



# Update on the Mitigation of 1,3-Dichloropropene and Pilot Studies

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Shafter AB617 Community  
Steering Committee Meeting



# Presentation Outline

- Background
- Mitigation Approach
- Mitigation Options
- Pilot Studies
- Q&A



# Background: 1,3-Dichloropropene

- Pre-plant fumigant used to control nematodes, insects, and disease organisms in the soil.
- Major uses in California include fruit and nut trees, strawberries, grapes, and carrots crops.
- Listed as a restricted material.
- In part due to recent elevated 1,3-D measured air concentrations, DPR is proposing additional control measures to mitigate 1,3-D acute health effects to bystanders.



# Mitigation Approach and Available Options

- DPR used HYDRUS and AERFUM computer models to identify various mitigation measures.
  - DPR's use of HYDRUS and AERFUM went through an intensive external peer review process coordinated by the University of California.
  
- Options Available to Address Acute Exposures:
  - Limit or prohibit 1,3-D applications
  - Require use of TIF tarps
  - Increase buffer zone distances
  - Require stringent application documentation
  - Set minimum soil moisture content threshold for applications
  - Use of new reduced-emission application methods



Image: Shutterstock.com

# Pilot Program

- Considerations:
  - 1,3-D is extensively used with annual average of 12.6m lbs applied (2011-2015).
  - No currently available viable commercial-scale alternatives to 1,3-D.
  - Proposed mitigation measures could be costly and may not achieve the desired emission reduction targets.
- DPR will be conducting a pilot program in selected high-use regions located near DPR air monitoring sites in Shafter, Parlier, and Delhi to test effectiveness and feasibility of proposed mitigation options.
- Applications of 1,3-D in the selected regions during the pilot program timeframe will need to adhere to DPR proposed mitigation options.
- The pilot program will begin in September 2020 and will run for one year.

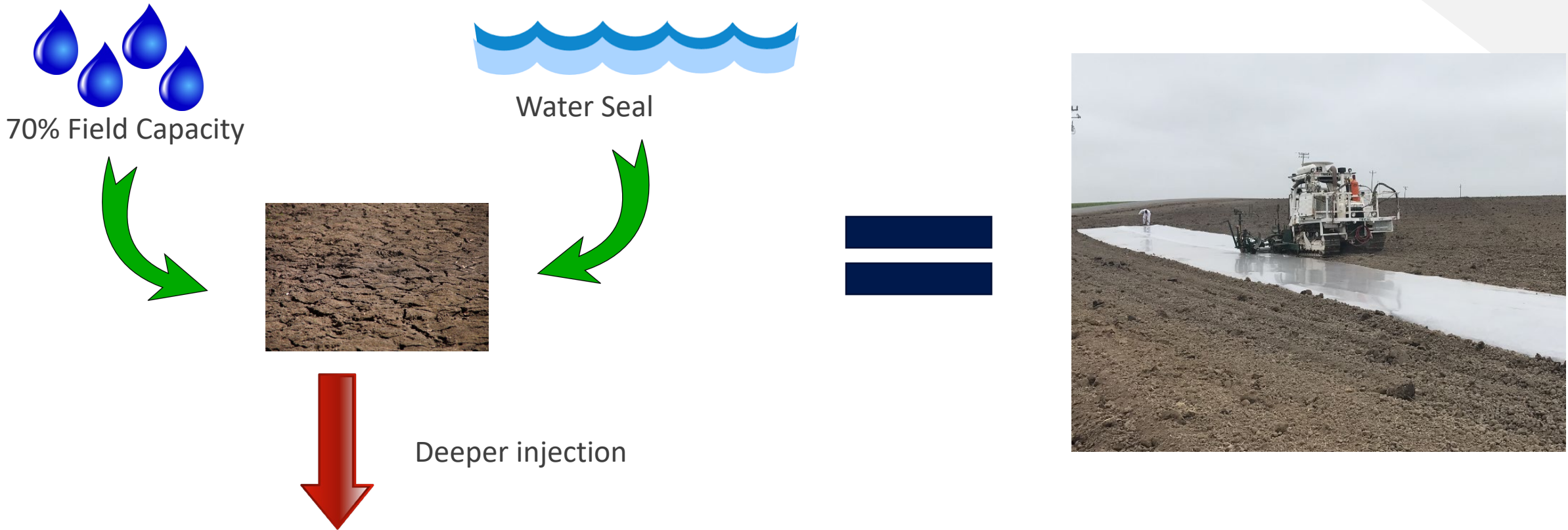
# Reducing 1,3-D Emissions

- Both US EPA and DPR offer a 60% buffer zone reduction credit when applicators use TIF tarps in certain fumigant applications.
- Computer modeling conducted by DPR show that 60% emission reduction equates to at least a 60% buffer zone reduction for most field sizes or application rates.
- Therefore, for this mitigation effort, DPR aims to reduce 1,3-D emissions by at least 60% compared to the standard 18" deep untarped application.
- DPR has identified several options that result in 1,3-D emission reductions of at least 60% compared to untarped fumigations.



# Reducing 1,3-D Emissions in Shafter

- What are the equivalent technology(s) for emission reductions that provide similar results to tarping?



- One of these options could potentially provide similar reductions to tarping

# Identified Mitigation Options

## 1. Use of TIF tarps

- This method would require application field to be covered with DPR-approved TIF tarps.

## 2. Pre-application moisture content of 70% field capacity

- Field irrigation to create a “barrier” or “cap” of soil moisture at **3-9” below the soil surface**.
- The exact irrigation volume required to meet 70% of “field capacity” (FC) depends on pre-existing soil conditions.

## 3. Post-application water seal

- Irrigation creates a zone of high moisture near the soil surface (“water seal”), slowing fumigant emissions.

## 4. Require fumigant injection at lower depths

- Under this option, 1,3-D is injected at a depth of at least 24” below the soil surface.
- Greater depth of injection increases the amount of time the fumigant spends in the soil and leads to lower emissions.



# Identified Mitigation Options

5. **24" injection depth combined with post-application water seal**
  - This option is a combination of *Mitigation Options 3 and 4*.
  
6. **50% of the field covered with TIF combined with standard 18" injection method**
  - A field is entirely fumigated, but rows are alternately sealed with TIF
  - 100% of the field area is fumigated: 50% will be covered by TIF, and 50% will be uncovered.
  
7. **50% of the field covered with TIF combined with deeper 24" injection method**
  - Same as above but injection depth is set at 24".
  
8. **Pre-application 70% FC moisture cap combined with 50% of field covered with TIF**
  - This option is a combination of *Mitigation Options 2 and 6*.

# Identified Mitigation Options

9. **Pre-application 70% FC moisture cap combined with 24" injection method and 50% TIF**
  - This option is a combination of *Mitigation Options 2, 4, and 6*.
10. **Pre-application 70% FC moisture cap combined with 24" injection method and post-application water seal**
  - This option is a combination of *Mitigation Options 2, 3, and 4*.
11. **Untarped fumigation at injection depth of 18" (FFM 1206) with expanded buffer zones or reduced application size**
  - Based on application rate and field size, buffer zones ranging up to ¼ mile may be required.
12. **Untarped fumigation at injection depth of 12" (FFM 1201) with expanded buffer zones or reduced application size**
  - Based on application rate and field size, buffer zones ranging up to ¼ mile may be required.

*Note: DPR continues to work to refine identified options and continues to seek input on additional options to explore.*

# Identified Mitigation Options



Application Method Options	Application rate (lb/ac)							
	100	110	125	150	200	250	300	332
1. TIF (FFM1242 or FFM 1247)	MR	MR	MR	MR	MR	MR	MR	MR
2. 70% FC moisture cap & 18" Injection	MR	MR	MR	MR	45 MR (200ft)	20 40 (200ft)	10 25 (200ft)	5 20 (200ft)
3. Post-application water seal & 18" Injection	MR	MR	MR	MR	MR	50 MR (200ft)	30 50 (200ft)	20 35 (200ft)
4. 24" injection	MR	MR	MR	MR	MR	40 70 (200ft)	25 40 (200ft)	15 30 (200ft)
5. 24" injection & post-application water seal	MR	MR	MR	MR	MR	MR	60 MR (200ft)	40 70 (200ft)
6. 50% TIF & 18" injection	MR	MR	MR	MR	70 MR (200ft)	35 55 (200ft)	20 35 (200ft)	10 25 (200ft)
7. 50% TIF & 24" injection	MR	MR	MR	MR	MR	MR	MR	MR
8. 50% TIF & 70% FC moisture cap & 18" injection	MR	MR	MR	MR	MR	65 MR (200ft)	40 65 (200ft)	30 50 (200ft)
9. 50% TIF & 70% FC moisture cap & 24" injection	MR	MR	MR	MR	MR	MR	MR	MR
10. 24" injection & 70% FC & water seal	MR	MR	MR	MR	MR	MR	MR	MR
11. Standard 18" Injection (FFM1206)	MR	65 MR (200ft) MR (500ft)	45 70 (200ft) MR (500ft)	25 40 (200ft) MR (500ft)	10 20 (200ft) 55 (500ft)	5 10 (200ft) 30 (500ft)	3 5 (200ft) 20 (500ft)	2 5 (200ft) 15 (500ft)
12. Standard 12" injection (FFM1201)	10 20 (200ft) 55 (500ft)	10 15 (200ft) 45 (500ft)	5 10 (200ft) 35 (500ft)	4 5 (200ft) 25 (500ft)	2 4 (200ft) 10 (500ft)	2 3 (200ft) 5 (500ft)	1 2 (200ft) 5 (500ft)	NA 1 (200ft) 5 (500ft)

Numbers on table refer to maximum application block size allowed per given method and application rate combination.

NA = Not Allowed

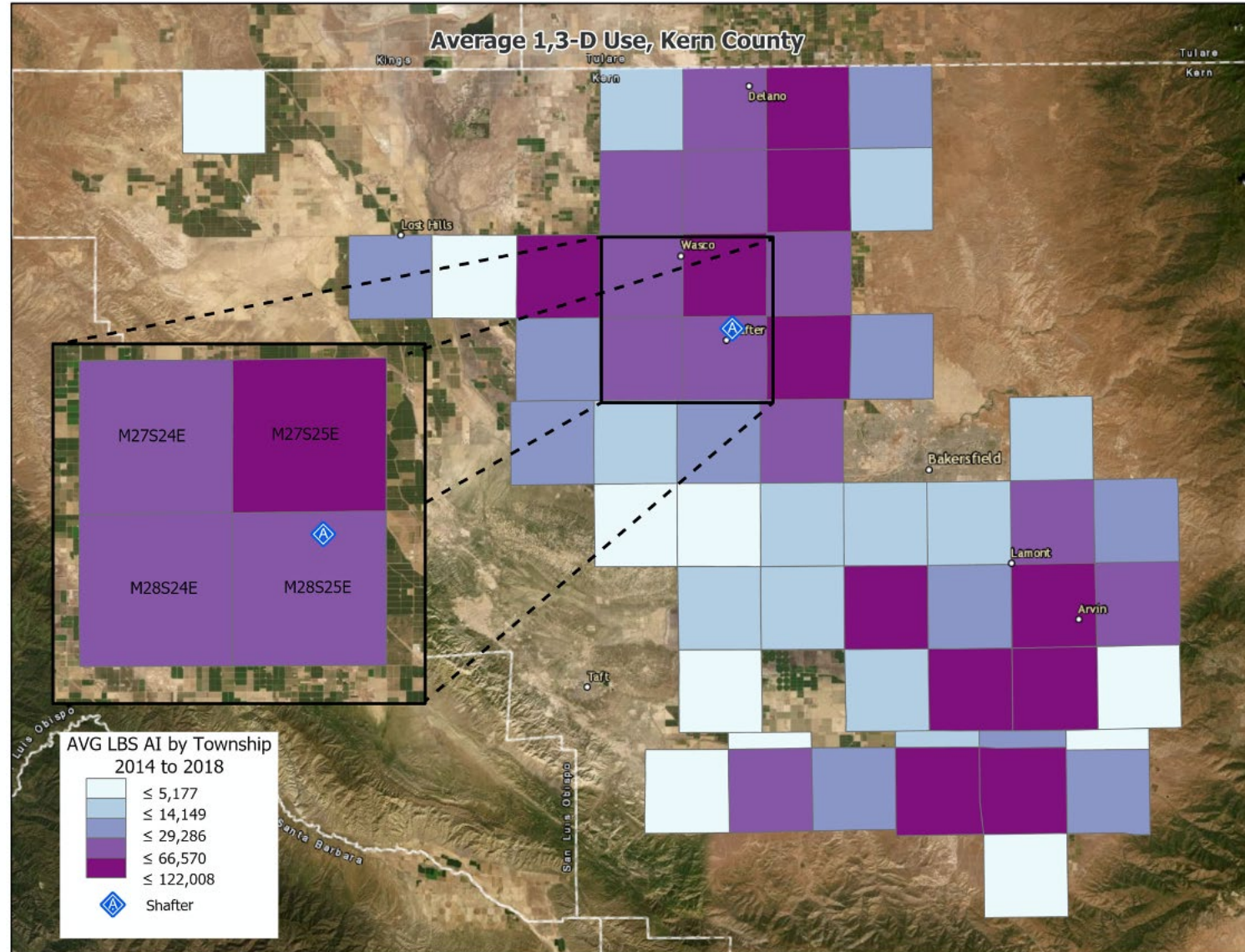
MR = Minimum Restrictions = Application blocks ≤ 80 ac and 100 ft. buffer zone for 7 d.

# Objectives of Pilot Program and Enhanced Monitoring Efforts

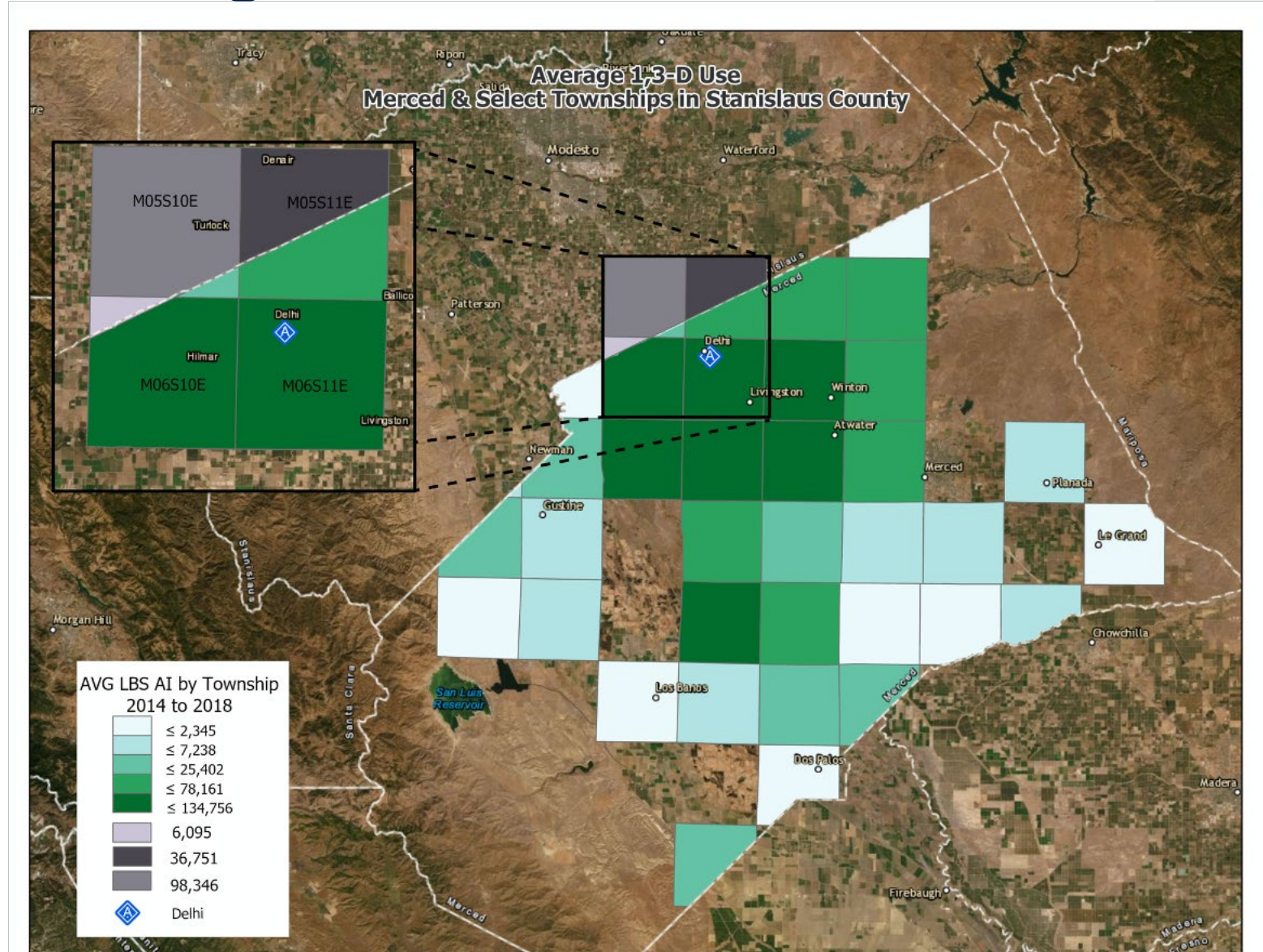
- Pilot program objectives:
  - To collect and evaluate monitoring data from new methods to validate computer modeling estimates, and
  - To evaluate feasibility of proposed mitigation options, and
  - To evaluate effectiveness of mitigation options aimed towards reducing emissions of 1,3-D for statewide implementation.
- Enhanced monitoring efforts during pilot program:
  - Continued ambient air monitoring efforts in the area.
  - Intensive ambient air monitoring during high-use season.
  - Application-site monitoring studies to measure and validate estimated emissions from new application methods.



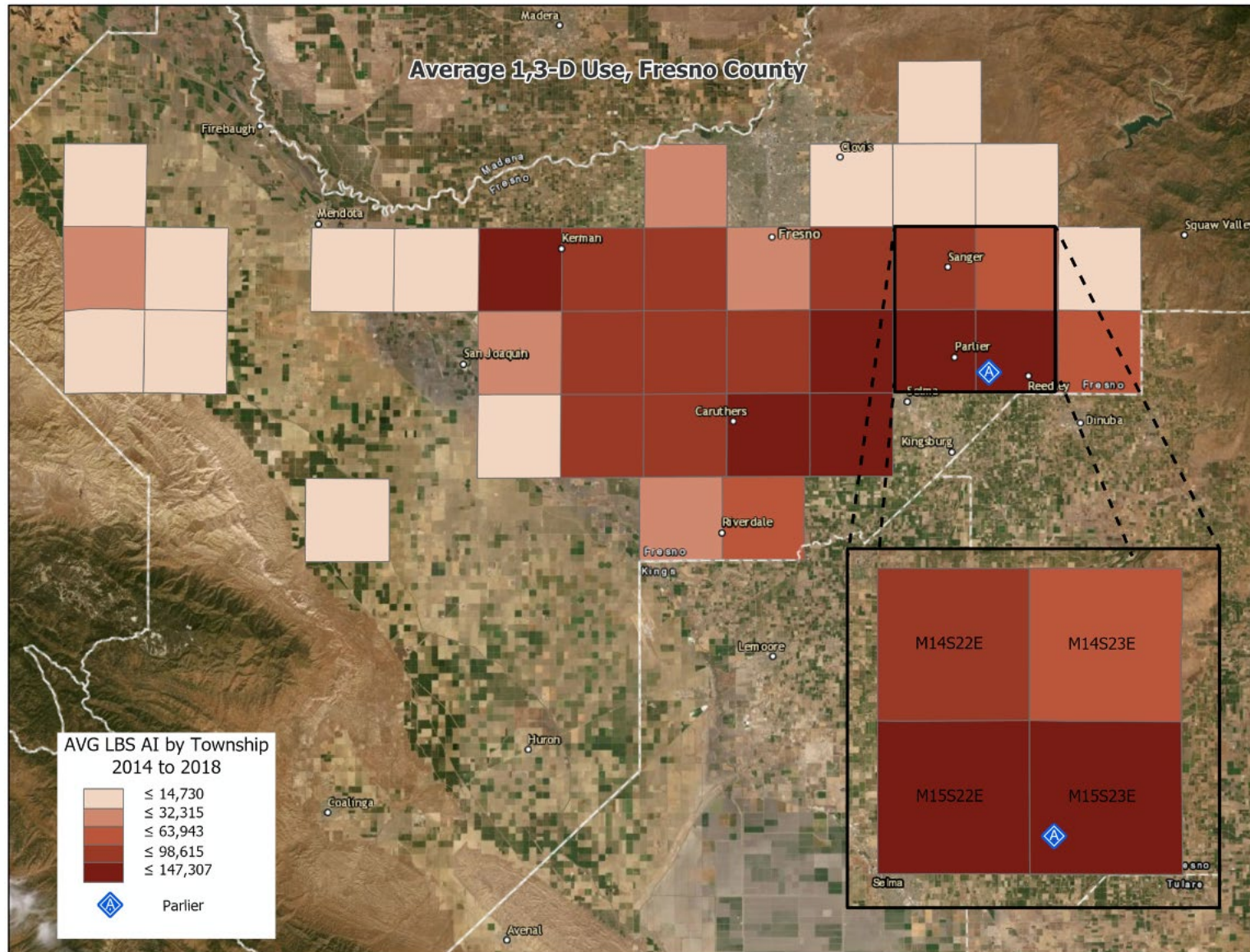
# Selected Pilot Program Area: Kern County



# Selected Pilot Program Area: Merced-Stanislaus Counties



# Selected Pilot Program Area: Fresno County



# Questions?

