

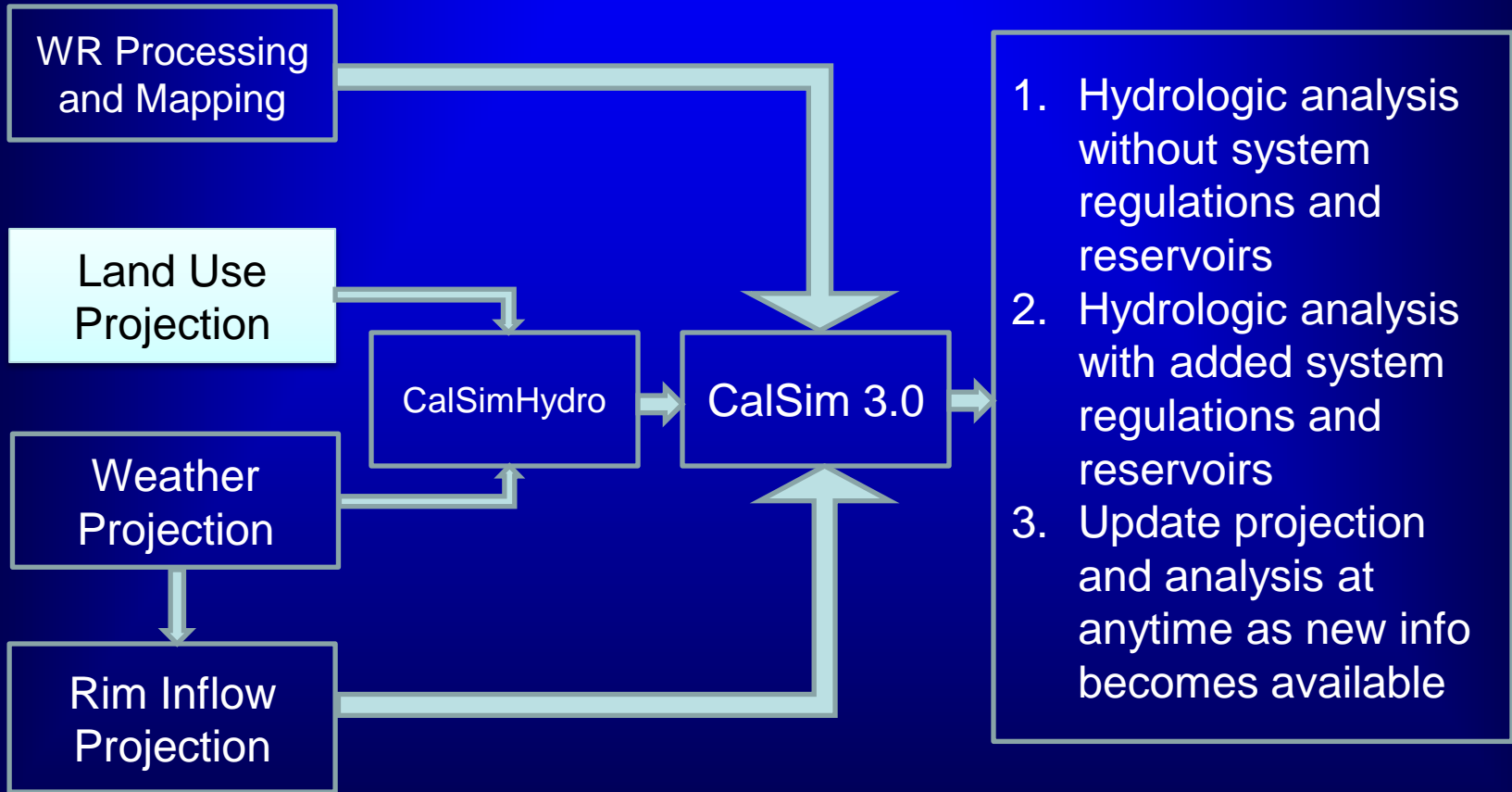
Land Use Projection for CalSim

Presenter: Liheng Zhong
Collaborator: Hongbing Yin
Bay-Delta Office
CA Department of Water Resources

CWEMF Annual Meeting
April 11, 2016



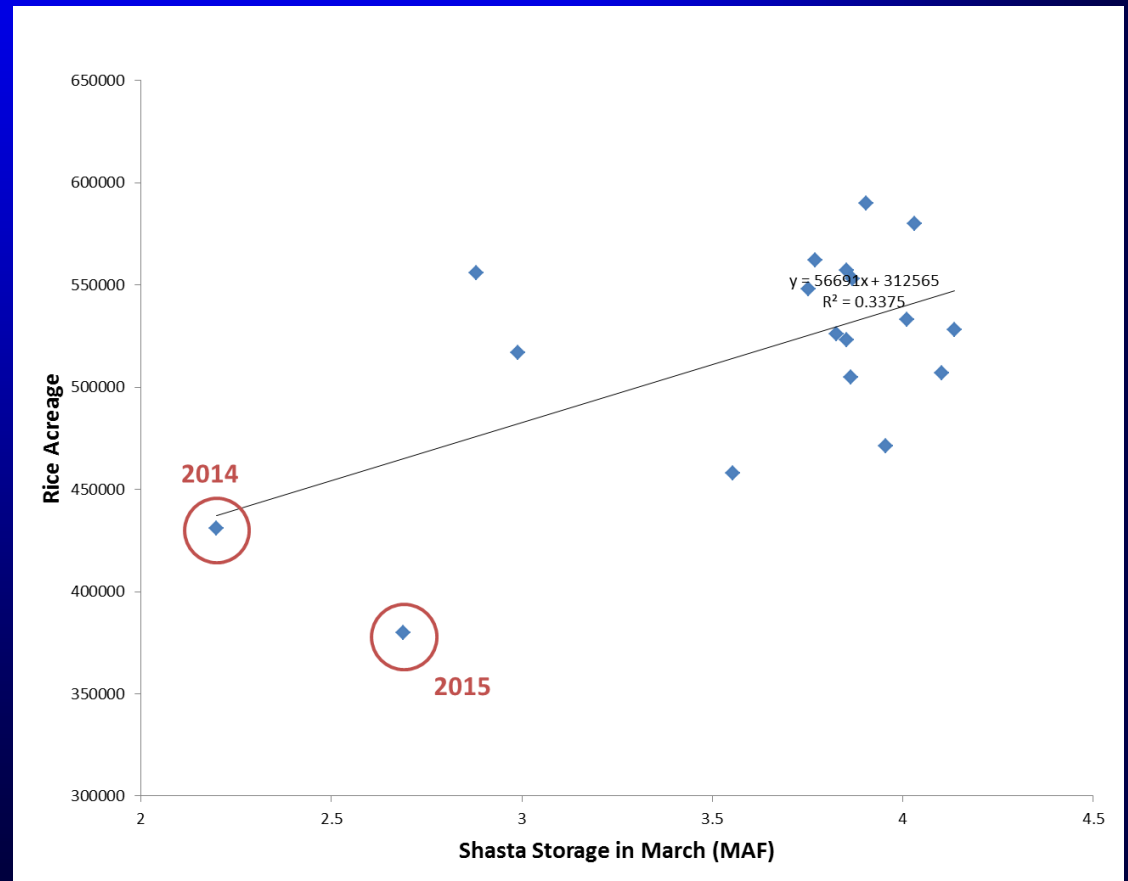
Incorporating Water Right Based Diversions Into CalSim 3.0 for real-time projection



2015 Land Use Projection

Attempts to project 2015 land use based on ~180 hydrologic variables (precipitation, storage & snow water depth)

Conclusion: latest land use is necessary rather than data from the past



2015 Land Use Projection

Rice

remote sensing based mapping using Landsat imagery and rice phenology

Other crops

a combination of
base map and
projected change

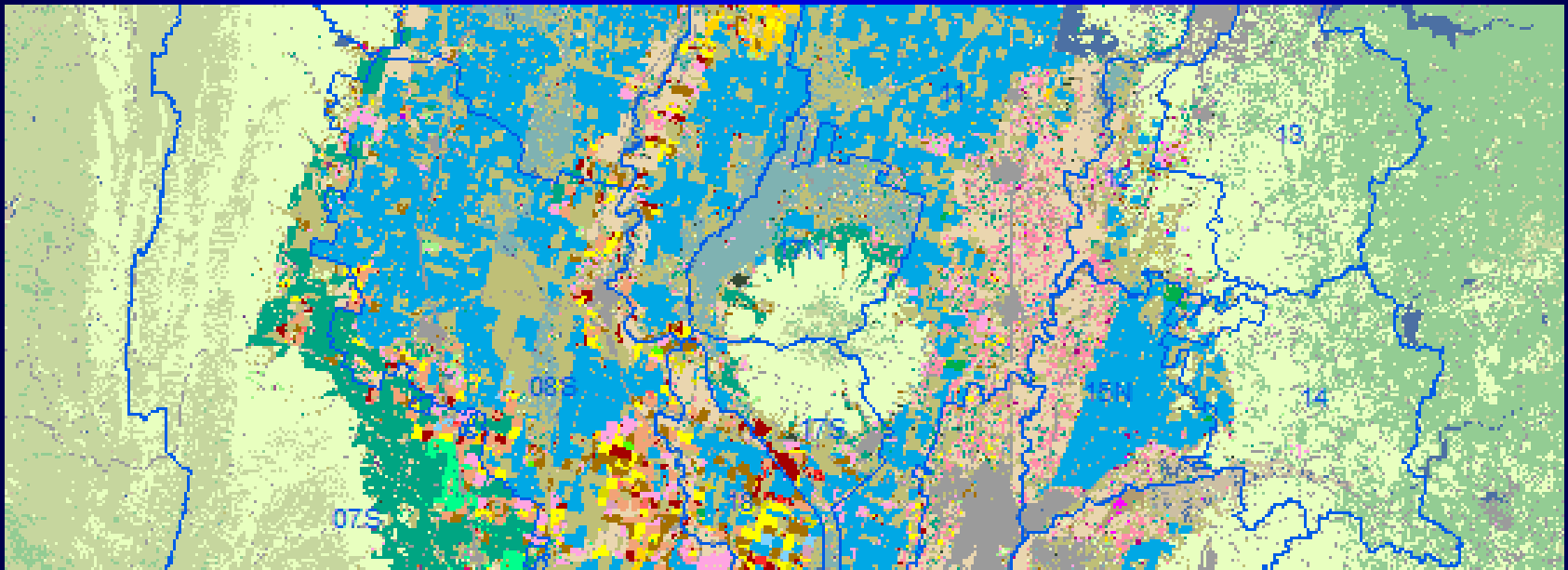
Base: 2014 Cropland Data Layer

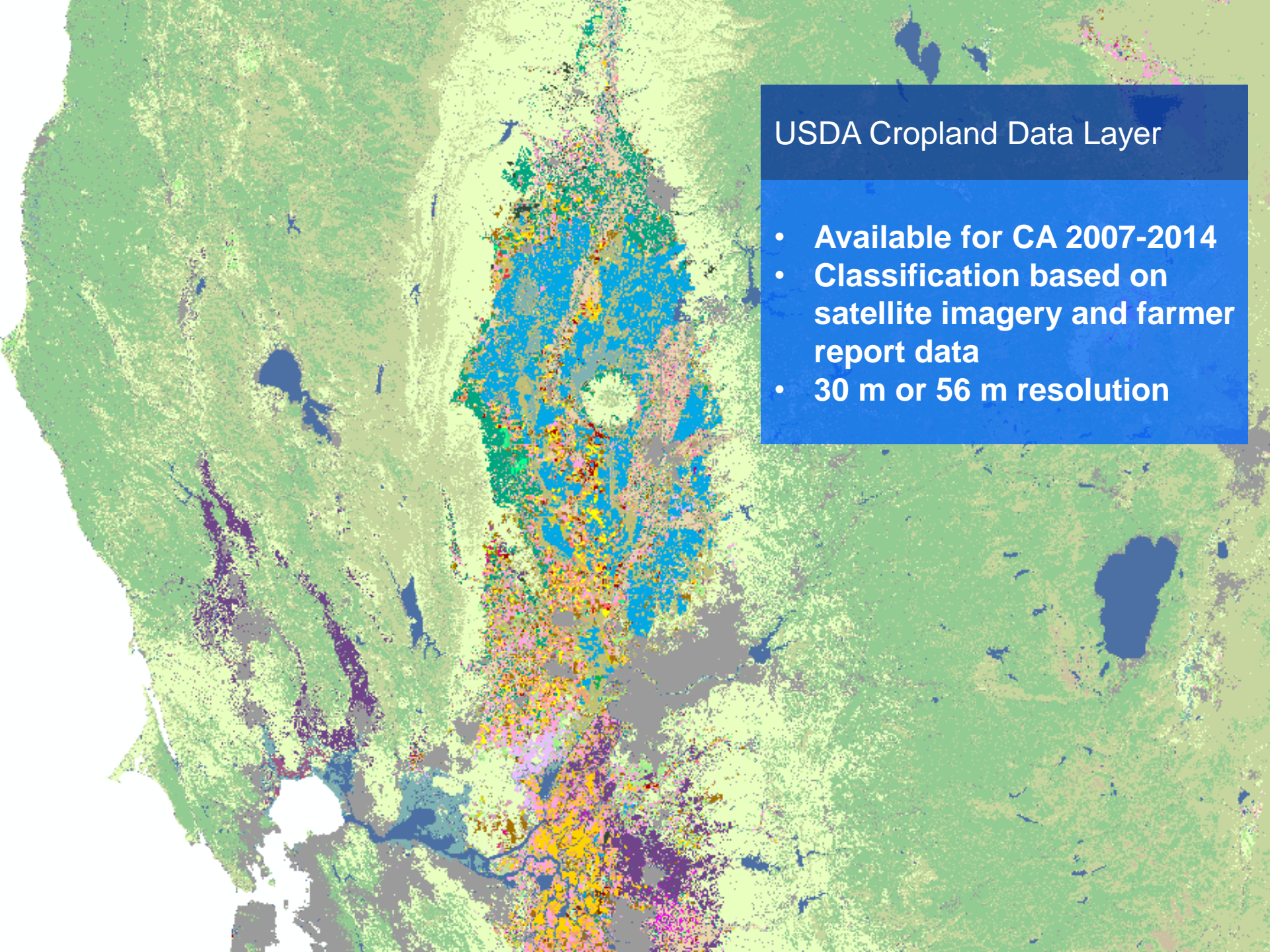
2015 change according to published
data

2015 Land Use Projection

For crops other than rice:

2014 Map + 2015 Projected Change





USDA Cropland Data Layer

- Available for CA 2007-2014
- Classification based on satellite imagery and farmer report data
- 30 m or 56 m resolution

Corn	Sugarbeets	Other Tree Crops	Asparagus	Dbl Crop Soybeans/Cotton
Cotton	Dry Beans	Citrus	Garlic	Dbl Crop Soybeans/Oats
Rice	Potatoes	Pecans	Cantaloupes	Dbl Crop Corn/Soybeans
Sorghum	Other Crops	Almonds	Prunes	Blueberries
Soybeans	Sugarcane	Walnuts	Olives	Cabbage
Sunflower	Sweet Potatoes	Pears	Oranges	Cauliflower
Peanuts	Misc Veggies & Fruits	Clouds/No Data	Honeydew Melons	Celery
Tobacco	Watermelons	Developed	Broccoli	Radishes
Sweet Corn	Onions	Water	Peppers	Turnips
Pop or Orn Corn	Cucumbers	Wetlands	Pomegranates	Eggplants
Mint	Chick Peas	Nonag/Undefined	Nectarines	Gourds
Barley	Lentils	Aquaculture	Greens	Cranberries
Durum Wheat	Peas	Open Water	Plums	Dbl Crop Barley/Soybeans
Spring Wheat	Tomatoes	Perennial Ice/Snow	Strawberries	
Winter Wheat	Caneberries	Developed/Open Space	Squash	
Other Small Grains	Hops	Developed/Low Intensity	Apricots	
Dbl Crop WinWht/Soybeans	Herbs	Developed/Medium Intensity	Vetch	
Rye	Clover/Wildflowers	Developed/High Intensity	Dbl Crop WinWht/Corn	
Oats	Sod/Grass Seed	Barren	Dbl Crop Oats/Corn	
Millet	Switchgrass	Deciduous Forest	Lettuce	
Speltz	Fallow/Idle Cropland	Evergreen Forest	Pumpkins	
Canola	Pasture/Grass	Mixed Forest	Dbl Crop Lettuce/Durum Wht	
Flaxseed	Forest	Shrubland	Dbl Crop Lettuce/Cantalou	
Safflower	Shrubland	Grassland Herbaceous	Dbl Crop Lettuce/Cotton	
Rape Seed	Barren	Pasture/Hay	Dbl Crop Lettuce/Barley	
Mustard	Cherries	Woody Wetlands	Dbl Crop Durum Wht/Sorghu	
Alfalfa	Peaches	Herbaceous Wetlands	Dbl Crop Barley/Sorghum	
Other Hay/Non Alfalfa	Apples	Pistachios	Dbl Crop WinWht/Sorghum	
Camelina	Grapes	Triticale	Dbl Crop Barley/Corn	
Buckwheat	Christmas Trees	Carrots	Dbl Crop WinWht/Cotton	

USDA Cropland Data Layer

- >100 specific crop types
- ~85% accuracy for cropland based on evaluation using reported plantation

CDL Value	CDL Class	First Crop Category	Second Crop Category
1	Corn	Corn	
2	Cotton	Cotton	
3	Rice	Rice	
4	Sorghum	Other Field	
5	Soybeans	Other Field	
6	Sunflower	Other Field	
10	Peanuts	Other Truck	
11	Tobacco	Other Truck	
...
225	Dbl Crop WinWht/Corn	Grain	Corn
226	Dbl Crop Oats/Corn	Grain	Corn
227	Lettuce	Other Truck	
229	Pumpkins	Cucurbits	
230	Dbl Crop Lettuce/Durum Wht	Other Truck	Grain
231	Dbl Crop Lettuce/Cantaloupe	Other Truck	Cucurbits
232	Dbl Crop Lettuce/Cotton	Other Truck	Cotton
233	Dbl Crop Lettuce/Barley	Other Truck	Grain
234	Dbl Crop Durum Wht/Sorghum	Grain	Other Field
235	Dbl Crop Barley/Sorghum	Grain	Other Field
236	Dbl Crop WinWht/Sorghum	Grain	Other Field
237	Dbl Crop Barley/Corn	Grain	Corn
238	Dbl Crop WinWht/Cotton	Grain	Cotton
239	Dbl Crop Soybeans/Cotton	Other Field	Cotton
240	Dbl Crop Soybeans/Oats	Other Field	Grain
241	Dbl Crop Corn/Soybeans	Corn	Other Field
242	Blueberries	Other Truck	
243	Cabbage	Other Truck	
244	Cauliflower	Other Truck	
245	Celery	Other Truck	
246	Radishes	Other Truck	
247	Turnips	Other Truck	
248	Eggplants	Other Truck	
249	Gourds	Other Truck	
250	Cranberries	Other Truck	
254	Dbl Crop Barley/Soybeans	Grain	Other Field

Mapping of CDL types to CalSim 3.0 categories

2015 Land Use Projection

For crops other than rice:

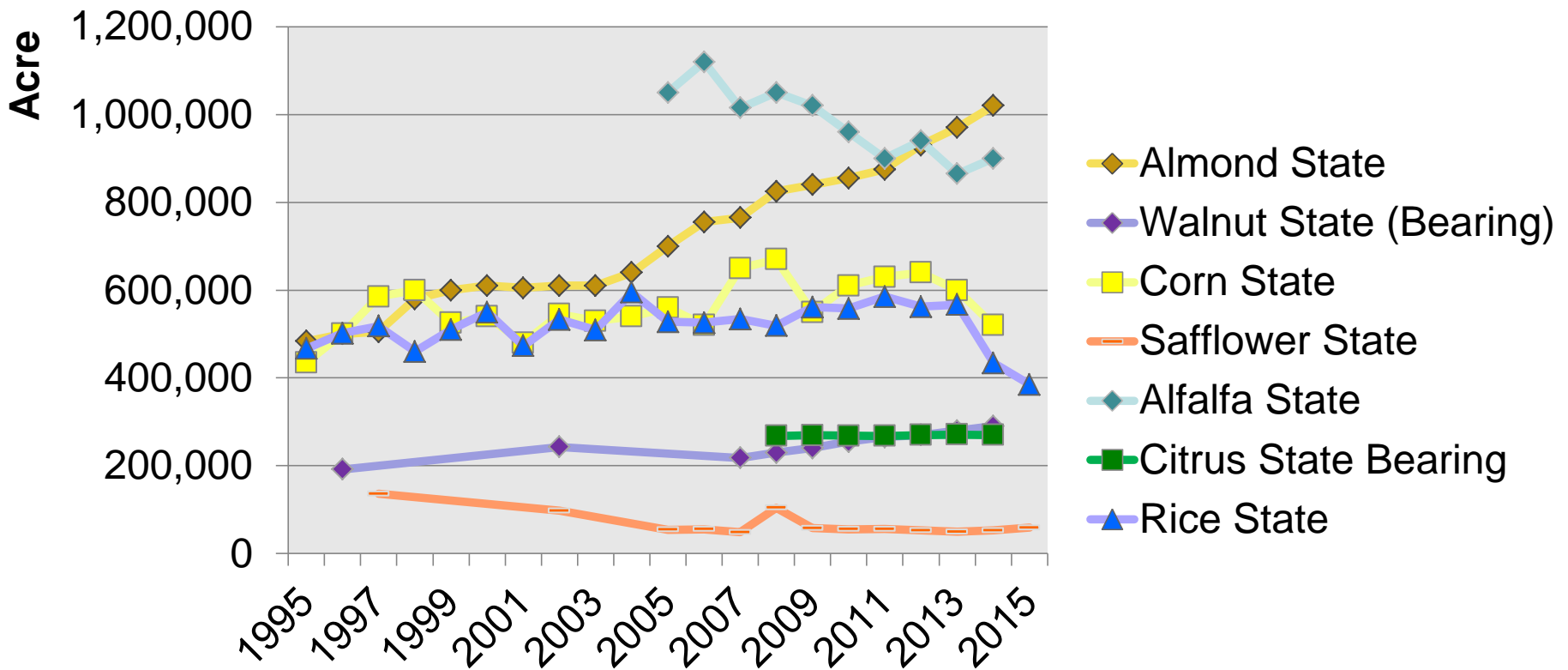
2014 Map + 2015 Projected Change

Crop	Acreage	Rate	Date	Source
Alfalfa	820000	93.7%	7/7/2015	USDA Pacific Region Results of Mid-Year Surveys
Almond	890000	102.3%	5/4/2015	USDA California Almond Acreage Report
Corn	430000	83.0%	3/31/2015	USDA Pacific Region Farm News
Walnut		102.6%		Trend Analysis 2011-2014
Safflower	59000	112.4%	7/7/2015	USDA Pacific Region Results of Mid-Year Surveys

2015 Land Use Projection

For crops other than rice:

2014 Map + 2015 Projected Change



2015 Land Use Projection

Mapped rice fields in late-June using Landsat:



2015 Land Use Projection - Timeline

Date of Update	Crop	Source
Late Jan – Early Feb	All	USDA map (Cropland Data Layer) of previous year
Late Mar	Rice, Corn	USDA Pacific Region Farm News
Late Apr – Early May	Almond	USDA California Almond Acreage Report
Late May	Almond	USDA Pacific Region Farm News
Late May	Walnut	USDA California Walnut Acreage Report of previous year
Mid Jun	Rice	Map from automated method based on Landsat imagery
Late Jun – Early Jul	Rice, Corn, Alfalfa, Hay	USDA Pacific Region Results of Mid-Year Surveys
Early Jul	Almond	USDA Pacific Region Farm News
Early Aug	Rice, Corn	USDA Pacific Region Farm News
Early Sep	Rice, Corn	USDA Pacific Region Farm News

THANK YOU

Questions?