

ESRI USER CONFERENCE 2021

ArcGIS Operations Dashboard to Triage and Investigate Outliers in 2020 Census

Session: Ensuring Census Data Quality with GIS

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May 11, 2021

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All data shown are fictitious data used for illustrative purposes only.*

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United States[®]
Census
2020

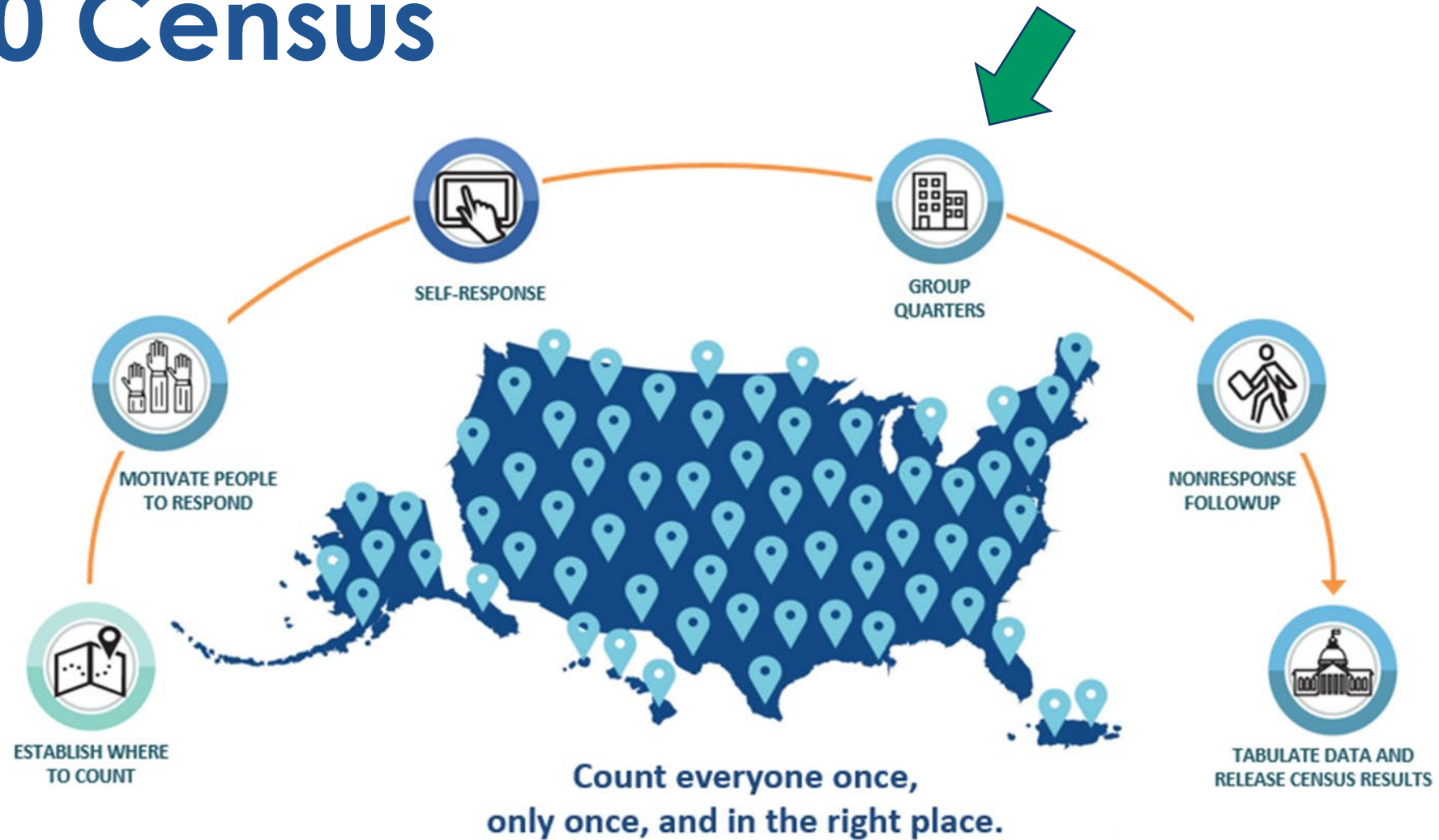
Objectives

- How the Decennial Field Quality Monitoring Program (DFQM) fit in with the 2020 Census
- What the program monitored
- What the NRFU Metrics Mapper is
- How the NRFU Metrics Mapper helped with near-real time analysis
- Lessons Learned and Future Iterations

2020 Census



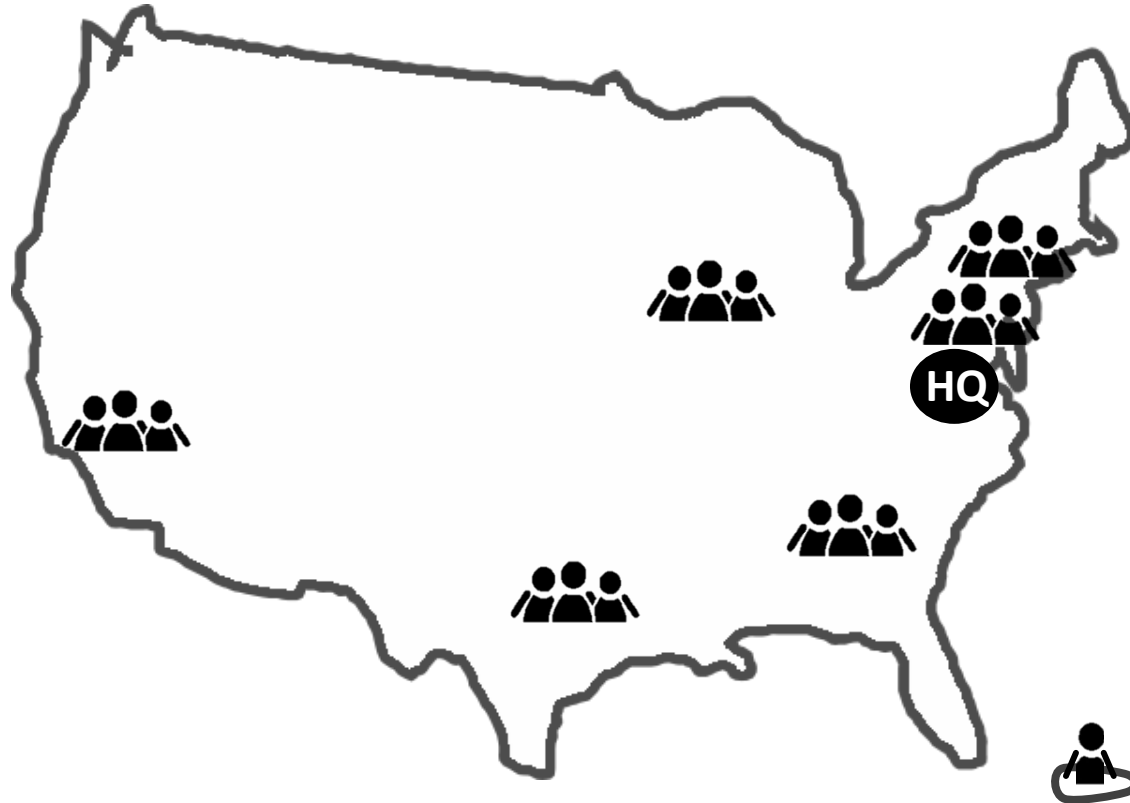
2020 Census



2020 Census



Centralized Design and Local implementation



Centralized staff at HQ developing and providing guidance, data tools, and reports

Teams of data analysts at each of six regional field offices as “boots on the ground” to investigate field quality issues using near real-time data from a central data repository.

DFQM's Fit In Quality Assurance

	<u>Inspection</u>	<u>Sampling</u>	<u>Process Monitoring</u>
Description	Data Quality	Reinterview	Atypical Patterns
Question	Are the data complete and does it make sense?	If I send a second enumerator to the household, will the results be the same?	Are the enumerators correctly following procedures?

DFQM's Fit In Quality Assurance

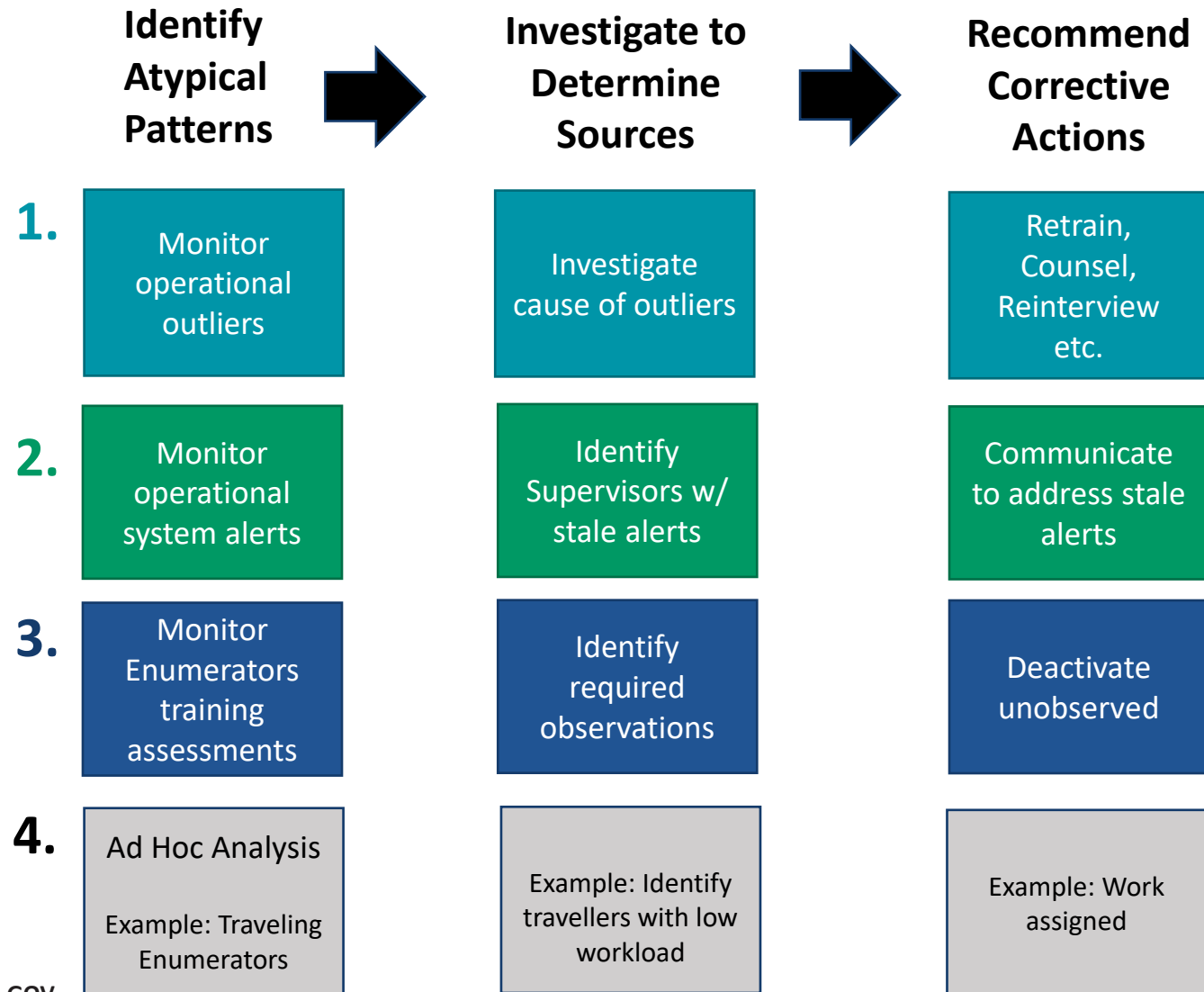


	<u>Inspection</u>	<u>Sampling</u>	<u>Process Monitoring</u>
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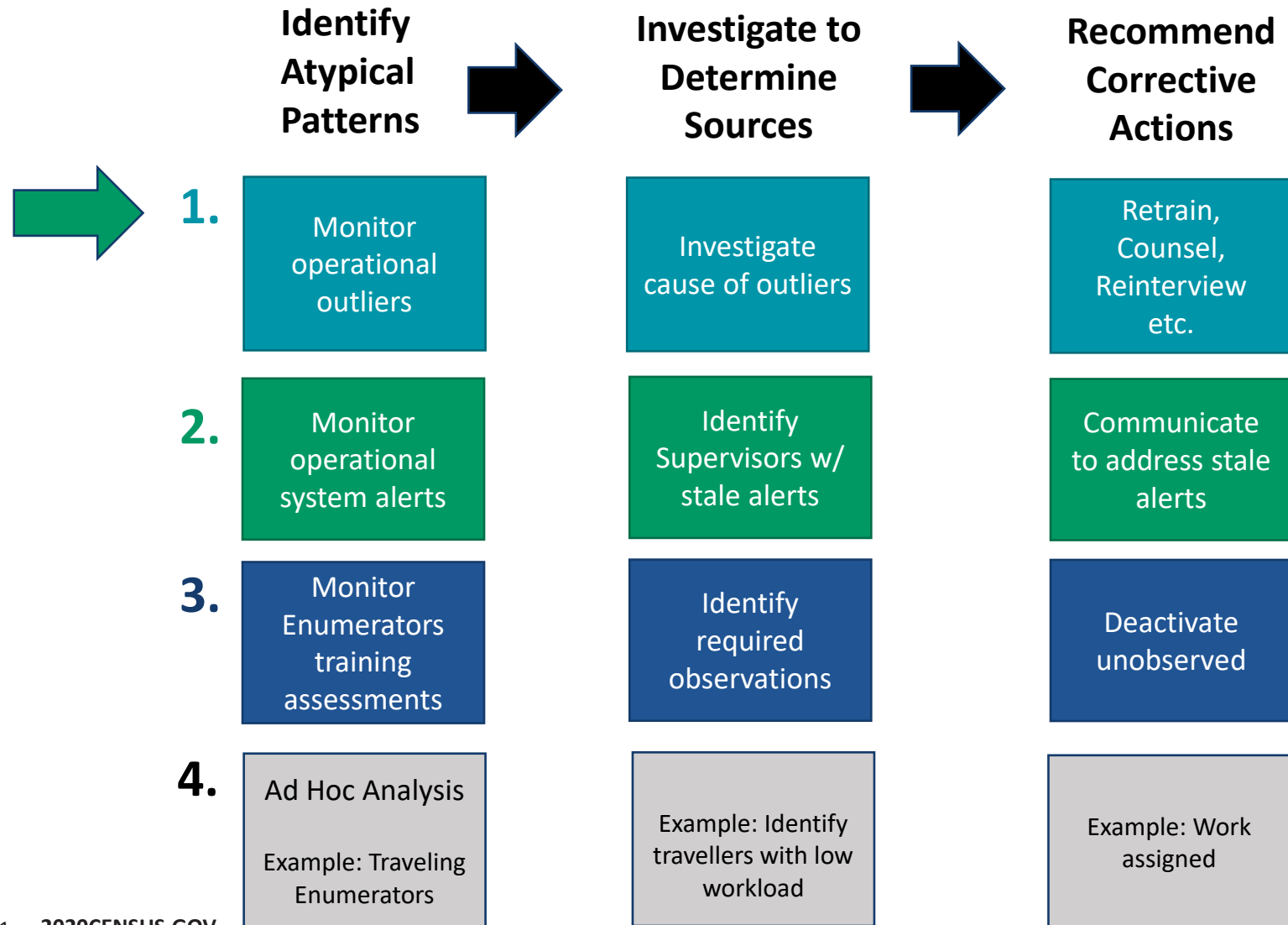
What DFQM Monitored

	Identify Atypical Patterns	Investigate to Determine Sources	Recommend Corrective Actions
1.	Monitor operational outliers	Investigate cause of outliers	Retrain, Counsel, Reinterview etc.
2.	Monitor operational system alerts	Identify Supervisors w/ stale alerts	Communicate to address stale alerts
3.	Monitor Enumerators training assessments	Identify required observations	Deactivate unobserved
4.	Ad Hoc Analysis Example: Traveling Enumerators	Example: Identify travellers with low workload	Example: Work assigned

What DFQM Monitored



What DFQM Monitored



NRFU Metrics Mapper - ACO

DFQM NRFU Metrics Mapper by the Office of Survey and Census Analytics (OSCA)

RCC Clear NY PH CG AT DA LA

ACO Total Outliers

Lexington 2357
8 total outliers

Olympia 3294
7 total outliers

San Bernardino 3278
7 total outliers

Springfield 2582
7 total outliers

Greenville 2909
6 total outliers

Honolulu 3255
5 total outliers

Pensacola 2976
5 total outliers

Tuscon 3109
5 total outliers

Guaynabo 2293
4 total outliers

Harrisburg 2373
4 total outliers

Egg Harbor 2264
4 total outliers

Gulfport 2901
4 total outliers

Colorado Springs 3156
4 total outliers

Hagerstown 2361
4 total outliers

Fayetteville 2556
4 total outliers

Beckley 2390
3 total outliers

Eau Claire 2584
3 total outliers

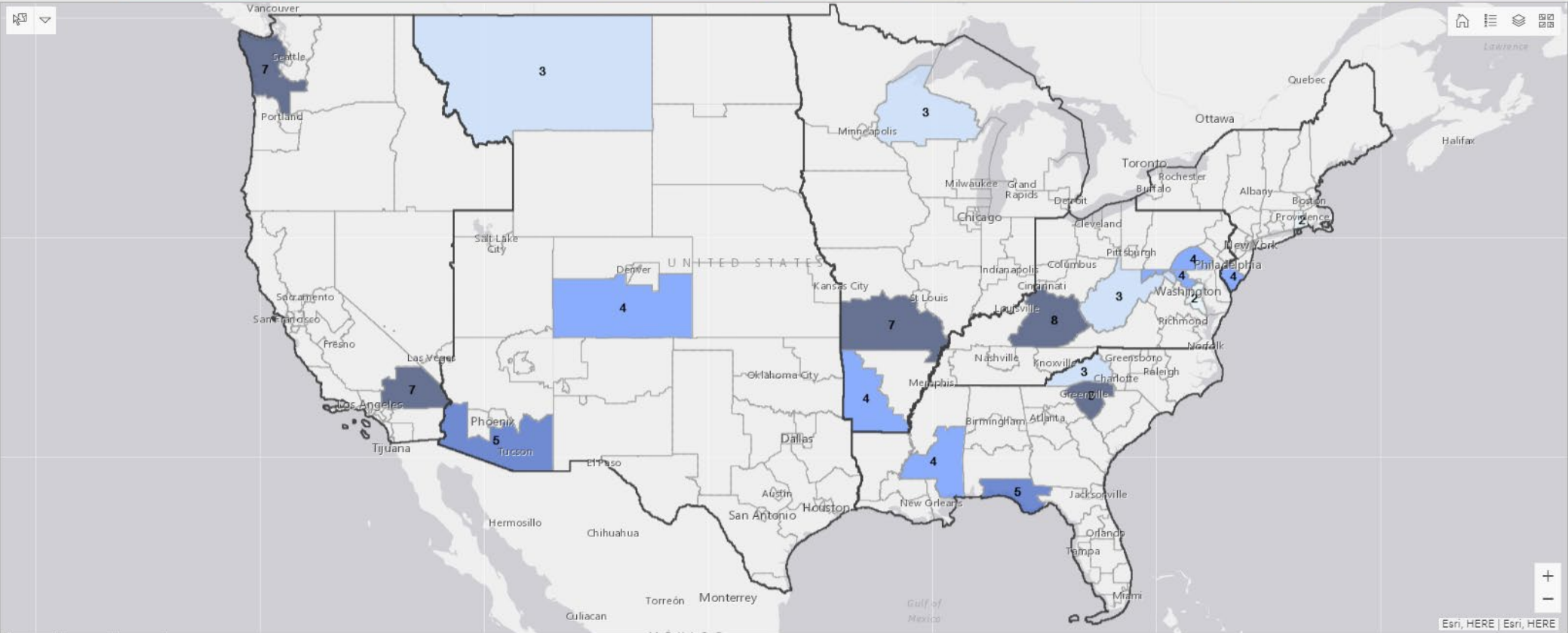
Asheville 2992
3 total outliers

Billings 3160
3 total outliers

ACO Total Outliers

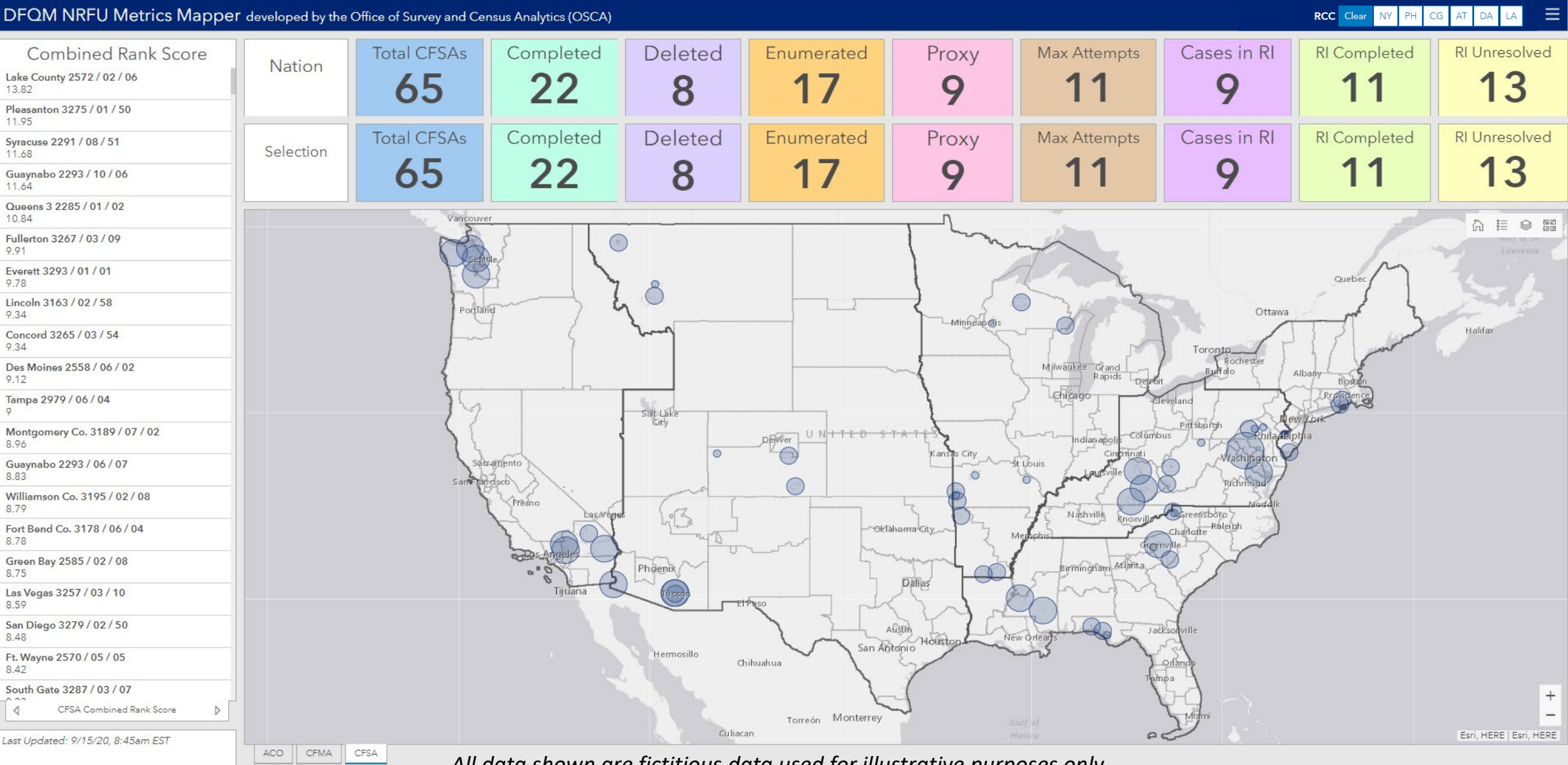
Last Updated:

Nation	Total CFSAs	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
	65	22	8	17	9	11	9	11	13
Selection	Total CFSAs	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
	65	22	8	17	9	11	9	11	13



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NRFU Metrics Mapper - CFSA



NRFU Metrics Mapper - CFSA

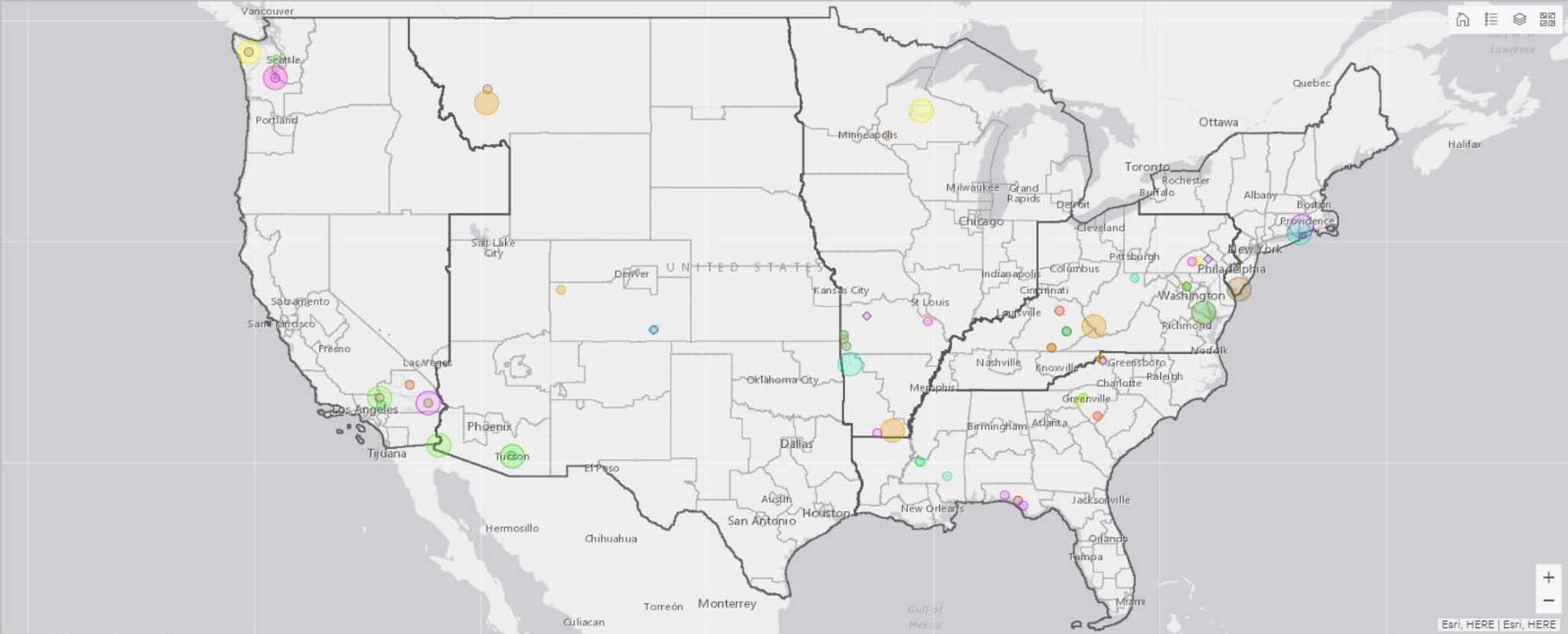
DFQM NRFU Metrics Mapper developed by the Office of Survey and Census Analytics (OSCA)

RCC Clear NY PH CG AT DA LA

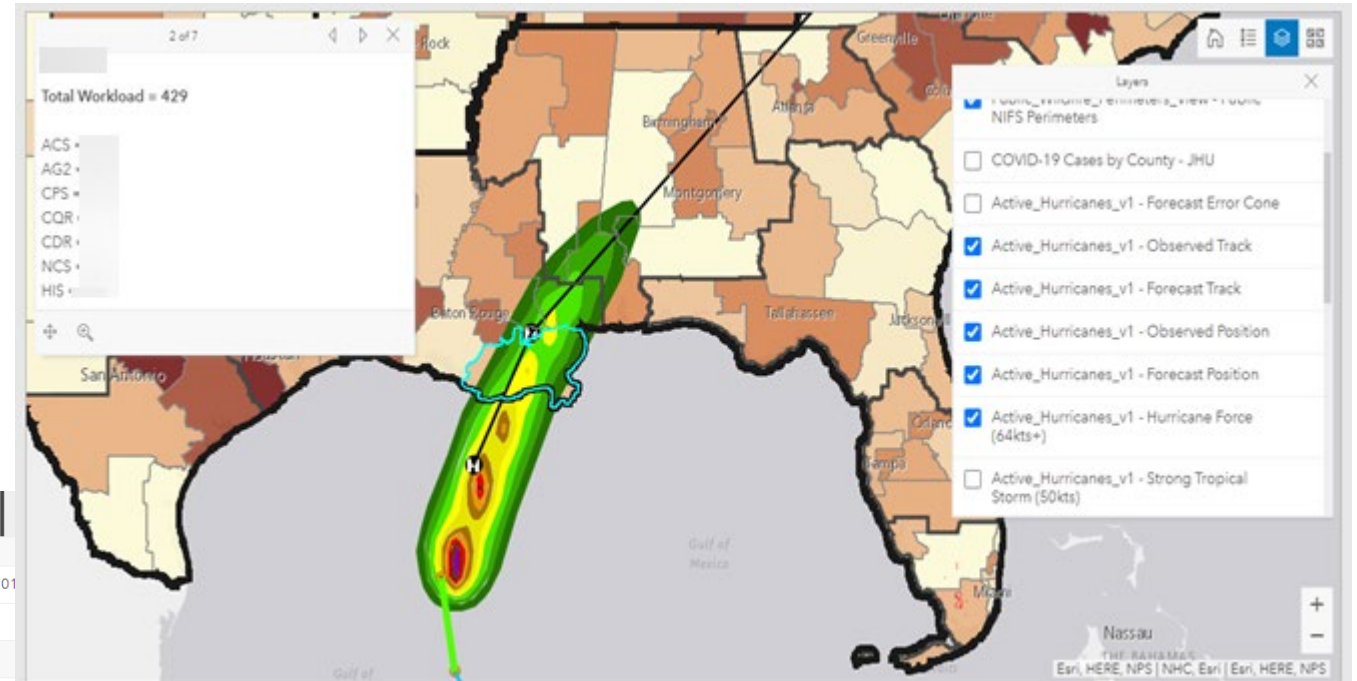
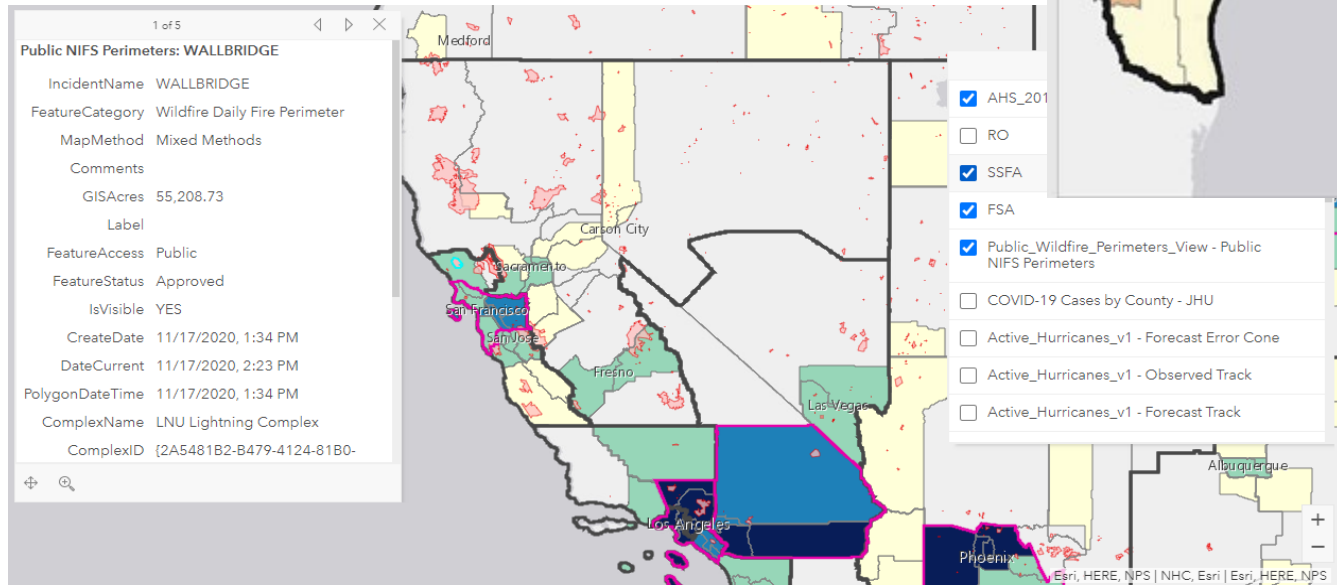
Combined Rank Score
Lake County 2572 / 02 / 06 13.82
Pleasanton 3275 / 01 / 50 11.95
Syracuse 2291 / 08 / 51 11.68
Guaynabo 2293 / 10 / 06 11.64
Queens 3 2285 / 01 / 02 10.84
Fullerton 3267 / 03 / 09 9.91
Everett 3293 / 01 / 01 9.78
Lincoln 3163 / 02 / 58 9.34
Concord 3265 / 03 / 54 9.34
Des Moines 2558 / 06 / 02 9.12
Tampa 2979 / 06 / 04 9
Montgomery Co. 3189 / 07 / 02 8.96
Guaynabo 2293 / 06 / 07 8.83
Williamson Co. 3195 / 02 / 08 8.79
Fort Bend Co. 3178 / 06 / 04 8.78
Green Bay 2585 / 02 / 08 8.75
Las Vegas 3257 / 03 / 10 8.59
San Diego 3279 / 02 / 50 8.48
Ft. Wayne 2570 / 05 / 05 8.42
South Gate 3287 / 03 / 07 8.22
CFSA Combined Rank Score

Last Updated: 9/15/20, 8:45am EST

Nation	Total CFSA's	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
	65	22	8	17	9	11	9	11	13
Selection	Total CFSA's	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
	65	22	8	17	9	11	9	11	13



Hurricane and Wildfire Layers



Workaround to Create a Filter Reset

DFQM NRFU Metrics Mapper by the Office of Survey and Census Analytics (OSCA)

RCC Clear 2,299 2,399 2,599 2,999 3,199 3,299

ACO Total Outliers	Nation	Total CFSAs	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
Lexington 2357 8 total outliers		65	22	8	17	9	11	9	11	13
Olympia 3294 7 total outliers		Total CFSAs	Completed	Deleted	Enumerated	Proxy	Max Attempts	Cases in RI	RI Completed	RI Unresolved
San Bernardino 3278 7 total outliers	Selection									
Springfield 2582 7 total outliers										
Greenville 2909 6 total outliers										
Honolulu 3255 5 total outliers										
Pensacola 2976 5 total outliers										
Tucson 3109 5 total outliers										
Guaynabo 2290 4 total outliers										
Harrisburg 4000 4 total outliers										
Gulfport 2901 4 total outliers										
Colorado Springs 3156 4 total outliers										
Hagerstown 2361 4 total outliers										
Fayetteville 2556 4 total outliers										
Beckley 2390 3 total outliers										
Eau Claire 2584 3 total outliers										
Asheville 2992 3 total outliers										
Billings 3160 3 total outliers										

Filter Reset

Step 1: Clear

Step 2: Refresh

Last Updated:

18

2020CENSUS.GOV

ACO CFMA CFSa

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United States[®]
Census
2020

Workaround to Create a Filter Reset

Selector Options

Data

Categories From

Defined Values

Features

Grouped Values

Value Type

String

Integer

Value

Display Name

*

Step 1: Clear

+ Add

Selector

Label

Filter Reset

Selection

Single

Multiple

Operator

equal

Preferred Display Type

Button bar

Display Type Threshold

10

None Option

Placement

First

Last

Label for None

Step 2: Refresh

Default selection

Step 2: Refresh

Actions

When Selection Changes

Filter

Add Target

List - Combined Rank

Source Field

Target Field

Filter Field

GEOID

string

RCC Category Selector

Source Field

Target Field

Filter Field

rcc

string

List (1)

Source Field

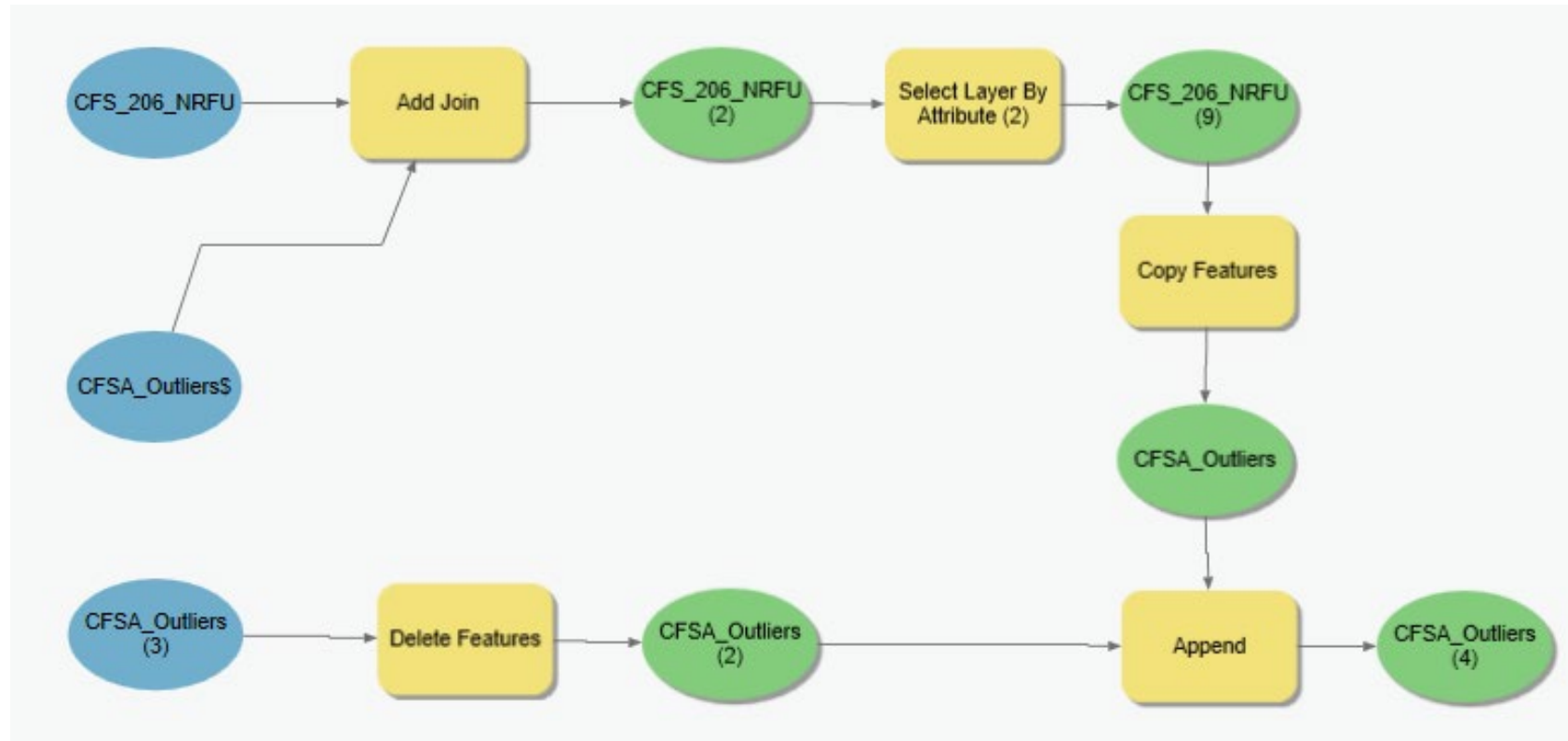
Target Field

Filter Field

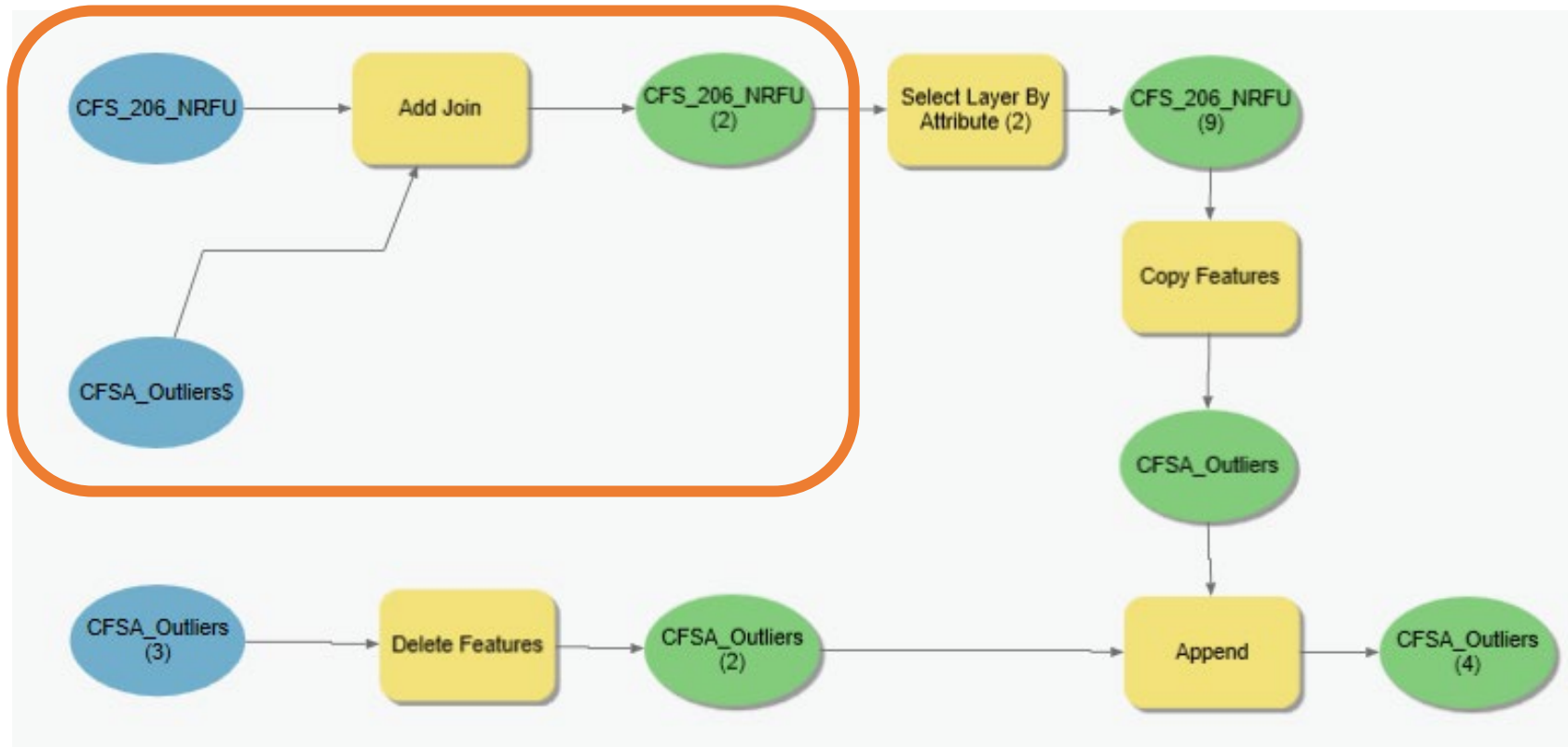
GEOID

string

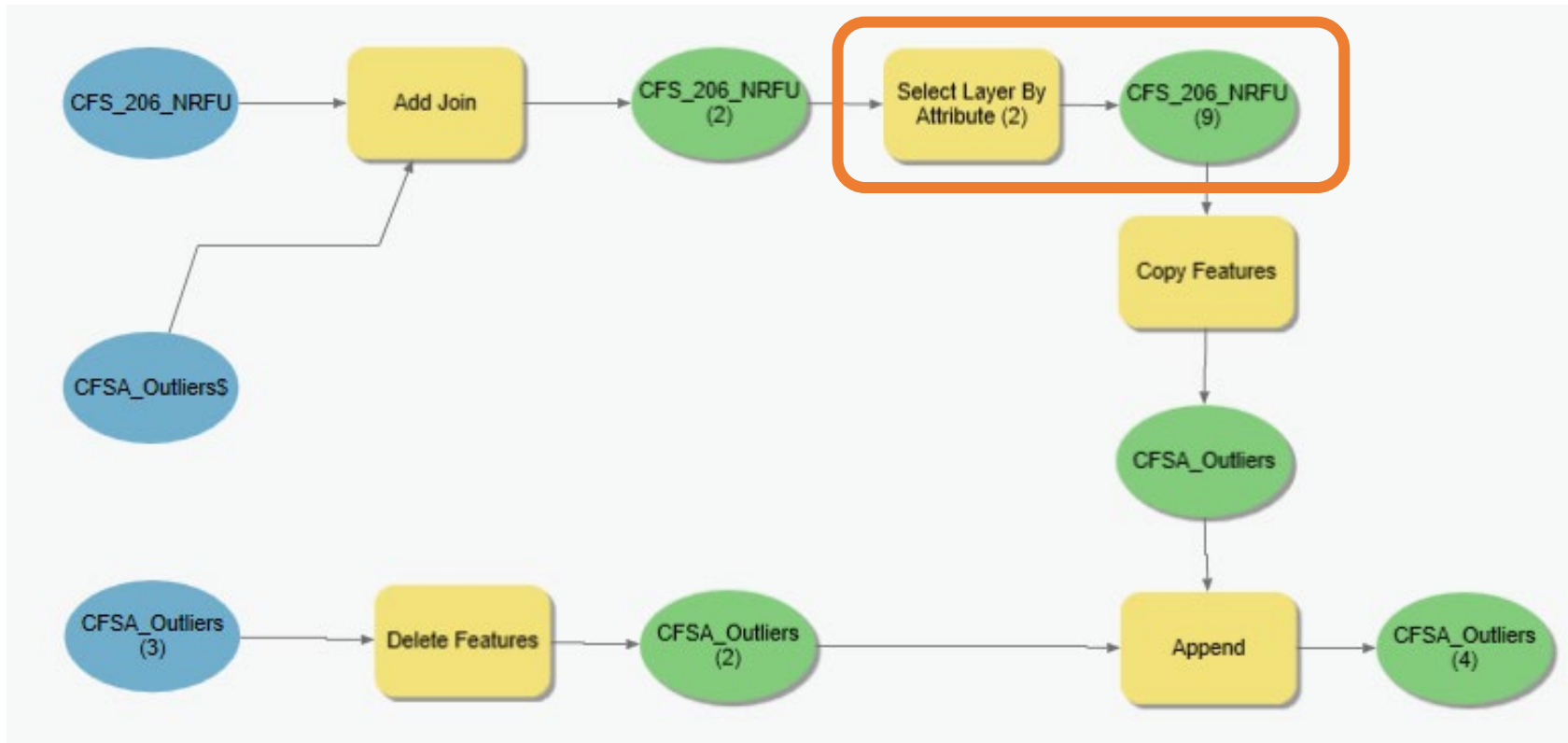
Manual Data Updates using Model Builder



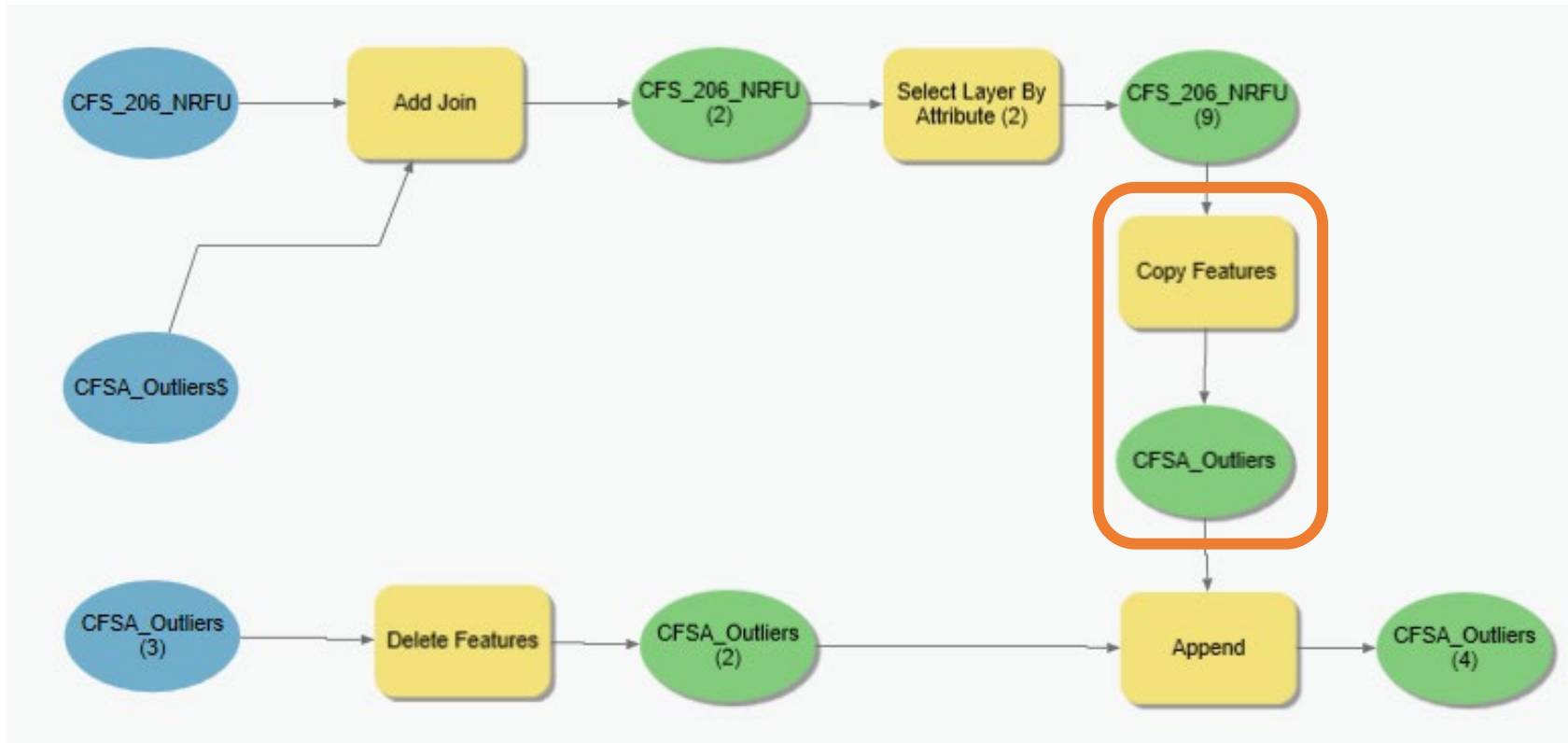
Manual Updates using Model Builder



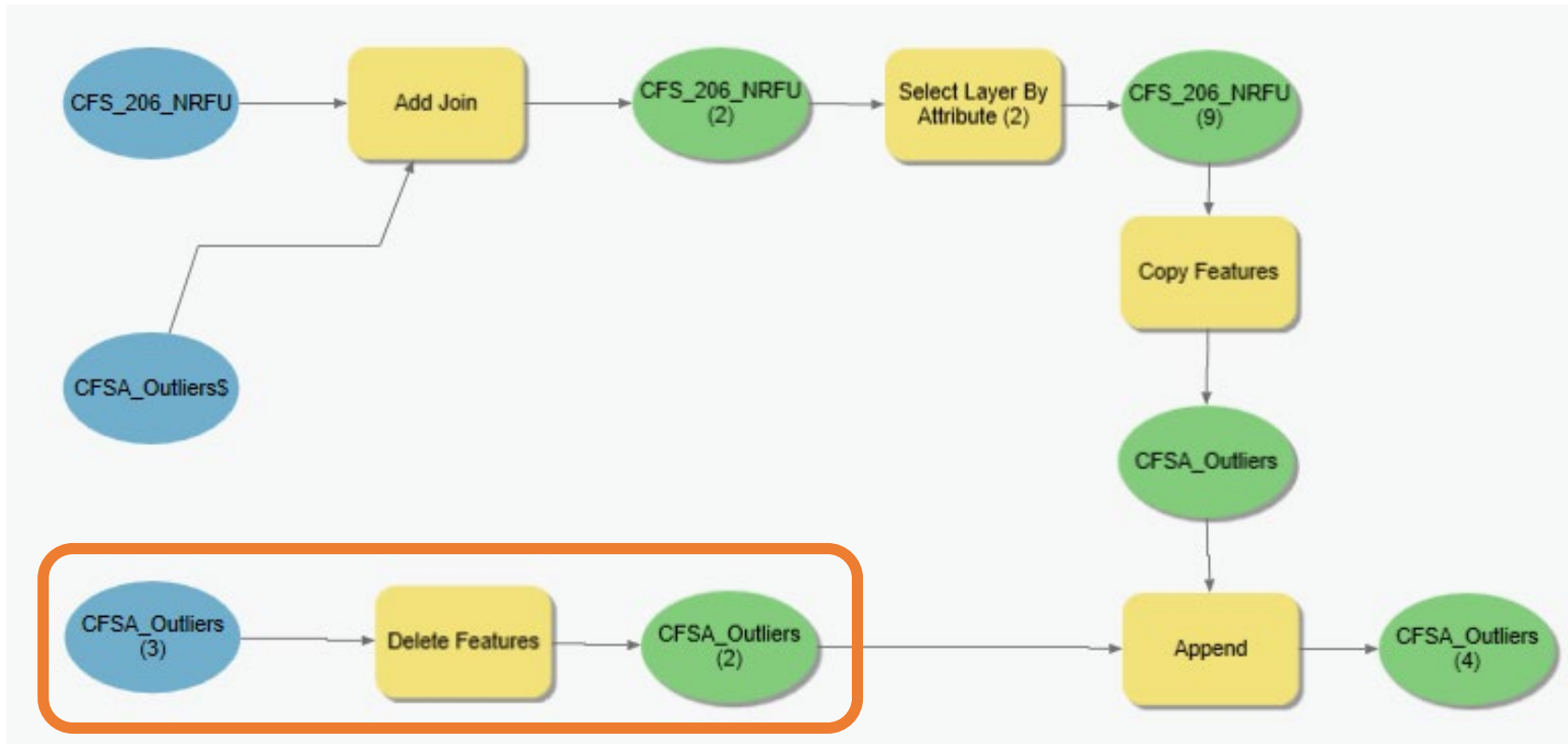
Manual Updates using Model Builder



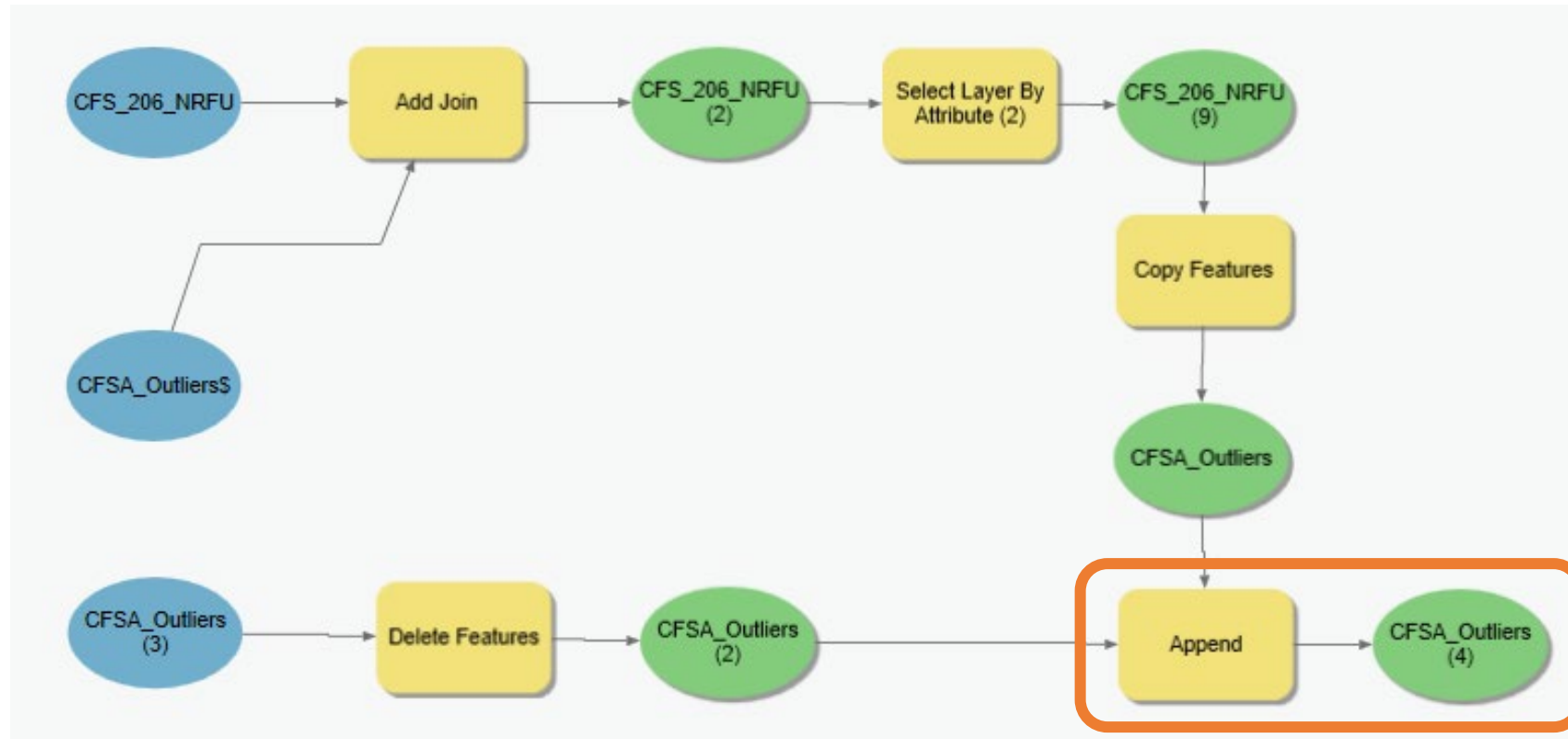
Manual Updates using Model Builder



Manual Updates using Model Builder



Manual Updates using Model Builder



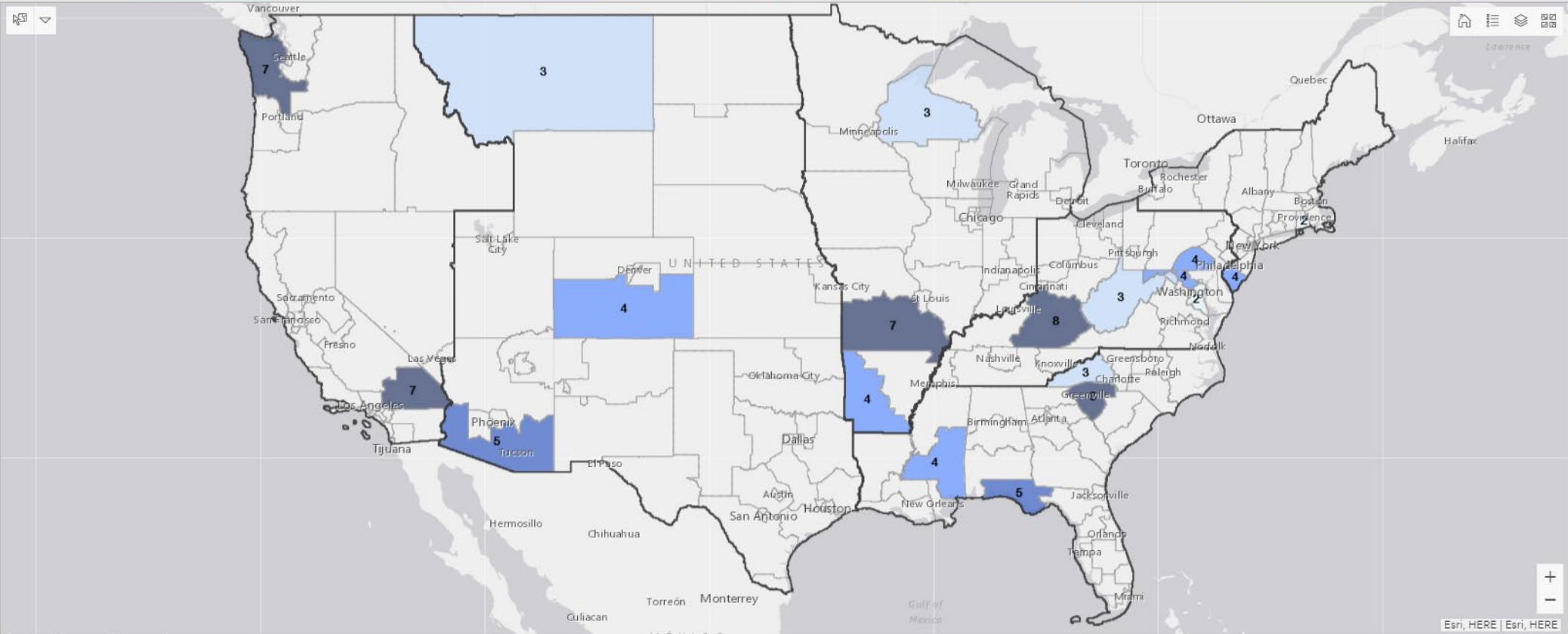
Total Outliers by ACO using Test Data

DFQM NRFU Metrics Mapper by the Office of Survey and Census Analytics (OSCA)

RCC Clear NY PH CG AT DA LA

ACO Total Outliers
Lexington 2357 8 total outliers
Olympia 3294 7 total outliers
San Bernardino 3278 7 total outliers
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Guaynabo 2293 4 total outliers
Harrisburg 2373 4 total outliers
Egg Harbor 2264 4 total outliers
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Colorado Springs 3156 4 total outliers
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Eau Claire 2584 3 total outliers
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Billings 3160 3 total outliers
ACO Total Outliers
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LARCC Outliers using Test Data

DFQM NRFU Metrics Mapper developed by the Office of Survey and Census Analytics (OSCA)

RCC Clear NY PH CG AT DN LA

ACO Total Outliers

San Bernardino 3278
7 total outliers

Olympia 3294
7 total outliers

Honolulu 3255
5 total outliers

Anchorage 3298
2 total outliers

Nation

Total CFSAs

65

Completed

22

Deleted

8

Enumerated

17

Proxy

9

Max Attempts

11

Cases in RI

9

RI Completed

11

RI Unresolved

13

Selection

Total CFSAs

4

Completed

1

Deleted

0

Enumerated

0

Proxy

1

Max Attempts

1

Cases in RI

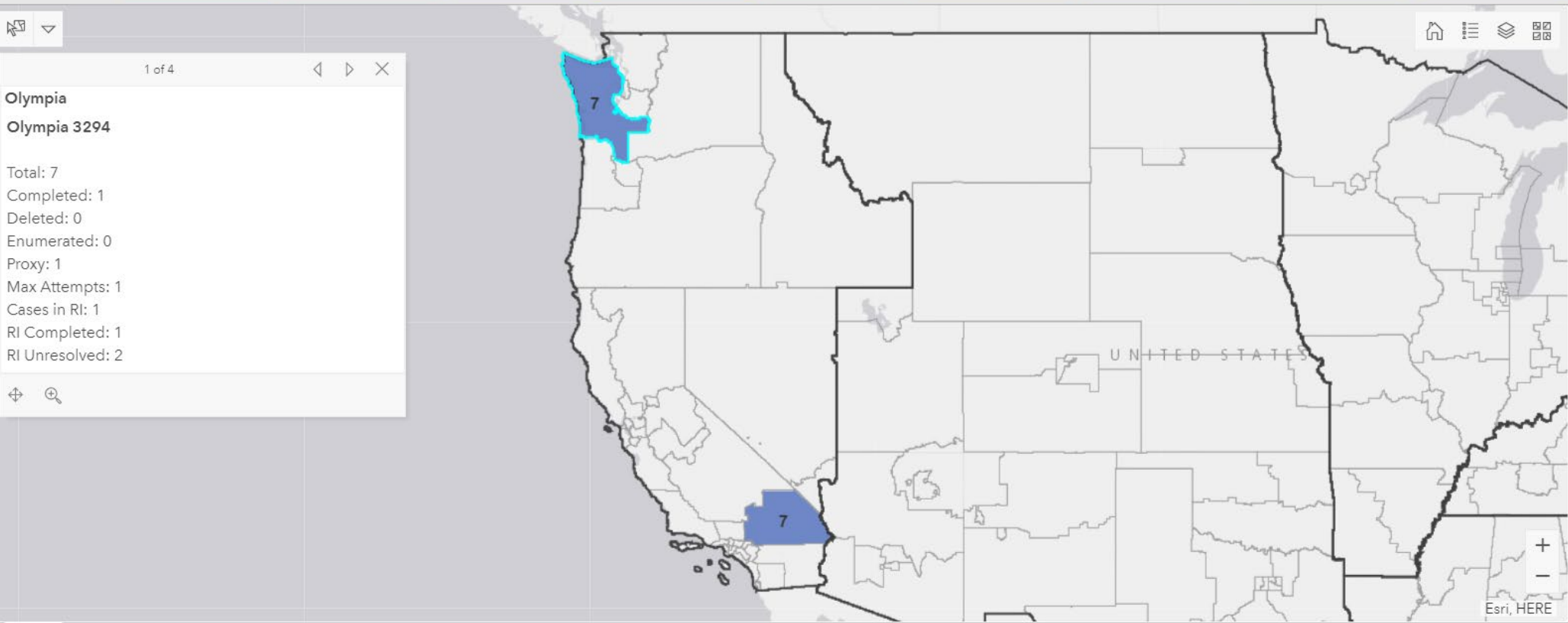
1

RI Completed

1

RI Unresolved

2



Last Updated: 9/15/20, 8:45am EST

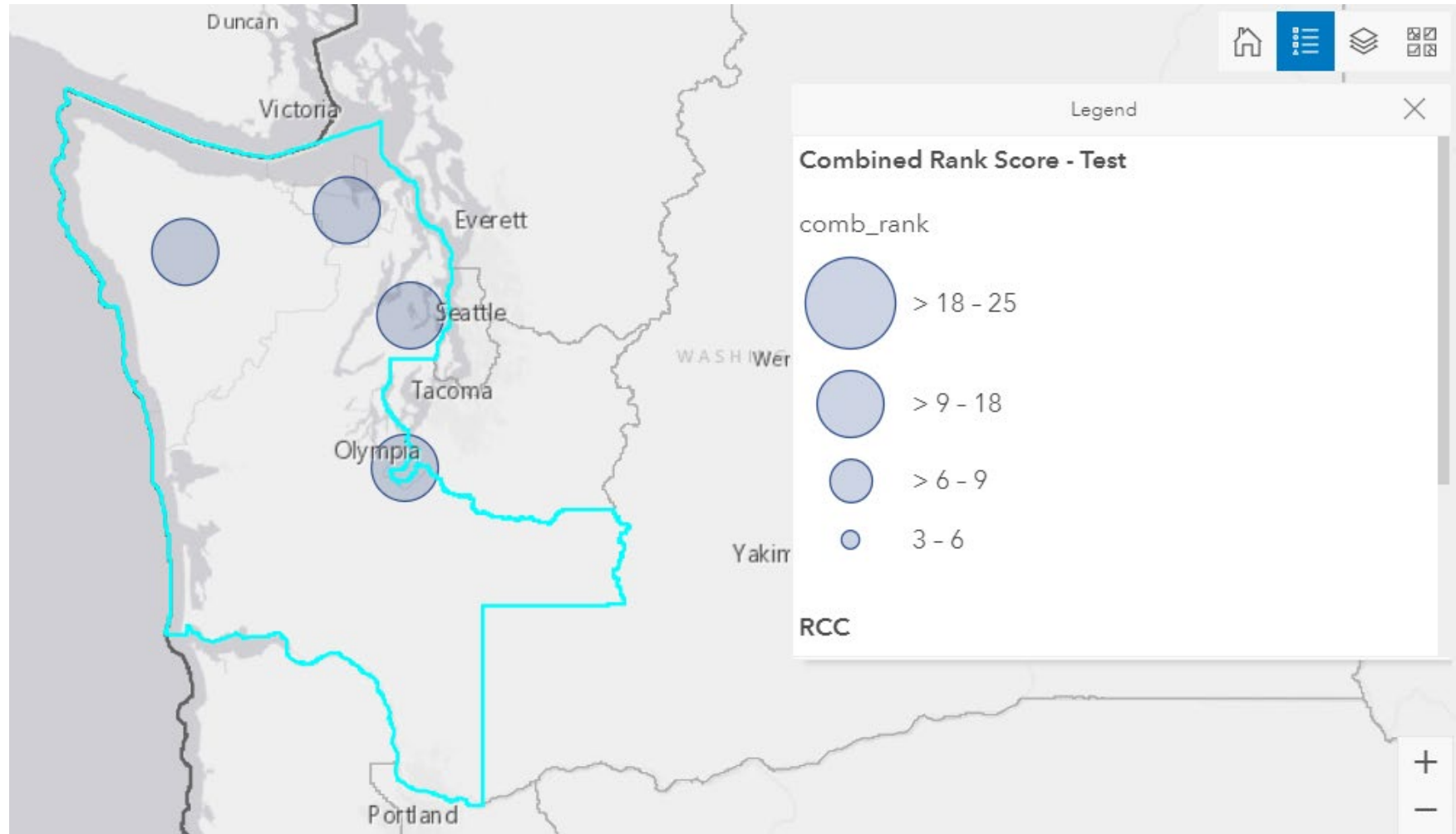
ACO

CFMA

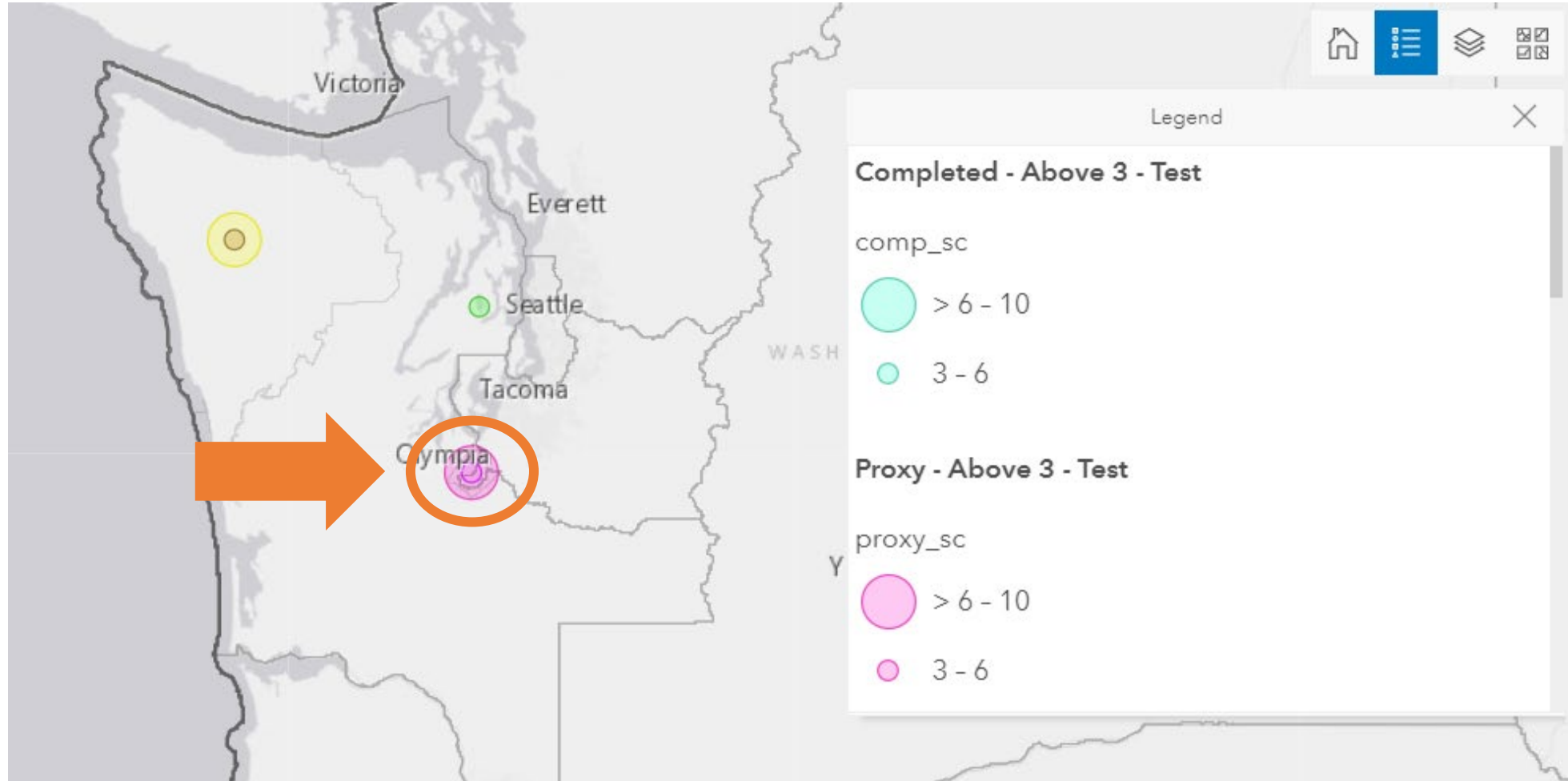
CFSA

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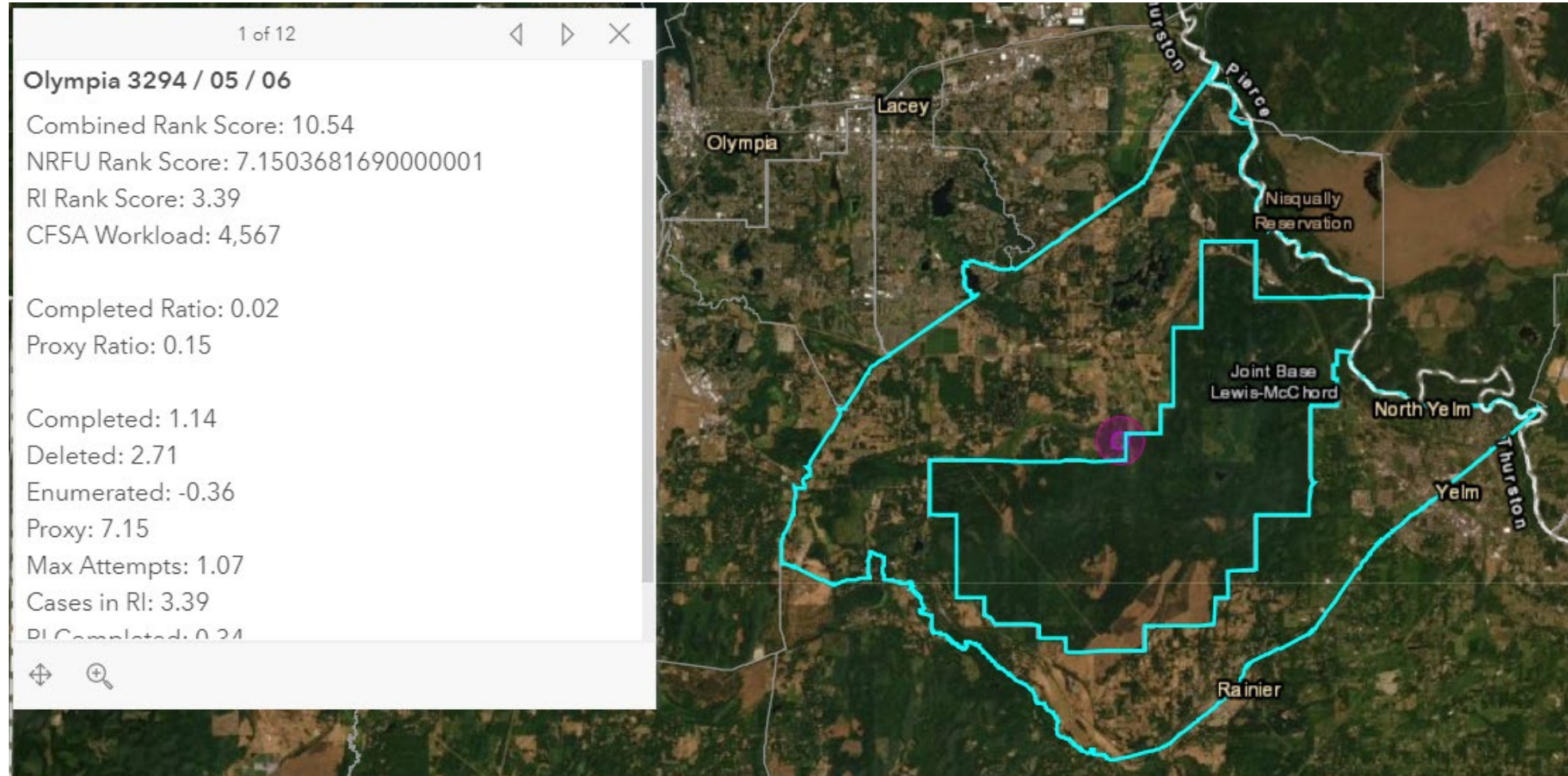
Outlier Investigation



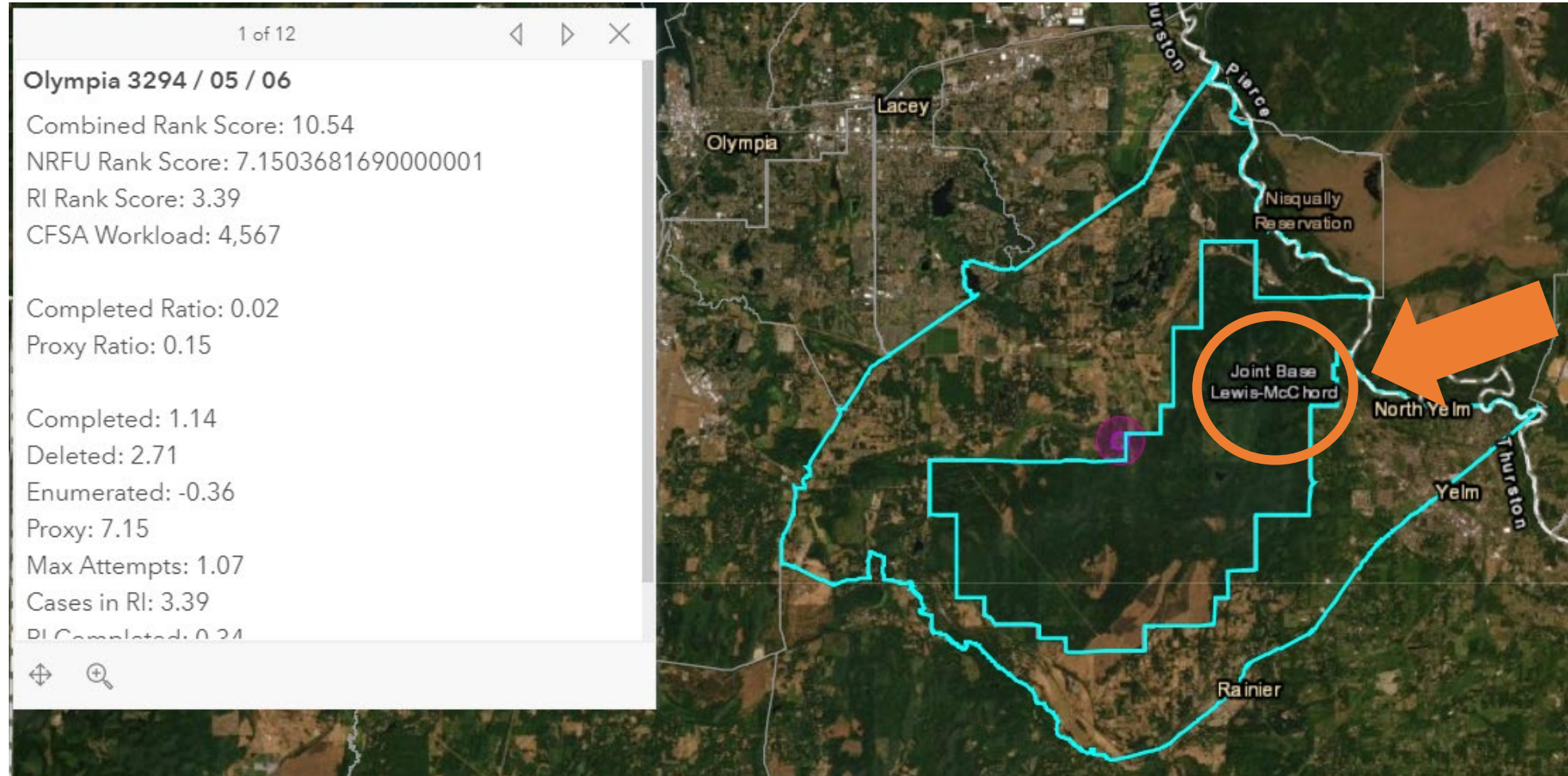
Outlier Investigation



Outlier Investigation



Outlier Investigation



Investigative Outcomes

- **No action necessary**
- **Refresher training / counseling / coaching sessions**
- **Recommendations for Supplemental RI**
- **Enumerator separations**
- **Enumerators travelled**

Lessons Learned

What Worked Well

- Ability to see the geographic boundaries of collection geography
- Ability to see land-use such as rural/urban or military bases
- Weather, hurricane and wildfire layers
- Pop-up boxes for layers were informative
- Overall picture to triage and understand outlier distribution

Lessons Learned

Potential Improvements

- Mapper for each region
- More filtering functionality for types of metrics
- More filtering functionality from ACO map/list to CFMA/CFSA maps/lists
- More layers for context such as
 - Smoke/air quality index layer especially for areas with wildfires
 - Vacancies
 - Progress of operation
- Automated updating of the mapper data

Future Iterations

- Metrics Mapper was improved and adapted for the Field Quality Monitoring Program for ongoing surveys
- First survey is the 2021 American Housing Survey
- Collaboration with the in-house ESRI staff to create a REST service for automated updating

AHS FQM Metrics Mapper

AHS FQM Metrics Mapper developed by the Office of Survey and Census Analytics (OSCA)



National NYRO PHRO CGRO ATRO DNRO LARO

Nation	FQM FSAs	FRs Lq Wkld	Total Outliers	RR	Partial	Refusal	Type-B/C	In Cback	Overall INR	Time	Sections	CHI 5+
Selected	FQM FSAs	FRs Lq Wkld	Total Outliers	RR	Partial	Refusal	Type-B/C	In Cback	Overall INR	Time	Sections	CHI 5+

FQM FSA Outliers

3 outlier(s)
5.89 combined rank

2 outlier(s)
4.65 combined rank

2 outlier(s)
4.51 combined rank

2 outlier(s)
4.37 combined rank

2 outlier(s)
4.32 combined rank

FRs

431 cases

431 cases

431 cases

431 cases

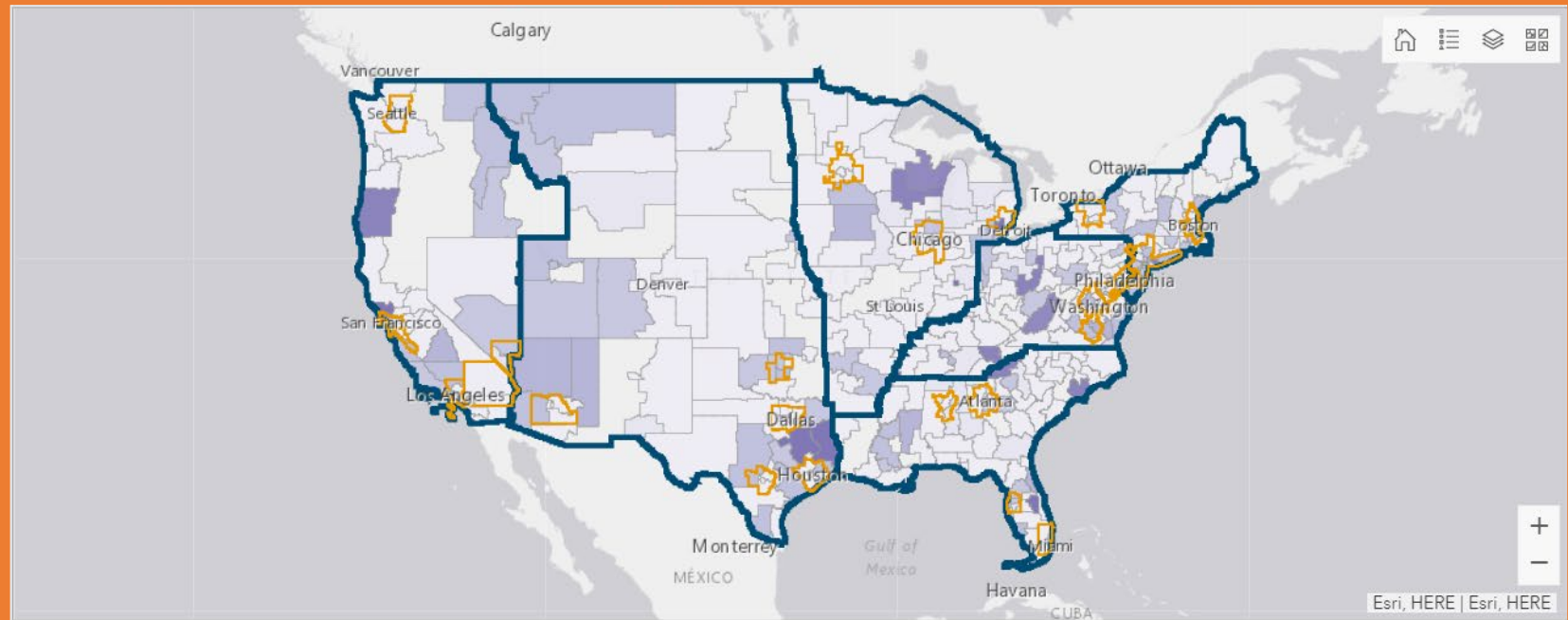
431 cases

431 cases

431 cases

431 cases

431 cases



Avg. FQM FSA
Workload
Checked-in



Issue Tracker

New

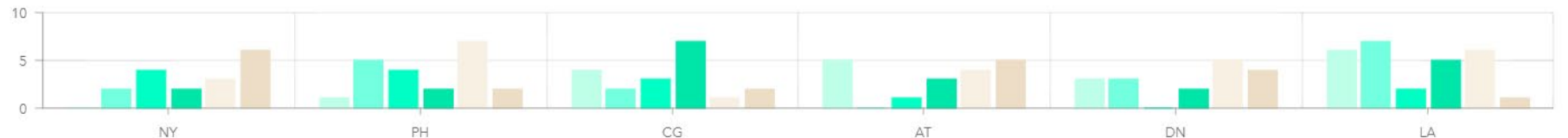
In Progress

Closed

Resources:

[Go to Issue Tracker](#)
[Go to FQM Metrics Dashboard](#)
[Go to FQM Issue Tracker Dashboard](#)
[Go to Data Dictionary](#)

Updated: 4/28/2021, 8:00 PM



Selectors

View Selector
Clear All Filters
Issue Tracker Selector

☒ New York

Clear All Filters

Step 1: Clear

Step 2: Refresh

Issue Tracker Status

Clear

New

In Progress

Closed

FSA Selectors

FSA: RR Outlier

Clear

Yes

No

FSA: Partial Outlier

Clear

Yes

No

FSA: Refusal Outlier

Clear

Yes

No

FSA: Type-B/C Outlier

Clear

Yes

No

FSA: Incomplete Callback Outlier

Clear

Yes

No

FSA: Overall INR Outlier

Clear

Yes

No

FSA: Time in Instrument Outlier

Clear

Yes

No

FSA: Sections Flagged Outlier

Clear

Yes

No

FSA: CHI 5+ Outlier

Clear

No

Case Selectors

Cases: Metro / National

Clear

Metro

National

Cases: Outcome Code

All

Cases: Outcome + Workload Types

All

Cases: Time in Instrument Flag

Clear

Yes

No

Cases: Avg. # of Sections Flagged

0

4

Cases: Last CHI Date

- ☒ Clear
- ☐ Within the last 5 days
- ☐ More than 5 days
- ☐ More than 10 Days
- ☐ More than 2 Weeks
- ☐ Never
- ☐ Manual

FR Selectors

FRs: Large Workload

Clear

Yes

No

FR: Response Rate

0

1

FR: Partial Rate

0

1

FR: Refusal Rate

0

1

FR: Type-B/C Rate

0

1

FR: Incomplete Callback Rate

0

1

FR: Overall Item Non-response Rate

0.03

0.45

FR: Case Item Non-response Rate

0.03

0.43

FR: Time in Instrument Rate

0

1

FR: Sections Flagged Rate

0

4

Point Zoom - Admin Only



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