Fallowed Area Mapping for Drought Impact Reporting and Decision Making

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NIDIS California Drought Outlook Forum
Sacramento, CA **Feb. 20, 2014**

Drought Impacts on Land Fallowing

- **Background:** Mapping of fallowed areas during drought identified as a research priority for NIDIS by CA Department of Water Resources (CDWR)

- **Information needed:** Product similar to 'idle lands' class in USDA-NASS Cropland Data Layer for California, but on a monthly basis during growing season

- **Project objective:** apply satellite data to provide information that will allow CDWR and other stakeholders to identify extent of, or change from historical conditions in, fallowed acreage due to water shortage

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USDA

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Drought Impacts on Land Fallowing

- **Decisions supported**:
  - State concurrence in county-level requests for USDA drought disaster designations
  - State proclamations of emergency pursuant to the California Emergency Services Act
  - State priorities for providing assistance with and processing of local water transfer requests

- **Limitations of previously available information:**
  - USDA-NASS CDL generally not available until year-end
  - Fallowed acreage reports from other sources do not follow standard definitions or data collection methods → often generate conflicting estimates

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Satellite Data

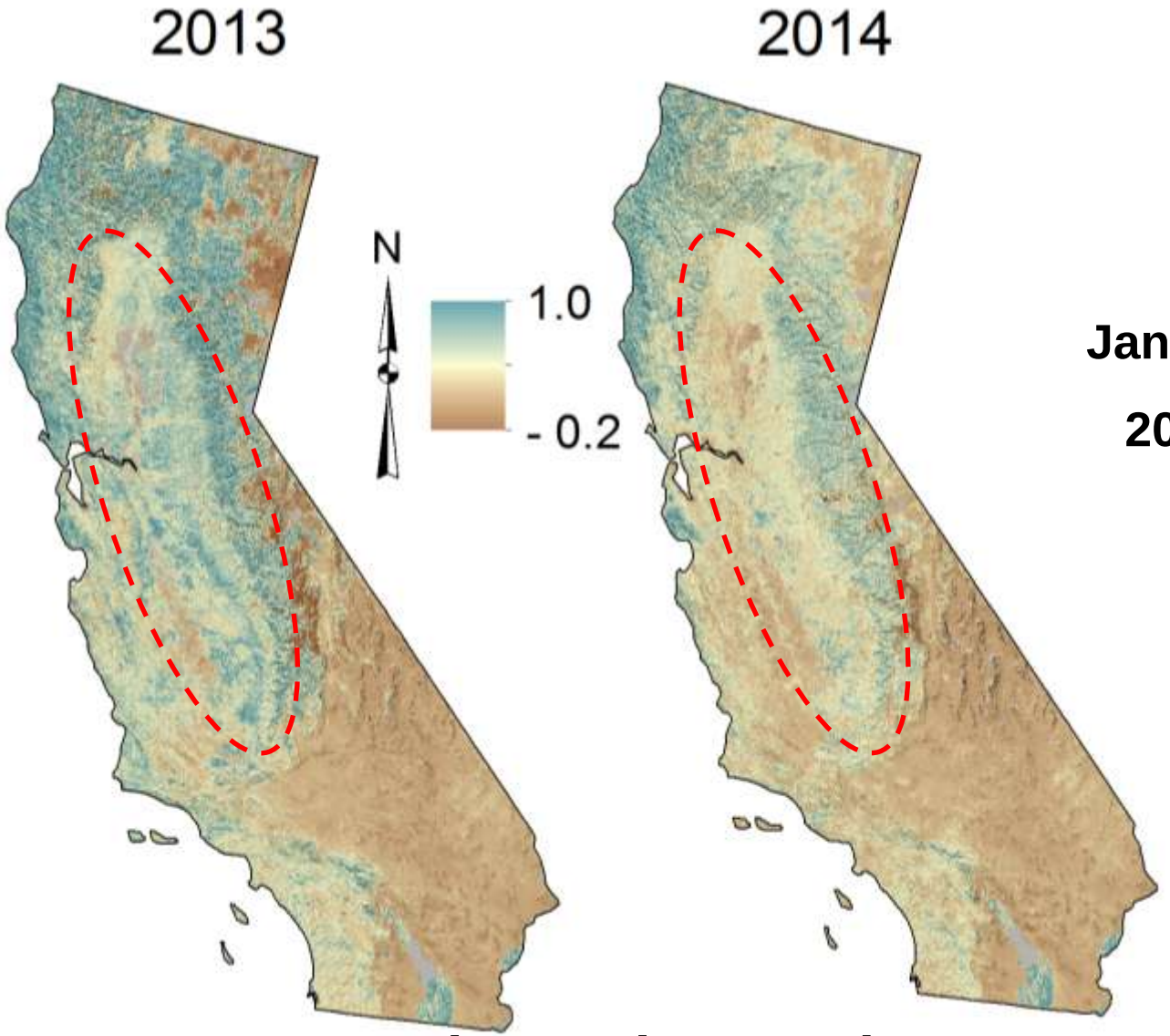
Landsat, SPOT, DMC

20-30m / 0.1 - 0.25 acres
overpass every 8-16 days

MODIS

250m / 16 acres
~daily overpass

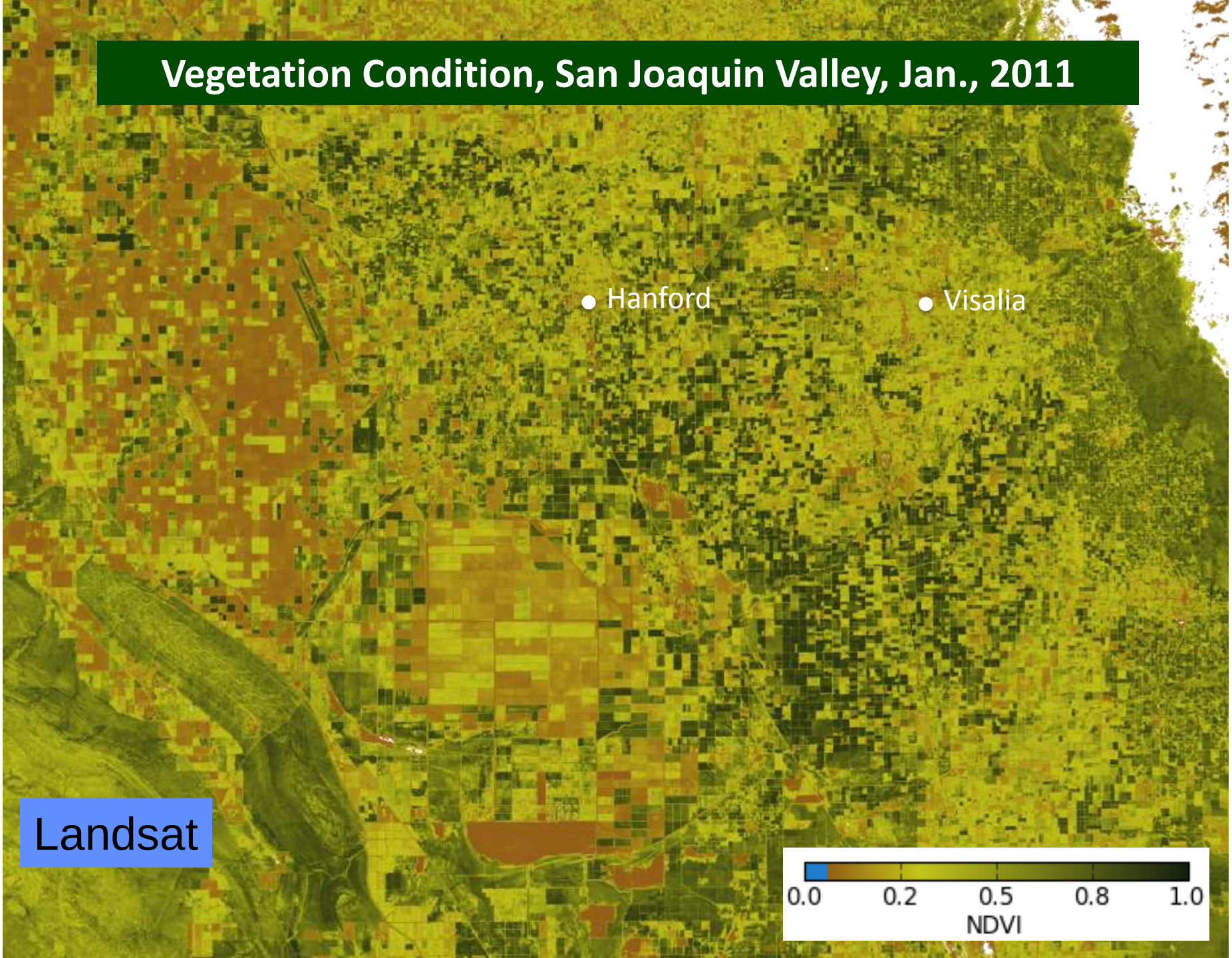
Statewide vegetation condition



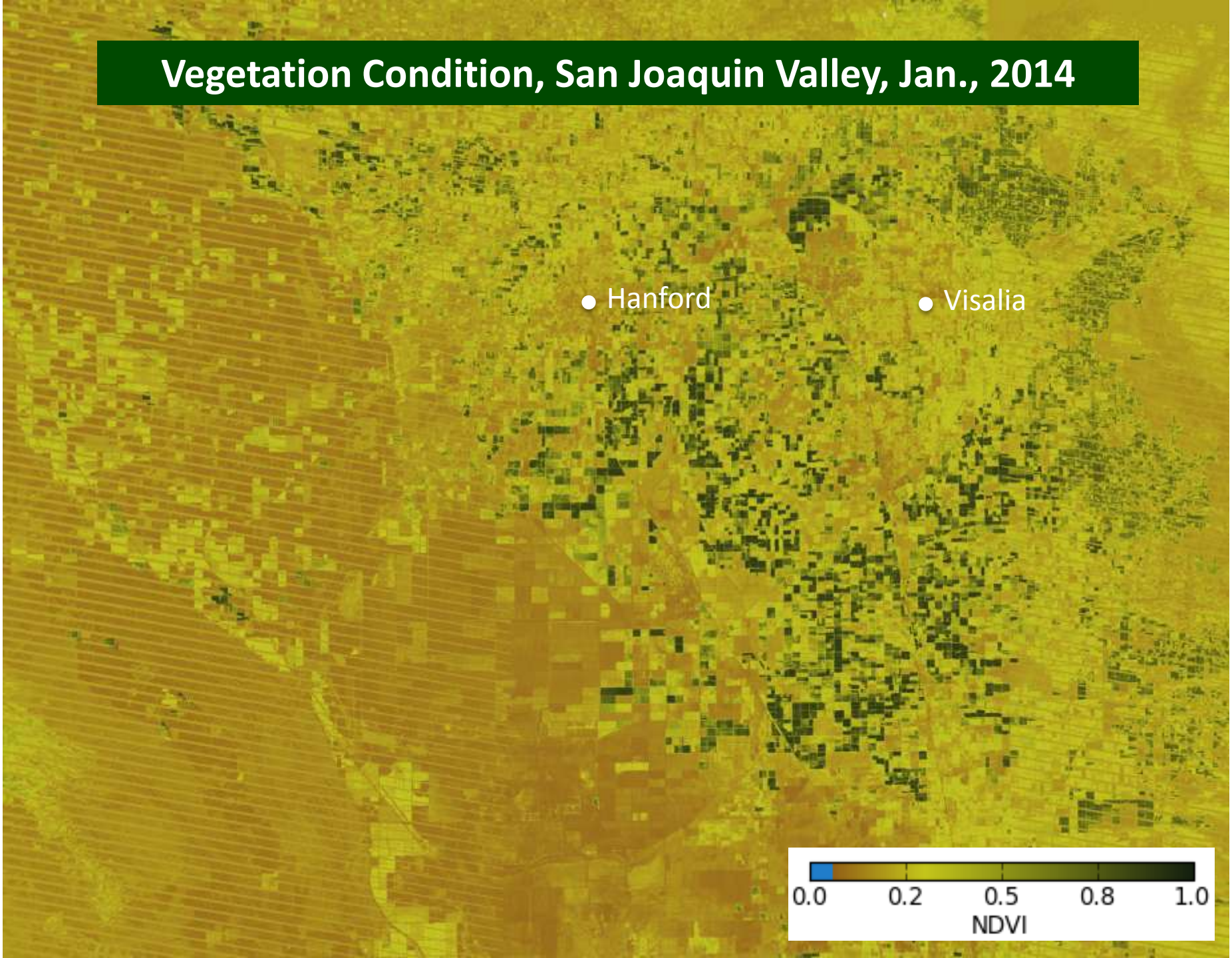
January 2013

January 2014

MODIS - Enhanced Veg Index


Vegetation Condition, San Joaquin Valley, Jan., 2011
Hanford
Visalia
Landsat
0.0
0.2
0.5
0.8
1.0
NDVI

Vegetation Condition, San Joaquin Valley, Jan., 2014



Stakeholder requirements

- Monthly tabular acreage summaries by county for April - September
- Latency of no more than two weeks
- Historical data required for context

Accomplishments

- **Within-season estimates for June, August, September from USDA NASS using CDL infrastructure**
  - USDA Farm Service Agency (FSA) data used in training decision tree algorithms for each year
- **Early-season estimates for March – May developed by NASA Ames Research Center**
  - Decision tree algorithms applied to time-series of satellite vegetation index data
- **USDA NASS results can be replicated with USGS ACCA and MODIS 250m NDVI**
  - Potential to extend history back 6 more years

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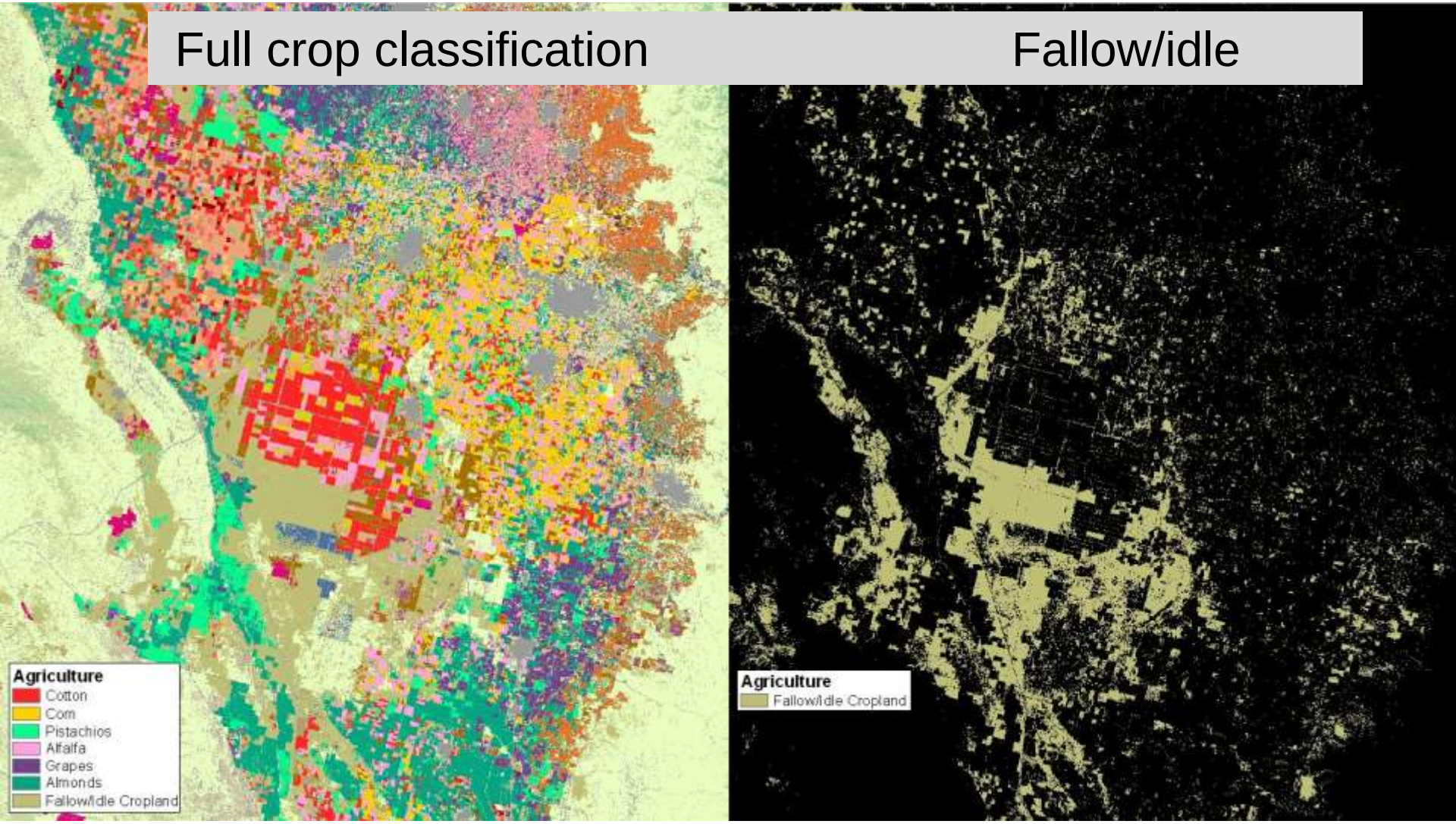
2013 USDA-NASS Cropland Data Layer



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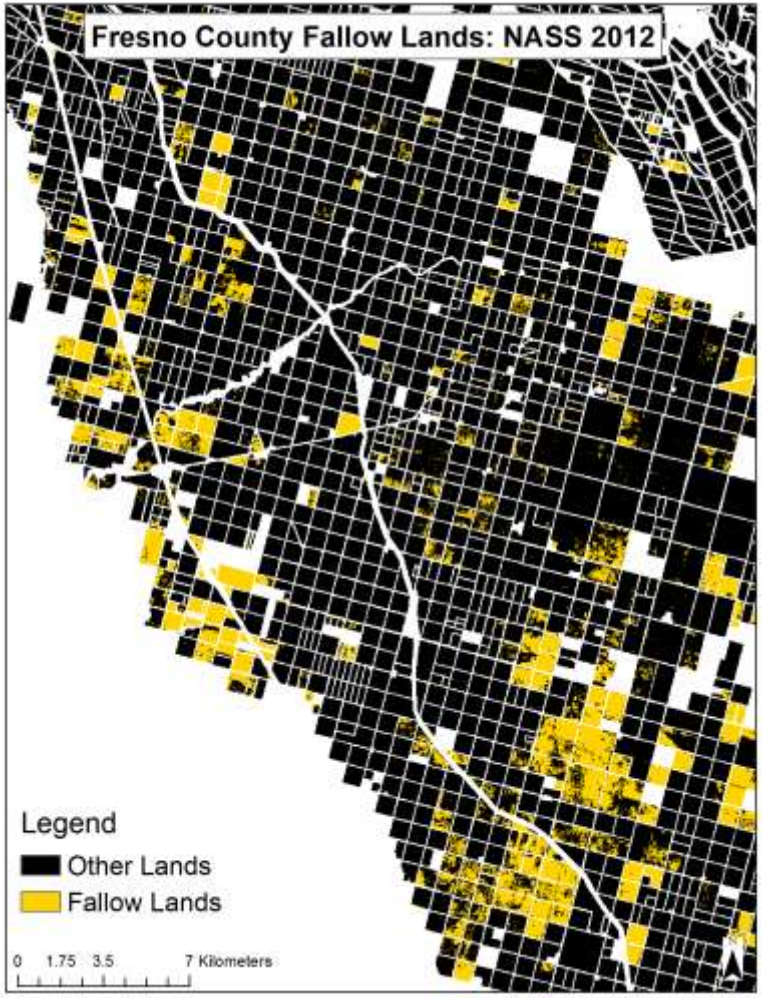
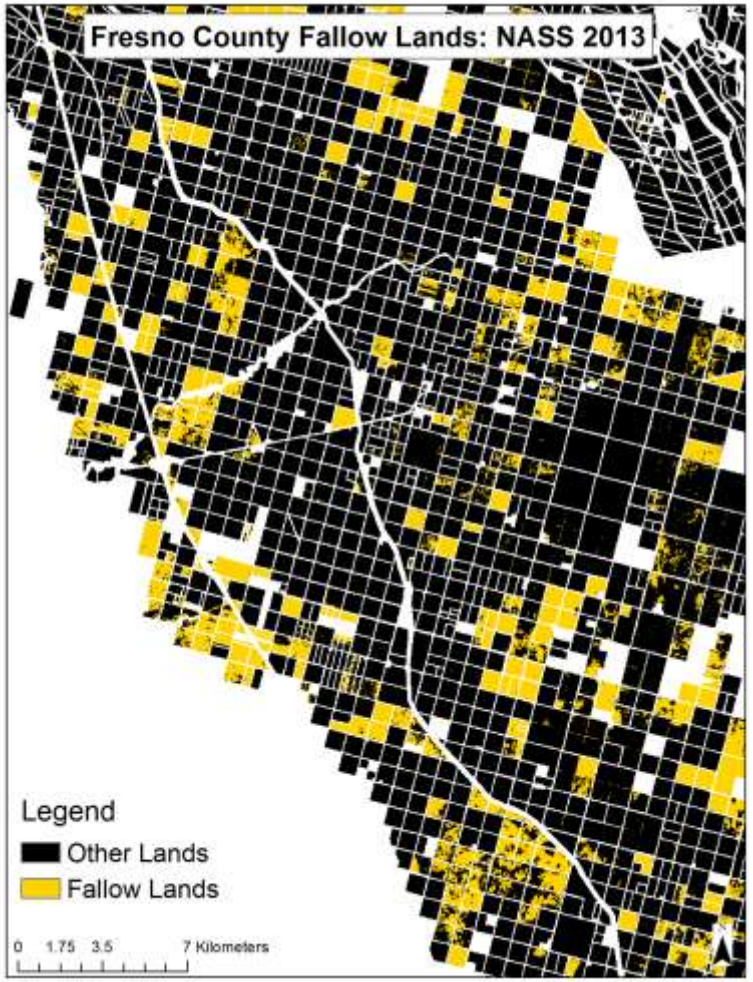
Statewide monitoring at the field scale





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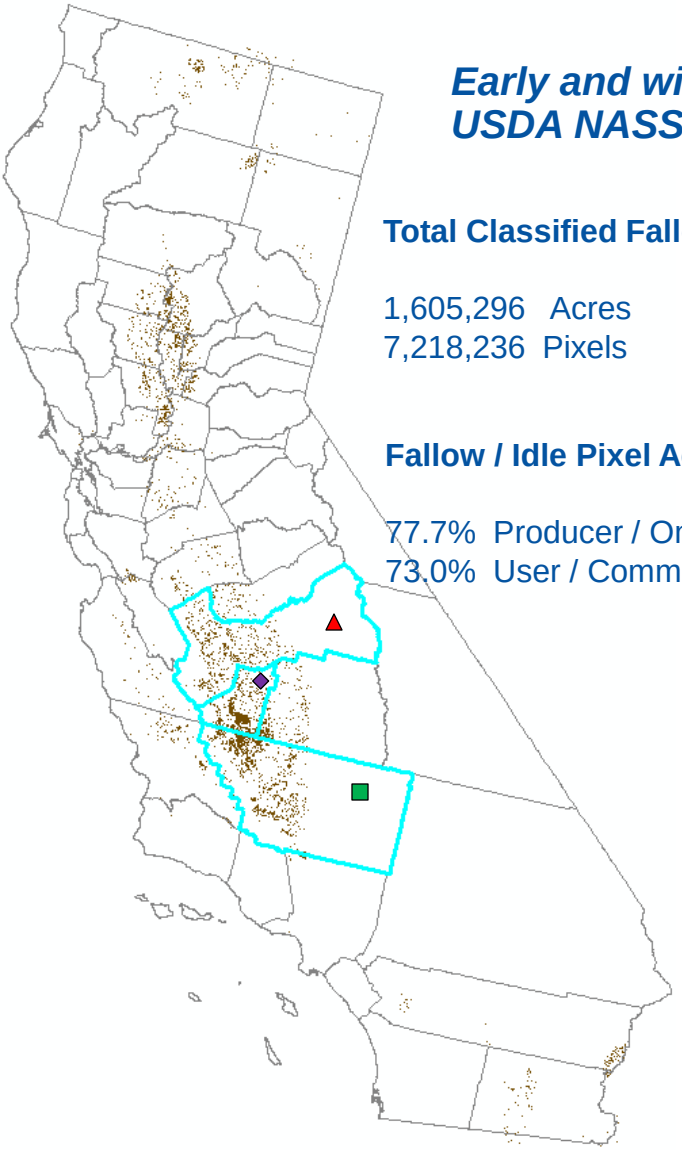
2012 USDA NASS CDL Fallow Acreage



Early and within-season monthly maps of fallow acreage developed by USDA NASS team. Data available for June in early July.

Total Classified Fallow / Idle

1,605,296 Acres
7,218,236 Pixels

Fallow / Idle Pixel Accuracy

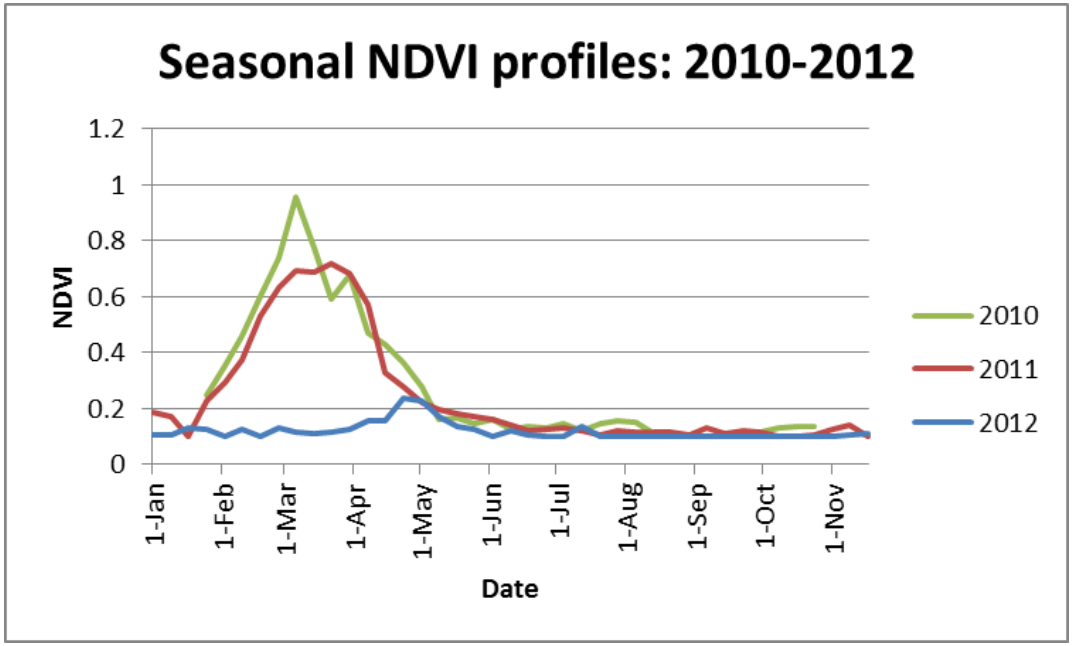
77.7% Producer / Omission
73.0% User / Commission

Total Fallow Acres by CDL Iteration

	Cropland Data Layer Iterations		
County	September	August	June
Kern	366,649	345,599	322,500
Fresno	208,711	191,436	196,443
Kings	203,170	159,347	142,714
Tulare	113,399	124,151	110,825
Butte	80,742	76,546	52,709
Yolo	67,341	58,611	69,525
Sutter	52,897	45,125	32,613
Siskiyou	45,175	46,852	49,840
Colusa	43,493	40,556	22,546
Glenn	38,048	38,240	25,552

Early Season Mapping of Fallowed Area (March – June)

- Land idling causes detectable change in seasonal veg index profiles



Groundtruth transects:

Central California

April-June, 2012; Sept-Oct, 2012; Mar-June, 2013