MATH MODELING CAN MAKE YOU FILTHY RICH

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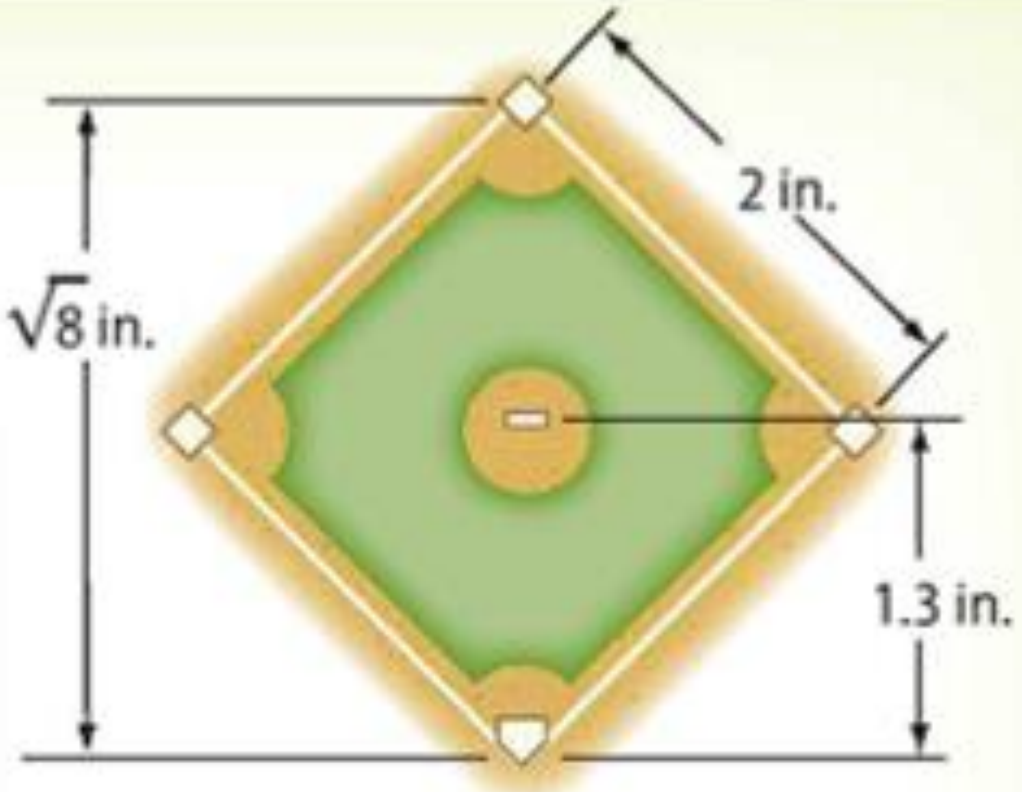
Real-World Link

Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



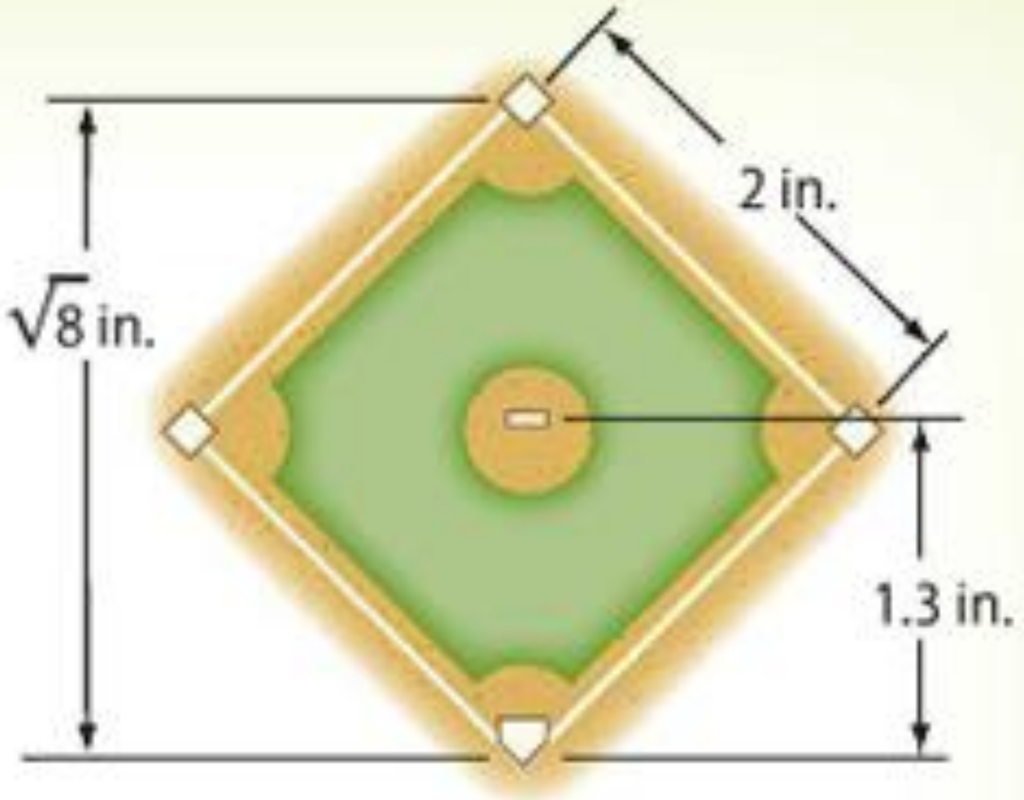
1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

Real-World Link

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

____

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

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3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

Common Core State Standards

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Mathematical Practices
1, 3, 4, 6


Doritos
NACHO CHEESE
Doritos
COOL RANCH
Cheetos
Puffs
Cheetos
Crunchy
Doritos® & Cheetos® Mix
20 Singles
DORITOS® Nacho Cheese Flavored Tortilla Chips 1 OZ. EA. DORITOS® COOL RANCH® Flavored Tortilla Chips1 OZ. EA. CHEETOS® Puffs Cheese Flavored Snacks 7/8 OZ. EA. CHEETOS® Crunchy Cheese Flavored Snacks 1 OZ. EA.
20 INDIVIDUAL BAGS: 7/8 OZ. EACH, 1 OZ. EACH, TOTAL NET WT. 19 5/8 OZ. (1 LB. 3 5/8 OZ.) 556.3 g
⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

THINKING TIME

- Why did many of you expect there to be five of each?
- Why was it not five of each?
- How might they decide on this combination?

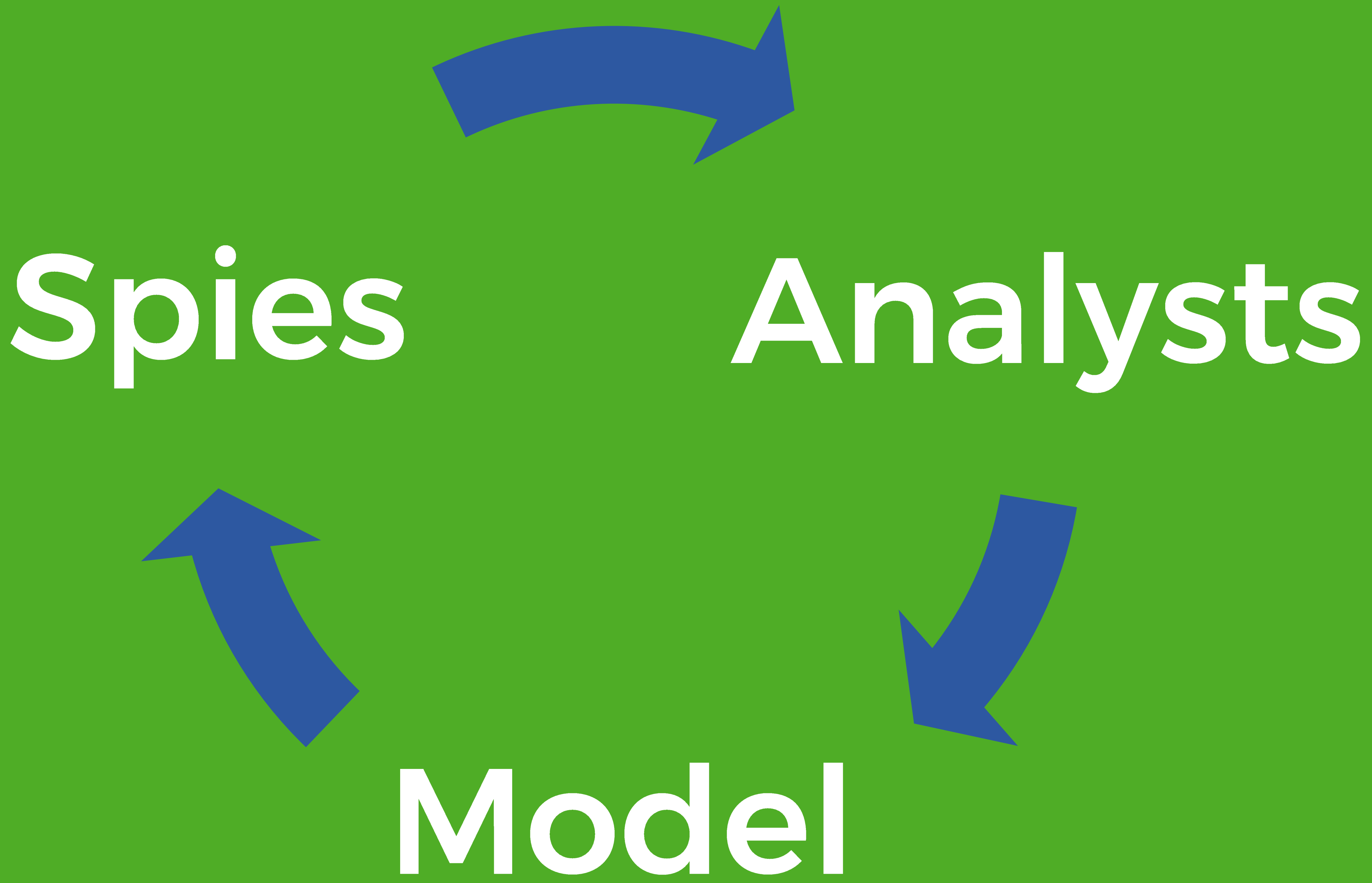
Lay's
Classic
Doritos
NACHO CHEESE
Doritos
COOL RANCH
Cheetos
Crunchy
Sun Chips
ORIGINAL
Fritos
BRAND
The ORIGINAL
CORN CHIPS
Classic Mix
20
Singles
LAY'S® Classic Potato Chips, DORITOS® Nacho Cheese Flavored Tortilla Chips, DORITOS® COOL RANCH® Flavored Tortilla Chips, CHEETOS® Crunchy Cheese Flavored Snacks, SUNCHIPS® Original Multigrain Snacks, FRITOS® Original Corn Chips (All 1 OZ. Each)
20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g
⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

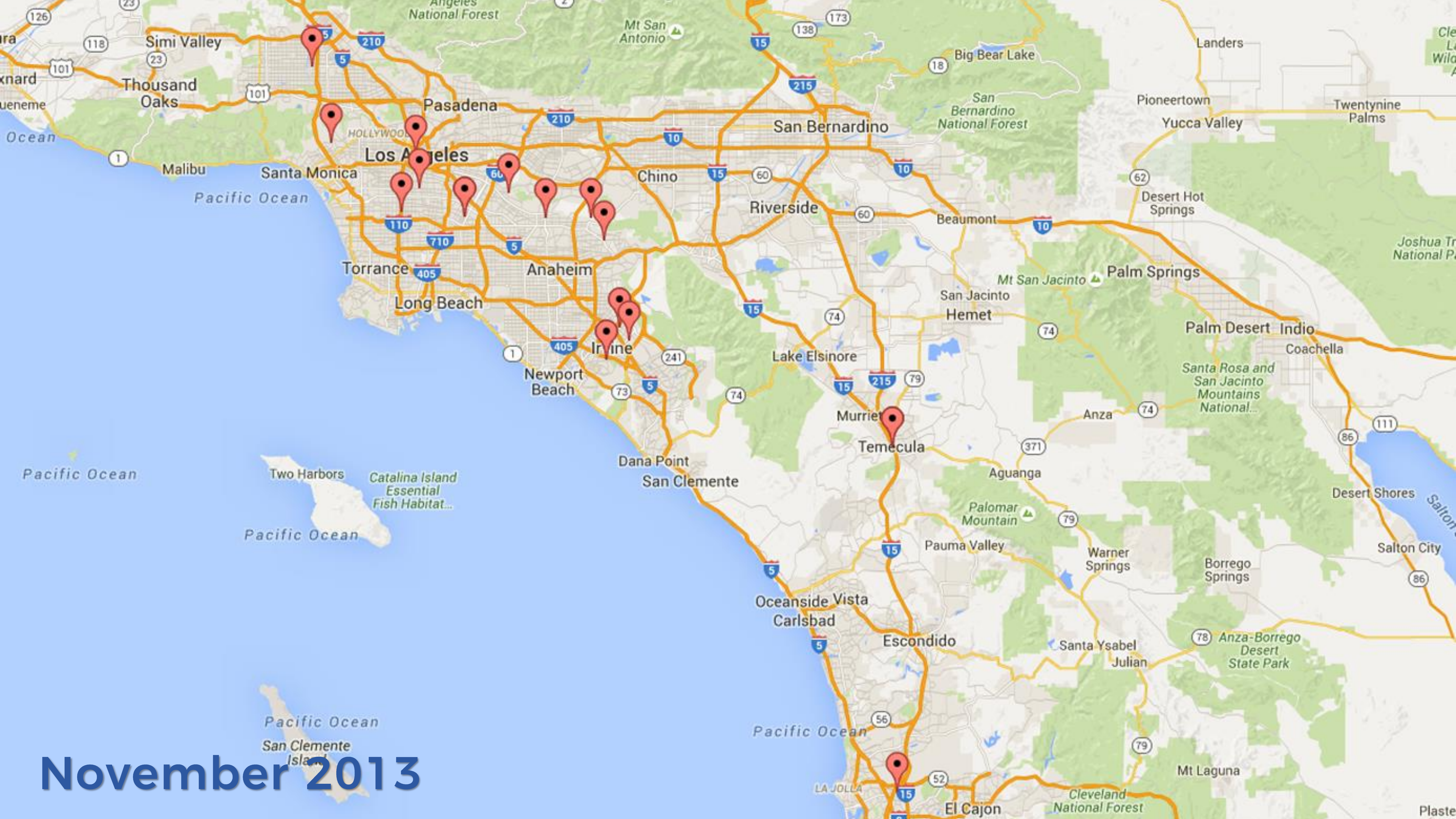
GOALS

- ❑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ❑ IS IT JUST ANSWERING QUESTIONS?
- ❑ HOW DO YOU PROFIT FROM MATH MODELING?
- ❑ HOW DO WE HELP OUR STUDENTS IMPROVE?
- ❑ WHERE CAN WE FIND MORE RESOURCES?

CENTRAL INTELLIGENCE AGENCY

UNITED STATES OF AMERICA


Spies
Analysts
Model



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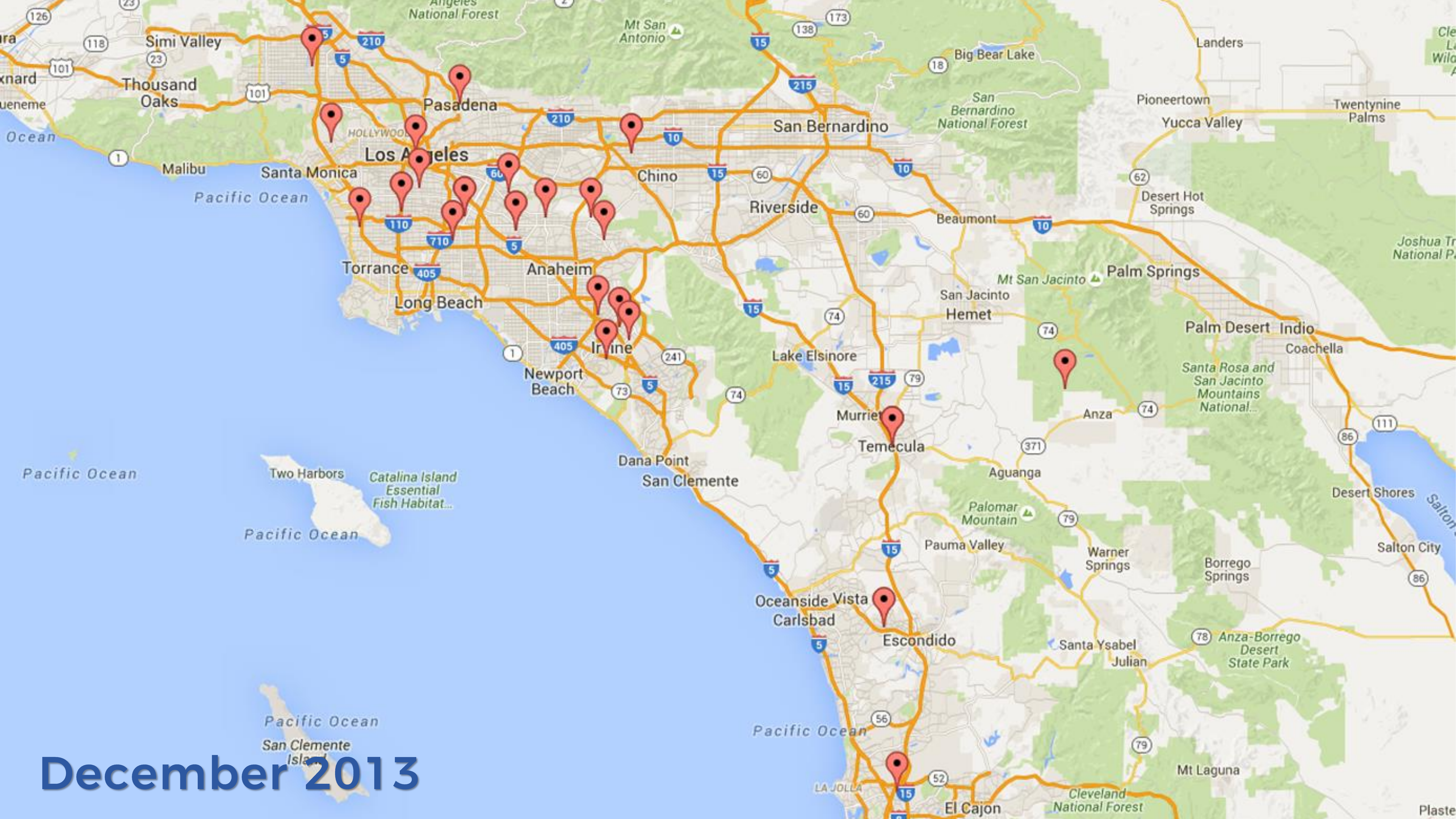

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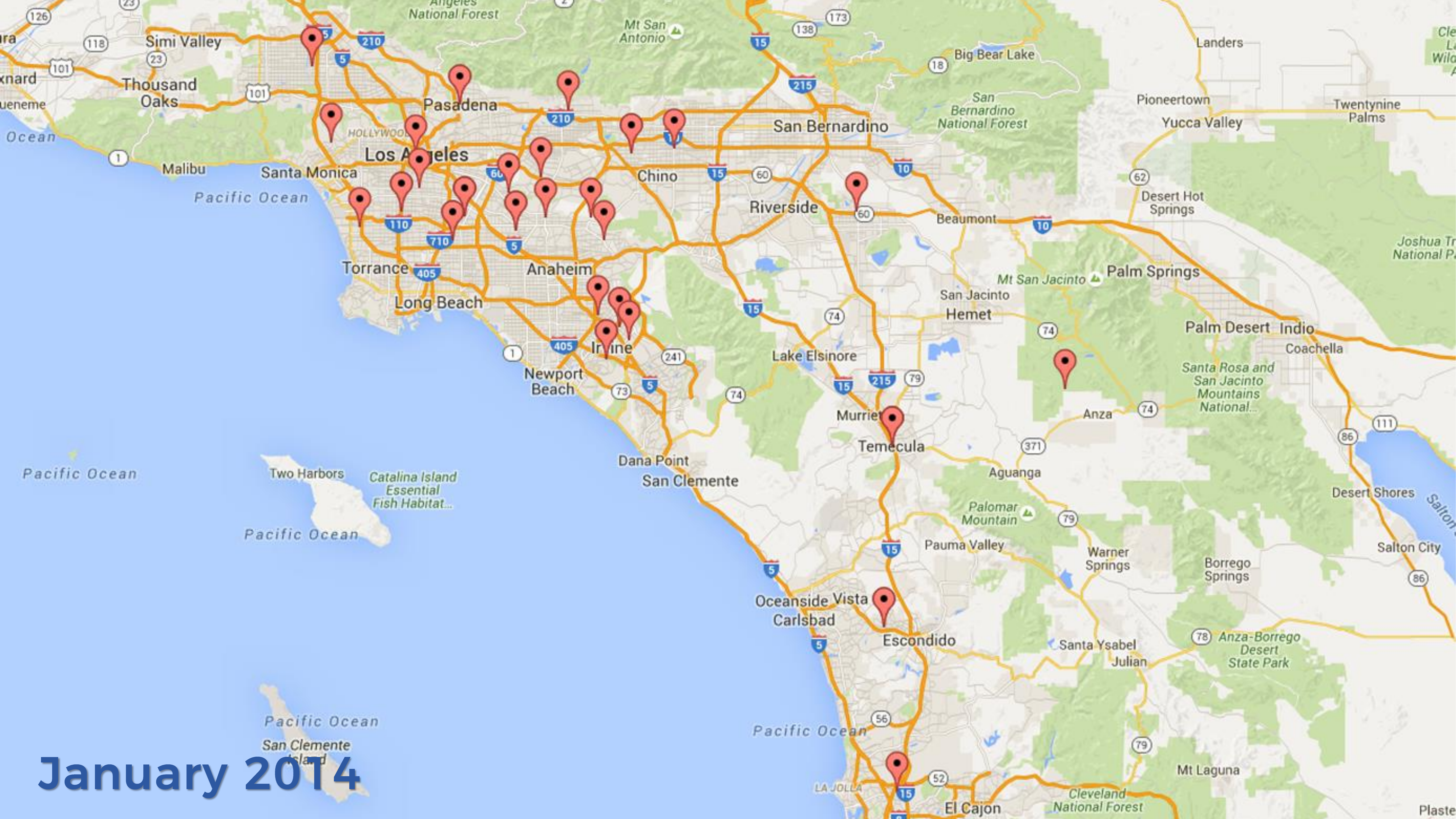

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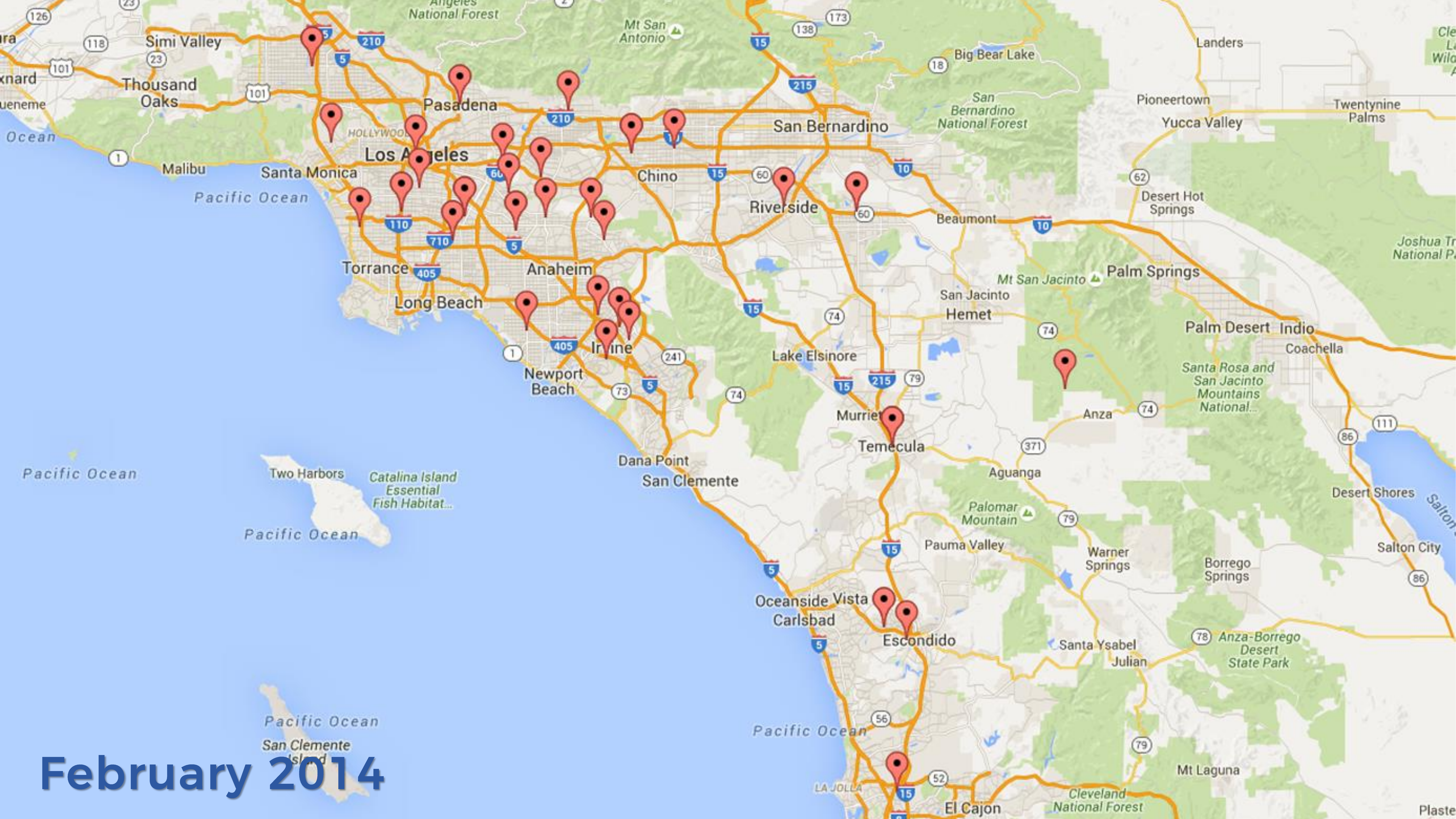

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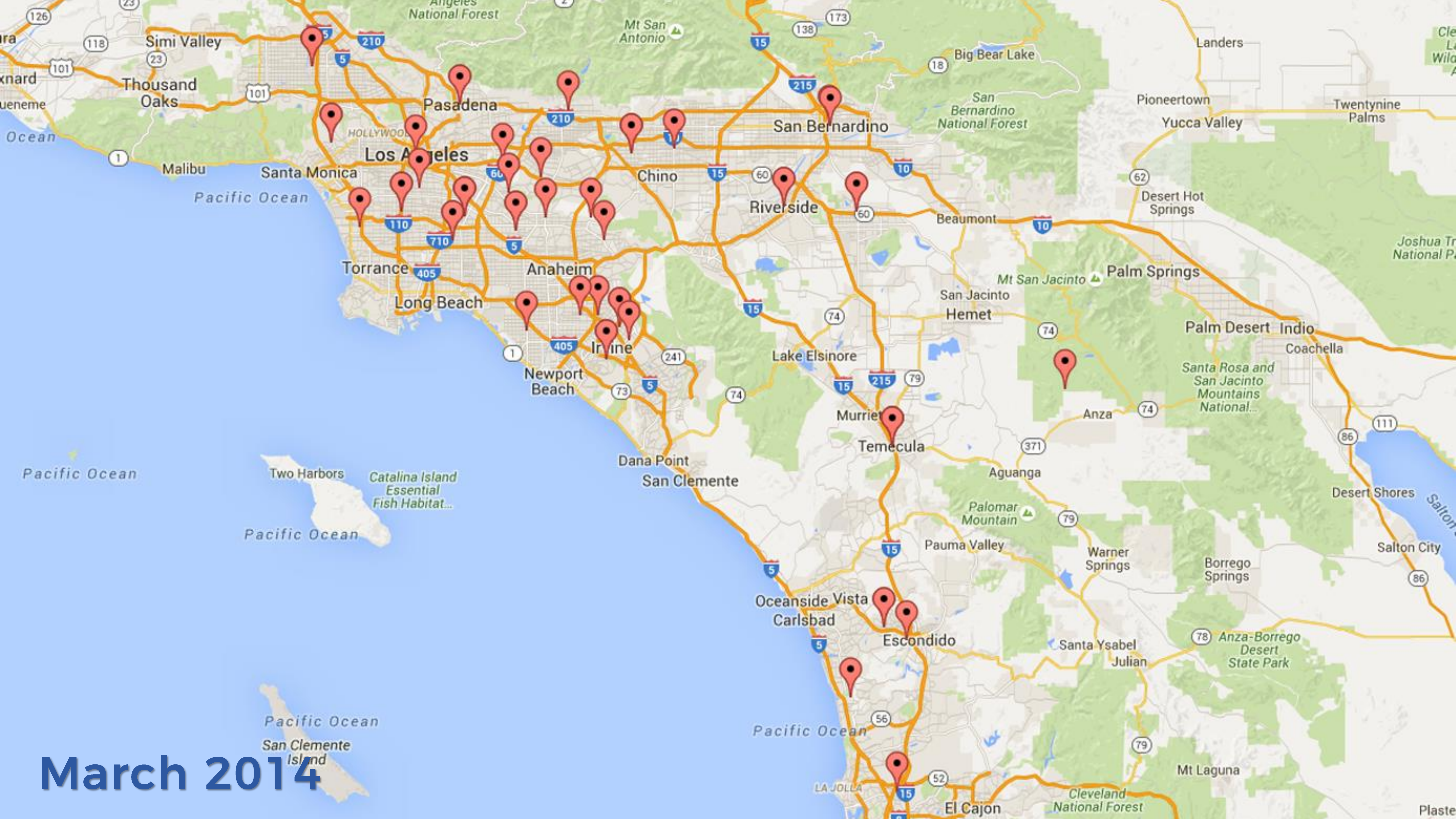
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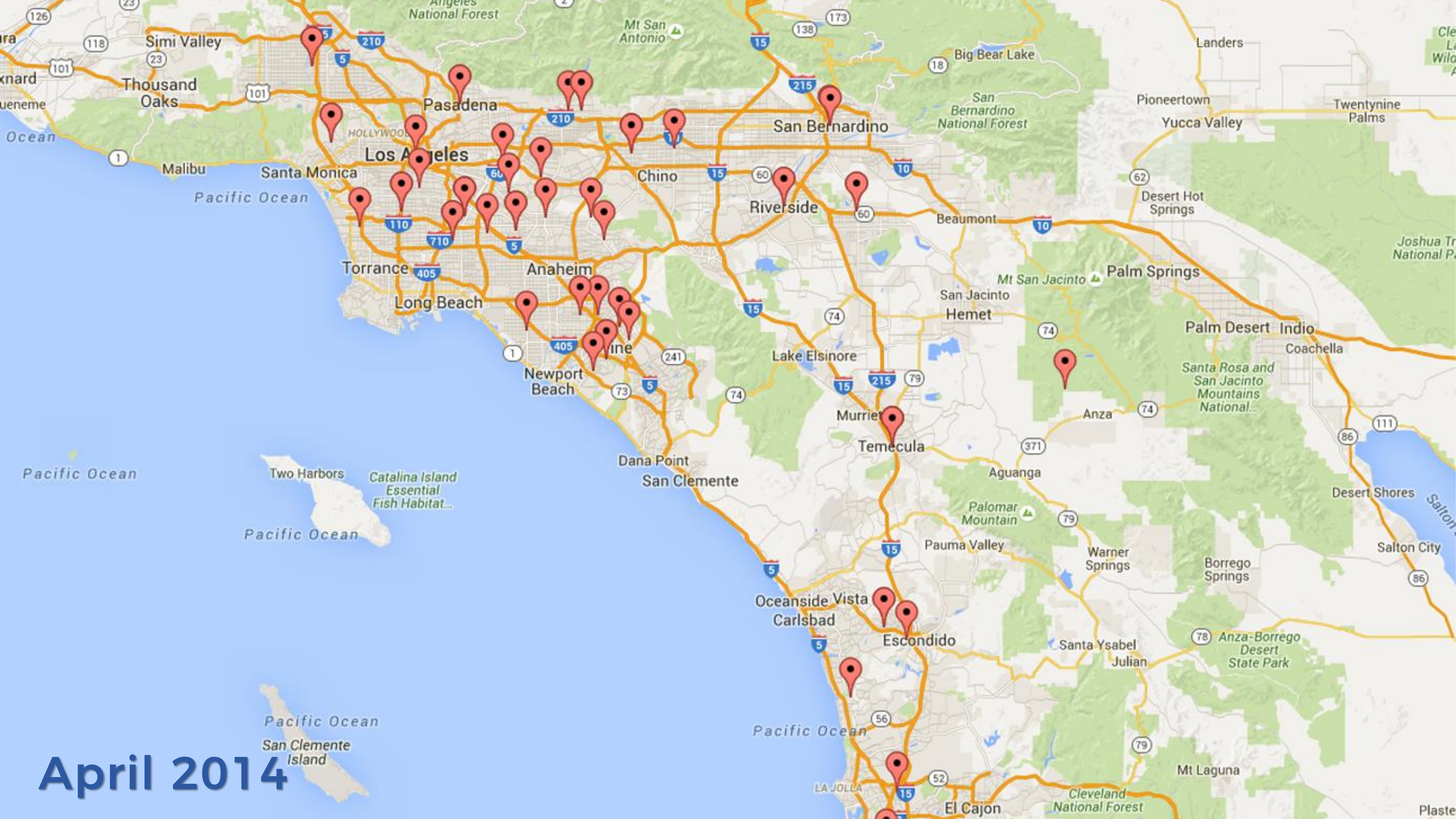
Oxnard
Malibu
Santa Monica
Pacific Ocean
Los Angeles
Hollywood
Pasadena
Mt San Antonio
Angeles National Forest
Big Bear Lake
San Bernardino
San Bernardino National Forest
Landers
Pioneertown
Yucca Valley
Twentynine Palms
Chino
Riverside
Beaumont
Desert Hot Springs
Joshua Tree National Park
Torrance
Long Beach
Anaheim
Irvine
Newport Beach
Palm Springs
Mt San Jacinto
San Jacinto
Hemet
Palm Desert
Indio
Coachella
Lake Elsinore
Murrieta
Temecula
Anza
Santa Rosa and San Jacinto Mountains National...
Aguanga
Dana Point
San Clemente
Two Harbors
Catalina Island Essential Fish Habitat...
Palomar Mountain
Pauma Valley
Warner Springs
Borrego Springs
Desert Shores
Salton City
Oceanside
Vista
Carlsbad
Escondido
Santa Ysabel
Julian
Anza-Borrego Desert State Park
San Clemente Island
La Jolla
El Cajon
Mt Laguna
Cleveland National Forest



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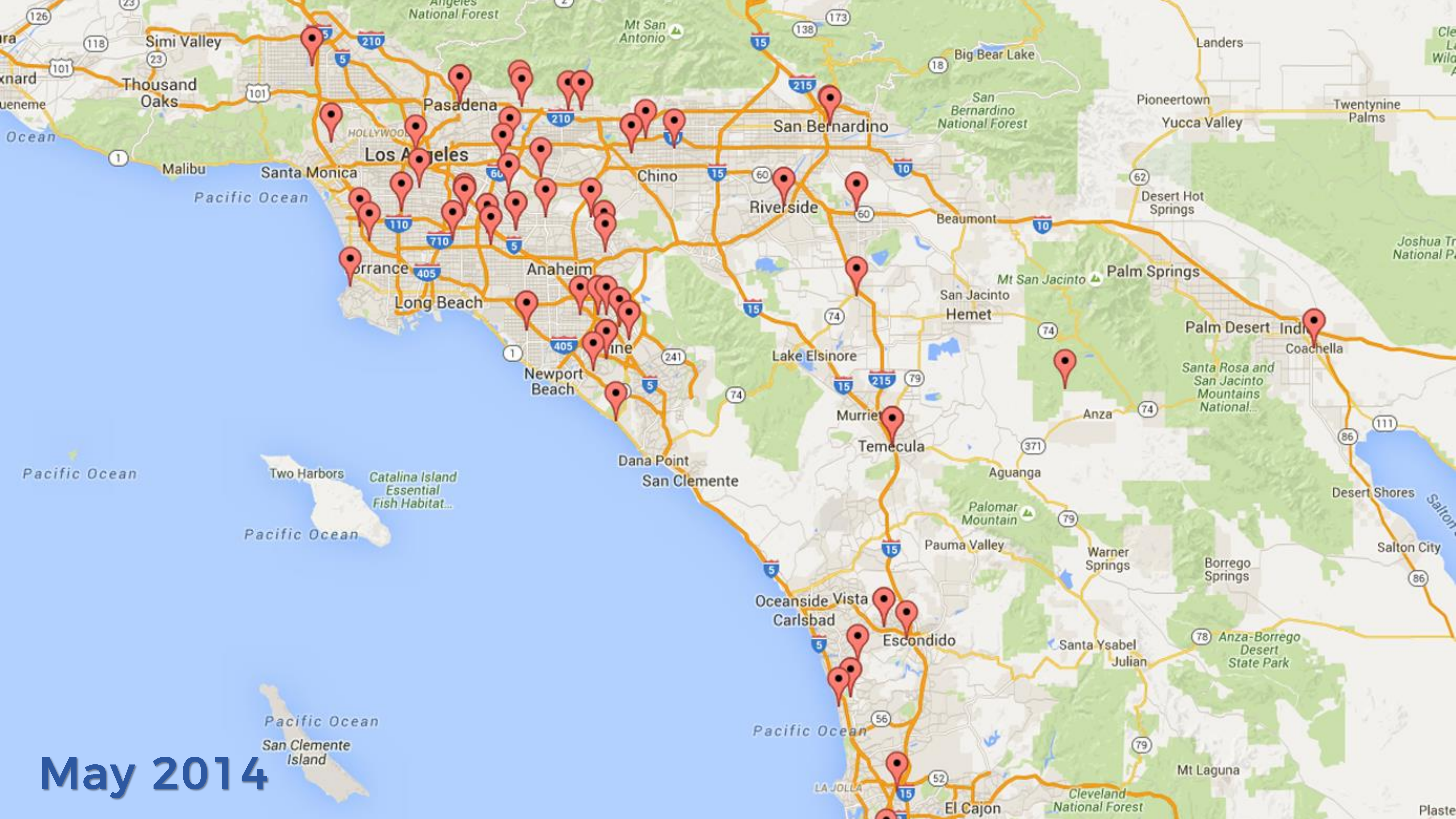
Julian
Anza-Borrego Desert State Park
San Clemente Island
LA JOLLA
El Cajon
Mt Laguna
Cleveland National Forest
HOLLYWOOD
Oxnard
Hueneme
Ocean

April 2014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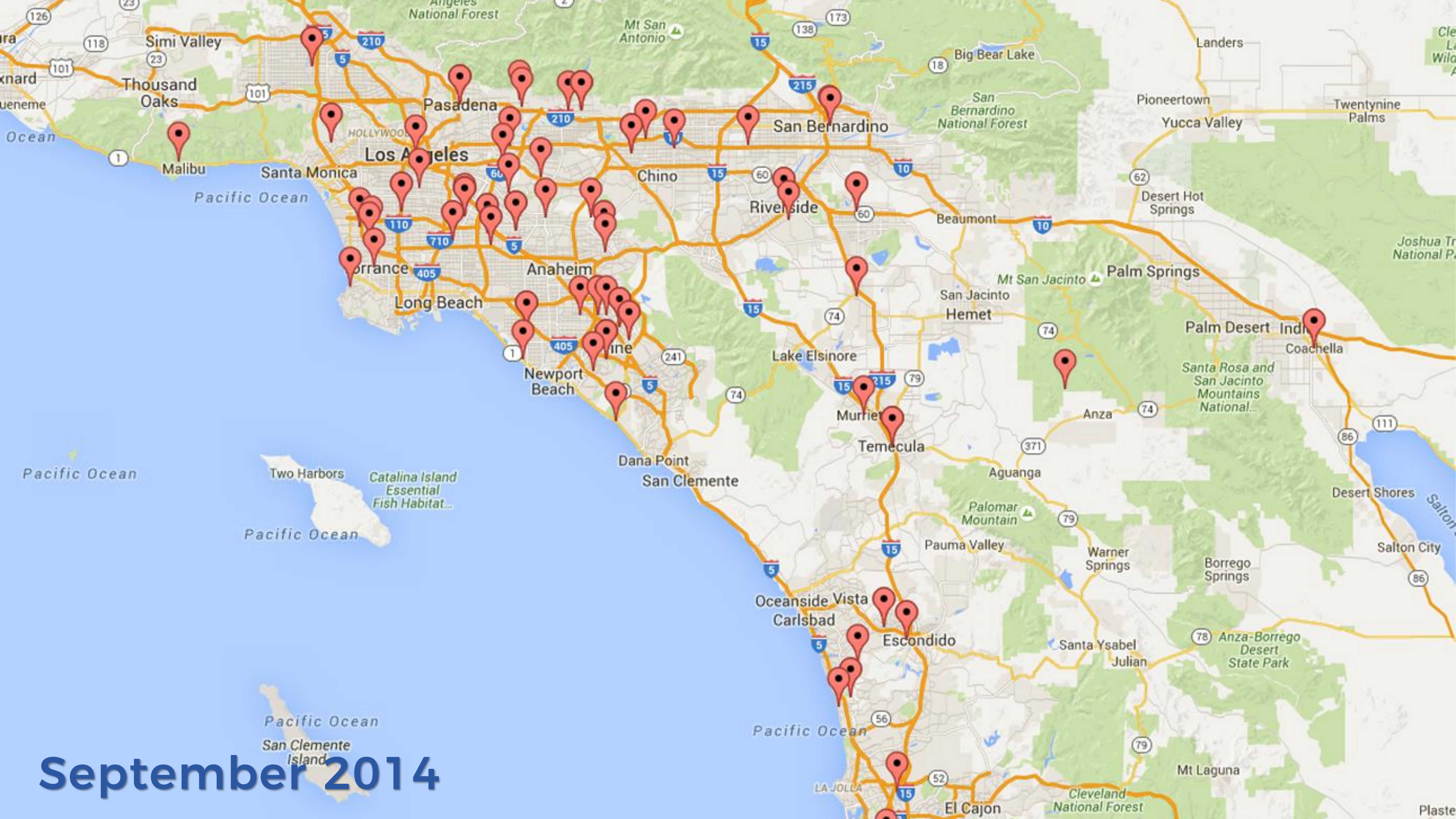
May 2014



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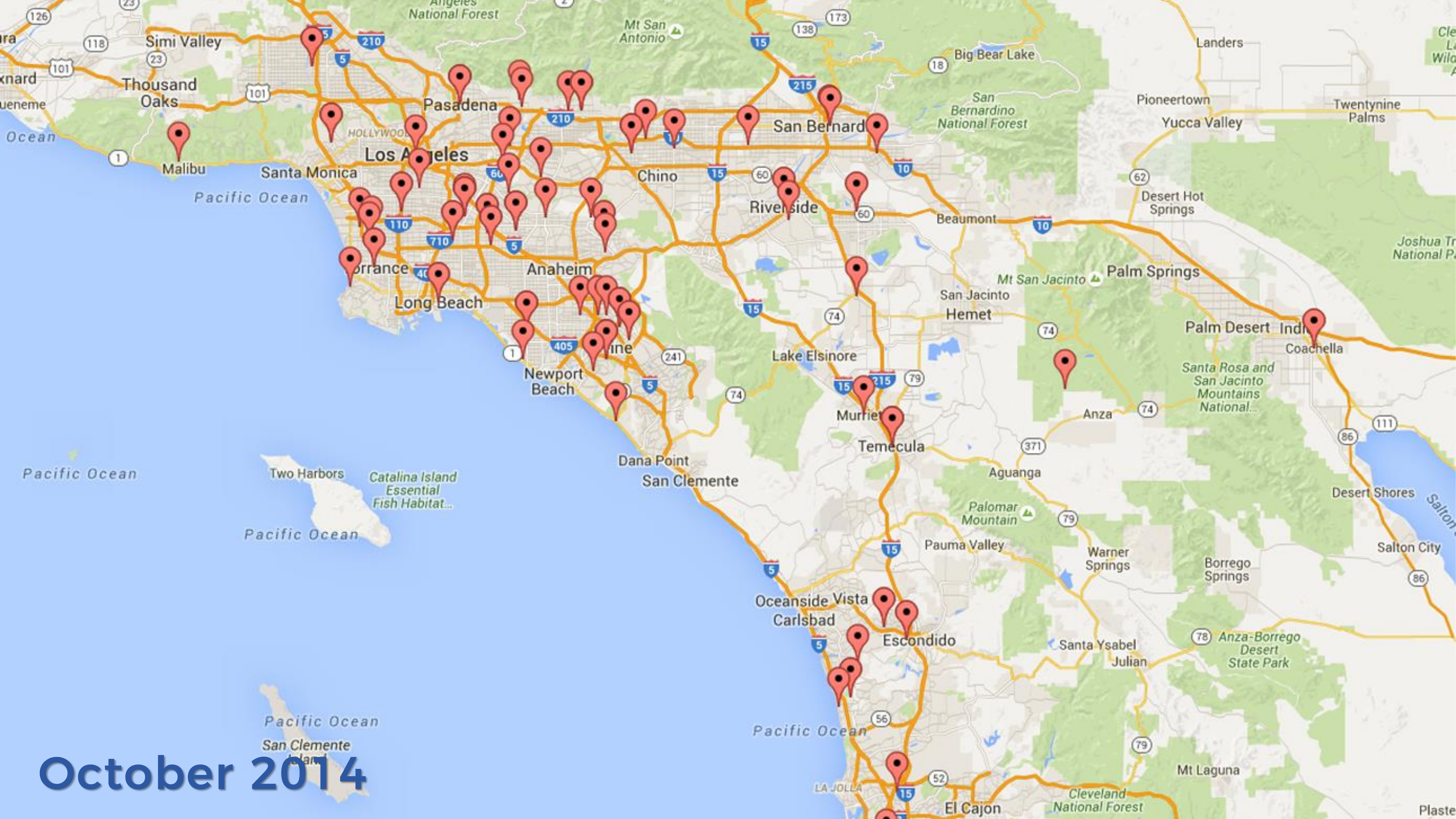

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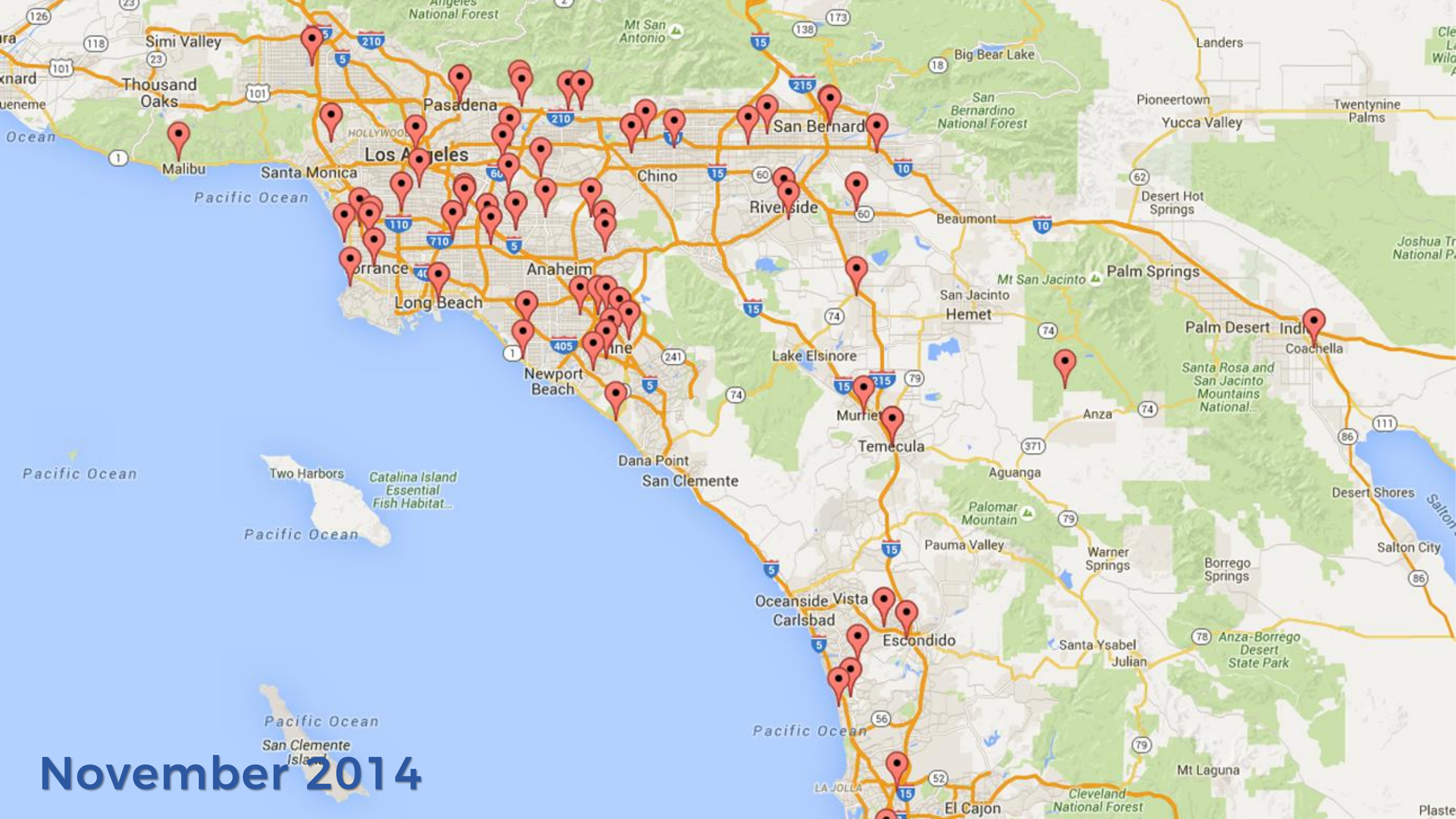

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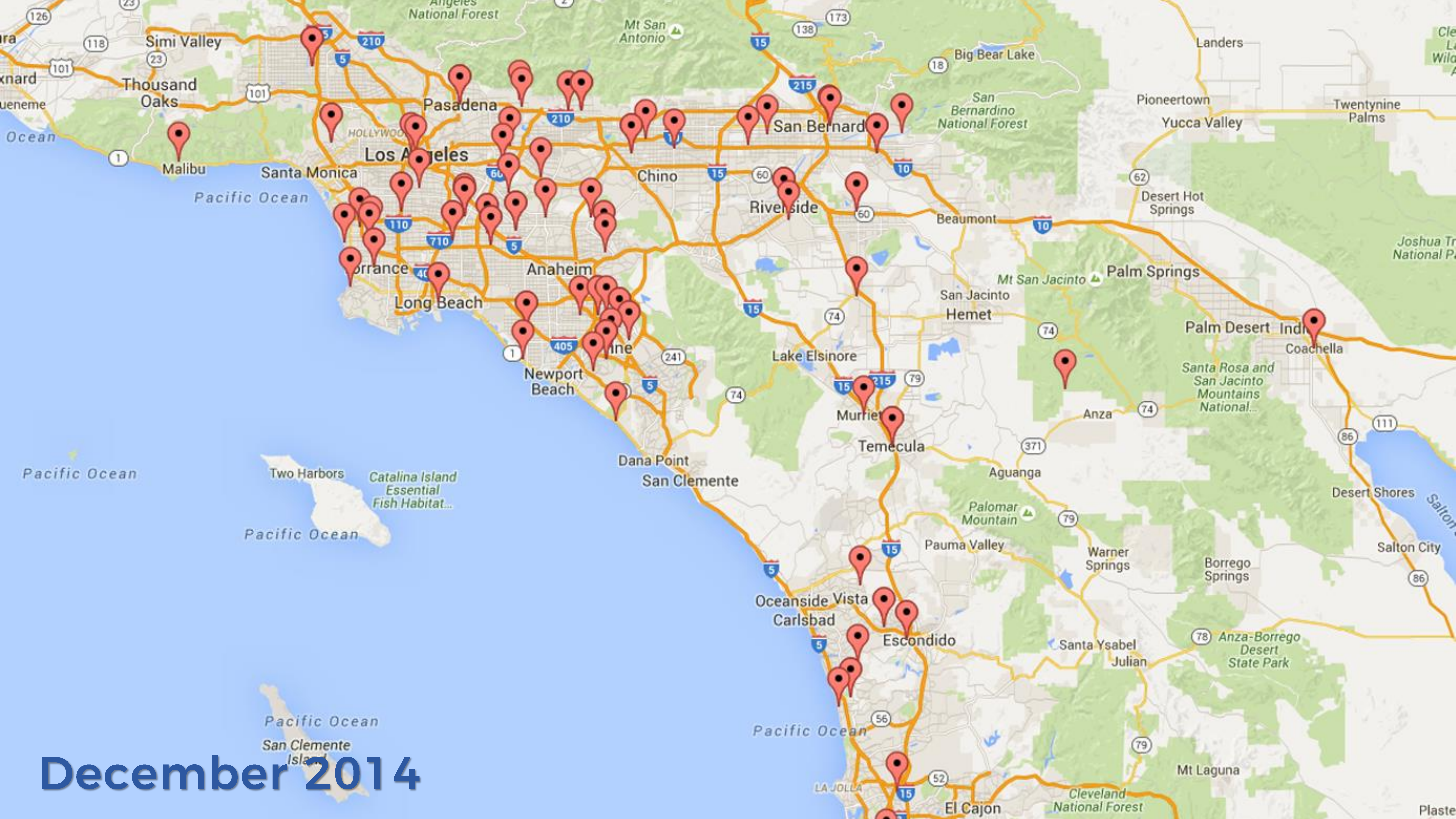

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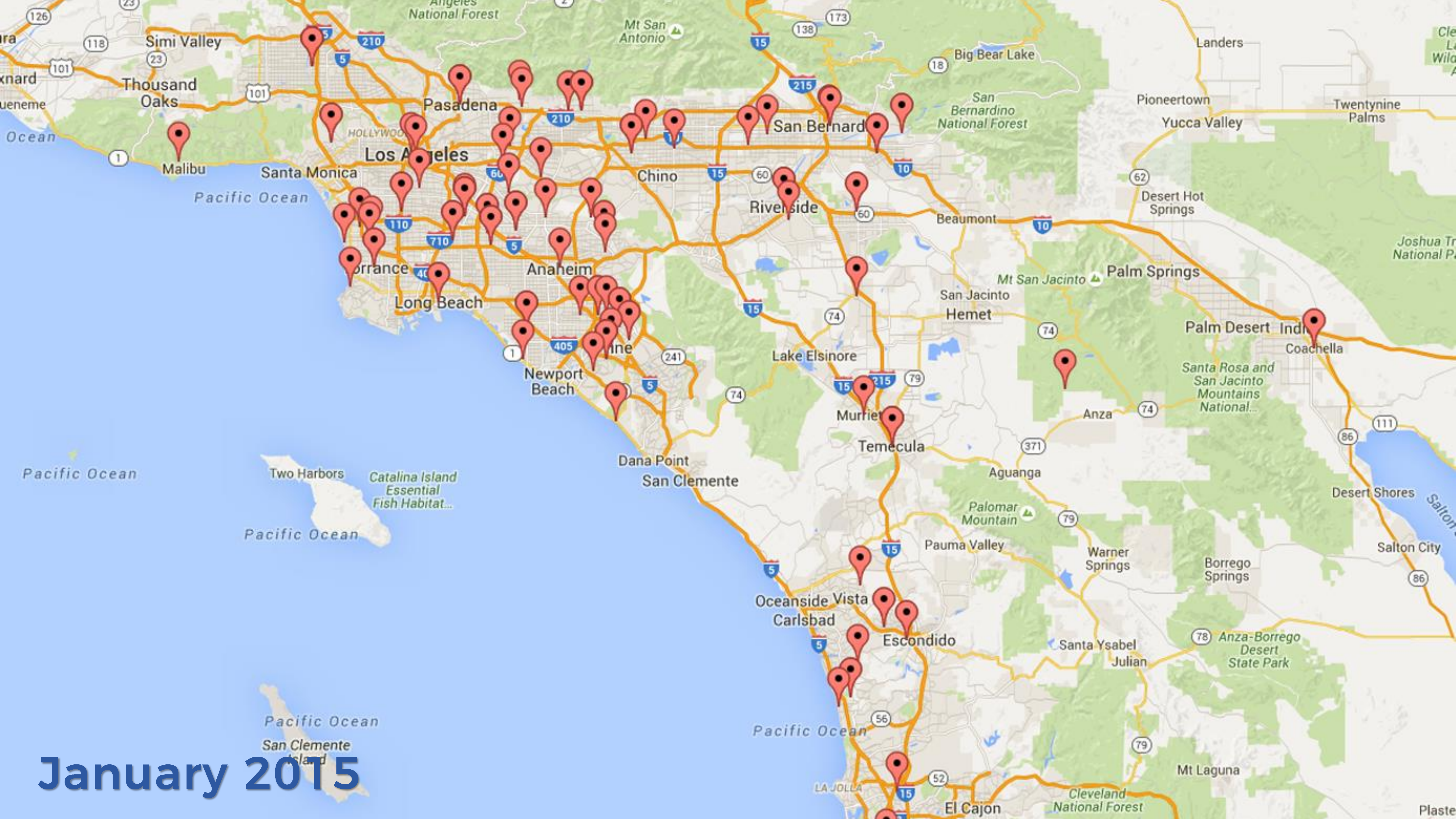

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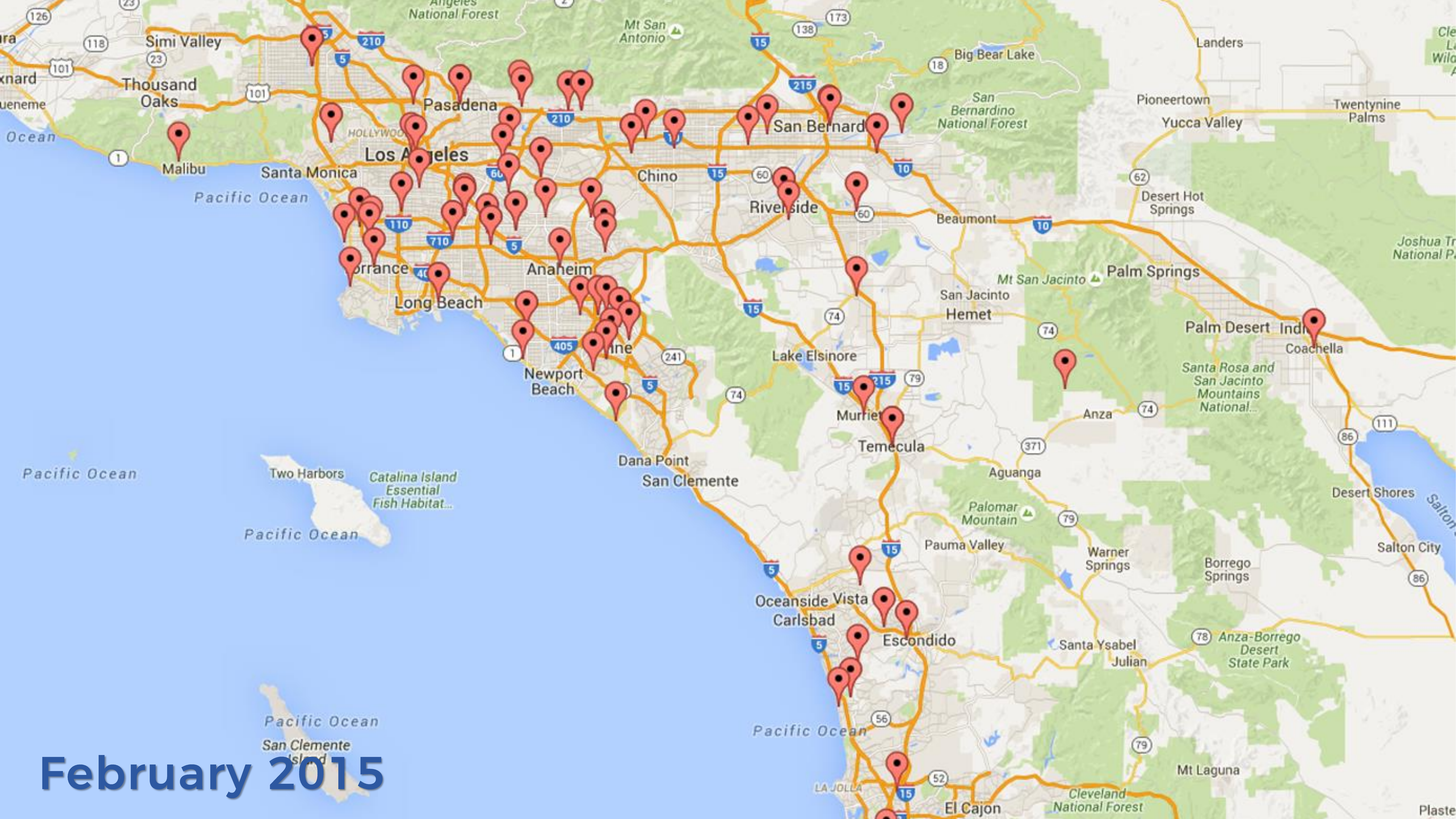
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Oxnard
Hueneme
Ocean
Malibu
Santa Monica
Pacific Ocean
Pasadena
Hollywood
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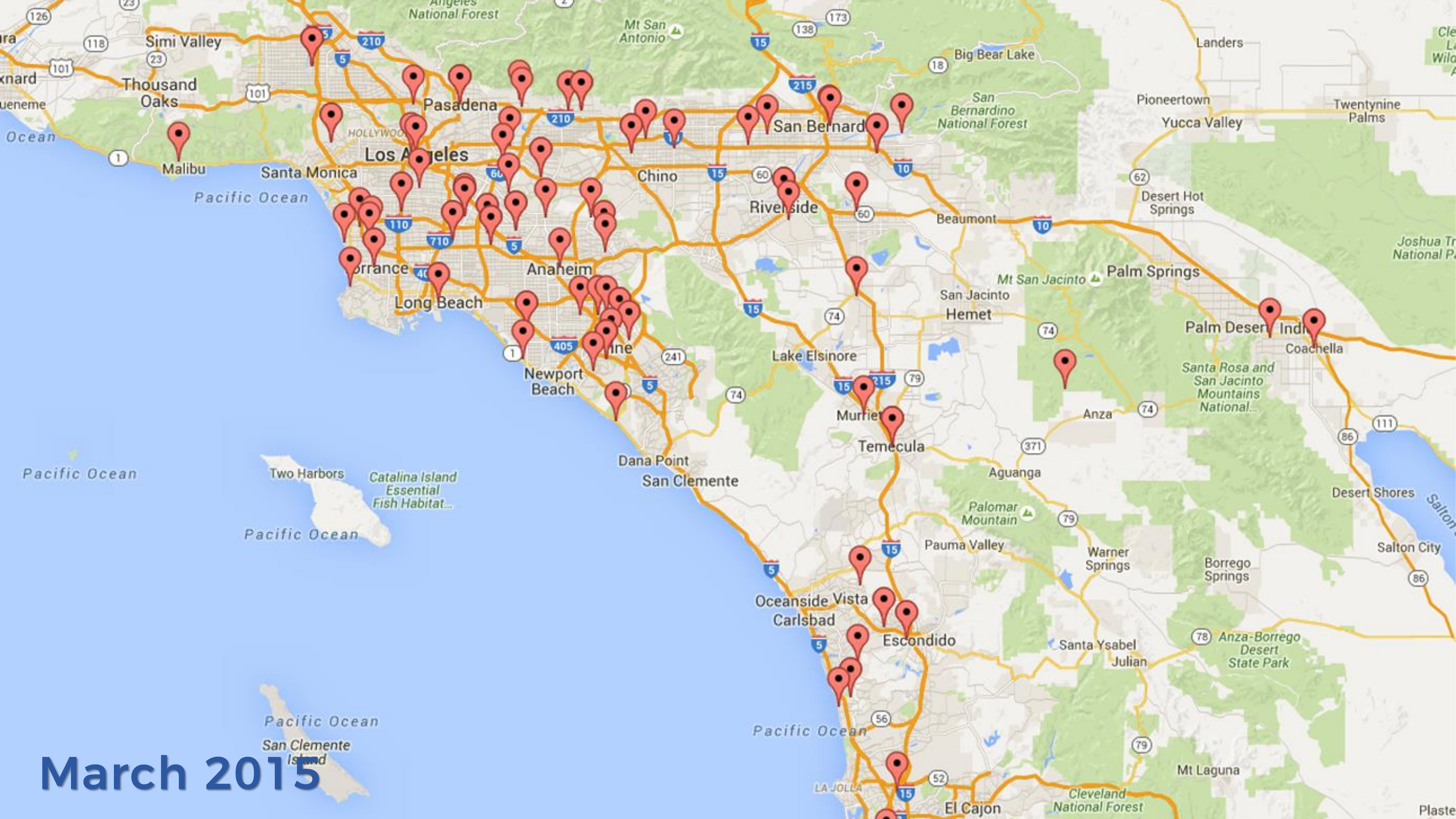
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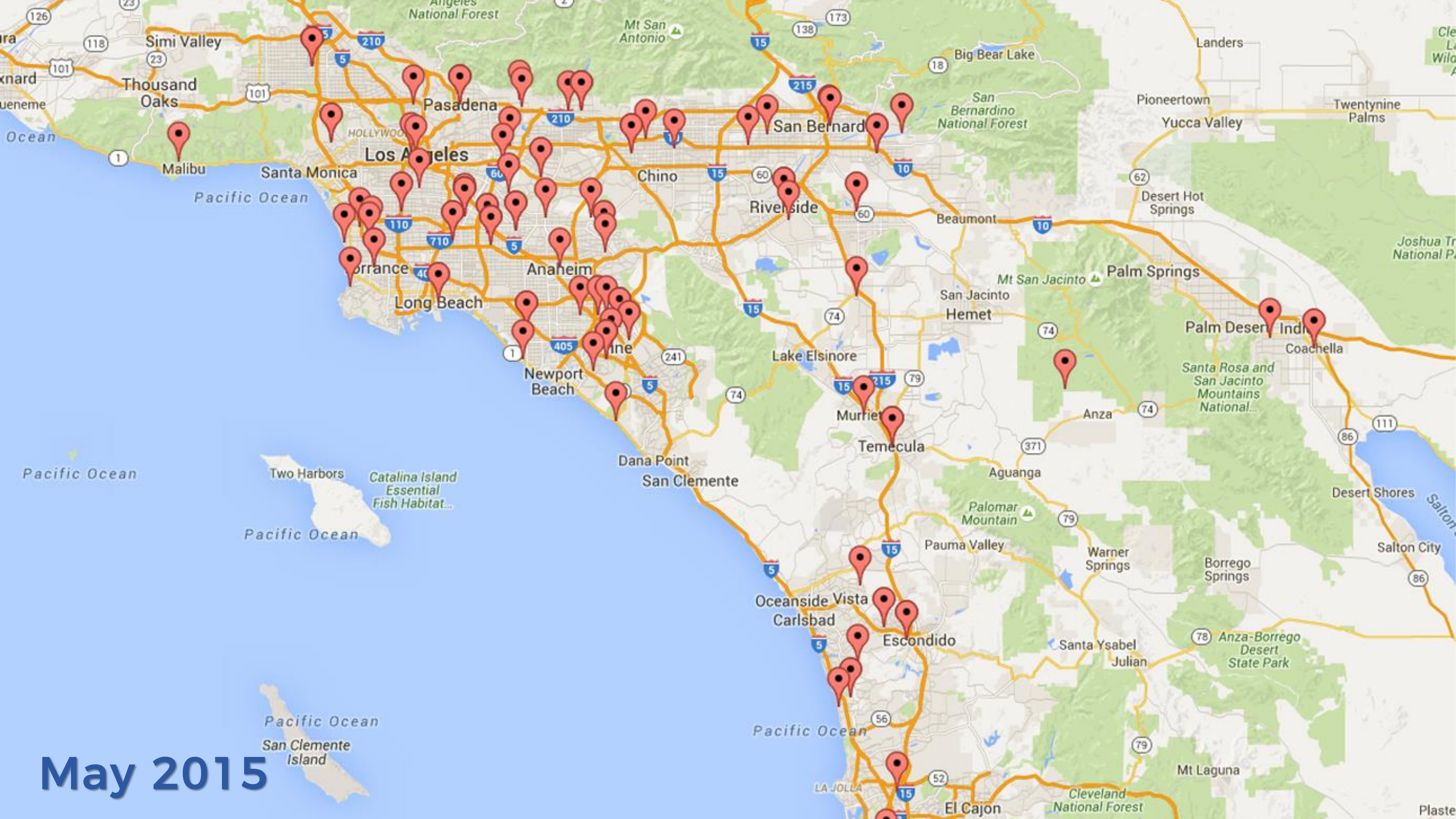
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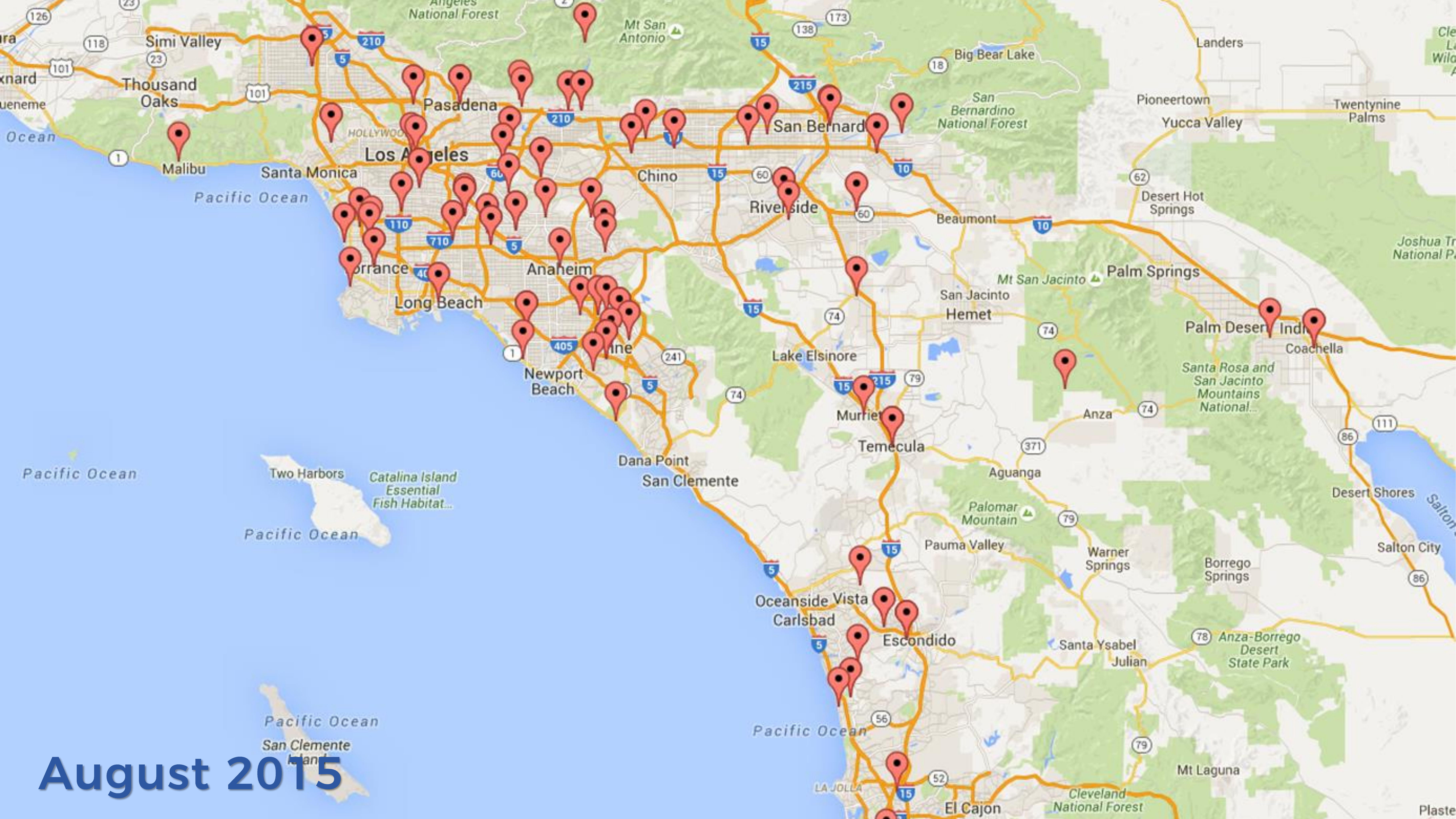
May 2015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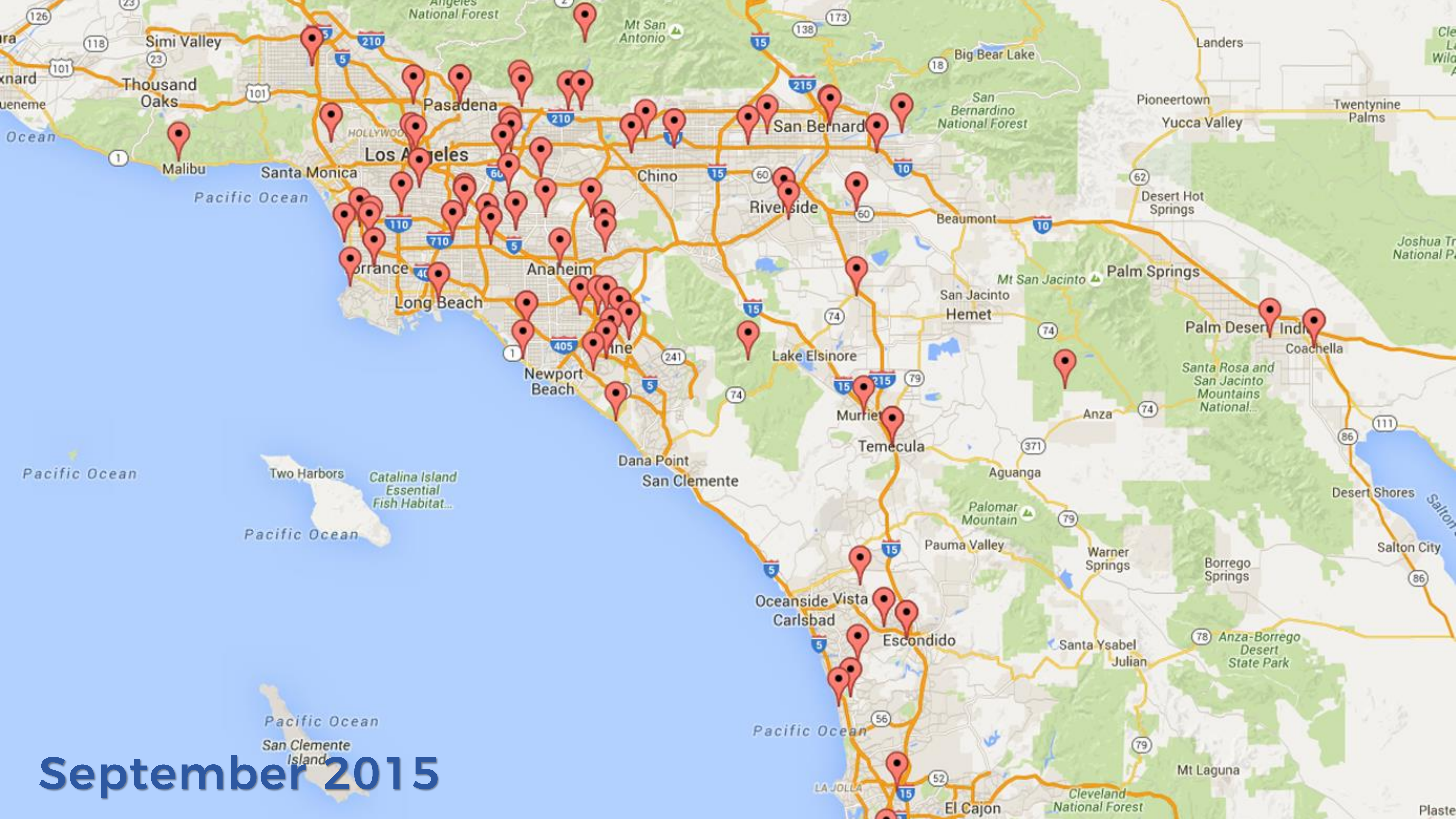

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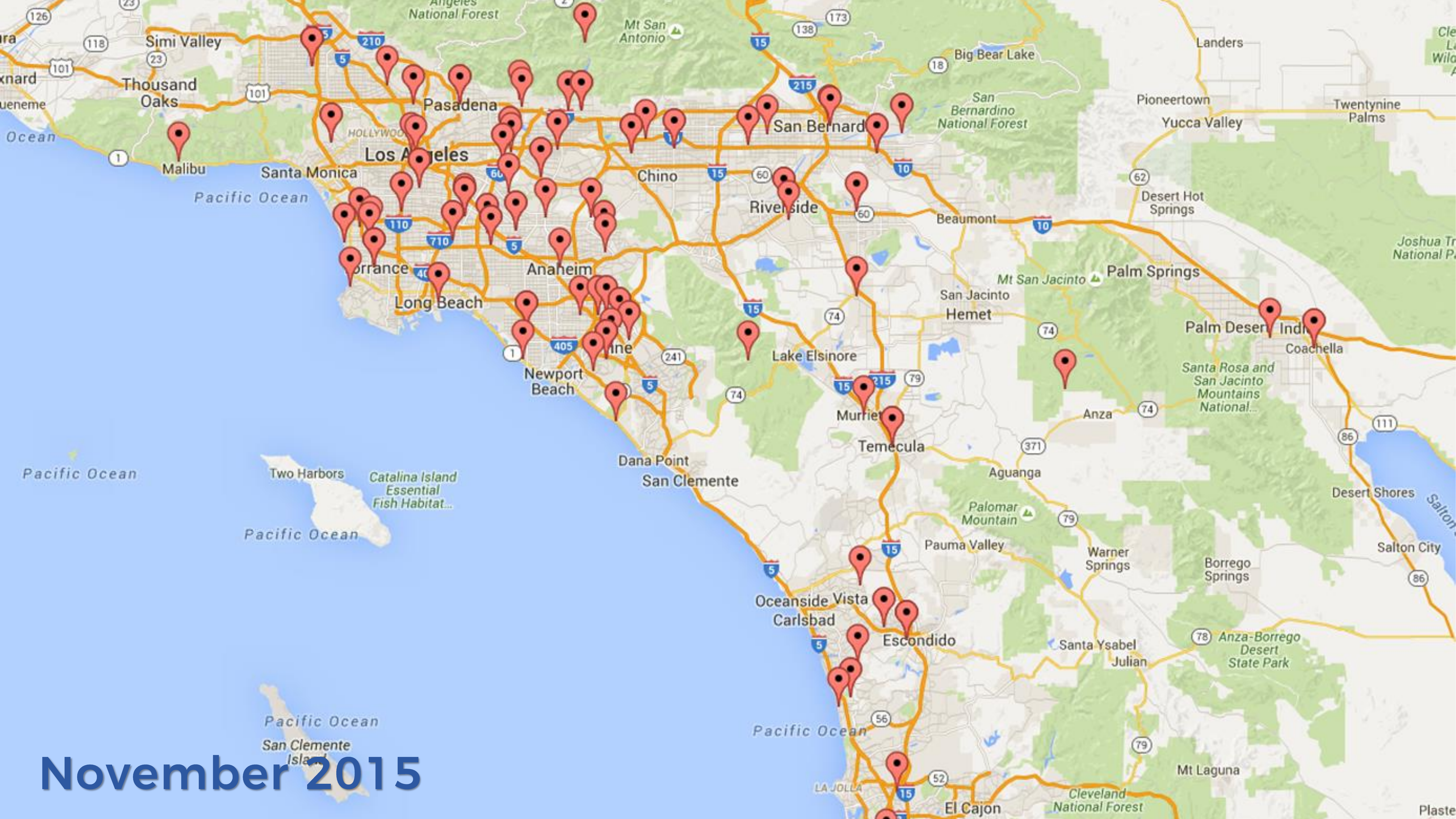

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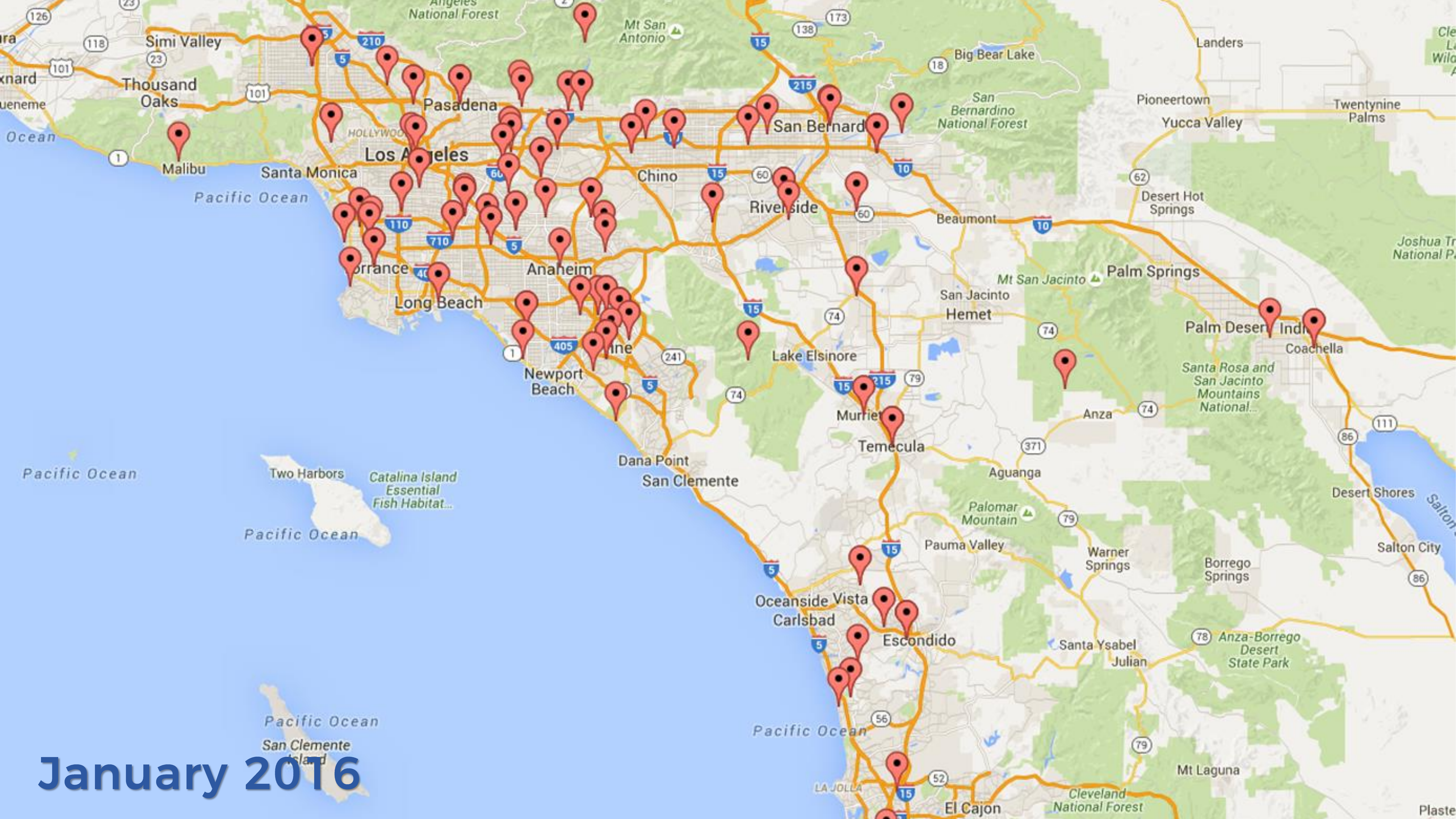

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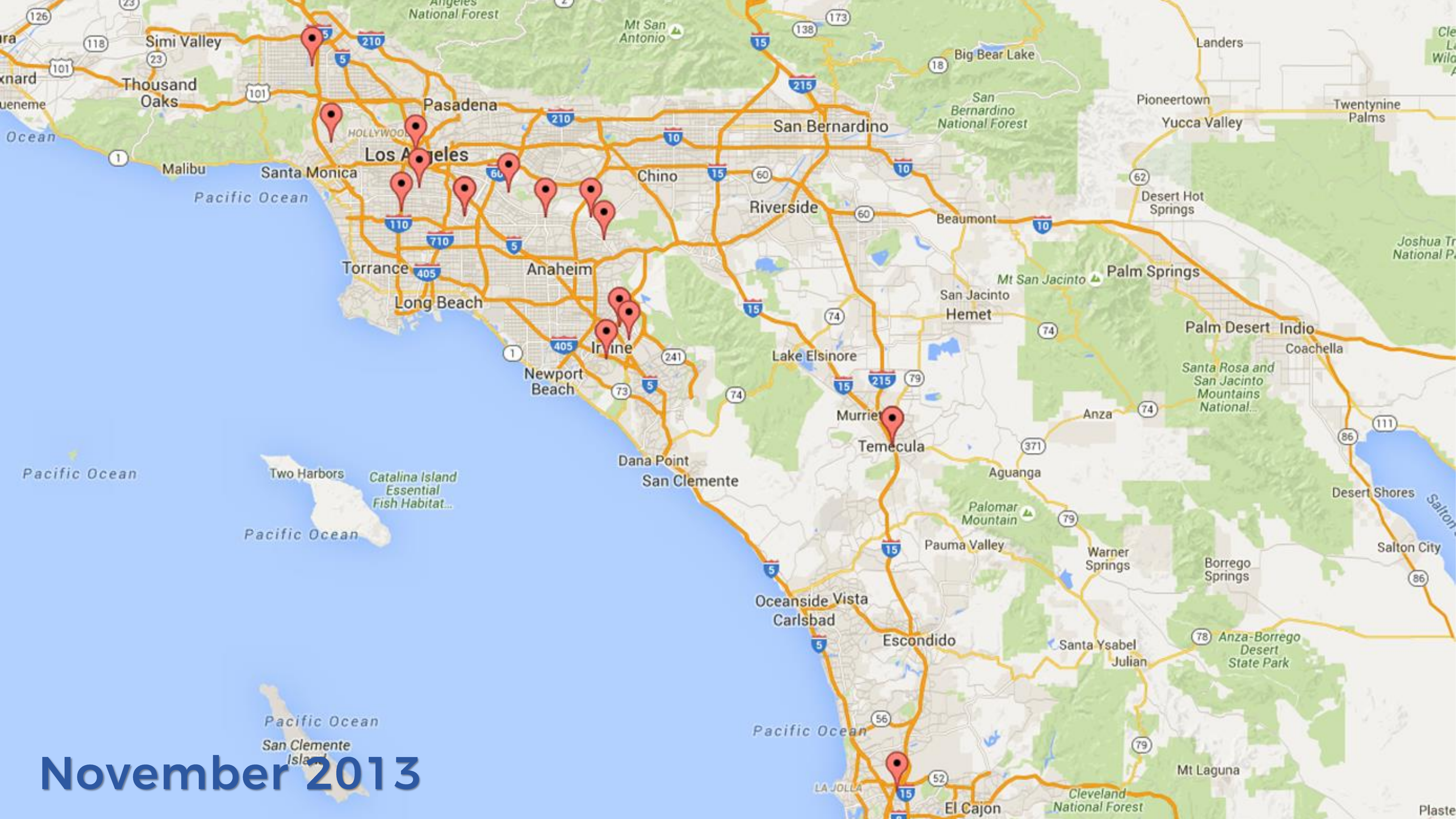

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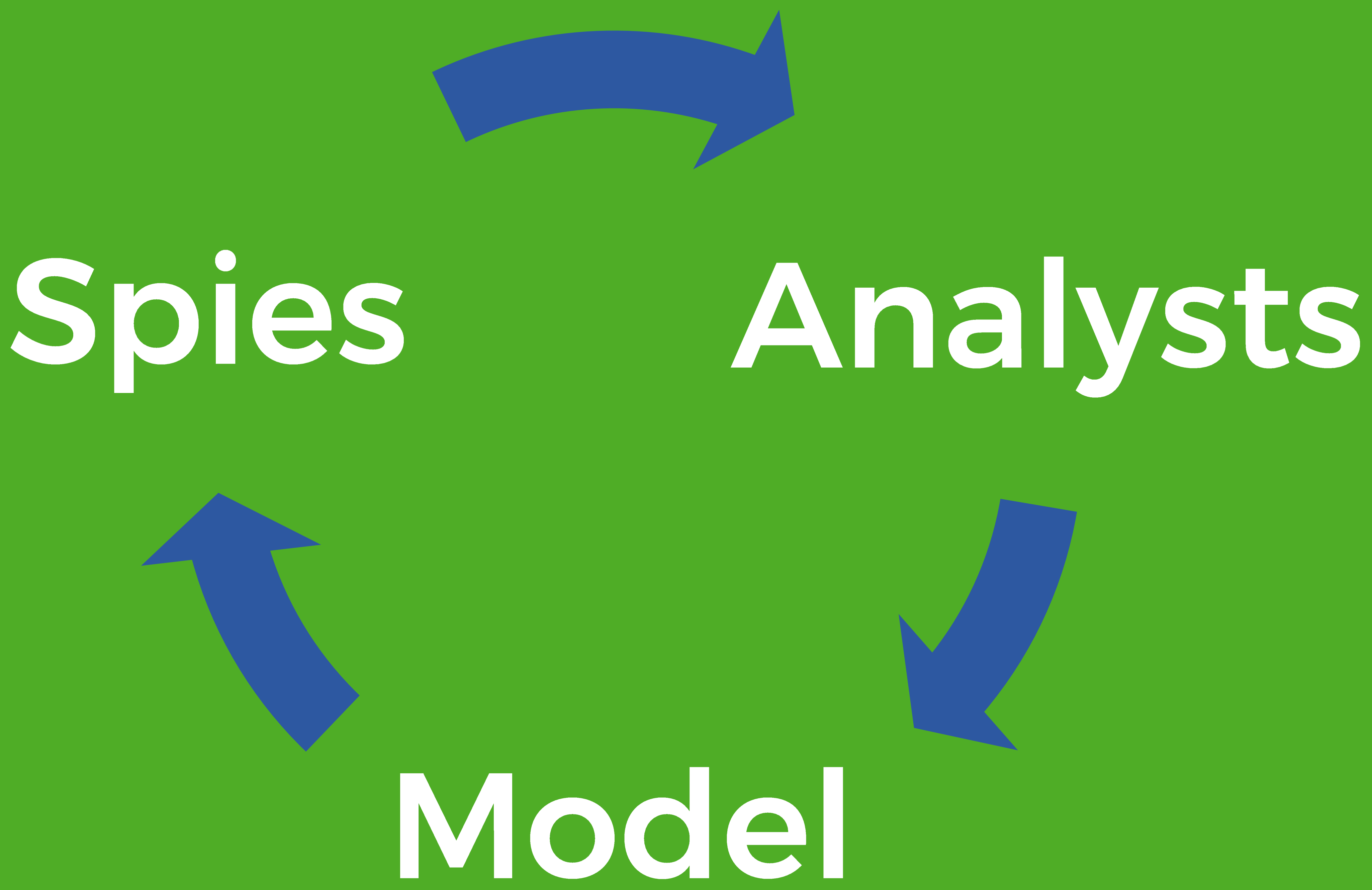
Spies
Analysts
Model

All models are wrong, but some are useful.

GEORGE E. P. BOX

Lay's
Classic
4
Doritos
NACHO CHEESE
4
Doritos
COOL RANCH
2
Cheetos
Crunchy
4
Sun Chips
ORIGINAL
2
Fritos
BRAND
The ORIGINAL
CORN CHIPS
4
Classic Mix
20
Singles
LAY'S® Classic Potato Chips, DORITOS® Nacho Cheese Flavored Tortilla Chips, DORITOS® COOL RANCH® Flavored Tortilla Chips, CHEETOS® Crunchy Cheese Flavored Snacks, SUNCHIPS® Original Multigrain Snacks, FRITOS® Original Corn Chips (All 1 OZ. Each)
20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g
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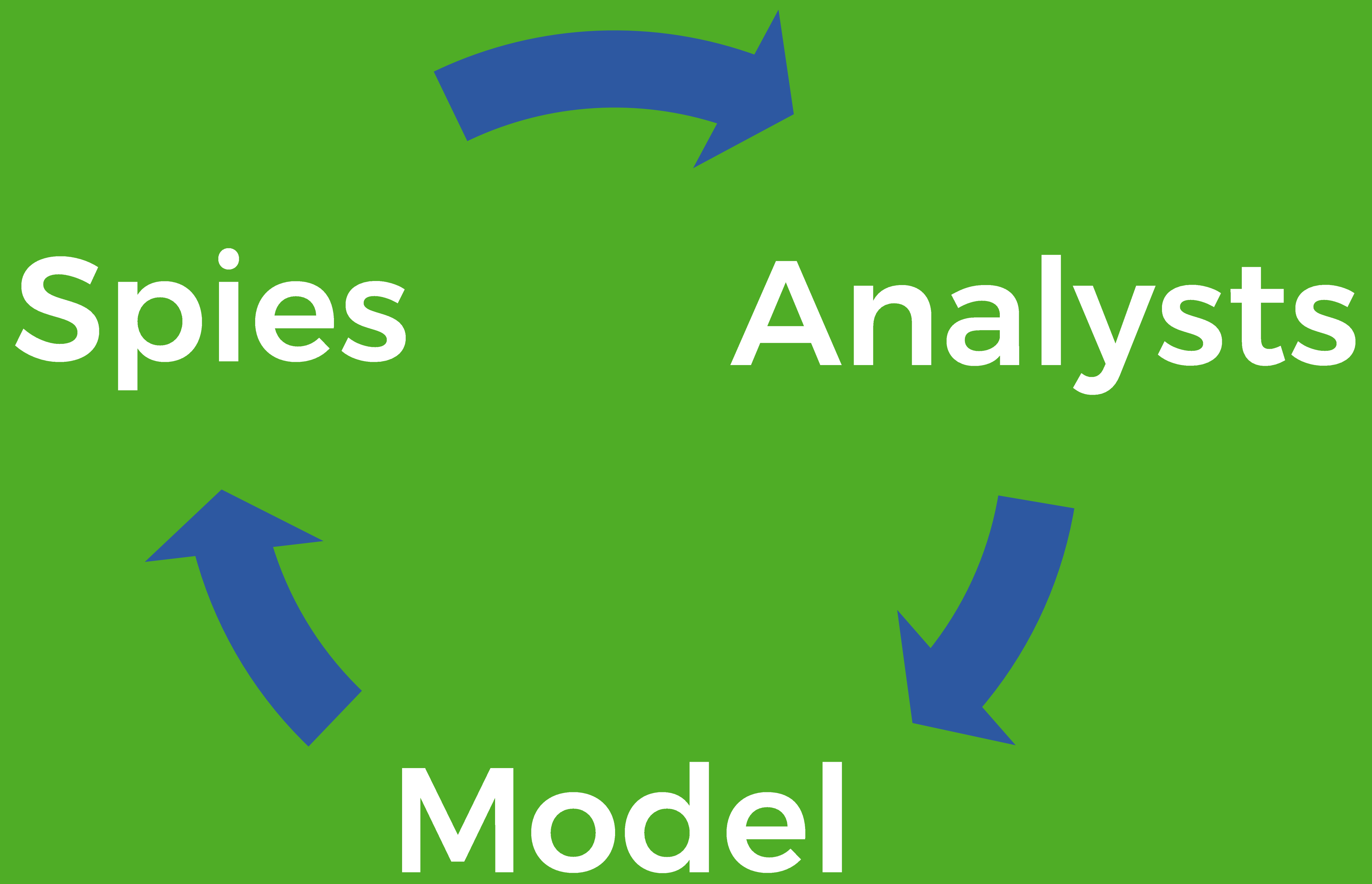
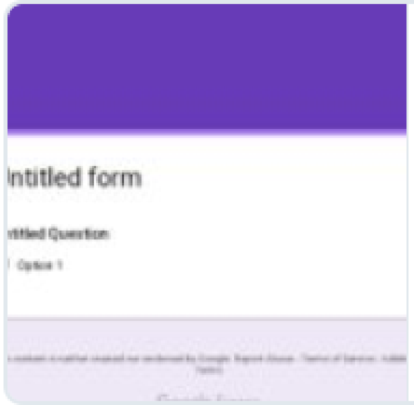

Spies
Analysts
Model

THINKING TIME

Robert Kaplinsky
@robertkaplinsky

Hey #MTBoS, can you do me a favor and complete this 3 question anonymous survey about your favorite chips? I need data for a presentation. Please RT.
goo.gl/forms/etPtujlI… #iteachmath



Favorite Chips
Please complete this anonymous survey. I'll be using this data in a presentation.
docs.google.com

8:05 PM - 4 Feb 2018

63 Retweets **45** Likes

18 63 45

Favorite Chips (Responses)

File Edit View Insert Format Data Tools Form Add-ons Help

Comments Share

100% $ % .0 .00 123 Arial 10 B I S A

fx Timestamp

	A	B	C	D	E	F	G	H
1	Timestamp	Lays (Classic)	Doritos (Nacho Cheese)	Doritos (Cool Ranch)	Cheetos (Crunchy)	Sun Chips (Original)	Fritos (Original)	Time Zone
2	2/4/2018 20:06:53	6	5	4	2	3	1	Central Time Zone
3	2/4/2018 20:06:55	1	5	6	3	2	4	Eastern Time Zone
4	2/4/2018 20:06:56	5	2	1	3	6	4	Central Time Zone
5	2/4/2018 20:06:57	2	1	6	3	5	4	Pacific Time Zone
6	2/4/2018 20:07:36	4	1	2	3	5	6	Pacific Time Zone
7	2/4/2018 20:08:02	5	1	6	4	2	3	Pacific Time Zone
8	2/4/2018 20:08:05	6	2	4	3	5	1	Pacific Time Zone
9	2/4/2018 20:08:07	4	2	1	5	3	6	Pacific Time Zone
10	2/4/2018 20:08:29	5	3	4	1	6	2	Central Time Zone
11	2/4/2018 20:08:56	4	5	6	1	2	3	Central Time Zone
12	2/4/2018 20:09:54	5	6	5	6	5	4	Pacific Time Zone
13	2/4/2018 20:10:01	4	2	3	1	5	6	Pacific Time Zone
14	2/4/2018 20:10:04	6	2	3	1	5	4	Central Time Zone
15	2/4/2018 20:10:04	3	5	6	1	4	2	Central Time Zone
16	2/4/2018 20:10:05	4	2	6	1	3	5	Eastern Time Zone
17	2/4/2018 20:10:06	3	2	6	5	1	2	Pacific Time Zone
18	2/4/2018 20:10:10	4	2	6	3	5	1	Mountain Time Zone
19	2/4/2018 20:10:12	3	1	5	6	2	4	Eastern Time Zone
20	2/4/2018 20:10:26	5	3	6	2	4	1	Pacific Time Zone

Sheet3

Explore

THINKING TIME

- The available data includes:
  - Lays, Nacho Cheese Doritos, Cool Ranch Doritos, Cheetos, Sun Chips, and Fritos ranked from 1 to 6
  - Geographic region: West, Central, or Eastern

ANALYSTS' JOB FOR THE TOP 1

1. Count all the first place votes for each chip type.
2. Divide the total first place votes for each chip type by the total number of votes.
3. Multiply that fraction by 20 to find how many bags there would be in a twenty pack, rounding as necessary.

ANALYSTS' EXAMPLE

ANALYSTS' JOB FOR THE TOP 4

1. Count all the first, second, third, and fourth place votes for each chip type.
2. Multiply the first place votes by four, the second place votes by three, the third place votes by two, and the fourth place votes by one.
3. Add the weighted votes for each chip type and divide by the total number of weighted votes.
4. Divide the weighted votes for each chip type by the total number of votes.
5. Multiply that fraction by 20 to find how many bags there would be in a twenty pack, rounding as necessary.

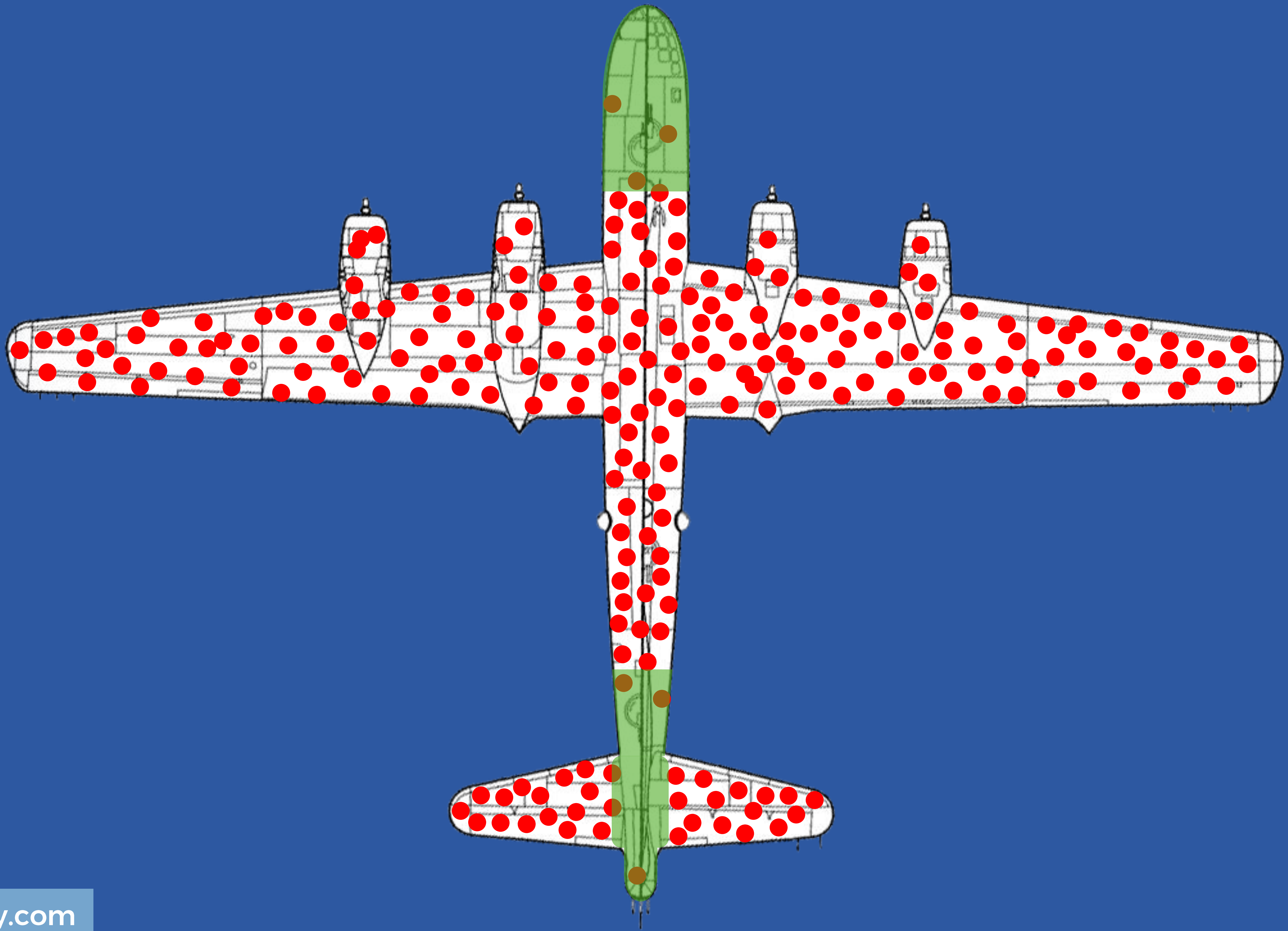
ANALYSTS' EXAMPLE

CHIP BAG RESULTS

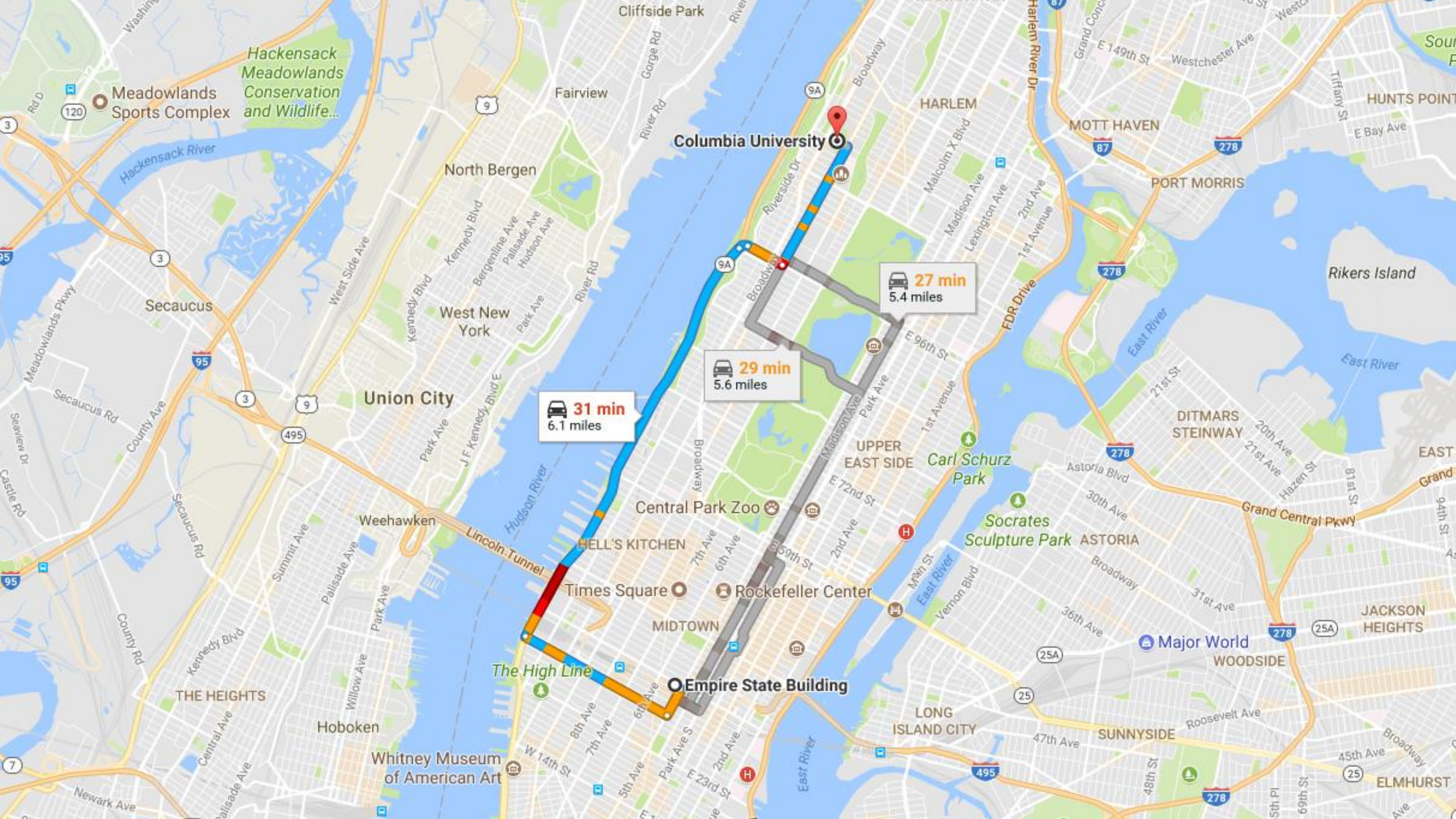
GOALS

- ☑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ☐ IS IT JUST ANSWERING QUESTIONS?
- ☐ HOW DO YOU PROFIT FROM MATH MODELING?
- ☐ HOW DO WE HELP OUR STUDENTS IMPROVE?
- ☐ WHERE CAN WE FIND MORE RESOURCES?


224612



- ~~How do we protect our planes?~~
- ~~Which parts of the plane are being hit by the most bullets?~~
- Which parts of the plane are the most critical to protect?


Columbia University
Empire State Building
31 min
6.1 miles
29 min
5.6 miles
27 min
5.4 miles
Cliffside Park
Hackensack Meadowlands Conservation and Wildlife...
Meadowlands Sports Complex
Hackensack River
Fairview
North Bergen
Secaucus
West New York
Union City
Weehawken
Lincoln Tunnel
Hudson River
HELL'S KITCHEN
Times Square
Rockefeller Center
MIDTOWN
Central Park Zoo
The High Line
THE HEIGHTS
Hoboken
Whitney Museum of American Art
HARLEM
MOTT HAVEN
HUNTS POINT
PORT MORRIS
Rikers Island
East River
UPPER EAST SIDE
Carl Schurz Park
Socrates Sculpture Park
ASTORIA
DITMARS STEINWAY
JACKSON HEIGHTS
Major World
WOODSIDE
LONG ISLAND CITY
SUNNYSIDE
ELMHURST
Grand Central Pkwy
FDR Drive
Harlem River Dr
Broadway
Riverside Dr
Madison Ave
Park Ave
E 96th St
E 72nd St
59th St
W 14th St
E 23rd St

- ~~How do we find the fastest route for each customer?~~
- How do we find the fastest route for each customer without impacting our other customers?

Lay's
Classic
4
Doritos
NACHO CHEESE
4
Doritos
COOL RANCH
2
Cheetos
Crunchy
4
Sun Chips
ORIGINAL
2
Fritos
BRAND
The ORIGINAL
CORN CHIPS
4
Classic Mix
20
Singles
4 LAY'S® Classic Potato Chips, 4 DORITOS® Nacho Cheese Flavored Tortilla Chips, 2 DORITOS® COOL RANCH® Flavored Tortilla Chips, 4 CHEETOS® Crunchy Cheese Flavored Snacks, 2 SUNCHIPS® Original Multigrain Snacks, 4 FRITOS® Original Corn Chips (All 1 OZ. Each)
20 INDIVIDUAL BAGS: 1 OZ. EACH, TOTAL NET WT. 20 OZ. (1 LB. 4 OZ.) 567 g
⚠ WARNING: PREVENT ENTANGLEMENT AND STRANGULATION. KEEP THIS BAG AWAY FROM YOUNG CHILDREN. IT IS NOT A TOY.

- ~~How many of each flavor should we put in a package?~~
- ~~How many of each flavor should we put in a package for each region?~~
- How can we determine if the extra cost of creating different packages will make us more money?

Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later.

CCSS MATH PRACTICE 4

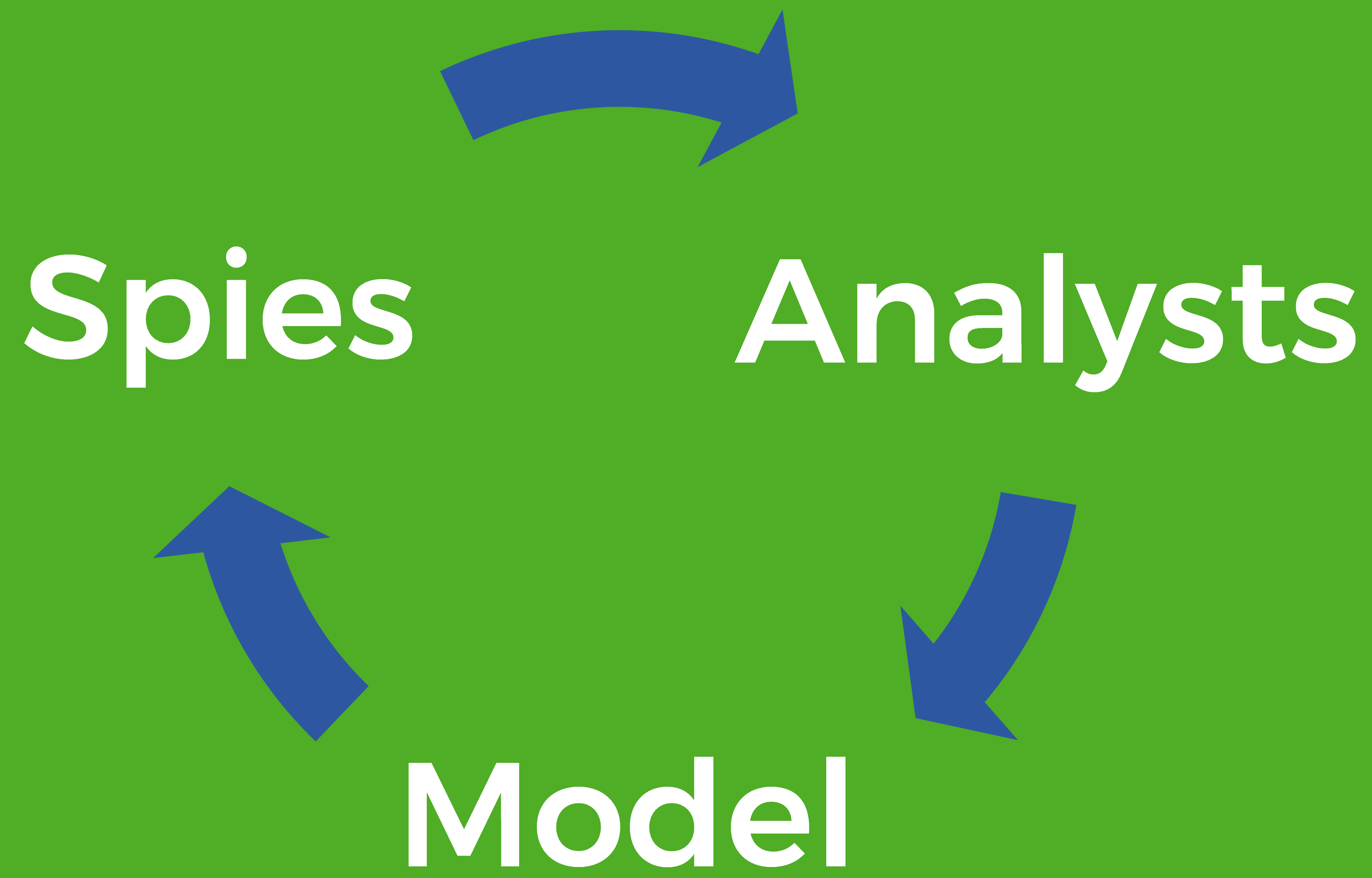
They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

CCSS MATH PRACTICE 4

GOALS

- [x] HOW DO WE MAKE SENSE OF MATH MODELING?
- [x] IS IT JUST ANSWERING QUESTIONS?
- [ ] HOW DO YOU PROFIT FROM MATH MODELING?
- [ ] HOW DO WE HELP OUR STUDENTS IMPROVE?
- [ ] WHERE CAN WE FIND MORE RESOURCES?


TARGET
TARGET PARKING


Spies
Analysts
Model

They used 25 products for a pregnancy prediction’ score including:

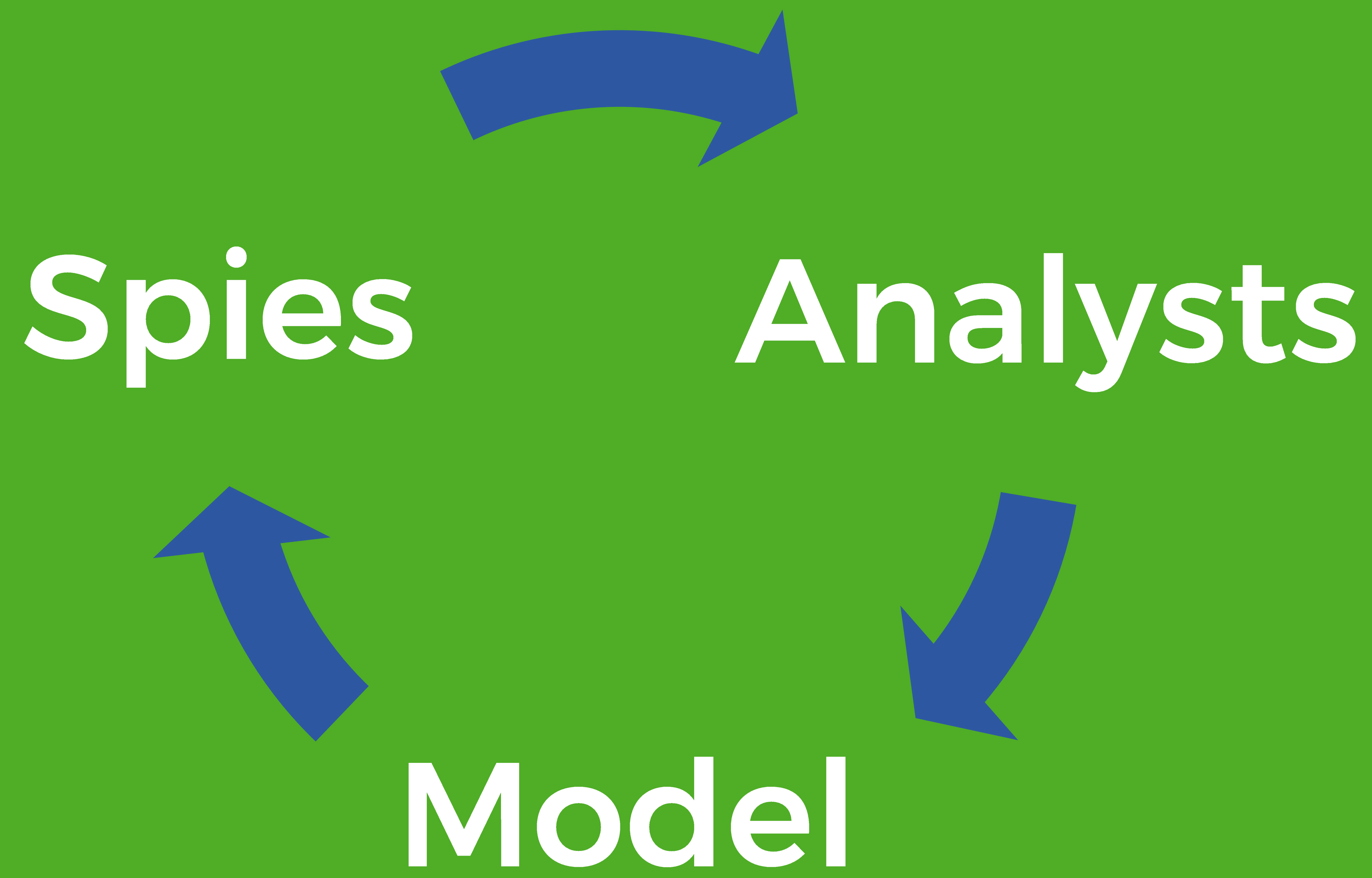
- unscented lotion
- mineral supplements
- cotton balls

Source: New York Times

ANALYSTS' EXAMPLE

1. Add the number of bottles of unscented lotion, jars of mineral supplements, and bags of cotton balls.
2. Multiply that times the day of the week.
3. Click your heels twice.
4. Repeat the phrase "There's no place like home!"

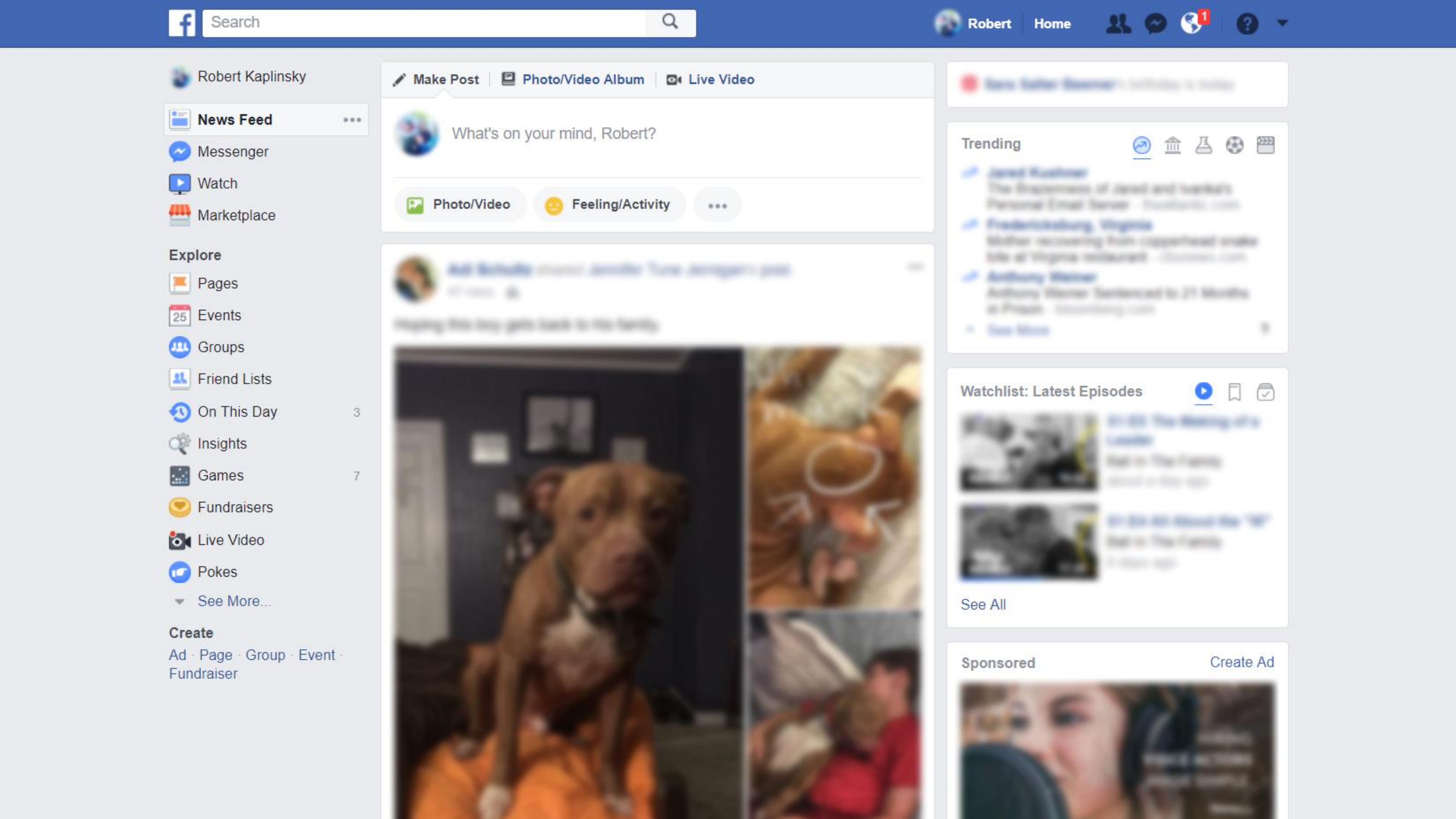

UNITED
A319
4047
B G→
←G A


Spies
Analysts
Model

Priority is determined by:

- passenger's fare class
- itinerary
- frequent flyer program membership
- check-in time

Source: United Airlines


Search
Robert
Home
Robert Kaplinsky
News Feed
Messenger
Watch
Marketplace
Explore
Pages
25
Events
Groups
Friend Lists
On This Day
3
Insights
Games
7
Fundraisers
Live Video
Pokes
See More...
Create
Ad · Page · Group · Event · Fundraiser
Make Post
Photo/Video Album
Live Video
What's on your mind, Robert?
Photo/Video
Feeling/Activity
Trending
Watchlist: Latest Episodes
See All
Sponsored
Create Ad

Spies

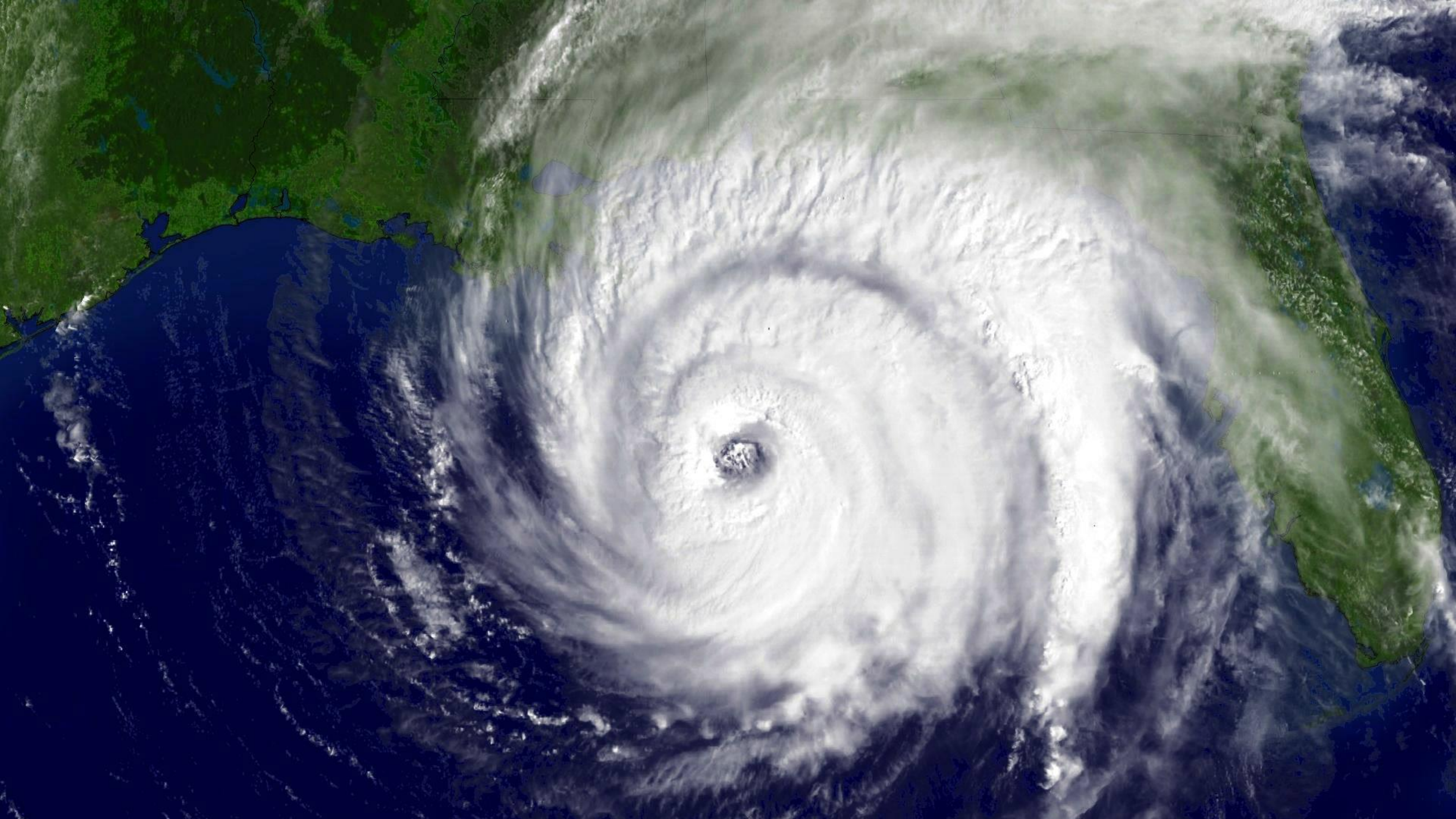
Analysts

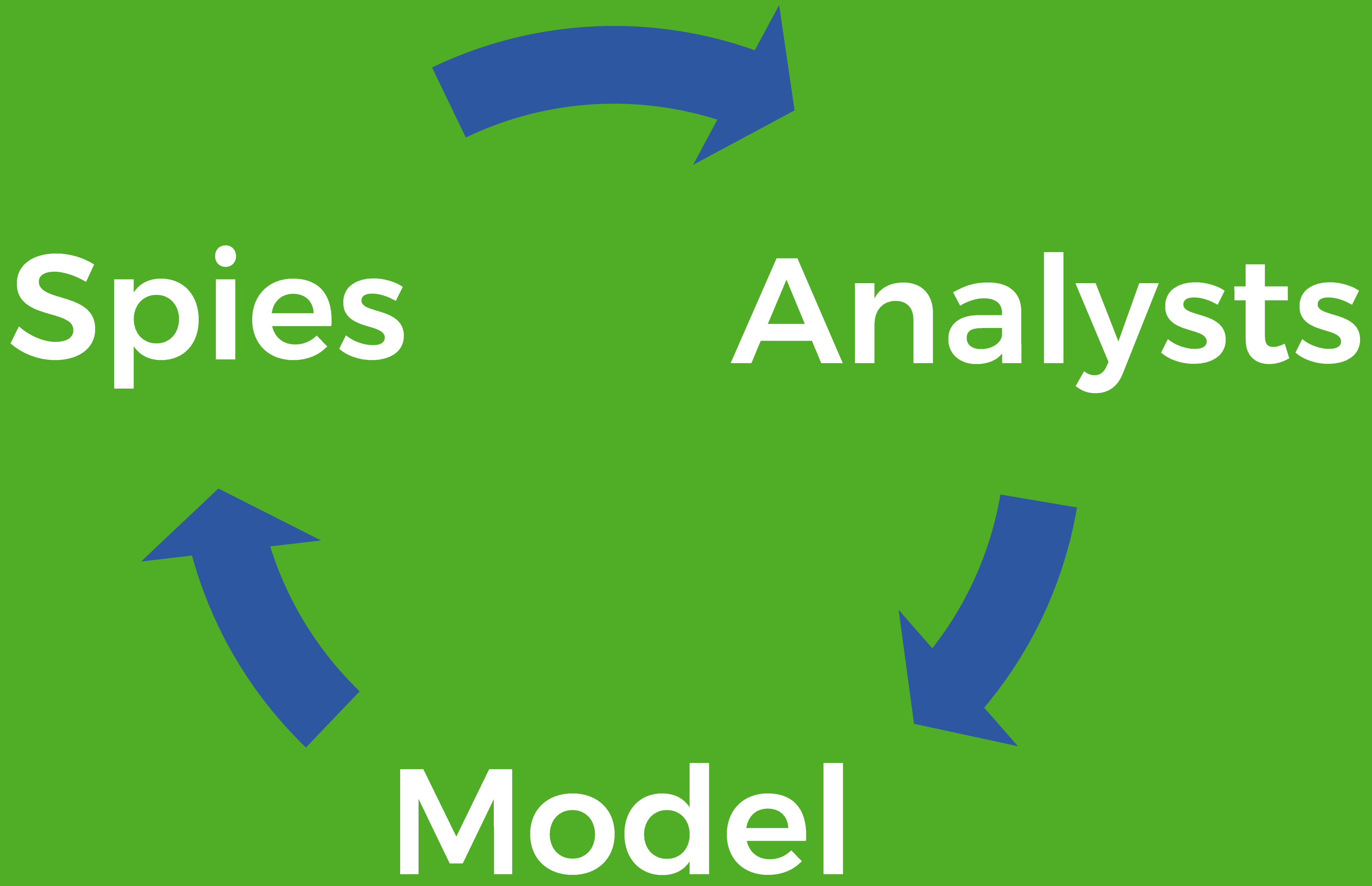
Model

The stories that show in your News Feed are influenced by:

- friends you interact with the most
- the number of comments and likes a post receives
- what kind of story it is (ex: photo, video, status update)

Source: Facebook




Spies
Analysts
Model


WAFFLE HOUSE
WAFFLE HOUSE

The index has three levels:

- Green: full menu - restaurant has power and damage is limited.
- Yellow: limited menu - no power or only power from a generator, or food supplies may be low.
- Red: the restaurant is closed - indicating severe damage.

Source: Wikipedia

MORE EXAMPLES

- How does US News and World Reports rank colleges?
- How does Google know which results to show?
- How do sports teams know who to draft?
- How does SpaceX make boosters land standing up?
- How does Zillow estimate home prices?
- How does Pandora know what music to play?
- How did the BCS rank college football teams?
- How do they figure out who should speak at a conference?

GOALS

- [x] HOW DO WE MAKE SENSE OF MATH MODELING?
- [x] IS IT JUST ANSWERING QUESTIONS?
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- [ ] HOW DO WE HELP OUR STUDENTS IMPROVE?
- [ ] WHERE CAN WE FIND MORE RESOURCES?

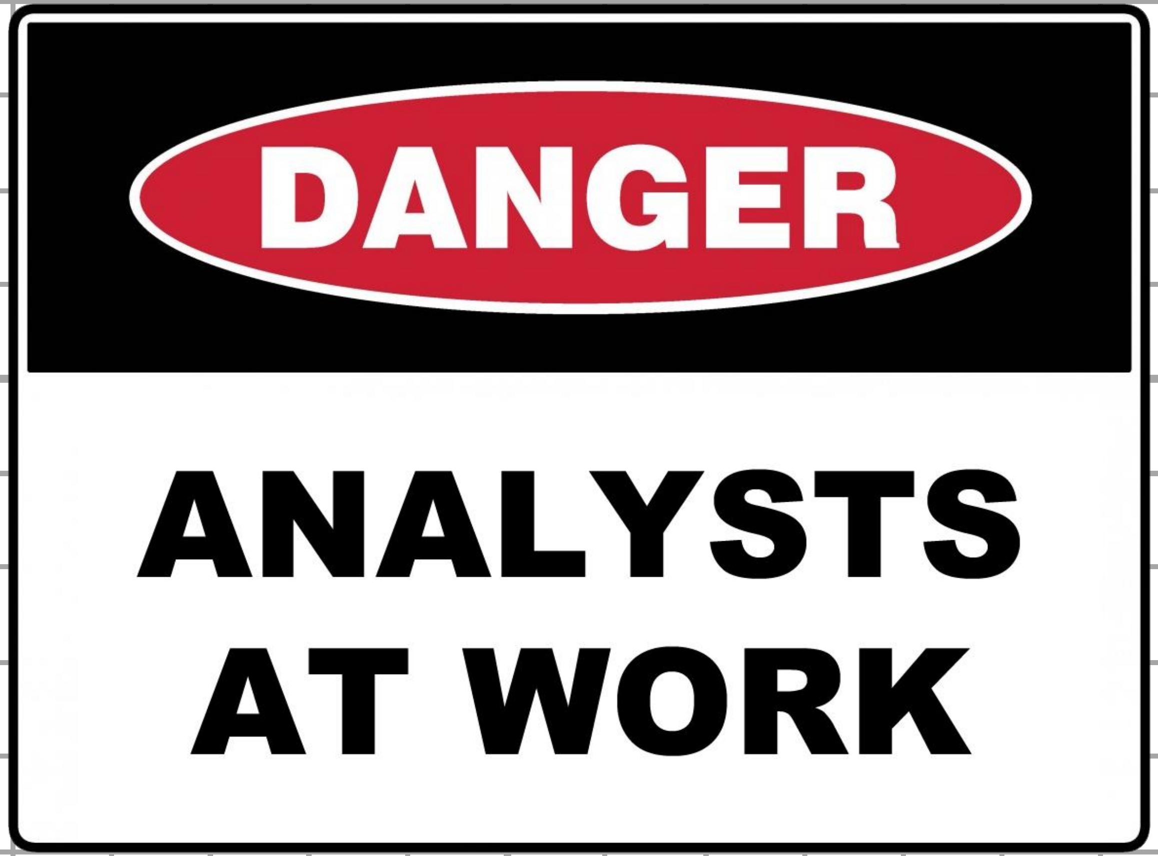
Name: ____________________ Period: __________ Date: ____________________

What problem are you trying to figure out?	What estimates do you have?
	low high Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**

TOP SECRET! SPIES ONLY

What is your conclusion? How did you reach that conclusion?

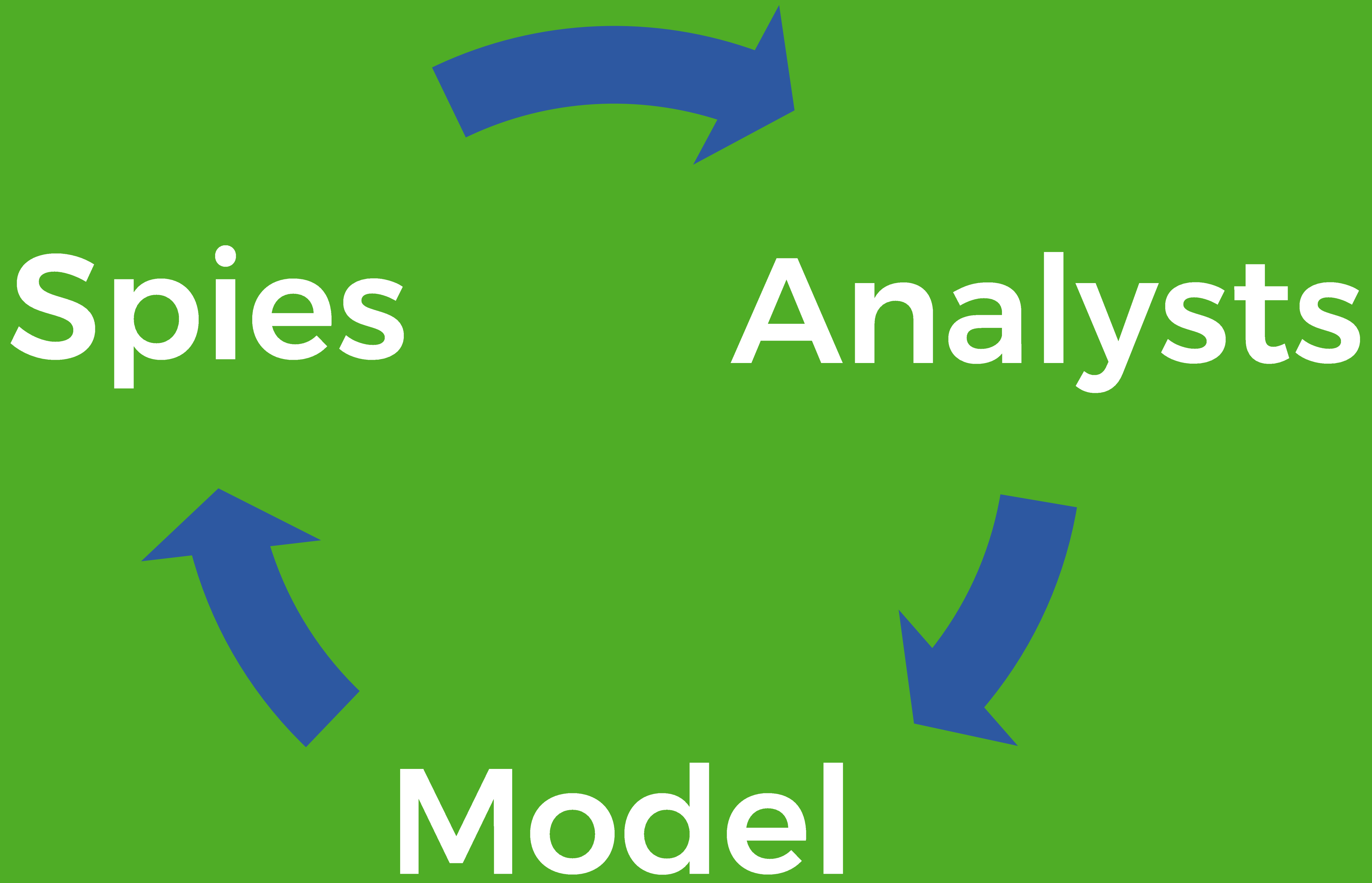
Your work



MODELING EXAMPLES

- ❑ ELEMENTARY SCHOOL
- ❑ MIDDLE SCHOOL
- ❑ HIGH SCHOOL


WYFF4.COM
Coca-Cola


Spies
Analysts
Model

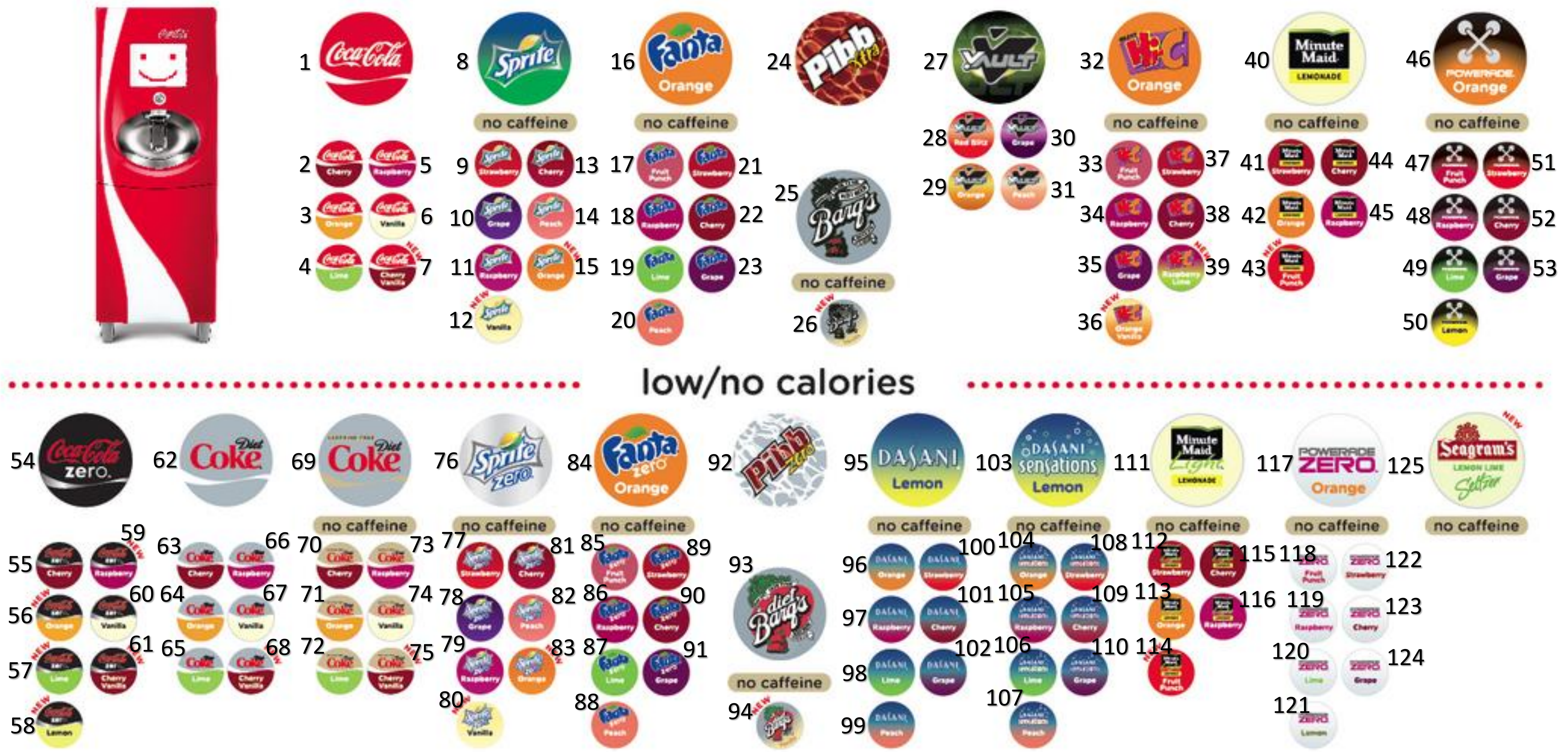
THINKING TIME

Name: ______________________ Period: __________ Date: ______________

What problem are you trying to figure out?	What estimates do you have?
How many beverage choices are there?	10 (low) — 100 — 400 (high) Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**
• There are main flavors and added flavors. • Lemonade is yummy.	• How many main flavors are there? • How many added flavors are there? • Can we mix them all together?

What is your conclusion? How did you reach that conclusion?

COUNT ALL



low/no calories
no caffeine
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125

COUNT GROUPS

INVENTED STRATEGY

7 + 8 + 8 + 1 + 2 + 5 + 8 + 6 + 8 + 8 + 7 + 7 + 8 + 8 + 1 + 2 + 8 + 8 + 6 + 8 + 1

20 + 10 + 25 + 20 + 40 + 10

50 + 25 + 50

125 beverage choices

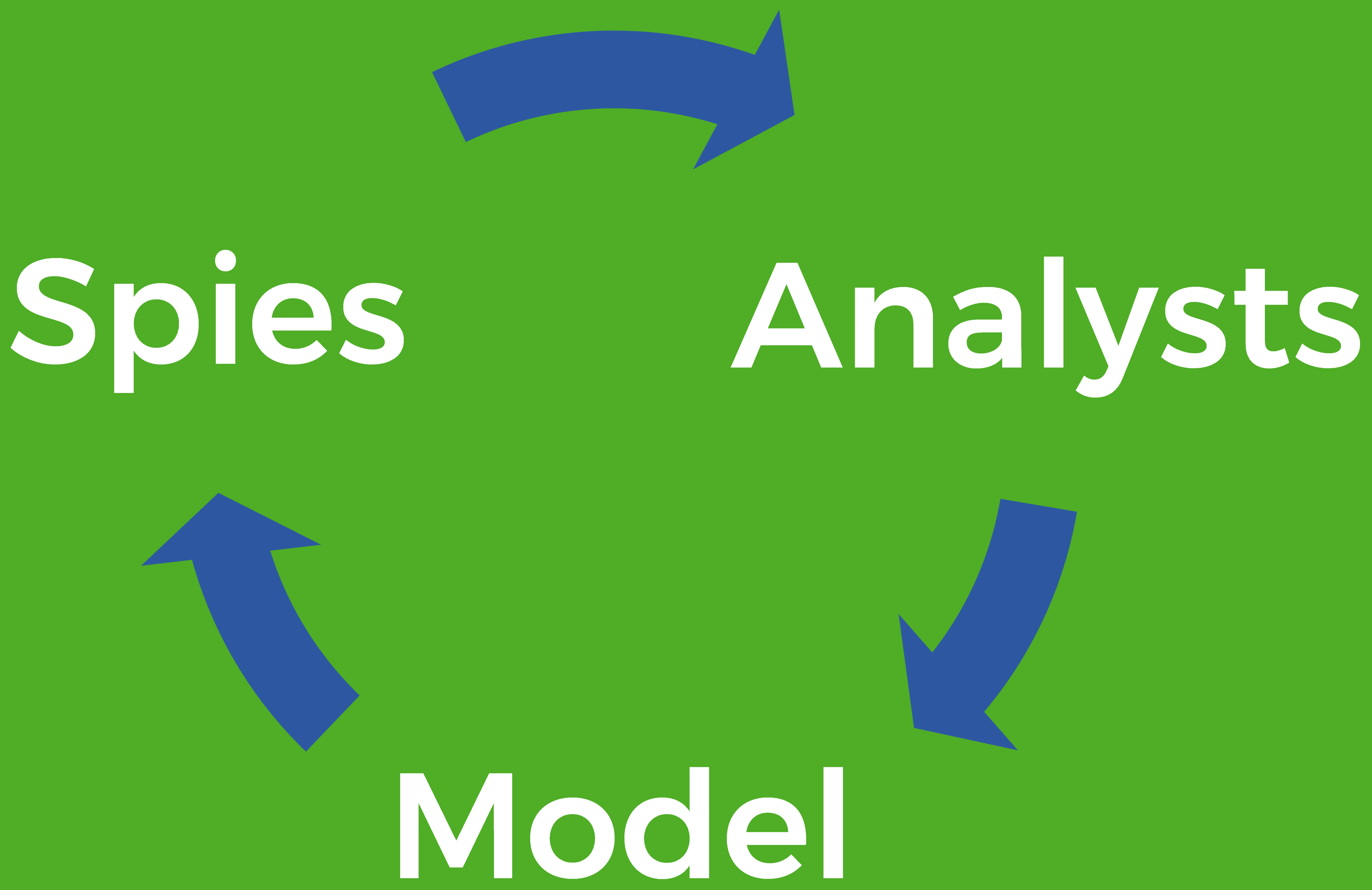
The main attraction for a busload of Dover fifth-graders was supposed to be the Museum of Fine Arts, but that all changed when they stopped by Kelly's Roast Beef and got a glimpse of their soda-drinking future.

At the entrance of Kelly's sat a sleek Coca-Cola Freestyle fountain crafted to resemble an old-fashioned vending machine, but with a twist: a touchscreen computer embedded in the machine gives customers the option of 125 flavors. You can quench your thirst with a Coke or a Sprite, or try something more exotic — Sprite with Grape or a Hi-C Orange Vanilla.

MODELING EXAMPLES

- ☑ ELEMENTARY SCHOOL
- ☐ MIDDLE SCHOOL
- ☐ HIGH SCHOOL


IVE
FOX NEWS
Junction


Spies
Analysts
Model

THINKING TIME

Name: ____________________ Period: __________ Date: ____________________

What problem are you trying to figure out?	What estimates do you have?
How much money was that?	$1,000,000 (low) — $500,000,000 — $1,000,000,000 (high) Place your estimate on the number line.

What info do you already know about the problem?	What info do you need about the problem?
• There is a lot of money. • It is in a pile. • It is in bundles.	• Is it all the same denomination? • ~~How much does one bill weigh?~~ • ~~How much does all the money weigh?~~

What is your conclusion? How did you reach that conclusion?

Name: ______________________________ Period: ________ Date: __________________

What problem are you trying to figure out?	What estimates do you have?
How much money was that?	low: $1,000,000 · $500,000,000 · high: $1,000,000,000 Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**
• There is a lot of money. • It is in a pile. • It is in bundles.	• Is it all the same denomination? • How many rows and columns are there? • How many bills are in one stack?

What is your conclusion? How did you reach that conclusion?


PGR
SIEDO


PGR
SIEDO
PGR
SIEDO

Your work

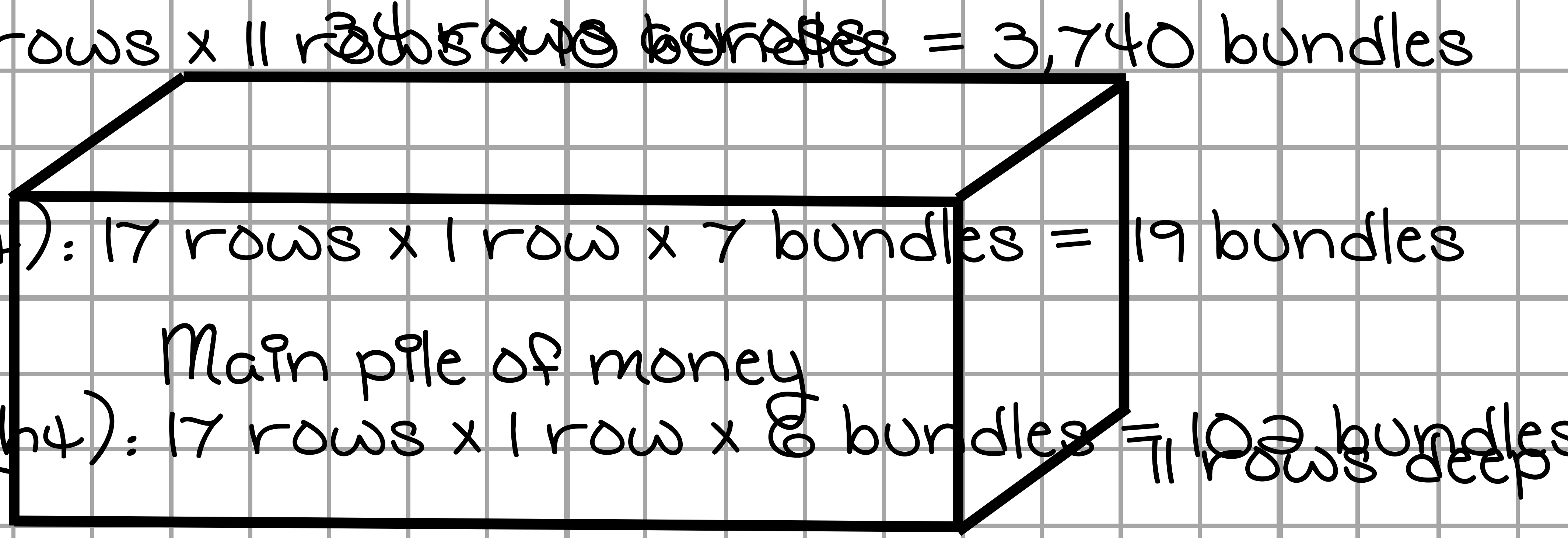
Main pile: 34 rows x 11 rows x 10 bundles = 3,740 bundles

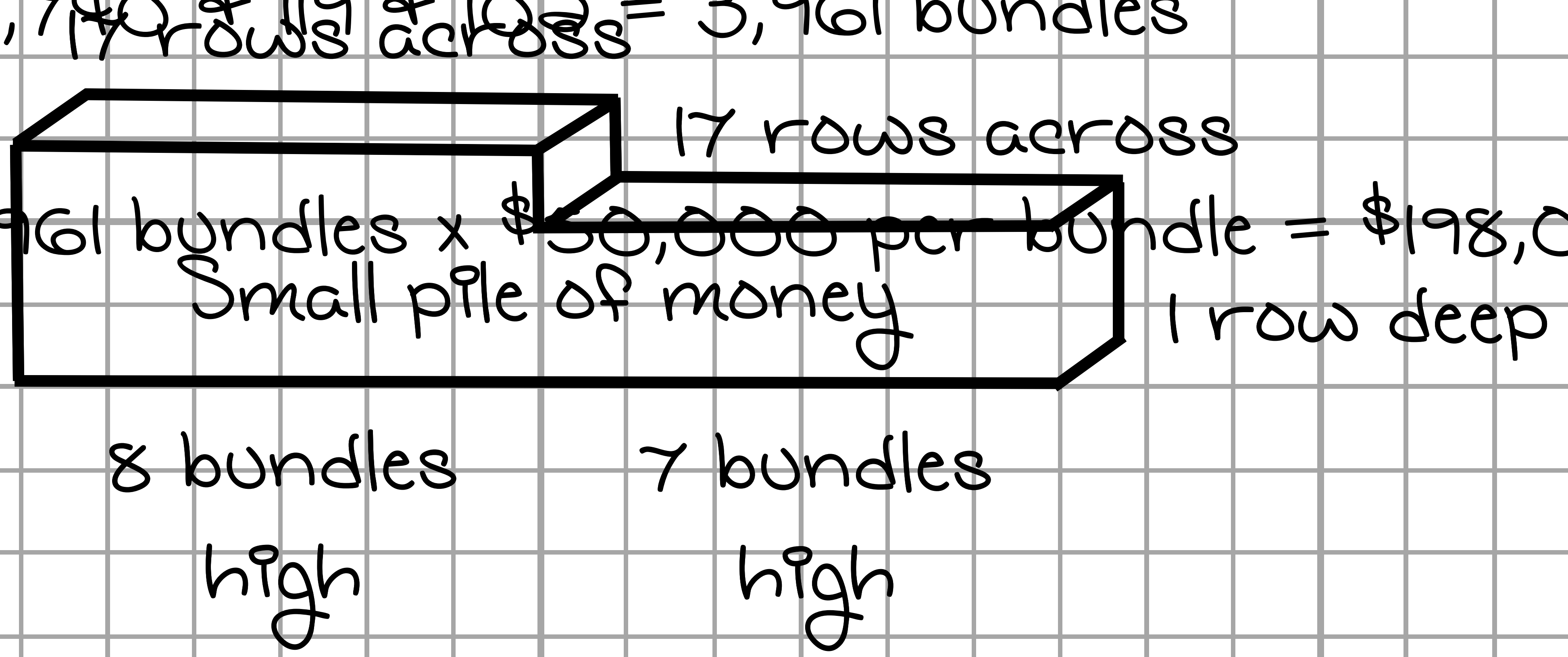
Small pile (left): 17 rows x 1 row x 7 bundles = 119 bundles

Small pile (right): 17 rows x 1 row x 6 bundles = 102 bundles

Total bundles: 3,740 + 119 + 102 = 3,961 bundles

Total money: 3,961 bundles x $50,000 per bundle = $198,050,000



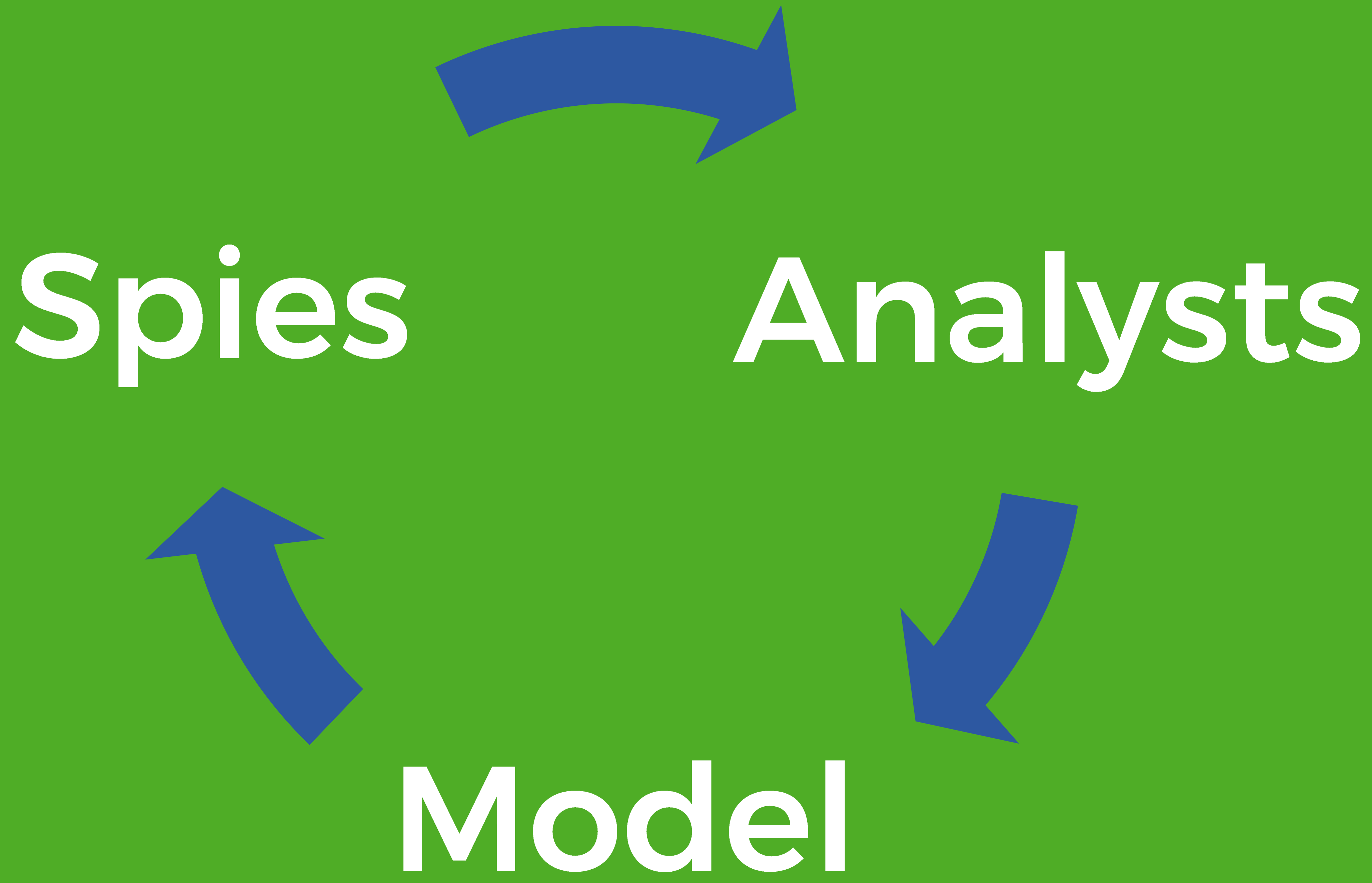



FOX

MODELING EXAMPLES

- [x] ELEMENTARY SCHOOL
- [x] MIDDLE SCHOOL
- [ ] HIGH SCHOOL


NON-STAGGERED
STAGGERED


Spies
Analysts
Model

THINKING TIME

Name: ______________________ Period: __________ Date: ______________

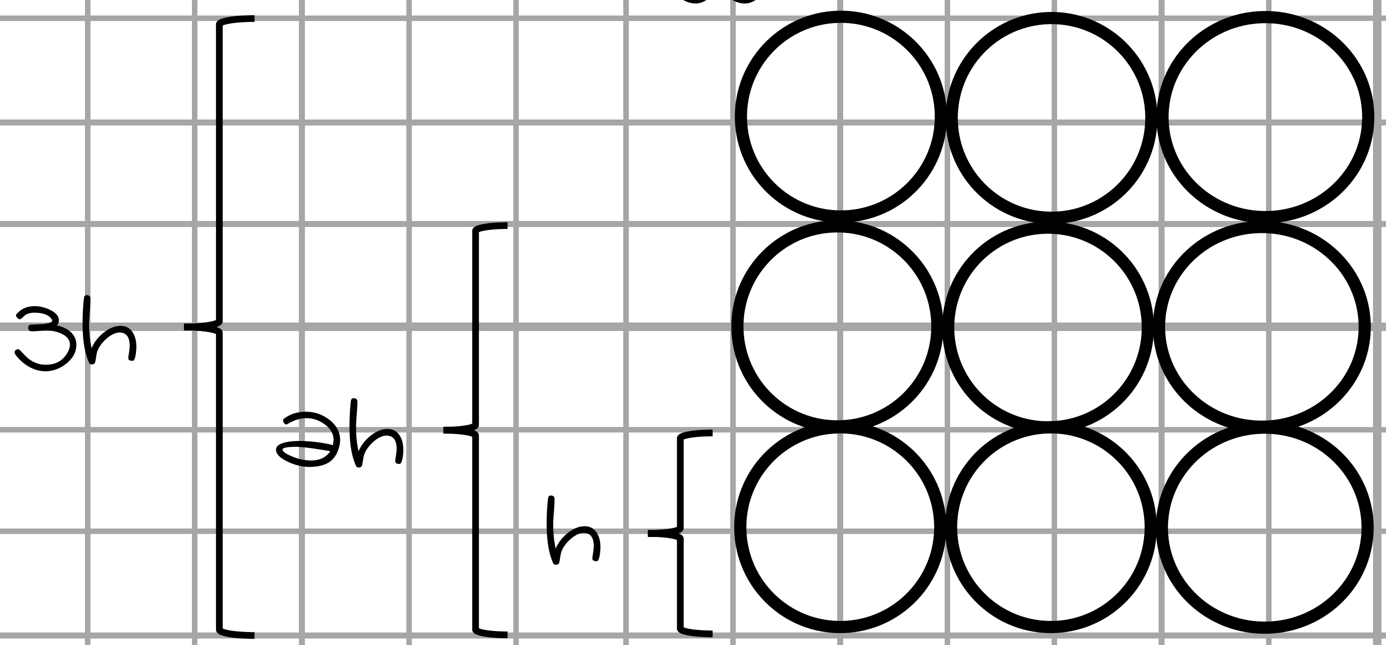
What problem are you trying to figure out?	What estimates do you have?
How much shorter are 20 layers of non-staggered pipes?	low: $\boxed{3}$ — 8 — high: $\boxed{20}$ (in inches) Place your estimate on the number line.
What info do you already know about the problem?	**What info do you need about the problem?**
• One pile of pipes is staggered. • One pile of pipes is not staggered. • We have to compare 20 layers of each.	• What are the dimensions of a pipe? • What units are we using to measure?

What is your conclusion? How did you reach that conclusion?

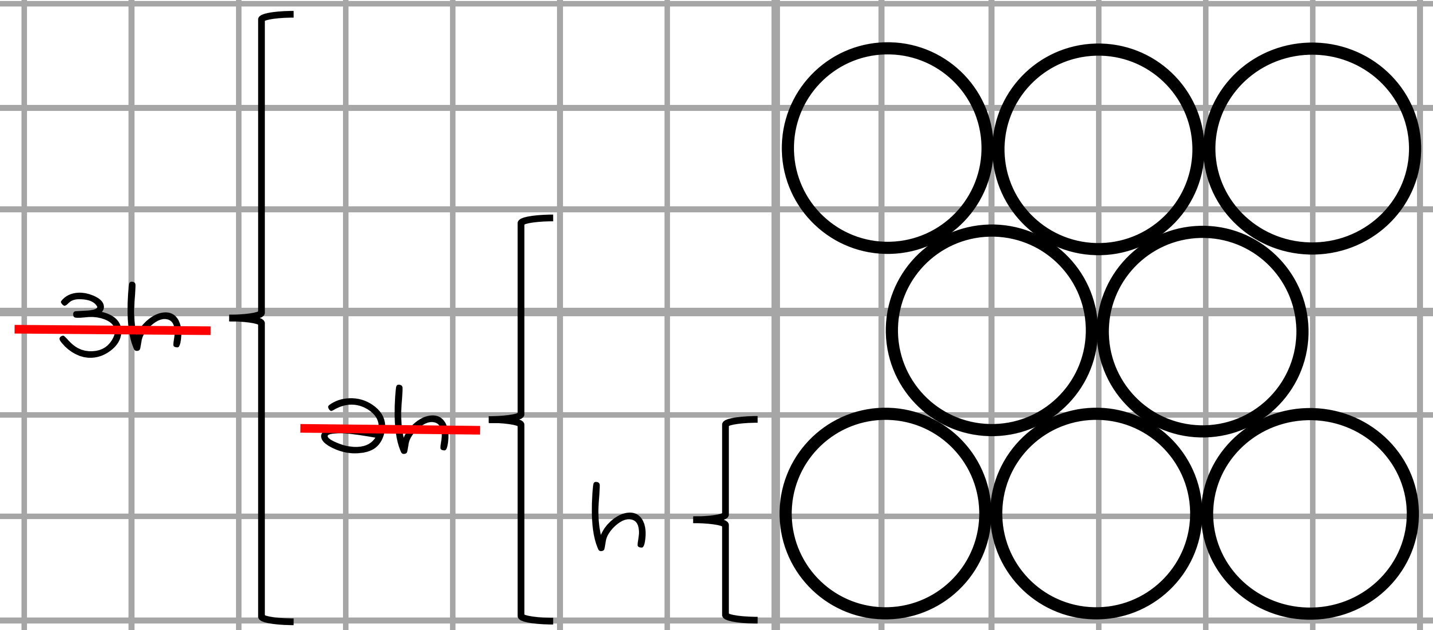

6
7

Your work

Non-staggered pipes



Staggered pipes



1 pipe = h cm

2 pipes = 2h cm

3 pipes = 3h cm

⋮

20 pipes = 20h cm

1 pipe = h cm

2 pipes = ?? cm

3 pipes = ?? cm

⋮

20 pipes = ?? cm

MODELING EXAMPLES

- ☑ ELEMENTARY SCHOOL
- ☑ MIDDLE SCHOOL
- ☑ HIGH SCHOOL

GOALS

- ☑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ☑ IS IT JUST ANSWERING QUESTIONS?
- ☑ HOW DO YOU PROFIT FROM MATH MODELING?
- ☑ HOW DO WE HELP OUR STUDENTS IMPROVE?
- ☐ WHERE CAN WE FIND MORE RESOURCES?

PBL RESOURCES

- Problem-based lesson search engine:
  robertkaplinsky.com/prbl-search-engine
- My lessons (Elementary, Middle, and High School)
  robertkaplinsky.com/lessons
- Dan Meyer (Middle and High School)
  threeacts.mrmeyer.com
- Andrew Stadel (Elementary and Middle School)
  www.estimation180.com/lessons.html
- Graham Fletcher (Elementary and Middle School)
  gfletchy.com/3-act-lessons

Home

How I Can Help You

Real World Problems

My workshops help teachers implement problem-based lessons by helping them experience them from both student and teacher perspective, leading to increase students' success with performance tasks and the Common Core State Standards.

Depth of Knowledge

Problems at higher depth of knowledge levels have the potential to challenge your most talented student yet remain accessible to everyone. I can help teachers develop best practices for implementing them so that students persevere longer towards finding the solution.

Search

Type and hit enter ...

Subscribe for Updates

Do you like the ideas you're reading? If so, you'll love having the best ones sent to you via email!

Enter your information below and I'll send you a short email each Tuesday about an idea you can use with your students right away.

If you live in the United States, enter your zip code and I'll use it to let you know about events near you.

First Name

Lessons

View all | Kinder | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | Alg 1 | Geo | Alg 2

How Much Money Were Those Pennies?

How Can We #SaveNelly?

How Many Chip Bags Will There Be?

How Can We Make Stronger Passwords?

Search

Type and hit enter ...

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Enter your information below and I'll send you a short email each Tuesday about an idea you can use with your students right away.

If you live in the United States, enter your zip code and I'll use it to let you know about events near you.

First Name

Robert Kaplinsky's Problem-Based Lessons

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

	A	B	C	D	E	F	G	H	
1	Lesson	Concept / Skill	Standard 1	Standard 2	Standard 3	Standard 4	Standard 5	Standard 6	Stan 7
2	How Much Money Were Those Pennies?	Money, Multiplying Decimals, Proportions	4.MD.2	5.NBT.5	5.NBT.7	7.RP.3			
3	How Can We #SaveNelly?	Dividing Decimals	6.NS.3						
4	How Many Chip Bags Will There Be?	Ratio and Proportions, Population Sampling	6.RP.3	6.RP.3c	7.RP.2	7.RP.3	7.SP.1	7.SP.2	
5	How Can We Make Stronger Passwords?	Permutations, Combinations, Probability, Exponents, Exponential Growth	7.SP.8	8.EE.1	S-MD.7	S-CP.5	S-CP.9		
6	How Many Hot Dogs And Buns Should He Buy?	Least Common Multiple (LCM)	6.NS.4						
7	What Does 2000 Calories Look Like?	Unit Rates, Ratios, Solving Equations, and Solving Inequalities	6.EE.3	6.EE.4	6.EE.5	6.EE.6	6.EE.7	6.EE.8	6.RP.
8	How Much Money Are The Coins Worth?	Decimal Operations and Coin Counting	2.MD.8	5.NBT.7	6.NS.3				
9	How Many Times Will A Case of Paper Jam?	Interpreting Percentages	6.RP.3c	7.RP.3					
10	How Many Soda Combinations Are There On A Coke Freestyle?	Counting, Composing, and Decomposing Numbers	K.CC.5	K.CC.6	K.OA.1	K.OA.2	K.OA.3	K.OA.4	K.NB
11	What Should The Freeway Sign Show?	Fractions on Number Lines, Converting Units, Decimal and Fraction Operations	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	4.MD.
12	How Fast Was The Fastest Motorcycle Speeding Ticket Ever?	Converting Units and Unit Rates	5.MD.1	6.RP.3d	7.RP.1	N.Q.1			
13	How Much Did Patrick Peterson Lose By Not Cashing His Check?	Compound and/or Simple Interest	7.RP.3	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-REI.11	F-IF.4
14	How Many Biscuits Can You Make?	Dividing Fractions and Mixed Numbers	5.NF.7	5.NF.7a	5.NF.7b	5.NF.7c	6.NS.1		
15	How Much Bigger Should They Make Zoolander's School?	Scale and Proportions	5.NF.5A	7.RP.2	7.G.1				
16	Where Is The Freeway Sign Located?	Identifying Fractions on a Number Line	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	3.NF.
17	How Far Apart Are Exits On A Ring Road?	Arc length measures	G-C.5						
18	How Much Is One Third Of A Cup Of Butter?	Identifying Fractions on a Number Line	3.NF.1	3.NF.2	3.NF.2a	3.NF.2b	3.NF.3	3.NF.3a	3.NF.
19	How Do Skytypers Write Messages?	Transformations (Rotations, Reflections, Dilations, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4	G-CO.2	G-CO.3	G-CO
20	How Big Is The Bermuda Triangle?	Coordinate Geometry: Area of Triangle	G-GPE.7						
21	What Fraction Of Children Are In The Right Car Seat?	Representing and Comparing Fractions	3.NF.1	3.NF.2	3.NF.3	4.NF.1	4.NF.2		
22	How Much Did The Temperature Drop?	Absolute Value	6.NS.7c	7.NS.1c					
23	How Much Shorter Are Staggered Pipe Stacks?	Circles, Pythagorean Theorem, trigonometric ratios, and linear functions	8.G.7	A-CED.1	A-CED.3	A-CED.4	A-SSE.1a	A-SSE.1b	A-SS
24	How Do You Write A Check To Pay For Something?	Expanded Form	2.NBT.3	4.NBT.2	5.NBT.3a				
25	How Can We Correct The Scarecrow?	Pythagorean Theorem	8.G.6	G-SRT.4					
26	How Much Does A 100×100 In-N-Out Cheeseburger Cost?	Building and Interpretting Linear Functions	8.F.1	8.F.3	8.F.4	8.F.5	F-IF.4	F-IF.5	F-IF.6
27	How Can We Water All Of The Grass?	Circles, Pythagorean Theorem, trigonometric ratios	7.G.4	8.G.7	G-SRT.8	G-MG.1	G-MG.3		
28	How Much Money IS That?!	Volume of rectangular prism	5.MD.3	5.MD.4	5.MD.5	5.MD.5b	5.MD.5c	6.G.2	7.G.6
29	How Much Money Should Dr. Evil Demand?	Exponential Growth	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-REI.11	F-IF.4	F-IF.7
30	How Tall Is Mini-Me?	Scale and Dividing Decimals	5.NF.5	5.NF.5a	5.NF.5b	6.NS.3			
31	How Did They Make Ms. Pac-Man?	Transformations (Rotations, Reflections, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4	G-SRT.2	G-CO.4	G-CO
32	Which Ticket Option Is The Best Deal?	Unit Rates and Ratios	6.RP.2	6.RP.3	6.RP.3a	6.RP.3b			
33	How Far Apart Are The Freeway Exits?	Fractions on a Number Line and Subtracting Fractions	3.NF.2	3.NF.2b	4.NF.2	4.NF.3a	4.NF.3c	4.NF.3d	5.NF.
34	Do We Have Enough Paint?	Area	3.MD.5	3.MD.6	3.MD.7				

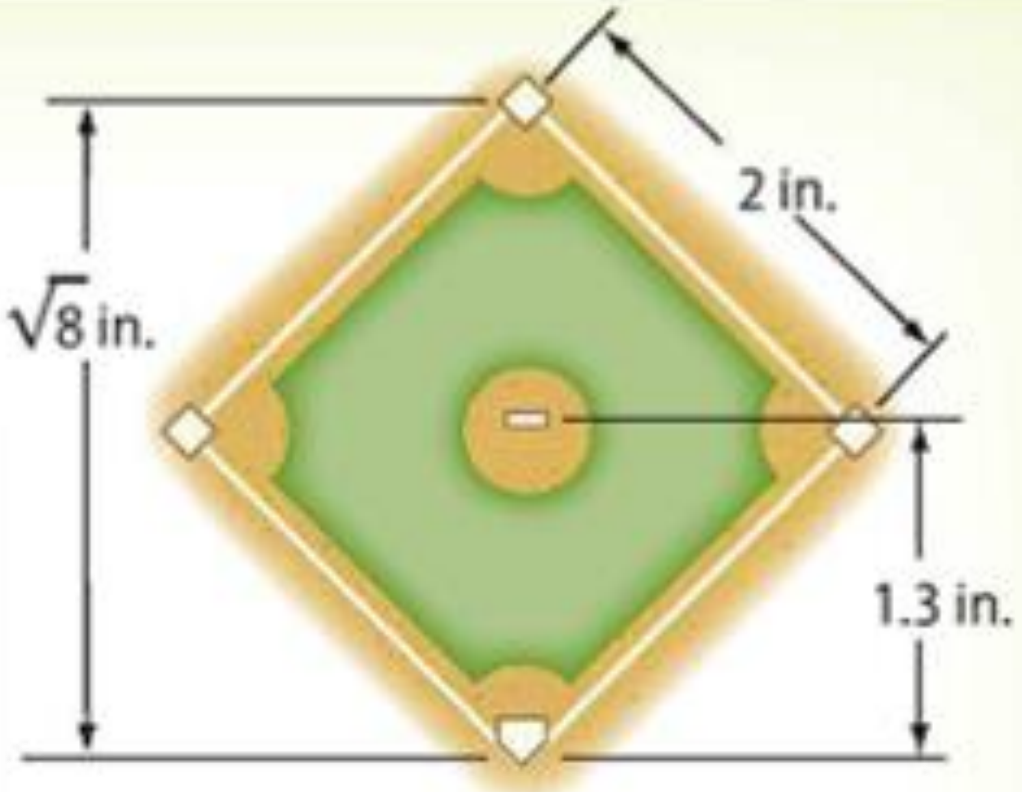
Sheet1

GOALS

- ☑ HOW DO WE MAKE SENSE OF MATH MODELING?
- ☑ IS IT JUST ANSWERING QUESTIONS?
- ☑ HOW DO YOU PROFIT FROM MATH MODELING?
- ☑ HOW DO WE HELP OUR STUDENTS IMPROVE?
- ☑ WHERE CAN WE FIND MORE RESOURCES?

Real-World Link

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



1. On the model, the distance from the pitching mound to home plate is 1.3 inches. Is 1.3 a rational number? Explain.

2. On the model, the distance from first base to second base is 2 inches. Is 2 a rational number? Explain.

3. The distance from home plate to second base is $\sqrt{8}$ inches. Using a calculator, find $\sqrt{8}$. Does it appear to terminate or repeat?

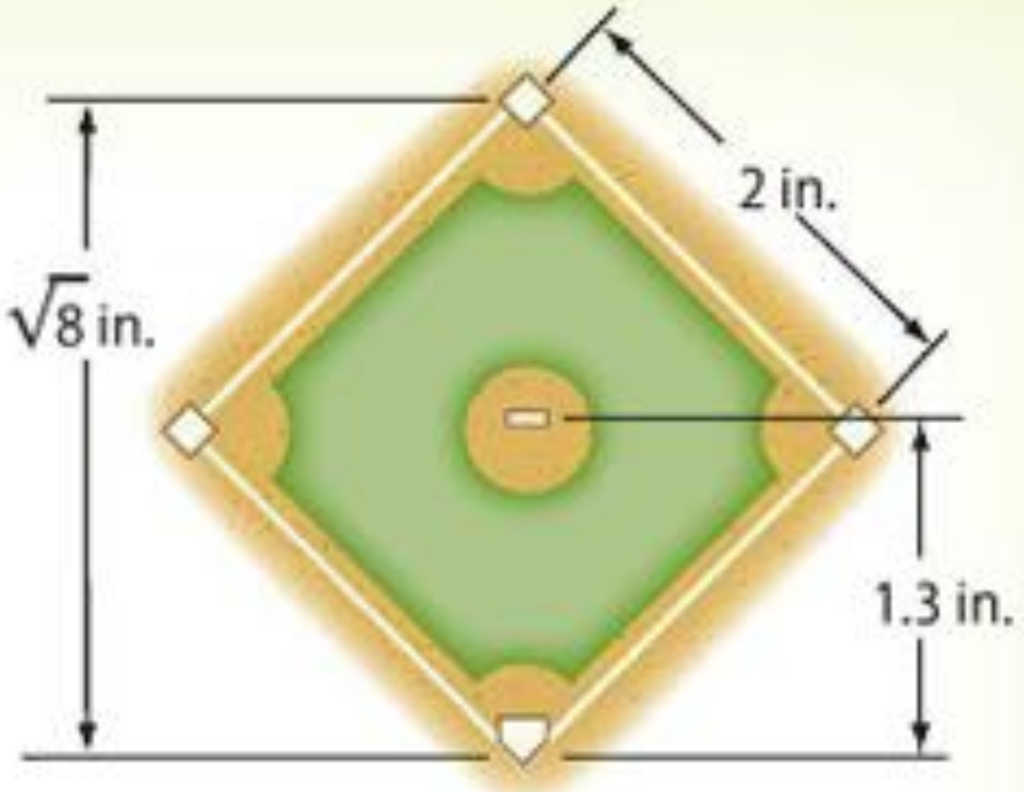
Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Real-World Link

Sports Major League baseball has rules for the dimensions of the baseball diamond. A model of the diamond is shown.



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Common Core State Standards

Content Standards
8.NS.1, 8.NS.2, 8.EE.2

Mathematical Practices
1, 3, 4, 6

Scary & Dangerous


2009
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MATH MODELING CAN MAKE YOU FILTHY RICH

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