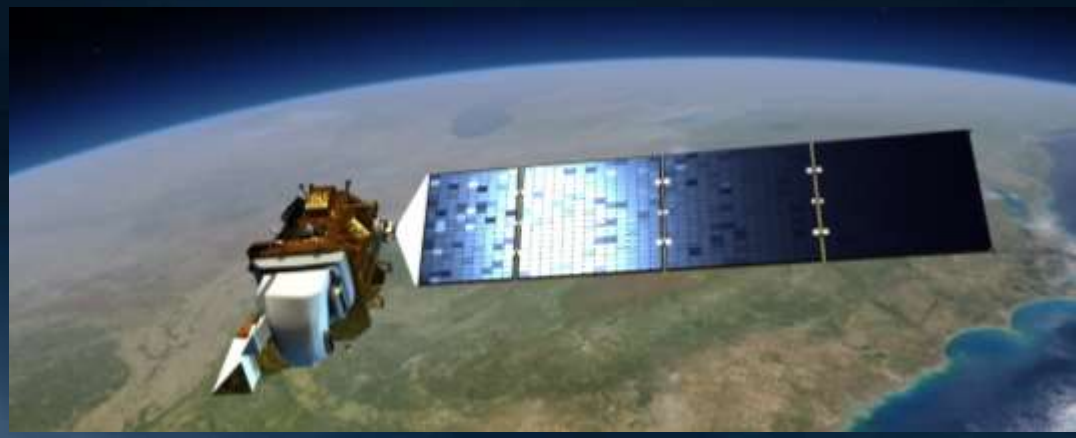
Application of Remote Sensing Technologies for Understanding Urban and Outdoor Water Use

Conservation & Local Resources Committee
Item 4b
November 5, 2018

Remote Sensing

Satellite



Aircraft

Drone

Applications

1. Turf identification & turf water use
2. Agricultural water use
3. Crop / Fallowed land identification

Application 1:
Turf in MWD's service area

Questions

- How much turf, and where?
- How has the total turf area changed over time?
- How much water does turf consume?

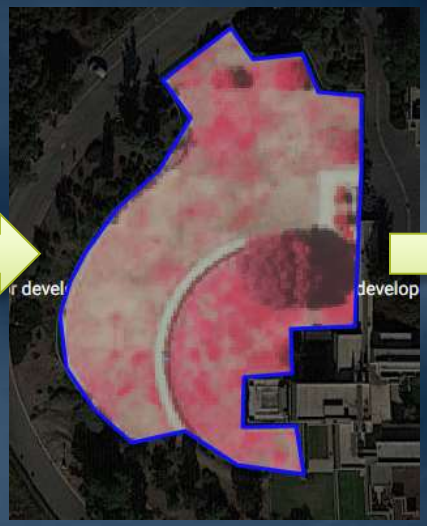
Challenges

- Requires high spatial resolution (1 foot or better)
- Distinguishing native grasses from irrigated turf

Classifying Turf

Visible

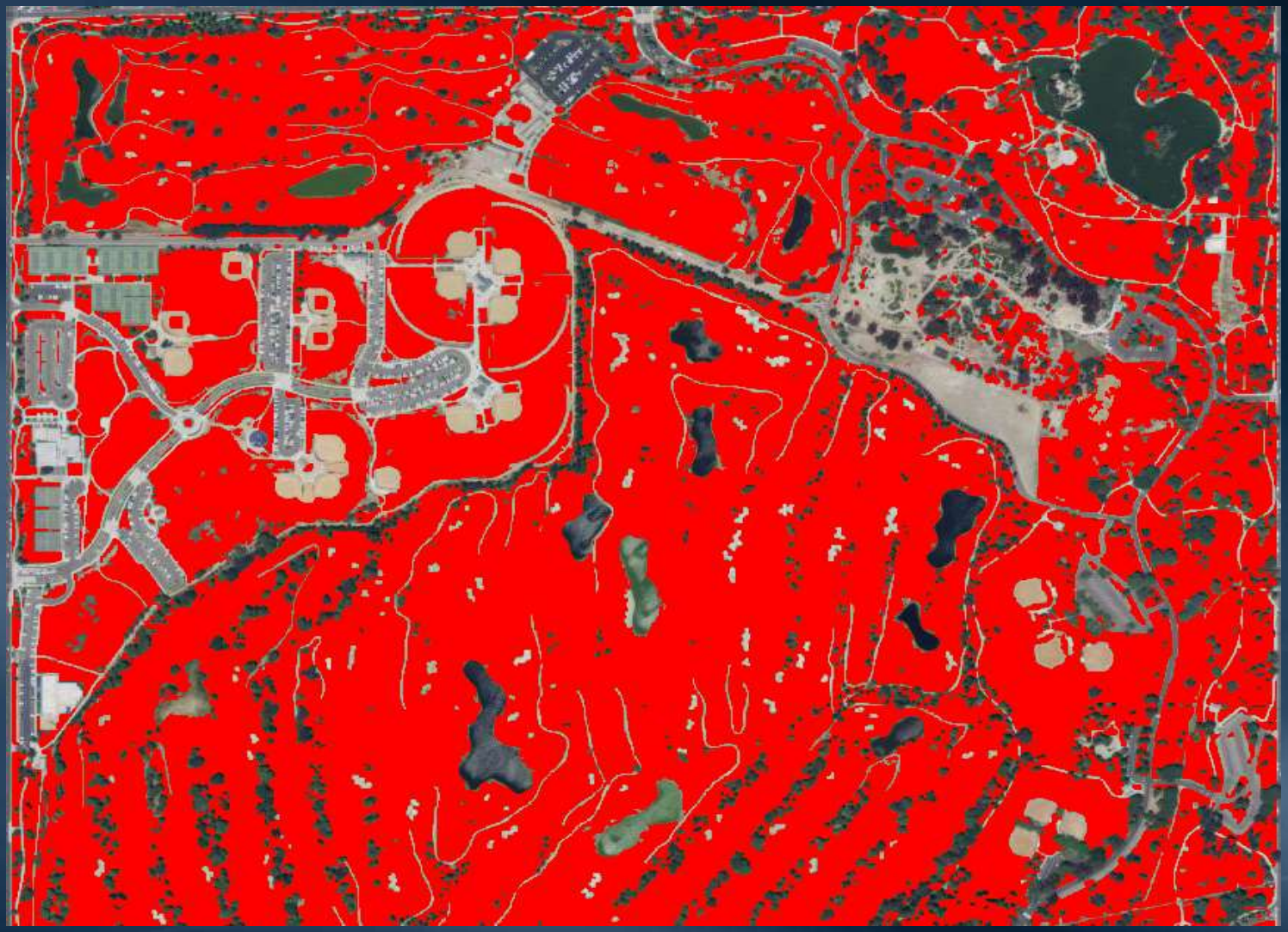
Infrared



Vegetation Index

Water Use

Classification of 1-meter NAIP imagery



Example Turf Removal Project

March 2015

February 2016

State Efficiency Standards

- Outdoor residential irrigation budget based on irrigable area – anywhere with evidence of prior irrigation
  - Green grass
  - Brown/dead grass
  - Bare dirt/soil
  - Landscape trees and shrubs
  - Swimming pools & water features
- Not Irrigable
  - Hardscape
  - Undeveloped land & native vegetation

State Efficiency Standards

- DWR will provide parcel-level irrigable landscape area to urban retail suppliers by Jan 2021
- Suppliers may also use their own data
- DWR will use 1-foot NAIP imagery collected in late summer
- Initial pilot agencies: Padre Dam MWD, City of Santa Rosa
- Future pilots: 10 agencies, then 50 agencies
- DWR will develop separate recommendations for metered CII irrigation accounts

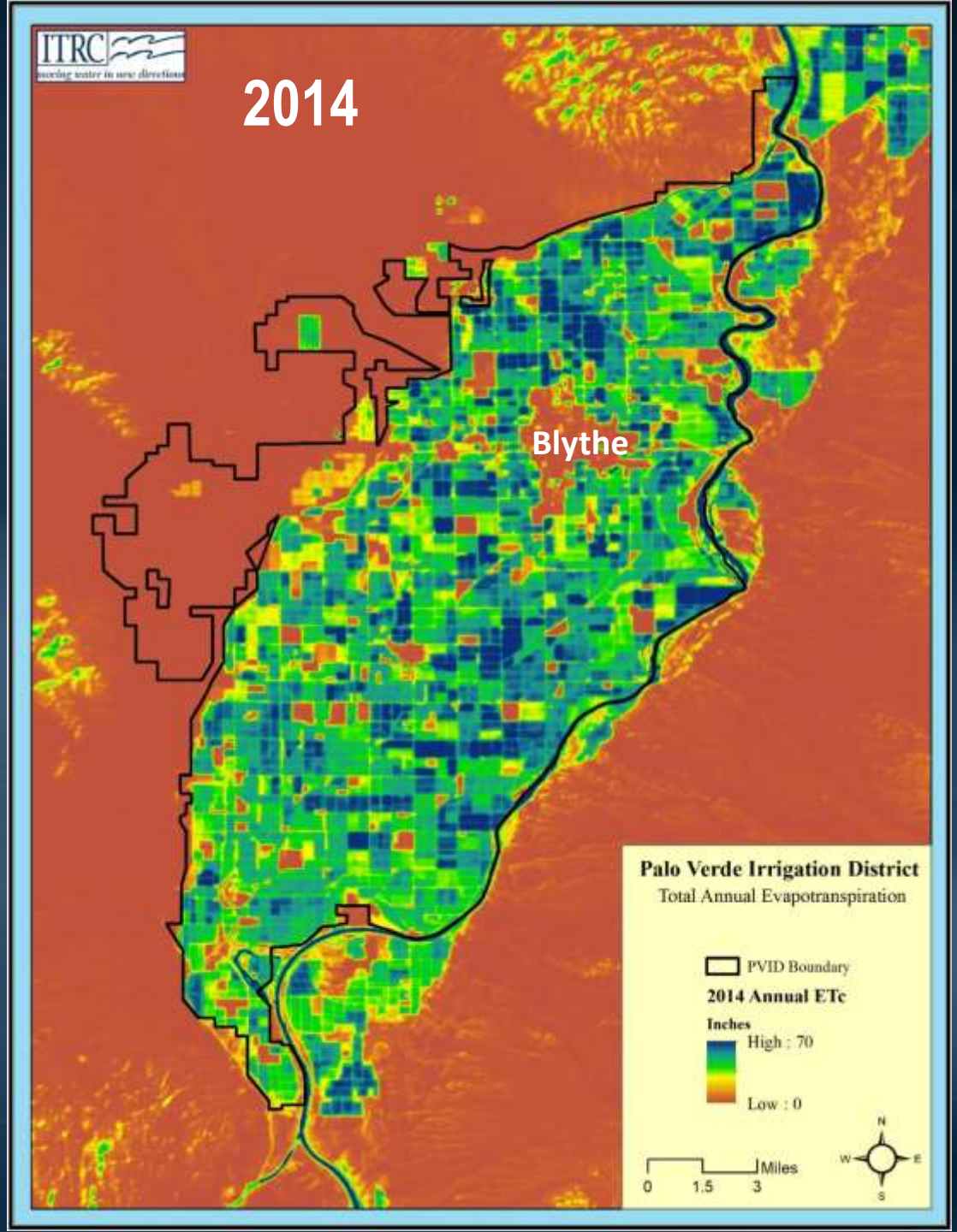
Application 2: Agricultural Water Use

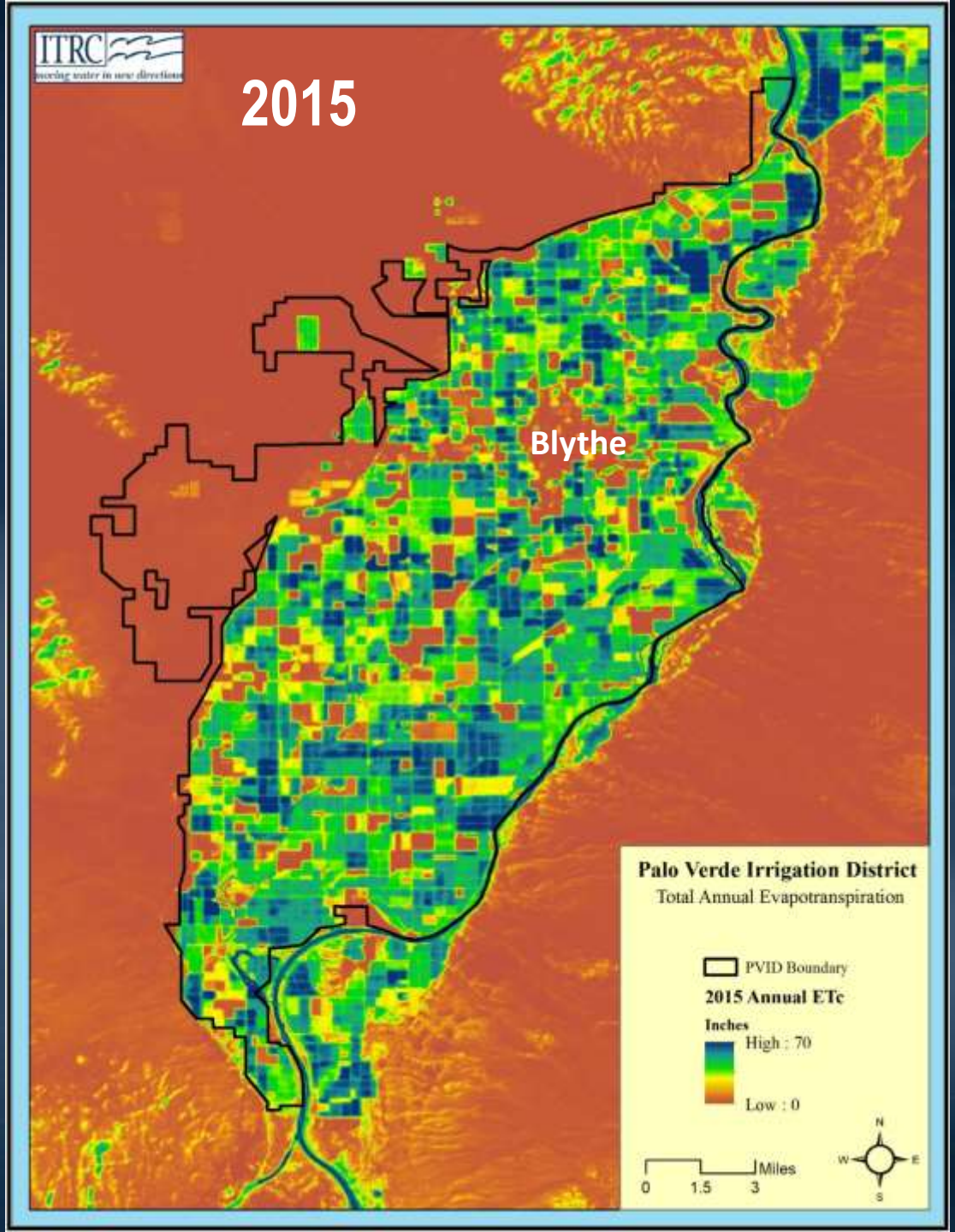
Applications

- Quantifying benefits of ag. conservation programs
- Land management
- Irrigation scheduling for growers

Challenges

- Spatial resolution (best available = 30m)
- Temporal resolution (image every 2 weeks)


ITRC
2014
Blythe
Palo Verde Irrigation District
Total Annual Evapotranspiration
PVID Boundary
2014 Annual ETc
Inches
High : 70
Low : 0
Miles
0
1.5
3
N
W
E
S


ITRC
moving water in new directions
2015
Blythe
Palo Verde Irrigation District
Total Annual Evapotranspiration
PVID Boundary
2015 Annual ETc
Inches
High : 70
Low : 0
Miles
0
1.5
3
N
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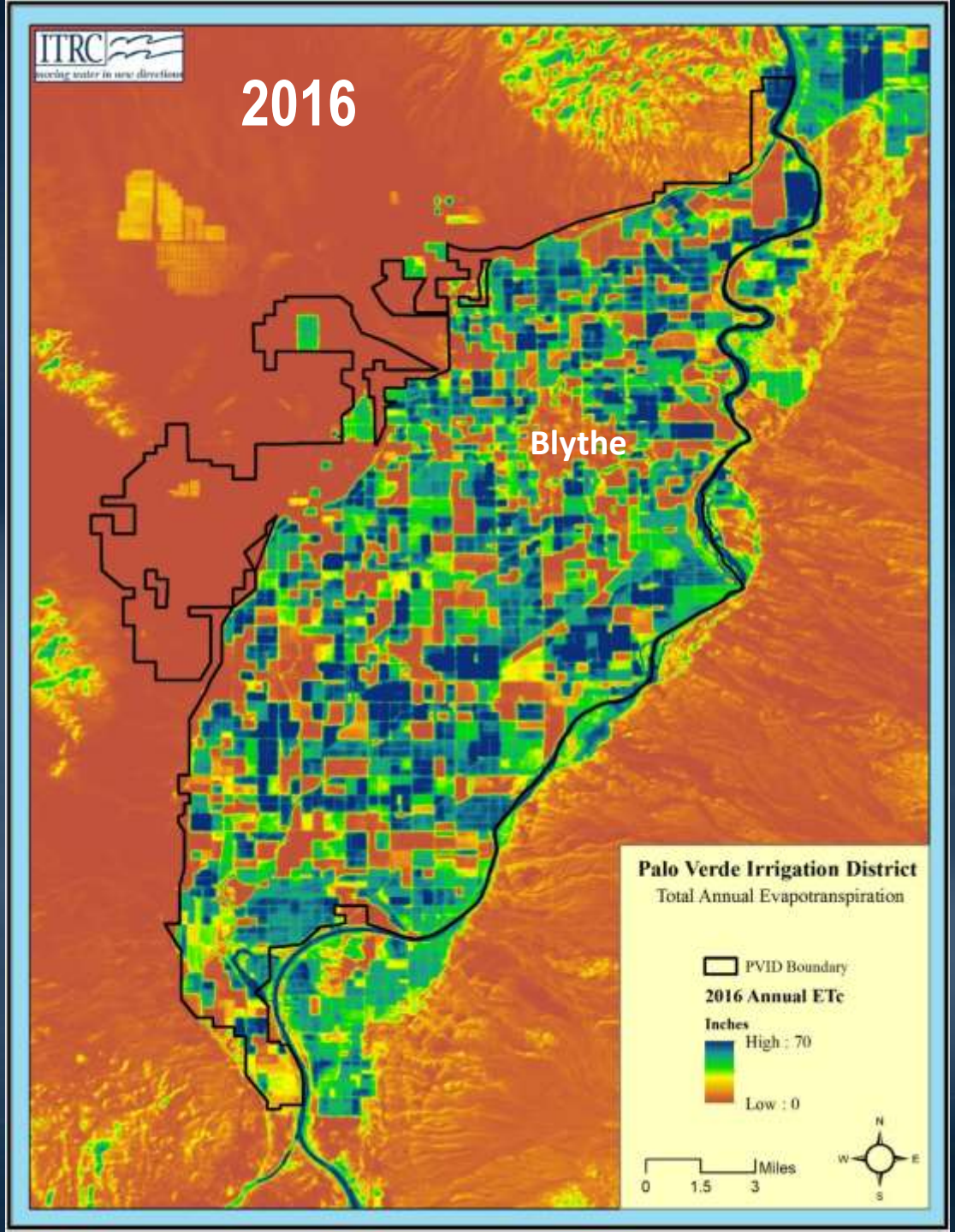
ITRC
2016
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Hayday 2 Crop Water Use Map

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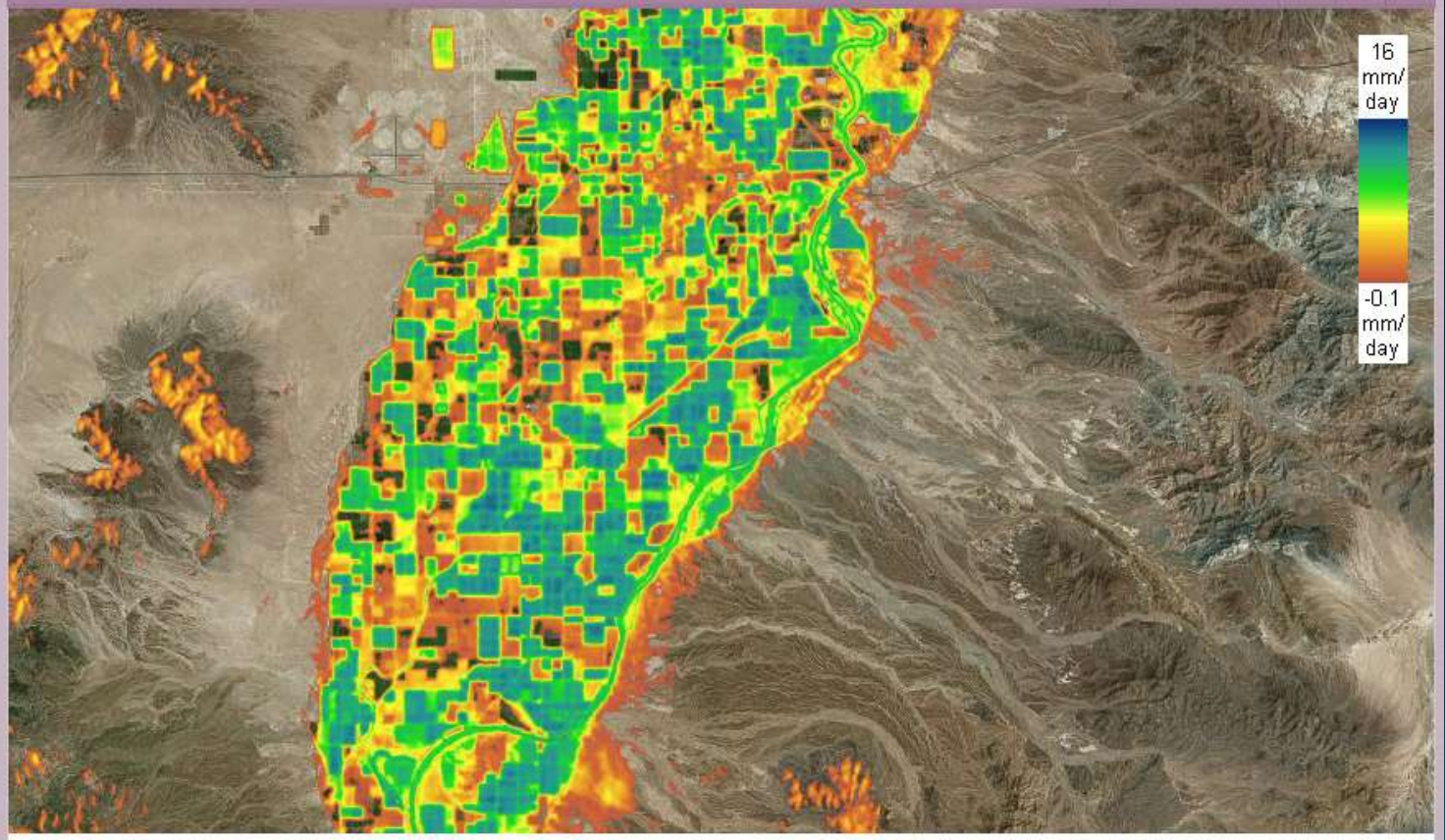
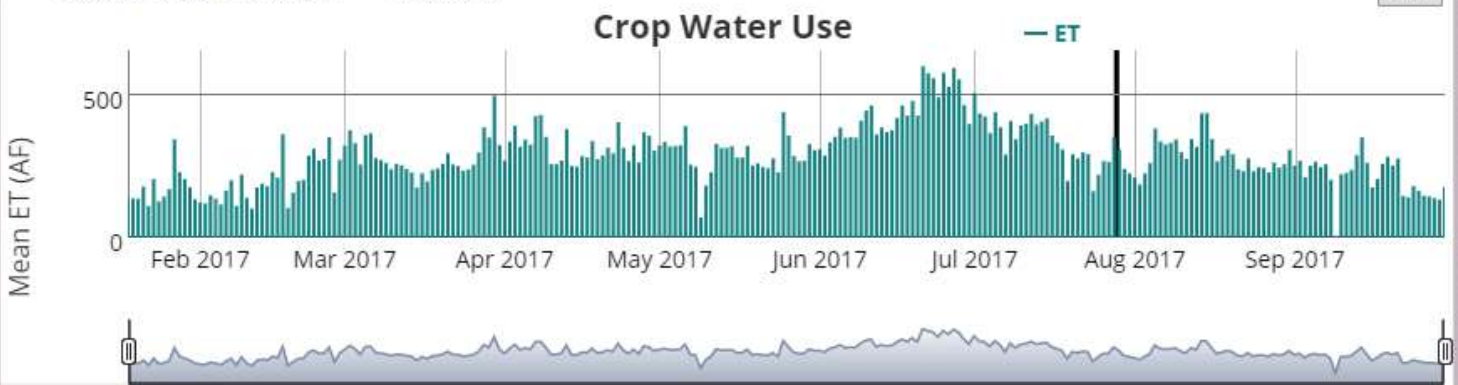


Selected Date: 07/28/2017 ET: 351.63

CSV



Sentinel-2 imagery showing cycles of alfalfa growing and cutting over one year

Application 3: Crop/Fallowed Land Identification

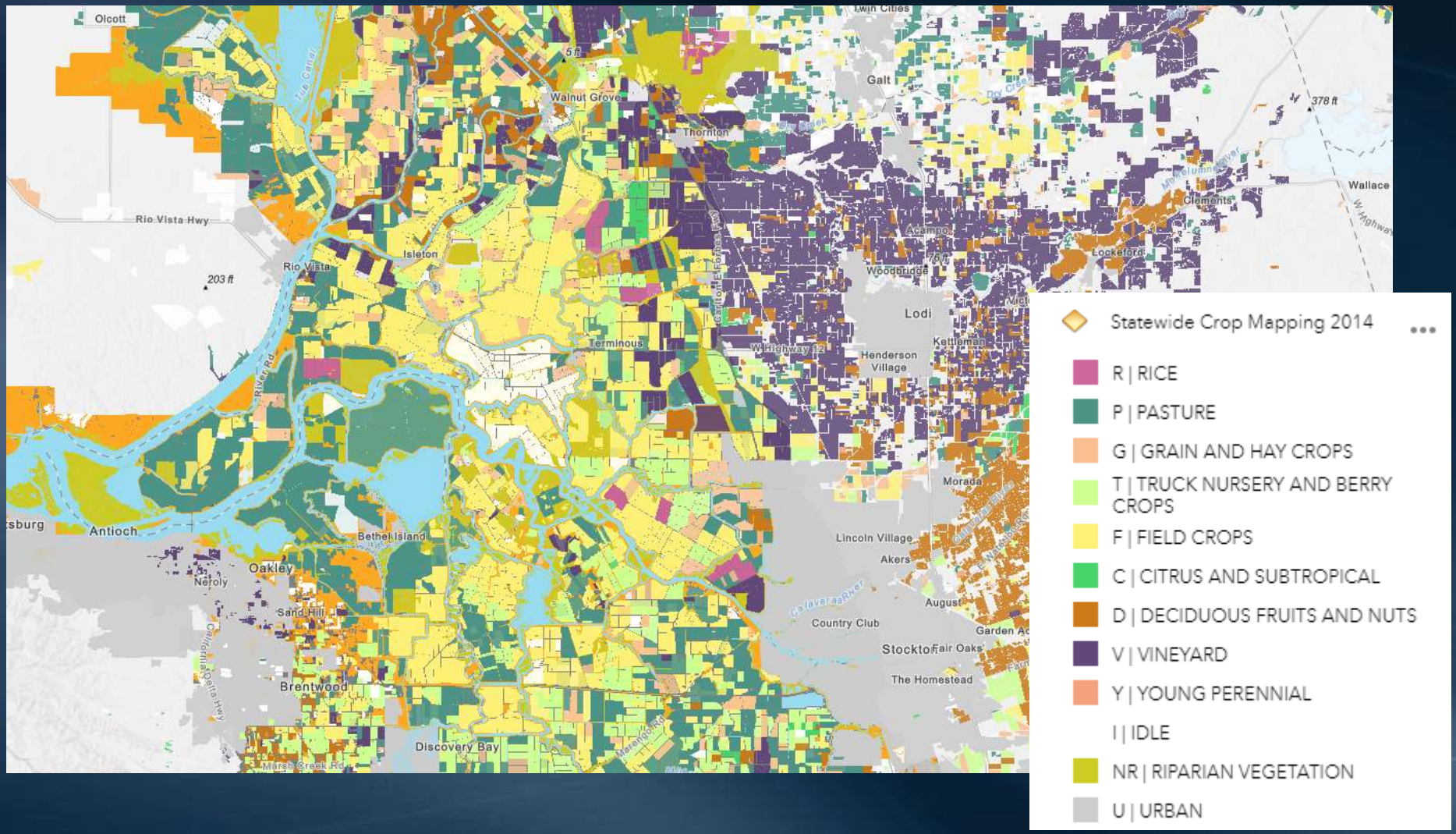
Applications

- Land management
- Fallowing verification

Challenges

- Temporal resolution (image every 2 weeks)

Crop classification in the delta



Fallowing Rotation

Fields being rotated out of fallow

August 19, 2018

August 26, 2018

Next Steps

- Turf Area
  - Explore use of artificial intelligence to develop better estimates of turf area
- Ag Water Use
  - Calibrate remote sensing models using ground-based evapotranspiration sensors
- Reservoir Operations
  - Explore use of drones for water quality, cyanobacteria management


THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA
1928