

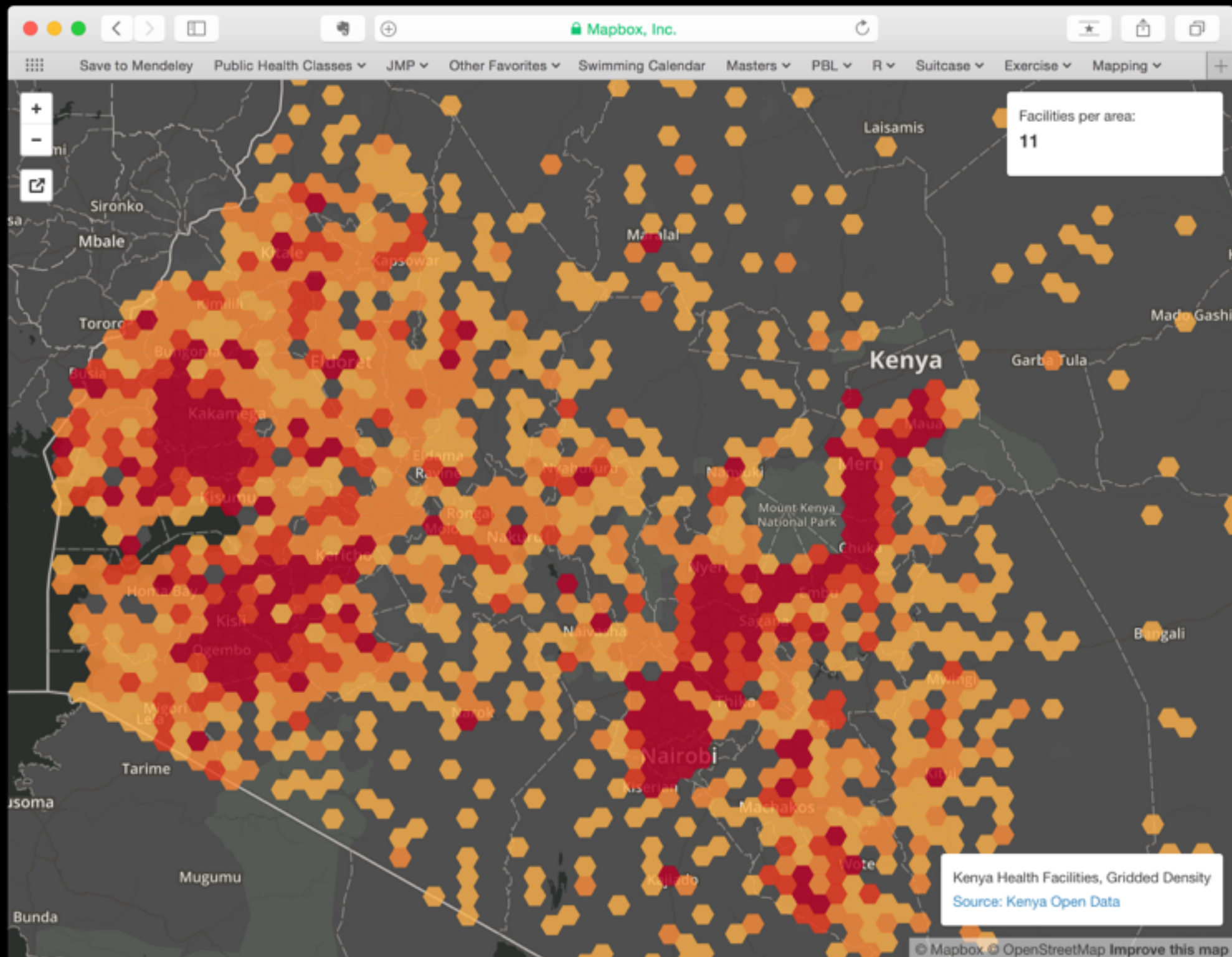
MAPPING FOR PUBLIC HEALTH AND MEDICINE

JOSH PEPPER | JRPEPPER@GMAIL.COM
UC BERKELEY | UCSF JOINT MEDICAL PROGRAM

Welcome! While we wait, please:

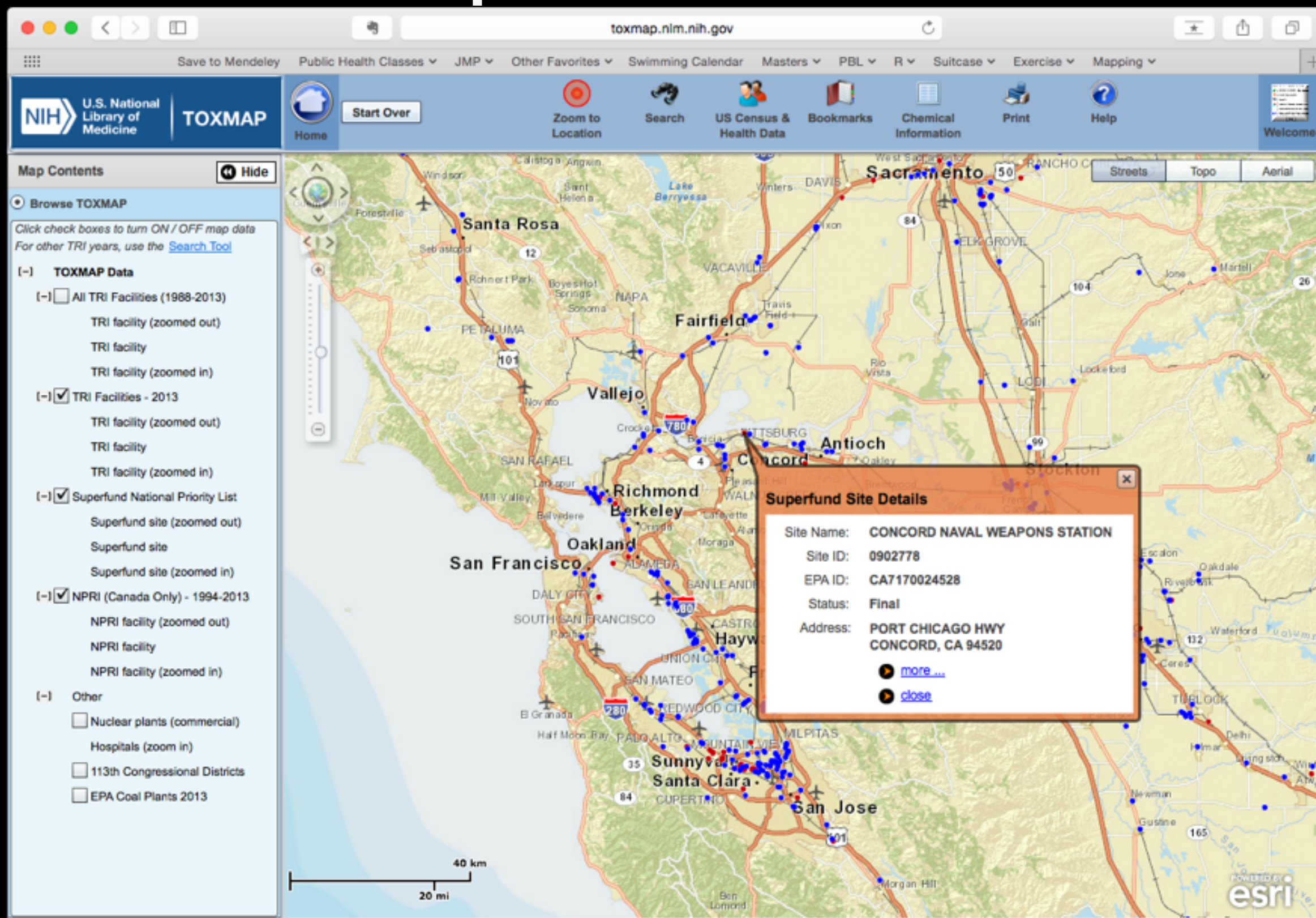
- Create an account at www.cartodb.com
- Download file from:
<http://tinyurl.com/datadownload-dlab>
(no need to download Dropbox! just close the dialog box)

Density of Health Facilities in Kenya



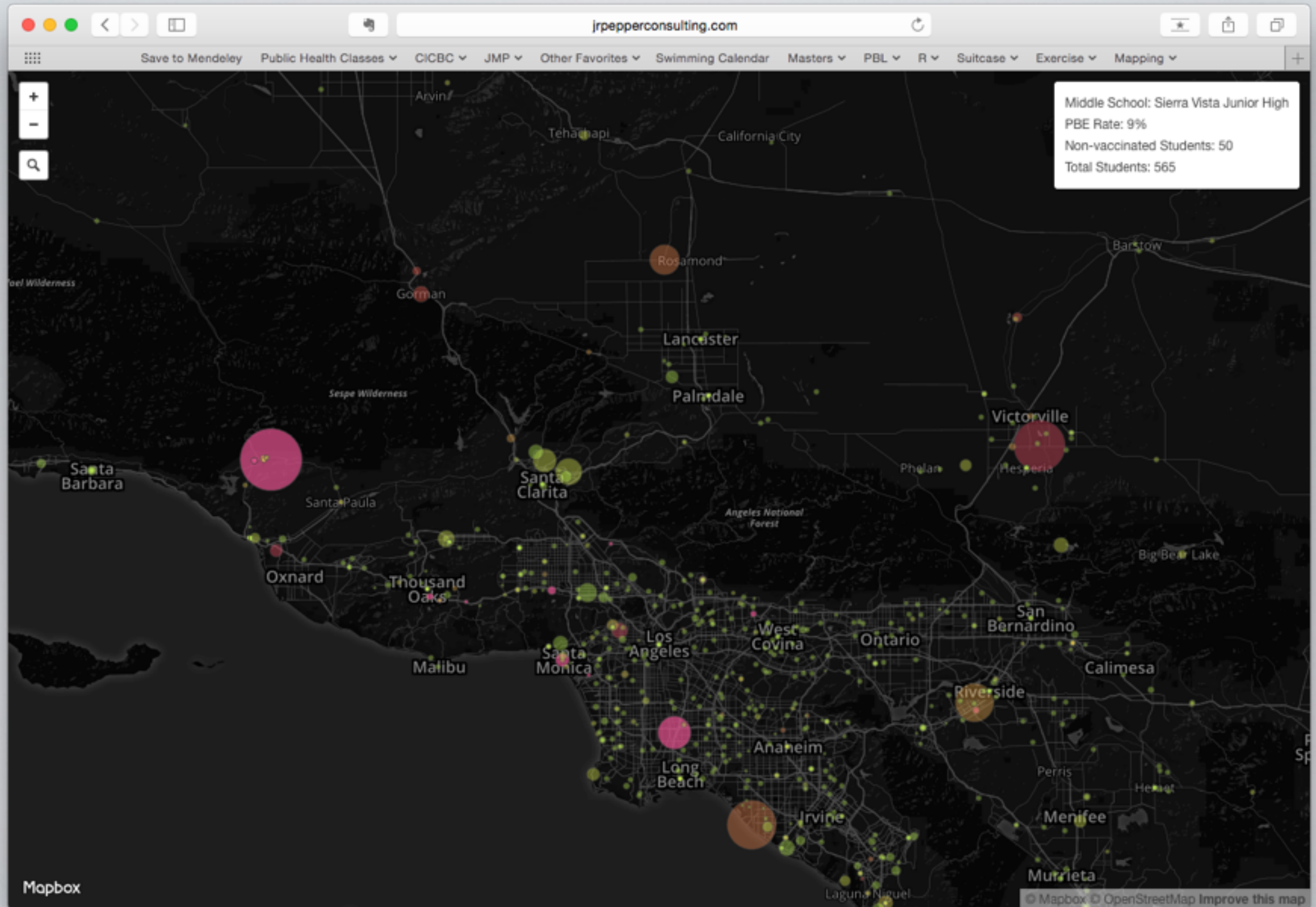
<https://www.mapbox.com/blog/open-source-to-map-health-data/>

Superfund Sites



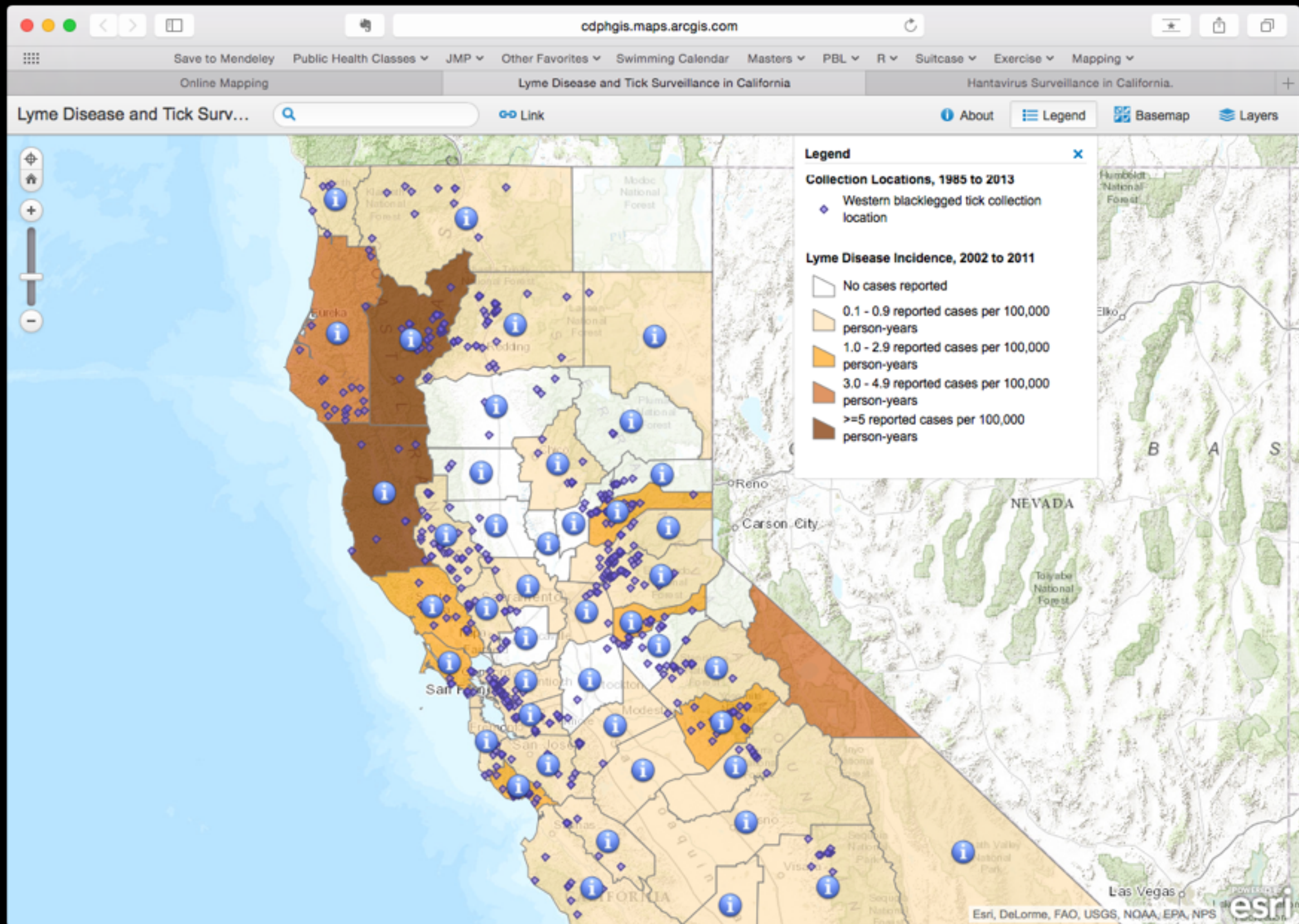
<http://toxmap.nlm.nih.gov/toxmap/flex/>

Immunizations



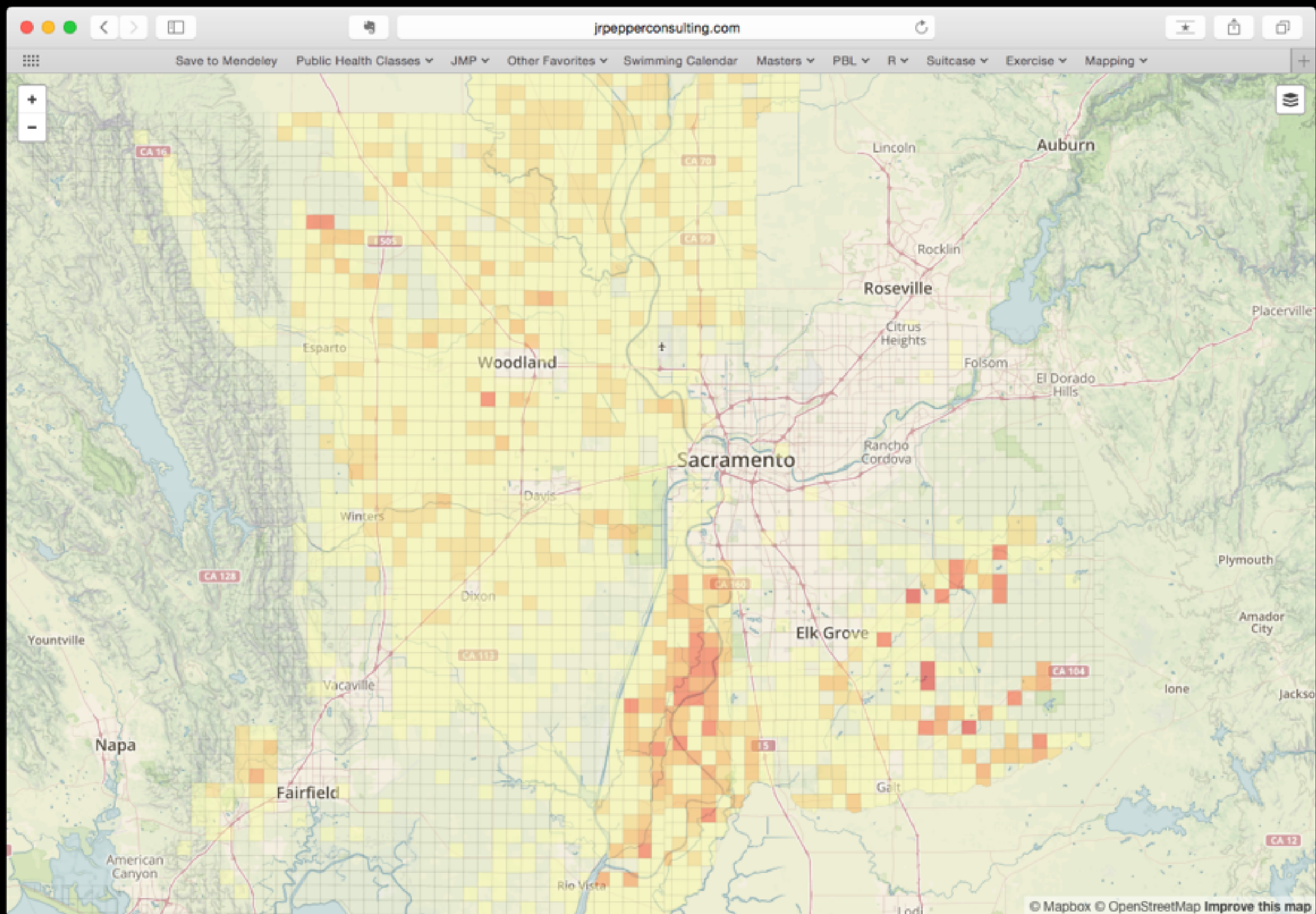
<http://jrpepperconsulting.com/mapping/pbe/>

Lyme Disease



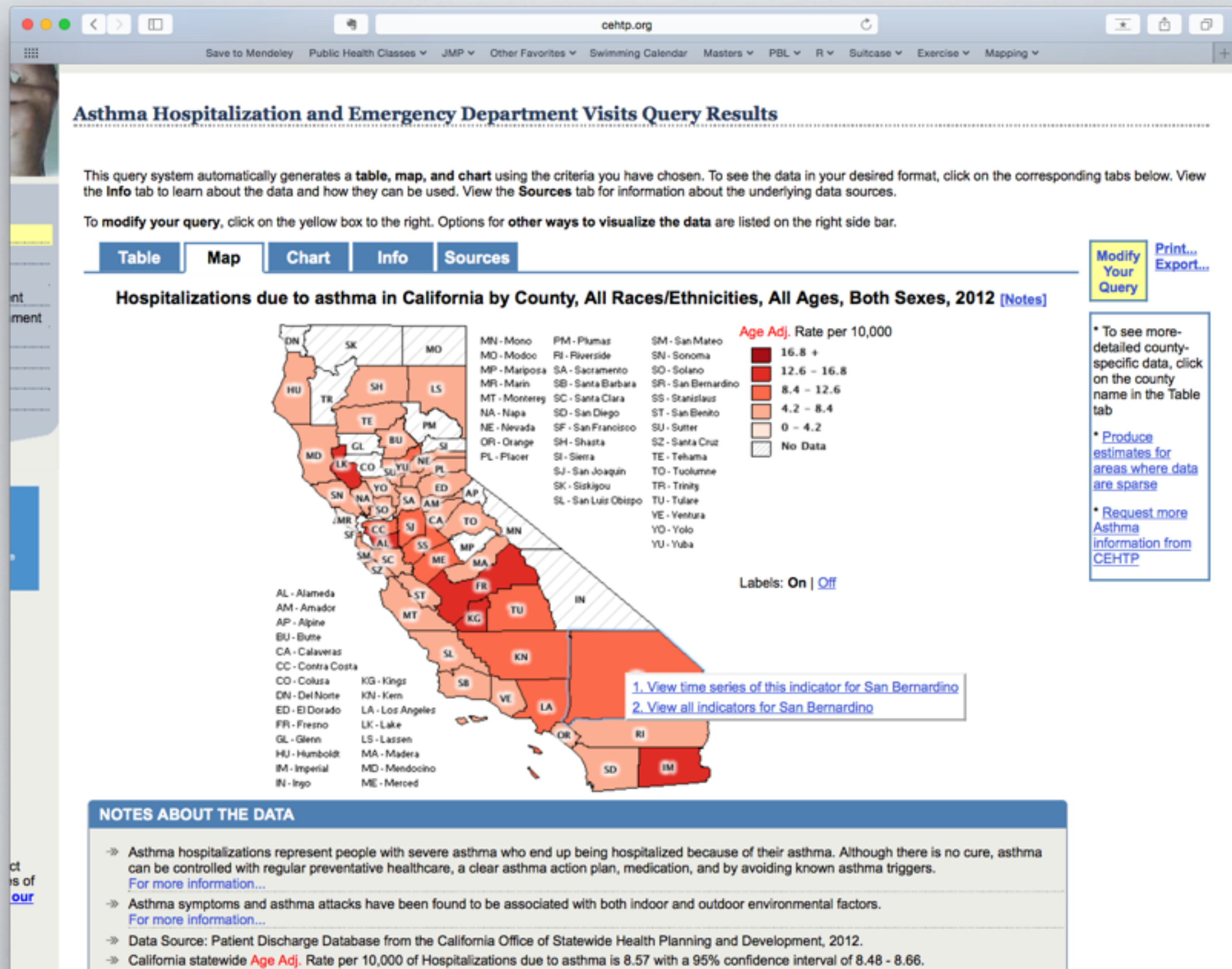
<http://cdphgis.maps.arcgis.com/apps/SocialMedia/index.html?appid=8d99fb1135d1424f9d8a8711acb7d459>

Pesticide Use



<http://jrpepperconsulting.com/mapping/woodland/>

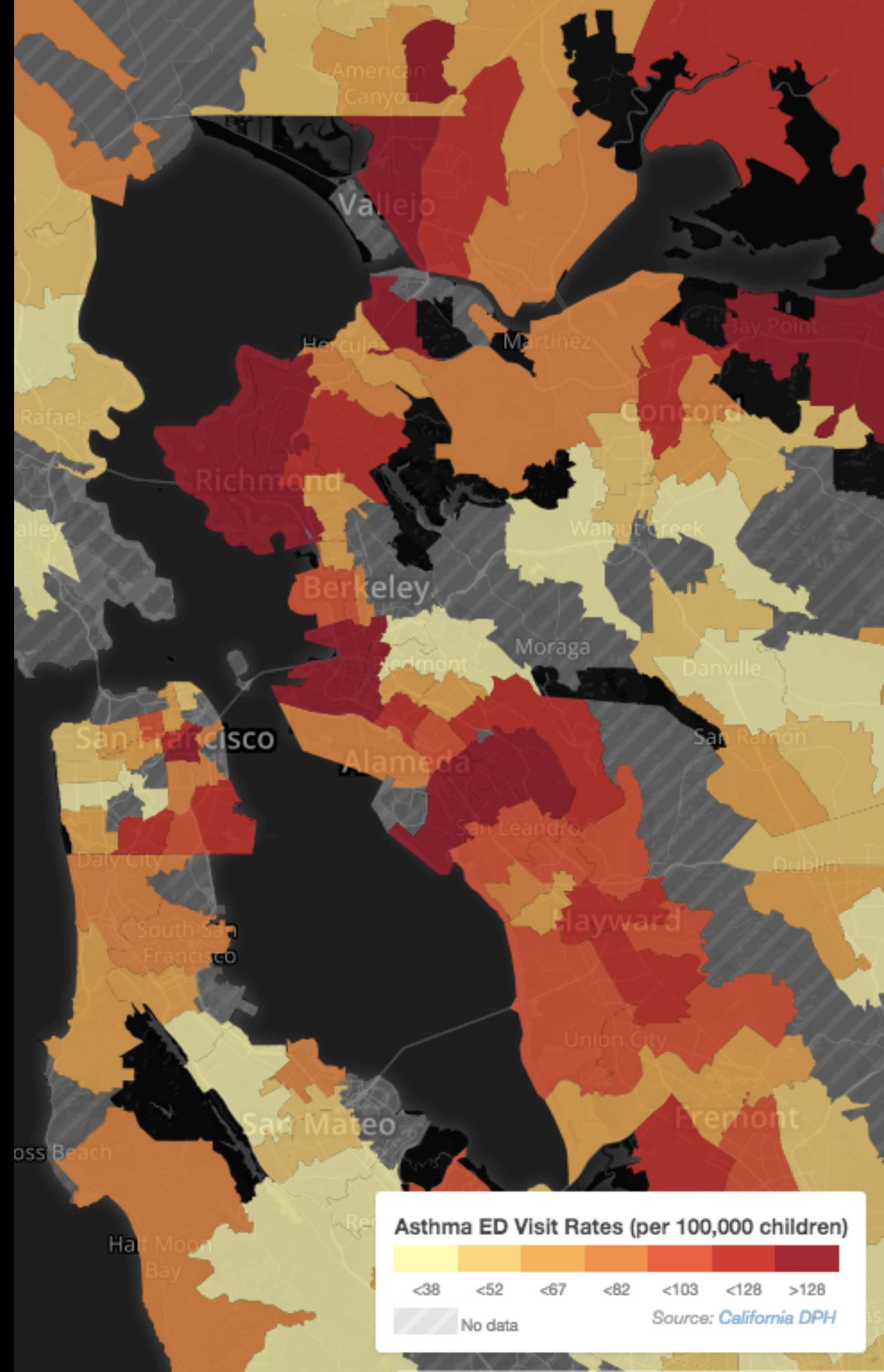
Asthma



http://cehtp.org/page.jsp?page_key=125&year=2012

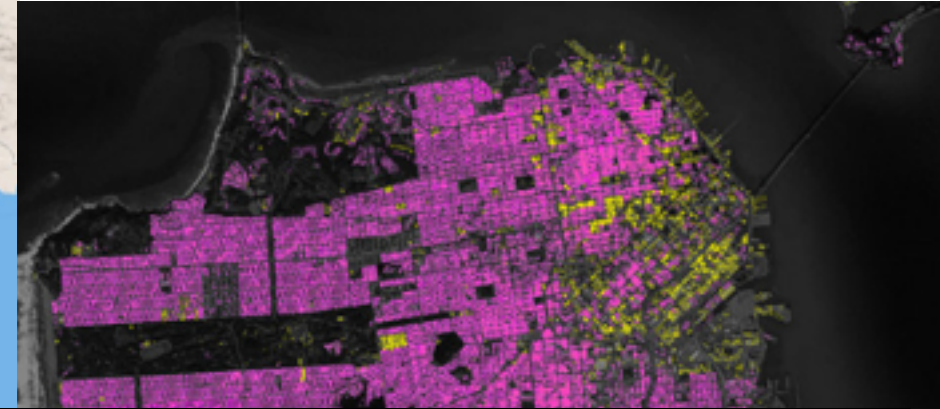
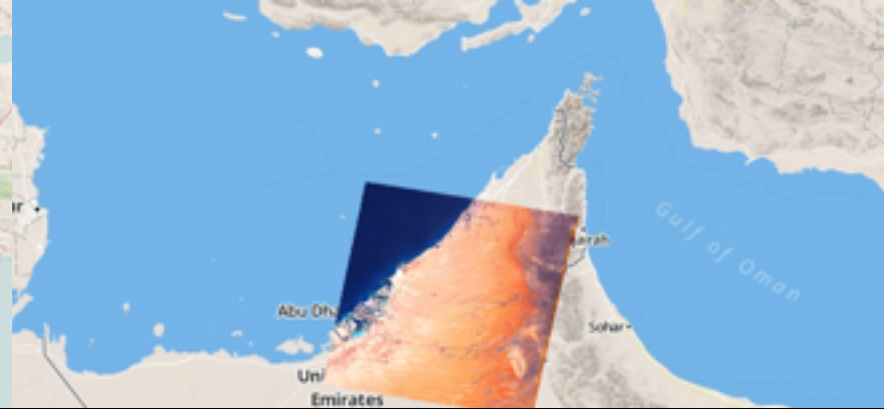
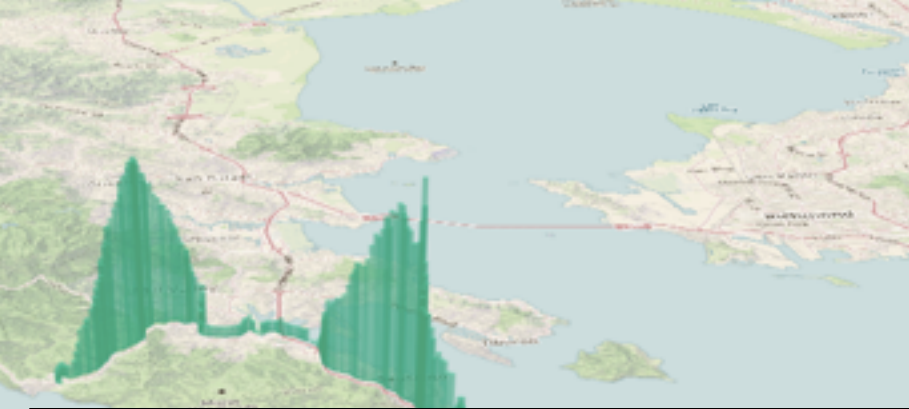
OVERVIEW

- Why maps matter in public health
- Different types of maps
- The landscape of free map-making software
- **Tutorial of map-making:** creating an online and printed map of asthma-related ED visits in California.
- Extra time for questions, and working with **your data**



File	Help							
1: 0,0	2864	203,22865	203,22866	203,22867	203,22868	203,22869	203,22870	203,22871
203: 202,0	2864	202,22865	202,22866	202,22867	202,22868	202,22869	202,22870	202,22871
204: 203,0	2864	203,22865	203,22866	203,22867	203,22868	203,22869	203,22870	203,22871
205: 204,0	2864	204,22865	204,22866	204,22867	204,22868	204,22869	204,22870	204,22871
206: 205,0	2864	205,22865	205,22866	205,22867	205,22868	205,22869	205,22870	205,22871
207: 206,0	2864	206,22865	206,22866	206,22867	206,22868	206,22869	206,22870	206,22871
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209: 208,0	2864	208,22865	208,22866	208,22867	208,22868	208,22869	208,22870	208,22871
210: 209,0	2864	209,22865	209,22866	209,22867	209,22868	209,22869	209,22870	209,22871
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220: 219,0	2864	219,22865	219,22866	219,22867	219,22868	219,22869	219,22870	219,22871
221: 220,0	2864	220,22865	220,22866	220,22867	220,22868	220,22869	220,22870	220,22871
222: 221,0	2864	221,22865	221,22866	221,22867	221,22868	221,22869	221,22870	221,22871
223: 222,0	2864	222,22865	222,22866	222,22867	222,22868	222,22869	222,22870	222,22871
224: 223,0	2864	223,22865	223,22866	223,22867	223,22868	223,22869	223,22870	223,22871

Public health
involves lots
of data

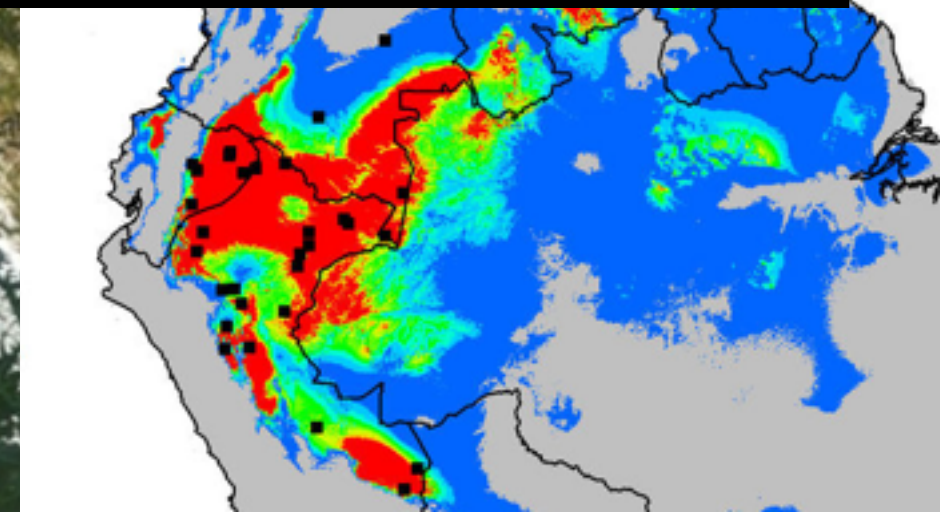
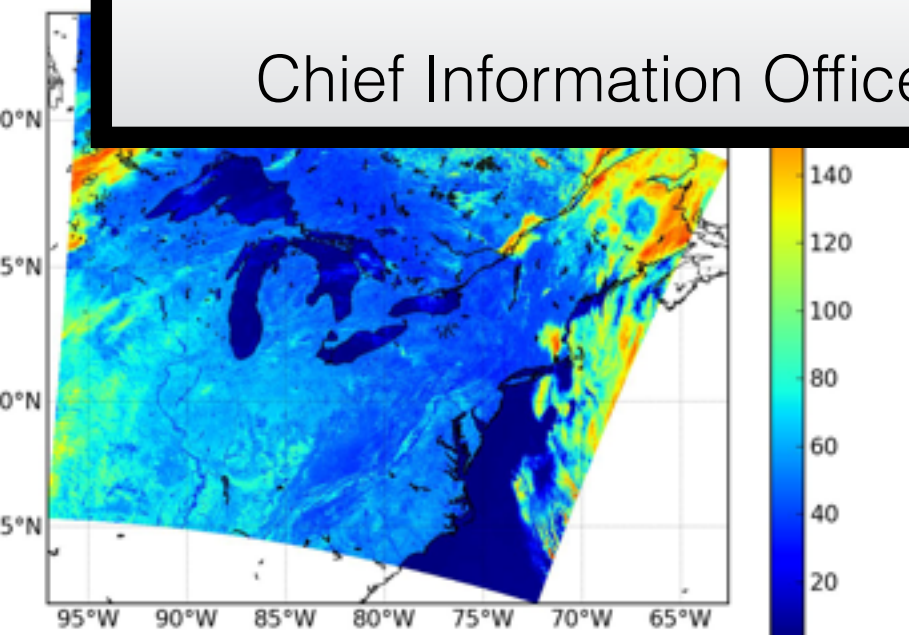


"When expressed in a map display, these seemingly sterile and often isolated statistical health data suddenly become immediately **useful, co-relational information systems** that health planners can use directly to modify programs that affect community and individual health care in such a way as to improve health outcomes."



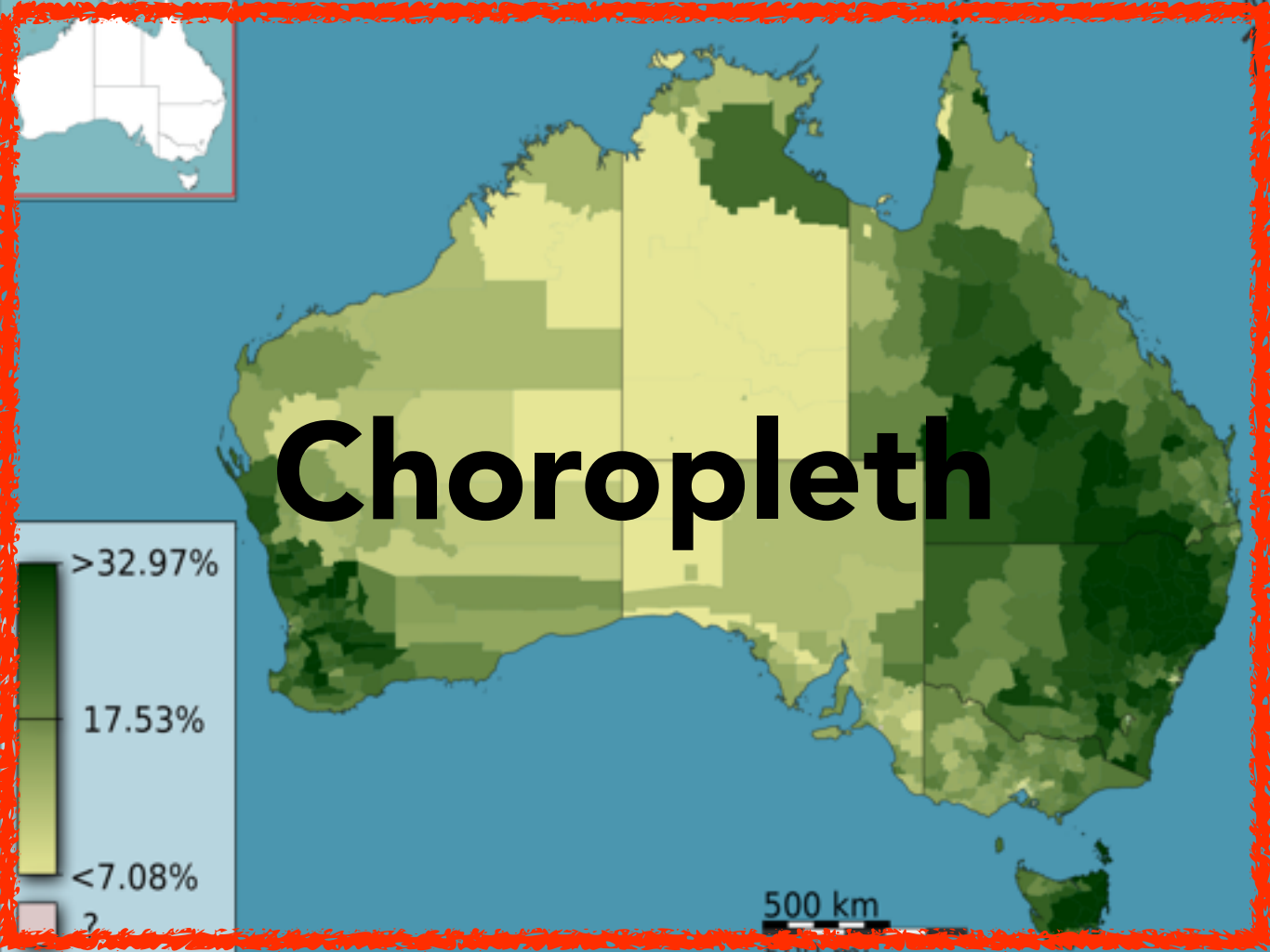
– Saleem Sayani

Chief Information Officer, Maryland Department of Health and Mental Hygiene

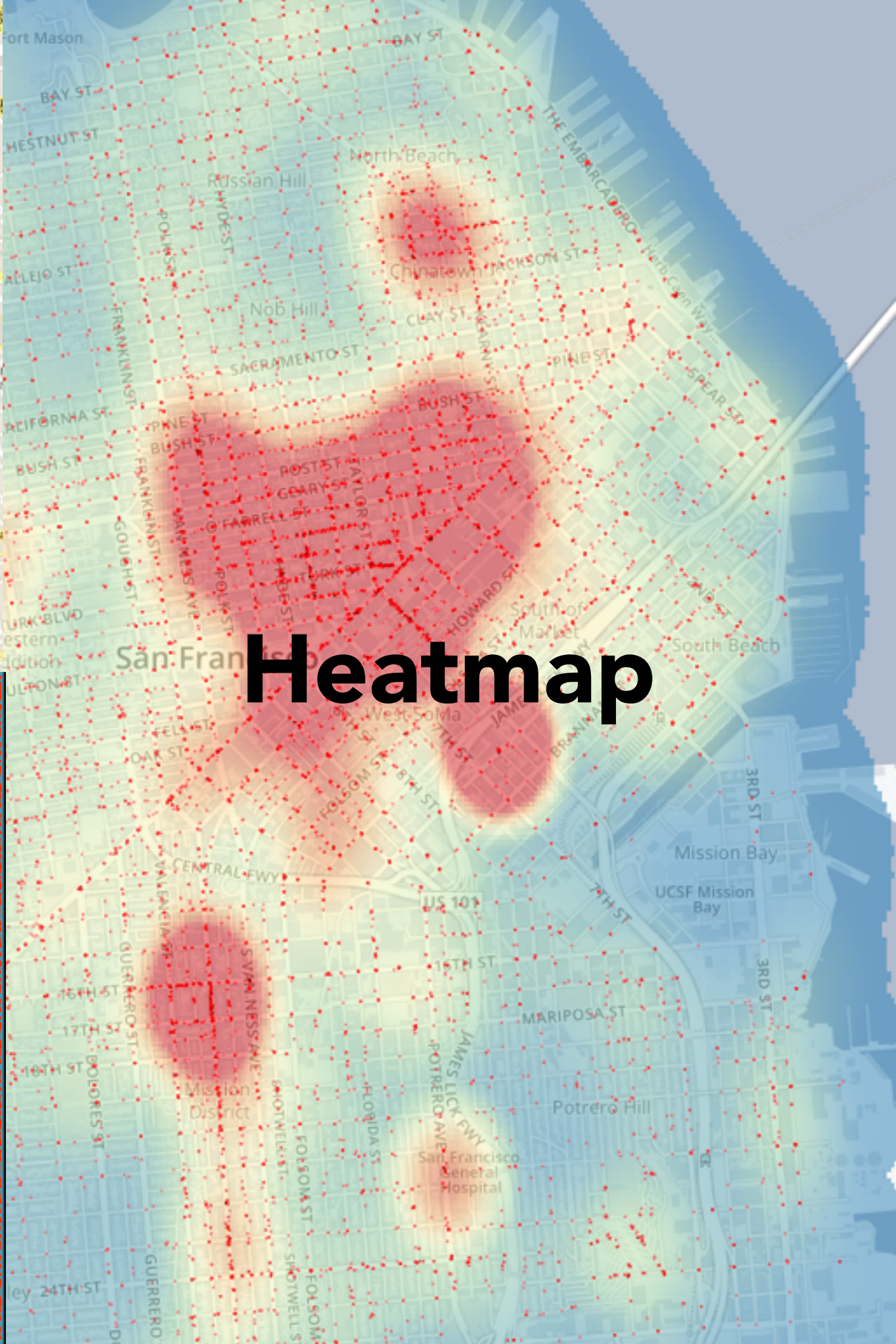




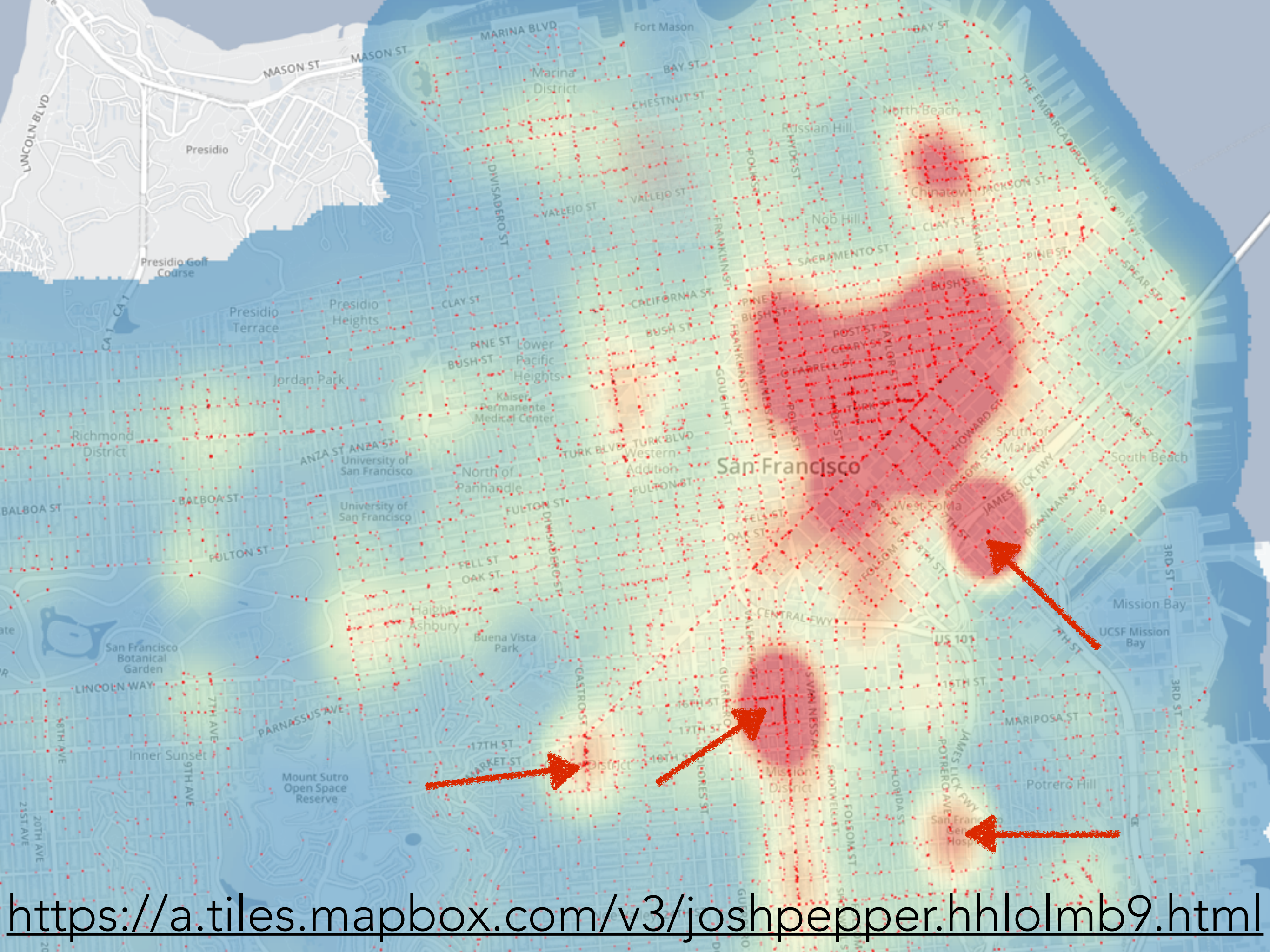
Markers



Choropleth



Heatmap



<https://a.tiles.mapbox.com/v3/joshpepper.hhlolmb9.html>

SOME FREE TOOLS FOR MAPPING

- **QGIS**

- Free alternative to ArcGIS, geospatial analysis and connecting data to 'shapefiles'

- **CartoDB**

- online editor only, but very **easy** to use

- **Mapbox**

- also has online editor, though not nearly as powerful
- create the offline editors TileMill and Mapbox Studio
- Turf.js for spatial analysis
- Mapbox.js for developing web apps.

- **R**

HOW DO WE GET TO A MAP?

HealthData.gov

Home Data Blog Q & A Ideas Developers

Search entire site...

Asthma Emergency Department Visit Rates by **ZIP** Code in 2012

This dataset contains counts and rates (per 10,000) of asthma (ICD9-CM, 493.0-493.9) emergency department visits among California residents by ZIP Code and age group (all ages, 0-17, 18+) for 2012. For more information please go to www.californiabreathing.org

Download the Data: [Other](#) [Other](#) [Other](#) [Other](#)

Agency and Program Information

Agency:	State of California
Federated Catalog:	State of California (CDPH)
Data Series Location:	https://cdph.data.ca.gov/d/fqaj-k8t7

Ask a Question

Please enter your question below:

Content limited to 128 characters, remaining

What code is in the image? *

Enter the characters shown in the image.

Ask C

<https://www.healthdata.gov/data/dataset/asthma-emergency-department-visit-rates-zip-code-2012>

- <http://tinyurl.com/datadownload-dlab>

Asthma rates

Zip code	Number of visits for children (0- 17)	Age-adjusted rate for children (per 10,000)	Number of visits for adults (18+)	Age-adjusted rate for adults (per 10,000)	Number of visits for all ages	Age-adjusted rate for all ages (per 10,000)	County FIPS code
90001 (33.973271508000494, -118.24896959899968)	221	108.6	212	64.9	433	76.2	6037
90002 (33.94895251300045, -118.24697958699971)	215	113.3	223	66	438	78.2	6037
90003 (33.96335186100049, -118.27393599999971)	295	125.2	264	65.2	559	80.7	6037
90004 (34.07572239300049, -118.30301712299968)	179	134	186	38.6	365	63.2	6037
90005 (34.05907233200048, -118.30301712299968)	73	87.4	59	19.3	132	36.9	6037
90006 (34.05010424100044, -118.2926890439997)	144	98.2	125	28.7	269	46.6	6037
90007 (34.02833141800045, -118.28507659499968)	101	145.2	109	48.3	210	73.3	6037
90008 (34.01097312100046, -118.34158773599972)	126	176.4	212	88.4	338	111.1	6037
90011 (34.00790120200048, -118.25903697699971)	336	88.2	247	43.3	583	54.9	6037
90012 (34.059480762000476, -118.24204800599972)	15	46.6	56	18.9	71	26	6037
90013 (34.04726260700045, -118.24609754999972)			140	105.9	147	112.4	6037
90014 (34.04475119400047, -118.2527367189997)			66	100	72	129.2	6037
90015 (34.04012376300045, -118.26498963499972)	59	143.7	66	47.7	125	72.4	6037
90016 (34.02888323300044, -118.35308896599969)	157	130.1	229	64.3	386	81.3	6037
90017 (34.05230281300044, -118.26338632799968)	70	118.9	57	36.9	127	58.1	6037
90018 (34.03077331100047, -118.31686899999971)	192	144.4	241	62.7	433	83.8	6037
90019 (34.04884418900048, -118.33610868499972)	147	107.1	221	43.7	368	60.1	6037
90020 (34.06636325100044, -118.30164844599972)	72	95.5	74	24.2	146	42.5	6037
90021 (34.03012156000045, -118.24177861599969)			38	190.3	47	221.4	6037
90022 (34.023543222000455, -118.15512616999968)	146	71.1	198	44.1	344	51	6037
90023 (34.02418193800048, -118.20195663999971)	158	104.1	127	40	285	56.5	6037
90024 (34.06136215000049, -118.4402367409997)			43	12.1	52	15.5	6037
90025 (34.04518134900047, -118.45025632399972)	21	38.1	52	14.8	73	20.8	6037
90026 (34.07687382000046, -118.26535895999967)	128	91.6	165	31.4	293	46.9	6037
90027 (34.10546395500046, -118.2923675139997)	46	80.1	144	38.4	190	49.2	6037
90028 (34.10072355400047, -118.32821815499972)	40	136.3	127	48.7	167	71.3	6037
90029 (34.08989145600049, -118.29490934299969)	96	125.2	95	32.7	191	56.5	6037
90031 (34.07752122500045, -118.2131059239997)	79	77.4	81	27.5	160	40.3	6037
90032 (34.08151428500048, -118.17678602299969)	127	108.4	128	37.4	255	55.7	6037
90033 (34.04856176400045, -118.2115199969997)	172	117.2	228	72.2	400	83.8	6037
90034 (34.02829231300046, -118.40269589399969)	75	76.7	117	26.9	192	39.7	6037
90035 (34.05421027100044, -118.38387767499972)	22	36.4	62	27.2	84	29.6	6037
90036 (34.06889204400045, -118.35077742299967)	24	39.1	65	23.1	89	27.3	6037
90037 (34.00349102100046, -118.28709702299972)	236	124	254	60.6	490	76.9	6037
90038 (34.08898335000049, -118.32483774099973)	57	106.5	74	32.8	131	51.8	6037
	46	81.5	89	41.8	135	54.6	6037

Download file from: <http://tinyurl.com/datadownload-dlab>

Asthma rates

Zip	children-number of visits for (0- 17)	Children-Age- adjusted rate (per 10,000)	Adults-Number of visits (18+)	adults-Age- adjusted rate (per 10,000)	All Ages - Number of visits	all ages-Age- adjusted rate (per 10,000)	County FIPS code
94002	14	23.7	58	28.2	72	27.1	6081
94010	32	34.8	66	19.4	98	23.4	6081
94014	70	72.4	194	50.8	264	56.4	6081
94015	82	72.9	189	37.6	271	46.7	6081
94019	29	67.5	25	19	54	31.5	6081
94022			12	10.4	20	12.7	6085
94024					14	8.4	6085
94025	53	50.4	58	19.2	111	27.3	6081
94030	15	36.2	78	41.2	93	39.9	6081
94038					12	32.6	6081
94040	28	35.8	34	14	62	19.6	6085
94041			13	11.5	23	18	6085
94043	13	22.5	34	16.7	47	18.2	6085
94044	45	60.2	111	39.7	156	45	6081
94061	53	58.5	100	34.7	153	40.9	6081
94062	18	32.8	45	22.9	63	25.4	6081
94063	87	101.9	130	57.7	217	69.1	6081
94065					14	12.4	6081

Download file from: <http://tinyurl.com/datadownload-dlab>

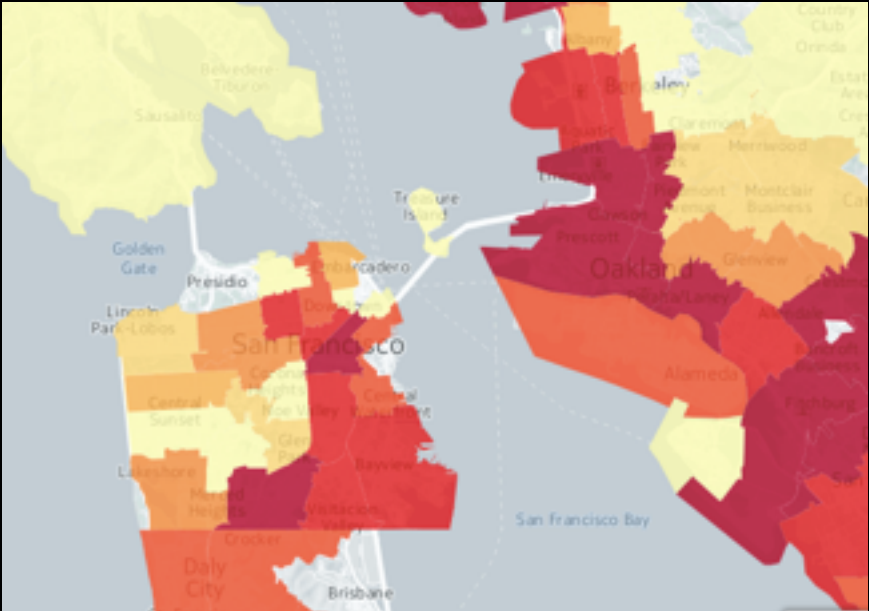
FLOWCHART FOR MAPMAKING

Zip	children-number of visits for (0- 17)	Children-Age- adjusted rate (per 10,000)	Adults-Number of visits (18+)	adults-Age- adjusted rate (per 10,000)	All Ages - Number of visits	all ages-Age- adjusted rate (per 10,000)	County FIPS code
94002	14	23.7	58	28.2	72	27.1	6081
94010	31	34.8	66	19.4	98	23.4	6081
94014	70	72.4	194	50.8	264	56.4	6081
94015	82	72.9	189	37.6	271	46.7	6081
94019	29	67.5	25	19	54	31.5	6081
94022			12	10.4	20	12.7	6085
94024					14	8.4	6085
94025	53	50.4	58	19.2	111	27.3	6081
94030	15	36.2	78	41.2	93	39.9	6081
94038					12	32.6	6081
94040	28	35.8	34	14	62	19.6	6085
94041			13	11.5	23	18	6085
94043	13	22.5	34	16.7	47	18.2	6085
94044	45	60.2	111	39.7	156	45	6081
94061	53	58.5	100	34.7	153	40.9	6081
94062	18	32.8	45	22.9	63	25.4	6081
94063	87	101.9	130	57.7	217	69.1	6081
94065					14	12.4	6081

Asthma data
by zip code

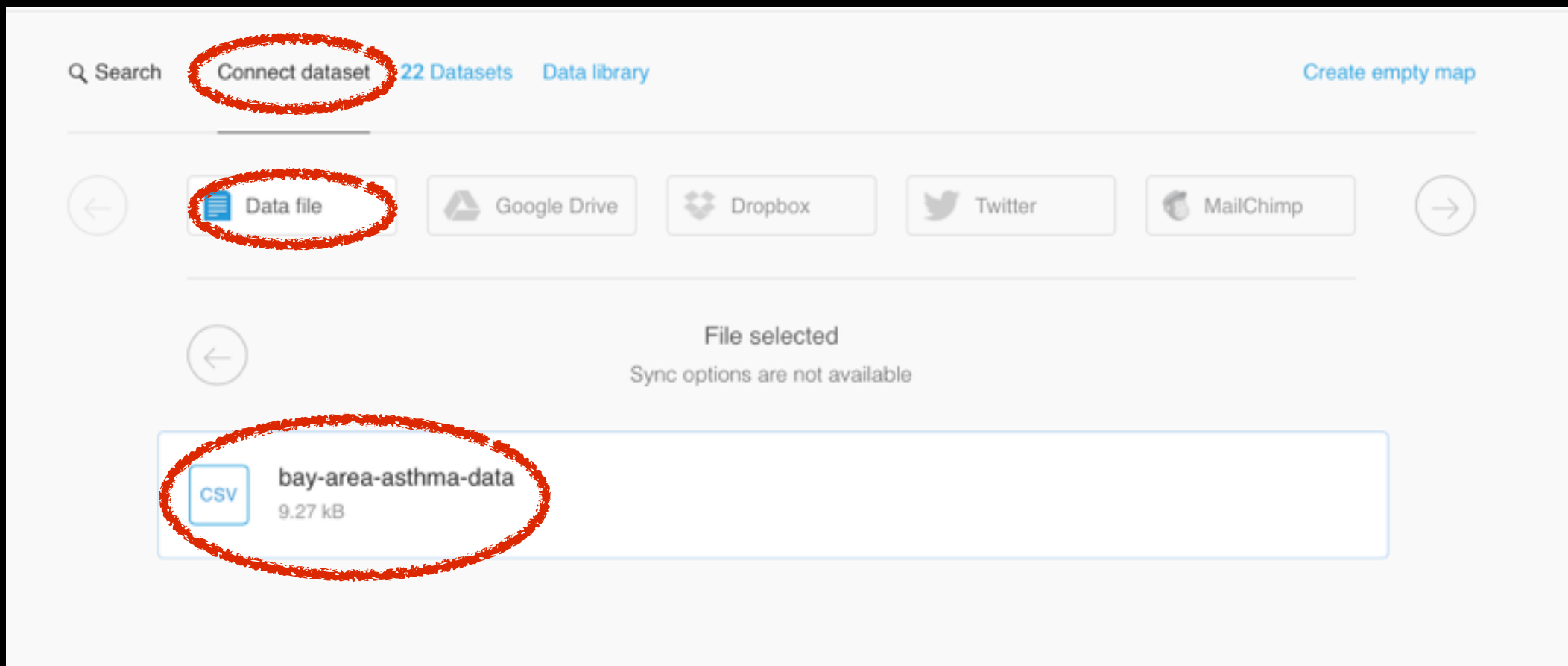


A **shapefile**
of zip code
boundaries



LET'S MAKE A CARTODB MAP!

1. Download file from: <http://tinyurl.com/datadownload-dlab>
2. Open cartodb.com and log into your account.
3. Click on 'New Map'
4. Click on 'Connect Dataset' and upload the file:
bay-area-asthma-data.csv



1) Select Data View

2) Select Zip

3) Select Georeference

DATA VIEW					Edit ▾		PUBLISH
adjusted_rate_per_10_000 ▾	children_number_of_visits_for_0_17 ▾	county_fips_code ▾	county_name ▾	zip ▾			
	number	number	string	number			
	94	6001	Alameda				
	null	6001	Alameda				
	113	6001	Alameda				
	133	6001	Alameda				
	46	6001	Alameda				
	195	6001	Alameda				
	21	6001	Alameda	94542			
	236	6001	Alameda	94544			

STEPS TO CREATE CARTODB MAP

1) Select Postal Codes

Select the column that has the Postal Codes
Georeference your data by postal codes.

2) Select Zip

1 In Which Column Are Your Postal Codes Stored?

zip

2 Country Where Postal Codes Are Located, If Known

Select column or type it

3) Type 'United States'
on the bottom of
this dropdown

adults_number_of_visits_18

N

all_ages__number_of_visits

N

all_ages_age_adjusted_rate_p...

N

children_age_adjusted_rate_pe...

N

children_number_of_visits_for_...

N

United States

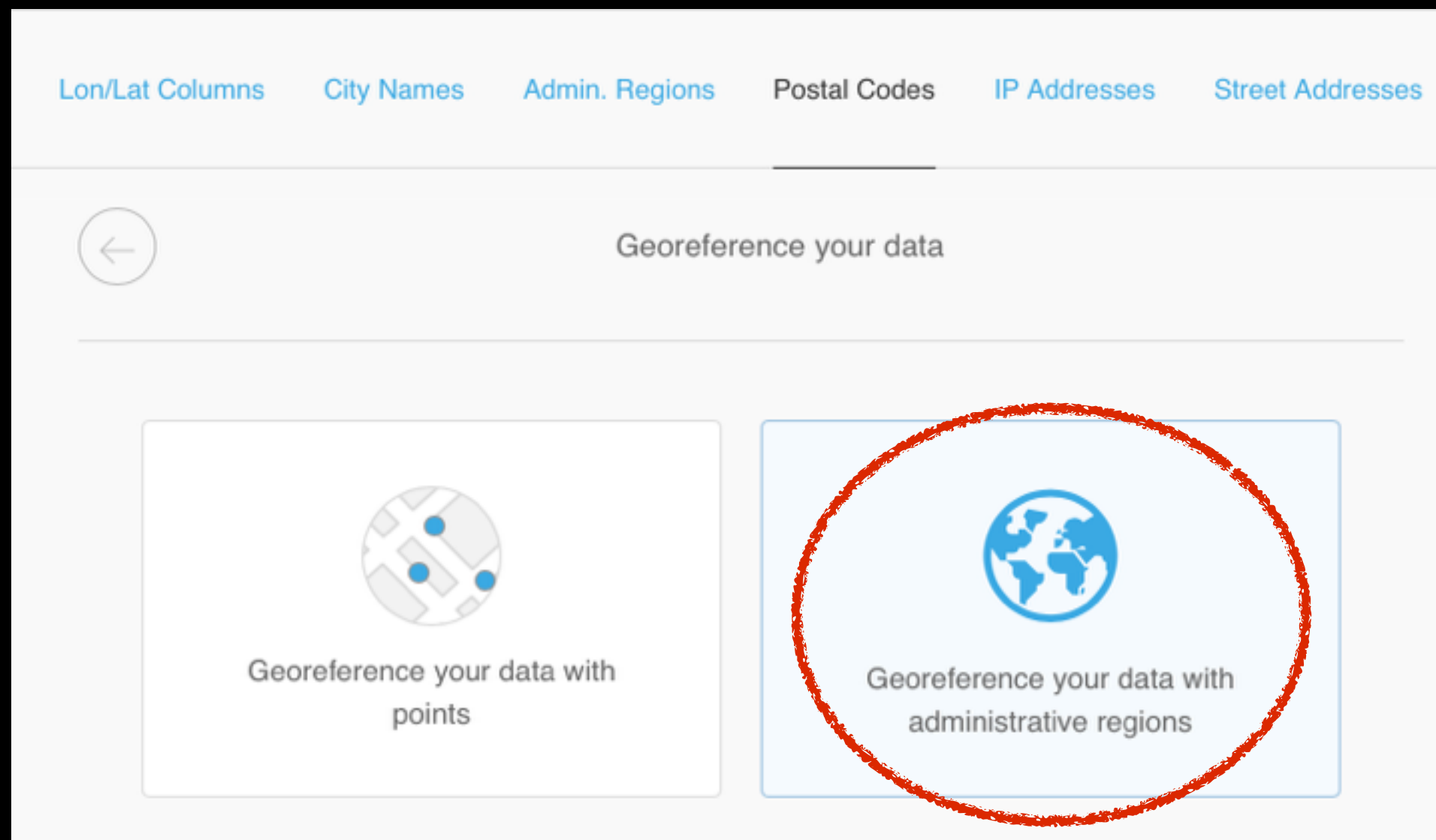
T.

all values. Geocode all your rows, even those with geometry data.

CONTINUE

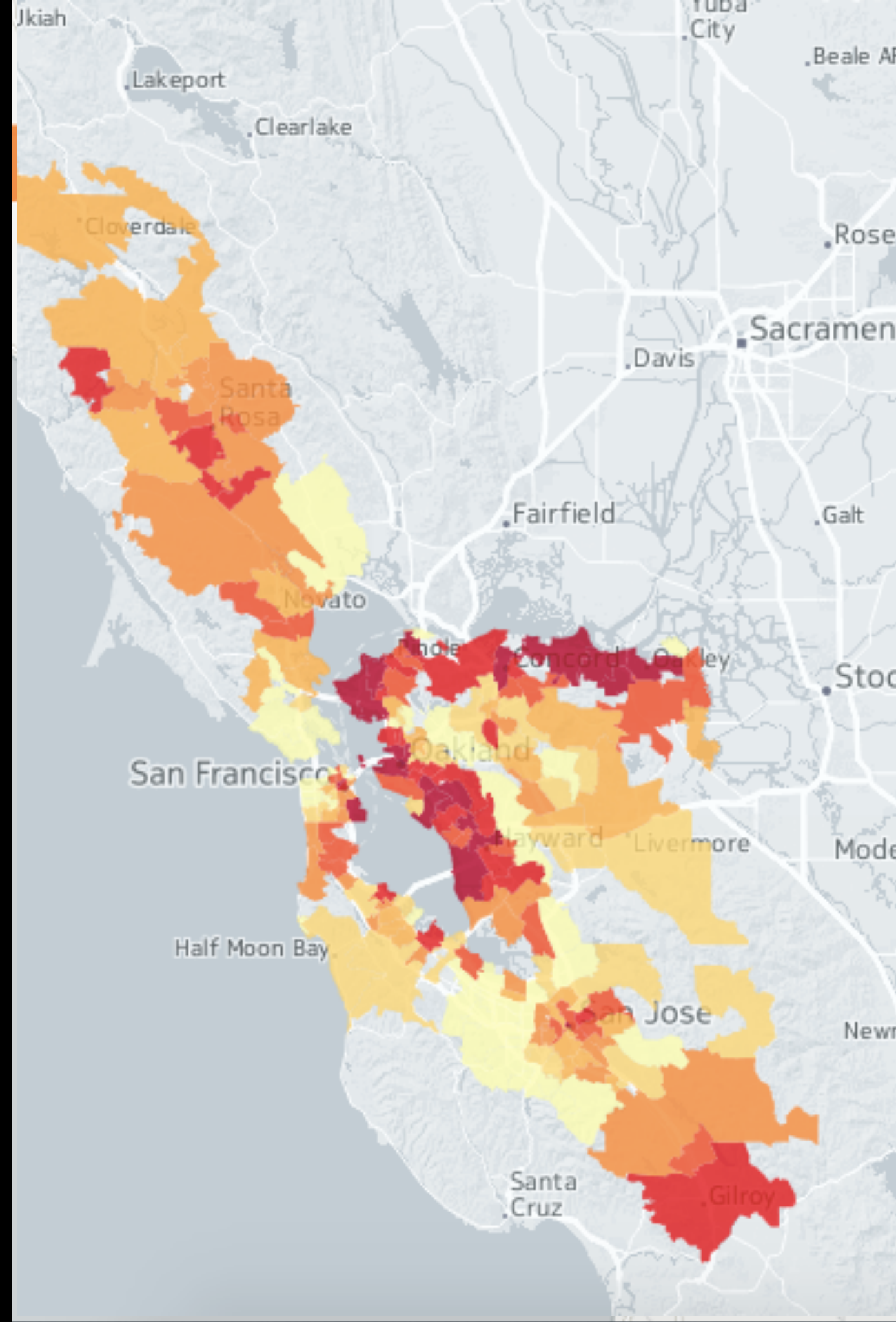
STEPS TO CREATE CARTODB MAP

7. Select Georeference your data with administrative regions.



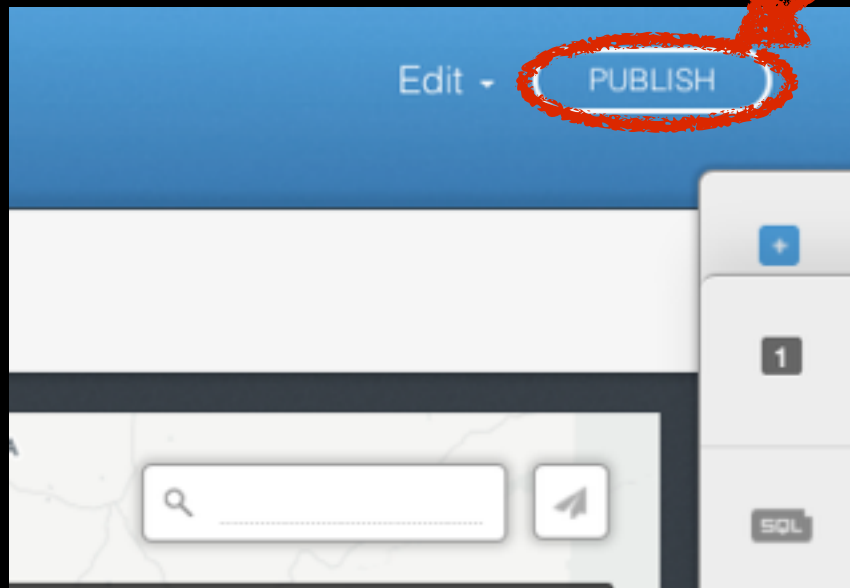
YOUR CARTODB MAP!

- Zoom into California and view your new map!
- Click on 'wizards' on the right, select 'choropleth' and try playing with the settings.
- Pick a column to color your data by.
- Try to add an infobox and legend!
- Experiment with filters!

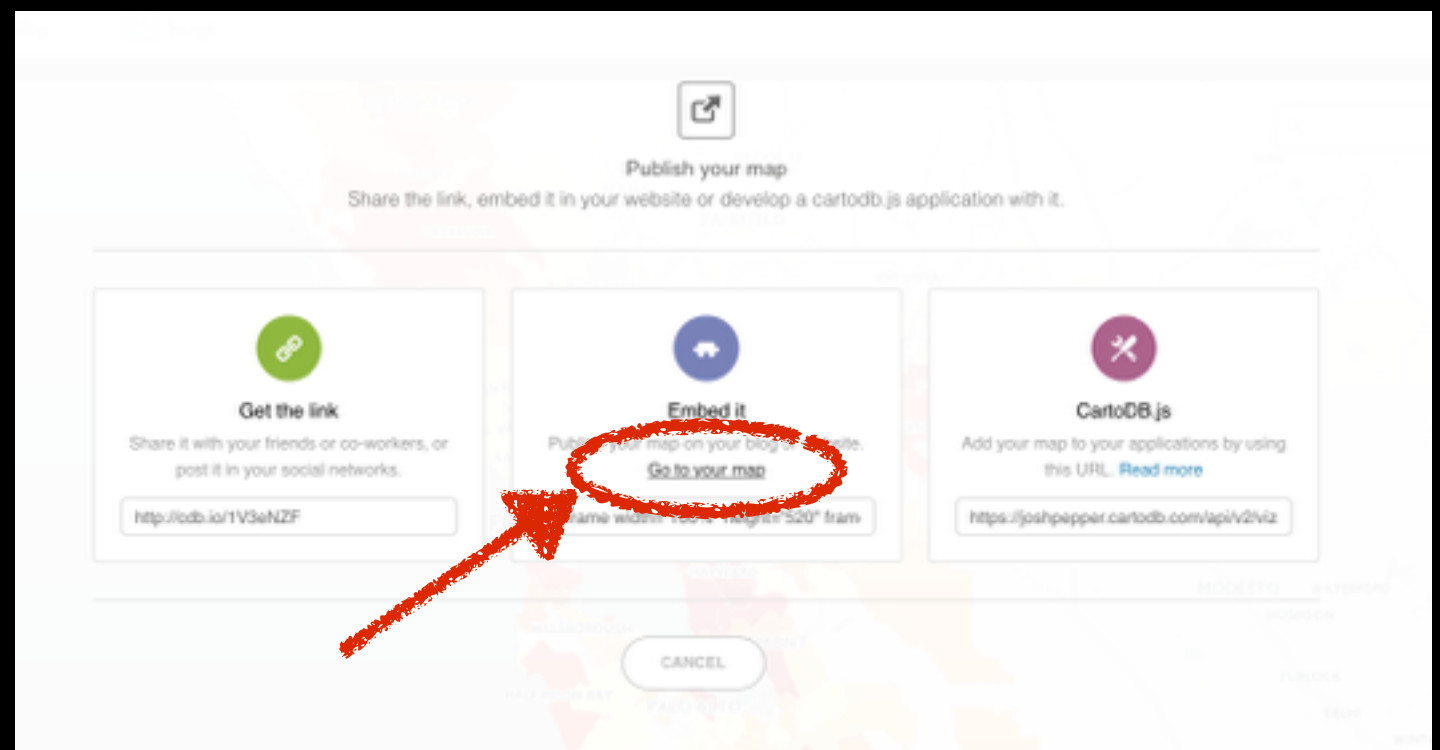


SHARE YOUR WEBMAP!

Step 1: Click Publish in top right corner



Step 2:
Click 'Go to your map'

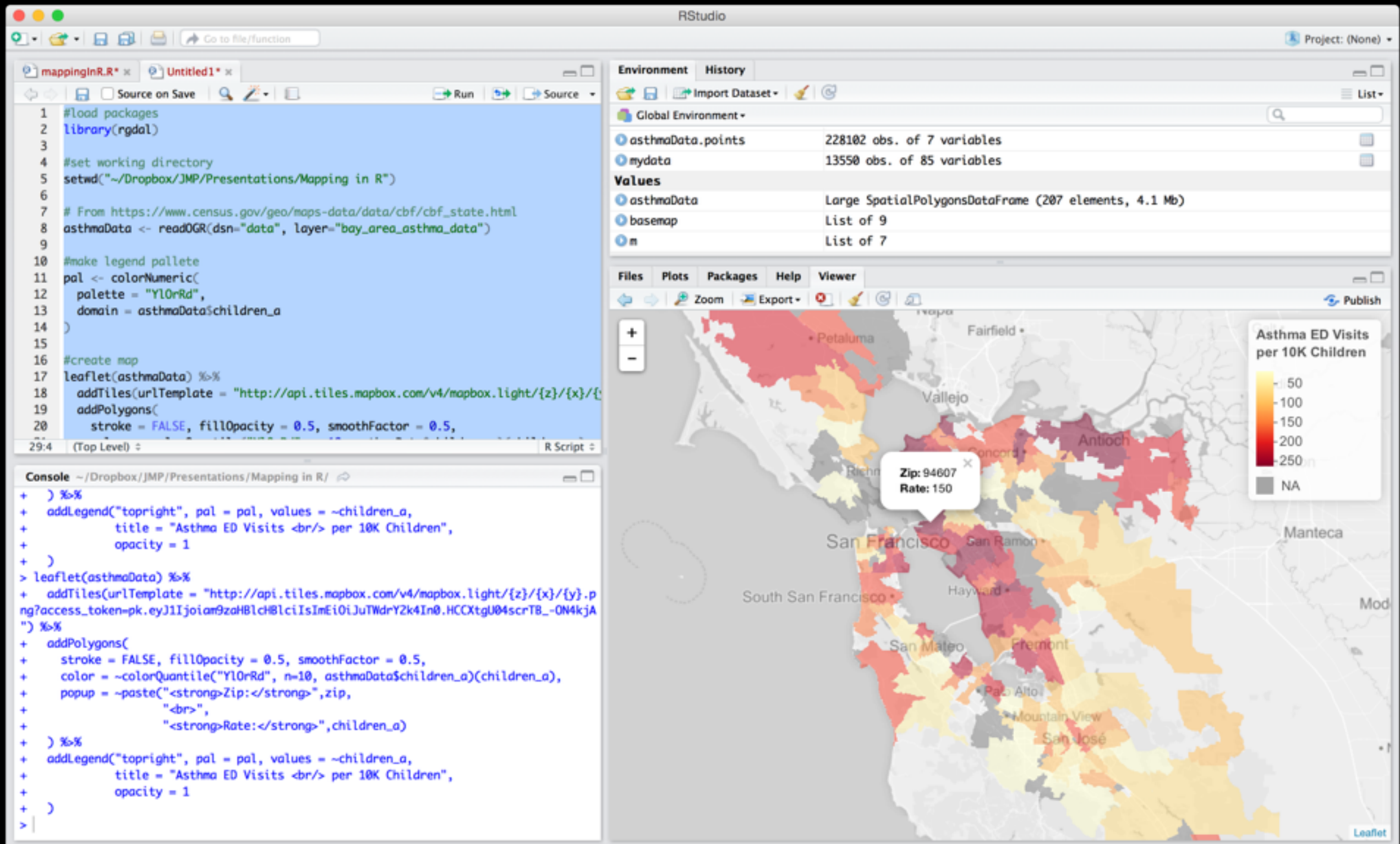


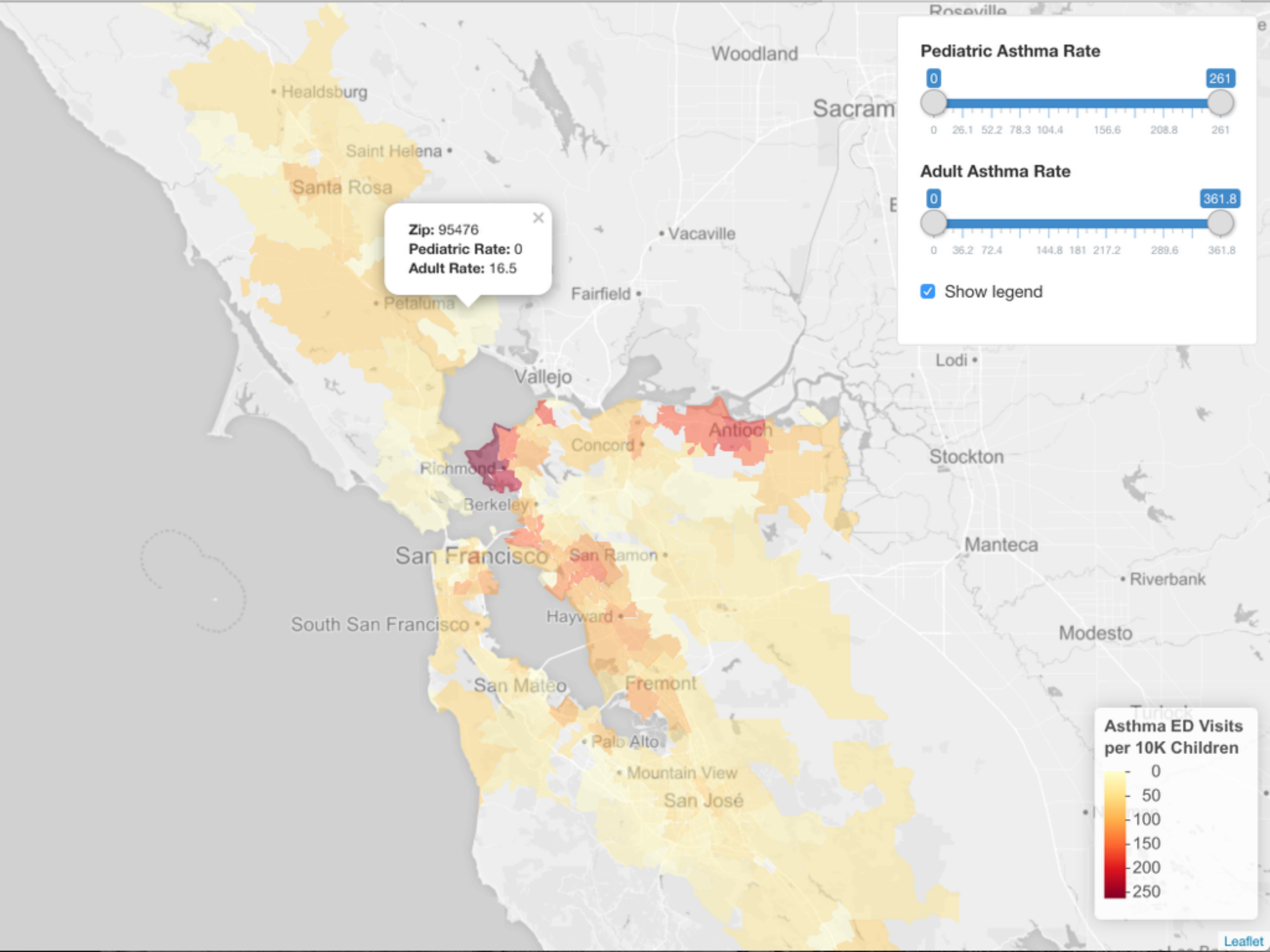
my map: <http://tiny.cc/dlab-asthma-map>

PUBLIC HEALTH DATA SOURCES

- **City of Berkeley Open Data Portal**
 - <http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=105239>
- **SF OpenData**
 - <https://data.sfgov.org>
- **healthdata.gov**
- **Compiled national resources by the NY DPH**
 - <https://www.health.ny.gov/statistics/chac/national.htm>
- **Large, national health surveys**
 - http://www.cdc.gov/nchs/data_access/hdi/hdi_data_sources.htm

COME OCTOBER 22ND: WEBMAPS IN R, LEAFLET & SHINYAPPS





KEEP EXPLORING!! SOME ADDITIONAL RESOURCES:

- **Choosing colors**

- colorbrewer2.org
- color.adobe.com

- **Creating and hosting online maps**

- www.mapbox.com
- www.cartodb.com

- **Spatial Analysis**

- <http://www.qgis.org/en/site/>
- Turf.js
- Georeferencing: batchgeo.com (and CartoDB, and Mapbox)

- **Tutorials / Examples**

- <http://docs.cartodb.com/tutorials.html>
- <http://academy.cartodb.com/>
- <https://www.mapbox.com/mapbox.js/example/v1.0.0/>
- <https://www.mapbox.com/guides/>
- <https://www.mapbox.com/tilemill/docs/crashcourse/introduction/>



THANK YOU!

- Feedback appreciated!!
- My contact info:
Josh Pepper
jrpepper@gmail.com