deposit in the lung (Löndahl *et al.* 2012). The ultrafine fraction of diesel PM (aerodynamic diameter less than 0.1 μm) is of concern because researchers believe these particles penetrate deeper into the lung, can carry toxic compounds on particle surfaces, and are more biologically reactive than larger particles (Betha and Balasubramanian, 2013; Nemmar *et al.*, 2007). In urban areas, diesel PM is a major component of the particulate air pollution from traffic (McCreanor *et al.*, 2007).

Children and those with existing respiratory disease, particularly asthma, appear to be especially susceptible to the harmful effects of exposure to airborne PM from diesel exhaust, resulting in increased

asthma symptoms and attacks along with decreases in lung function (McCreanor *et al.*, 2007; Wargo, 2002).

People that live or work near heavily-traveled roadways, ports, railyards, bus yards, or trucking distribution centers may experience a high level of exposure (USEPA, 2002; Krivoshto *et al.*, 2008). People that spend a significant amount of time near heavily-traveled roadways may also experience a high level of exposure. A study of U.S. workers in the trucking industry found an increasing risk for lung cancer with increasing years on the job (Garshick *et al.*, 2008). The same trend was seen among railroad workers, who showed a 40% increased risk of lung cancer (Garshik *et al.*, 2004). Studies have found strong associations between diesel particulate exposure and exacerbation of asthma symptoms in asthmatic children who attend school in areas of heavy truck traffic (Patel *et al.* 2010, Spira-Cohen *et al.* 2011). Studies of both men and women demonstrate cardiovascular effects of diesel PM exposure, including coronary vasoconstriction and premature death from cardiovascular disease (Krivoshto *et al.*, 2008).

Exposure to diesel PM, especially following periods of severe air pollution, can lead to increased hospital visits and admissions due to worsening asthma and emphysema-related symptoms (Krivoshto *et al.*, 2008). Diesel exposure may also lead to reduced lung function in children living in close proximity to roadways (Brunekreef *et al.*, 1997).

Method

Gridded diesel PM emissions from on-road sources were calculated as follows:

- CARB's on-road emissions model, EMFAC2013, was used to calculate 2010 county-wide estimates of diesel PM emissions for a July weekday.
  http://www.arb.ca.gov/msei/modeling.htm
- EMFAC2013 county-wide emission estimates are spatially distributed to 4km-by-4km grid cells based on the distribution of regional vehicle activity represented in local agency transportation networks and Caltrans' statewide transportation network (where local agency data are not available) using the Direct Travel Impact model (DTIM4). Transportation networks are produced from travel demand modeling conducted by local agencies and Caltrans.

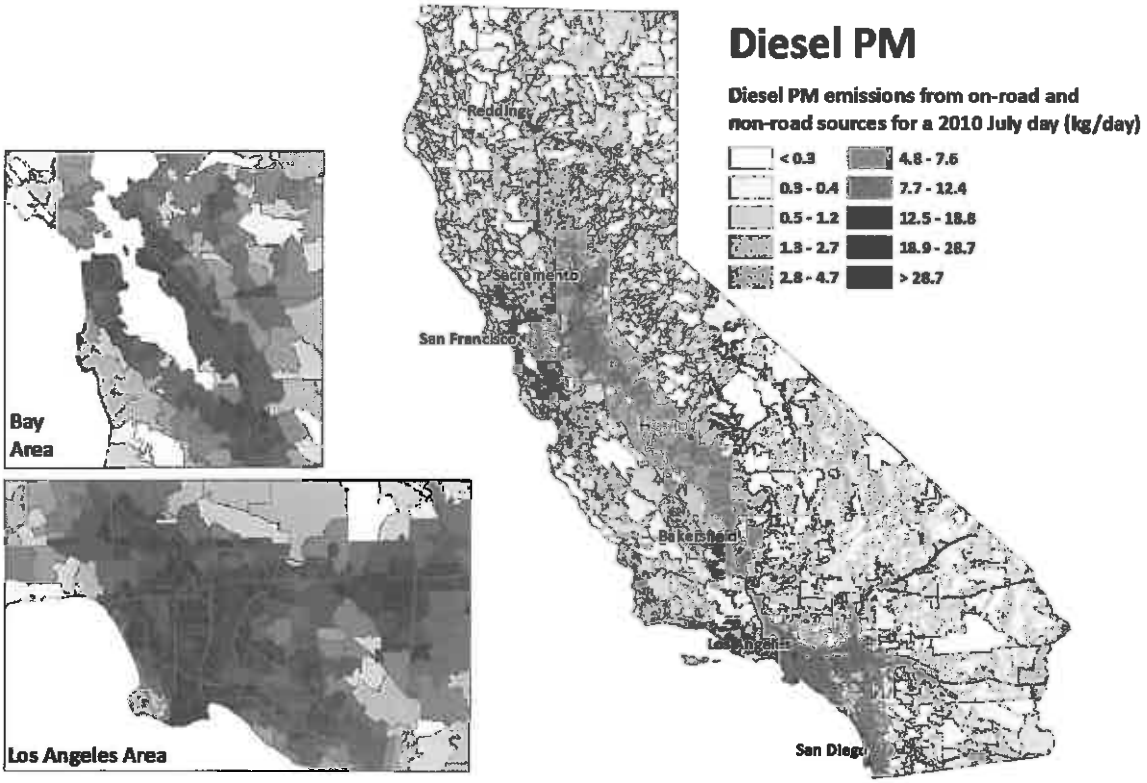
Gridded diesel PM from non-road sources were calculated as follows:

- County-wide estimates of diesel PM from non-road sources for a July weekday were extracted from CARB's emissions inventory forecasting system, CEPAM.
  http://www.arb.ca.gov/app/emsinv/fcemssumcat2009.php
- County-wide emission estimates are spatially distributed to 4km-by-4km grid cells based on a variety of gridded spatial surrogate datasets. Each category of emissions is mapped to a spatial surrogate that generally represents the expected sub-county

locations of source-specific activities. The surrogates include, for example: Lakes and Coastline; Population; Housing and Employment; Industrial Employment; Irrigated Cropland; Unpaved Roads; Single-Housing Units; Forrest Land; Military Bases; Non-irrigated Pasture Land; Rail Lines; Non-Urban Land; Commercial Airports; and Ports.

Resulting gridded emission estimates from the on-road and non-road categories were summed into a single gridded dataset. Gridded diesel PM emission estimates are then allocated to ZCTA zones in ArcMap using a weighted average where the proportion of a grid-cell intersecting a ZIP code is used as the weight. The resulting ZCTA totals are assigned a percentile based on the statewide distribution of values.

Indicator Map



References

Betha R, Balasubramanian R (2013). Emissions of particulate-bound elements from biodiesel and ultra low sulfur diesel: size distribution and risk assessment. *Chemosphere* **90**(3):1005-15.

Brunekreef B, Janssen NA, de Hartog J, Harssema H, Knape M, van Vliet P (1997). *Epidemiology* **8**(3): 298-303.

Garshick E, Laden F, Hart JE, Rosner B, Davis ME, Eisen EA, Smith TJ (2008). Lung Cancer and Vehicle Exhaust in Trucking Industry Workers. *Environmental Health Perspectives* **116**:1327–1332.

Garshick E, Laden F, Hart JE, Rosner B, Davis ME, Smith TJ, Dockery DW, Speizer FE (2004). Lung Cancer in Railroad Workers Exposed to Diesel Exhaust. *Environmental Health Perspectives* **112**:1539-1543.

Krivoshto IN, Richards JR, Albertson TE, Derlet RW (2008). The Toxicity of Diesel Exhaust: Implications for Primary Care. *Journal of the American Board of Family Medicine* **21**:55– 62.

Löndahl J, Swietlicki E, Rissler J, Bengtsson A, Boman C, Blomberg A, *et al.* (2012). Experimental determination of the respiratory tract deposition of diesel combustion particles in patients with chronic obstructive pulmonary disease. *Part Fibre Toxicol* **9**:30.

McCreanor J, Cullinan P, Nieuwenhuijsen MJ, Stewart-Evans J, Malliarou E, Jarup L, *et al.* (2007). Respiratory effects of exposure to diesel traffic in persons with asthma. *N Engl J Med* **357**(23):2348-58.

Nemmar A, Al-Maskari S, Ali BH, Al-Amri IS (2007). Cardiovascular and lung inflammatory effects induced by systemically administered diesel exhaust particles in rats. *Am J Physiol Lung Cell Mol Physiol* **292**(3):L664-70.

Patel MM, Chillrud SN, Deepti KC, Ross JM, Kinney PL (2012). Traffic-related air pollutants and exhaled markers of airway inflammation and oxidative stress in New York City adolescents. *Environ Res.*

Spira-Cohen A, Chen LC, Kendall M, Lall R, Thurston GD (2011). Personal exposures to traffic-related air pollution and acute respiratory health among Bronx schoolchildren with asthma. *Environ Health Perspect* **119**(4):559-65.

Wargo, J (2002). Children's Exposure to Diesel Exhaust on School Buses. *Environment and Human Health, Inc* 1-76. http://ehhi.org/reports/diesel/diesel.pdf

PESTICIDE USE

Exposure Indicator

Communities near agricultural fields, primarily farm worker communities, may be at risk for exposure to pesticides. Drift or volatilization of pesticides from agricultural fields can be a significant source of pesticide exposure. Complete statewide data on human exposures to pesticides do not exist. The most robust pesticide information available statewide are data maintained by the California Department of Pesticide Regulation showing where and when pesticides are used across the state. Pesticide use, especially use of volatile chemicals that can easily become airborne, can serve as an indicator of potential exposure. Similarly, unintended environmental damage from the use of pesticides may increase in areas with greater use.

Indicator

Total pounds of selected active pesticide ingredients (filtered for hazard and volatility) used in production-agriculture per square mile.

Data Source

Pesticide Use Reporting,
California Department of Pesticide Regulation (DPR)

In California, all agricultural pesticide use must be reported monthly to county agricultural commissioners, who report the data to DPR. California has a broad legal definition of agricultural use—production agricultural is defined as pesticides used on any plant or animal to be distributed in the channels of trade and non-production agricultural includes pesticide applications to parks and recreational lands, rights-of-ways, golf courses, and cemeteries for example. Non-agricultural control includes home, industrial, institutional, structural, vector control, and veterinary uses. Production agricultural pesticide use data are publicly available for each Meridian-Township-Range-Section (MTRS) in California and was used to create this indicator. An MTRS, or section, is roughly equivalent to one square mile. Data are available statewide except for some areas that are exempt from reporting, such as some military and tribal lands.

Non-production agricultural and non-agricultural pesticide use data is only available at the county scale and was not included in the indicator due to the large geographic scale.

http://www.DPR.ca.gov/docs/pur/purmain.htm

Rationale

To determine whether pesticide exposure may be occurring as a result of agricultural use, DPR established a pesticide air monitoring network for agricultural areas where there is high use of pesticides likely to concentrate in air. Preliminary results for the first year of monitoring show that more than half of pesticides sampled were detected, although none were above the health screening levels (CDPR, 2012). Pesticide air monitoring is not available statewide.

High use of pesticides, however, has been correlated with exposure and with acute pesticide-related illness, and there is evidence of association with chronic disease outcomes. Pregnant, low income Latinas residing in an agricultural area of California had pesticide metabolite levels in

their urine up to 2.5 times higher than a representative sample of U.S. women (Bradman *et al.*, 2005). Some research indicates that proximity to agricultural fields is correlated with measured concentrations in homes (Bradman *et al.*, 2007; Harnly *et al.*, 2009). A recent study in California comparing farmworker homes to homes of low income urban residents found indoor concentrations of an agricultural pesticide only in homes of farmworkers (Quiros-Alcala *et al.*, 2011). Another study, based on data from the California Pesticide Use Report database, found that nearby agricultural pesticide use was significantly associated with pesticide concentrations in carpet dust (Gunier *et al.*, 2011).

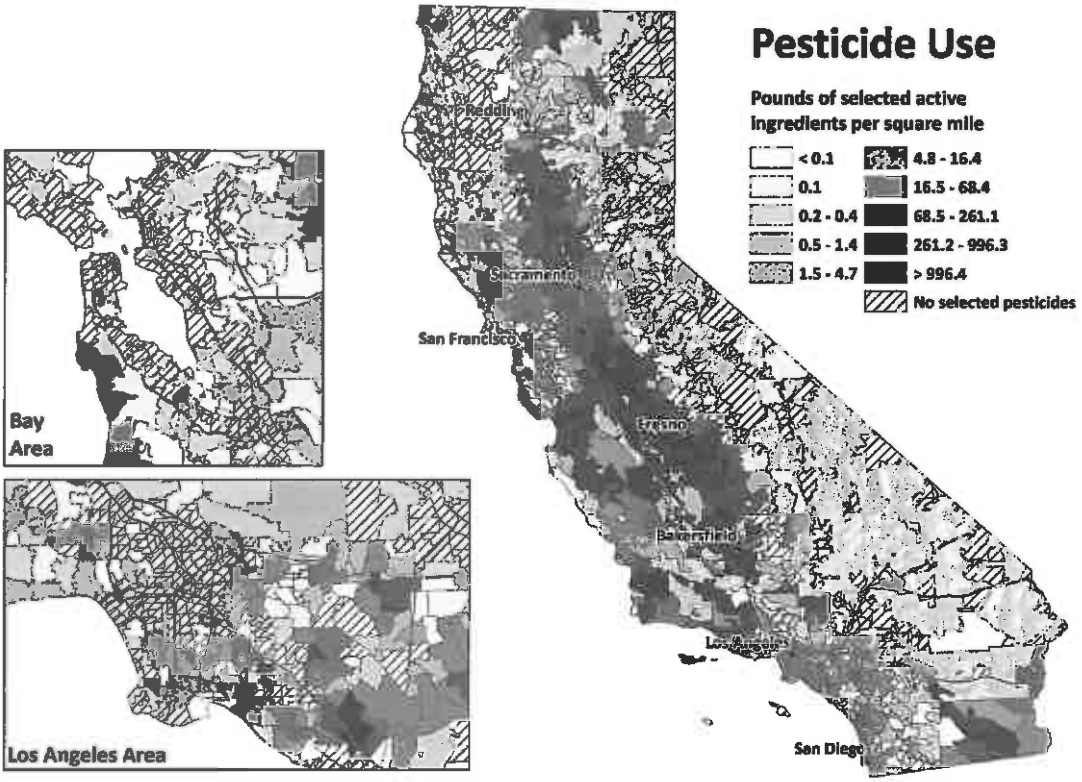
A large cohort study of male pesticide applicators found a significant association between the use of four specific insecticides and aggressive prostate cancer (Koutros *et al.*, 2012). Prenatal exposure to the organophosphate chlorpyrifos has been associated with abnormalities in brain structure in children (Rauh *et al.*, 2012). An examination of national pesticide illness data concluded that agricultural workers and residents near agriculture had the highest rates of pesticide poisoning from drift incidents. Soil fumigation accounted for most of the cases (Lee *et al.*, 2011). DPR has also documented numerous pesticide drift incidents that have led to illness in California (O'Malley *et al.*, 2005). Because of their physical and chemical characteristics, fumigants and other volatile pesticides are most likely to be involved in pesticide drift incidents and illnesses. However, any pesticide that is applied by air or sprayed during windy conditions can drift over neighboring communities (Coronado *et al.*, 2011; Lee *et al.*, 2011).

Method

Specific pesticides included in the measure of pesticide use were narrowed from the list of all registered pesticides in use in California to focus on a subset of 66 chemicals that are filtered for hazard and volatility. Volatility is indicative of higher likelihood of drift and exposure (See Appendix).

- Production agricultural pesticide use records were obtained for the entire state for the years 2009 and 2010.
- Production pesticide use (total pounds of selected active ingredient) for MTRS records were matched to ZIP codes using a match file created in the GIS software ArcMap.
- Production pesticide use for each ZIP code was divided by each ZIP code's area.

Indicator Map



Appendix

Pesticide Use – Filter for Hazard and Volatility

Specific pesticides included in the measure of pesticide use were identified from the list of all registered pesticides through consideration of both hazard and likelihood of exposure.

The more hazardous pesticides were identified using a list generated under the Birth Defect Prevention Act of 1984 (SB 950) and the Proposition 65 list (Safe Drinking Water and Toxic Enforcement Act of 1986). As part of a review process of active ingredients under the SB 950 program, pesticides are classified as "High", "Moderate", or "Low" priority for potential adverse health effects using studies of sufficient quality to characterize risk. The prioritization of each pesticide is a subjective process based upon the nature of potential adverse effects, the number of potential adverse effects, the number of species affected, the no observable effect level (NOEL), potential human exposure, use patterns, quantity used, and US EPA evaluations and actions, among others. Proposition 65 requires the state to maintain a list of chemicals that cause cancer or reproductive toxicity. For the purpose of developing an exposure indicator, pesticides that were prioritized as "Low," not prioritized under SB 950, or not on the Proposition 65 list

were removed from the analysis.

The analysis was further limited to pesticides of high or moderate volatility. Higher volatility was considered to increase the likelihood of exposures. A list of pesticide volatilities was obtained from DPR. Pesticides not appearing on this list were researched for chemical properties in the open literature. Pesticides with volatility less than 10^{-6} mm Hg were removed from the indicator analysis.

The filtering of pesticides for both hazard and volatility resulted in a list of 66 pesticides that were included in the analysis here. The pesticides that are included in the indicator calculation are identified below.

- *1,3-Dichloropropene*
- *2,2-Dibromo-3-nitrilopropionamide (DBNPA)*
- *2,2-dichlorovinyl dimethyl phosphate (DDVP, Dichlorvos)*
- *Acephate*
- *Acrolein*
- *Aldicarb*
- *Azinphos-methyl (Guthion)*
- *Bromoxynil heptanoate*
- *Bromoxynil octanoate*
- *Buprofezin*
- *Carbaryl (Sevin)*
- *Carbofuran*
- *Chloropicrin*
- *Chlorothalonil*
- *Chlorpyrifos*
- *Chlorthal-dimethyl (DCPA, Dacthal)*
- *Clomazone*
- *Cycloate (Ro-Neet)*
- *Cyprodinil*
- *Dazomet*
- *Diazinon*
- *Dichloran*
- *Dimethoate*
- *Endosulfan**
- *Ethalfluralin*
- *Ethoprop*
- *Fenamiphos*
- *Fenpropathrin*
- *Fenthion*
- *Fludioxonil*
- *Flumioxazin*
- *Hydrogen cyanamide*
- *Imazalil*
- *Linuron*
- *Malathion*
- *Metalaxyl*
- *Metam-sodium*
- *Methamidophos (Monitor)*
- *Methidathion*
- *Methomyl*
- *Methyl bromide*
- *Methyl isothiocyanate*
- *Methyl parathion*
- *Molinate*
- *Myclobutanil*
- *Naled*
- *Oxydemeton-methyl*
- *Pentachloronitrobenzene (PCNB)*
- *Phosphine*
- *Metam-potassium*
- *Propetamphos*
- *Propoxur (Baygon)*
- *Propylene oxide*
- *Pyrimethanil*
- *S,S,S-Tributyl phoshorotrithioate (DEF)*
- *S-Ethyl dipropylthiocarbamate (EPTC)*
- *Sodium cyanide*
- *Sodium tetrathiocarbonate*
- *Sulfur dioxide*
- *Sulfuryl fluoride*
- *Thiram*
- *Triclopyr butoxyethyl ester (TBEE)*
- *Triclopyr triethylamine salt (TEA)*
- *Triflumizole*
- *Trifluralin*
- *Ziram*

* *Added based on its designation as a Toxic Air Contaminant (AB 1807 Program).*

References

Bradman A, Eskenazi B, Barr DB, Bravo R, Castorina R, Chevrier J, *et al.* (2005). Organophosphate urinary metabolite levels during pregnancy and after delivery in women living in an agricultural community. *Environ Health Perspect* **113**(12):1802-7.

Bradman A, Whitaker D, Quiros L, Castorina R, Claus Henn B, Nishioka M, *et al.* (2007). Pesticides and their metabolites in the homes and urine

of farmworker children living in the Salinas Valley, CA. *J Expo Sci Environ Epidemiol* **17**(4):331-49.

CDPR (2012). California Department of Pesticide Regulation. Air Monitoring Network Results for 2011. Volume 1. [Available at URL: http://www.cdpr.ca.gov/docs/emon/airinit/amn_draft_vol1.pdf].

Coronado GD, Holte S, Vigoren E, Griffith WC, Barr DB, Faustman E, Thompson B (2011). Organophosphate pesticide exposure and residential proximity to nearby fields: evidence for the drift pathway. *J Occup Environ Med* **53**(8):884-91.

Gunier RB, Ward MH, Airola M, Bell EM, Colt J, Nishioka M, *et al.* (2011). Determinants of agricultural pesticide concentrations in carpet dust. *Environmental health perspectives* **119**(7):970.

Harnly ME, Bradman A, Nishioka M, McKone TE, Smith D, McLaughlin R, *et al.* (2009). Pesticides in dust from homes in an agricultural area. *Environ Sci Technol* **43**(23):8767-74.

Koutros S, Beane Freeman LE, Lubin JH, Heltshe SL, Andreotti G, Barry KH, *et al.* (2013). Risk of total and aggressive prostate cancer and pesticide use in the Agricultural Health Study. *Am J Epidemiol* **177**(1):59-74.

Lee SJ, Mehler L, Beckman J, Diebolt-Brown B, Prado J, Lackovic M, *et al.* (2011). Acute Pesticide Illnesses Associated with Off-Target Pesticide Drift from Agricultural Applications: 11 States, 1998–2006. *Environmental health perspectives* **119**(8):1162.

O'Malley M, Barry T, Ibarra M, Verder-Carlos M, Mehler L (2005). Illnesses related to shank application of metam-sodium, Arvin, California, July 2002. *Journal of Agromedicine* **10**(4):27-42.

Quiros-Alcala L, Bradman A, Nishioka M, Harnly ME, Hubbard A, McKone TE, *et al.* (2011). Pesticides in house dust from urban and farmworker households in California: an observational measurement study. *Environ Health* **10**:19.

Rauh VA, Perera FP, Horton MK, Whyatt RM, Bansal R, Hao X, *et al.* (2012). Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A* **109**(20):7871-6.

TOXIC RELEASES FROM FACILITIES

Exposure Indicator

There is widespread concern regarding exposures to chemicals that are released from industrial facilities. Statewide information directly measuring exposures to toxic releases has not been identified. However, some data on the *release* of pollutants into the environment is available and may provide some relevant evidence for potential subsequent exposures. The U.S. Environmental Protection Agency maintains a toxic substance inventory of on-site releases to air, water, and land and underground injection of any classified chemical, as well as quantities transferred off-site. The data are reported by each facility.

Indicator

Total toxicity-weighted pounds of chemicals released on-site to air or water from all facilities within the ZIP code, or within one kilometer of the ZIP code.

Data Source

Toxics Release Inventory (TRI) and
Risk Screening Environmental Indicators (RSEI),
U.S. Environmental Protection Agency (US EPA)

TRI is a database of self-reported disposal or other releases and waste management activities for certain listed toxic chemicals. It is updated annually. The TRI program was created by the federal Emergency Planning and Community Right-to-Know Act (EPCRA) and Pollution Prevention Act. The chemicals included in the database are those on EPCRA:

- Chemicals identified in EPCRA Section 313 (593 individually listed chemicals and 30 chemical categories including 3 delimited categories containing 62 chemicals); and
- Persistent, Bioaccumulative and Toxic (PBT) Chemicals (16 specific chemicals and 4 chemical classes).

Facilities are required to report if they have 10 or more full-time employees, operate within a set of industrial sectors outlined by TRI, and manufacture more than 25,000 pounds or otherwise use more than 10,000 pounds of any listed chemical during the calendar year. Lower reporting thresholds apply for PBT chemicals (10 or 100 pounds) and dioxin-like chemicals (0.1 gram).

RSEI is a computer-based chronic health screening tool developed by US EPA. It includes chemical-specific toxicity weights, which can be applied to TRI emissions data to produce a toxicity-weighted result. These weights are drawn from various programs of the US EPA, Cal/EPA, and the Agency for Toxic Substances and Disease Registry. For each facility, individual chemical weights are multiplied by the pounds of the chemical reported released. These are summed across all chemicals reported by the facility for the total toxicity-weighted pounds. Using this metric helps to incorporate toxicity considerations into the emissions data.

http://www.epa.gov/tri/index.htm
http://www.epa.gov/oppt/rsei/pubs/technical_appendix_a_toxicity_v2.3.1.pdf

Rationale

The Toxics Release Inventory (TRI) provides public information on emissions and releases into the environment from a variety of facilities across the state. TRI data do not, however, provide information on the extent of public exposure to these chemicals. That said, US EPA has stated that "[d]isposal or other releases of chemicals into the environment occur through a range of practices that could ultimately affect human exposure to the toxic chemicals ." (US EPA, 2010). A study of pollution in the printed wiring board industry found that among states with high TRI emissions in 2006, RSEI risk scores for California were by far the highest. According to the study, California combines high toxic emissions with a high risk score, based on location, composition of emissions and population exposure modeling (Lam *et al.*, 2011).

Air monitoring data at hundreds of locations across the United States have identified over a dozen hazardous air pollutants at concentrations that exceed California cancer or non-cancer benchmarks (McCarthy *et al.*, 2009). Many of the locations that these authors found to have elevated levels are near major industrial sources, and many of the chemicals monitored are the same as those that are emitted from these facilities. In California, a study that modeled concentrations of air toxic chemicals found significant levels of risk (Morello-Frosch *et al.*, 2000). Although this study found that mobile sources accounted for a major portion of the risk, the authors pointed out that for some communities, local industrial sources were a major contributor.

In addition to routine chemical releases, some communities located near TRI facilities are at risk from exposure to accidental chemical releases. A study of self-reported accident rates at U.S. chemical facilities over a five year period reported that 1,205 facilities (7.8% of facilities in the database) had at least one accident during the reporting period, and an additional 355 facilities (2.3%) had multiple accidents during the reporting period (Kleindorfer *et al.*, 2003). Associated with these events were a total of 1,987 injuries and 32 deaths among workers, and 167 injuries among nonemployees, including emergency responders. There were 215 total hospitalizations and 6,057 individuals given other medical treatments. Over 200,000 community residents were involved in evacuations and shelter-in-place incidents over that five year period.

Several studies have examined the potential for health effects from living near TRI facilities. For example, a case-control study reported an increase in risk for diagnosis of brain cancer in children of mothers living within a mile of a TRI facility that released carcinogens (Choi *et al.*, 2006). In another study, TRI air and water concentrations were associated with an increase in infant, but not fetal, mortality rates (Agarwal *et al.*, 2010).

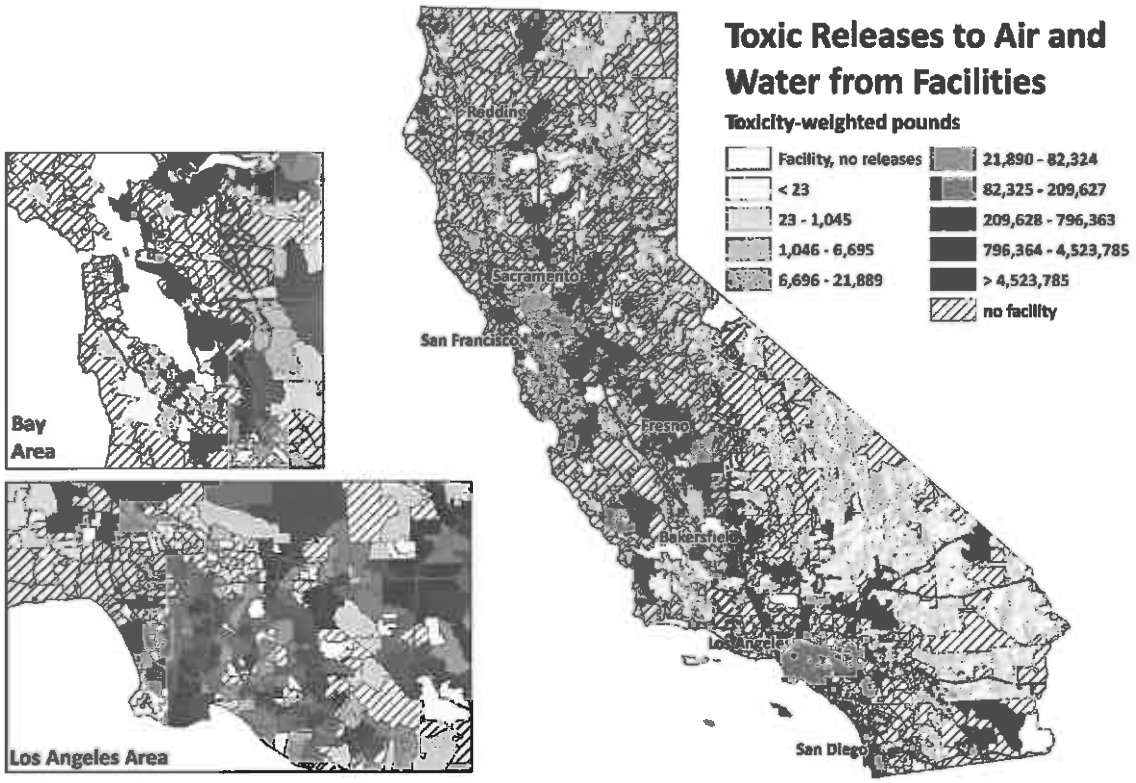
Multiple studies have observed greater emissions in low-income and

disadvantaged areas (Szasz and Meuser, 1997). Additionally, race and ethnicity have been correlated with the presence of toxic release facilities. People of color in studied regions of southern California were found to have a greater likelihood of living in areas with higher toxic releases (Morello-Frosch *et al.*, 2002; Sadd *et al.*, 1999).

Method

- Data on the location and toxicity-weighted emissions for facilities in California, or within one kilometer of California, were extracted from TRI using the TRI.NET program for 2008, 2009, and 2010. (http://www.epa.gov/tri/tridotnet/index.html)
- Toxicity-weighted on-site emissions to air and water were selected. (Releases to land and off-site transfers were excluded.)
- Facility locations with a valid latitude and longitude were mapped. Facility locations with address only were geocoded (ArcMap).
- A 1 kilometer (km) circular buffer (~3.14 km^2) was placed around each facility.
- ZIP codes were scored by summing the toxicity-weighted pounds of emissions for all facilities within the ZIP code or within one kilometer of the ZIP code, using an area-apportionment method:
  - If the 1 km buffer of a facility was fully located within a ZIP code, the toxicity-weighted pounds were fully applied to the ZIP code.
  - If the 1 km buffer crossed adjacent ZIP code(s), a portion of the toxicity-weighted pounds was applied to the ZIP codes based on the portion of the buffer located in each ZIP code area. For example, if the measured area of a facility's buffer was half in one ZIP code and half in another, 50 percent of the toxicity-weighted pounds was assigned to each ZIP code.
- Facilities that do not fall within the boundaries of census ZIP codes (or within the 1 km buffer) were added to the toxicity-weighted pounds of the census ZIP code that corresponds to the facility's ZIP code reported in the TRI database.
- For a three-year average, toxicity-weighted emissions by ZIP code were calculated for the years 2008 to 2010, individually, and then averaged.
  - ZIP codes were assigned a percentile based on their position in the distribution of ZIP codes with a facility located within it or within 1 km of the ZIP code. (If facilities are located within a ZIP code but all had no reported emissions for 2008-2010, the ZIP code is assigned the lowest percentile value.)

Indicator Map



References

Agarwal N, Banternghansa C, Bui L (2010). Toxic exposure in America: Estimating fetal and infant health outcomes from 14 years of TRI reporting. *Journal of Health Economics* **29**(4):557-74.

Choi HS, Shim YK, Kaye WE, Ryan PB (2006). Potential residential exposure to toxics release inventory chemicals during pregnancy and childhood brain cancer. *Environmental Health Perspectives* **114**(7):1113.

Kleindorfer PR, Belke JC, Elliott MR, Lee K, Lowe RA, Feldman HI (2003). Accident epidemiology and the U.S. chemical industry: accident history and worst-case data from RMP*Info. *Risk Anal* **23**(5):865-81.

Lam CW, Lim SR, Schoenung JM (2011). Environmental and risk screening for prioritizing pollution prevention opportunities in the U.S. printed wiring board manufacturing industry. *J Hazard Mater* **189**(1-2):315-22.

McCarthy MC, O'Brien TE, et al (2009). Characterization of the Chronic Risk and Hazard of Hazardous Air Pollutants in the United States Using Ambient Monitoring Data. *Environ Health Perspect* **117**(5): 790–796.

Morello-Frosch R, Pastor MJ, Porras C, Sadd J (2002). Environmental justice and regional inequality in southern California: implications for future research. *Environmental Health Perspectives* **110**(Suppl 2): 149-154.

Morello-Frosch RA, Woodruff TJ, Axelrad DA, Caldwell JC (2002). Air toxics and health risks in California: the public health implications of outdoor concentrations. *Risk Anal* **20**(2):273-91.

Sadd JL, Pastor MJ, Boer JT, Snyder LD (1999). "Every breath you take...": the demographics of toxic air releases in Southern California. *Economic Development Quarterly* **13**(2):107-23.

Szasz A, Meuser M (1997). Environmental inequalities: literature review and proposals for new directions in research and theory. *Current Sociology* **45**(3):99-120.

US EPA (2010). 2010 Toxics Release Inventory National Analysis Overview. 35 pp. http://www.epa.gov/tri/NationalAnalysis/archive/2010_National_Analysis_Overview_Document.pdf

TRAFFIC DENSITY

Exposure Indicator

While California has the strictest auto emissions standards in the U.S., the state is also known for its freeways and heavy traffic. Traffic is a significant source of air pollution, particularly in urban areas, where more than 50% of particulate emissions come from traffic. Exhaust from vehicles contains a large number of toxic chemicals, including nitrogen oxides, carbon monoxide, and benzene. Traffic exhaust also plays a role in the formation of photochemical smog. Health effects of concern from these pollutants include heart and lung disease, cancer, and increased mortality.

Indicator

Traffic density – Sum of traffic volumes adjusted by road segment length (vehicle-kilometers per hour) divided by total road length (kilometers) within 150 meters of the ZIP code boundary.

Data Source

Traffic Volume Linkage Tool,
California Environmental Health Tracking Program (CEHTP)
Environmental Health Investigations Branch,
California Department of Public Health

Data on the amount of traffic traveling on major roadways statewide are available. Traffic data are compiled under the California Department of Transportation's (Caltrans) Highway Performance Monitoring System (HPMS) every four years. The data consist of traffic volumes along various pre-defined segments of roadways across the state. Locally maintained roads are not included in the data.

A Traffic Volume Linkage Tool developed under CEHTP uses the annual average daily traffic (AADT) volumes from the 2004 HPMS data to calculate traffic-related metrics within a circular buffer of any geographic coordinate in California.

For this analysis, CEHTP used the 2004 HPMS data and the Traffic Volume Linkage Tool to calculate traffic density within a 150 meter buffer of the ZIP code boundary. Traffic density was calculated as the sum of all road length-adjusted traffic volumes per hour divided by the total road length (from HPMS) in and within 150 meters of each ZIP code.

The most recent year for which data are available for use by this tool is 2004.

http://www.cehtp.org/p/tools_traffic

Rationale

Traffic density is used to represent the number of mobile sources in a specified area, resulting in human exposures to chemicals that are released into the air by vehicle exhaust, as well as other effects related to large concentrations of motor vehicles. Major roadways have been associated with a variety of effects on communities, including noise, vibration, injuries, and local land use changes such as increased numbers of gas stations. For example, motorists often detour through residential

streets near major roads in order to avoid congestion or traffic controls, a phenomenon known as "rat-running"; this phenomenon can increase risk of injuries among pedestrians or bicyclists in these communities. Vehicle speed is directly associated with risk of pedestrian fatality, and speeds along major roadways tend to be higher than normal speeds on residential streets.

Studies have shown that non-white and low income people make up the majority of residents in high-traffic areas (Gunier *et al.* 2003; Tian *et al.*, 2013) and that schools that are located near busy roads are more likely to be in poor neighborhoods than those farther away (Green *et al.* 2004). In addition, children who live or attend schools near busy roads are more likely to suffer from asthma and bronchitis than children in areas with lower traffic density. This relationship has been seen in both developed (Patel *et al., 2011;* Schultz *et al.* 2012) and developing countries (Baumann *et al.*, 2011).

Exposure to air pollutants from vehicle emissions has been linked to adverse birth outcomes, such as low birth weight and preterm birth (Ghosh *et al.*, 2012; Ritz *et al.* 2007). A recent study of children in Los Angeles found that those with the highest prenatal exposure to traffic-related pollution were up to 15% more likely to be diagnosed with autism than children of mothers in the lowest quartile of exposure (Becerra *et al.*, 2013). The Atherosclerosis in Communities study, a cohort study with over 15,000 participants, found that traffic density and distance to roadways were associated with reduced lung function in adult women (Kan *et al.*, 2007). Road density and traffic volume were associated with adult male mortality from cardiovascular disease in an urban area in Brazil (Habermann and Gouveia, 2012). Motor vehicle exhaust is also a major source of polycyclic aromatic hydrocarbons (PAH), which can damage DNA and may cause cancer (IARC, 2010).

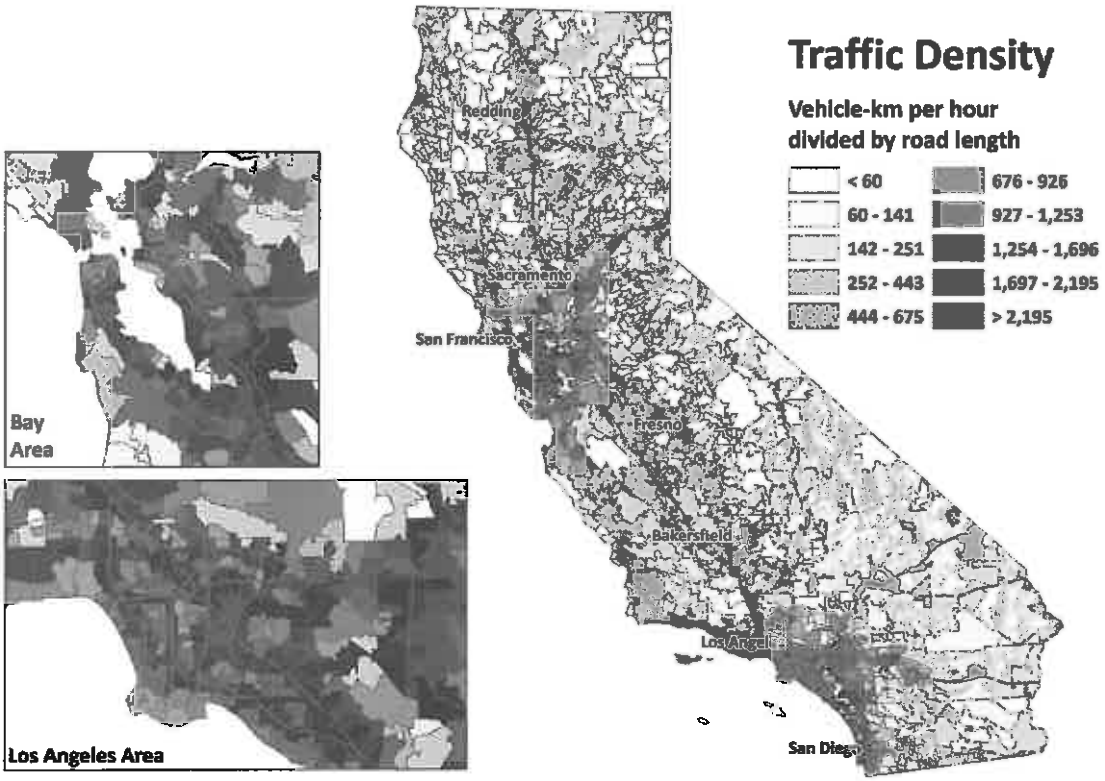
Method

- A 150 meter buffer was placed around each of the census ZIP codes in California. A buffer was chosen to account for roadways near ZIP code boundaries. The selected buffer distance of 150 meters, or about 500 feet, is taken from the California Air Resources Board Air Quality and Land Use Handbook recommendations, which states that most particulate air pollution from traffic drops off after approximately 500 feet (CARB, 2005).
- The buffered boundaries were put into the Traffic Volume Linkage Tool.
- Traffic density was calculated using two metrics from the tool: 1) the sum of all length-adjusted traffic volumes within the buffered ZIP code (vehicle-km/hr), then divided by 2) the sum of the length of all road segments within the buffered ZIP code (km).
- Due to differences in the length of road segments within Highway Performance Monitoring (HPMS), a length-adjusted traffic volumes metric was selected. This metric multiplies traffic volumes by length of the road segment in HPMS.
- Traffic density is calculated as traffic volumes (adjusted by road

segment lengths) divided by the total road length within the 150 meter buffer of each ZIP code (vehicles-km/hr/km).

- ZIP codes were sorted by traffic density and assigned percentiles based on the distribution.

Indicator Map



References

Air Quality and Land Use Handbook: A Community Health Perspective, California Air Resources Board (CARB): Sacramento, CA, USA, 2005. Available online: http://www.arb.ca.gov/ch/handbook.pdf (accessed on December 20, 2012).

Becerra TA, Wilhelm M, Olsen J, Cockburn M, Ritz B (2013). Ambient air pollution and autism in Los Angeles County, California. *Environ Health Perspect* **121**(3):380-6.

Ghosh JKC, Wilhelm M, Su J, Goldberg D, Cockburn M, Jerrett M, *et al.* (2012). Assessing the Influence of Traffic-related Air Pollution on Risk of Term Low Birth Weight on the Basis of Land-Use-based Regression Models and Measures of Air Toxics. *American Journal of Epidemiology* **175**(12):1262-74.

Green, R. S., S. Smorodinsky, *et al.* (2004). Proximity of California public schools to busy roads. *Environ Health Perspect* **112**(1): 61-66.

Gunier, R. B., A. Hertz, *et al.* (2003). Traffic density in California: socioeconomic and ethnic differences among potentially exposed children. *J Expo Anal Environ Epidemiol* **13**(3): 240-246.

IARC. Some non-heterocyclic polycyclic aromatic hydrocarbons and some related exposures. (2010). *IARC Monogr Eval Carcinog Risks Hum* **92**:1-853.

Kan H, Heiss G, Rose KM, Whitsel E, Lurmann F, London SJ (2007). Traffic Exposure and lung function in adults: the Atherosclerosis Risk in Communities study. *Thorax* **62**:873-79.

Ritz, B., M. Wilhelm, *et al.* (2007). Ambient air pollution and preterm birth in the environment and pregnancy outcomes study at the University of California, Los Angeles. *Am J Epidemiol* **166**(9): 1045-52.

Schultz, E. S., O. Gruzieva, *et al.* (2012). Traffic-Related Air Pollution and Lung Function In Children At 8 Years Of Age - A Birth Cohort Study. *Am J Respir Crit Care Med.* 186(10).

Tian N, Xue J, Barzyk TM (2013). Evaluating socioeconomic and racial differences in traffic-related metrics in the United States using a GIS approach. *J Expo Sci Environ Epidemiol* **23**(2):215-22.

CLEANUP SITES

Environmental Effects Indicator

Sites undergoing cleanup actions by governmental authorities or by property owners have suffered environmental degradation due to the presence of hazardous substances. Of primary concern is the potential for people to come into contact with these substances. Some of these "brownfield" sites are also underutilized due to cleanup costs or concerns about liability. The most complete set of information available related to cleanup sites and brownfields in California is maintained by the Department of Toxic Substances Control.

Indicator

Sum of weighted sites within each ZIP code.

Since the nature and the magnitude of the threat and burden posed by hazardous substances vary among the different types of sites as well as the site status, the indicator takes both into account.

Data Source

EnviroStor Cleanup Sites Database,
Department of Toxic Substances Control (DTSC)
Agency for Toxic Substances and Disease Registry (ATSDR) Hazardous Waste Site Polygon Data with CIESIN Modifications, v1 (2008)

EnviroStor is a public database that provides access to information maintained by DTSC on site cleanup. The database contains information on numerous types of cleanup sites, including Federal Superfund, State Response, Corrective Action, School Cleanup, Voluntary Cleanup, Tiered Permit, Evaluation, Historical, and Military Evaluation sites. The database contains information related to the status of the site such as required cleanup actions, involvement/land use restriction, or "no involvement."

The Columbia University Center for International Earth Science Information Network (CIESIN) maintains and distributes the dataset for National Priorities List (NPL) Superfund sites nationwide. The data come in polygon format and generally represent the parcel boundaries of the sites. These data represent a subset of the larger Hazardous Waste Polygon Database, originally developed by the Center for Disease Control's Geospatial Research, Analysis, and Services Program.

http://www.envirostor.dtsc.ca.gov/public/
http://sedac.ciesin.columbia.edu/data/set/superfund-atsdr-hazardous-waste-site-ciesin-mod-1996

Rationale

Contaminated sites can pose a variety of risks to nearby residents. Hazardous substances can move off-site and impact surrounding communities through volatilization, groundwater plume migration, or windblown dust. Studies have found levels of organochlorine pesticides in blood (Gaffney *et al.* 2005) and toxic metals in house dust (Zota *et al.* 2011) that were correlated with residents' proximity to contaminated sites.

A study of pregnant women living near Superfund sites in New York state found an increased risk of having a low birth weight male child

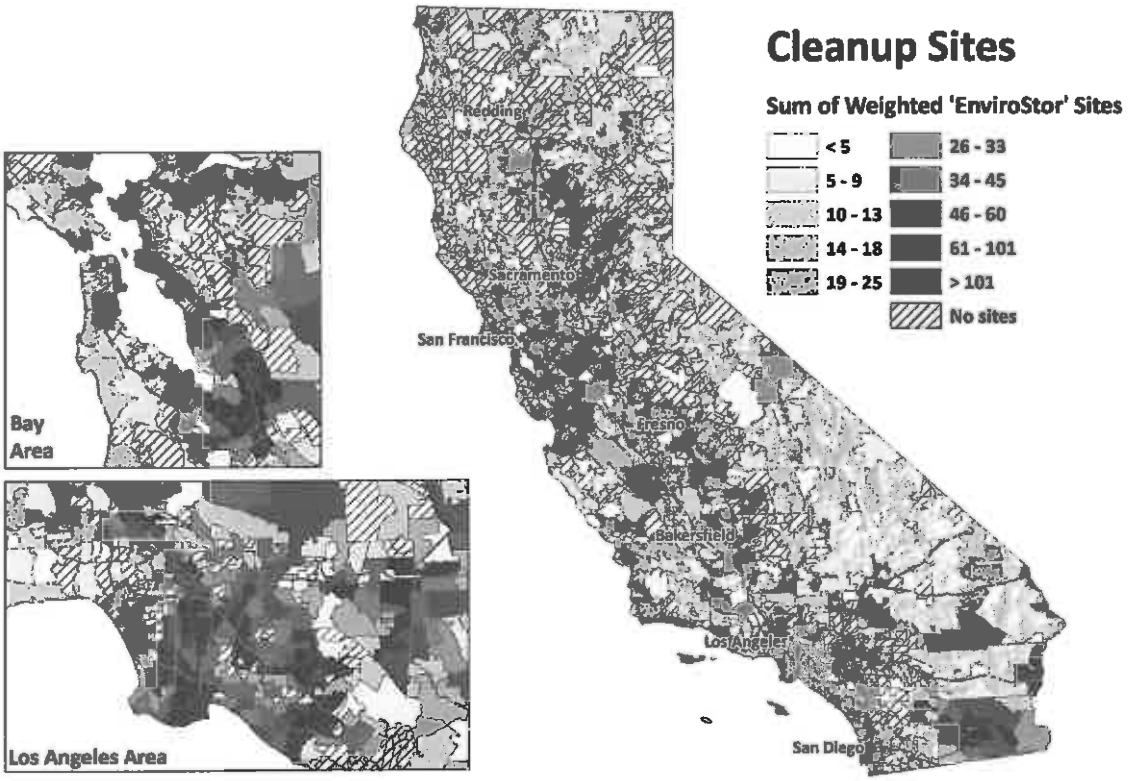
(Baibergenova *et al.* 2003). A later study in New York City found an association between prevalence of liver disease and the number of Superfund sites per 100 square miles (Ala *et al.* 2007). A demographic study of socioeconomic factors in communities in Florida found that census tracts with Superfund sites had significantly higher proportions of African Americans, Latinos and people employed in "blue collar" occupations than census tracts that did not contain a Superfund site (Kearney and Kiros, 2009).

It generally takes many years for a site to be certified as clean, and cleanup work is often delayed due to cost, litigation, concerns about liability or detection of previously unrecognized contaminants. Contaminated sites also have the potential to degrade nearby wildlife habitats, resulting in potential ecological impacts as well as threats to human health.

Method

- Data on cleanup site type, status, and location (coordinate or address) for the entire state were downloaded from the EnviroStor Cleanup Sites database.
- Several types of sites and statuses were excluded from the analysis because they indicate neither the presence of hazardous waste nor potential environmental risk (See Appendix).
- Each remaining site was scored on a weighted scale of 2 to 12 in consideration of both the site type and status (See Appendix). Higher weights were applied to Superfund, State Response sites, and cleanups compared to evaluations, for example. Similarly, higher weights were applied to sites that are undergoing active remediation and oversight by DTSC, relative to those with little or no state involvement.
- Sites with a valid latitude and longitude were mapped and sites with address only were geocoded in ArcMap.
- Agency for Toxic Substances and Disease Registry (ATSDR) Hazardous Waste Site polygon data were downloaded from the CIESIN website.
- Polygon sites in California on the NPL were identified. Sites were assigned a score of 12 (as a federal Superfund site).
- EnviroStor sites with a NPL polygon representation were replaced.
- All sites, including NPL polygon sites, were assigned a 250-meter buffer.
- Each ZIP code was scored based on the sum of the weighted sites it contains and the buffers that it intersects.
- Summed ZIP code ranks were assigned percentile scores.

Indicator Map



References

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Agency for Toxic Substances and Disease Registry (ATSDR) Hazardous Waste Site Polygon Data with CIESIN Modifications, 1996. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). http://sedac.ciesin.columbia.edu/data/set/superfund-atsdr-hazardous-waste-site-ciesin-mod-1996. Accessed 15 October 2012.

Ala A, Stanca CM, Bu-Ghanim M, Ahmado I, Branch AD, Schiano TD, *et al.* (2006). Increased prevalence of primary biliary cirrhosis near Superfund toxic waste sites. *Hepatology* **43**(3):525-31.

Baibergenova A, Kudyakov R, Zdeb M, Carpenter DO (2003). Low birth weight and residential proximity to PCB-contaminated waste sites. *Environ Health Perspect* **111**(10):1352-7.

Gaffney SH, Curriero FC, Strickland PT, Glass GE, Helzlsouer KJ, Breysse PN (2005). Influence of geographic location in modeling blood pesticide levels in a community surrounding a U.S. Environmental protection agency superfund site. *Environ Health Perspect* **113**(12):1712-6.

Kearney G, Kiros GE (2009). A spatial evaluation of socio demographics surrounding National Priorities List sites in Florida using a distance-based approach. *Int J Health Geogr* **8**:33.

Zota AR, Schaider LA, Ettinger AS, Wright RO, Shine JP, Spengler JD (2011). Metal sources and exposures in the homes of young children living near a mining-impacted Superfund site. *J Expo Sci Environ Epidemiol* **21**(5):495-505.

Appendix

Weighting Matrix for Cleanup Sites

Cleanup Sites from the EnviroStor Cleanup Sites database were weighted on a scale of 0 to 12 in consideration of both the site type and status. The following table shows the weights applied for each site type and status.

Site and status types excluded from the analysis:
School Investigation and *Border Zone/Hazardous Waste Evaluation* site types were not included in the analysis. Sites with the following statuses were also not included in the analysis: *Agreement – Work Completed, Referrals, Hazardous Waste Disposal Land Use,* and *De-listed.* Sites with statuses of *Certified, Completed,* and *No Further Action* were assigned a weight of zero and were effectively not included in the analysis. These sites and status types were excluded because they are not indicative of hazardous waste or potential environmental risk.

For a given ZIP code, the weighted scores of all facilities in the area were summed. Definitions used in the table are defined below.

Site Type	Status		
	Low • Certified • Completed • No Further Action	Medium • Inactive-Needs Eval. • Inactive • Certified Operation & Maintenance – Land Use Restrictions • Certified Operation & Maintenance	High • Active • Backlog • Inactive- Action Required
Low • Evaluation • Historical • Military Evaluation	0	4	6
Medium • Corrective Action • School Cleanup • Voluntary Cleanup • Tiered Permit	1	7	9
High • State Response • Superfund	2	10	12

Definitions*

- *Active*: Identifies that an investigation and/or remediation is currently in progress and that DTSC is actively involved, either in a lead or support capacity.
- *Certified Operation and Maintenance (O&M)*: Identifies sites that have certified cleanups in place but require ongoing O&M activities.
- *Certified*: Identifies completed sites with previously confirmed releases that are subsequently certified by DTSC as having been remediated satisfactorily under DTSC oversight.
- *Corrective Action*: Identifies sites undergoing "corrective action," defined as investigation and cleanup activities at hazardous waste facilities (either Resource Conservation and Recovery Act (RCRA) or State-only) that either were eligible for a permit or received a permit. These facilities treat, store, dispose and/or transfer hazardous waste.
- *Evaluation*: Identifies suspected, but unconfirmed, contaminated sites that need or have gone through a limited investigation and assessment process.
- *Inactive – Action Required*: Identifies non-active sites where, through a Preliminary Endangerment Assessment (PEA) or other evaluation, DTSC has determined that a removal or remedial action or further extensive investigation is required.
- *Inactive - Needs Evaluation*: Identifies inactive sites where DTSC has determined a Preliminary Endangerment Assessment or other evaluation is required.

- *No Further Action*: Identifies completed sites where DTSC determined after investigation, generally a PEA (an initial assessment), that the property does not pose a problem to public health or the environment.
- *School Cleanup*: Identifies proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination at which remedial action occurred.
- *State Response*: Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.
- *Superfund*: Identifies sites where the US EPA proposed, listed, or delisted a site on the National Priorities List (NPL).
- *Voluntary Cleanup*: Identifies sites with either confirmed or unconfirmed releases, and the project proponents have requested that DTSC oversee evaluation, investigation, and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

* EnviroStor Glossary of Terms
(http://www.envirostor.dtsc.ca.gov/public/EnviroStor%20Glossary.pdf)

GROUNDWATER THREATS

Environmental Effects Indicator

Many activities can pose threats to groundwater quality. These include the storage and disposal of hazardous materials on land and in underground storage tanks at various types of commercial, industrial, and military sites. Thousands of storage tanks in California have leaked petroleum or other hazardous substances, degrading soil and groundwater. Storage tanks are of particular concern when they can affect drinking water supplies. Storage tank sites can expose people to contaminated soil and volatile contaminants in air. In addition, the land surrounding these sites may be taken out of service due to perceived cleanup costs or concerns about liability. The most complete set of information related to sites that may impact groundwater and require cleanup is maintained by the State Water Resources Control Board.

Indicator

Sum of weighted scores for sites within each ZIP code.

The nature and the magnitude of the threat and burden posed by sites maintained in GeoTracker vary significantly by site type (e.g., leaking underground storage tank or cleanup site) and status (e.g., Completed Case Closed or Active Clean up). Thus, the indicator takes into account information about both the type of site and its status.

Data Source

GeoTracker Database,
State Water Resources Control Board (SWRCB)

GeoTracker is a public web site that allows the SWRCB, regional water quality control boards and local agencies to oversee and track projects at cleanup sites that can impact groundwater. The GeoTracker database contains information on locations and water quality of wells that could be contaminated, as well as potential sources of groundwater contamination. These include leaking underground storage tanks (LUSTs), leaking military underground storage tanks (USTs) cleanup and land disposal sites, and cleanup sites, industrial sites, airports, dairies, dry cleaners, and publicly-owned sewage treatment plants. For each site, there is additional information on the status of cleanup activities. Groundwater quality data are extracted from monitoring and records maintained by SWRCB, the Department of Water Resources, Department of Public Health, Department of Pesticide Regulation, U.S. Geological Survey and Lawrence Livermore National Laboratory. The database is constantly updated and sites are never deleted from the database, where they may ultimately be designated 'clean closed.'

A separate GeoTracker database contains information on the location of underground storage tanks (not leaking), which was not used.

http://geotracker.waterboards.ca.gov/

Rationale

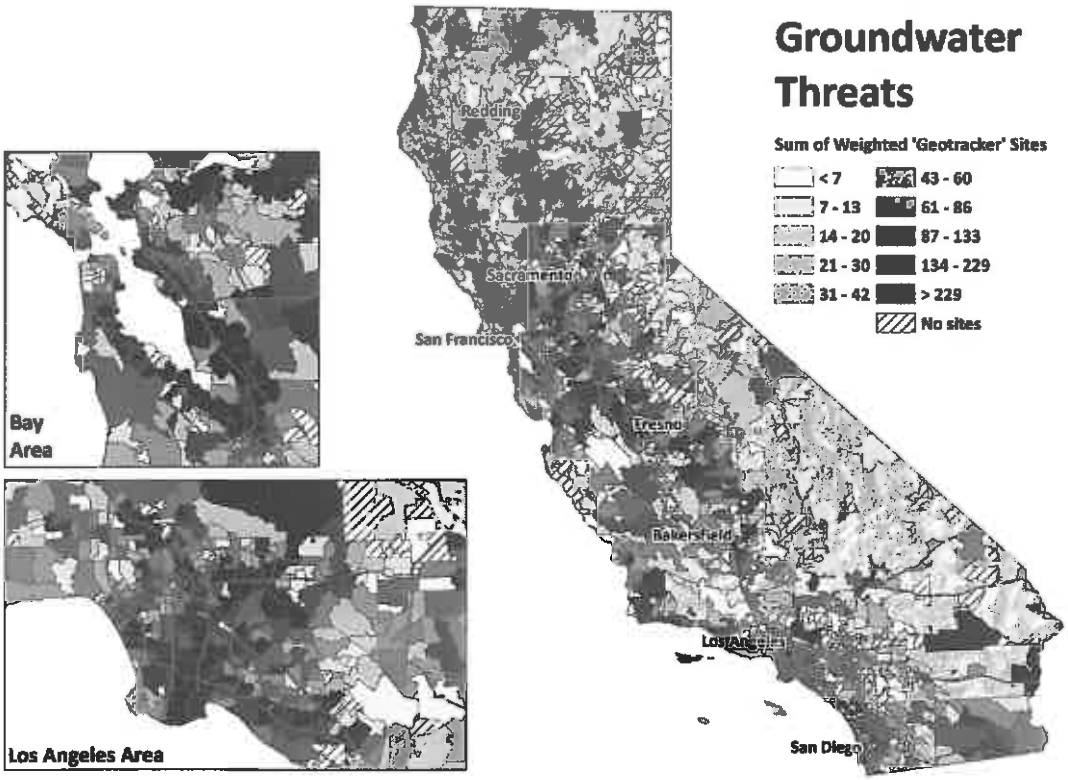
Common groundwater pollutants found at LUST and cleanup sites in California include gasoline and diesel fuels, chlorinated solvents and other volatile organic compounds (VOCs) such as benzene, toluene, and methyl tert-butyl ether (MTBE); heavy metals such as lead, chromium and

arsenic; polycyclic aromatic hydrocarbons (PAHs); persistent organic pollutants like polychlorinated biphenyls (PCBs); DDT and other insecticides; and perchlorate (SWRCB, 2012; DPR, 2011; US EPA, 2002). Dioxins and dioxin-like substances have been detected in groundwater in areas where treated wastewater has been used for irrigation (Mahjoub *et al.*, 2011) and near wood treatment facilities (Karouna-Renier *et al.*, 2007). The occurrence of storage tanks, leaking or not, provides a good indication of potential concentrated sources of some of the more prevalent compounds in groundwater. For example, the detection frequency of VOCs found in gasoline is associated with the number of UST or LUST sites within one kilometer of a well (Squillace and Moran, 2007). The occurrence of chlorinated solvents in groundwater is also associated with the presence of cleanup sites (Moran *et al.*, 2007). Some of these cancer-causing compounds have in turn been detected in drinking water supplies in California (Williams *et al.*, 2002). People who live near shallow groundwater plumes containing VOCs may also be exposed via the intrusion of vapors from soil into indoor air (Picone *et al.*, 2012; Yao *et al.*, 2013).

Method

- Data on cleanup site type, status, and location (coordinate or address) for the entire state were downloaded from GeoTracker (http://geotracker.waterboards.ca.gov/data_download.asp; GeoTracker Cleanup Sites).
- Certain types of sites and statuses were excluded from the analysis because they are not indicative of a hazard or a potential environmental risk (see Appendix).
- Each remaining site was scored on a weighted scale of 3 to 15 in consideration of both the site type and status.
- Sites with a valid latitude and longitude were mapped and sites with address only were geocoded in ArcMap. Sites without a valid latitude and longitude or unrecognizable address were excluded from the analysis.
- Sites were assigned a 250-meter buffer.
- Each ZIP code was scored based on the sum of the weighted sites it contains and the buffers it intersects.
- Summed ZIP code scores were assigned percentiles.

Indicator Map



References

Karouna-Renier NK, Rao KR, Lanza JJ, Davis DA, Wilson PA (2007). Serum profiles of PCDDs and PCDFs, in individuals near the Escambia Wood Treating Company Superfund site in Pensacola, FL. *Chemosphere* **69**(8):1312-9.

Mahjoub O, Escande A, Rosain D, Casellas C, Gomez E, Fenet H (2011). Estrogen-like and dioxin-like organic contaminants in reclaimed wastewater: transfer to irrigated soil and groundwater. *Water Sci Technol* **63**(8):1657-62.

Moran MJ, Zogorski JS, Squillace PJ (2007). Chlorinated solvents in groundwater of the United States. *Environ Sci Technol* **41**(1): 74-81.

Picone S, Valstar J, van Gaans P, Grotenhuis T, Rijnaarts H (2012). Sensitivity analysis on parameters and processes affecting vapor intrusion risk. *Environ Toxicol Chem* **31**(5):1042-52.

Squillace PJ, Moran MJ (2007). Factors associated with sources, transport, and fate of volatile organic compounds and their mixtures in aquifers of the United States. *Environ Sci Technol* **41**(7):2123-30.

Williams P, Benton L, Warmerdam J, Sheehan P (2002). Comparative risk analysis of six volatile organic compounds in California drinking

water. *Environ Sci Technol* **36**(22): 4721-28.

Yao Y, Shen R, Pennell KG, Suuberg EM (2013). Examination of the Influence of Environmental Factors on Contaminant Vapor Concentration Attenuation Factors Using the U.S. EPA's Vapor Intrusion Database. *Environ Sci Technol* **47**(2):906-13.

Appendix

Weighting Matrix for Groundwater Threats

Groundwater threats from the GeoTracker database were weighted on a scale of 3 to 15 in consideration of both the site type and status. The following table shows the weights applied for each site type and status.

Sites with a status type of *Completed – Case Closed* and *Open-Referred* were excluded from the analysis.

For a given ZIP code, the weighted scores of all facilities in the area were summed.

	Status	
	Low • Open • Open—Inactive Open • Open—Verification Monitoring	**High** • Open—Remediation • Open—Reopen • Open—Site Assessment • Open—Site Assessment & Remedial Action
Low • LUST Cleanup Program • Military Underground Storage Tanks	3	5
Medium • Land Disposal Site	6	10
High • Cleanup Program Site • Military Privatized Site • Military Cleanup Site	9	15

Definitions*

- *Cleanup Program Site* (Site Cleanup Program): In general, Site Cleanup Program sites are areas where a release of pollutants has occurred that is not addressed in the other core regulatory programs (e.g., permitted facilities, USTs). The funding for the Program is primarily cost reimbursement from responsible parties.
- *Completed - Case Closed:* A closure letter or other formal closure decision document has been issued for the site.
- *Land Disposal Site:* The Land Disposal program regulates water quality aspects of discharges to land for disposal, treatment, or storage of waste at waste management facilities and units such as landfills, waste piles and land treatment units under California

Code of Regulations, Title 27. A land disposal unit is an area of land, or a portion of a waste management facility, at which waste is discharged.

- *Military Cleanup Site:* Military Cleanup Program sites are areas where a release of pollutants from an active or closed military facility has occurred. The military fully funds for the Program oversight.
- *Military Privatized Site:* These sites are within the Site Cleanup Program. They are unique because these sites have been transferred by the military into non-military ownership with or without further cleanup necessary.
- *Military Underground Storage Tanks (UST):* Military UST Program sites are areas where a release of pollutants from an underground storage tank has occurred at a military or former military installation. The military fully funds for the Program oversight costs.
- *Open – Eligible for Closure:* Identifies cases that meet the general and media-specific criteria established in the SWRCB Low-Threat Underground Storage Tank Policy Case Closure Policy.
- *Open – Inactive:* Identifies inactive cases where a Regional Water Quality Control Board and/or a local agency have determined a site assessment or other evaluation is required. The case may also be inactive if a responsible party appears to be recalcitrant and or has inadequate funding.
- *Open – Remediation:* Identifies sites that have on-going cleanup activities designed to remove or destroy in-place the most readily recoverable fraction of source-area mass.
- *Open – Site Assessment and Interim Remedial Action:* An interim remedial action is occurring at the site and additional activities such as site characterization, investigation, risk evaluation, and/or site conceptual model development are occurring.
- *Open – Site Assessment:* Activities such as site characterization, investigation, risk evaluation, and/or conceptual site model development are occurring.
- *Open – Verification Monitoring:* Identifies sites that have recently completed remedial actions and the RWQCB and or a local agency have requested post remediation sampling to assess the post remediation conceptual site model.

HAZARDOUS WASTE FACILITIES AND GENERATORS

Environmental Effects Indicator

Most hazardous waste must be transported from hazardous waste generators to permitted recycling, treatment, storage, or disposal facilities (TSDF) by registered hazardous waste transporters. Most shipments must be accompanied by a hazardous waste manifest. There are widespread concerns for both human health and the environment from sites that serve for the processing or disposal of hazardous waste. Many newer facilities are designed to prevent the contamination of air, water, and soil with hazardous materials, but even newer facilities may negatively affect perceptions of surrounding areas in ways that have economic, social and health impacts. The Department of Toxic Substances Control maintains data on permitted facilities that are involved in the treatment, storage, or disposal of hazardous waste as well as information on hazardous waste generators.

Indicator

Sum of weighted permitted hazardous waste facilities and hazardous waste generators within each ZIP code.

Data Source

EnviroStor Hazardous Waste Facilities Database and
Hazardous Waste Tracking System,
Department of Toxic Substances Control (DTSC)

EnviroStor is a public web site that provides access to detailed information on hazardous waste permitted facilities. Information included in the database includes the facility name and address, geographic location, facility type and status.

DTSC also maintains information on the manifests created for the transport of hazardous waste from generators in its Hazardous Waste Tracking System. Manifests include the generators' name and identification number, the transporter, the designated recipient and description of the type and quantity of waste classified by a coding system. Data are currently available for 2009.

http://www.envirostor.dtsc.ca.gov/public/data_download.asp
http://hwts.dtsc.ca.gov/

Rationale

Hazardous waste by definition that is potentially dangerous or harmful to human health or the environment. U.S. EPA and DTSC both have standards for determining when waste materials must be managed as hazardous waste. Hazardous waste can be liquids, solids, or contained gases. It can include manufacturing by-products, and discarded used or unused materials such as cleaning fluids (solvents) or pesticides. Used oil and contaminated soil generated from a site clean-up can be hazardous wastes (DTSC, Defining Hazardous Waste). In 1995, 97% of toxic chemicals released nationwide came from small generators and facilities (McGlinn, 2000). Generators of hazardous waste may treat waste onsite or send it elsewhere for disposal.

The potential health effects that come from living near hazardous waste

disposal sites have been examined in a number of studies (Vrijheid, 2000). While there is sometimes limited assessment of exposures that occur in nearby populations, there are studies that have found health effects, including diabetes and cardiovascular disease, associated with living in proximity to hazardous waste sites (Kouznetsova *et al.*, 2007; Sergeev and Carpenter, 2005).

Location of hazardous waste sites in communities has long been an environmental justice concern in California. For example, a recent study of 82 hazardous waste treatment, storage, and disposal facilities in Los Angeles County found that the communities most affected by the facilities are composed of working-class and ethnic minority populations living near industrial areas (Aliyu et al, 2011). A 1997 study correlated race/ethnicity with the location of hazardous waste treatment, storage and disposal facilities for both African-American and Latino populations (Boer *et al.*, 1997).

Electronic waste is defined as universal waste rather than hazardous waste by California law, and is subject to different rules for handling and transportation. However, some components of electronic devices contain hazardous materials, and facilities that collect or recycle electronic waste are potential sources of exposure to toxic chemicals (DTSC, 2010; CalRecycle, 2012).

Method

Permitted hazardous waste facilities:

- Permitted facility data were obtained from the DTSC website.
- Facilities were scored on a weighted scale in consideration of the type and permit status for the facility (See Appendix).
- Site locations were mapped or geocoded (in ArcMap).

Hazardous waste generators:

- Generator data were obtained from DTSC from the Hazardous Waste Tracking System.
- Facilities were scored on a weighted scale in consideration the type of waste (RCRA[7] waste vs. non-RCRA[8] waste) and volume generated (large quantity generator) (see Appendix).
- Class I hazardous waste facilities that did not fall within the boundaries of census ZIP codes (or within the 250 meter buffer) were assigned to the ZIP code matching the facility's postal ZIP code provided in the database.
- Site locations were mapped or geocoded (in ArcMap).

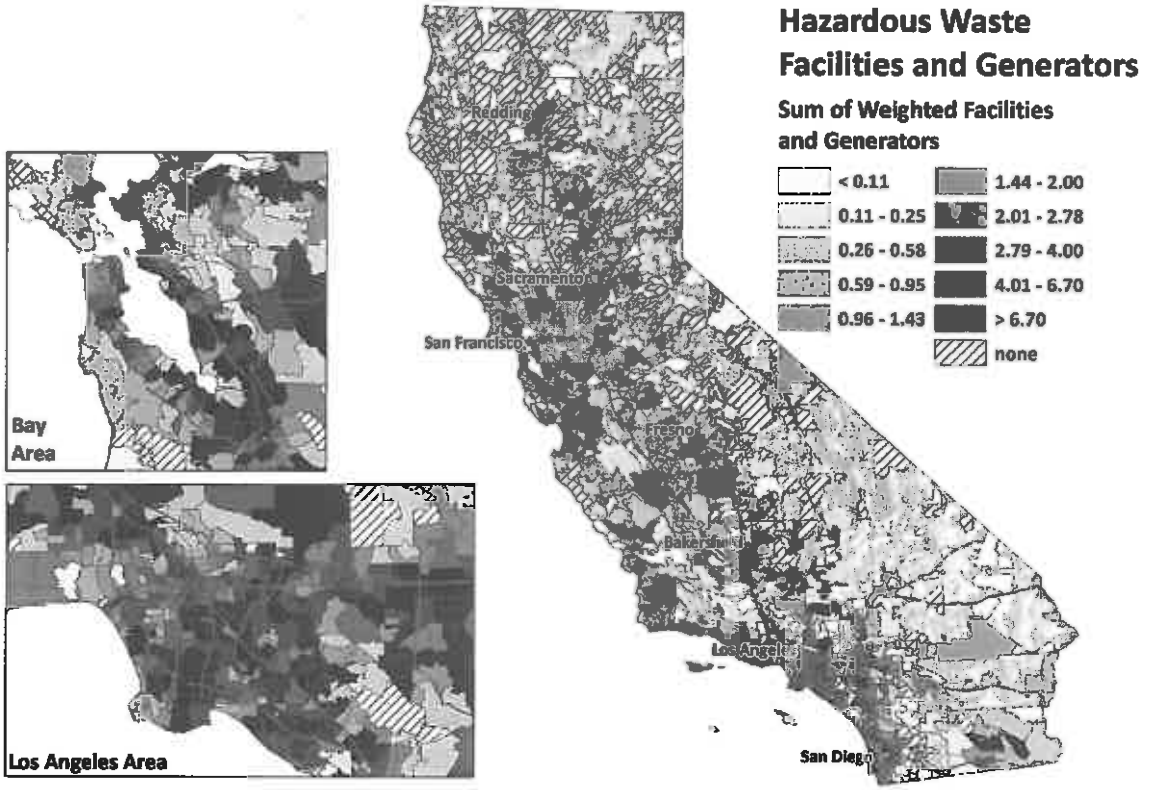
All sites were assigned a 250-meter buffer and ZIP codes were scored based on the sum of weighted sites contained in their boundaries or buffers that they intersected (in ArcMap). Summed scores were assigned

[7] RCRA: Resource Conservation and Recovery Act governs the federal management of hazardous wastes; (List of RCRA waste: http://www.epa.gov/osw/inforesources/data/br91/na_apb-p.pdf)

[8] Non-RCRA: waste streams considered hazardous in California; (List: http://www.dtsc.ca.gov/LawsRegsPolicies/Title22/upload/OEARA_REG_Title22_Ch11_AppXII.pdf)

percentiles.

Indicator Map



References

Aliyu AA, Kasim R, Martin D (2011). Siting of hazardous waste dump facilities and their correlation with status of surrounding residential neighbourhoods in Los Angeles County. *Property Management.* **29** (1): 87-102.

Boer JT, Pastor MJ, Sadd JL, Snyder LD (1997). Is there environmental racism? The demographics of hazardous waste in Los Angeles County. *Social Science Quarterly* **78**(4):793-810.

CalRecycle. "What is E-Waste?". Last updated October 26, 2012. http://www.calrecycle.ca.gov/Electronics/WhatisEwaste/. Accessed February 14, 2013.

DTSC. "Electronic Hazardous Waste (E-Waste)" 2010. http://www.dtsc.ca.gov/hazardouswaste/ewaste/. Accessed February 14, 2013.

DTSC. "Defining Hazardous Waste" 2012 http://www.dtsc.ca.gov/HazardousWaste/upload/HWMP_DefiningHW111.pdf. Accessed February 14,2013

Kouznetsova M, Huang X, Ma J, Lessner L, Carpenter DO (2007).

Increased rate of hospitalization for diabetes and residential proximity of hazardous waste sites. *Environ Health Perspect* **115**(1):75-9.

McGlinn L (2000). Spatial patterns of hazardous waste generation and management in the United States. *The Professional Geographer* **52**(1):11-22.

Sergeev AV, Carpenter DO (2005). Hospitalization rates for coronary heart disease in relation to residence near areas contaminated with persistent organic pollutants and other pollutants. *Environ Health Perspect* **113**(6):756-61.

Vrijheid M (2000). Health effects of residence near hazardous waste landfill sites: a review of epidemiologic literature. *Environmental health perspectives* **108**(Suppl 1):101.

Appendix

Weighting Matrix for Permitted Hazardous Waste Facilities and Hazardous Waste Generators

Permitted Hazardous Waste Facilities from DTSC's permitted facilities database were weighted on a scale of 1 to 12 in consideration of both facility activity and permit type. The score for any given Permitted Hazardous Waste Facility represents the sum of its Facility Activity and Permit Type.

Hazardous waste generators were weighted on a scale of 0.05 to 0.1, where all generators were given a base weight of 0.05. The score for hazardous waste generators is the sum of the based weight and any additional type of generator activity.

The following tables show the weights applied to the facilities and generators. Greater concerns were identified for permitted hazardous waste facilities that handle much of the hazardous waste generated from the ~30,000 generators in California. For this reason, weighting of generators was considerably lower than that for the handling facilities. Of the generators, higher weights were given for those that create RCRA waste or are large quantity generators (>1000 kg/month). For all ZIP codes, the weighted scores of all facilities in the area were summed.

Permitted Hazardous Waste Facilities

Category	Facility Activity	Permit Type
Permitted Hazardous Waste Facilities	**10** (Landfill) **7** (Treatment) **4** (Storage) **2** (Post-closure)	**1** (Large facilities) **1** (Non-RCRA facilities) **2** (RCRA facilities)

Hazardous Waste Generators

Category	Base weight	Generator activity
Hazardous Waste Generators	**0.05** (All generators)	**0.025** (Large quantity generator) **0.025** (RCRA waste)

IMPAIRED WATER BODIES

Environmental Effects Indicator

Contamination of California streams, rivers, and lakes by pollutants can compromise the use of the water body for drinking, swimming, fishing, aquatic life protection, and other beneficial uses. When this occurs, such bodies are considered "impaired." Information on impairments to these water bodies can help determine the extent of environmental degradation within an area.

Indicator

Summed number of pollutants across all water bodies designated as impaired within the area.

Data Source

303(d) List of Impaired Water Bodies,
State Water Resources Control Board (SWRCB)

The SWRCB provides information relevant to the condition of California surface waters. Such information is required by the Federal Clean Water Act. Every two years, State and Regional Water Boards assess the quality of California surface waters. Lakes, streams and rivers that do meet water quality standards, or are not expected to meet water quality standards, are listed as impaired under Section 303(d) of the Clean Water Act.

http://www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/303dlist.shtml

Rationale

Rivers, lakes, estuaries and marine waters in California are important for many different uses. Water bodies used for recreation may also be important to the quality of life of nearby residents if subsistence fishing is critical to their livelihood (Cal/EPA, 2002). Water bodies also support abundant flora and fauna. Changes in aquatic environments can affect biological diversity and overall health of ecosystems. Aquatic species important to local economies may be impaired if the habitats where they seek food and reproduce are changed. Marine wildlife like fish and shellfish that are exposed to toxic substances may potentially expose local consumers to toxic substances as well (Cal/EPA, 2002). Excessive hardness, unpleasant odor or taste, turbidity, color, weeds, and trash in the waters are types of pollutants affecting water aesthetics (Cal/EPA, 2002), which in turn can affect nearby communities.

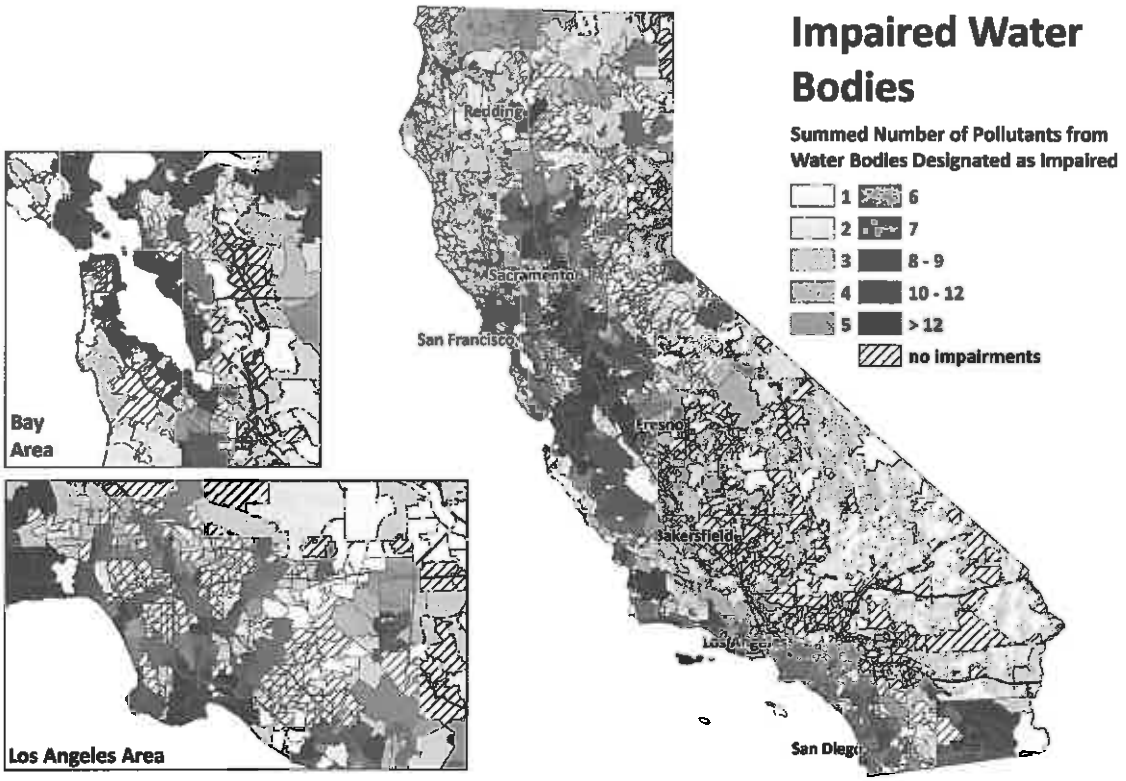
Communities of color, low-income communities, and tribes generally depend on the fish, aquatic plants, and wildlife provided by nearby surface waters to a greater extent than the general population (NEJAC, 2002). Some communities that rely on resources provided by nearby surface waters have populations of lower socioeconomic status than the general population. For example, certain fishing communities along California's northern coast have lower educational attainment and median income than California as a whole (Pomeroy *et al.*, 2010). Low-income communities in California that rely on fishing and waterfront businesses have been affected by a recent decline in the fishing

community (California State Lands Commission, 2011). Lower per capita income has been associated with increased levels of certain surface water pollutants, as have a higher percentage of minorities and people of color (Farzin and Grogan, 2012).

Method

- Data on water body type, water body ID, and pollutant type were downloaded in Excel format, and GIS data showing the visual representation of all water bodies were downloaded from the SWRCB website. http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml)
- All water bodies were identified in all ZIP codes in the GIS software ArcMap.
- The number of pollutants listed in streams and/or rivers that intersected a ZIP code were counted.
- The number of pollutants listed in lakes, bays, estuaries and/or shoreline that intersected or bordered a ZIP code were counted.
- The two pollutant counts were summed for every ZIP code.
- Each ZIP code was scored based on the sum of the number of individual pollutants found within and/or bordering it. For example, if two stream sections within a ZIP code were both listed for the same pollutant, the pollutant was only counted once.
- Summed ZIP code scores were assigned percentile scores.

Indicator Map



References

Cal/EPA, Agency CR (2002). Environmental Protection Indicators for California. In OEHHA (Ed.) (2002 ed., pp. 303). Sacramento: Cal/EPA. Available at URL: http://oehha.ca.gov/multimedia/epic/Epicreport.html.

California State Lands Commission (2012). Central Coastal California Seismic Imaging Project. Final Environmental Impact Report. Vol. 2. Section III. Chapter 7.

Farzin YH and Grogan KA (2012). Socioeconomic factors and water quality in California. Environmental Economics and Policy Studies. Published Online: 08 June 2012. Available at URL: http://www.feem.it/userfiles/attach/2011781234534NDL2011-051.pdf.

NEJAC (2002). National Environmental Justice Advisory Council. Fish Consumption and Environmental Justice. A Report developed from the National Environmental Justice Advisory Council Meeting of December 3-6, 2001. Available at URL: http://www.epa.gov/environmentaljustice/resources/publications/nejac/fish-consump-report_1102.pdf

Pomeroy C, Thomson CJ, Stevens MM (2010). California's North Coast Fishing Communities Historical Perspective and Recent Trends. Scripps Institution of Oceanography.SLC (2012). Available at URL: http://www-csgc.ucsd.edu/BOOKSTORE/documents/FullRept.pdf

SOLID WASTE SITES AND FACILITIES

Environmental Effects Indicator

Many newer solid waste landfills are designed to prevent the contamination of air, water, and soil with hazardous materials. However, older sites that are out of compliance with current standards or illegal solid waste sites may degrade environmental conditions in the surrounding area and pose a risk of exposure. Other types of facilities, such as composting, treatment and recycling facilities, may raise concerns about odors, vermin, and increased truck traffic. While data that describe environmental effects from the siting and operation of all types of solid waste facilities are not currently available, the California Department of Resources Recycling and Recovery (CalRecycle) maintains data on facilities that operate within the state, as well as sites that are abandoned, no longer in operation, or illegal.

Indicator

Sum of weighted solid waste sites and facilities.

Data Source

Solid Waste Information System (SWIS) and
Closed, Illegal, and Abandoned (CIA) Disposal Sites Program,
California Department of Resources Recycling and Recovery, CalRecycle

SWIS is a database which tracks solid waste facilities, operations, and disposal sites throughout California. Solid waste sites found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites.

The CIA Disposal Sites Program is a subset of the SWIS database, and includes closed landfills and disposal sites that have not met minimum state standards for closure as well as illegal and abandoned sites. Sites within CIA have been prioritized to assist local enforcement agencies investigate the sites and enforce state standards.

http://calrecycle.ca.gov/SWFacilities/Directory/
http://www.calrecycle.ca.gov/SWFacilities/CIA/

Rationale

Solid waste sites can have multiple impacts on a community. Waste gases like methane and carbon dioxide can be released into the air from disposal sites for decades, even after site closure (US EPA, 2011; Ofungwu and Eget, 2005). Fires, although rare, can pose a health risk from exposure to smoke and ash (CalRecycle, 2010a; US Fire Administration, 2002). Odors and the known presence of solid waste may impair a community's perceived desirability.

Although all active solid waste sites are regulated, CalRecycle has recorded a number of old closed disposal sites and landfills that are monitored less frequently. Former abandoned disposal sites present potential for human or animal exposure to uncovered waste or burn ash. Such sites are of concern to State and local enforcement agencies (CalRecycle, 2010b).

Many of the studies that address the potential toxicity of solid waste site emissions look at the biological effects of landfill leachate on selected species of animals and plants in the laboratory. New ecological test methods have demonstrated that exposure to landfill soil containing a mixture of hazardous chemicals can cause genetic changes that are associated with adverse effects on the reproductive system (Roelofs *et al.*, 2012). In addition, an epidemiologic study of human births near landfills in Wales found an increase in the rate of birth defects after the opening or expansion of sites (Palmer *et al.*, 2005). A study conducted after an accidental fire at a municipal landfill in Greece found unacceptably high levels of dioxins in food products, primarily meat, milk and olives, from an area near the landfill (Vassiliadou *et al.*, 2009).

Method:

Closed, Illegal, and Abandoned (CIA) sites:

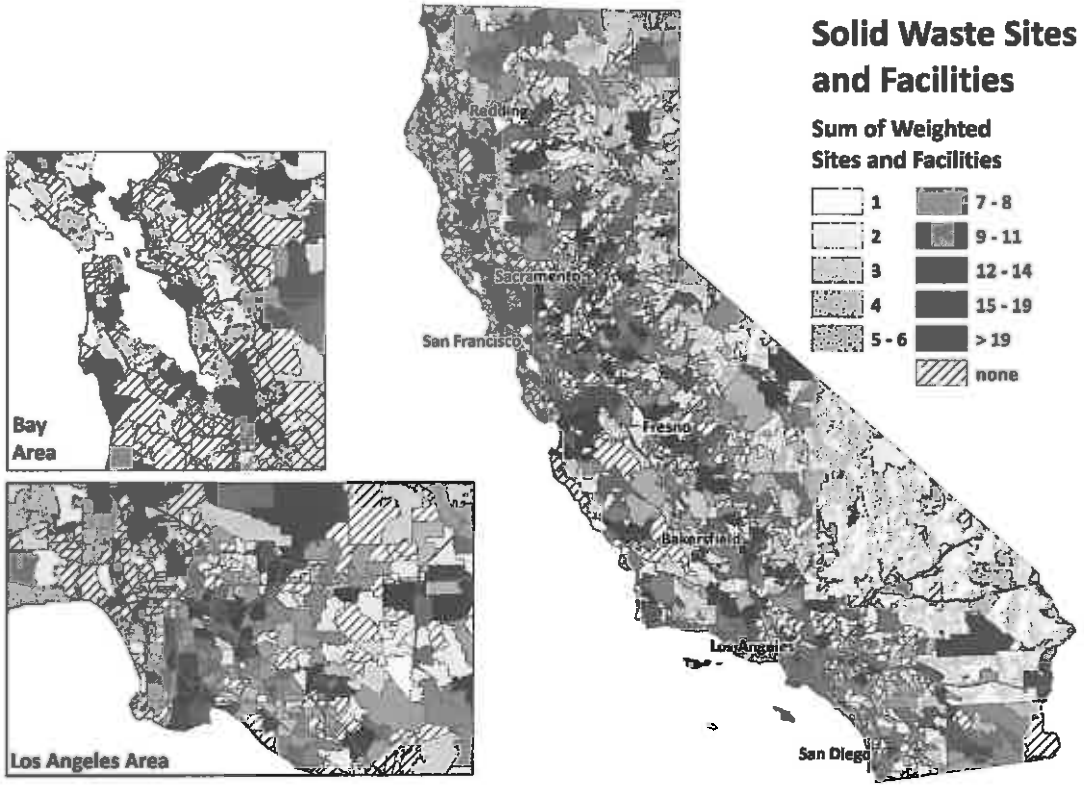
- CIA data were obtained from CalRecycle for all priorities. (Only high priority CIA sites data are available online.)
- Unconfirmed and non-solid waste sites were removed from the analysis.
- Each remaining site was scored on a weighted scale in consideration of CalRecycle's prioritization categories (see table in appendix).
- Site locations were mapped or geocoded (in ArcMap).

Active Solid Waste Information (SWIS) sites:

- SWIS data were obtained from the CalRecycle website.
- CIA records were filtered from the database because SWIS contains an inventory of both active and CIA sites.
- Of the remaining sites, Clean Closed, Absorbed, Inactive and Planned sites were not included.
- Each remaining site was scored on a weighted scale in consideration of the category type of solid waste operation (see table in appendix).
- Site locations were mapped or geocoded (in ArcMap).

All sites were assigned a 250-meter buffer and ZIP codes were scored based on the sum of weighted sites contained in their boundaries or buffers that they intersected (in ArcMap).
Solid waste facilities that scored higher than seven under the weighting matrix that did not fall within the boundaries of census ZIP codes (or within the 250 meter buffer) were assigned to the ZIP code matching the facility's postal ZIP code provided in the database.
Summed scores were assigned percentiles.

Indicator Map



References

CalRecycle. "Fire at Solid Waste Facilities". Last updated September 3, 2010. http://www.calrecycle.ca.gov/SWFacilities/Fires/. Accessed April 26, 2012.

CalRecycle. "Former Landfill and Disposal Site Investigations". Last updated October 6, 2010. http://www.calrecycle.ca.gov/Publications/Documents/Facilities%5C2010008.pdf. Accessed March 12, 2013.

Ofungwu J, Eget S (2006). Brownfields and health risks--air dispersion modeling and health risk assessment at landfill redevelopment sites. *Integr Environ Assess Manag* **2**(3):253-61.

Palmer SR, Dunstan FD, Fielder H, Fone DL, Higgs G, Senior ML (2005). Risk of congenital anomalies after the opening of landfill sites. *Environ Health Perspect* **113**(10):1362-5.

Roelofs D, de Boer M, Agamennone V, Bouchier P, Legler J, van Straalen N (2012). Functional environmental genomics of a municipal landfill soil. *Front Genet* **3**:85.

US EPA (2011). "General Information on the Link Between Solid Waste Management and Greenhouse Gas Emissions". Last updated April 14, 2011. http://www.epa.gov/climatechange/wycd/waste/generalinfo.html.

Accessed April 26, 2012.

US Fire Administration (2002). "Landfill Fires: Their Magnitude, Characteristics, and Mitigation". Prepared by TriDataCorporation: Arlington, Virginia; 2002. http://www.usfa.fema.gov/downloads/pdf/publications/fa-225.pdf. Accessed April 26, 2012.

Vassiliadou I, Papadopoulos A, Costopoulou D, Vasiliadou S, Christoforou S, Leondiadis L (2009). Dioxin contamination after an accidental fire in the municipal landfill of Tagarades, Thessaloniki, Greece. *Chemosphere* **74**(7):879-84.

Appendix

Weighting Matrix for Solid Waste Sites and Facilities

Solid Waste Sites and Facilities from the Solid Waste Information System were weighted on a scale of 1 to a maximum of 13 in consideration of both the site type and violation history. The following table shows the weights applied to the facilities and sites. The score for any given Solid Waste Site or Facility represents the sum of its 'Site or Facility Type' and 'Violations'. For all ZIP codes, the weighted scores of all facilities in the area were summed.

Category	Criteria	Site or Facility Type	Violations (any in previous 12 months) [1]
Closed, Illegal, or Abandoned Site [1]	Priority Code [2]	**6** (Priority Code A) **4** (Priority Code B) **2** (Priority Code C) **1** (Priority Code D)	NA
Solid Waste Landfill or Construction, Demolition and Inert (CDI) Debris Waste Disposal (active) [3]	Tonnage	**8** (> 10,000 tpd) **7** (> 3,000 to < 10,000 tpd) **6** (> 1,000 to < 3,000 tpd) **5** (> 100 to < 1,000 tpd) **4** (< 100 tpd)	**3** (gas) **1** (each for litter, dust, noise, vectors, and site security)
Solid Waste Disposal Site (closed, closing, inactive) [4]	Tonnage	**1** (All)	**3** (gas) **1** (each for litter, vector, site security)
Inert Debris: Engineered Fill	Regulatory Tier [5]	**2** (Notification)	**1** (each for dust, noise, vectors, site security)
Inert Debris: Type A Disposal	Regulatory Tier [5]	**3** (Permitted)	**1** (each for dust, noise, vectors, site security)
Composting	Regulatory Tier [5]	**4** (Permitted) **3** (Permitted: Chipping & Grinding, 200 to ≤500 tpd) **2** (Notification)	**1** (each for vector, odor, litter, hazard, nuisance, noise, dust, site security) **1** (fire)
Transfer/Processing	Regulatory Tier [5]	**5** (Permitted: large vol.) **3** (Permitted: medium vol.; direct transfer) **2** (Notification)	**1** (each for dust, litter, vector/bird/animal, fire, site security)
Waste Tire	Regulatory Tier [5]	**4** (Major) **2** (Minor)	**2** (each for storage, fire) **1** (each for vectors, site security)

[1] Violations: Recurring requirements ensures only facilities that exhibit a pattern and practice of non-compliance receive a higher impact score and reduces point-in-time fluctuations. Explosive gas violations have a greater potential environmental impact than dust, noise, and vectors (from SWIS and the Waste Tire Management System).

[2] CIA Sites weighted per established CIA Site Priority Code scoring methodology (A through D; additional information available at http://www.calrecycle.ca.gov/SWFacilities/CIA/forms/prioritize.htm).

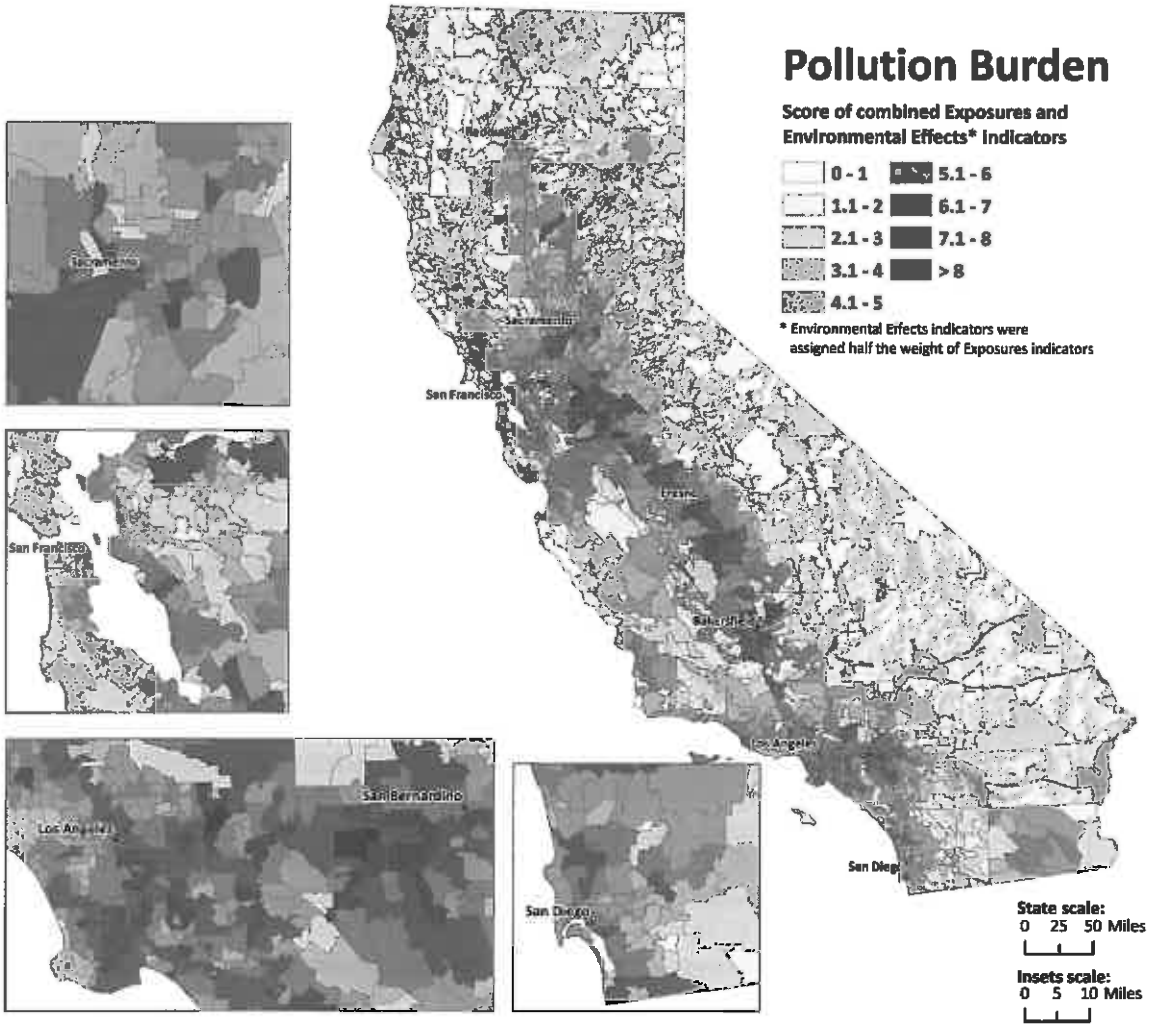
[3] Active landfills (other than Contaminated Soil Disposal Sites and Nonhazardous Ash Disposal/Monofill Facilities) are all in the Full Permit tier, so permitted tonnage (from SWIS) is used to scale impact score.

[4] Solid Waste Disposal Site (closed) means the site was closed pursuant to state closure standards that became operative in 1989. Closed sites associated with the CIA Site database were closed prior to 1989 in accordance with standards applicable at the time of closure.

[5] Regulatory Tier used to weight the site or facility. Placement within a regulatory tier accounts for the type of waste and amount of waste processed per day or onsite at any one time. See SWIS for compost and transfer/processing; Waste Tire Management System (WTMS) for waste tire sites.

SCORES FOR POLLUTION BURDEN (RANGE OF POSSIBLE SCORES: 0.1 TO 10)

Pollution Burden scores for each ZIP code are derived from the average percentiles of the six Exposures indicators (ozone and PM2.5 concentrations, diesel PM emissions, pesticide use, toxic releases from facilities, and traffic density) and the five Environmental Effects indicators (cleanup sites, impaired water bodies, groundwater threats, hazardous waste facilities and generators, and solid waste sites and facilities). Indicators from the Environmental Effects component were given half the weight of the indicators from the Exposures component. The calculated average percentile (up to 100th percentile) was divided by 10 and rounded to one decimal place for a Pollution Burden score ranging from 0.1 -10.



AGE: CHILDREN AND ELDERLY

Sensitive Populations Indicator

Children can be especially sensitive to the adverse effects of pollutants for many reasons. Children are often more susceptible to the health effects of air pollution because their immune systems and organs are still immature. Irritation or inflammation caused by air pollution is more likely to obstruct their narrow airways. Children, especially toddlers and young children, may have higher background exposures to multiple contaminants from contact with the ground, from breathing through their mouths, and from spending a significant amount of time outdoors. Further, exposure to toxic contaminants in air or other sources during infancy or childhood could affect the development of the respiratory, nervous, endocrine and immune systems, and could increase the risk of cancer later in life.

Elderly populations can also be more vulnerable to adverse health effects from exposures to pollutants than younger adults. This population is more likely to have health conditions that may worsen responses, such as weakened immune system and existing cardiovascular and respiratory disease. A history of exposure to pollutants, or interactions with medications, may influence responses.

Indicator *Percent of population under age 10 and over age 65.*

Data Source U.S. Census Bureau

As part of the 2010 decennial census, the U.S. Census Bureau questionnaire asked all census respondents for the age and date of birth of all members of the household. Datasets describing the number of individuals in different age categories are available for California at different geographic scales. The data are made available using the American FactFinder website.

http://factfinder2.census.gov/

Rationale *Sensitivity of Children*

Biological differences account for children's enhanced susceptibility to environmental pollutants. Children have smaller airways, a higher oxygen demand, and lower body weight than adults. Studies have demonstrated that children under the age of two have the highest exposure to lead in soil and household dust because of hand-to-mouth behavior. Even low levels of lead in a child's blood can result in intellectual delays, attention deficit-hyperactivity disorder and behavior problems. Childhood lead poisoning is associated with poverty, recent immigrant status and lack of private health insurance (Bellinger 2004; Howarth 2012; Wright *et al.* 2008, Canfield *et al.* 2003).

Children may spend 70% of their time outdoors, where they are exposed to contaminants in outdoor air. Air pollution can contribute to asthma, aggravated by children's high breathing rates and increased particle deposition in their small airways. Because children have low

body weights and high oxygen demands, they can also ingest higher amounts of chemicals than adults in relation to their size (OEHHA, 2001).

Children have proportionately greater skin surface area than adults, allowing body heat to be lost more readily and requiring a higher rate of metabolism to maintain body temperature and fuel growth and development. The resulting higher oxygen and food requirements can lead to higher exposures to environmental contaminants in air and food (Cohen Hubal *et al.*, 2000). In addition, the skin of children, especially newborns, is softer than the skin of adults and therefore can be more readily penetrated by chemicals. Infants may have higher exposures to fat-soluble chemicals once the layer of fat underlying the skin develops at approximately 2-3 months of age, continuing through the toddler period (OEHHA, 2001). The percentage of body fat generally decreases with age (Cohen Hubal *et al.*, 2000). Once environmental chemicals have been absorbed, the infant's immature renal system is unable to eliminate them as effectively as older children and adults (Sly and Flack, 2008).

Sensitivity of the Elderly

The mechanisms of absorption, distribution, metabolism, and excretion change with age. There is a reduction in lean body mass, certain blood proteins, and total body water as we get older. In comparison to younger adult populations, there is more variation in elderly individuals' capacity to metabolize substances. Reduced metabolic rates result in decreases in blood flow, prolonging the process of chemical elimination. In addition, renal function can be reduced by 50% in the elderly (Pedersen, 1997). Heart disease, which is found in the majority of elderly populations, increases susceptibility to the effects of exposure to particulate matter and can decrease heart rate and oxygen saturation (Adler, 2003).

Researchers in Korea in the 1990s noted that an increase in air pollution resulted in an increased risk for stroke in adults over the age of 65 (Hong *et al.*, 2002). Increased prevalence of stroke has also been associated with higher concentrations of carbon monoxide, sulfur dioxide, ozone, and nitrogen oxide (Adler, 2003). A study involving senior citizens in Denver found an increased hospitalization rate for heart attacks, atherosclerosis, and pulmonary heart disease on days with high air pollution levels. Sulfur dioxide and carbon monoxide exposure have also been linked to longer hospital stays for cardiac dysrhythmias and congestive heart failure, respectively (Koken *et al.*, 2003).

Contaminants in drinking water, such as arsenic, may also pose a threat to the elderly. Arsenic accumulates in cardiovascular tissue and can trigger inflammation of the arteries, increasing the risk of atherosclerosis and vascular disease (Adler, 2003).

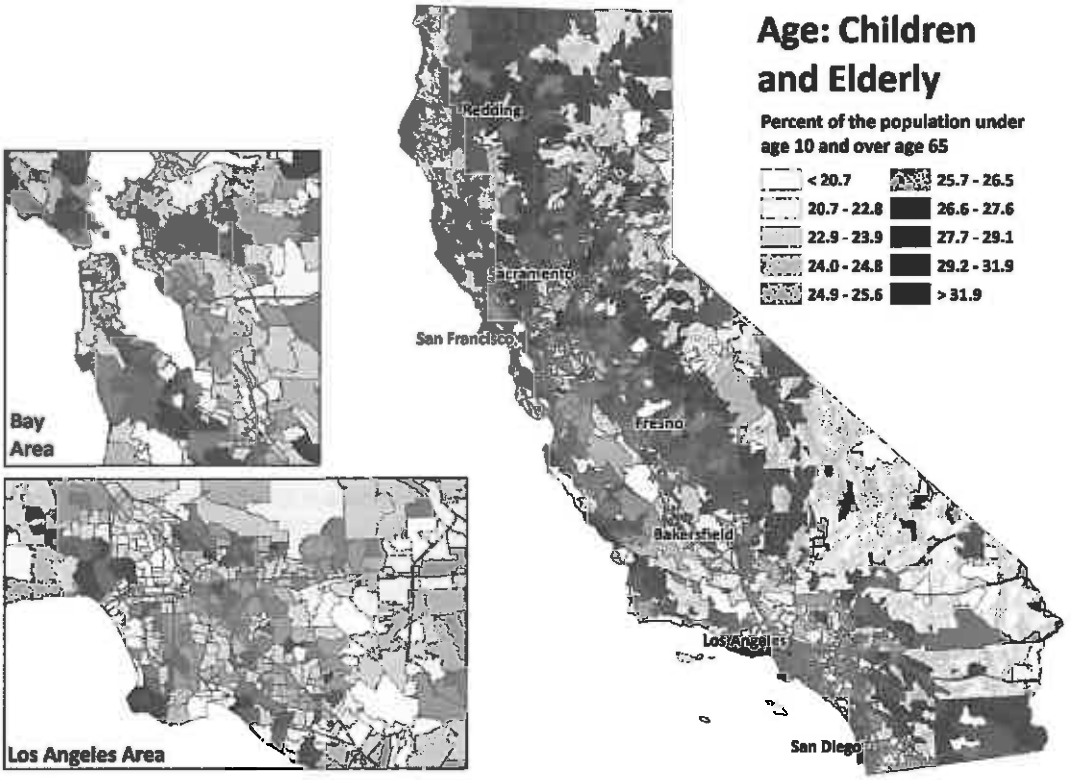
Method

- A dataset containing the number of people in different age groups by census ZIP codes was downloaded for the State.
- The percentage of children and elderly in each ZIP code was

calculated as the total number of individuals less than 10 years of age and greater than 65 years of age in the ZIP code divided by the ZIP code's total population.

- ZIP codes were ordered by this percentage. A percentile score for each ZIP code was determined by its place in the distribution of all ZIP codes.

Indicator Map



References

Adler, T (2003). Aging Research: The Future Face of Environmental Health. *Environmental Health Perspectives, 111,* 14.

Bellinger DC (2004). Lead. *Pediatrics* **113**(4 Suppl):1016-22.

Canfield RL, Henderson CR, Jr., Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP (2003). Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. *N Engl J Med* **348**(16):1517-26.

Cohen Hubal EA, Sheldon LS, Burke JM, McCurdy, TR, Berry, MR, Rigas, ML, Zartarian, VG, *et al.* (2000). Children's exposure assessment: a review of factors influencing Children's exposure, and the data available to characterize and assess that exposure. *Environmental Health*

Perspectives, **108**(6):475-86.

Hong Y-C, Lee JT, Kim H, and Kwon H-J (2002). Air Pollution: A New Risk Factor in Ischemic Stroke Mortality. *Stroke* **33**(9):2165.

Howarth D (2012). Lead exposure–implications for general practice. *Aust Fam Physician* **41**(5):311-5.

Koken P JM, Piver WT, Ye F, Elixhauser A, Olsen LM, and Portier CJ (2003). Temperature, Air Pollution, and Hospitalization for Cardiovascular Diseases among Elderly People in Denver. *Environmental Health Perspectives* **111**(10):1312-1317.

Office of Environmental Health Hazard Assessment (OEHHHA). (2001, October). Prioritization of toxic air contaminants under the Children's Environmental Health Protection Act. Available from URL: http://oehha.ca.gov/air/toxic_contaminants/pdf_zip/SB25%20TAC%20prioritization.pdf

Pedersen T (1997). The Unique Sensitivity of the Elderly. UCD ExtoxNet FAQ. Available from URL: http://extoxnet.orst.edu/faqs/senspop/elder.htm

Sly PD and Flack F (2008). Susceptibility of Children to Environmental Pollutants. *Annals of the New York Academy of Sciences* **1140**(1):163-183.

Wright JP, Dietrich KN, Ris MD, Hornung RW, Wessel SD, Lanphear BP, *et al.* (2008). Association of prenatal and childhood blood lead concentrations with criminal arrests in early adulthood. *PLoS Med* **5**(5):e101.

ASTHMA

Sensitive Populations Indicator

Asthma is a chronic lung disease characterized by episodic breathlessness, wheezing, coughing, and chest tightness. While the causes of asthma are poorly understood, it is well established that exposure to traffic and outdoor air pollutants, including particulate matter, ozone, and diesel exhaust, can trigger asthma attacks. Nearly three million Californians currently have asthma and about five million have had it at some point in their lives. Children, the elderly and low-income Californians suffer disproportionately from asthma (California Health Interview Survey, 2009). Although well-controlled asthma can be managed as a chronic disease, asthma can be a life-threatening condition, and emergency department visits for asthma are a very serious outcome, both for patients and for the medical system.

Indicator

Spatially modeled, age-adjusted rate of emergency department (ED) visits for asthma per 10,000 (averaged over 2007-2009).

Data Source

California Office of Statewide Health Planning and Development (OSHPD)
California Environmental Health Tracking Program (CEHTP)
Environmental Health Investigations Branch,
California Department of Public Health

Since 2005, hospitals licensed by the state of California to provide emergency medical services are required to report all emergency department (ED) visits to OSHPD. Federally-owned facilities, including Veterans Administration and Public Health Services hospitals are not required to report. The ED dataset includes information on the principal diagnosis, which can be used to identify which patients visited the ED because of asthma.

ED utilization does not capture the full burden of asthma in a community because not everyone with asthma requires emergency care, especially if they receive preventive care, avoid asthma triggers and undertake disease maintenance. However, there is limited state-wide monitoring of other indicators, such as planned and unplanned doctor's visits, that might provide a better indication of overall disease burden. Some ED visits result in hospitalization, and OSPHD collects data on hospitalization due to asthma in addition to emergency department visits. ED visits are thought to provide a better comparative measure of asthma burden than hospitalizations and deaths because the data capture a larger portion of the overall burden and include less severe occurrences.

CEHTP used OSHPD's data to calculate age-adjusted rates of asthma ED visits for California ZIP codes. These estimates make use of ZIP-code level population estimates from a private vendor (Esri) and the U.S. 2000 Standard Population to derive age-adjusted rates. Age-adjustment takes the age distribution of a population into account and allows for meaningful comparisons between ZIP codes with different age

structures.

http://www.oshpd.ca.gov/HID/Products/EmerDeptData/
http://www.cehtp.org/p/asthma

Rationale

Asthma increases an individual's sensitivity to pollutants. Air pollutants, including particulate matter, ozone, nitrogen dioxide, and diesel exhaust, can trigger symptoms among asthmatics (Meng *et al.*, 2011). Children living near major roadways and traffic corridors in California have been shown to suffer disproportionate rates of asthma (Kim *et al.*, 2004). Particulate matter from diesel engines has been implicated as a cause of new-onset asthma (Pandya *et al*, 2002). Exposure to certain pesticides can also trigger wheezing, coughing, and chest tightness (Hernández *et al.*, 2011).

Asthma can increase susceptibility to respiratory diseases such as pneumonia and influenza (Kloepfer *et al.*, 2012). For example, one study found that when ambient particulate pollution levels are high, persons with asthma have twice the risk of being hospitalized for pneumonia compared to persons without asthma (Zanobetti *et al.*, 2000).

Asthma rates are a good indicator of population sensitivity to environmental stressors because asthma is both caused by and worsened by pollutants (CDPH, 2010). The severity of symptoms and the likelihood of needing hospital care decrease with access to regular medical care and asthma medication (Delfino *et al.*, 1998; Grineski *et al.*, 2010). Asthma-related emergency department visits provide a conservative estimate of total asthma cases because not all cases require emergency care. However, using those cases requiring emergency care as an indicator also captures some aspects of access to care and can be seen as a marker of both environmental and social stressors. Potential biases in using emergency department visits as an indicator of sensitivity include the possibility that lower socioeconomic status or more isolated rural populations may not have access to nearby health care facilities. Conversely, populations without health insurance may turn to emergency departments for care.

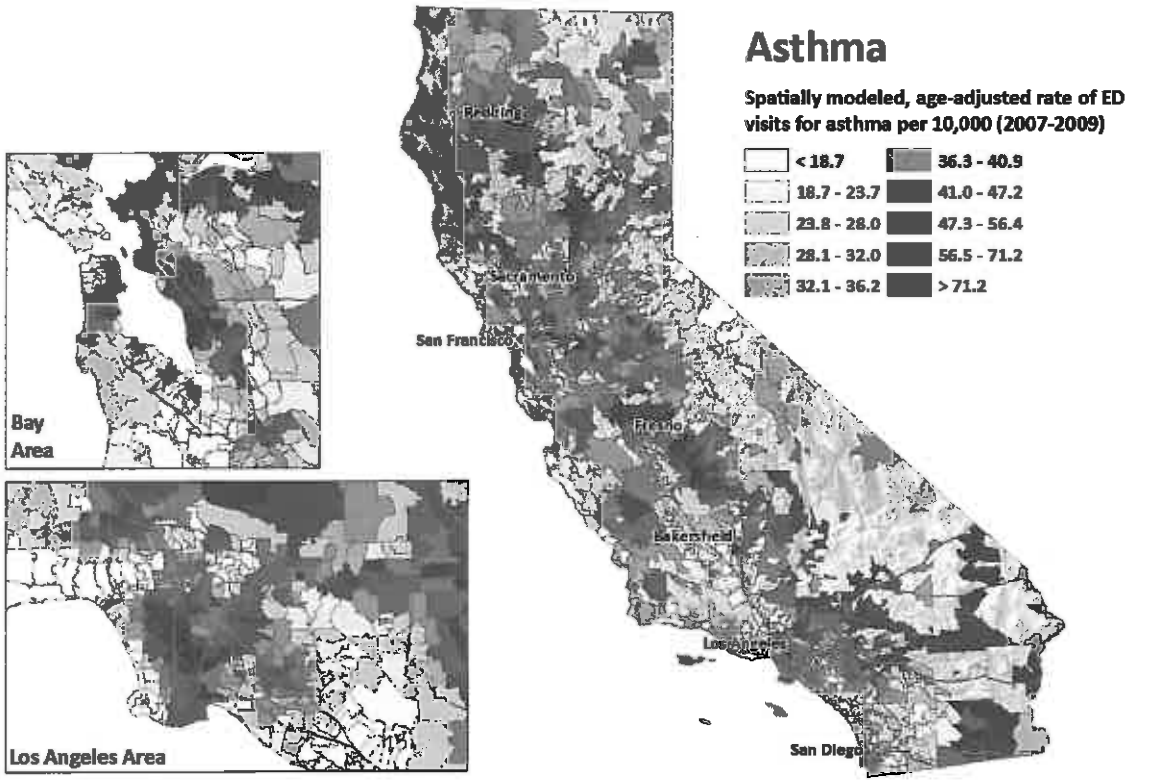
Method

- An age-adjusted rate of asthma emergency department (ED) visits was calculated for each ZIP code by CEHTP using data obtained from OSHPD.
- CEHTP obtained records for ED visits occurring during 2007-2009 from OSHPD's Emergency Department and Ambulatory Surgery files if the patient was listed as residing in California and principle diagnostic ICD-9-CM code began with the digits 493 (asthma).
- Population data used for the age-adjustment were obtained from Esri and rates reported are standardized to the 2000 U.S. population using five-year age groupings (0-4, 5-9, etc.). The rates are per 10,000 residents per year.
- The age-adjusted rates of asthma ED visits per 10,000 residents by ZIP code were then spatially modeled to provide estimates for ZIP codes with fewer than 12 ED visits and to incorporate information

about local and statewide averages into the calculations.

- A Bayesian modeling technique was used to calculate the spatially modeled rates (Mollié, 1996).
- ZIP codes without a spatially modeled rate are census ZIP codes that did not correspond to Esri ZIP codes used in the age-adjustment.
- ZIP codes were ordered by the spatially modeled rate and were assigned percentiles based on the distribution across all ZIP codes.

Indicator Map



References

California Health Interview Survey, (2009). Accessed November 2012 at http://www.chis.ucla.edu/main/default.asp

CDPH. "Asthma and the Environment." http://www.ehib.org/page.jsp?page_key=27. Last edited 9/29/2010, accessed 2/15/2013.

Delfino RJ, Zeiger RS, Seltzer JM, Street DH (1998). Symptoms in pediatric asthmatics and air pollution: differences in effects by symptom severity, anti-inflammatory medication use and particulate averaging time. *Environ Health Perspect* **106**(11):751-61.

Grineski SE, Staniswalis JG, Peng Y, Atkinson-Palombo C (2010). Children's asthma hospitalizations and relative risk due to nitrogen dioxide (NO_2): Effect modification by race, ethnicity, and insurance

status. *Environmental Research* **110**(2):178-88.

Hernández AF, Parrón T, Alarcón R (2011). Pesticides and asthma. *Current Opinion in Allergy and Clinical Immunology* **11**(2):90.

Kim JJ, Smorodinsky S, Lipsett M, Singer BC, Hodgson AT, Ostro B (2004). Traffic-related Air Pollution near Busy Roads The East Bay Children's Respiratory Health Study. *American Journal of Respiratory and Critical Care Medicine* **170**(5):520-6.

Kloepfer KM, Olenec JP, Lee WM, Liu G, Vrtis RF, Roberg KA, *et al.* (2012). Increased H1N1 infection rate in children with asthma. *Am J Respir Crit Care Med* **185**(12):1275-9.

Mollié A (1996). Bayesian mapping of disease. In: *Markov Chain Monte Carlo in Practice*. Gilks WR, Richardson S, Spiegelhalter DJ, eds. Chapman & Hall: London, pp. 359–379.

Meng Y, Wilhelm M, Ritz B, Balmes J, Lombardi C, Bueno A, *et al.* (2011). Is disparity in asthma among Californians due to higher pollution exposures, greater vulnerability, or both? In CAR Board (Ed.). Sacramento: CARB.

Pandya RJ, Solomon G, Kinner A, Balmes JR (2002). Diesel exhaust and asthma: hypotheses and molecular mechanisms of action. *Environ Health Perspect* **110**(Suppl 1):103.

Zanobetti A, Schwartz J, Gold D (2000). Are there sensitive subgroups for the effects of airborne particles? *Environ Health Perspect* **108**(9):841-5.

LOW BIRTH WEIGHT INFANTS

Sensitive Populations Indicator

Infants born weighing less than 2,500 grams (about 5.5 pounds) are classified as low birth weight (LBW), a condition that is associated with increased risk of later health problems as well as infant mortality. Most LBW infants are small because they were born early. Infants born at full term (after 37 complete weeks of pregnancy) can also be LBW if their growth was impaired during pregnancy. Nutritional status, lack of prenatal care, stress, and maternal smoking are known risk factors for LBW. Studies also suggest links with environmental exposures to lead, air pollution, toxic air contaminants, traffic pollution, pesticides, and polychlorinated biphenyls (PCBs). These children are at risk for numerous chronic health conditions and may be more sensitive to environmental exposures after birth. Low weight births are more common among African-American women than they are among Hispanic and non-Hispanic white women, even among those with comparable socioeconomic status, prenatal care, and behavioral risk factors (Lu and Halfon, 2003).

Indicator

Percent low birth weight (averaged over 2007-2011).

Data Source

California Department of Public Health (CDPH)

The Health Information and Research Section of CDPH is responsible for the stewardship and distribution of birth records in the state. Medical data related to a birth, as well as demographic information related to the infant, mother, and father is collected from birth certificates. The residential ZIP code reported by the mother is also included. Birth profiles for California ZIP codes and counties can be accessed by the general public from the CDPH website. Personal identifiers are not released publicly to protect confidentiality.

http://www.cdph.ca.gov/data/statistics/Pages/BirthProfilesbyZIPCode.aspx
http://www.cdph.ca.gov/data/statistics/Pages/CountyBirthStatisticalDataTables.aspx

Rationale

LBW is considered a key marker of overall population health. Being born low weight puts individuals at higher risk of health conditions that can subsequently make them more sensitive to environmental exposures. For example, children born low weight are at increased risk of developing asthma (Nepomnyaschy and Reichman, 2006). Asthma symptoms, in turn, are worsened by exposure to air pollution. LBW can also put one at increased risk of coronary heart disease and type 2 diabetes (Barker *et al.*, 2002). These conditions can predispose one to mortality associated with particulate air pollution or excessive heat (Bateson and Schwartz, 2004; Basu and Samet, 2002). There is also evidence that children born early have lowered cognitive development and more behavioral problems compared to children born at term (Butta *et al.*, 2002), putting them at disadvantage for subsequent opportunities

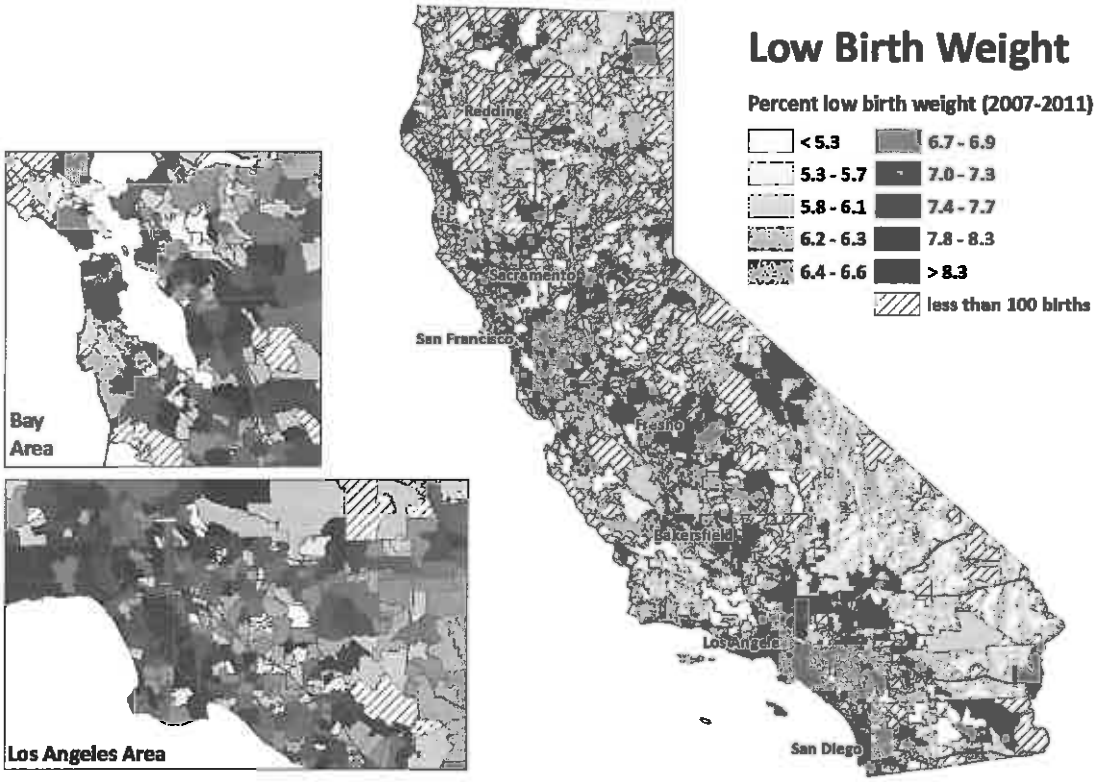
for good health.

Risk of LBW is increased by certain environmental exposures and social factors and can therefore be considered a marker of the combined impact of environmental and social stressors. For example, exposures to traffic and to toxic air contaminants such as benzene, xylene, and toluene have been linked to LBW in California (Ghosh *et al.*, 2012). Living in close proximity to freeways has been associated with an increased risk for low birth weight term infants (Laurent *et al.*, 2013). Latina women exposed to pesticides in California in low-income farmworker communities were found to be at risk for low birth weight infants that were small for gestational age, with smaller than average head circumference, an indicator of brain development. (Harley *et al.*, 2011).

Method

- The average low birth weight (LBW) rate was defined as the percent of live births (including multiple births) weighing less than 2,500 grams occurring in one year.
- Estimates derived from places with few births are considered unreliable because they vary greatly from year to year. For this reason, ZIP codes with less than 100 live births during the time period considered were excluded. The average was estimated using five years of data (2007-2011) in order to minimize the number of ZIP codes that had to be excluded. It was assumed that the ZIP code geographic boundaries did not change during these five years.
- Reported ZIP codes were assigned the rate of their corresponding census ZIP code, assuming perfect geographic overlap. Reported ZIP codes that did not correspond to a census ZIP code were excluded from the analysis.
- ZIP codes that had less than 100 live births over the five years or did not correspond to a census ZIP code were excluded from the calculation of percentiles for all other ZIP codes.

Indicator Map



References

Barker DJ, Eriksson JG, Forsen T, Osmond C (2002). Fetal origins of adult disease: strength of effects and biological basis. *Int J Epidemiol* **31**(6):1235-9.

Basu R, Samet JM (2002). Relation between elevated ambient temperature and mortality: a review of the epidemiologic evidence. *Epidemiol Rev* **24**(2):190-202.

Bateson TF, Schwartz J (2004). Who is sensitive to the effects of particulate air pollution on mortality? A case-crossover analysis of effect modifiers. *Epidemiology* **15**(2):143-9.

Bhutta AT, Cleves MA, Casey PH, Cradock MM, Anand KJ (2002). Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. *JAMA* **288**(6):728-37.

Ghosh JKC, Wilhelm M, Su J, Goldberg D, Cockburn M, Jerrett M, *et al.* (2012). Assessing the Influence of Traffic-related Air Pollution on Risk of Term Low Birth Weight on the Basis of Land-Use-based Regression Models and Measures of Air Toxics. *American Journal of Epidemiology* **175**(12):1262-74.

Harley KG, Huen K, Schall RA, Holland NT, Bradman A, Barr DB, *et al.* (2011). Association of organophosphate pesticide exposure and

paraoxonase with birth outcome in Mexican-American women. *PloS one* **6**(8):e23923.

Laurent O, Wu J, Li L, Chung J, Bartell S (2013). Investigating the association between birth weight and complementary air pollution metrics: a cohort study. *Environ Health* **12**(1):18.

Lu MC, Halfon N (2003). Racial and ethnic disparities in birth outcomes: a life-course perspective. *Matern Child Health J* **7**(1):13-30.

Nepomnyaschy L, Reichman NE (2006). Low birthweight and asthma among young urban children. *Am J Public Health* **96**(9):1604-10.

EDUCATIONAL ATTAINMENT

Socioeconomic Factors Indicator

Educational attainment is an important element of socioeconomic status and a social determinant of health. Numerous studies suggest education can have a protective effect from exposure to environmental pollutants that damage health. Information on educational attainment is collected annually in the U.S. Census Bureau's American Community Survey (ACS). In contrast to the decennial census, the ACS surveys a small sample of the U.S. population to estimate more detailed economic and social information for the country's population.

Indicator

Percent of the population over age 25 with less than a high school education (5-year estimate, 2007-2011).

Data Source

American Community Survey
U.S. Census Bureau

The American Community Survey (ACS) is an ongoing survey of the U.S. population conducted by the U.S. Census Bureau and has replaced the long form of the decennial census. Unlike the decennial census, which attempts to survey the entire population and collects a limited amount of information, the ACS releases results annually based on a sub-sample of the population and includes more detailed information on socioeconomic factors such as educational attainment. Multiple years of data are pooled together to provide more reliable estimates for geographic areas with small population sizes. The most recent results available at the census ZIP code are the 5-year estimates for 2007-2011. The data are made available using the American FactFinder website.

http://www.census.gov/acs/www/
http://factfinder2.census.gov/

Rationale

Educational attainment is an important independent predictor of health (Cutler and Lleras-Muney, 2006). As a component of socioeconomic status, education is often inversely related to the degree of exposure to indoor and outdoor pollution. Several studies have associated educational attainment with susceptibility to the health impacts of environmental pollutants. For example, individuals without a high school education appear to be at higher risk of mortality associated with particulate air pollution than those with a high school education (Krewski *et al.*, 2000). There is also evidence that the effects of air and traffic-related pollution on respiratory illness, including childhood asthma, are more severe in communities with lower levels of education (Cakmak *et al.*, 2006; Shankardass *et al.*, 2009; Neidell, 2004).

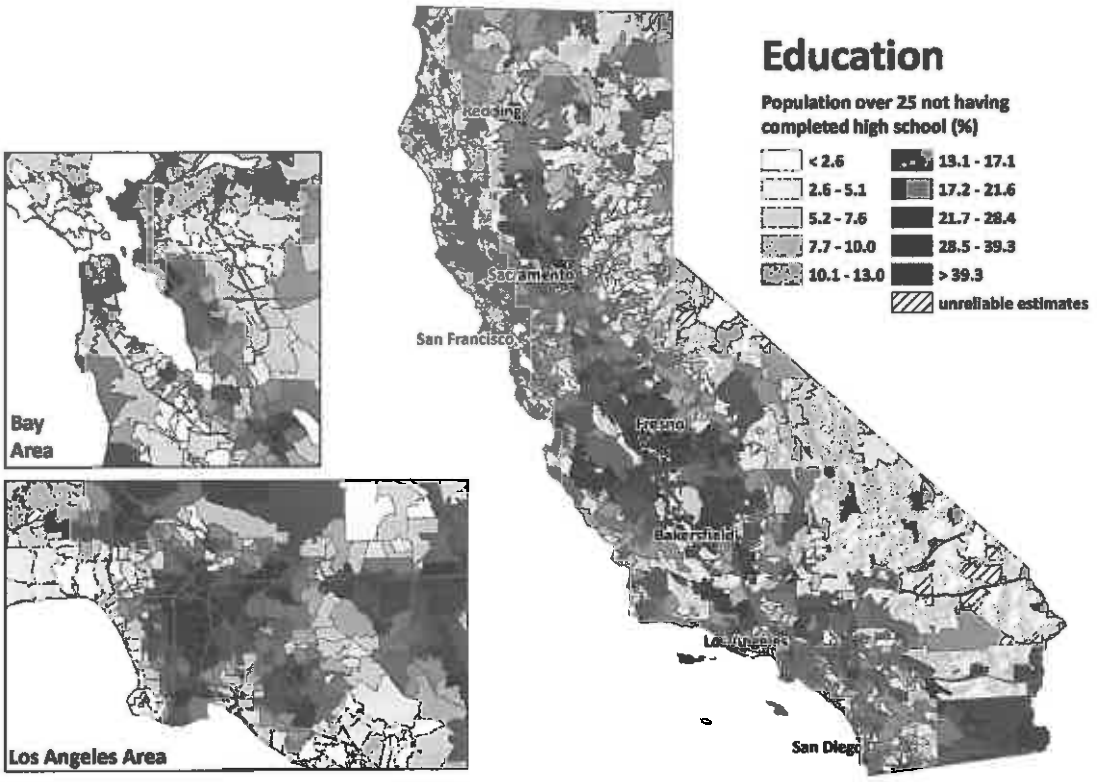
The ways in which lower educational attainment can decrease health status are not completely understood, but may include economic hardship, stress, fewer occupational opportunities, lack of social support, and reduced access to health-protective resources such as medical care, prevention and wellness initiatives, and nutritious food. In a study of pregnant women in Amsterdam, smoking and exposure to environmental

tobacco smoke were more common among women with less education. These women also were at significantly increased risk of preterm birth, low birth weight and small for gestational age infants (van den Berg *et al.*, 2012). A review of studies tying social stressors with the effects of chemical exposures on health found that level of education was related to mortality and incidence of asthma and respiratory diseases from exposure to particulate air pollution and sulfur dioxide (Lewis *et al.*, 2011).

Method

- From the 2007-2011 American Community Survey estimates, a dataset containing the percentage of the population over age 25 with a high school education or higher was downloaded by census ZIP codes for the state of California.
- This percentage was subtracted from 100 to obtain the proportion of the population with less than a high school education by census ZIP code.
- Due to small sampling size or small population size within a ZIP code, not all estimates of the educational attainment are reliable. The margin of error (MOE) reported in the ACS was used to evaluate the reliability estimates. The MOE is the difference between an estimate and its upper or lower confidence bound. All ACS-published margins of error are based on a 90 percent confidence level.
- All ZIP codes in which the ratio of the MOE to the estimate was less than 66.6 percent (two-thirds) were retained. Of the remaining estimates, the MOE was larger than 20.6, which corresponds to the 33.3 percentile (tertile) of all-percent high school education estimates. These estimates were also removed.
- ZIP codes meeting this criteria were ordered by percent of population over age 25 with less than a high school education and percentiles were assigned to each based on the distribution across all ZIP codes.

Indicator Map



References

Cakmak S, Dales RE, Judek S (2006). Respiratory health effects of air pollution gases: modification by education and income. *Archives of Environmental & Occupational Health* **61**(1):5-10.

Cutler DM, Lleras-Muney A (2006). Education and Health: Evaluating Theories and Evidence. *National Bureau of Economic Research Working Paper Series* **No. 12352.**

Krewski D, Burnett RT, Goldberg MS, Hoover K, Siemiatycki J, Jerrett M, *et al.* (2000). Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of particulate air pollution and mortality. *Cambridge, MA: Health Effects Institute.*

Lewis AS, Sax SN, Wason SC, Campleman SL (2011). Non-chemical stressors and cumulative risk assessment: an overview of current initiatives and potential air pollutant interactions. *Int J Environ Res Public Health* **8**(6):2020-73.

Neidell MJ (2004). Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma. *Journal of Health Economics* **23**(6):1209-36.

Shankardass K, McConnell R, Jerrett M, Milam J, Richardson J, Berhane K (2009). Parental stress increases the effect of traffic-related air pollution on childhood asthma incidence. *Proc Natl Acad Sci U S A* **106**(30):12406-11.

van den Berg G, van Eijsden M, Vrijkotte TG, Gemke RJ (2012). Educational inequalities in perinatal outcomes: the mediating effect of smoking and environmental tobacco exposure. *PLoS One* 7(5):e37002.

Linguistic Isolation

Socioeconomic Factors Indicator

According to the most recent U.S. Census Bureau's 2007-2011 American Community Survey (ACS), nearly 43% of Californians speak a language at home other than English, about 20% of the state's population speaks English "not well" or "not at all," and 10% of all households in California are linguistically isolated. The U.S. Census Bureau uses the term "linguistic isolation" to measure households where all members 14 years of age or above have at least some difficulty speaking English. A high degree of linguistic isolation among members of a community raises concerns about access to health information and public services, and effective engagement with regulatory processes. Information on language use is collected annually in the ACS. In contrast to the decennial census, the ACS surveys a small sample of the U.S. population to estimate more detailed economic and social information for the country's population.

Indicator

Percentage of households in which no one age 14 and over speaks English "very well" or speaks English only.

Data Source

American Community Survey
U.S. Census Bureau

The American Community Survey (ACS) is an ongoing survey of the U.S. population conducted by the U.S. Census Bureau and has replaced the long form of the decennial census. Unlike the decennial census, which attempts to survey the entire population and collects a limited amount of information, the ACS releases results annually based on a sub-sample of the population and includes more detailed information on socioeconomic factors such as linguistic isolation. Multiple years of data are pooled together to provide more reliable estimates for geographic areas with small population sizes. The most recent results available at the census ZIP code are the 5-year estimates for 2007-2011. The data are made available using the American FactFinder website.

http://www.census.gov/acs/www/
http://factfinder2.census.gov/

Rationale

From 1990 to 2000 the number of households in the U.S. defined as "linguistically isolated" rose by almost 50% (Shin and Bruno, 2003). While the percentage of immigrant households in California that are linguistically isolated is comparable to the national percentage, according to the 2009 American Community Survey (Hill, 2011), California has a higher proportion of immigrants than any other state and the immigrant population has increased by 400% since 1970 (Johnson, 2011). The inability to speak English well can affect an individual's communication with service providers and his or her ability to perform daily activities. People with limited English are less likely to have regular medical care and are more likely to report difficulty getting medical information or advice than English speakers. Communication is essential for many steps in the process of obtaining health care, and limited English speakers may delay care because they

lack important information about symptoms and available services (Shi *et al.* 2009). Non-English speakers are also less likely to receive mental health services when needed, and because in California non-English speakers are concentrated in minority ethnic communities, limited English proficiency may contribute to further ethnic and racial disparities in health status and disability (Sentell *et al.* 2007). Linguistic isolation is also an indicator of a community's ability to participate in decision-making processes and the ability to navigate the political system.

Lack of proficiency in English often results in racial discrimination, and both language difficulties and discrimination are associated with stress, low socioeconomic status and reduced quality of life (Gee and Ponce, 2010). Linguistic isolation hampers the ability of the public health sector to reduce racial and ethnic disparities because non-English-speaking individuals participate in public health surveillance studies at very low rates, even when there is translation available (Link *et al.*, 2006).

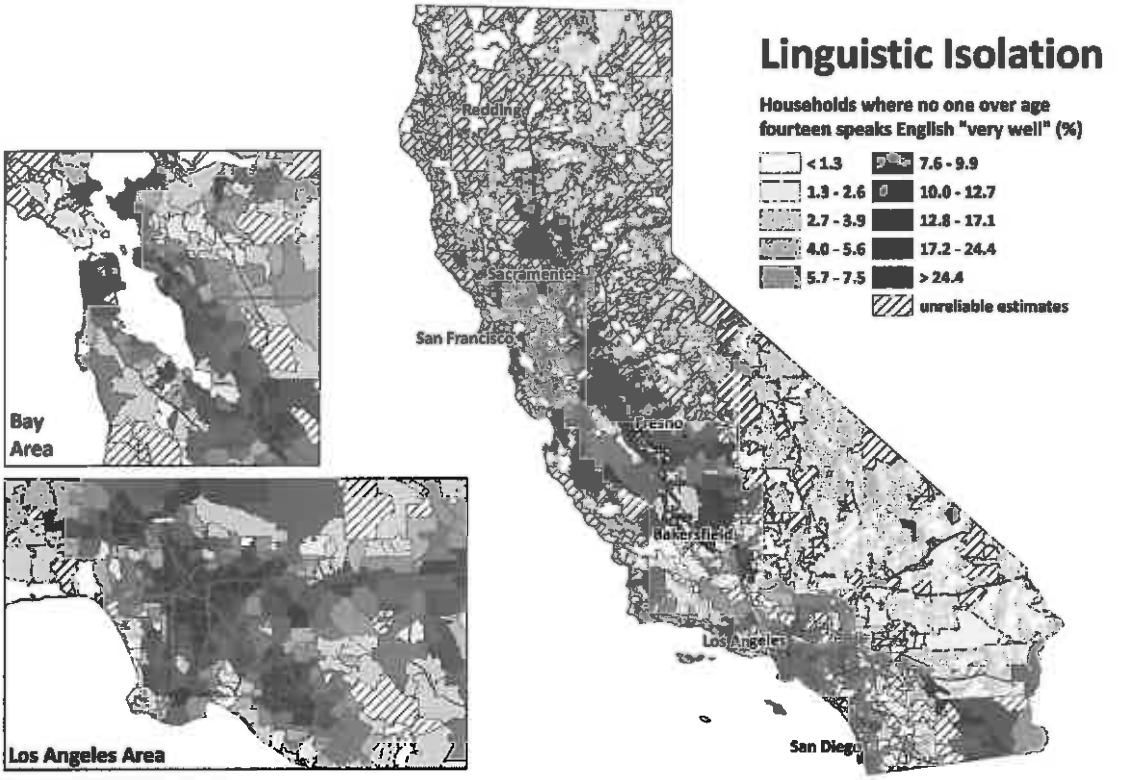
In the event of an emergency, such as an accidental chemical release or a spill, households that are linguistically isolated may not receive timely information on evacuation or shelter-in-place orders, and may therefore experience health risks that those who speak English can more easily avoid. Additionally, linguistic isolation was independently related to both proximity to a Toxic Release Inventory (TRI) facility and cancer risks by the National-Scale Air Toxics Assessment (NATA) in an analysis of the San Francisco Bay Area, suggesting that linguistically isolated communities may bear a greater share of health risks from air pollution hazards (Pastor *et al*,. 2010).

Method

- From the 2007-2011 American Community Survey, a dataset containing the average percent of household in which no one age 14 and over speaks English "very well" or speaks English only was downloaded by census ZIP codes for the state of California. This variable is referred to as "linguistic isolation" and measures households where no one speaks English well.
- Due to small sampling size or small population size within a ZIP code, not all estimates are reliable. The margin of error (MOE) reported in the ACS was used to evaluate the reliability of each estimate. The margin of error is the difference between an estimate and its upper or lower confidence bound. All ACS-published margins of error are based on a 90 percent confidence level. The following criteria were used:
  - All estimates where the ratio of the MOE to the estimate was less than 66.6 percent (two-thirds) were included.
  - The distribution of all the ZIP codes was considered. The 33.3 percentile (lower tertile) was 4.2% and the 66.6 percentile (upper tertile) was 11.2%.
  - For estimates below 4.2%, if the upper bound was greater or equal to 4.2%, then the estimate was retained.
  - For estimates between 4.3% and 11.2%, if the lower bound was greater than 4.3% and the upper bound was less than 11.2%,

then the estimate was retained.
  - For estimates greater than 11.3%, if the lower bound was greater than 4.3%, then the estimate was retained.
- ZIP codes meeting this criteria were ordered by the percent linguistically isolated and percentiles were assigned to each based on the distribution across all ZIP codes.

Indicator Map



References

Gee GC, Ponce N (2010). Associations between racial discrimination, limited English proficiency, and health-related quality of life among 6 Asian ethnic groups in California. *Am J Public Health* **100**(5):888-95.

Hill, Laura (2011). English Proficiency of Immigrants. Fact Sheet. Public Policy Institute of California, March 2011. 2 pp. Accessed 1/30/2013. http://www.ppic.org/content/pubs/jtf/JTF_EnglishProficiencyJTF.pdf

Johnson, Hans (2011). Immigrants in California. Fact Sheet. Public Policy Institute of California, April 2011. 2 pp. Accessed 1/30/2013. http://www.ppic.org/content/pubs/jtf/JTF_ImmigrantsJTF.pdf

Link MW, Mokdad AH, Stackhouse HF, Flowers NT (2006). Race, ethnicity, and linguistic isolation as determinants of participation in public health surveillance surveys. *Prev Chronic Dis* **3**(1):A09.

Pastor M, Morello-Frosch R, Sadd J (2010). *Air pollution and*

environmental justice: integrating indicators of cumulative impact and socio-economic vulnerability into regulatory decision-making: California Environmental Protection Agency, Air Resources Board, Research Division.

Sentell T, Shumway M, Snowden L (2007). Access to mental health treatment by English language proficiency and race/ethnicity. *J Gen Intern Med* **22 Suppl 2**:289-93.

Shi L, Lebrun LA, Tsai J (2009). The influence of English proficiency on access to care. *Ethn Health* **14**(6):625-42.

Shin HB, Bruno R (2003). Language Use and English-Speaking Ability: 2000. In US Dept of Commerce (Ed.) (pp. 1-11). Washington, DC: U.S. Census Bureau.

POVERTY

Socioeconomic Factors Indicator

Poverty is an important social determinant of health. Numerous studies have suggested that impoverished populations are more likely than wealthier populations to experience adverse health outcomes when exposed to environmental pollution. Information on poverty is collected annually in the U.S. Census Bureau's American Community Survey (ACS). In contrast to the decennial census, the ACS surveys a small sample of the U.S. population to estimate more detailed economic and social information for the country's population.

Indicator

Percent of the population living below two times the federal poverty level (5-year estimate, 2007-2011).

Data Source

American Community Survey
U.S. Census Bureau

The American Community Survey (ACS) is an ongoing survey of the U.S. population conducted by the U.S. Census Bureau and has replaced the long form of the decennial census. Unlike the decennial census, which attempts to survey the entire population and collects a limited amount of information, the ACS releases results annually based on a sub-sample of the population and includes more detailed information on socioeconomic factors such as poverty. Multiple years of data are pooled together to provide more reliable estimates for geographic areas with small population sizes. The most recent results available at the census ZIP code are the 5-year estimates for 2007-2011. The data are made available using the American FactFinder website.

The Census Bureau uses income thresholds that are dependent on family size to determine a person's poverty status during the previous year. For example, if a family of four with two children has a total income less than $21,938 during 2010, everyone in that family is considered to live below the federal poverty line. A threshold of twice the federal poverty level was used in this analysis because the federal poverty thresholds have not changed since the 1980s despite increases in the cost of living, and because California's cost of living is higher than many other parts of the country.

http://www.census.gov/acs/www/
http://factfinder2.census.gov/

Rationale

Wealth influences health because it helps determine one's living conditions, nutrition, occupation, and access to health care and other health-promoting resources. For example, studies have shown a stronger effect of air pollution on mortality (Forastiere *et al.*, 2007) and childhood asthma (Lin *et al.*, 2004, Meng *et al.*, 2011) among low income communities. A multi-city study in Canada found that the effect of nitrogen dioxide on respiratory hospitalizations was increased among lower income households compared to those with higher incomes (Cakmak *et al.*, 2006). Other studies have found that neighborhood-level

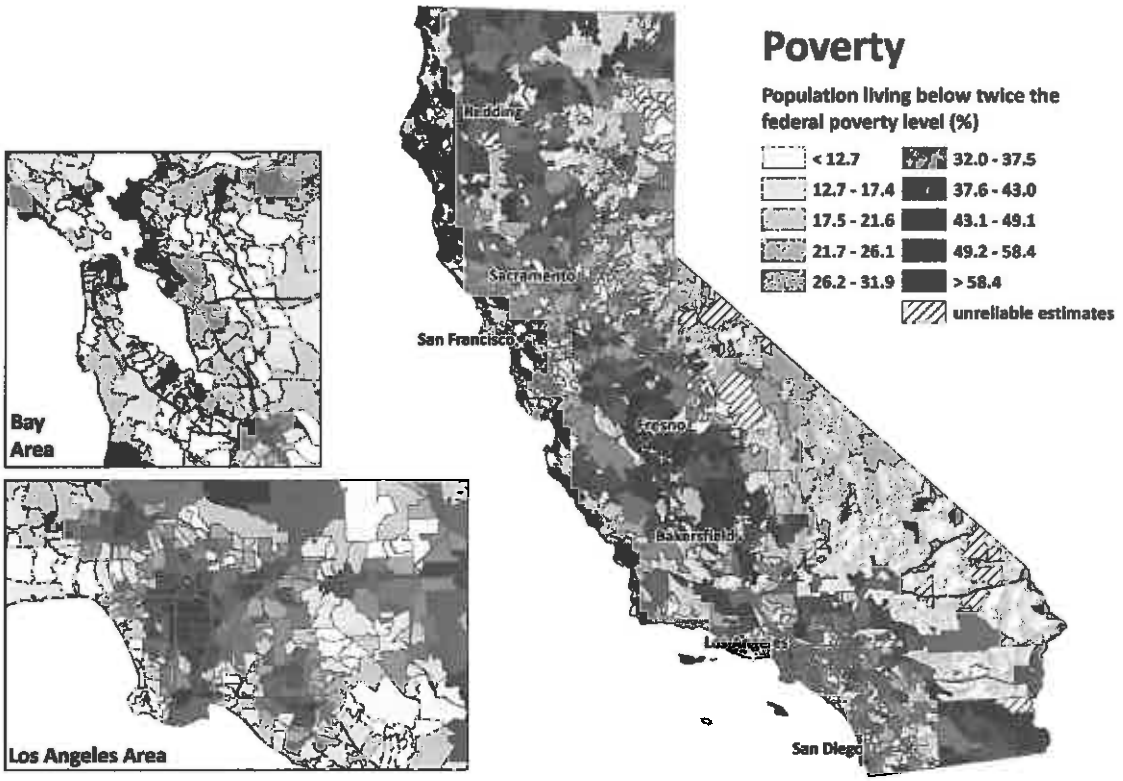
income modifies the relationship between particulate air pollution and preterm birth (Yi *et al.*, 2010) as well as traffic and low birth weight (Zeka *et al.*, 2008), with mothers living in low income neighborhoods having higher risk of both outcomes.

One way by which poverty may lead to greater susceptibility is from the effects of chronic stress on the body (Wright *et al.*, 1999; Brunner and Marmot, 2006). Differential underlying burdens of pre-existing illness and co-exposure to multiple pollutants are other possible factors (O'Neill *et al.*, 2003).

Method

- From the 2007-2011 American Community Survey, a dataset containing the number of individuals below 200 percent of the federal poverty level was downloaded by census ZIP codes for the state of California.
- The number of individuals below the poverty level was divided by the total population for whom poverty status was determined to obtain a percent.
- The margin of error (MOE) reported in the ACS was used to evaluate the reliability of each estimate. Due to small sampling size or small population size within a ZIP code, not all estimates are reliable. The MOE is the difference between an estimate and its upper or lower confidence bound. All ACS-published margins of error are based on a 90 percent confidence level.
- MOEs are reported on the total population (for whom poverty status was determined). The MOE was used to evaluate the reliability of each estimate. If the ratio of MOE) to the total population was greater 66.6 percent (two-thirds), the estimate was excluded.
- ZIP codes meeting this criteria were ordered by the percentage of the population below twice (or 200 percent of) the federal poverty level. A percentile score for a ZIP code was determined by its place in the distribution of all ZIP codes.

Indicator Map



References

Brunner E and Marmot M (2006). Social organization, stress and health. In: *Social Determinants of Health* (2nd edition). Marmot M and Wildinson RG, eds. Oxford, UK: Oxford University Press, p. 7-30.

Cakmak S, Dales RE, Judek S (2006). Respiratory health effects of air pollution gases: modification by education and income. *Archives of Environmental & Occupational Health* **61**(1):5-10.

Forastiere F, Stafoggia M, Tasco C, Picciotto S, Agabiti N, Cesaroni G, *et al.* (2007). Socioeconomic status, particulate air pollution, and daily mortality: differential exposure or differential susceptibility. *American Journal of Industrial Medicine* **50**(3):208-16.

Lin M, Chen Y, Villeneuve PJ, Burnett RT, Lemyre L, Hertzman C, *et al.* (2004). Gaseous air pollutants and asthma hospitalization of children with low household income in Vancouver, British Columbia, Canada. *American Journal of Epidemiology* **159**(3):294-303.

Meng Y, Wilhelm M, Ritz B, Balmes J, Lombardi C, Bueno A, *et al.* (2011). Is disparity in asthma among Californians due to higher pollution exposures, greater vulnerability, or both? In CAR Board (Ed.). Sacramento: CARB.

O'Neill MS, Jerrett M, Kawachi I, Levy JI, Cohen AJ, Gouveia N, *et al.*

(2003). Health, wealth, and air pollution: advancing theory and methods. *Environmental Health Perspectives* **111**(16):1861.

Wright RJ, Rodriguez M, Cohen S (1998). Review of psychosocial stress and asthma: an integrated biopsychosocial approach. *Thorax* **53**(12):1066-74.

Yi O, Kim H, Ha E (2010). Does area level socioeconomic status modify the effects of PM10 on preterm delivery? *Environmental Research* **110**(1):55-61.

Zeka A, Melly SJ, Schwartz J (2008). The effects of socioeconomic status and indices of physical environment on reduced birth weight and preterm births in Eastern Massachusetts. *Environ Health* **7**:60.

RACE/ETHNICITY

Socioeconomic Factors Indicator

Emerging scientific research indicates that the relationship between pollutant exposure, stress and health outcomes can vary based on the race and ethnicity of the population. For example, studies have shown that maternal exposure to particulate pollution results in a greater reduction in infant birth weight among African-American mothers than white mothers. Similarly, higher mortality has been observed among African-American populations exposed to ozone than other populations exposed to the same levels. Racial and ethnic minority groups dominate many urban underserved communities (Saha *et al.*, 2000; Mertz and Grumbach 2001). The U.S. Census Bureau collects information on race and ethnicity as part of the decennial census and makes this information publicly available.

Indicator

Percent of the population that is non-white or Hispanic/Latino.(Includes all people in the U.S. Census who identified a race other than white or who identified as Hispanic, Latino, or Spanish origin).

Data Source

U.S. Census Bureau

As part of the 2010 decennial census, the U.S. Census Bureau questionnaire asked all census respondents to identify if they were of Hispanic, Latino or Spanish origin and in a separate question, their race. Race and ethnicity are considered separate by the Census Bureau.

Other questions asked of all respondents in the decennial census are age and date of birth, household relationship, sex, and home ownership. Datasets describing the number of individuals in different race and ethnicity categories are available for California at different geographic scales. The data are made available using the American FactFinder website.

http://factfinder2.census.gov/

Rationale

There are multiple studies of demographics and health disparities that provide evidence that race and ethnicity can modify the adverse responses to specific pollutant exposures. For example, in a study of traffic-related pollution, the reduction in birth weight due to maternal exposure to particulate pollution (PM 2.5) was greater among black mothers than white mothers (Bell *et al.*, 2007). Another study found that African-American mothers of low socioeconomic status exposed to traffic-related air pollution had twice the likelihood of delivering a preterm infant compared to white low socioeconomic status mothers (Ponce *et al.*, 2005). The effect of ozone on the mortality of African American populations also appears to be stronger than its effect on non-black populations (Medina-Ramon and Schwartz, 2008).

A study of traffic exposure and spontaneous abortion found a greater effect for African-American women than other racial and ethnic groups (Green *et al.*, 2009). In a study of the effects of nitrogen dioxide (NO_2) on children without health insurance in Phoenix, Hispanic children had

twice the risk of hospitalization for asthma from NO_2 exposure as white children. Black children showed about twice the risk of asthma hospitalization from NO_2 exposure as Hispanic children, regardless of insurance status (Grineski *et al.*, 2010). Differences have also been observed for the effect of PM2.5 exposure on emergency department visits for asthma among patients of different races. The effect was found to be significant and greater in African American populations compared to Caucasians for the first three days following exposure (Glad *et al.*, 2012).

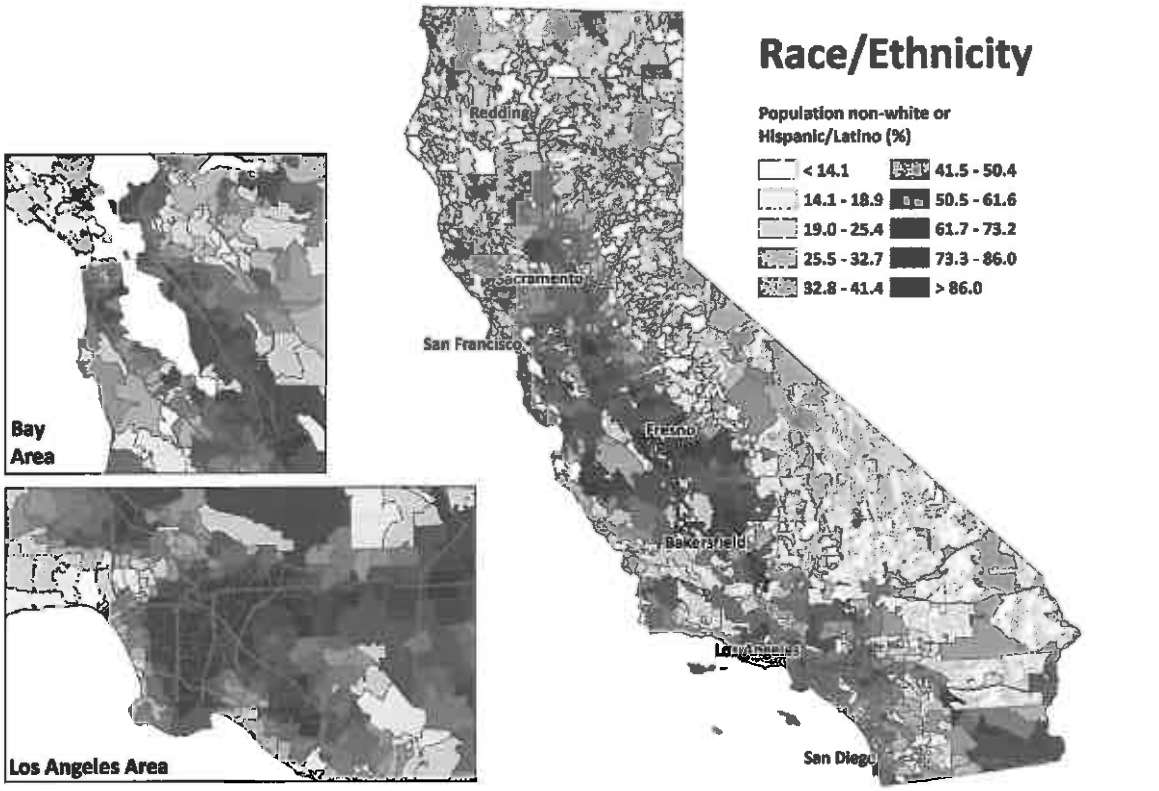
The mechanisms by which differences in race or ethnicity may lead to differences in health status and response to pollutants are complex and are not well understood. Some studies have explored the relationship between the experience of racism as a form of chronic stress and human health (Paradies, 2006; Kwate *et al.*, 2003), while others have looked at racial discrimination as an aspect of socioeconomic disadvantage, along with residential crowding, noise, poor housing quality, and exposure to violence (Evans and Marcynyszyn, 2004; Geronimus, 1996; Williams and Williams-Morris, 2000; Clark *et al.*, 1999). A study of the effect of blood lead level on blood pressure using NHANES data found that there are significant racial and ethnic disparities, with the strongest association occurring in African Americans with symptoms of depression (Hicken *et al.*, 2013). The authors suggest that this finding is evidence of the role that social stressors play in determining vulnerability to the health impacts of environmental exposures.

Native American adults of all ages are at increased risk of diabetes compared to individuals with health insurance in the general population, and those with diabetes are more likely to have other health problems as well (O'Connell *et al.*, 2010). Tribal communities are often poor, and have the same potential for exposure to environmental pollutants as other poor communities (Indian Health Service, 2013a). Rates of overweight and obesity among Native American children are also higher than among non-Native populations, potentially due in part to psychosocial stressors, lack of access to healthy food and exposure to environmental obesogens (Schell and Gallo, 2012). Native Americans have lower life expectancy and higher rates of certain chronic diseases than the U.S. population as a whole.

Method

- A dataset containing the number of people by race/ethnicity was downloaded by census ZIP codes for the State.
- The percentage of the population in each ZIP code was calculated as the total number of people identified as non-white or Hispanic/Latino in the ZIP code divided by the total population of the ZIP code.
- ZIP codes were ordered by the percentage of the population that is non-white or Hispanic/ Latino). A percentile score for a ZIP code was determined by its place in the distribution of all ZIP codes.

Indicator Map



References

Bell ML, Ebisu K, Belanger K (2007). Ambient air pollution and low birth weight in Connecticut and Massachusetts. *Environ Health Perspect* **115**(7):1118-24.

Clark R, Anderson NB, Clark VR, Williams DR (1999). Racism as a stressor for African Americans. A biopsychosocial model. *Am Psychol* **54**(10):805-16.

Evans GW, Marcynyszyn LA (2004). Environmental justice, cumulative environmental risk, and health among low- and middle-income children in upstate New York. *Am J Public Health* **94**(11):1942-4.

Geronimus AT (1996). Black/white differences in the relationship of maternal age to birthweight: a population-based test of the weathering hypothe-sis. *Soc Sci Med* **42**(4):589-97.

Glad JA, Brink LL, Talbott EO, Lee PC, Xu X, Saul M, and Rager J (2012). The relationship of ambient ozone and PM2. 5 levels and asthma emergency department visits: Possible influence of gender and ethnicity. *Archives of Environmental & Occupational Health* **67**(2): 103-108.

Green RS, Malig B, Windham GC, Fenster L, Ostro B, and Swan S

(2009). "Residential exposure to traffic and spontaneous abortion." *Environmental Health Perspectives* 117(12):1939.

Indian Health Service (2013a). Environmental Health Services (Fact Sheet). http://www.ihs.gov/factsheets/index.cfm?module=dsp_fact_ehs. Accessed 2/12/13.

Kwate NO, Valdimarsdottir HB, Guevarra JS, Bovbjerg DH (2003). Experiences of racist events are associated with negative health consequences for African American women. *J Natl Med Assoc* **95**(6):450-60.

Medina-Ramón M, Schwartz J (2008). Who is more vulnerable to die from ozone air pollution? *Epidemiology* **19**(5):672-9.

O'Connell JM, Wilson C, Manson SM, Acton KJ (2012). The costs of treating American Indian adults with diabetes within the Indian Health Service. *Am J Public Health* **102**(2):301-8.

Mertz EA, Grumbach K (2001). Identifying communities with low dentist supply in California. *Journal of Public Health Dentistry* **61**(3):172-7.

Paradies Y (2006). A systematic review of empirical research on self-reported racism and health. *Int J Epidemiol* **35**(4):888-901.

Ponce NA, Hoggatt KJ, Wilhelm M, Ritz B (2005). Preterm birth: the interaction of traffic-related air pollution with economic hardship in Los Angeles neighborhoods. *Am J Epidemiol* **162**(2):140-8.

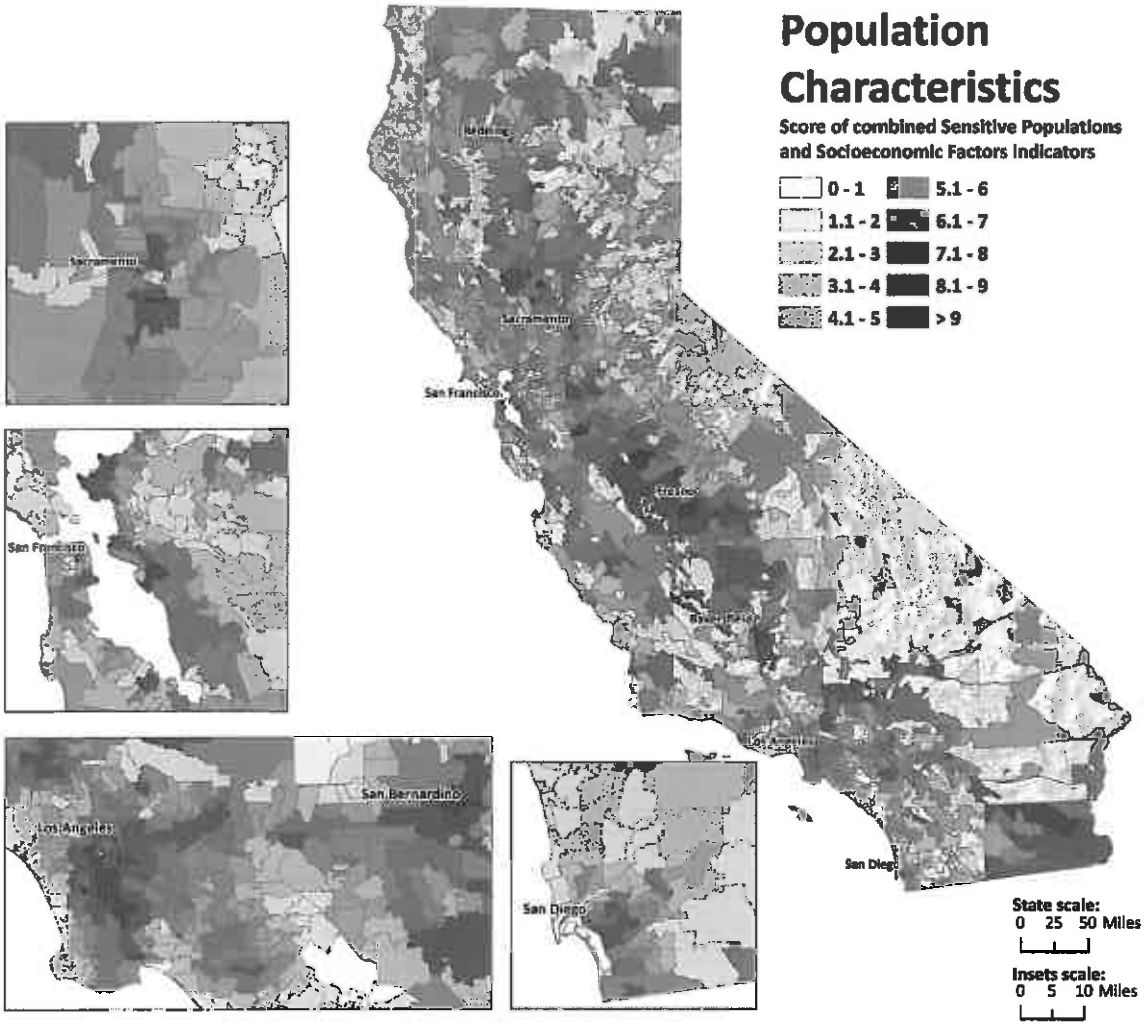
Saha S, Taggart SH, Komaromy M, Bindman AB (2000). Do patients choose physicians of their own race? *Health affairs* **19**(4):76-83.

Schell LM, Gallo MV (2012). Overweight and obesity among North American Indian infants, children, and youth. *Am J Hum Biol* **24**(3):302-13.

Williams DR, Williams-Morris R (2000). Racism and mental health: the African American experience. *Ethn Health* **5**(3-4):243-68.

SCORES FOR POPULATION CHARACTERISTICS (RANGE OF POSSIBLE SCORES: 0.1 TO 10)

Population Characteristics scores for each ZIP code are derived from the average percentiles for the three Sensitive Populations indicators (children/elderly, low birth weight, and asthma) and the four Socioeconomic Factors indicators (educational attainment, linguistic isolation, poverty, and race/ethnicity). The calculated average percentile divided by 10 for a Population Characteristic score ranging from 0.1 -10.

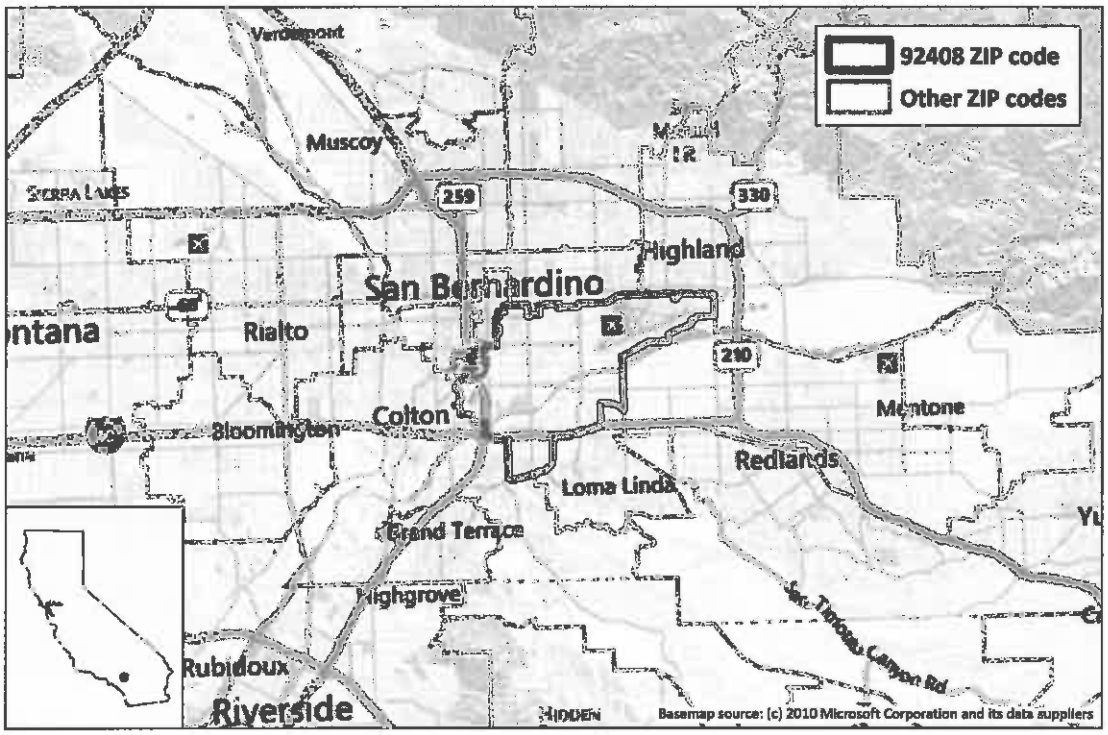


EXAMPLE ZIP CODE:
INDICATOR RESULTS AND CALENVIROSCREEN SCORE

EXAMPLE: 92408, SAN BERNARDINO
POPULATION 15,271

One example ZIP code was selected to illustrate how an overall CalEnviroScreen score is calculated using the California Communities Environmental Health Screening Tool. Shown below are:

- An area map for the ZIP code and surrounding ZIP codes.
- Tables for the indicators of Pollution Burden and Population Characteristics with percentile scores for each of the indicators.
- A table showing how a CalEnviroScreen score would be calculated for the example area, based on the data in this report.



Exposure Indicators						
Indicator	Ozone (concentration)	PM2.5 (concentration)	DieselPM (emissions)	Pesticide Use (lbs/sq. mi.)	Toxic Releases (weighted lbs)	Traffic (density)
Raw Value	0.81	14.0	22.65	0.35	576964	1,725
Percentile	98.26	83.28	84.68	29.88	78.50	80.92

Environmental Effects Indicators					
Indicator	Cleanup Sites (weighted sites)	Groundwater Threats (weighted sites)	Hazardous Waste Facilities/ Generators (weighted sites)	Impaired Water Bodies (number of pollutants)	Solid Waste Sites/Facilities (weighted sites and facilities)
Raw Value	91	110	5.95	1	24
Percentile	90.75	75.09	88.87	14.50	97.41

Sensitive Population Indicators			
Indicator	Children (<10) and Elderly (>65) (percent)	Asthma (rate per 10,000)	Low Birth Weight (percent)
Raw Value	23.2	73.26	8.11
Percentile	22.74	90.65	87.68

Socioeconomic Factor Indicators				
Indicator	Educational Attainment (percent)	Linguistic Isolation (percent)	Poverty (percent)	Race and Ethnicity (percent)
Raw Value	31.5	18.5	55.4	83.56
Percentile	83.51	83.36	87.22	87.87

CALCULATION OF CALENVIROSCREEN SCORE FOR 92408

	Pollution Burden		Population Characteristics	
	Exposures *(6 indicators)*	Environmental Effects* *(5 indicators)*	Sensitive Populations *(3 indicators)*	Socioeconomic Factors *(4 indicators)*
Indicator Percentiles	98.26 +83.28 +84.68 +29.88 +78.50 +80.92	+ (0.5 × 90.75) + (0.5 × 75.09) + (0.5 × 88.87) + (0.5 × 14.50) + (0.5 × 97.41)	22.74 + 90.65 + 87.68	+ 83.51 + 83.36 + 87.22 + 87.87
Average Percentile	638.83 ÷ (6 + (0.5 × 5)) = 75.16		543.02 ÷ 7 = 77.57	
Score (Range 0.1 – 10)	7.5		7.8	
CalEnviroScreen Score	7.5 x 7.8 = 58.5 (58.5 is in the top 5% of CalEnviroScreen ZIP codes statewide)			

* Indicators from the Environmental Effects component were given half the weight of the indicators from the Exposures component

CALENVIROSCREEN TOP 10% AND STATEWIDE RESULTS

The maps on the following pages depict the top 10 percent of statewide ZIP codes using the CalEnviroScreen methodology described in this report. The first set of maps depicts the top 5 and 10 percent scoring ZIP Codes in the state.

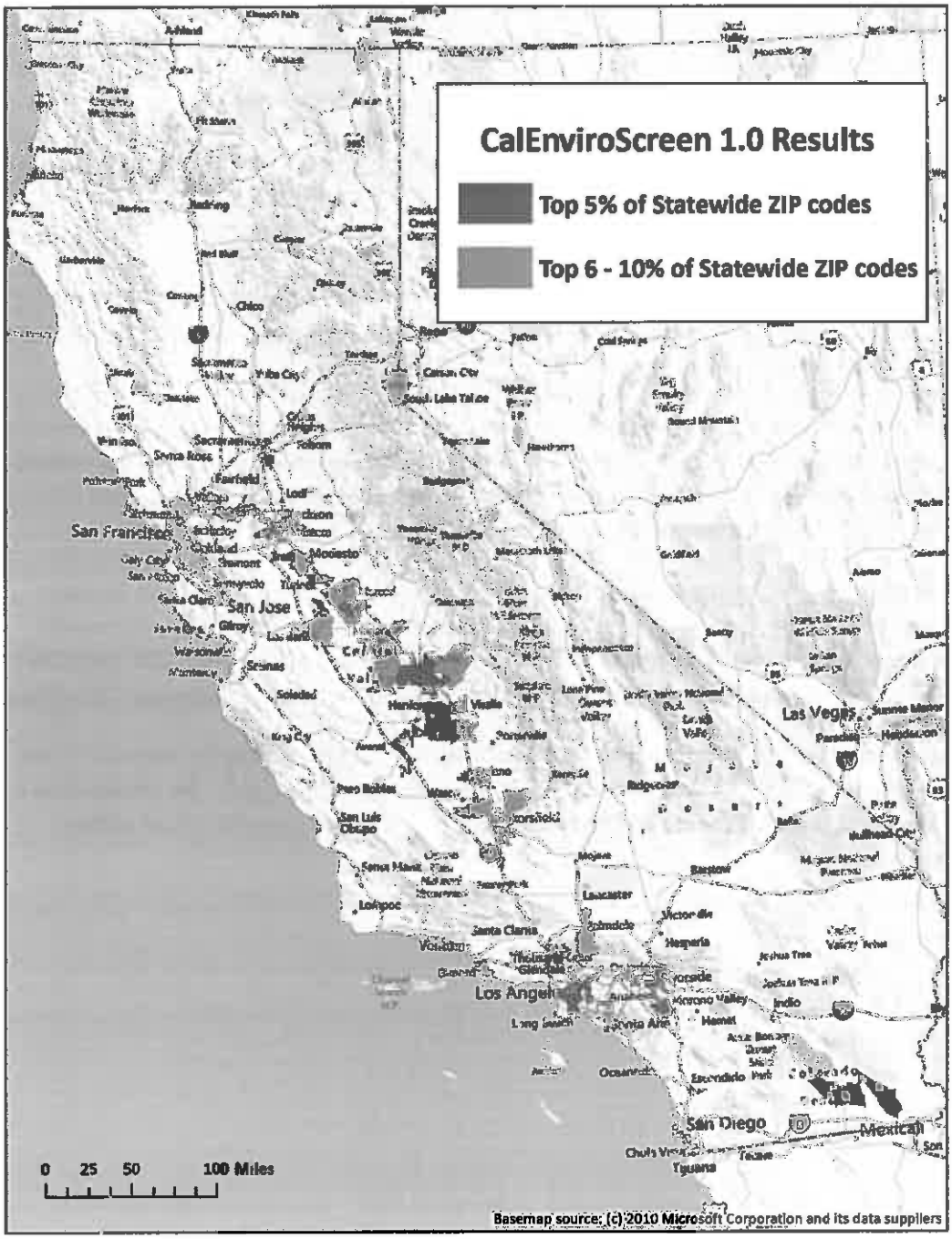
The second set of maps depicts the relative scoring of California's census ZIP codes. ZIP codes with darker colors have the higher CalEnviroScreen scores and therefore have relatively high pollution burdens and population sensitivities. ZIP codes with lighter colors have lower scores, and correspondingly lower pollution burdens and sensitivities.

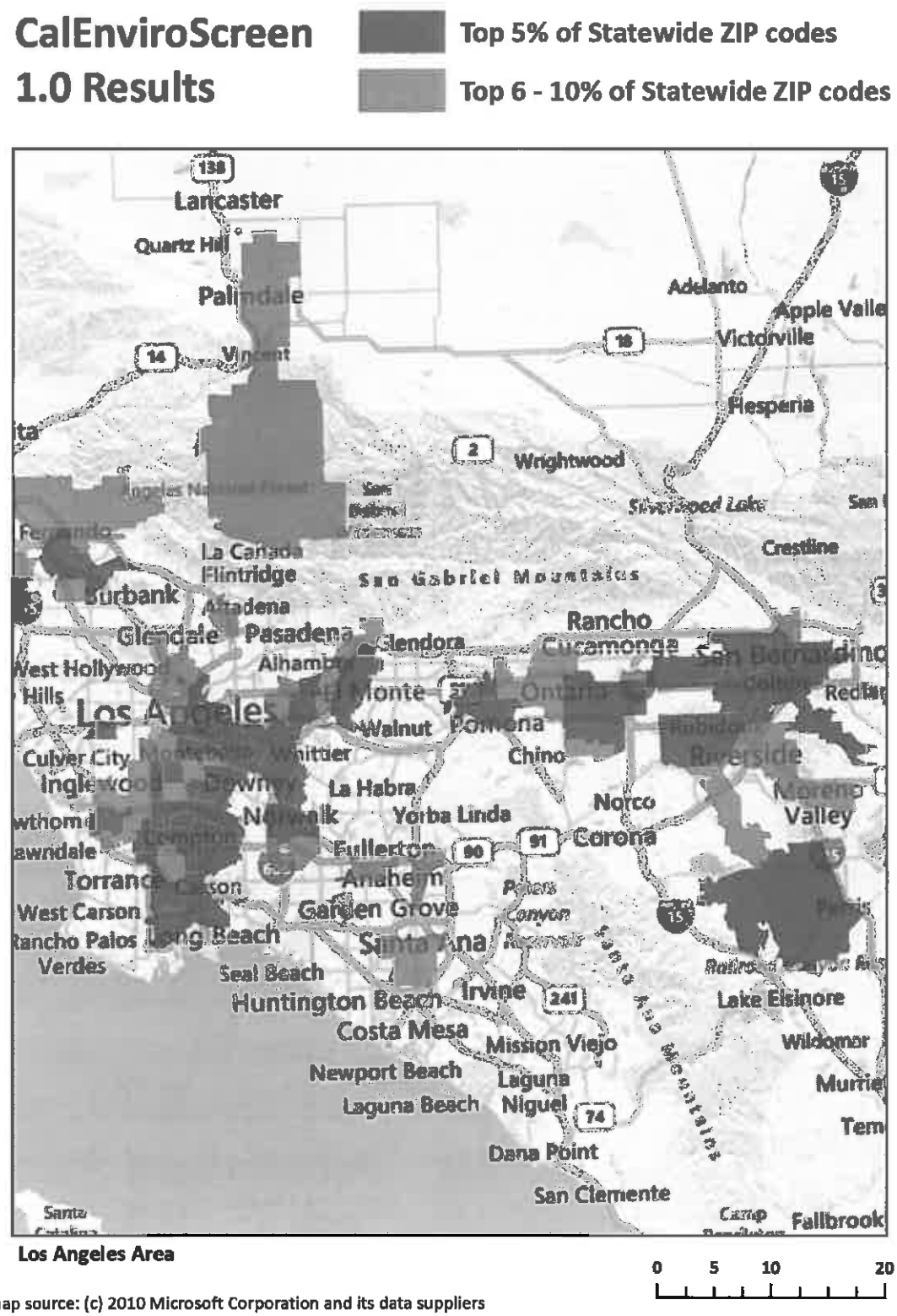
The maps of specific regions of the state (Los Angeles, San Francisco, San Diego, San Joaquin Valley, Sacramento and the Coachella and Imperial Region) are "close-ups" of the statewide map and are intended to provide greater clarity on the relative scoring of census ZIP codes in those regions. Colors on these maps reflect the relative statewide scoring of individual ZIP codes.

Numerical scores for each ZIP code, as well as the individual indicator scores for each ZIP code, may be found online at OEHHA's web site at (http://www.oehha.ca.gov/ej/). The information is available both in a Microsoft Excel spreadsheet format, and will be available as an online mapping application.

TOP 10% HIGHEST SCORING CENSUS ZIP CODES

Using the CalEnviroScreen scores for all the census ZIP codes across the State, the 10% of the ZIP codes with the highest scores were identified. This represents 176 of the 1769 ZIP codes in the State. Because of variation in the number of people living in different ZIP codes, the population represented in these 10% of ZIP codes is about 7.8 million, or about 21% of the 37 million people living in California.




CalEnviroScreen 1.0 Results
Top 5% of Statewide ZIP codes
Top 6 - 10% of Statewide ZIP codes
Lancaster
Quartz Hill
Palmdale
Adelanto
Victorville
Apple Valley
Hesperia
Wrightwood
La Canada Flintridge
San Gabriel Mountains
Crestline
Burbank
Glendale
Pasadena
Rancho Cucamonga
West Hollywood
Hills
Los Angeles
Walnut
Pomona
Chino
Culver City
Whittier
La Habra
Norwalk
Yorba Linda
Norco
Corona
Moreno Valley
Torrance
Fullerton
Anaheim
West Carson
Garden Grove
Long Beach
Santa Ana
Rancho Palos Verdes
Seal Beach
Huntington Beach
Irvine
Lake Elsinore
Costa Mesa
Mission Viejo
Wildomar
Newport Beach
Laguna Niguel
Laguna Beach
Dana Point
San Clemente
Fallbrook
Los Angeles Area
0 5 10 20 Miles
Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

Top 5% of Statewide ZIP codes

Top 6 - 10% of Statewide ZIP codes

San Francisco Area

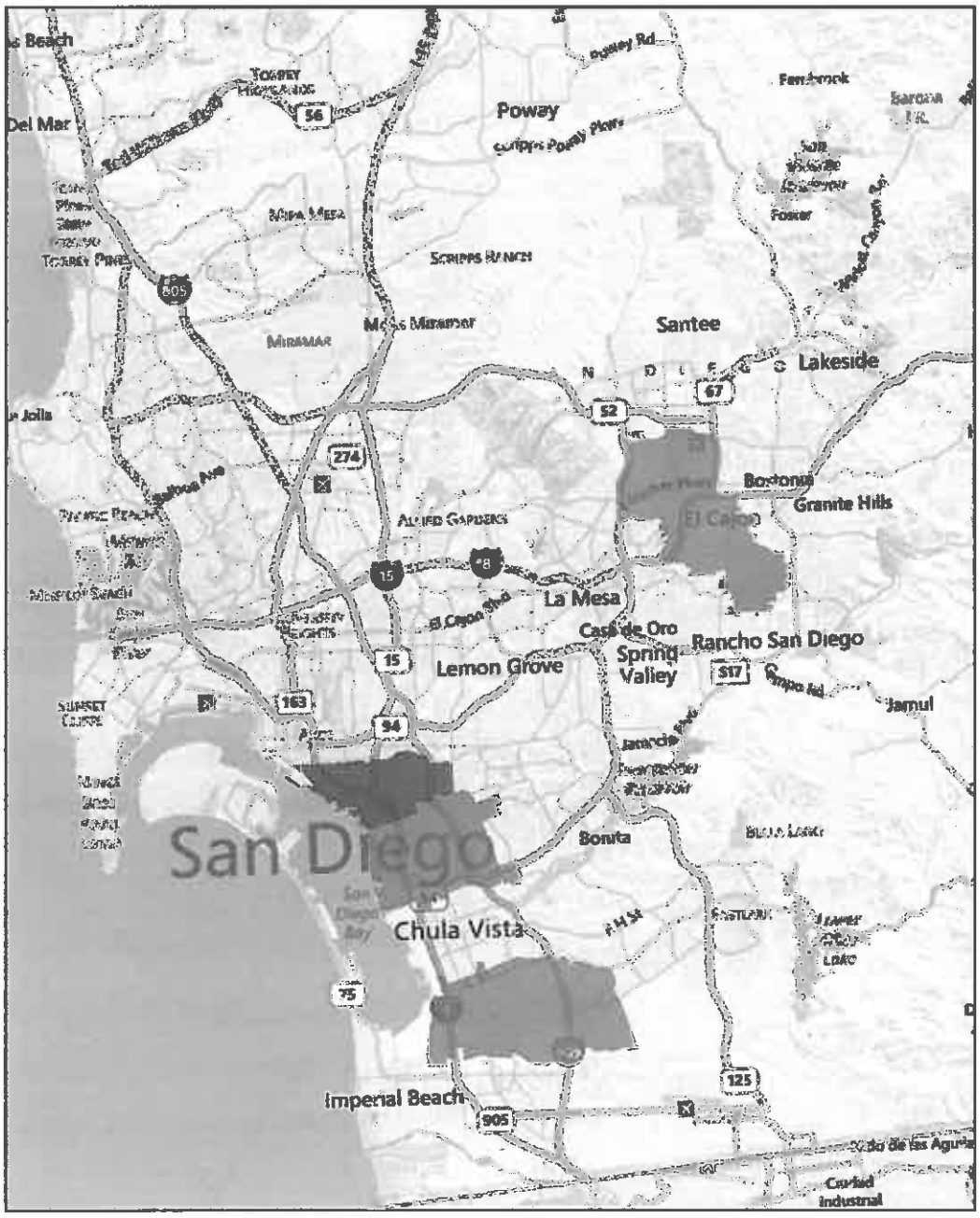
0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

Top 5% of Statewide ZIP codes

Top 6 - 10% of Statewide ZIP codes



San Diego Area

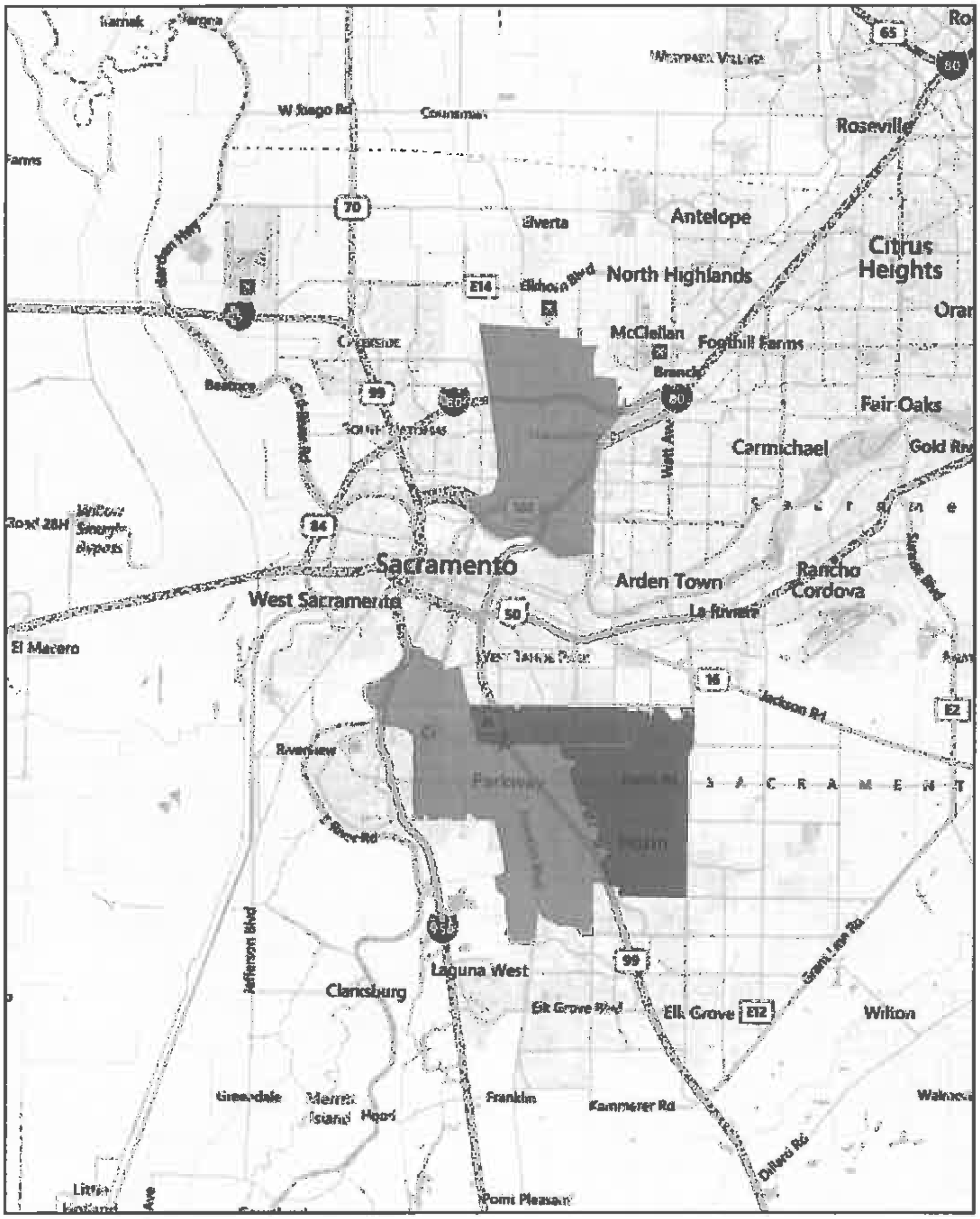
0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

Top 5% of Statewide ZIP codes

Top 6 - 10% of Statewide ZIP codes



Sacramento Area

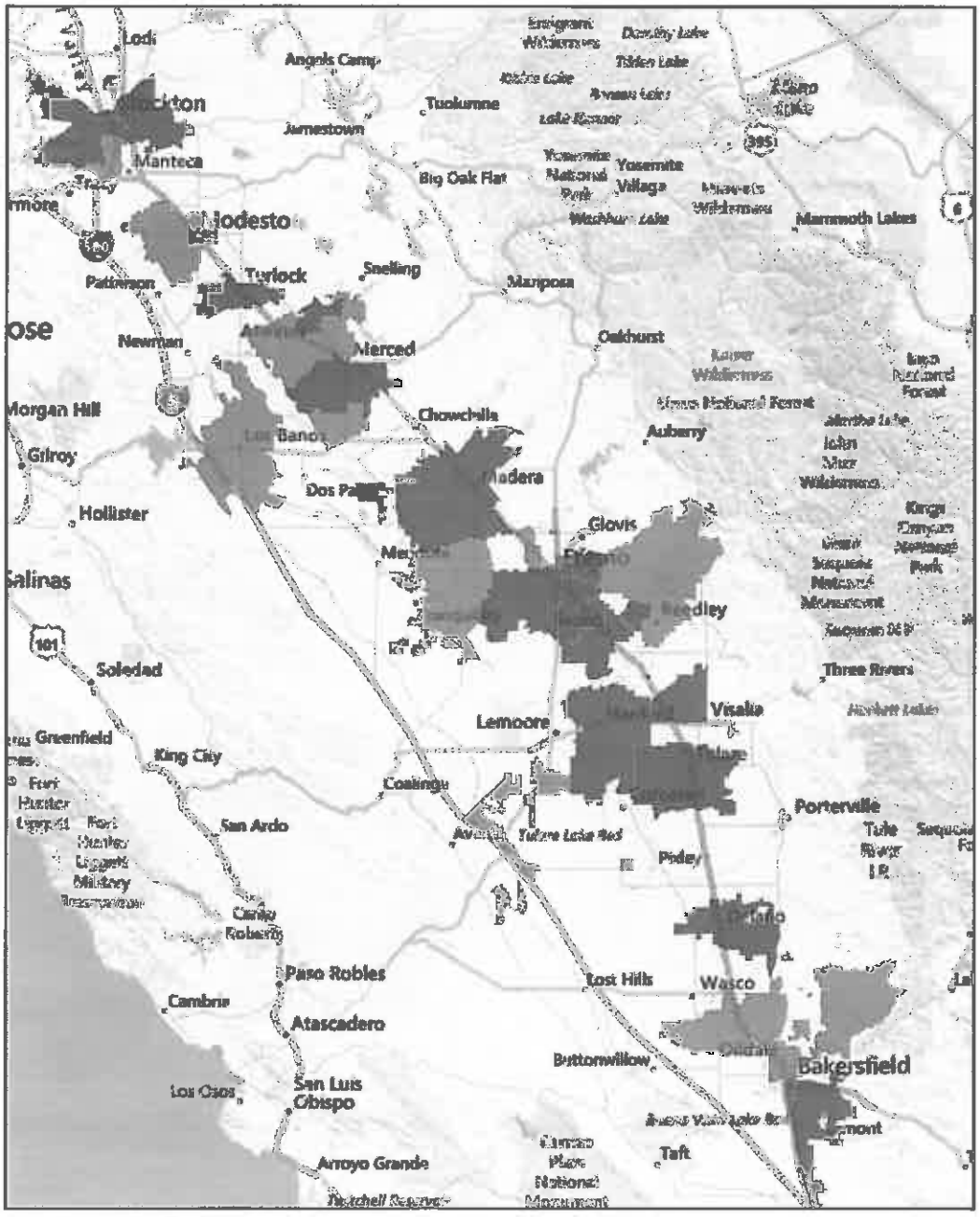
0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

Top 5% of Statewide ZIP codes

Top 6 - 10% of Statewide ZIP codes



San Joaquin Valley

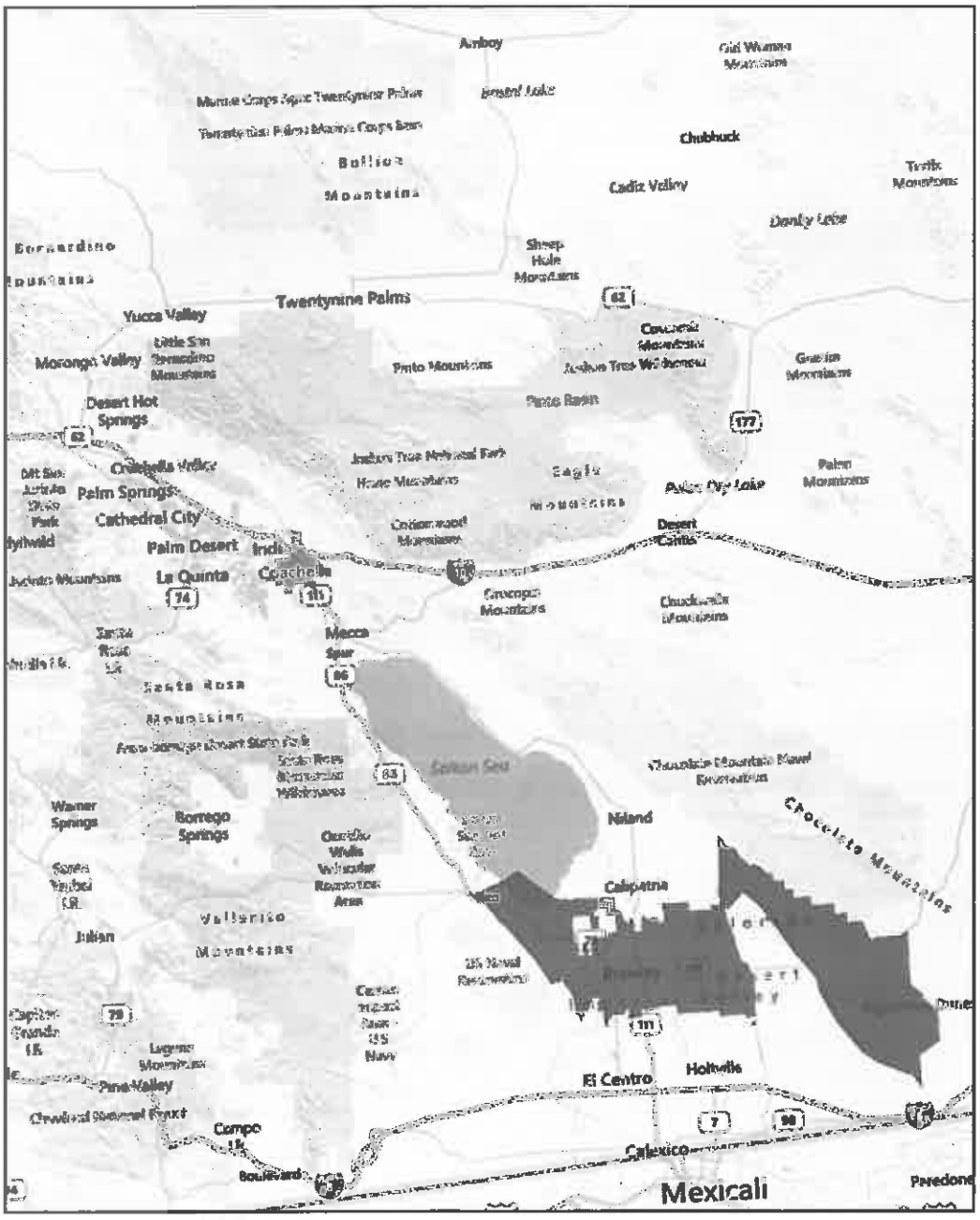
0 10 20 40 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

Top 5% of Statewide ZIP codes

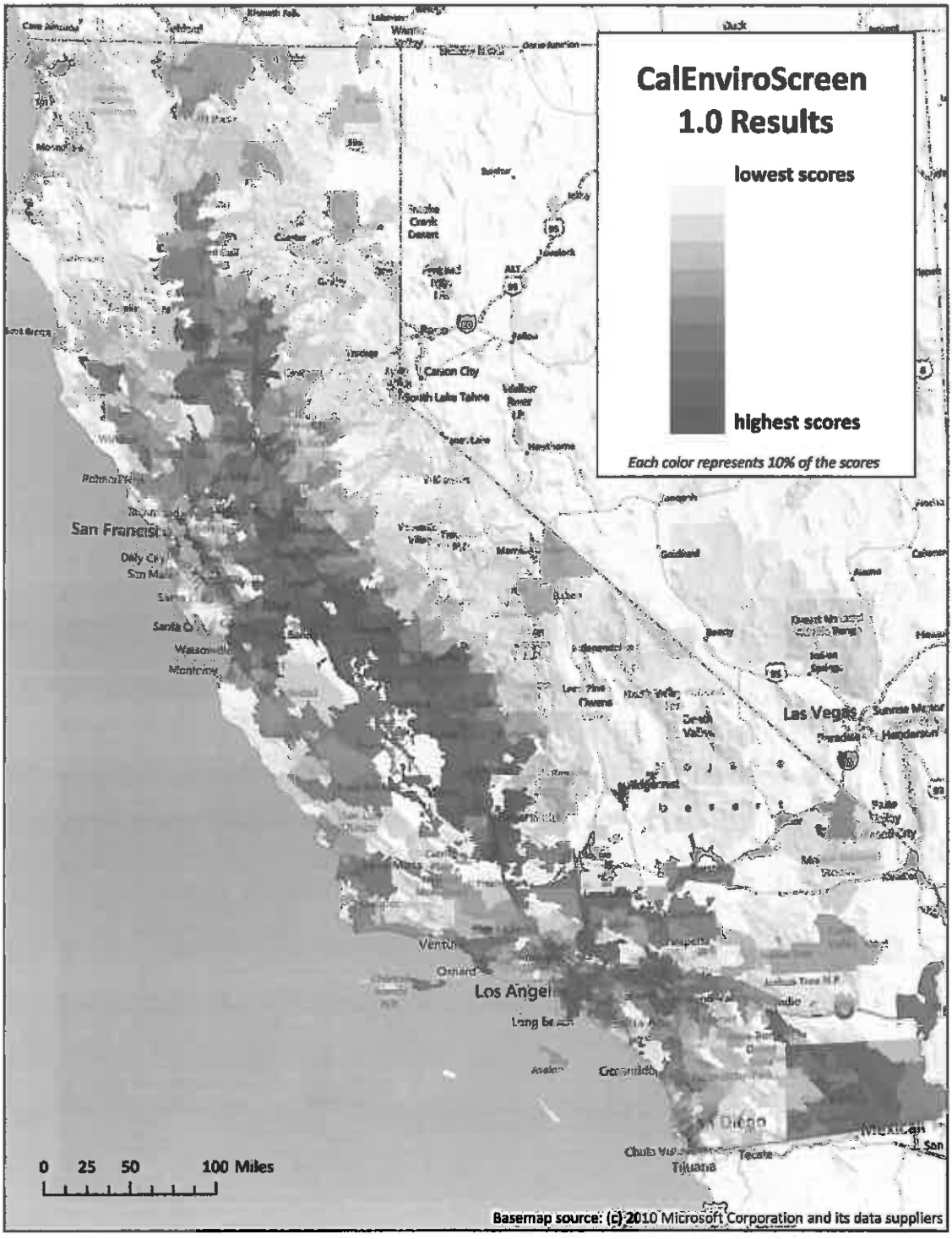
Top 6 - 10% of Statewide ZIP codes



Coachella & Imperial Region

0 5 10 20 Miles

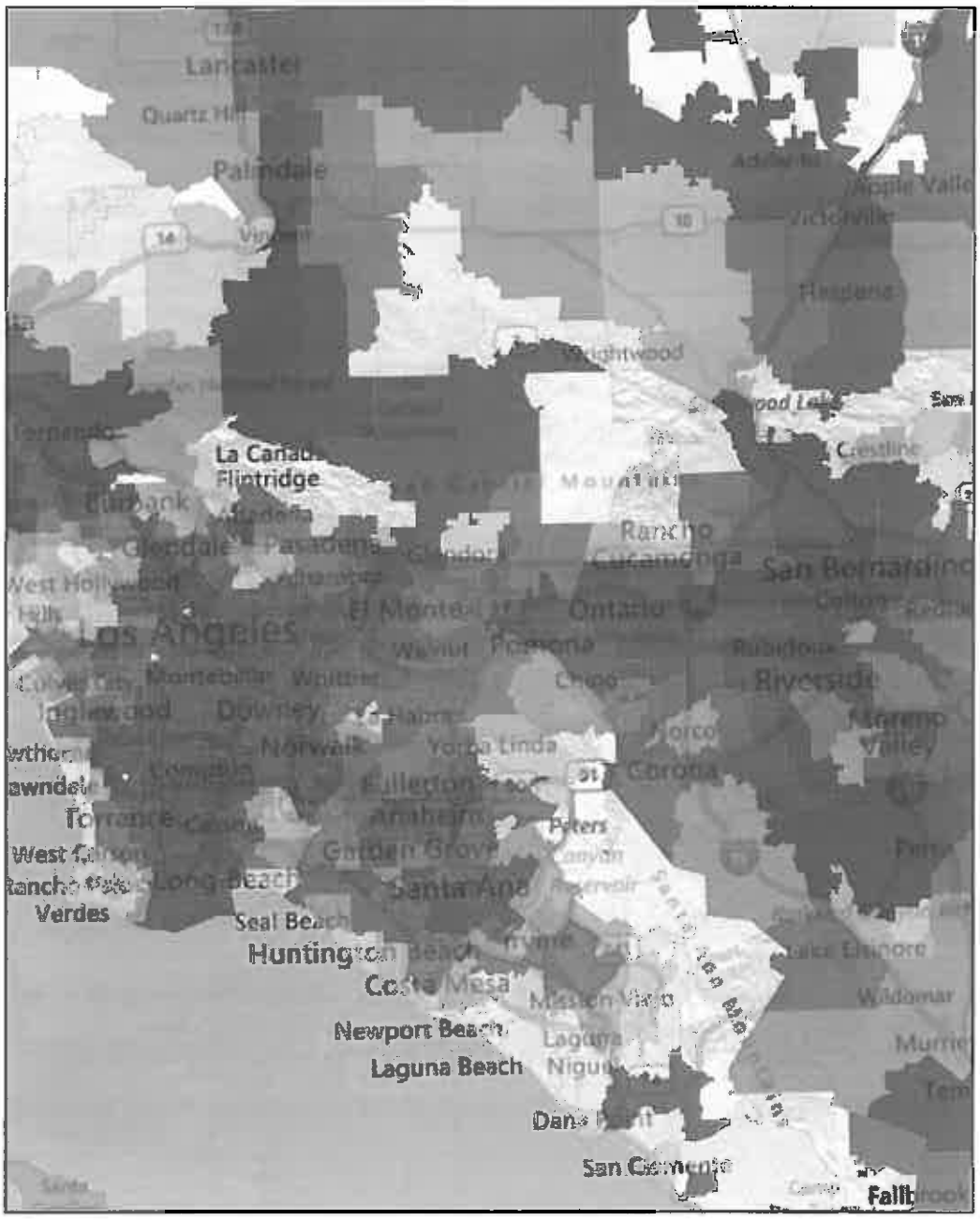
CALENVIROSCREEN STATEWIDE RESULTS



CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores



Los Angeles Area

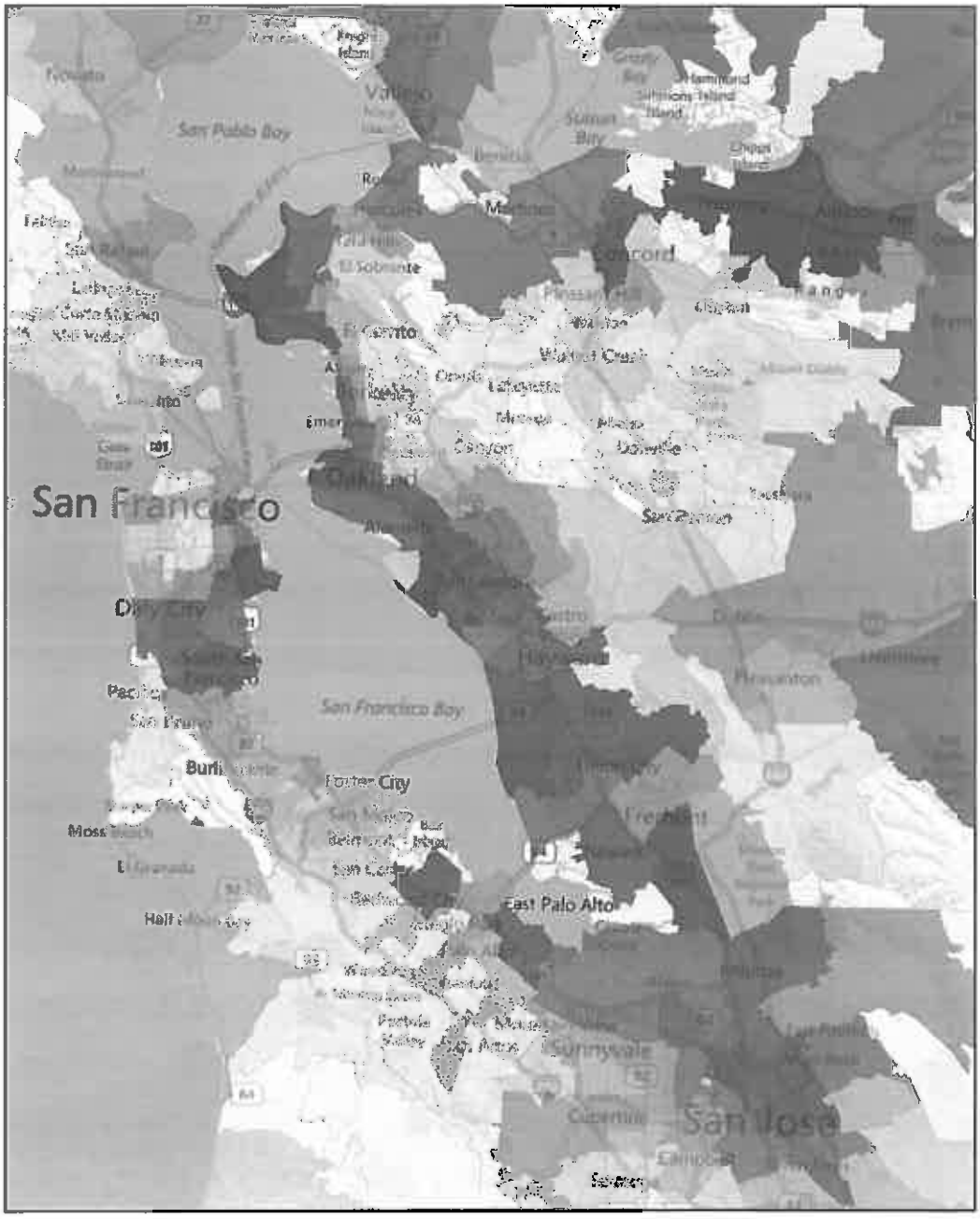
0 5 10 20 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores



San Francisco Area

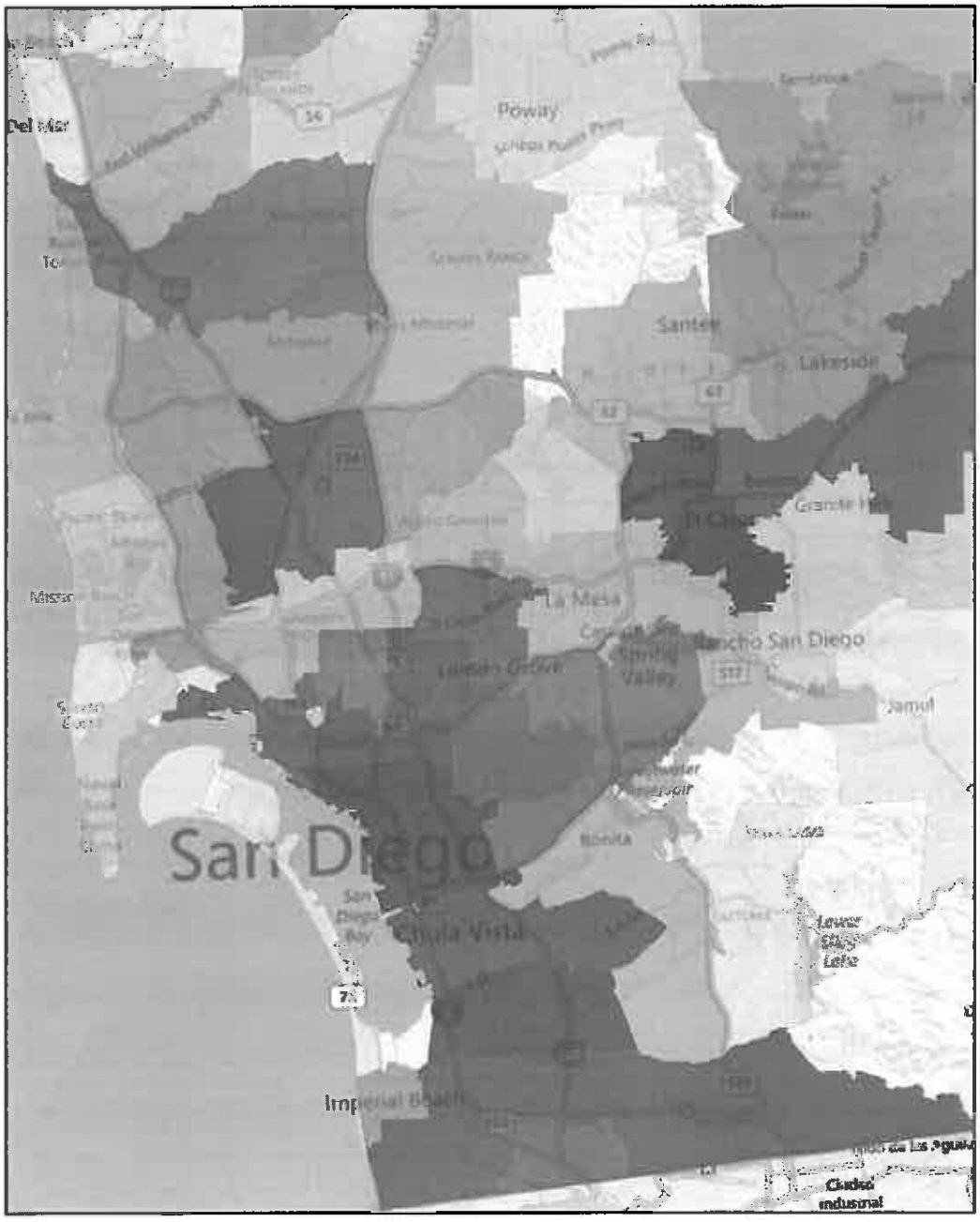
0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores



San Diego Area

0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores

Sacramento Area

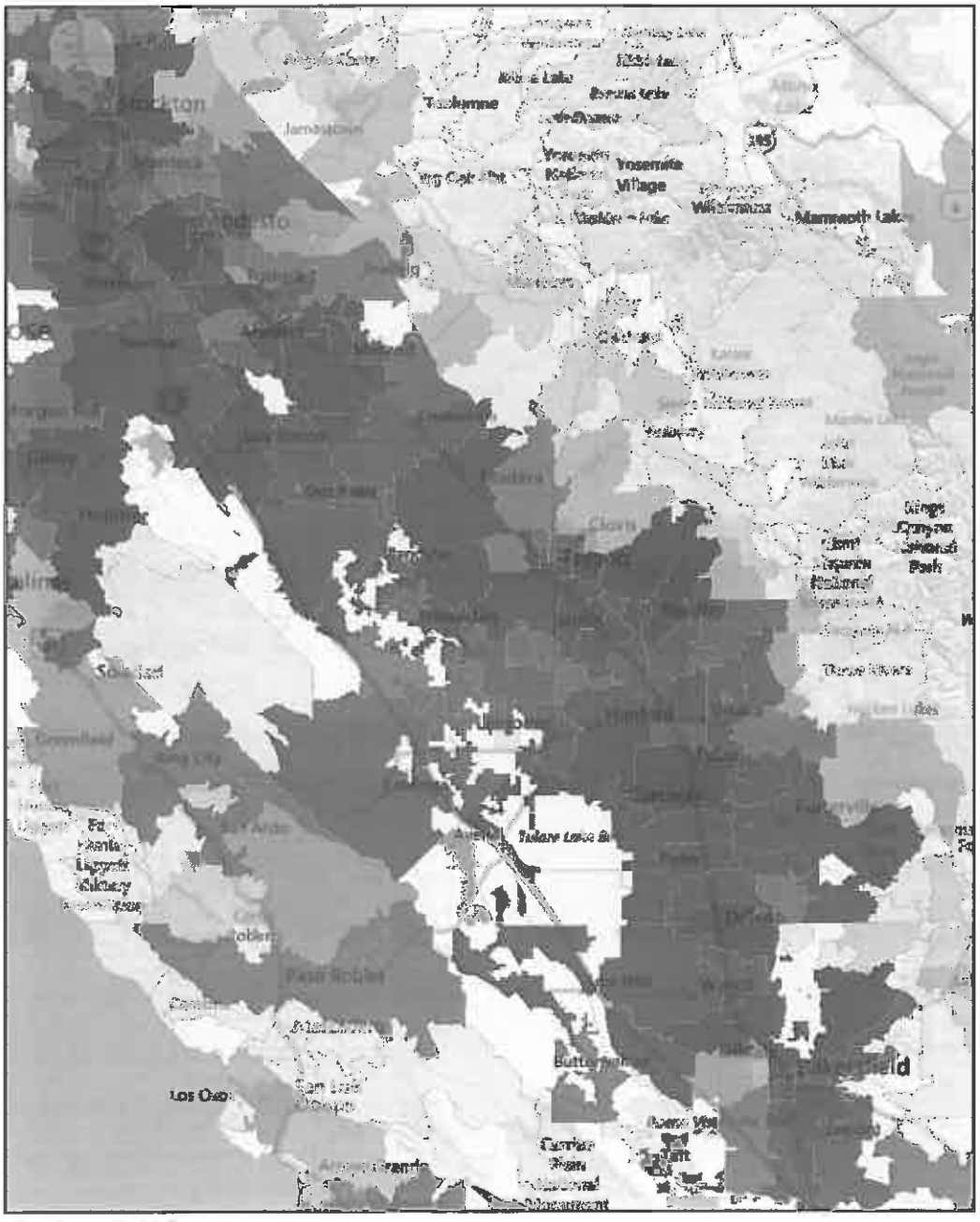
0 2.5 5 10 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores



San Joaquin Valley

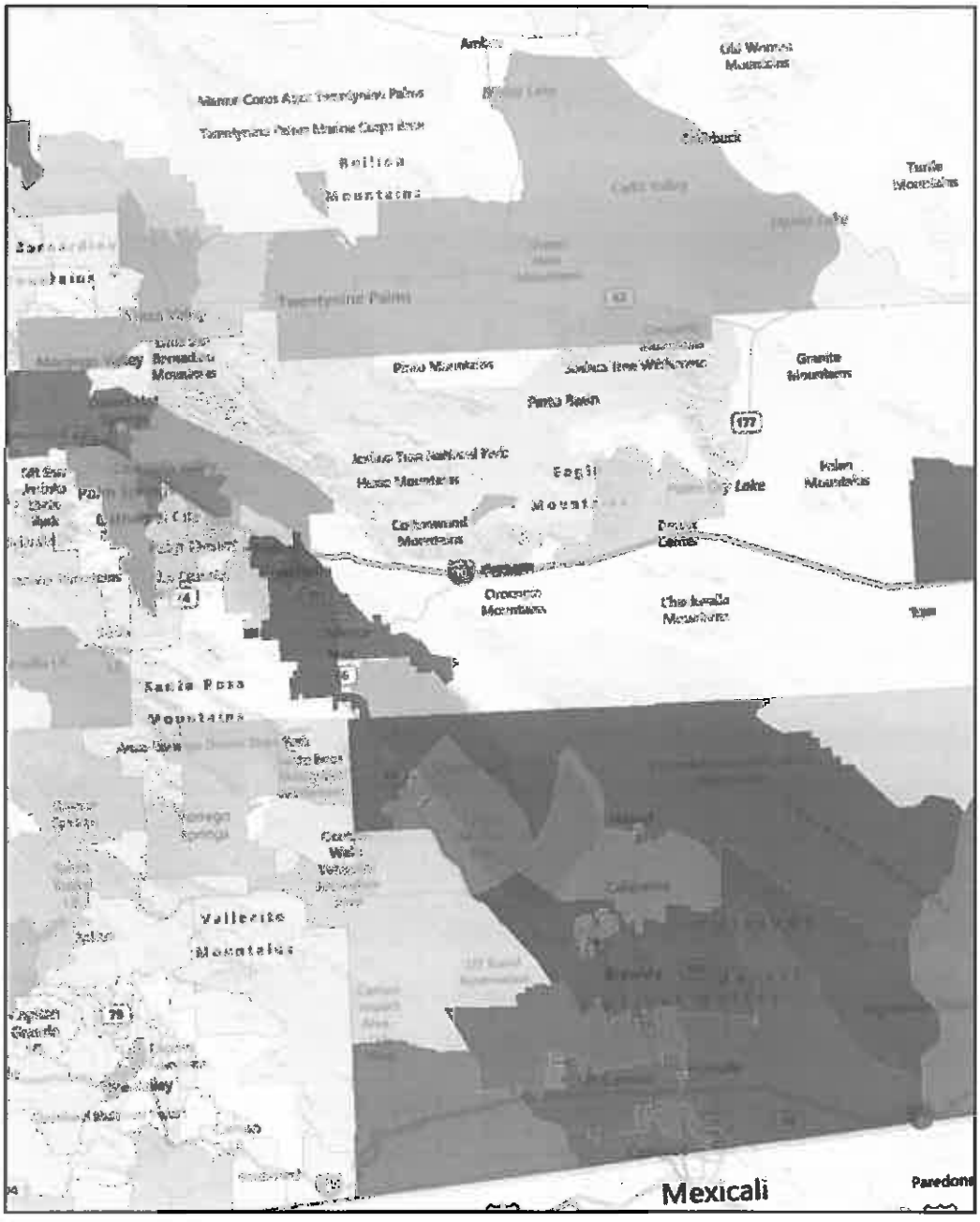
0 10 20 40 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

CalEnviroScreen 1.0 Results

lowest scores — highest scores

Each color represents 10% of the scores



Coachella & Imperial Region

0 5 10 20 Miles

Basemap source: (c) 2010 Microsoft Corporation and its data suppliers

AMENDED IN ASSEMBLY APRIL 10, 2014

CALIFORNIA LEGISLATURE—2013–14 REGULAR SESSION

ASSEMBLY BILL No. 1970

Introduced by Assembly Member Gordon

February 19, 2014

An act to add Chapter 3.6 (commencing with Section 39680) to Part 2 of Division 26 of the Health and Safety Code, relating to greenhouse gases.

LEGISLATIVE COUNSEL'S DIGEST

AB 1970, as amended, Gordon. California Global Warming Solutions Act of 2006: Community Investment and Innovation Program.

The California Global Warming Solutions Act of 2006 designates the State Air Resources Board as the state agency charged with monitoring and regulating sources of emissions of greenhouse gases. The act authorizes the state board to include the use of market-based compliance mechanisms. Existing law requires all moneys, except for fines and penalties, collected by the state board from the auction or sale of allowances as part of a market-based compliance mechanism to be deposited in the Greenhouse Gas Reduction Fund and to be available upon appropriation by the Legislature. Existing law requires the Department of Finance, in consultation with the state board and any other relevant state agency, to develop, as specified, a 3-year investment plan for the moneys deposited in the Greenhouse Gas Reduction Fund.

This bill would create the Community Investment and Innovation Program and would require moneys to be available from the Greenhouse Gas Reduction Fund, upon appropriation by the Legislature, for purposes of awarding ~~local assistance~~ grants and other financial assistance to eligible ~~grant~~ applicants, as defined, who submit plans to develop and

implement integrated community-level greenhouse gas emissions reduction projects in their region. The bill would require the Strategic Growth Council, in ~~coordination~~ *consultation* with the state board, to administer the program, as specified. ~~The bill would require 25% of the moneys appropriated for purposes of the program be awarded to eligible grant applicants whose projects include and specifically benefit environmental justice communities, as defined.~~

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: no.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds and declares all of the following:

(a) The reduction of greenhouse gas emissions is critical to public health, safety, the economy, and the natural ~~environment that residents rely on~~ *environment*.

(b) The scoping plan prepared by the State Air Resources Board pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code) encourages local governments to adopt greenhouse gas ~~emissions~~ *emission* reduction goals consistent with the state's overall goal of reducing statewide emissions to 1990 levels by 2020. In addition, the scoping plan recognizes local governments as critical partners in achieving the state's goals to reduce greenhouse gas emissions.

(c) Local and regional governments have broad influence and, in some cases exclusive authority, over activities that contribute to significant direct and indirect greenhouse gas emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the measures in the scoping plan to reduce greenhouse gas emissions rely on local government actions.

(d) State investments in local and regional greenhouse gas emission reduction projects in this state help local communities thrive, support the state's emission-reduction and clean-energy targets, lower the statewide unemployment rate, and spur new job growth.

(e) Providing incentives to local governments to plan and implement their own greenhouse gas emission reduction efforts

will assist the state to reach its emission-reduction targets faster and more efficiently.

(f) Local greenhouse gas emission reduction initiatives ~~best~~ recognize the particular reduction opportunities at the local level and provide an opportunity to enhance the environment and economy of local and regional places through multibenefit projects.

(g) Local governments are well suited to coordinate and aggregate micro-, small-, community-, and regional-scale projects that will help the state reach its environmental targets while providing incentives for investments and job growth at the local level.

(h) It is the intent of the Legislature to promote investments in local and regional greenhouse gas emission reduction projects.

SEC. 2. Chapter 3.6 (commencing with Section 39680) is added to Part 2 of Division 26 of the Health and Safety Code, to read:

CHAPTER 3.6. COMMUNITY INVESTMENT AND INNOVATION PROGRAM

39680. (a) The Community Investment and Innovation Program is hereby created.

(b) Moneys shall be available from the Greenhouse Gas Reduction Fund, created by Section 16428.8 of the Government Code, upon appropriation by the Legislature, for purposes of carrying out this chapter.

(c) ~~(1)~~ The Strategic Growth Council, in ~~coordination~~ *consultation* with the state board, shall ~~administer the Community Investment and Innovation Program.~~

~~(2) The Strategic Growth Council, in coordination with the state board, shall establish~~ *administer* the Community Investment and Innovation Program to provide ~~local assistance~~ grants and other financial assistance to eligible ~~grant~~ applicants who submit plans to develop and implement integrated community-level greenhouse gas emissions reduction projects in their region.

(d) For purposes of this chapter, ~~the following terms have the following meanings:~~

~~(1) "Eligible grant~~ *"eligible* applicant" means a city, county, city and county, charter city, charter county, *district,* special district, ~~regional energy network, environmental justice community,~~

or a collection of cities, counties, *districts,* or special districts, *including, but not limited to, a regional energy network.*

~~(2) "Environmental justice community" means a community that has been in the top 10 percent of statewide community scores under the latest version of the California Communities Environmental Health Screening Tool published by the Office of Environmental Health Hazard Assessment.~~

39681. The Strategic Growth Council, in consultation with the state board, shall develop guidelines for the implementation of this chapter consistent with Division 25.5 (commencing with Section 38550) and Chapter 4.1 (commencing with Section 39710). The guidelines shall do all of the following:

(a) Allow for project implementation by eligible ~~grant~~ applicants, as well as metropolitan planning organizations, regional climate authorities, ~~regional energy networks,~~ joint powers authorities, ~~districts,~~ regional collaboratives, or nonprofit organizations working in coordination with the eligible ~~grant~~ applicant.

(b) Provide for a portfolio of projects to be implemented that reduce greenhouse gases and maximize the ability to achieve one or more of the following:

(1) Decrease air or water pollution.

(2) Reduce the consumption of natural resources or energy.

(3) Provide opportunities to ~~achieve greenhouse gas emissions reductions in ways that~~ increase localized energy resources.

(4) Promote public-private partnerships to implement energy efficiency and clean energy projects.

(5) Promote financing incentives for residential and commercial facilities.

(6) Increase the reliability of local water supplies.

(7) Increase solid waste diversion from landfills.

(8) Increase electric vehicle infrastructure.

(9) ~~Achieve greenhouse gas emissions reductions in ways that reduce~~ *Reduce* vehicle miles traveled.

(10) Prevent *the* conversion of agricultural, forest, and open-space lands to uses that result in higher greenhouse gas emissions.

(c) Maximize the development of community-level projects that reduce greenhouse gas emissions.

~~(d) Ensure projects are consistent with Chapter 4.1 (commencing with Section 39710).~~

~~(e)~~

(d) Provide opportunities for both small- and large-population participants and take into consideration regional context when determining project eligibility.

~~(f)~~

(e) Provide incentives for projects that are in addition to projects already being implemented at the local level.

~~(g)~~

(f) Provide opportunities for the development and implementation of innovative projects that create new systems or technologies.

~~(h)~~

(g) Provide opportunities for existing, proven greenhouse gas emissions reducing or sequestering projects, including, but not limited to, those projects and programs already adopted by local agencies.

~~(i)~~

(h) Provide for the aggregation of community- and regional-scale emissions reduction or sequestration projects.

~~(j)~~

(i) Ensure projects funded pursuant to this chapter maximize moneys appropriated, provide environmental benefits, create jobs, and are consistent with law.

(j) Provide for the allocation of moneys appropriated by the Legislature for the purposes of this chapter consistent with Chapter 4.1 (commencing with Section 39710), including, but not limited to, the allocation of moneys to disadvantaged communities required pursuant to Section 39713.

39682. In evaluating potential projects to be funded pursuant to this chapter, the Strategic Growth Council, in ~~coordination~~ *consultation* with the state board, shall give priority to projects that demonstrate one or more of the following characteristics:

~~(a) Regional integrated implementation.~~

~~(b)~~

(a) The ability to leverage additional public and private funding.

~~(c)~~

(b) The potential for cobenefits or multibenefit attributes.

~~(d)~~

(c) The potential for the project or program to be replicated and to create best practices to serve as a model for communities across the state ~~and region~~.

~~(e) Consideration of geographic and socioeconomic issues.~~

~~(f)~~

(d) Demonstration of innovative strategies and approaches to reducing greenhouse gas emissions.

~~39683. (a) (1) Twenty-five percent of the moneys appropriated by the Legislature for purposes of this chapter shall be set aside for projects from eligible grant applicants that include and specifically benefit environmental justice communities.~~

~~(2) A project is only eligible for the set-aside if it meets both of the following requirements:~~

~~(A) One or more of the applicants is a city, county, city and county, or special district.~~

~~(B) The project is located in whole or in part in an environmental justice community and directly benefits an environmental justice community.~~

~~(b) Of the moneys to be appropriated pursuant to this section, the eligible grant applicant may use a portion of the moneys to provide technical assistance to environmental justice communities for purposes of preparing competitive projects and plans to be submitted to the Strategic Growth Council.~~

O

JANUARY 2014 U.S. POLICY

CALIFORNIA CAP-AND-TRADE PROGRAM SUMMARY

CENTER FOR CLIMATE AND ENERGY SOLUTIONS

California's program represents the first multi-sector cap-and-trade program in North America. Building on lessons from the northeast Regional Greenhouse Gas Initiative (RGGI) and the European Union Emission Trading Scheme (EU-ETS), the California program blends proven market elements with its own policy innovations.

SUMMARY

In 2013, California launched its cap-and-trade program, which uses a market-based mechanism to lower greenhouse gas emissions. California's program is second in size only to the European Union's Emissions Trading System based on the amount of emissions covered. In addition to driving emission cuts in the ninth largest economy in the world, California's program will provide critical experience in how an economy-wide cap-and-trade system can function in the United States.

California's emissions trading system will reduce greenhouse gas emissions from regulated entities by more than 16 percent between 2013 and 2020. It is a central component of the state's broader strategy to reduce total greenhouse gas emissions to 1990 levels by 2020.

The cap-and-trade rules came into effect on January 1, 2013 and apply to large electric power plants and large industrial plants. In 2015, they will extend to fuel distributors (including distributors of heating and transportation fuels). At that stage, the program will encompass around 360 businesses throughout California and nearly 85 percent of the state's total greenhouse gas emissions.

Under a cap-and-trade system, companies must hold enough emission allowances to cover their emissions, and are free to buy and sell allowances on the open market. California held its first auction of greenhouse gas allowances on November 14, 2012. This marked the beginning of the first greenhouse gas cap-and-trade program in the United States since the group of nine Northeastern states in the Regional Greenhouse Gas Initiative (RGGI), a greenhouse gas cap-and-trade program for power plants, held its first auction in 2008.

CAP AND TRADE BASICS

A cap-and-trade system is one of a variety of policy tools to reduce the greenhouse gas emissions responsible for climate change. A cap-and-trade program sets a clear limit on greenhouse gas emissions and minimizes the total costs to emitters while achieving the target. This limit is translated into tradable emission allowances (each allowance typically equivalent to one metric ton of carbon dioxide or carbon dioxide equivalent), which are auctioned or allocated to regulated emitters on a regular basis. At the end of each compliance period, each regulated emitter must surrender enough allowances to cover its actual emissions during the compliance period. The total number of available allowances decreases over time to reduce the total amount of greenhouse gas emissions. By creating a market, and a price, for emission reductions, the cap-and-trade system offers an environmentally effective and economically efficient response to climate change.

Ultimately, cap-and-trade programs offer opportunities for the most cost-effective emissions reductions. However,

many challenging issues must be addressed before initiating a cap-and-trade program. Once established, a well-designed cap-and-trade market is relatively easy to implement, can achieve emission reductions goals in a cost-effective manner, and drives low-greenhouse gas innovation.

CALIFORNIA CAP-AND-TRADE DETAILS

California's program represents the first multi-sector cap-and-trade program in North America. Building on lessons from the northeast Regional Greenhouse Gas Initiative (RGGI) and the European Union Emission Trading Scheme (EU-ETS), the California program blends proven market elements with its own policy innovations. These policy elements, and other relevant details of California's cap-and-trade program, are summarized in Table 1 below.

The California Air Resources Board (CARB) adopted the state's cap-and-trade rule on October 20, 2011, and will implement and enforce the program. The cap-and-trade rules will first apply to electric power plants and industrial plants that emit 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year or more. In 2015, the rules will also apply to fuel distributors (including distributors of heating and transportation fuels) that meet the 25,000 metric ton threshold, ultimately affecting a total of around 360 businesses throughout California. The program imposes a greenhouse gas emission limit that will decrease by two percent each year through 2015, and by three percent annually from 2015 through 2020 (**Figure 2**).

Emission allowances will be distributed by a mix of free allocation and quarterly auctions. The portion of emissions covered by free allowances will vary by industry, but initially will account for approximately 90 percent of a business's overall emissions. The percentage of free allowances allocated to the businesses will decline over time. A business may also buy allowances from other entities that have reduced emissions below the amount of allowances held. These policy elements, and other relevant details of California's cap-and-trade program, are summarized in Table 1 below.

TABLE 1: California Cap-and-Trade Details

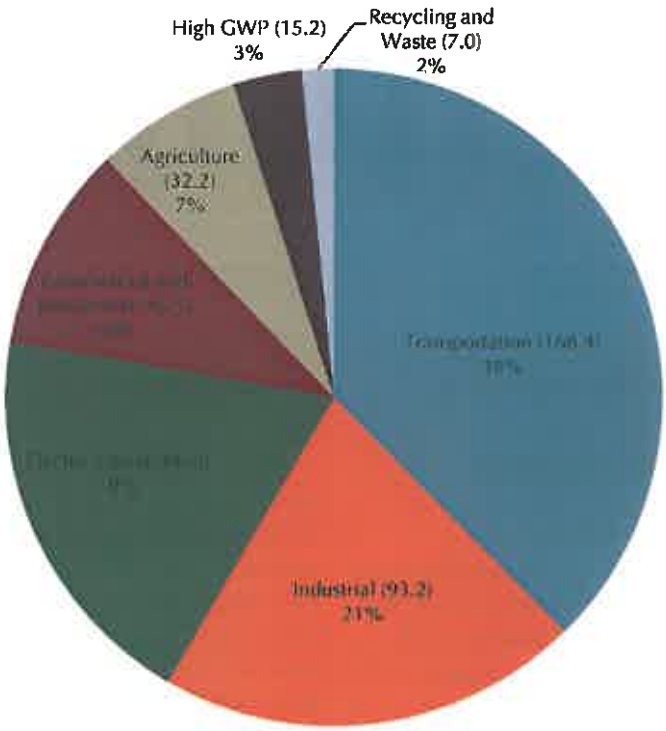
ISSUE	DETAILS AND DISCUSSION
Status of Regulation	
Legal Status	California Air Resources Board (CARB) adopted final regulations on October 20, 2011. An amended regulation, featuring a variety of minor adjustments, was adopted on September 12, 2012.
Legal Authority	Authorized by California Global Warming Solutions Act of 2006 (AB 32) AB 32 requires California to return to 1990 emission levels by 2020 (427 million metric tons (MMT) of carbon dioxide equivalent (CO_2e) whereas business-as-usual would be 507 MMT)
Lawsuit: Regulation does not go far enough	The Association of Irritated Residents (AIR) sued CARB, claiming cap and trade was not fully justified as a policy decision relative to a carbon tax or direct emission limits. After adding justification to the regulatory record, the court approved CARB's approach.
Lawsuit: Allowance auctions constitute a tax	Immediately preceding California's first allowance auction, the California Chamber of Commerce filed a lawsuit alleging that AB 32 does not give CARB the authority to raise revenue from allowance auctions, and that all allowances must therefore be freely allocated. Alternatively, the California Chamber of Commerce argues that if AB 32 did attempt to grant this authority, it would constitute a tax, which requires approval from two-thirds of the legislature. AB 32 did not receive two-thirds approval.

Lawsuit: Regulation goes too far	A lawsuit is anticipated that claims CARB is unconstitutionally attempting to regulate interstate commerce because the program will look outside of state borders to assign greenhouse gas reduction obligations to imported electricity.
Start Date	Regulation went into effect on January 1, 2012 The first auction took place on November 14, 2012 Compliance obligations began on January 1, 2013
Regulation Coverage	
Threshold of Coverage	Sources that emit at least 25,000 metric tons CO_2e/year are subject to regulation
Gases Covered	The six gases covered by the Kyoto Protocol (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) Plus NF_3 and other fluoridated greenhouse gases
Sectors Covered: Phase 1 (2013-2014)	Electricity generation, including imports Industrial sources Covers approximately 35% of California's total greenhouse gas emissions (approximately 160 MMT) (See Figures 1 and 2 below)
Sectors Covered: Phase 2 (2015-onward)	Includes sectors covered in Phase 1, plus: Distributors of transportation fuel Distributors of natural gas Distributors of other fuel Covers approximately 85% of California's total greenhouse gas emissions (approximately 395 MMT) (See Figures 1 and 2 below)
Point of Regulation	Electricity generators (within California) Electricity importers Industrial facility operators Fuel distributors
Allowance Allocation	
Distribution Method	Free allocation for electric utilities (not generators), industrial facilities, and natural gas distributors Free allocation amount declines over time Other allowances must be purchased at auction or via trade
Allocation Methodology	Industry: Based on output and sector-specific emissions intensity benchmark that rewards efficient facilities, initially set at about 90% of average emissions and declining over time; free allocation to leakage-prone industries declines relatively less over time Electricity: Based on long-term procurement plans Natural gas: To be determined by CARB before 2015; proposed to be based on 2011 emissions

Auction	Quarterly, single round, sealed bid, uniform price Price minimum: $10 in 2012, rising 5% annually over inflation Investor-owned utilities (both gas and electric) must consign their free allowances to be sold at auction; must use proceeds for ratepayer benefit
Emission Targets / Allowance Availability	162.8 MMT in 2013 (electricity and industry) 394.5 MMT in 2015 (includes all covered sectors) 334.2 MMT in 2020 (15% reduction between 2015 and 2020) (See Figure 2 below)
Market Flexibility	
Banking	A participating entity may bank allowances for future use and these allowances will not expire. However, regulated entities are subject to holding limits, restricting the maximum number of allowances that an entity may bank at any time. The holding limit quantity is based on a multiple of the entity's annual allowance budget
Borrowing	Borrowing of allowances from future years is not allowed
Offsets: Quantity	Allowed for 8% of total compliance obligation. Note that 8% refers to the total amount of allowances held by an entity; not the amount of reduction required by an entity. Thus more than 8% of the program's reductions can occur through offsets
Offsets: Protocols	Offsets must comply with CARB-approved protocols. Protocols currently exist for: forestry, dairy digesters, ozone depleting substances projects, and urban forestry. Initially limited to projects in the U.S.; framework in place for international expansion. All offset projects developed under a CARB Compliance Offset Protocol must be listed with a CARB-approved Offset Project Registry. To date, the American Carbon Registry (ACR) and Climate Action Reserve (CAR) are the two approved registries.
Strategic Reserve	A percentage of allowances, which increases over time from 1% to 7%, will be held in a strategic reserve by CARB in three tiers with different prices: $40, $45, $50 in 2013, rising 5% annually over inflation. Since these prices are not subject to market forces, the strategic reserve will help constrain compliance costs.
Compliance Period	3-year compliance periods (following 2-year Phase 1)
Emissions Reporting and Verification	
Reporting	Capped entities must report annually (as required since 2008)
Registration	Capped entities must register with CARB to participate in allowance trading market
Verification	Reported emissions will be verified by a third party.
Compliance and Enforcement	
Annual Obligation	Entities must provide allowances and/or offsets for 30% of their previous year's emissions
Compliance Period Obligation	At the end of every compliance period, entities must provide allowances and/or offsets for balance of emissions from the entire compliance period (2 years for the first period, 3 years for the next 2 periods).

Noncompliance	If a deadline is missed or there is a shortfall, four allowances must be surrendered for every metric ton not covered in time.
Trading and Enforcement	The regulation expressly prohibits any trading involving a manipulative device, a corner of or an attempt to corner the market, fraud, attempted fraud, or false or inaccurate reports. Violations of the regulations can result in civil or criminal penalties. Perjury statutes apply. The program includes mechanisms to prevent market manipulation.
Linking	
Quebec	California's program is linked with that of Quebec as of January 1, 2014.
Western Climate Initiative (WCI)	Other WCI partners (British Columbia, Manitoba, Ontario) plan to eventually join the linked program as well.
Other Jurisdictions	CARB is open to linking with additional state or regional programs.

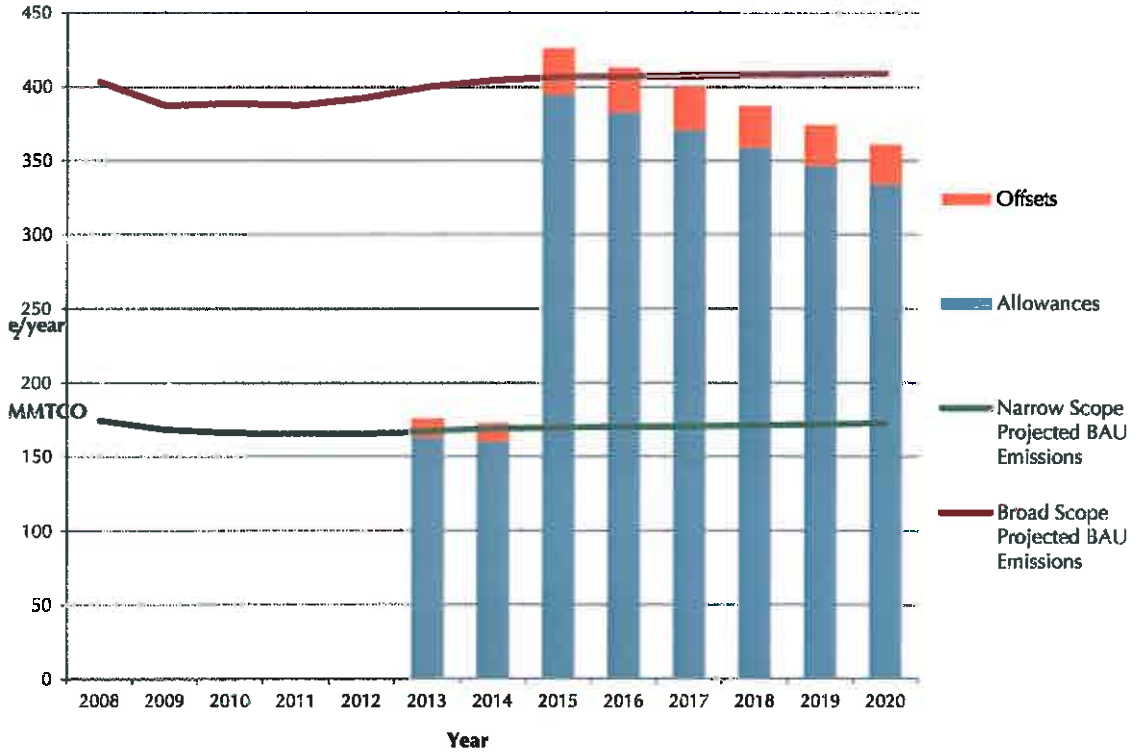
FIGURE 1: California Greenhouse Gas Emissions by Sector in 2011



Emissions are expressed in million metric tons of carbon dioxide equivalent (MMT CO_2e) and percent of total. Total 2011 gross emissions were 448.1 MMT CO_2e. Note that "Residential and Commercial" equates to heating fuel consumption, which is covered starting in 2015.

Source: CARB, Greenhouse Gas Inventory Data – Graphs, http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-11_2013-08-01.pdf

FIGURE 2: California's greenhouse gas emission cap and business-as-usual (BAU) projections



The cap-and-trade program has a "narrow" scope in 2013 and 2014 that encompasses the electricity and industrial sectors. The program expands in 2015 to encompass transportation and heating fuels. Offsets can be used for up to eight percent of each regulated entity's compliance obligation.

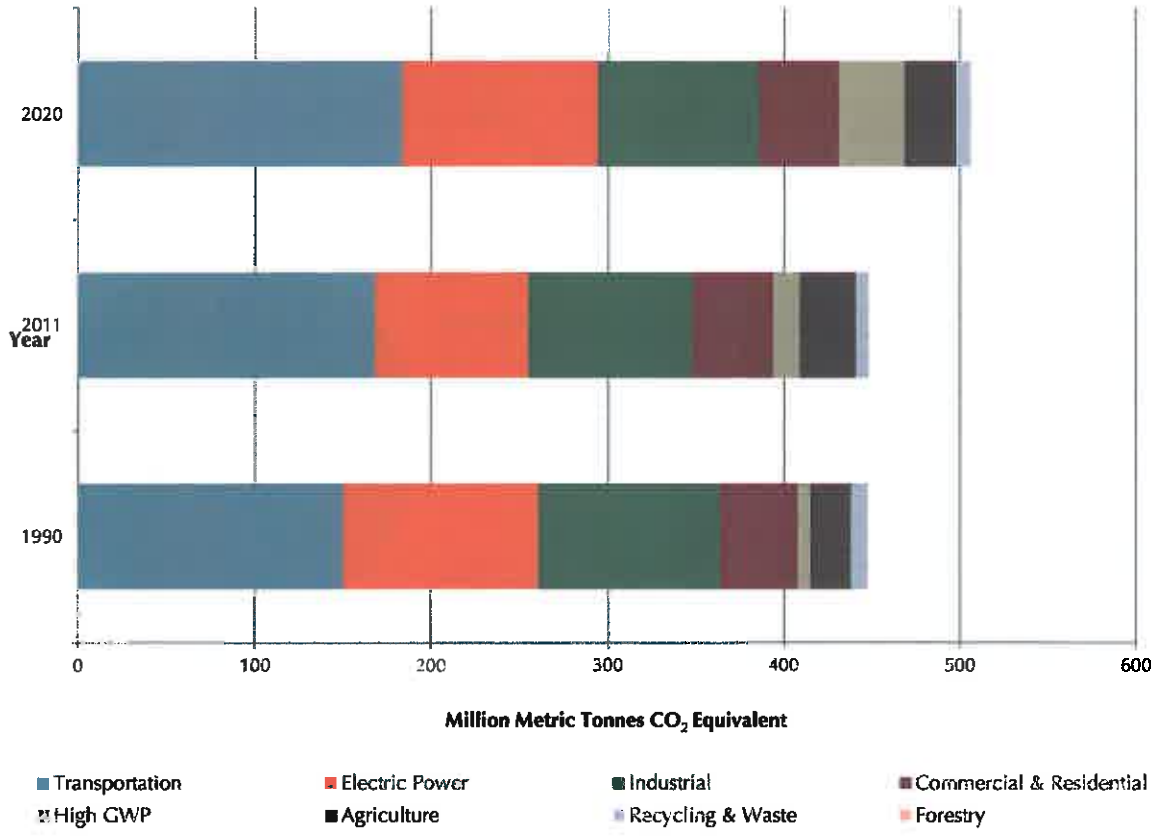
Source: CARB, California Cap-and-Trade Regulation Initial Statement of Reasons, Appendix E: Setting the Program Emissions Cap, http://www.arb.ca.gov/regact/2010/capandtrade10/capv3appe.pdf

CALIFORNIA'S OVERALL CLIMATE CHANGE PROGRAM

California's cap-and-trade program is only one element of its broader climate change initiative, as authorized in the California Global Warming Solutions Act of 2006 (AB 32). AB 32 seeks to slow climate change through a comprehensive program reducing greenhouse gas emissions from virtually all sources statewide. The Act requires CARB to develop regulations and market mechanisms that will cut the state's greenhouse gas emissions to 1990 levels by 2020 —a 25 percent reduction statewide. Figure 3 shows California's projected greenhouse gas emissions growth in the absence of cap and trade.

AB 32 also requires CARB to take a variety of actions aimed at reducing the state's impact on the climate. CARB has adopted a portfolio of measures to reduce greenhouse gas emissions in the state, including a Low Carbon Fuel Standard and a variety of energy efficiency standards. The cap under CARB's cap-and-trade rule is flexible and can be tightened if CARB's other measures reduce greenhouse gas emissions less than anticipated. California's cap-and-trade program therefore acts as a backstop to ensure its overall 2020 greenhouse gas target is met. Figure 4 shows the programs CARB is implementing to achieve the goals of AB 32 and the projected impact of each.

FIGURE 3: California Greenhouse Gas Emissions in 1990, 2011, and 2020 under Business-as-Usual

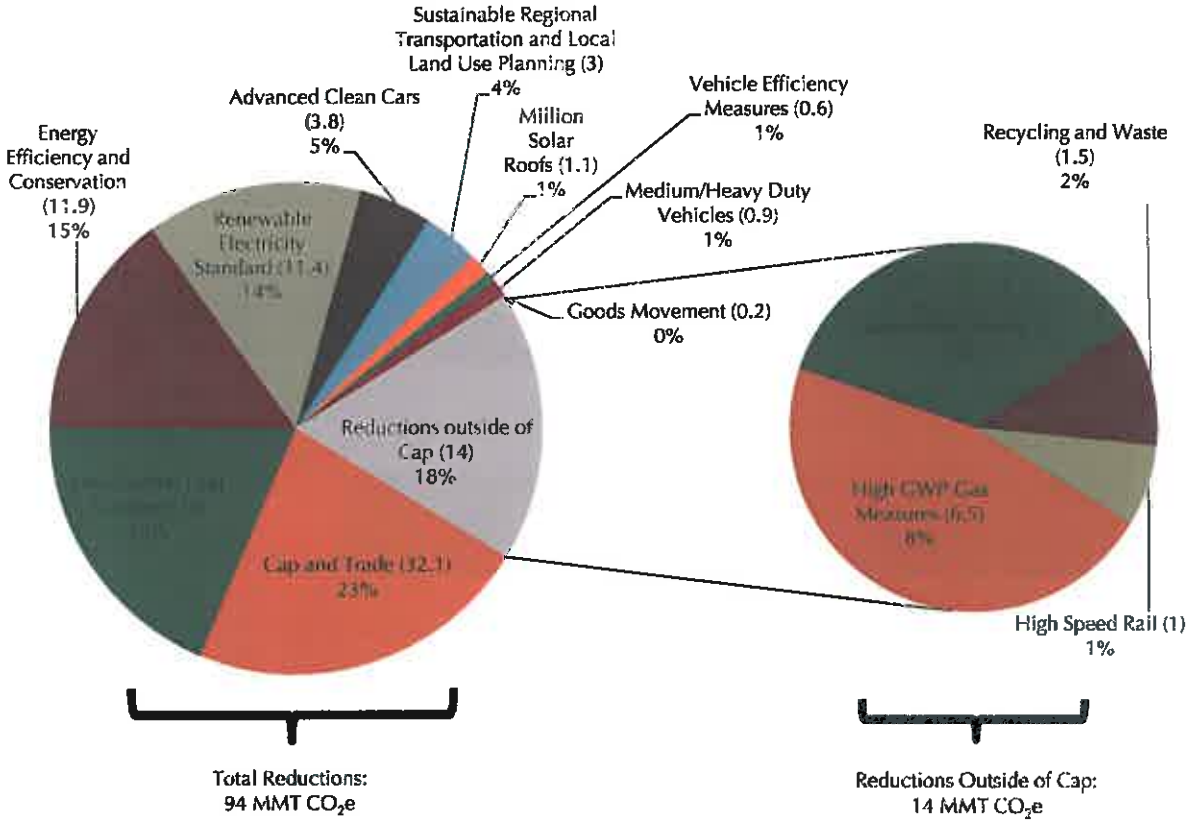


Sources:
1990: California Energy Commission, Inventory of Greenhouse Gas Emissions and Sinks: 1990 to 2004,http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-... CARB, California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit, http://www.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf

2011: CARB, California Greenhouse Gas Inventory for 2000-2011 – by Category as Defined in the Scoping Plan, http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-11_2013-08-01.pdf

2020: CARB, Greenhouse Gas Emission Forecast for 2020: Data Sources, Methods, and Assumptions, http://www.arb.ca.gov/cc/inventory/data/tables/2020_forecast_methodology_2010-10-28.pdf

FIGURE 4: Projected Reductions (in MMT CO_2e) Caused by AB 32 Measures by 2020 and Share of Total



Source: CARB, Greenhouse Gas Reductions from Ongoing, Adopted and Foreseeable Scoping Plan Measures, http://www.arb.ca.gov/cc/inventory/data/tables/reductions_from_scoping_plan_measures_2010-10-28.pdf

AUCTION REVENUE

Although a significant number of emission allowances will be freely allocated in California's program, many will also be sold at auction. The first year of auctions generated over $525 million in revenue for the state. The state anticipates annual auction revenue to rise over time. On September 30, 2012, Governor Jerry Brown signed two bills into law, establishing guidelines on how this annual revenue will be disbursed. The two laws do not identify specific programs that will benefit from the revenue, but they provide a framework for how the state will invest cap-and-trade revenue into local projects. California's first quarterly cap-and-trade GHG allowance auction took place on November 14, 2012. About 29 million greenhouse gas allowances, each representing one metric ton of carbon dioxide, were auctioned off in this first auction to more than 600 approved industrial facilities and electricity generators.

The first law, AB 1532, requires that the revenue from allowance auctions be spent for environmental purposes, with an emphasis on improving air quality. The second, SB 535, requires that at least 25 percent of the revenue be spent on programs that benefit disadvantaged communities, which tend to suffer disproportionately from air pollution. The California Environmental Protection Agency will identify disadvantaged communities for investment opportunities, while the

state's Department of Finance will develop a three-year investment plan and oversee the expenditures of this revenue to mitigate direct health impacts of climate change.

CALIFORNIA CAP AND TRADE IN CONTEXT

Prior to California's program, greenhouse gas cap-and-trade programs were operating in the European Union, Australia, New Zealand, and in nine Northeastern states (the Regional Greenhouse Gas Initiative, or RGGI). As of 2013, California and Quebec have operating programs as well. Table 2 below compares key elements of the California, RGGI, EU-ETS, and Quebec cap-and-trade systems.

TABLE 2: Comparison of cap-and-trade programs in California, RGGI, EU-ETS, and Quebec

	CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM	REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)	EU'S EMISSIONS TRADING SYSTEM	QUEBEC'S CARBON MARKET
Population	38 million	41 million	500 Million	8 Million
Gross Regional Product	US $1.9 trillion	US $2.3 trillion	US $16 trillion	US $304 billion
Participating Jurisdictions	California	9 US States: CT, DE, MA, MD, ME, NH, NY, RI, VT	Mandatory for all 27 EU members plus Norway, Iceland and Lichtenstein	Quebec
Greenhouse Gases Covered	CO_2, CH_4, N_2O, SF_6, PFCs, NF_3, other fluorinated greenhouse gases	CO_2 only	CO_2, plus N_2O and PFCs starting in 2013	CO_2, CH_4, N_2O, SF_6, PFCs, NF_3, other fluorinated greenhouse gases

	CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM	REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)	EU'S EMISSIONS TRADING SYSTEM	QUEBEC'S CARBON MARKET
Sectors Covered	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015	Fossil fuel-fired power plants (does not include imports)	Electricity, heat and steam production, oil, iron and steel, cement, glass, pulp and paper in 2005-2012; plus $CO_2$from petrochemicals, ammonia, aviation and aluminum, N_2O from acid production, and PFCs from aluminum starting in 2013	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015
Emissions Threshold	Emitters of at least 25,000 metric tons CO_2e annually	Fossil fuel-fired power plants generating 25 MW or greater located within the RGGI States	Any combustion installation over 20 MW; sector-specific threshold for other sources	Emitters of at least 25,000 metric tons CO_2e annually
Target	Approximately 17% below 2013 emissions by 2020	15% below 2013 emissions by 2020	21% cut below 2005 levels by 2020	20% below 1990 levels by 2020. Considering raising target to 25%
2013 Allowance Budgets (Millions of Allowances)	162.8	165	2039	23.7
Maximum Emissions Covered in million metric tons of CO_2equivalent (Year of Maximum Allowance Availability)	394.5 (2015)	171 (2009) (includes New Jersey, which has since exited the program)	2039 (2013)	63.3 (2015)

	CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM	REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)	EU'S EMISSIONS TRADING SYSTEM	QUEBEC'S CARBON MARKET
Emissions Target in million metric tons of CO_2equivalent (Target Year)	334.2 (2020)	71 (2020)	1643 (2020) - Target may become more aggressive	51 (2020)
Status	First auction on November 14, 2012; compliance obligations began January 1, 2013	Compliance obligations began on January 1, 2009	Compliance obligations began on January 1, 2005	Compliance obligations began January 1, 2013
Allocation Method	Mixed – some free allocations for industry; auctions for others	Approximately 90% available for sale at auction, remainder up to states	Mixed - some free allocation for industry based on benchmarking; auction for power sector and others that can pass on costs; EU sets broad harmonization rules, but members have some flexibility; approximately 50% auction in 2013	Free allocation for some sectors, auctions for others
Price Floor at Auction	$10 per metric ton for both 2012 and 2013 before rising 5% per year (plus inflation) starting in 2014.	$1.93 in 2012; increasing with consumer price index (CPI)	No Price Floor	$10 per metric ton price floor starting in 2012 and rising 5% for each year thereafter (plus inflation)
Affiliations	Helped establish Western Climate Initiative in 2007	None	UNFCCC, Kyoto Protocol	Joined Western Climate Initiative in 2008

	CALIFORNIA'S GREENHOUSE GAS CAP-AND-TRADE PROGRAM	REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)	EU'S EMISSIONS TRADING SYSTEM	QUEBEC'S CARBON MARKET
Linkage Status	Linked with Quebec starting in 2014	No current plans to link	Plans to link with Australia in 2018. Also helping China design their market	Linked with California in 2014
Offset Limit	Can account for 8% of a regulated entity's compliance obligation	Can account for 3.3% of a regulated entity's compliance obligation	No limit; considering setting limits after 2020	Can account for 8% of a regulated entity's compliance obligation
2013 Offset Use Limit (Millions of Offset Credits)	13	5	No limit; considering setting limits after 2020	2.1
Types of Offset Categories	1) Forestry; 2) Urban forestry; 3) Dairy digesters; 4) Destruction of ozone-depleting substances	1) Landfill methane destruction; 2) Reduction in emissions of SF_6 in the power sector; 3) Sequestration of carbon due to afforestation; 4) Reduction of CO_2 emissions from natural gas, oil, or propane end-use combustion in buildings; 5) Avoided methane emissions from agricultural manure management	1) Clean Development Mechanism (CDM) and Joint Implementation (JI) project types, except those from land use, land-use change and forestry activities; Starting in 2013 (third phase), HFC and adipic acid credits will be excluded.	1) Covered manure storage facilities – CH_4 destruction; 2) Landfill sites – CH_4 Destruction; 3) Destruction of ozone depleting substances contained in insulating foam recovered from appliances

CAP AND TRADE LINKAGE

California is part of the Western Climate Initiative (WCI), which also includes British Columbia, Manitoba, Ontario and Quebec. WCI partners are working together with a goal of eventually creating a linked cap-and-trade program that covers each jurisdiction. When Governor Schwarzenegger signed an agreement establishing the initiative on February 26, 2007, California became one of the original participants of the initiative. WCI Partners have developed a comprehensive initiative to reduce regional greenhouse gas emissions to 15 percent below 2005 levels by 2020. Quebec is currently the only other jurisdiction in WCI that is implementing cap and trade in the near-term, and its first compliance period began on January 1, 2013.

In October 2013 CARB and the Quebec Ministry of Sustainable Development, Environment, Wildlife, and Parks officially linked their greenhouse gas cap-and-trade programs. As a result, greenhouse gas emission allowances from California and Quebec are interchangeable for compliance purposes as of January 1, 2014. California and Quebec's link represents the first multi-sector cap-and-trade program linkage in North America. The partnership aims to create a gateway and framework for greater international greenhouse gas reductions.

This step came after years of work to coordinate the two programs. CARB had to align its program with Quebec's and prove to Governor Brown that Quebec's program is stringent enough to meet California's requirements. Quebec also had to draft amendments to its regulations in order to harmonize with California's reporting scheme. Both CARB and its parallel agency in Quebec adopted regulations necessary to link their programs in spring 2013.

GLOSSARY

Allowance: A government-issued authorization to emit a certain amount. In greenhouse gas markets, an allowance is commonly denominated as one ton of CO_2e per year. The total number of allowances distributed to all entities in a cap-and-trade system is determined by the size of the overall cap on emissions.

Allowance distribution: The process by which emissions allowances are initially distributed under an emissions cap-and-trade system. Authorizations to emit can initially be distributed in a number of ways, either through some form of auction, free allocation, or some of both.

Auctioning: A method for distributing emission allowances in a cap-and-trade system whereby allowances are sold to the highest bidder. This method of distribution may be combined with other forms of allowance distribution.

Banking: The carry-over of unused allowances or offset credits from one compliance period to the next.

Benchmarking: An allowance allocation method in which allowances are distributed based upon a specified level of emissions per unit of input or output.

Borrowing: A mechanism under a cap-and-trade program that allows covered entities to use allowances designated for a future compliance period to meet the requirements of the current compliance period. Borrowing may entail penalties to reflect a programmatic preference for near-term emissions reductions.

Business-as-Usual: In the absence of the regulation being discussed. This term is used to assess the future impacts of a regulation.

Cap and Trade: A cap-and-trade system sets an overall limit on emissions, requires entities subject to the system to hold sufficient allowances to cover their emissions, and provides broad flexibility in the means of compliance. Entities can comply by undertaking emission reduction projects at their covered facilities and/or by purchasing emission allowances (or credits) from the government or from other entities that have generated emission reductions in excess of their compliance obligations.

Carbon Dioxide Equivalent (CO_2e): Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 21. This means that emission of one million metric tons of methane is equivalent to emission of 21 million metric tons of carbon dioxide.

Compliance period: The time frame for which regulated emitters surrender enough allowances to cover their actual emissions during that time frame.

Credits: Credits can be distributed by the government for emission reductions achieved by offset projects or by achieving environmental performance beyond a regulatory standard.

Emissions Cap: A mandated constraint in a scheduled timeframe that puts a "ceiling" on the total amount of anthropogenic greenhouse gas emissions that can be released into the atmosphere.

Emissions Trading: The process or policy that allows the buying and selling of credits or allowances created under an emissions cap.

Global Warming Potential (GWP): A measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), compared to carbon dioxide.

Greenhouse Gases (GHG): Greenhouse gases include a wide variety of gases that trap heat near the Earth's surface, slowing its escape into space. Greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and water vapor and other gases. While greenhouse gases occur naturally in the atmosphere, human activities also result in additional greenhouse gas emissions. Humans have also manufactured some greenhouse gases not found in nature (e.g., hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride).

High GWP: Gases with high global warming potential (GWP). There are three major groups or types of high GWP gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These compounds are the most potent greenhouse gases. In addition to having high global warming potentials, SF_6 and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted.

Kyoto Protocol: An international agreement signed at the Third Conference of the Parties to the UN Framework Convention on Climate Change in Kyoto, Japan (December 1997). The Protocol sets binding emission targets for industrialized countries that would reduce their collective emissions by 5.2 percent, on average, below 1990 levels by 2012.

Leakage: A reduction in emissions of greenhouse gases within a jurisdiction that is offset by an increase in emissions of greenhouse gases outside the jurisdiction. For example, if a regulated facility moves across the border to continue operations unchanged rather than reducing its emissions

Linking: Authorization by the regulator for entities covered under a cap-and-trade program to use allowances or offsets from a different jurisdiction's regulatory regime (such as another cap-and-trade program) for compliance purposes. Linking may expand opportunities for low-cost emission reductions, resulting in lower compliance costs.

Offset: Projects undertaken outside the coverage of a mandatory emissions reduction system for which the ownership of verifiable greenhouse gas emission reductions can be transferred and used by a regulated source to meet its emissions reduction obligation. If offsets are allowed in a cap and trade program, credits would be granted to an uncapped source for the net emissions reductions a project achieves. A capped source could then acquire these credits as a method of compliance under a cap.

Price Trigger: A general term used to describe a price at which some measure will be taken to stabilize or lower allowance prices. For example, through 2013 RGGI used price triggers to expand the amount of offsets that could be used for compliance.

Program Review (RGGI): The Memorandum of Understanding among RGGI states calls for a 2012 Program Review. This Program Review, now complete, was a comprehensive evaluation of program success, program impacts, additional reductions, imports and emissions leakage, and offsets.

Scope: The coverage of a cap-and-trade system, i.e., which sectors or emissions sources will be included.

Sealed Bid (Auction): A type of auction process in which all bidders simultaneously submit sealed bids to the

auctioneer, so that no bidder knows how much the other auction participants have bid.

Single Round (Auction): Bids for allowances are all solicited and settled in a single round. Auction participants can submit multiple bids for this single round. For example, a participant could bid $15 per allowance for 10,000 allowances and $20 per allowance for a separate 20,000 allowances.

Source: Any process or activity that results in the net release of greenhouse gases, aerosols, or precursors of greenhouse gases into the atmosphere.

True-up: A submission of emission allowances equivalent to a regulated entity's emissions during a compliance period, less what the entity has already submitted at interim deadlines.

Uniform Price (Auction): All allowances awarded in a single auction will be the same price. Allowances will be sold to bidders, beginning with the highest bid price and moving to successively lower priced bids, until all of the available allowances are sold. The bid at which all available allowances are sold becomes the settlement price and this is the price per allowance that all bidders will be charged for the allowances won in the auction. Bids submitted at prices below the settlement price will not win any allowances.

Western Climate Initiative (WCI): A collaboration launched in February 2007 to meet regional challenges raised by climate change. WCI is identifying, evaluating and implementing collective and cooperative ways to reduce greenhouse gases in the region. Membership in the WCI presently consists of California, British Columbia, Manitoba, Ontario, and Quebec.

A Long-Term Investment Strategy for Cap-and-Trade Revenue

INTRODUCTION

California has long been an international leader on clean energy and climate efforts through energy efficiency requirements, renewable energy standards, natural resource conservation, and greenhouse gas emission standards for passenger vehicles.

In 2006, California established the nation's benchmark for greenhouse gas emission reductions with the passage of AB32, the California Global Warming Solutions Act (Pavley). AB32 required the State Air Resources Board to develop a scoping plan, including direct regulations, performance-based standards, and market-based mechanisms to achieve this level of greenhouse gas emission reductions.

The State Air Resources Board has implemented a Cap-and-Trade program under the general authority granted under AB32 to implement market-based mechanisms. But full pollution reductions cannot be achieved without a long-term strategy for investing the program's revenues effectively and affordably.

SB 535 (De Leon 2011) built upon the CA climate program by recognizing the disproportionate impacts of greenhouse gases on disadvantaged and low-income communities in California including, for example, higher rates of respiratory illness, hospitalizations, and premature death from inordinately substandard air quality. It requires that 25 percent of cap and trade revenues be allocated to disadvantaged communities to reduce pollution.

Through SB 375 of 2008 (Steinberg), the legislature recognized that without improved land use and transportation policy, California will not be able to achieve the goals of AB 32 because the transportation sector remained the single largest contributor of greenhouse gases of any sector in the State of California.

This long-term investment strategy of Cap-and-Trade revenue is deliberately designed to achieve the objectives of AB32: a significant reduction in greenhouse gas emissions while mitigating a disproportionate impact of policies' strategy on California's low-income and disadvantaged communities.

Fundamentally, this long-term investment strategy embodies the objectives of Cap-and-Trade by ensuring that all expenditures are used to achieve maximum reductions in greenhouse gases. This long-term investment strategy is designed to curb human-induced global warming by reducing pollution from traffic and vehicle trips through retrofitting our communities with more affordable and efficient transit, housing, and land uses. In doing so, this long term investment strategy will improve public health

and help Californians save money with convenient and affordable alternatives to spending more of their family budgets on ever-increasing fuel costs at the pump.

The objectives of this strategy will not be met overnight. It will take time and a long term commitment to witness the environmental dividends of these investments. That is why it is imperative to act now.

###

FRAMEWORK

All investments must:

- Lead to reductions in greenhouse gas emissions, consistent with AB32 (Pavley) of 2006;

- Be subject to a competitive ranking process to ensure those projects providing maximum feasible reductions in greenhouse gases are funded;

- Meet all existing constitutional and statutory requirements for use and allocation of Cap-and-Trade funds, including, but not limited to:
  - California Constitution Article XIII,
  - SB375 (Steinberg) – The Sustainable Communities and Climate Protection Act of 2008, relating to transit-oriented development,
  - SB535 (De Leon) – The California Communities Healthy Air Revitalization Trust of 2011, relating to ensuring disadvantaged communities receive at least 25% of funds,
  - SB1018 (Budget Committee) of 2012, relating to agencies carefully reporting, documenting and justifying expenditures of funds to protect against lawsuits.

INVESTMENT STRATEGY

I. A Permanent Source of Funding for Affordable Housing and Sustainable Communities (40%)

a. ***Purpose:*** Support regional sustainable communities strategies including investments in affordable housing, transit-oriented development, land use planning, , active transportation, high density mixed use development, transportation efficiency and demand management projects.

b. ***Parameters:*** At least half of these funds (equivalent to at least 20% of total allocations) shall be used for affordable housing, centered in transit-oriented development and consistent with GHG reduction strategies.

c. ***Allocation method:*** Distributed through SGC to regions. Projects selected based on competitive GHG performance.

II. A Permanent Source of Funding for Transit (30%)

a. ***Purpose:*** Transit construction and operations.

b. ***Parameters:***

i. At least 5% of the transit amount would have to be used for transit connectivity projects.

ii. At least 5% of the transit amount would have to be used for direct transit assistance to consumers (could be in the form of passes, additional access, etc.).

c. ***Allocation method:*** Distributed based on GHG performance criteria

III. A Permanent Source of Funding for High Speed Rail (20%)

a. ***Purpose:*** Ongoing source for construction of HSR.

b. ***Allocation method***: Continuously appropriated. Could be securitized.

IV. A Permanent Source of Funding for State Highway and Road Rehabilitation and for Complete Streets (10%)

a. ***Purpose:*** Traffic management, repair, deferred maintenance, bikeways, and retrofits of roads and highways.

b. ***Allocation method:*** distributed based on competitive GHG performance criteria.

V. Natural resource, water, and waste ($200 million annually)

a. ***Purpose:*** Water efficiency infrastructure projects, forestry and landscape issues, wetland development, waste diversion and recycling, energy efficiency, clean vehicles, and "black carbon" reduction.

b. ***Allocation method:*** Subject to annual appropriation in the Budget Act.

VI. Climate dividend for transportation fuel consumers ($200 million annually)

a. ***Purpose:*** To use portion of cap-and-trade funds to show consumers that California's climate policies are generating new dollars for them where such use would not create new legal vulnerabilities for the use of those funds.

b. ***Allocation method:*** Several options, for example, a rebate check on monthly fuel bills; once per year rebate with motor vehicle registrations. These options may require a higher legislative vote threshold depending upon how they are drafted.

VII. **"Charge Ahead" Electric Vehicle Deployment Program ($200 million annually)**

Purpose: Funding a comprehensive vision for cleaning up the state's cars, trucks, buses, and freight movement to meet federally mandated clean air requirements and California's long-term GHG goals.

a. Allocation Method. Appropriated annually in the Budget Act.

VIII. Green Bank Funding (not less than $10 million annually)

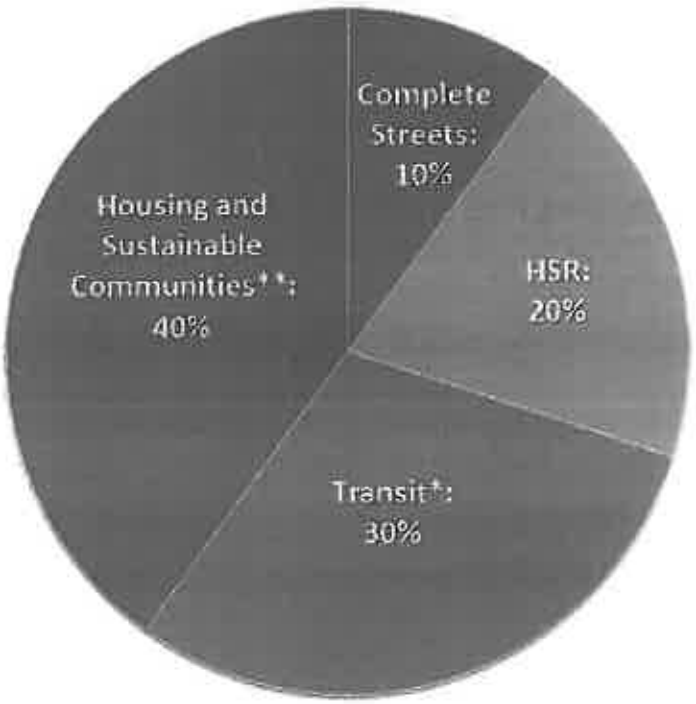
a. Purpose: a state fund to assist the financing of clean energy and other environmentally sustainable projects.

b. ***Allocation method***: appropriated annually in the Budget Act.

VISUAL SUMMARY

- $200 million for natural resource, water, and waste.
- $200 million for climate dividend for consumers.
- $200 million for electric vehicle deployment
- $10 million for green bank funding

Remaining balance distributed as follows:



**Of Transit amount, at least 5% shall be used for transit connectivity projects and at least 5% shall be used for direct transit assistance to consumers.*

***Of the Housing and Sustainable Communities amount, at least half shall be used for affordable housing.*

FISCAL ILLUSTRATION

Distribution of Cap-and-Trade, assuming revenue of $5 billion annually:

Category	Amount (millions)
I. Affordable Housing and Sustainable Communities	$1,756
II. Transit	$1,317
III. High Speed Rail	$878
IV. Complete Streets	$439
V. Natural Resource, Water, Waste	$200
VI. Climate Dividend	$200
VII. Electric Vehicle Deployment	$200
VIII. Green Bank Funding	$10
TOTAL	**$5,000**

March 31, 2014

Honorable Vice-Mayor Schenirer
Sacramento City Council
915 I Street, 5th Floor
Sacramento, CA 95814

Re: Greenhouse Gas Reduction Funds & SB 535

Dear Vice-Mayor Schenirer:

I write in my capacity as Board Chair of the Sacramento Metropolitan Air Quality Management District (SMAQMD) and as a member of the California Air Resources Board (ARB).

Like some of you, I have been closely monitoring the disposition of both the Administration and Legislature as it concerns an estimated $850 million in projected near-term Cap and Trade revenue, or Greenhouse Gas Reduction Funds (GHGRF). Having recently consulted with Larry Greene, SMAQMD's Executive Director about this subject, he and I agree it is very important we collectively consider the implications of the GHGRF as it becomes available to both implement AB 32,and to simultaneously assist disadvantaged communities in our city, county and region.

As such, Larry and his staff have identified at least six funding streams in the current GHGRF allocation proposal that various agencies and/or non-profit organizations could potentially access; e.g., SMAQMD, SACOG, Sacramento Tree Foundation. Additionally, SB 535 (De Leon) directs 25% of availableGHGRF to projects that *provide benefits to* disadvantaged communities, and at least 10% to projects *located within* disadvantaged communities. CalEnviroscreen, which is the state program detailing the location and nature of "disadvantaged communities" subject to SB 535, identifies areas in South Sacramento and Del Paso Heights as being in the top 10% of impacted areas around the state. Knowing these areas as I do, I'm hopeful you agree these and other local neighborhoods should be considered for potential SB 535 assistance.

Since potential GHGRF streams pass through variousstate agencies (and likely trailer bills and regulations are yet to be finalized that will affect funding availability), it will be later this year until we obtain further details. Regardless, it is important that our community and its leadership begin preparingnow, and that wherever possible future funding be directed towards coherent, well-thought-out programs and integrated plans. To this end, I expect to convene a series of meetings later this year that will serve to accomplish that objective.

Thank you in advance for your partnership and willingness to collaborate. Please feel free to contact me or my staff should you have questions.

Respectfully,

Phil Serna
SMAQMD Chairman
Member, California Air Resources Board

cc: CouncilmemberKevin McCarty
cc: Councilmember Allen Warren
cc: Councilmember Bonnie Pannell
cc: John Shirey, Sacramento City Manager
cc: Brad Hudson, Sacramento County Executive
cc: Larry Greene, SMAQMD Executive Director