

# Characterization of Dust Emissions from Playa and Desert Surfaces in the Salton Sea Air Basin

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**IID**

*A century of service.*

# Salton Sea Air Quality Mitigation Program

- Approximately 300,00 acre-feet per year of conserved water transfer (agriculture to urban, QSA)
- Comprehensive, science-based, adaptive program
  - Proactively detect, locate, assess, and identify options to mitigate dust emissions from exposed Salton Sea playa





# Estimate Emissions

## Objectives:

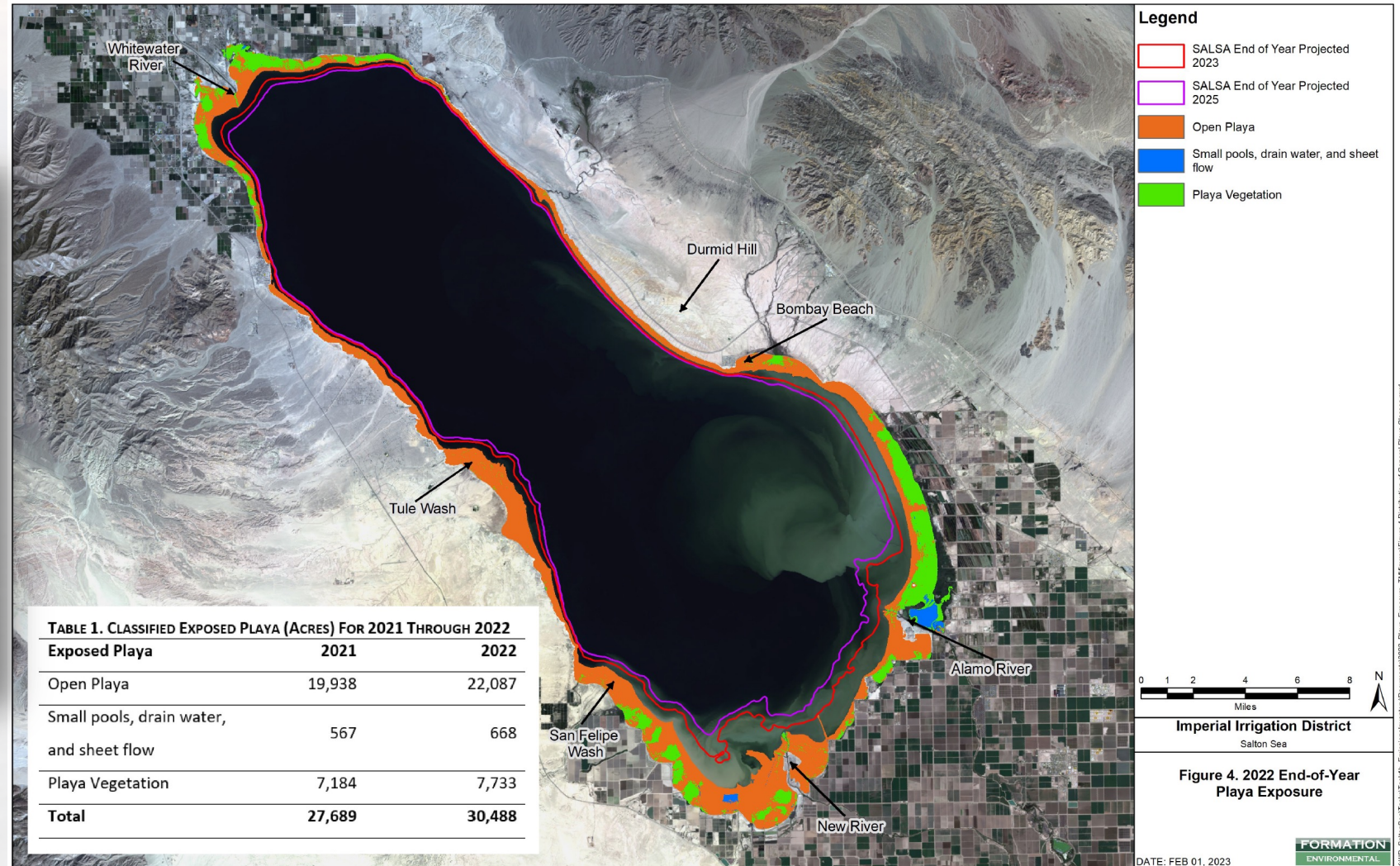
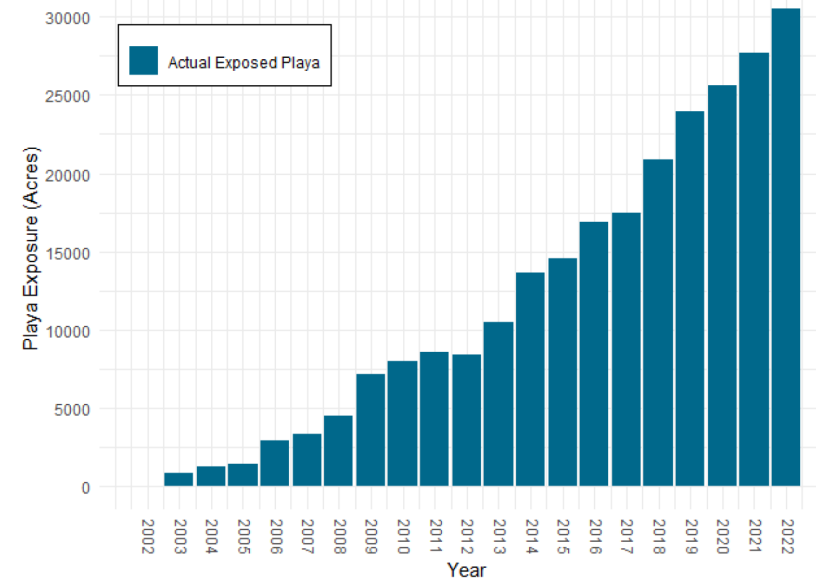
- Where and when dust emissions occur?
- How much dust is emitted?
- Where does the dust plume go?
- Which areas of the playa should be prioritized for dust control?



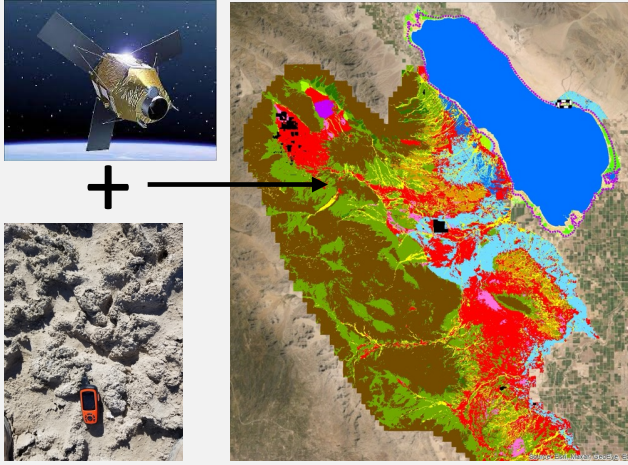


# Map Playa Exposure

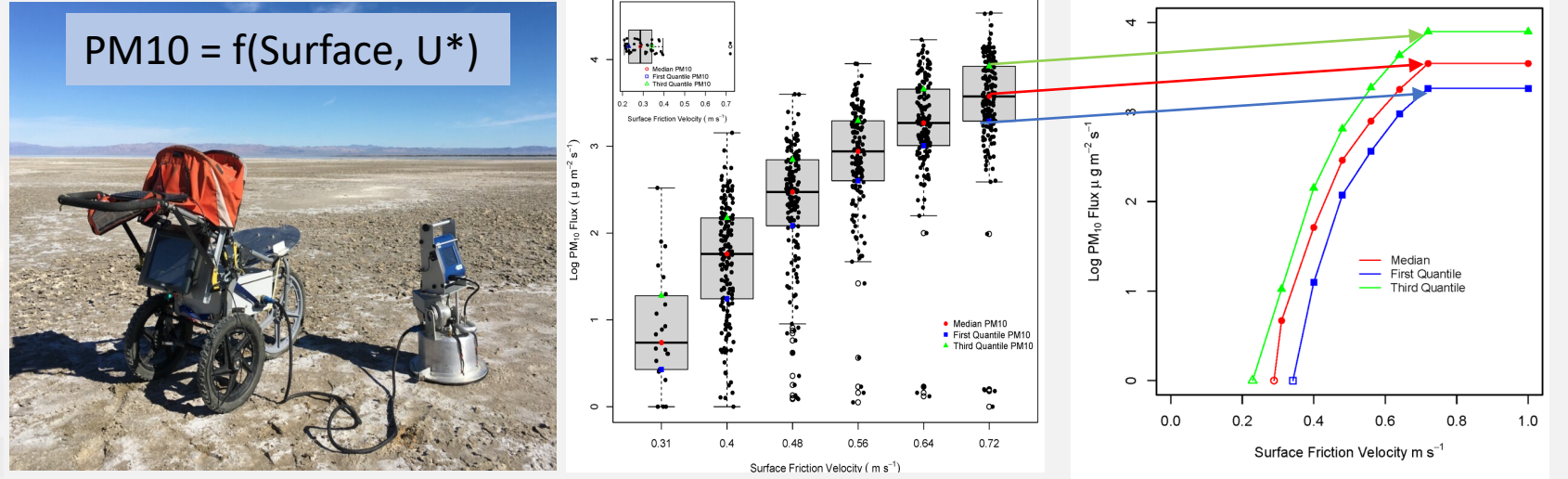
FIGURE 3. ACTUAL PLAYA EXPOSURE FROM 2003 THROUGH 2022



## Step 1: Playa and Desert Geomorphic Mapping

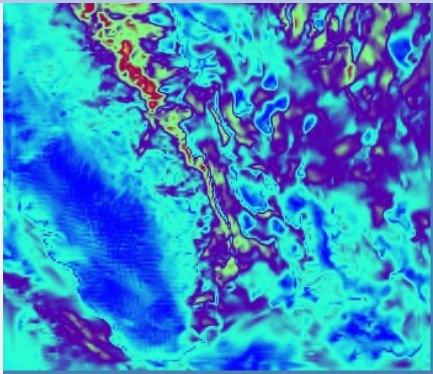


## Step 2: PI-SWERL – Emission Rates by Playa Surface or Desert Geomorphic Landform

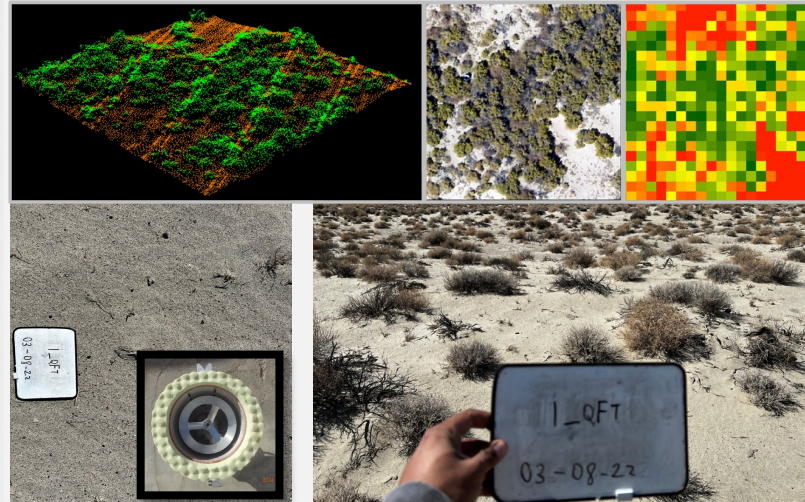


## Step 3: WRF – Wind Seed

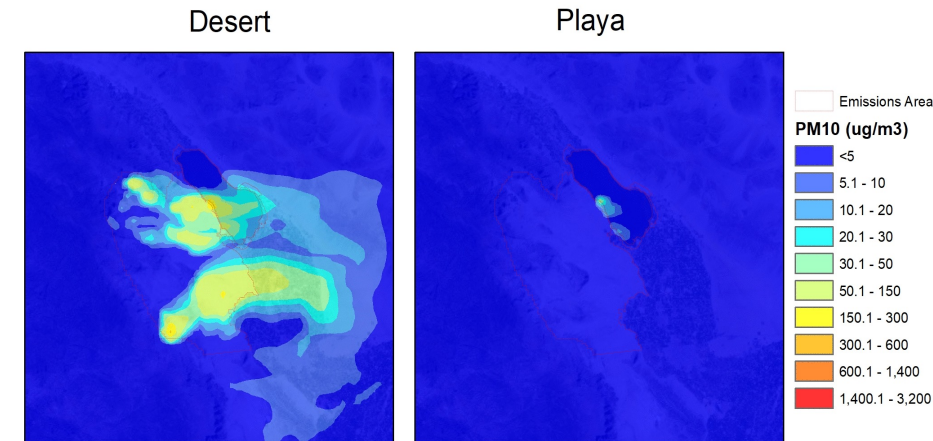
**WRF** 10-m wind speed for the calculation of  $U^*$

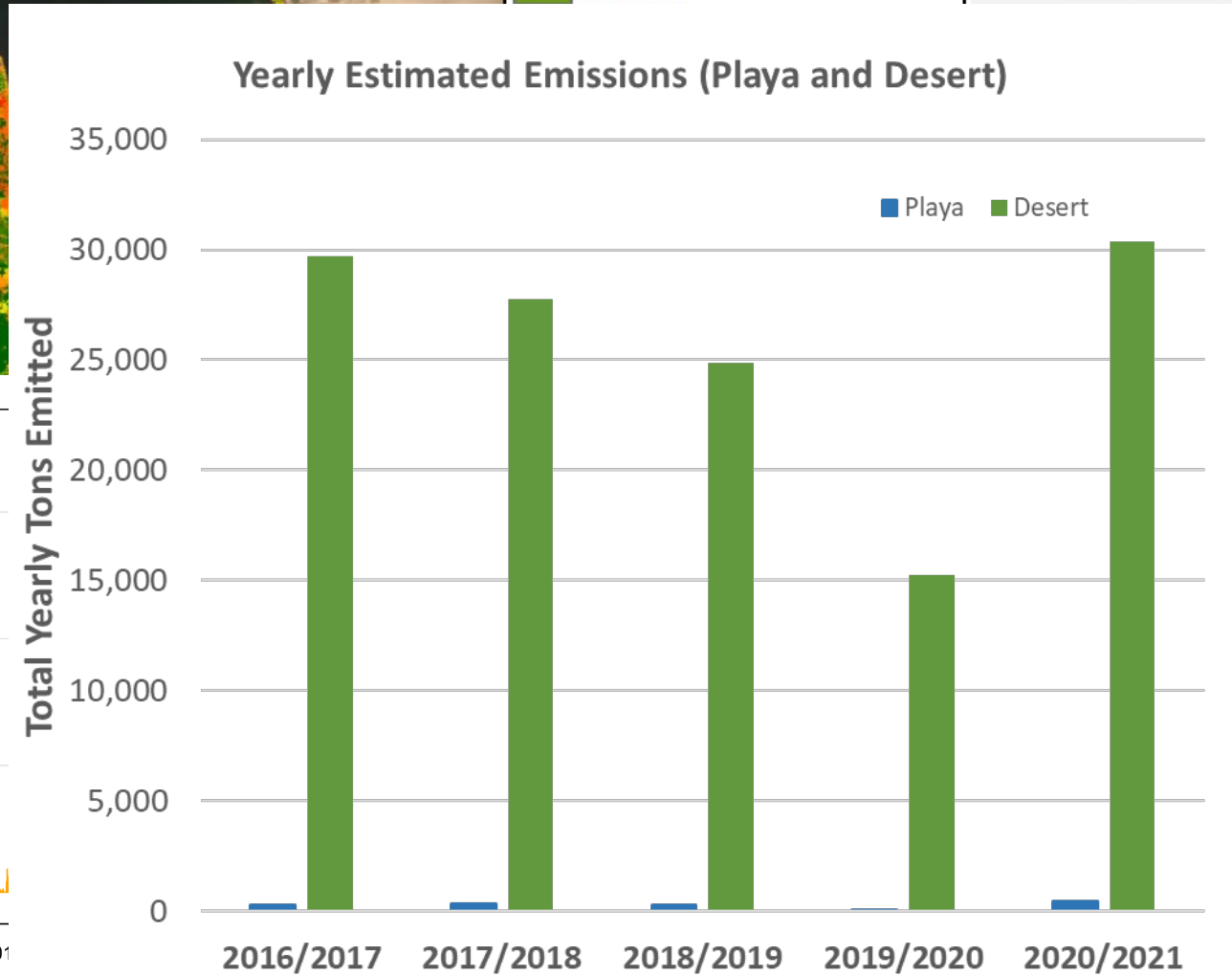
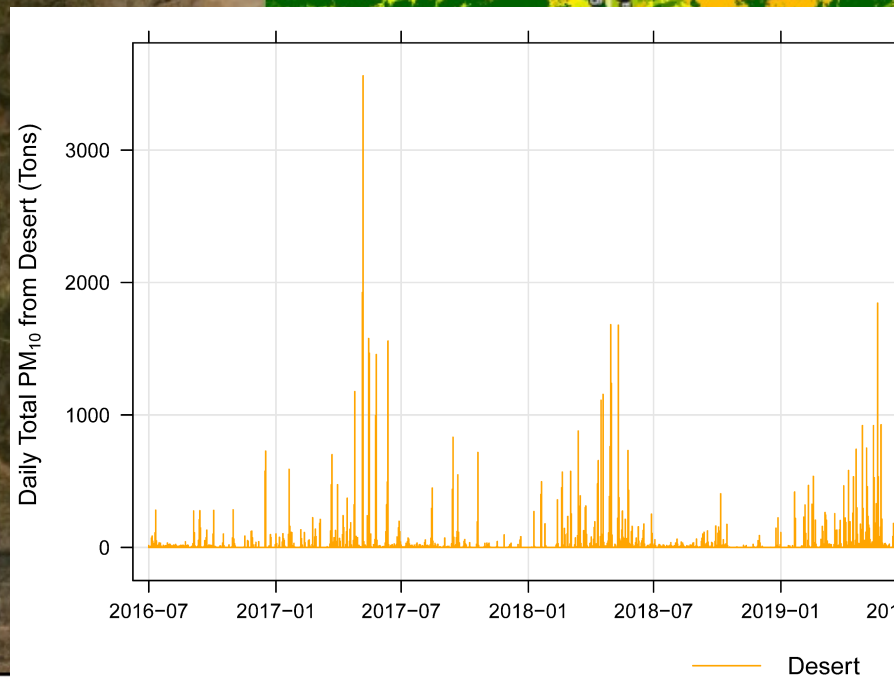


## Step 4: Corrected Frictional Velocity



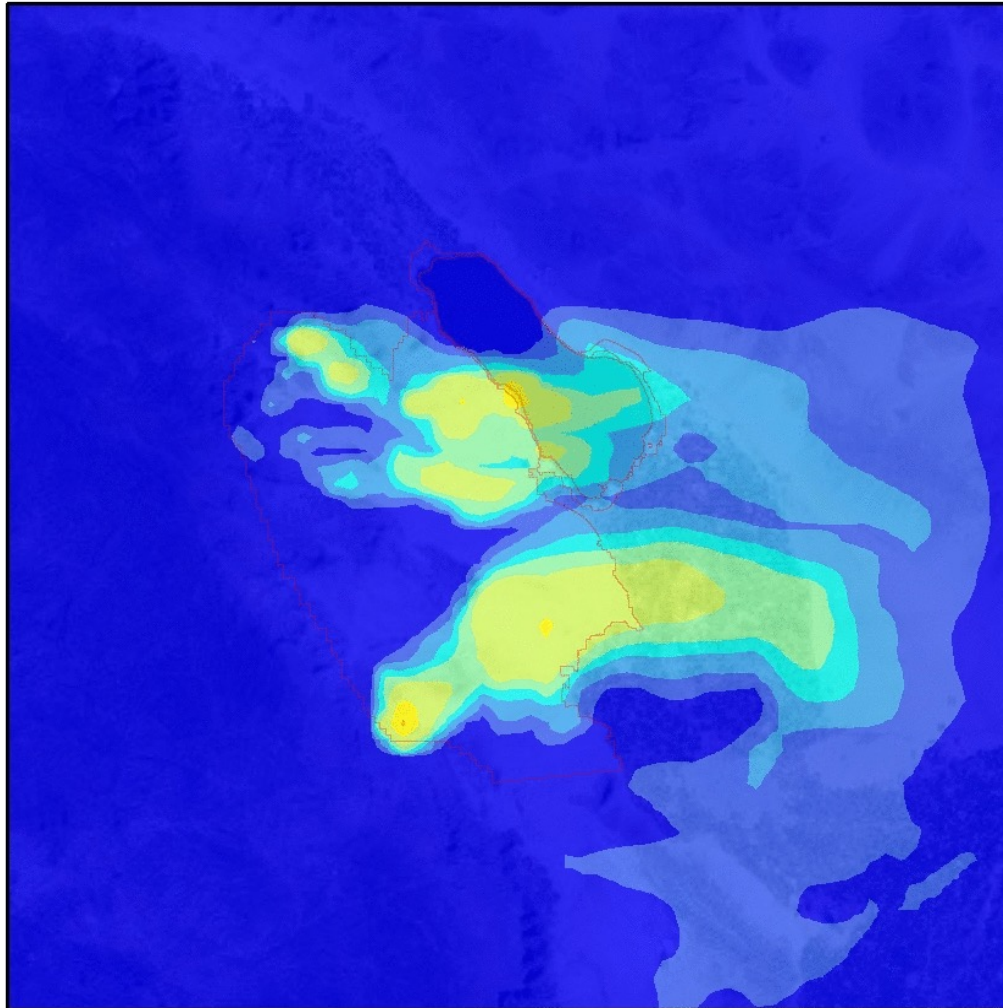
## Step 5: Emissions & Plume Modeling



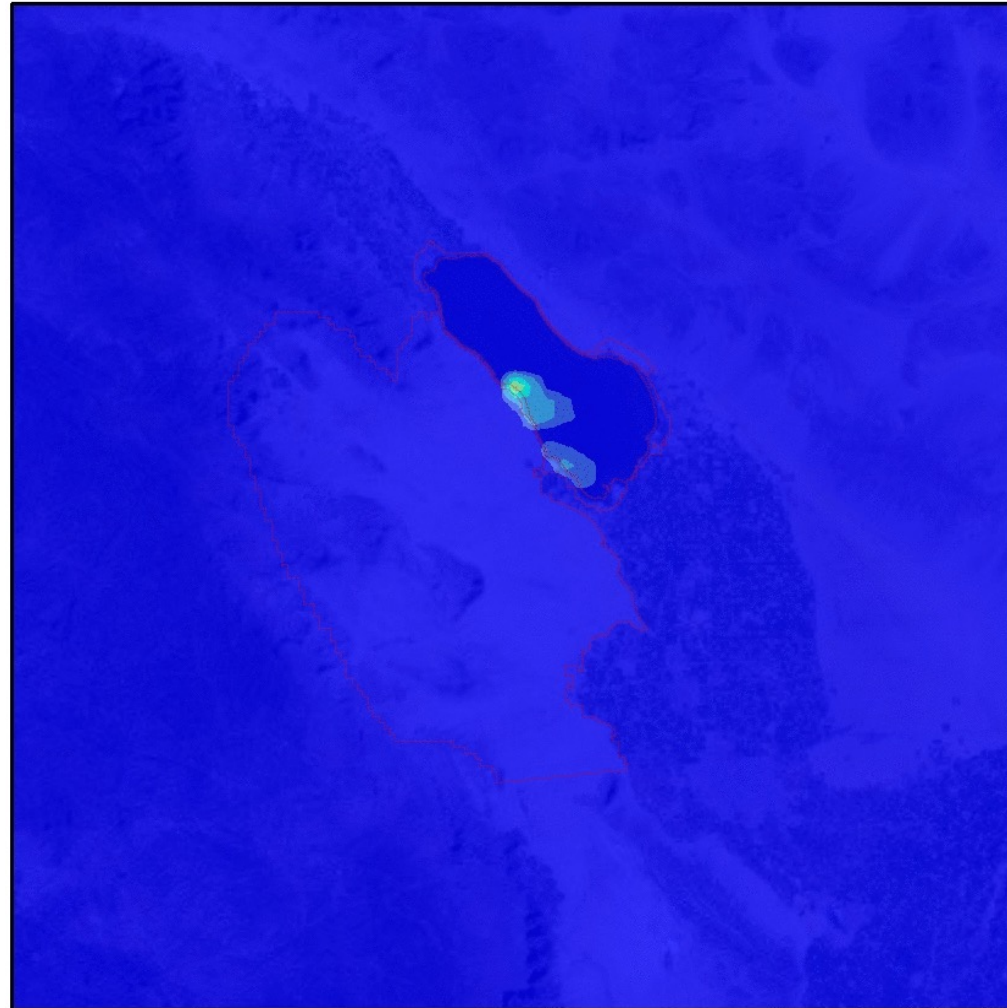


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Desert

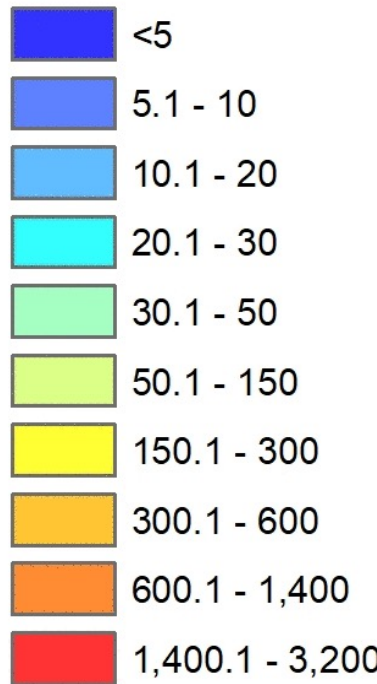


Playa

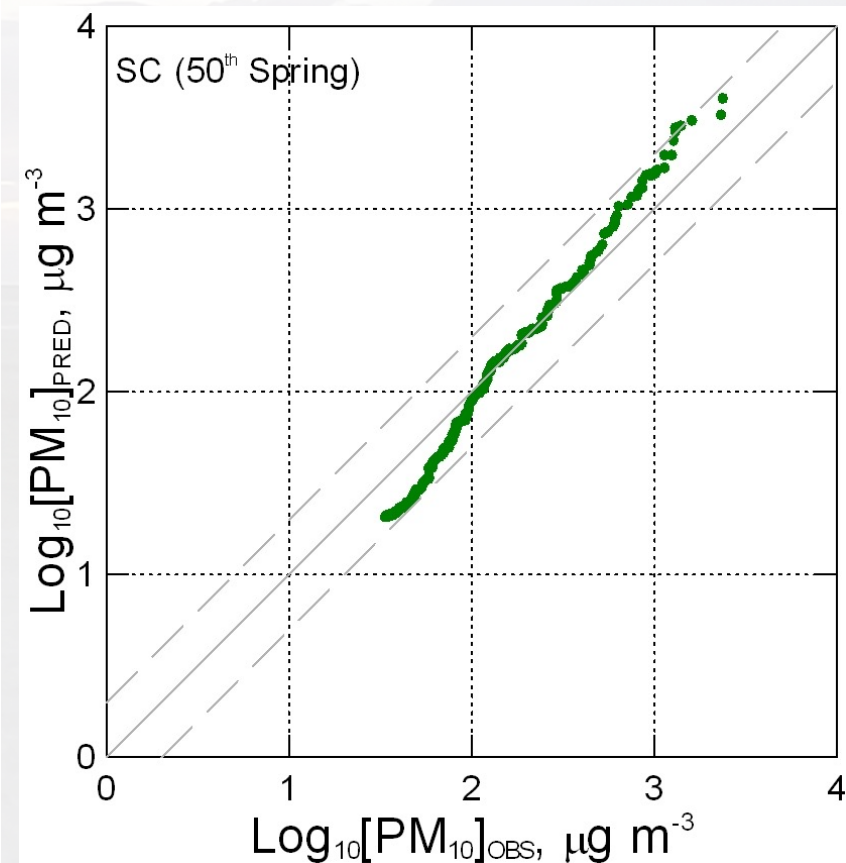
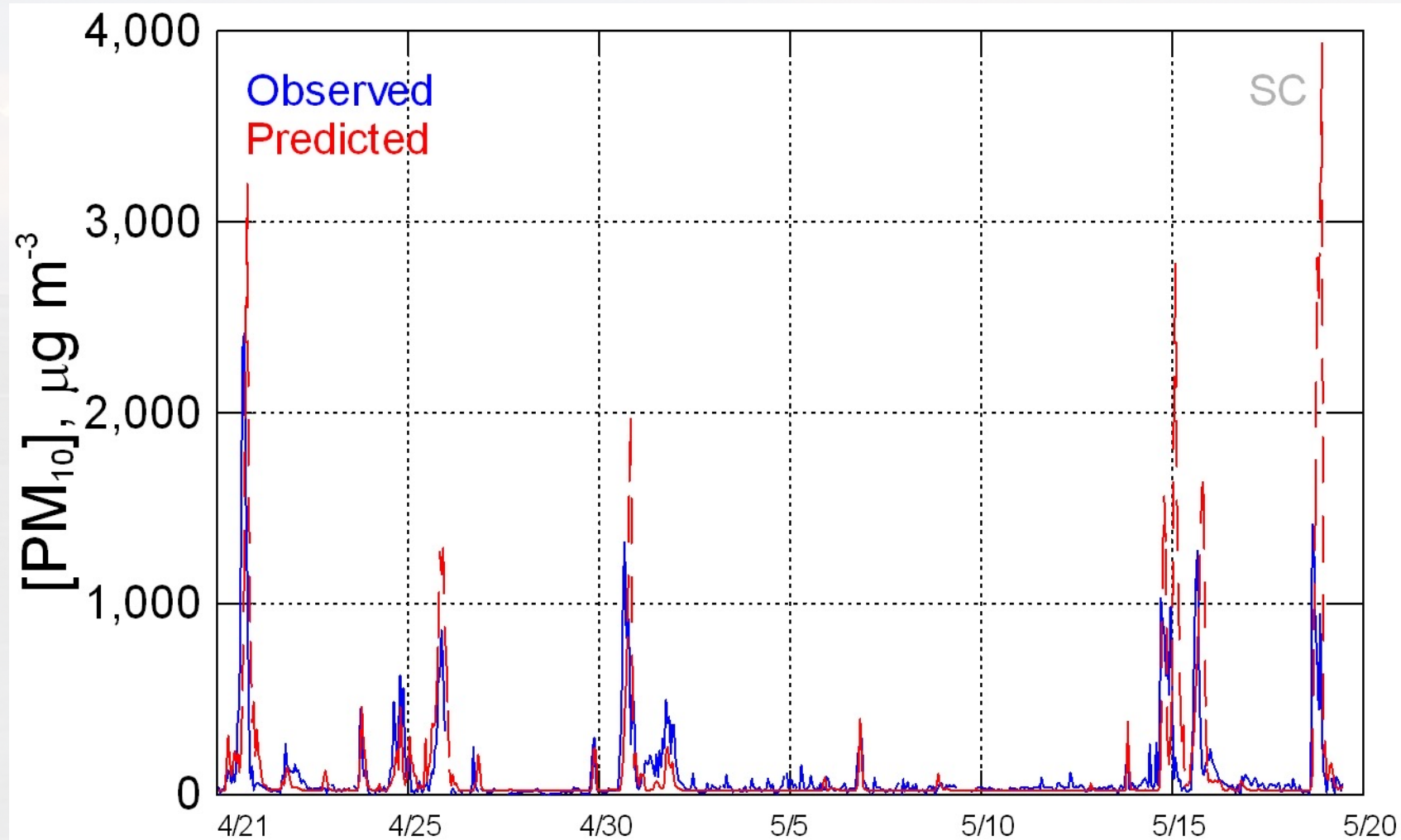


Emissions Area

**PM10 (ug/m3)**

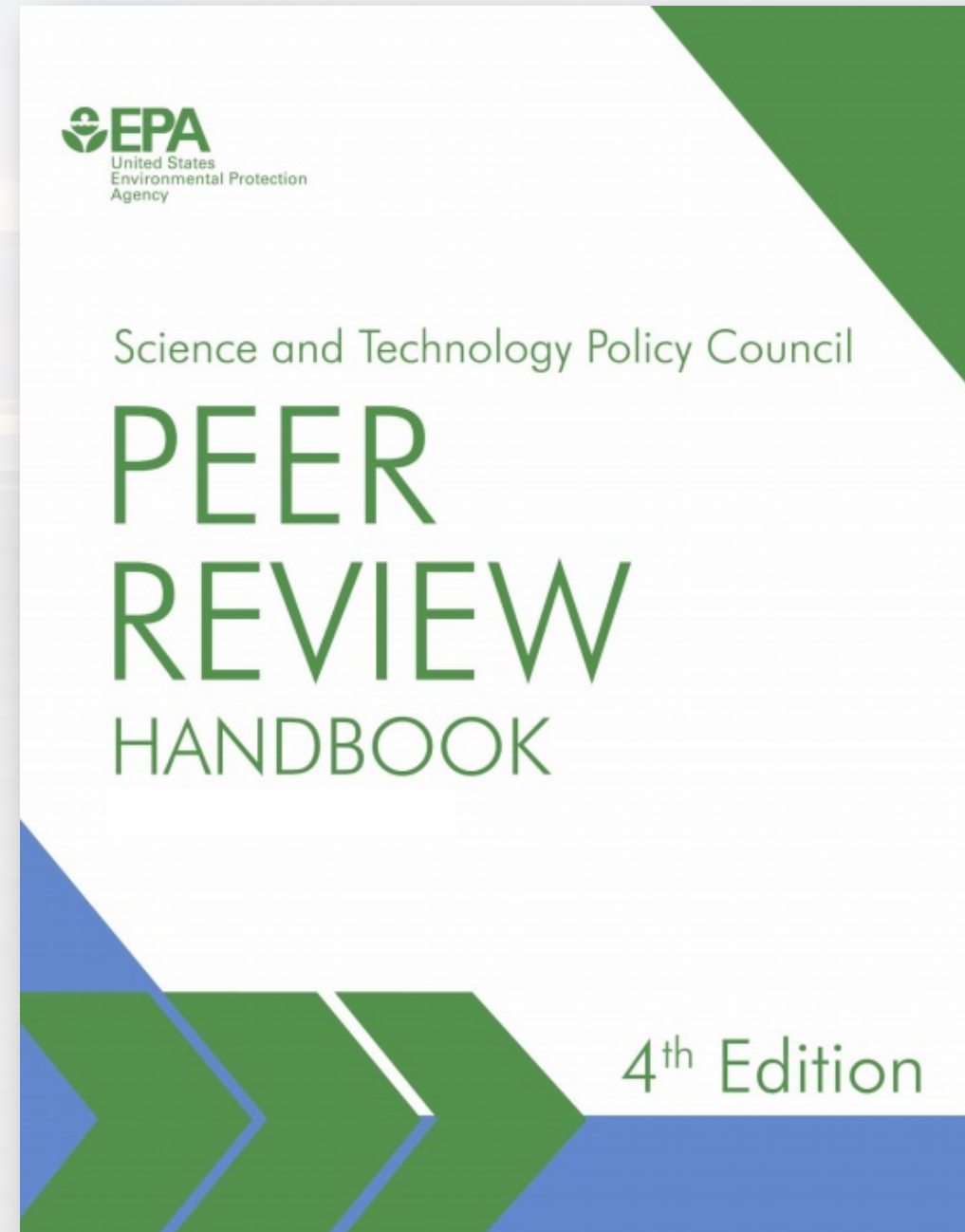


# Salton City – PM<sub>10</sub>



# Peer Review Process

- **Goal:** Obtain an independent review of the product from experts who have not contributed to its development
- Followed EPA “Science and Technology Policy Council - PEER REVIEW HANDBOOK”
  - Major scientific and technical work products
- Maintained records. Documented review, respond and incorporate comments.



# Peer Review Process



**Name:** Amato Evan, PhD

**Location:** UC San Diego

*"The work laid out in these documents is impressive and represents an appropriate method to identify high priority areas of the playa for dust control."*



**Name:** James King, PhD

**Location:** University of Montreal, Canada

*"The approach is scientifically rigorous and appropriate, if not overachieving for the goals of identifying the high emission areas of the playa to evaluate DCM control placement."*



**Name:** William Porter, PhD

**Location:** UC Riverside

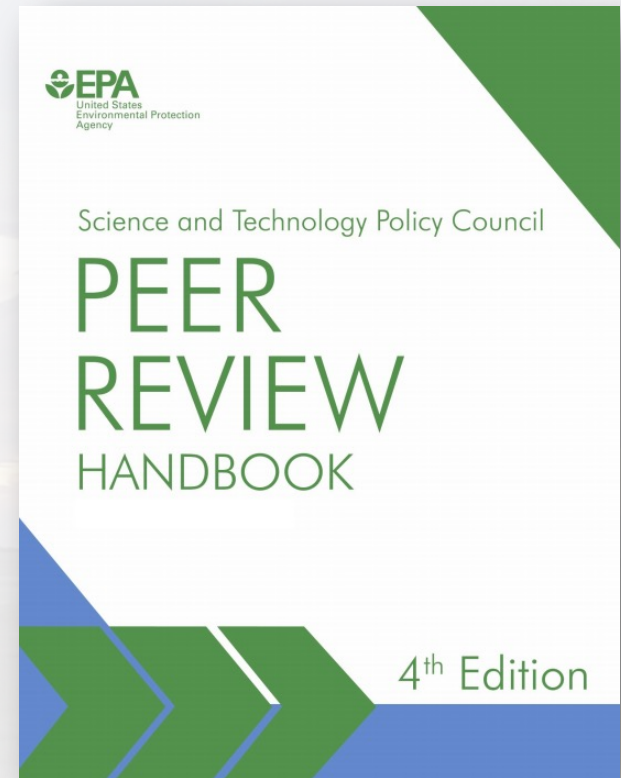
*"In my opinion this work represents a strong contribution to the objectives identified by the SS AQMP."*



**Name:** Mark Sweeney, PhD

**Location:** University of South Dakota

*"This is a thorough study with a massive data set, the results of which definitely can inform priority dust control implementation under the SS AQMP. To be quite honest, I've never seen such an integrated field-mapping-modeling study on this type of regional scale."*



# Research Papers / Manuscripts

## 1) Surface characterization (published, 1/2022)

- Remote sensing to identify:
  - Landform and crust type
  - Soil moisture and surface sand

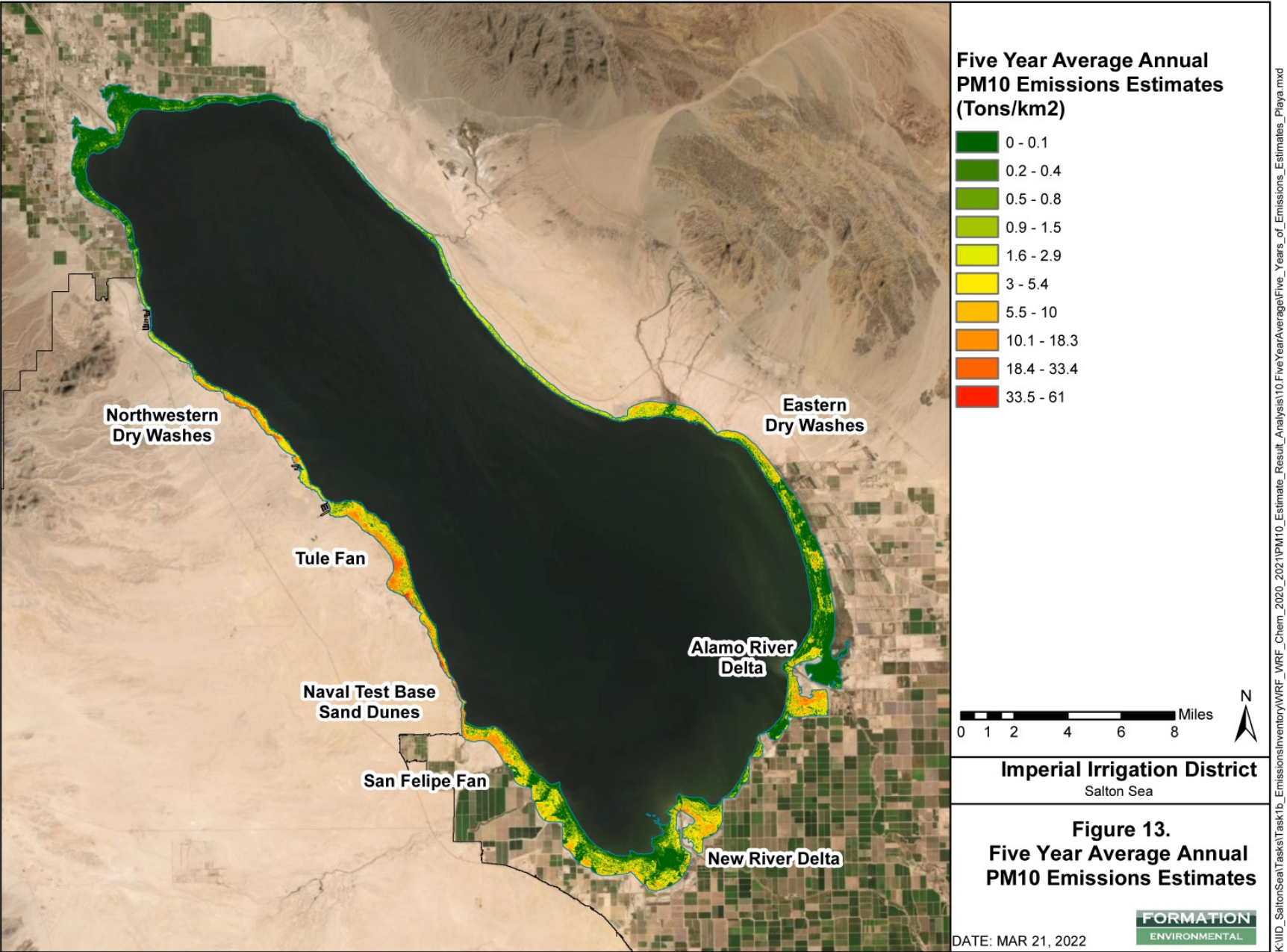
## 2) PM<sub>10</sub> emission potential (published, 1/2023)

- PI-SWERL sampling and surface survey

## 3) Wind field modeling and Ruleset (in review)

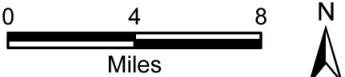
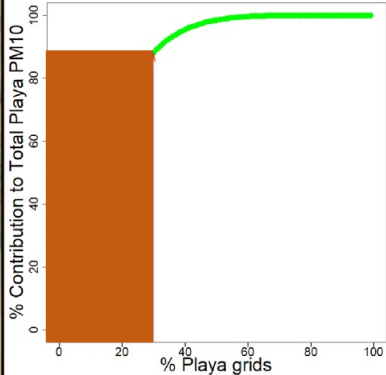
- Ruleset development
- Surface wind adjustments
- WRF model application
- Performance evaluation





### Five Year Annual Average Summary (07/2016 – 06/2021)

|                                        |        |
|----------------------------------------|--------|
| Total Acreage                          | 25,589 |
| Playa Acreage                          | 17,923 |
| Open Water Acreage                     | 660    |
| Vegetation Acreage                     | 7,006  |
| Emissions Estimates                    |        |
| Tons                                   | 291.87 |
| Tons day <sup>-1</sup>                 | 0.80   |
| Tons km <sup>-1</sup> yr <sup>-1</sup> | 2.82   |



Imperial Irrigation District  
Salton Sea

Figure 14.  
Ranking of Average  
Annual Emissions Estimates

DATE: APR 05, 2022



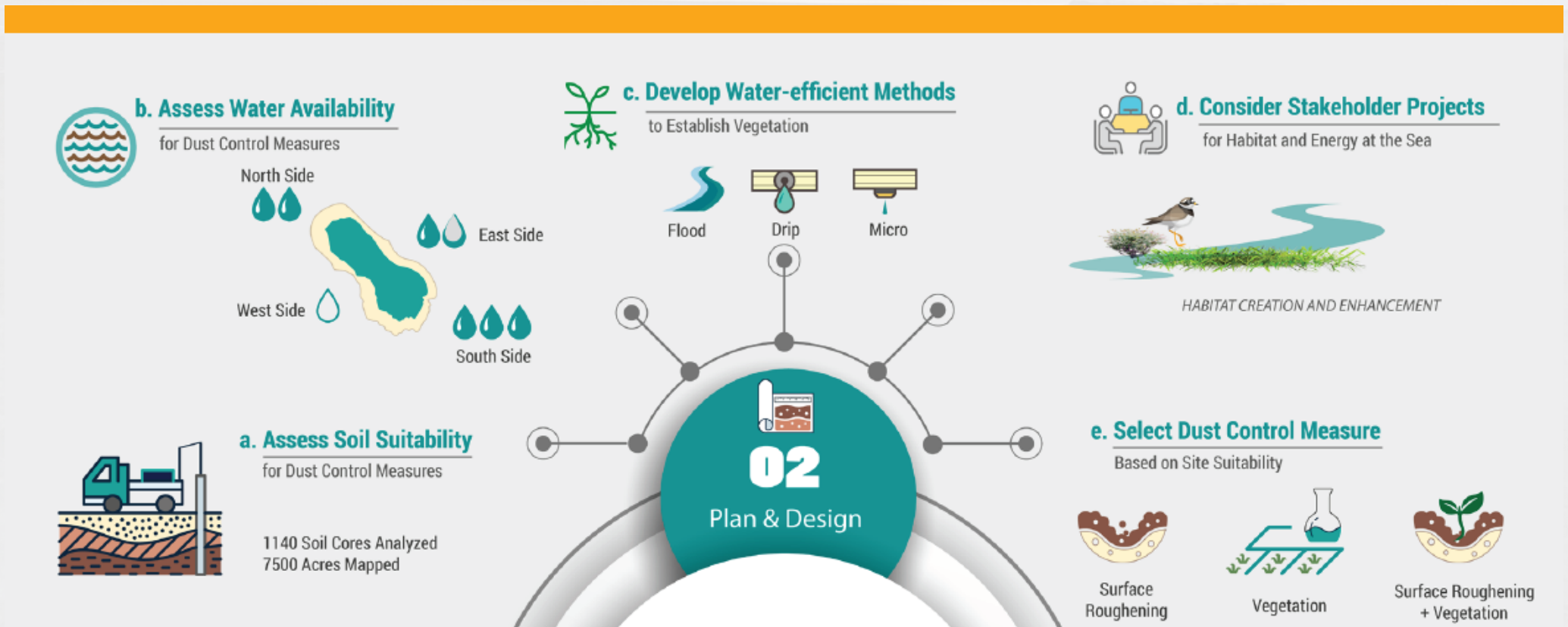
K:\IID\_SaltonSea\Tasks\Task 1b\_EmissionsInventory\WRF\_WRF\_Chem\_2020\_2021\PM10\_Estimate\_Result\_Analysis\10\_FiveYearAverage\Five\_Years\_of\_Emissions\_Analysis\_oneMap.mxd

| Playa Percentage | Area (ac) | Percent of Total PM <sub>10</sub> Emissions |
|------------------|-----------|---------------------------------------------|
| 5                | 1,280     | 32                                          |



## 02. Proactive Dust Control Plan:

- Recommend / provide options for dust control implementation on high priority playa
- Recommend maintenance activities (as needed) for existing DCMs based on performance monitoring results



Air Quality  
Mitigation  
Program

Salton Sea

03

Implement  
& Monitor

a. Proactive Mitigation

Active Projects  
Mitigating 51% of Playa Emissions

Stakeholder Projects

2,400 acres  
2 Projects

Sites Identified

2,800 acres  
4 Projects

Sites Designed

1,150 acres  
3 Projects

Sites Implemented

1,530 acres  
5 Projects

b. Performance Monitoring



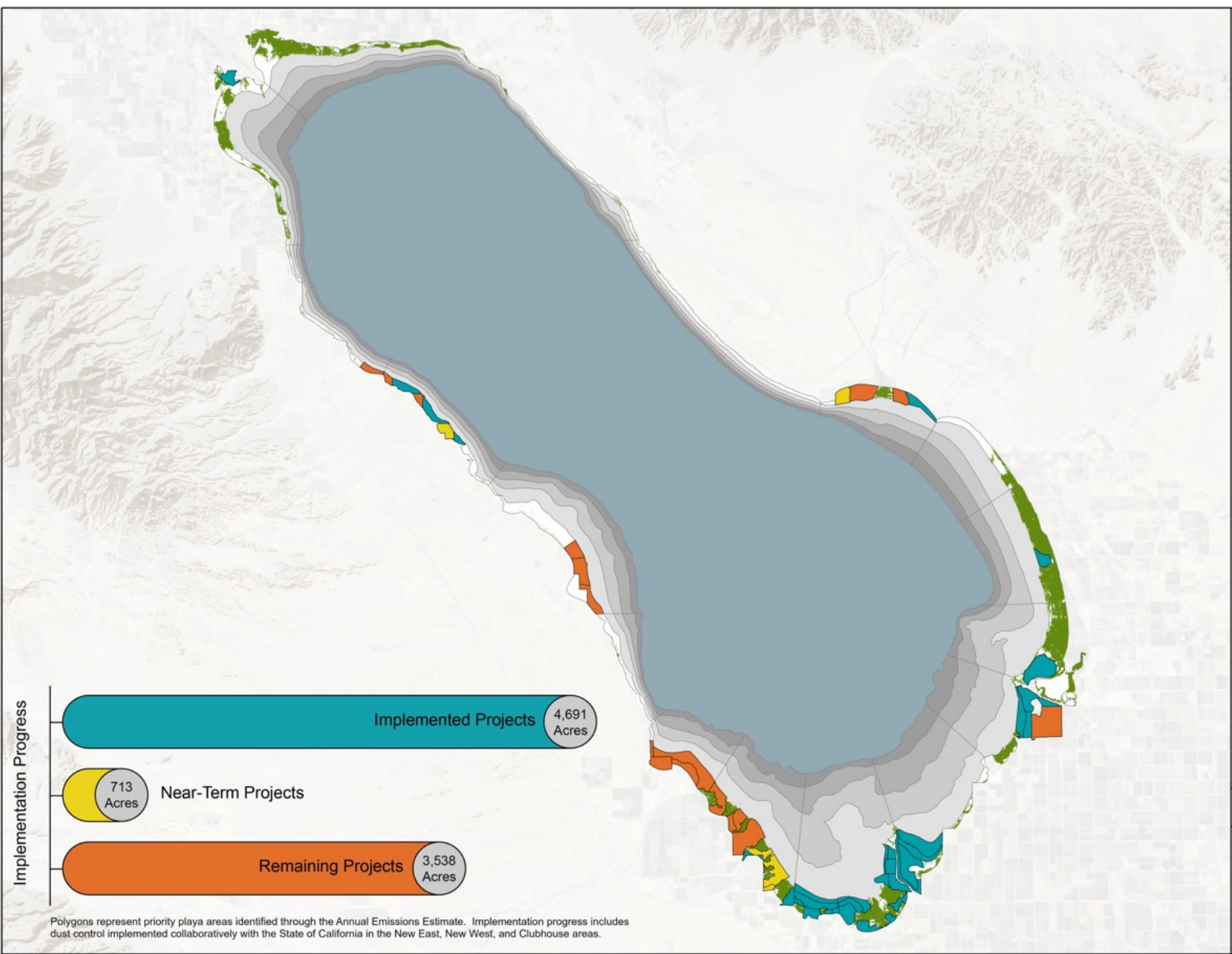
UAV  
Remote Sensing



Ground-based Sensors



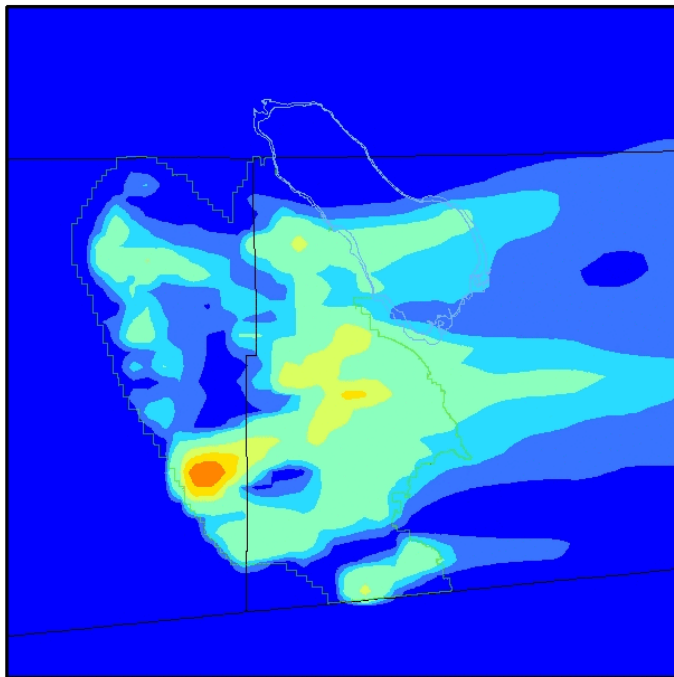
Video Footage



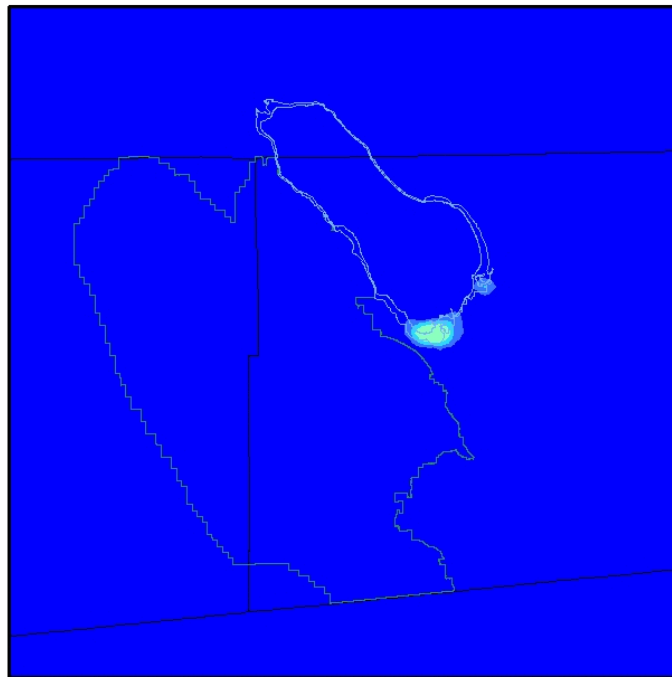
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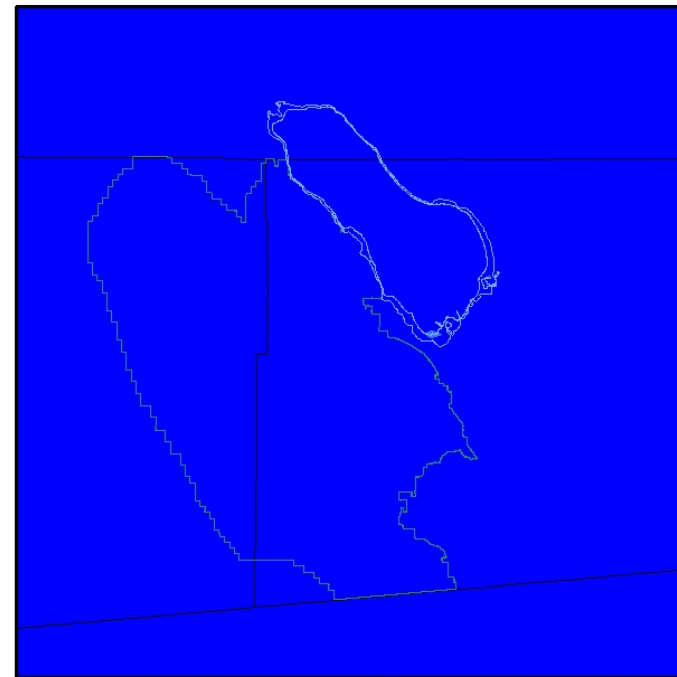
Desert



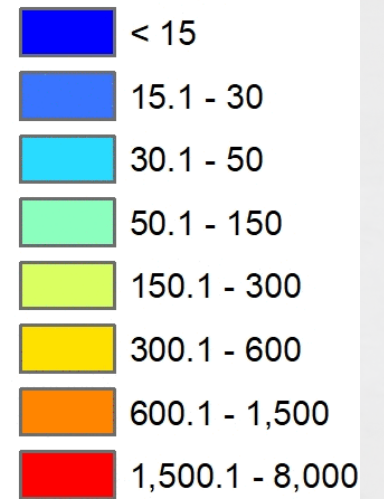
Playa (uncontrolled)



Playa (controlled)



**PM10 (ug/m3)**





# Thank You

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