

2016–2018 California Farmland Conversion Report

DOCUMENTING CHANGES IN AGRICULTURAL LAND USE
SINCE 1984

Gavin Newsom, Governor
Wade Crowfoot, Secretary, Natural Resources Agency
David Shabazian, Director, Department of Conservation



California Department of Conservation Division of Land Resource Protection (DLRP)



Our Mission:

The Department of Conservation balances today's needs with tomorrow's challenges and fosters intelligent, sustainable, and efficient use of California's energy, land, and mineral resources. The Department of Conservation administers multiple programs to promote the conservation of working lands and orderly growth and development.

Farmland Mapping and Monitoring Program:

Since 1984, the Farmland Mapping and Monitoring Program has provided consistent and accurate land use data, which is used by decision makers to assess status, review trends, and plan for the future of California's agricultural land resources.

About the Report:

Public Resources Code section 612 and Government Code section 65570 require The Department of Conservation to prepare Important Farmland Series maps and biennially report agricultural land conversion rates. The Farmland Mapping and Monitoring Program prepares these maps and farmland conversion reports. This report covers these trends for the 2016–2018 reporting period.

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Photo Credit:

Figure 9: Young Almond Orchard (Photo by Michael Kisko)

Acknowledgements

MANY INDIVIDUALS AND ORGANIZATIONS CONTRIBUTED TO THIS REPORT AND THE GIS DATA FROM WHICH IT WAS DERIVED.

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Thanks to Farl Grundy for all his contributions to the FMMP data. You are considered an honorary member of the FMMP team.

This report is dedicated to the memory of Troy Dick whose contributions to FMMP over many years and friendship are deeply appreciated and he will be missed.

Division of Land Resource Protection:

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Principal Data Sources include digital soil survey data, produced by the U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS); with aerial imagery from the National Agriculture Imagery Program (NAIP), Google Maps, and Google Streetview.

We derived cultural base information for the Important Farmland Maps from public domain data sets, based upon design of the U.S. Geological Survey, with updates generated by digitizing over current imagery.

The California Department of Water Resources, the California Department of Forestry and Fire Protection, and the GreenInfo Network provided additional data about land use and management.

Map reviewer comments have contributed to improvements in the quality of the Important Farmland Data. These reviewers include county and city planning offices, county agricultural commissioners, resource conservation districts, USDA Natural Resources Conservation Service district conservationists, California Farm Bureau Federation, University of California Cooperative Extension, California Cattlemen's Association, local water and irrigation districts, public interest groups, and building industry representatives.



Dear Members of the Legislature and Land Conservation Partners:

I am pleased to present the California Farmland Conversion Report produced by the Department of Conservation's Farmland Mapping and Monitoring Program. This report tracks agricultural land use conversion, urbanization, and other trends from 2016 - 2018 based on detailed geographic information system (GIS) mapping and includes comparisons to historic information.

The Legislature established the Farmland Mapping and Monitoring Program in 1982 to inventory California's important farmlands and document their conversion rates over time. Land use planners and decision makers at all levels use the program's data and reports to gauge the impact of planning decisions on California's agricultural lands.

Since the program was established, over 1.6 million acres of agricultural land in California has been developed or removed from agricultural production. This represents an area larger in size than Ventura County.

During the 2016 - 2018 period represented in this report, the State saw 152,627 acres of irrigated farmland moved out of production. On the other hand, 108,909 acres of formerly unirrigated lands were converted to irrigated farmland.

Further, the State added 37,583 acres of new Urban and Built-up Land. The Southern California region had the most development with 21,046 acres for urban, commercial, solar, and other nonagricultural uses.

California's agricultural land is a finite resource. Through this and prior reports, our goal is to provide useful and accurate data to help our State, local, and private partners shape a prosperous future that also preserves California's most productive agricultural lands.

David Shabazian
Director

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EXECUTIVE SUMMARY, 2016-2018

RATE OF URBANIZATION DECLINED SLIGHTLY WHILE IRRIGATED FARMLAND LOSS SHOWED A SUBSTANTIAL INCREASE.

The Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) biennial mapping survey covers 50.6 million acres in 51 counties, an expansion of 1.5 million acres above the 2014-2016 cycle (the current survey area is shown in Figure 2 on page 9). FMMP produces Important Farmland Data in the form of GIS data, maps, and statistics by delineating land use in the State with the use of aerial imagery which is combined with soil quality data from the USDA NRCS. The earliest data for most counties is from 1984, allowing FMMP to produce an accurate and consistent long-range geospatial dataset for agricultural land use change. Stable long-term data across nearly all of California's agricultural landscapes makes FMMP mapping a uniquely critical resource to understand local agricultural land use history and trends and inform decisions to respond to anticipated challenges looking ahead.

While delays in imagery availability and resource limitations during the pandemic delayed the FMMP process for producing a statewide report for 2016-2018, FMMP is continuously releasing individual county maps for the 2018-2020 cycle that can be found at www.conservation.ca.gov/dlrp/fmmp.

Urban Land and Agricultural Land Summary

Urban development in California totaled 37,583 net acres for the 2016-2018 period. Urban development took place on 11,465 acres of irrigated farmland (Prime, Statewide, and Unique Farmland). Southern California led the way in urbanization with 21,046 acres of development.

Meanwhile, agricultural land in California decreased by 74,641 net acres from 2016-2018. Of that, irrigated farmland (Prime, Statewide, and Unique Farmland) decreased by 56,186 net acres. Decreases in irrigated farmland are measured by a lack of irrigation for at least four years prior to the mapping date. This four-year period is to ensure that the irrigated farmland is going out of production rather than simply undergoing a temporary fallowing for soil fertility purposes. Statewide, the highest-quality farmland, known as Prime Farmland, decreased by 38,683 net acres, coupled with a Farmland of Statewide Importance decrease of 30,052 net acres. Further, nonirrigated Grazing Land and Farmland of Local Importance decreased by 18,455 net acres. The addition of 12,549 net acres of irrigated crops on lesser quality soils partially offset these losses of farmland.

New Urban and Built-up Land

Of the 37,583 acres of new Urban and Built-up Land -- which includes housing, energy infrastructure, and commercial development -- the highest amount, 56 percent, occurred in the Southern California region (21,046 acres). In second place for urban growth was the San Joaquin Valley region with 38 percent (14,290 acres). Nine out of the top ten urbanizing counties were in the Southern California and San Joaquin Valley regions. These two regions accounted for 94 percent of total urban growth in the State. Finally, new Urban and Built-up Land included solar facility construction that contributed over 17,000 acres of urbanization.

Sources of Urban and Built-up Land: Irrigated farmland was the source of 30 percent (11,465 acres) of all new Urban and Built-up Land. Prime Farmland was the source of 12 percent (4,748 acres) of urban land. Farmland of Statewide Importance and Unique Farmland combined as the further source of 18 percent (6,717 acres) of urban land. Another 52 percent (19,454 acres) of new Urban and Built-up Land was developed from land dedicated to dryland farming and grazing. The remaining 18 percent (6,664 acres) was derived from natural vegetation or vacant lands (Other Land).

Southern California: Southern California comprised 56 percent of the statewide urban development increase (21,046 acres). Five of the top ten urbanizing counties were in Southern California with Riverside, Imperial, and Los Angeles counties leading the way with 8,139 acres, 4,352 acres, and 3,866 acres, respectively.

The Southern California region led the way in terms of irrigated land to urban land shifts, with 5,732 acres of conversion. Imperial County had the most urbanization of irrigated land in the State with 4,172 acres.

San Joaquin Valley: The San Joaquin Valley comprised 38 percent of the statewide urban development increase (14,290 acres). Four out of the top ten counties with the largest increase of Urban and Built-up Land were in the San Joaquin Valley. Kern County had the second largest urban increase in the State. The Urban and Built-up Land footprints of Kern and Fresno counties expanded by 5,906 and 3,958 acres, respectively.

The San Joaquin Valley region had the second largest proportion of irrigated land to Urban and Built-up Land conversion (3,782 acres). Fresno County had the most acreage converted from irrigated farmland to urban land with 929 acres.

Energy Infrastructure: Solar facility development accounted for 17,192 acres of urban development between 2016 and 2018. Solar facility construction was a significant component of the urban increases in Imperial (91 percent), Kern (73 percent), Los Angeles (67 percent), and Fresno (63 percent) counties.

Agricultural Trends

Irrigated Land Expansion: Conversions of range and other lands to new irrigated land between 2016 and 2018 totaled 108,909 acres, a decrease of 16 percent from the prior cycle. Sixty-seven percent of these new irrigated lands did not have soil qualities that meet the Prime Farmland criteria.

San Joaquin Valley: All of the counties in the San Joaquin Valley had irrigated land expansions greater than 5,000 acres except Kings County. However, in contrast to last update, new plantings did not exceed 10,000 acres in any county in this region.

Sacramento Valley: Sacramento Valley counties exhibited substantial new additions of irrigated land with plantings exceeding 4,000 acres in Glenn, Sacramento, and Yolo counties.

Other Regions: San Luis Obispo and Santa Barbara counties each added over 3,000 acres of irrigated crops in the Central Coast region.

Land Removed from Irrigation: Land was removed from irrigated categories—to uses aside from urban—at a rate 19 percent higher than compared with the prior update (128,105 acres in 2014-2016 and 152,627 acres in 2016-2018).

Land idling, where irrigated land was converted to nonirrigated land due to a lack of irrigation over time, conversion to dry farming, or in advance of a planned use for urbanization, was responsible for the conversion of 117,927 acres or 77 percent of the land removed from irrigation for uses aside from urban. Irrigated land conversions due to idling are often associated with water resource limitations, market conditions, salinity-related land idling, and fiscal and management advantages for future urbanization. The cessation of irrigation results in land being reclassified to Grazing Land or Farmland of Local Importance, which could be reversed if resource, economic, management decisions, or environmental factors change.

The remaining 23 percent of land removed from irrigated categories—for reasons aside from urbanization—was converted to Other Land, which included miscellaneous uses such as oil field expansion, rural residences, rural commercial, and disturbed land that was graded for development.

San Joaquin Valley: The San Joaquin Valley was most impacted by land idling. There were 60,329 acres of land reclassified from irrigated land to Grazing Land or Farmland of Local Importance in the San Joaquin Valley due to idling, comprising 51 percent of the statewide total.

Other Regions: The Sacramento Valley experienced the next most conversions from irrigated land due to land idling or dry farming with 18,812 acres. This was followed by the North State (16,854 acres) and Southern California (11,705 acres) regions.

Net-Irrigated Farmland Change: Statewide, irrigated farmland showed a net decrease of 56,186 acres between 2016 and 2018, an amount substantially higher than the decline reported between 2014 and 2016 (11,165 acres). Land idling has been the major contributing factor to irrigated farmland decreases during recent map updates. Kings County's net decrease of irrigated farmland was the largest at 20,359 acres. On the other hand, some counties saw net-increases in their irrigated farmland totals during the 2016 to 2018 update. Notable examples of counties with the largest irrigated land increases included Stanislaus, Tulare, Madera, and San Joaquin counties.

Historic Trends and Conclusion

1984-2018 Net-Land Use Change: The Department of Conservation has recorded the conversion of over 1.6 million acres of agricultural land in California to nonagricultural purposes since 1984. This represents an area larger in size than Ventura County. The largest losses in agricultural land have been from Prime Farmland (-816,123 acres), Farmland of Statewide Importance (-455,287 acres), and Grazing Land (-423,565 acres)—some of California's best farmland. The largest agricultural category to increase over this period has been Unique Farmland (100,646 acres), due to expansion of high value crops, primarily orchards and vineyards.

As 2018-2020 mapping proceeds, the Department of Conservation will continue to support informed planning decisions with consistent and accurate agricultural land resource data, capturing trends as they evolve.



CHAPTER 1: THE FARMLAND MAPPING AND MONITORING PROGRAM

DOCUMENTING CHANGES IN AGRICULTURAL LAND USE SINCE 1984

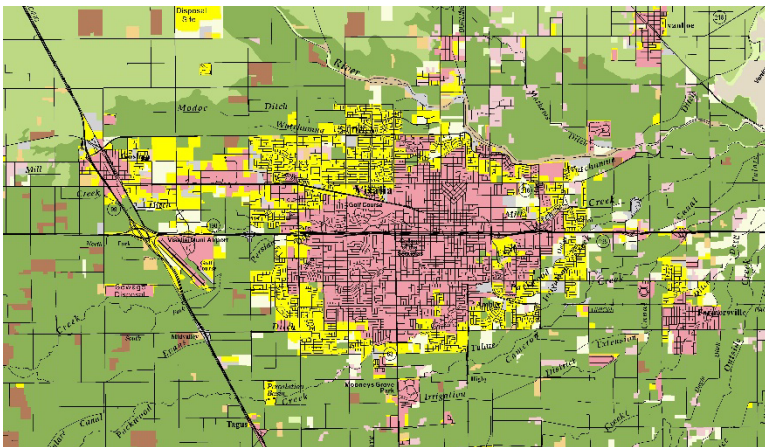
The goal of FMMP is to provide consistent and accurate land use data to decision makers to use to assess agricultural land resource status in California. An example of urbanization since mapping was initiated is illustrated below for the Visalia area of Tulare County (Figure 1).

FMMP mapped approximately 50.6 million acres during the 2016 to 2018 update cycle, an increase of over 1.5 million acres from the previous update. The survey area is shown on page 9 (Figure 2). FMMP updates each map every two years, which provides an archive to track land use change over time.

Using a geographic information system (GIS), aerial imagery, comments from local agencies, and other information, FMMP combines soil quality data and current land use information to produce Important Farmland Maps. Government Code section 65570 mandated the program, and it is funded through the State's Soil Conservation Fund, which receives revenues from Williamson Act contract cancellation fees.

Advances in technology have supported significant FMMP data improvements over the years. Most recently, the [California Important Farmland Finder](#)¹ allows users to locate their area of interest on mobile devices and desktops using many different search features. This allows use of the data in the field, complementing the program's

**FIGURE 1: URBANIZATION IN THE VISALIA AREA,
TULARE COUNTY, 1986-2018**
(NEW URBAN LAND IN YELLOW)



printed maps, PDF maps, statistics, and GIS data. The maps and data are used in environmental studies to assess the impacts of proposed development on agricultural and open space land. A number of jurisdictions base their agricultural land mitigation requirements on the amounts of Important Farmland affected by development project conversions. FMMP data is also used in urbanization and environmental modeling and comparative land cover studies.

¹ <https://maps.conservation.ca.gov/DLRP/CIFF/>

In addition, only land that is classified in one of the four main agricultural categories (Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance) on Important Farmland Maps is eligible for enrollment in a Farmland Security Zone contract. Under these contracts, landowners receive substantial property tax benefits in exchange for their commitment to keep their land in agricultural use for no less than 20-year periods.

The 2016-2018 California Farmland Conversion Report is the seventeenth produced by FMMP since the program's inception and is focused on the 2016-2018 time period with comparisons to prior data.

Important Farmland Map Categories

FMMP's study area coincides with boundaries of U.S. Department of Agriculture (USDA) modern soil surveys. Technical soil ratings and current land use information are combined to determine the appropriate map category. The minimum land use mapping unit for all categories is 10 acres unless otherwise noted. Soil units smaller than 1 acre are maintained to represent the original USDA data most accurately.

Prime Farmland has the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Farmland of Statewide Importance is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Unique Farmland consists of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include nonirrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.

Farmland of Local Importance is land of importance to the local agricultural economy as determined by each county's board of supervisors following recommendations by a local advisory committee. The definitions for this category are detailed in Appendix E (page 99) of this report.

Grazing Land is land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.

Urban and Built-up Land is occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. Common examples include residential, energy infrastructure, industrial, commercial, institutional facilities, prisons, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water infrastructure.

Water is defined as perennial water bodies with an extent of at least 40 acres.

Other Land is land not included in any other mapping category. Common examples include low density rural developments, vegetative and riparian areas not suitable for livestock grazing, confined animal agriculture facilities, strip mines, borrow pits, and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land. More detailed data on these uses are available in counties containing the Rural Land Use Mapping categories.

Rural Land Use Mapping Categories

The Rural Land Mapping project provides more map and statistical detail than standard Important Farmland Map products by classifying Other Land into five subcategories, as described below. These data are only available in the eight San Joaquin Valley counties and Mendocino County. For more information, see the Appendix D tables on page 87.

Rural Residential Land includes residential areas of 1 to 5 structures per 10 acres.

Semi-Agricultural and Rural Commercial includes farmsteads, small packing sheds, unpaved parking areas, composting facilities, firewood lots, and campgrounds.

Vacant or Disturbed Land consists of open field areas that do not qualify for an agricultural category, mineral and oil extraction areas, and rural freeway interchanges.

Confined Animal Agriculture includes aquaculture, dairies, feedlots, and poultry facilities.

Nonagricultural and Natural Vegetation covers heavily wooded, rocky or barren areas, riparian and wetland areas, grassland areas that do not qualify for Grazing Land due to their size or land management restrictions, small water bodies, and recreational water ski lakes. Constructed wetlands are also included in this category. The Rural Land classes are not designed for interpretation as habitat.

Optional Designation

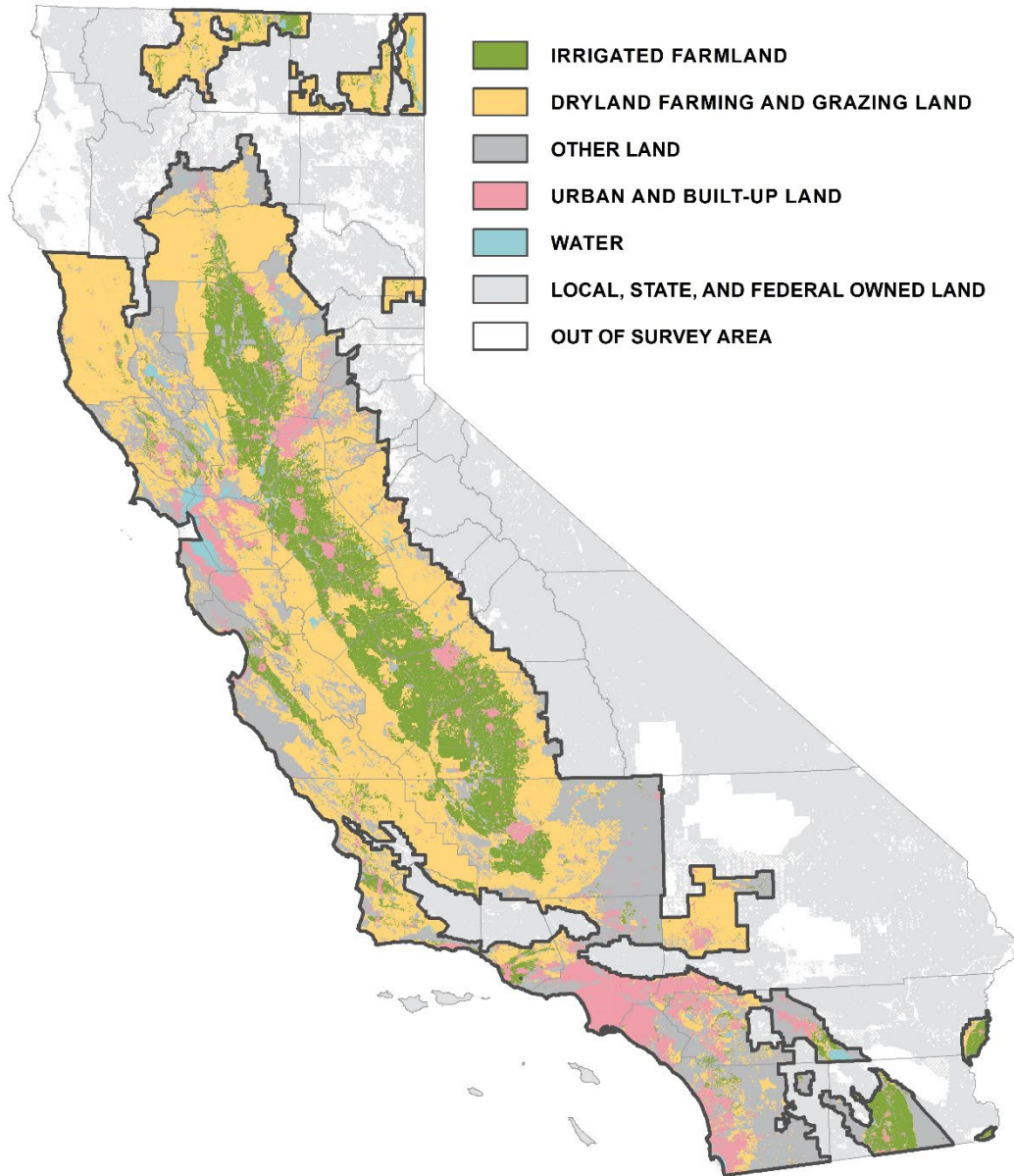
Land Committed to Nonagricultural Use is defined as existing farmland, grazing land, and vacant areas that have a permanent commitment for development. This optional designation allows local governments to provide detail about the nature of changes expected to occur in the future. Due to a continued lack of data submissions, compilation and analysis of this optional designation were suspended. Jurisdictions interested in updating this information should contact FMMP for assistance.

Survey Area Coverage

In Figure 2 on the next page, the 'Irrigated Farmland' area includes the Prime Farmland, Farmland of Statewide Importance, and Unique Farmland categories. The 'Dryland Farming and Grazing Land' designation includes the Farmland of Local Importance and Grazing Land categories.

Locations shown as 'Out of Survey Area' may be added in the future, while those indicated as 'Local, State, and Federal Owned Land' are not planned for incorporation. Examples of government-owned land include National Parks and Forests and Bureau of Land Management property. Please note that small areas of public land are included within the Important Farmland survey area—generally appearing as 'Other Land' on the map.

FIGURE 2: 2018 IMPORTANT FARMLAND SURVEY AREA





CHAPTER 2: 2016-2018 DATA IMPROVEMENTS

SURVEY AREA ADDITIONS AND NEW COUNTY BOUNDARY WITH IMPROVED COASTLINE

Each update cycle provides the opportunity to make improvements to the Important Farmland Data to achieve increased accuracy, process efficiency, or better reporting capabilities.

Survey Area Additions

The Important Farmland survey area expanded in three counties for the 2016-2018 map update. Nearly 519,000 acres in Calaveras County, and over 307,000 acres in Tuolumne County were mapped for the first time, filling a longstanding gap in the Sierra foothill counties. Calaveras County adopted a Farmland of Local Importance definition and Tuolumne County did not.

FIGURE 3: CALAVERAS AND TUOLUMNE COUNTY ADDITIONS

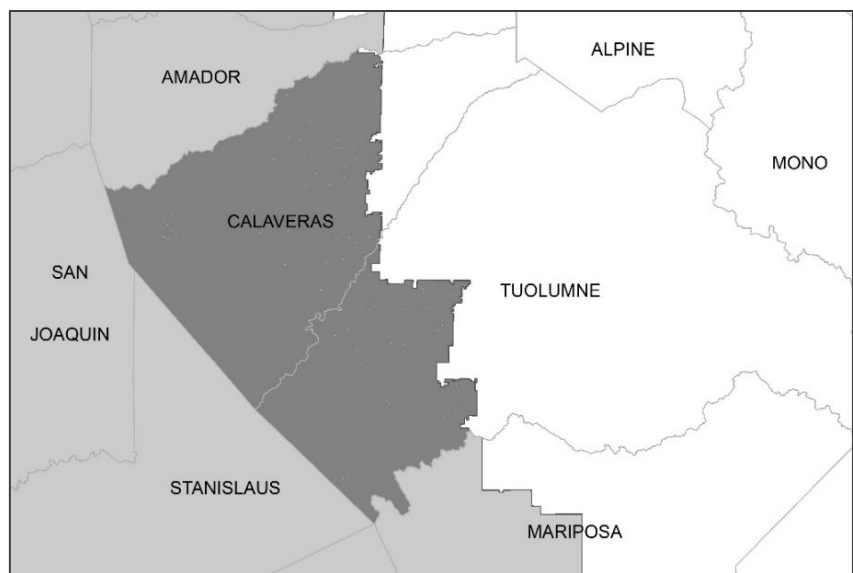


TABLE 1: CALAVERAS COUNTY IMPORTANT FARMLAND 2018

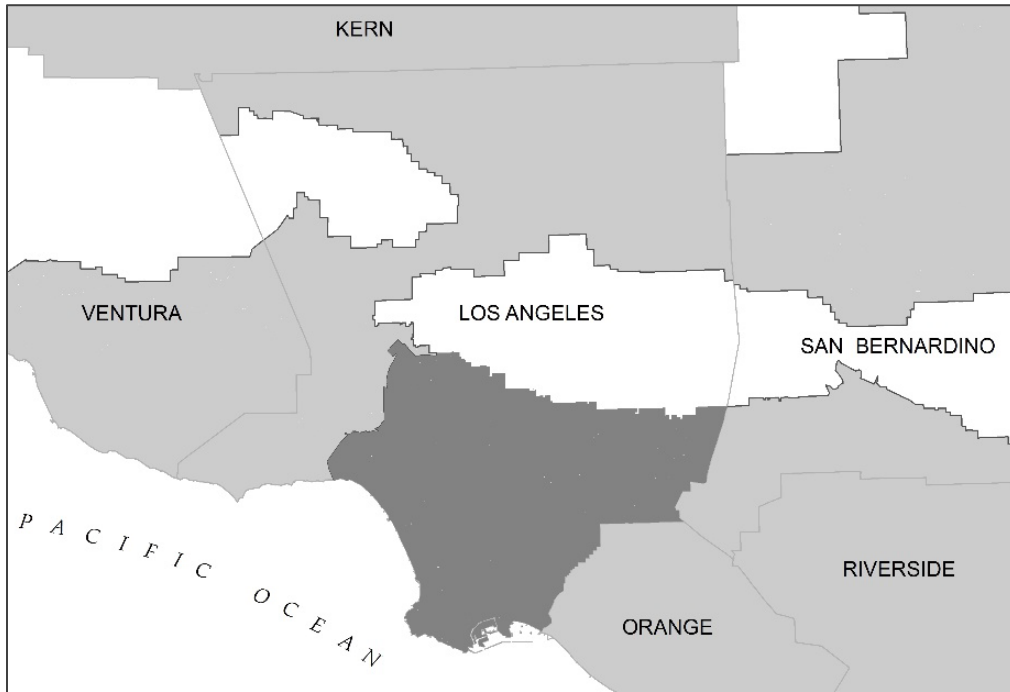
Prime Farmland	120
Farmland of Statewide Importance	341
Unique Farmland	1,690
Farmland of Local Importance	223,022
Important Farmland Subtotal	225,173
Grazing Land	252,723
Agricultural Land Subtotal	477,896
Urban and Built-Up Land	10,113
Other Land	17,149
Water Area	13,807
Total Area Inventoried	518,965

TABLE 2: TUOLUMNE COUNTY IMPORTANT FARMLAND 2018

Prime Farmland	37
Farmland of Statewide Importance	75
Unique Farmland	172
Farmland of Local Importance	0
Important Farmland Subtotal	284
Grazing Land	262,197
Agricultural Land Subtotal	262,481
Urban and Built-Up Land	14,905
Other Land	11,487
Water Area	18,562
Total Area Inventoried	307,435

In Los Angeles County, the survey area expanded 710,235 acres into the Los Angeles Basin and Ports of Los Angeles and Long Beach, the majority as Urban and Built-Up Land. Combined, these three survey area additions bring over 1.5 million acres into the program, for a total survey area of 50.6 million acres in 51 counties.

FIGURE 4: LOS ANGELES COUNTY EXPANSION



**TABLE 3: LOS ANGELES COUNTY
SURVEY ADDITION 2018**

Prime Farmland	282
Farmland of Statewide Importance	40
Unique Farmland	848
Farmland of Local Importance	0
Important Farmland Subtotal	1,170
Grazing Land	22,871
Agricultural Land Subtotal	24,041
Urban and Built-Up Land	600,804
Other Land	84,439
Water Area	951
Total Area Inventoried	710,235

Improved County Boundary Data

The 2016-2018 Important Farmland data adopted the California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP) 2018 version of California Counties GIS data. This version has a vastly improved coastline with more detailed mapping of piers, jetties, breakwaters, coastal rocks, and sea stacks. Some of these features result in very small polygons, many less than an acre. Statistical implications of adopting the new county boundaries are shown in Table 4 and in the individual county tables of Appendix A.

TABLE 4: 2018 IMPORTANT FARMLAND SURVEY AREA ADDITIONS
AND COUNTY BOUNDARY ADJUSTMENTS
(ACRES)

County	Description	Boundary Adjustments	Survey Area Additions
Alameda	Technical boundary improvements.	859	
Calaveras	Survey area addition.		518,965
Contra Costa	Technical boundary improvements.	59	
Fresno	Technical boundary improvements.	-64	
Los Angeles	Coastline improvements and survey area addition.	3,614	710,235
Madera	Technical boundary improvements.	64	
Marin	Coastline improvements and Tomales Bay inclusion to the county area.	10,868	
Mendocino	Coastline improvements.	32	
Monterey	Coastline improvements.	-471	
Orange	Coastline improvements and inclusion of Anaheim Bay, Huntington Harbor, and Newport Bay to the county area.	1,808	
Placer	Technical boundary improvements.	-94	
Sacramento	Technical boundary improvements.	9	
San Diego	Coastline improvements and inclusion of Mission Bay and San Diego Bay to the county area.	13,176	
San Luis Obispo	Coastline improvements and Morro Bay inclusion to the county area.	1,906	
San Mateo	Coastline improvements.	-225	
Santa Barbara	Coastline improvements.	-609	
Santa Clara	Technical boundary improvements.	-20	
Santa Cruz	Coastline improvements.	-209	
Solano	Technical boundary improvements.	-158	
Sonoma	Coastline improvements and Bodega Bay inclusion to the county area.	957	
Tuolumne	Survey area addition.		307,435
Ventura	Coastline improvements.	85	
Yuba	Technical boundary improvements.	93	



CHAPTER 3: UNDERSTANDING THE DATA

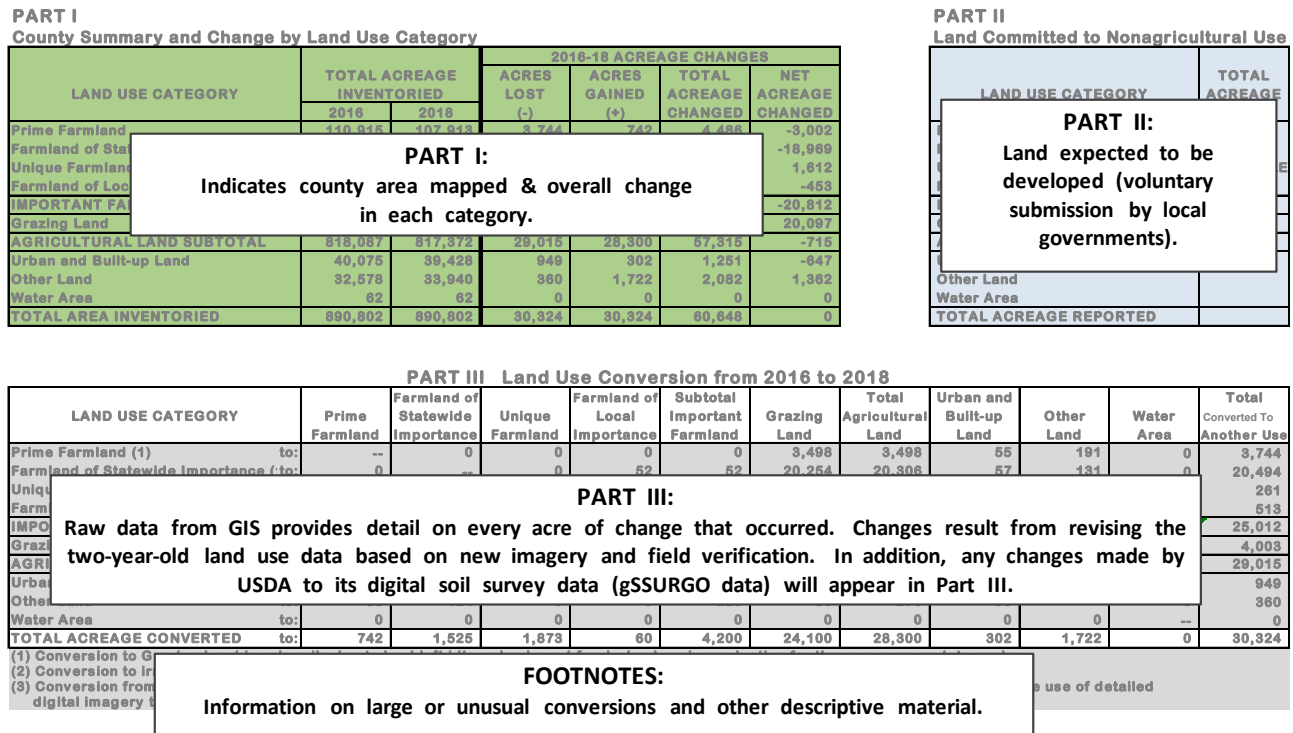
LOCATING AND INTERPRETING THE FARMLAND CONVERSION REPORT'S TABULAR DATA AND GRAPHICS

Important Farmland Data are developed on an individual county basis, taking two years to map the 50.6 million-acre survey area. The statewide and regional summaries in Chapter 4 are the result of compiling individual county data in various ways to provide a larger perspective on land use conversion.

Appendix A: County Conversion Tables

Appendix A, beginning on page 30, contains county-level data for all counties represented in this report. These data are used as source data for regional and statewide summaries and are organized in tables that include acreage tallies and conversion statistics for individual counties. Below, Figure 5 depicts how conversion tables are constructed and the information they contain.

FIGURE 5: CONVERSION TABLE STRUCTURE FOR COUNTY AND STATEWIDE DATA



Appendix B: Statewide and Regional Summaries

Statewide Summary: Appendix B summarizes material from all three sections of the Appendix A tables in Table B-1 on page 79 and has the same structure as the individual county tables.

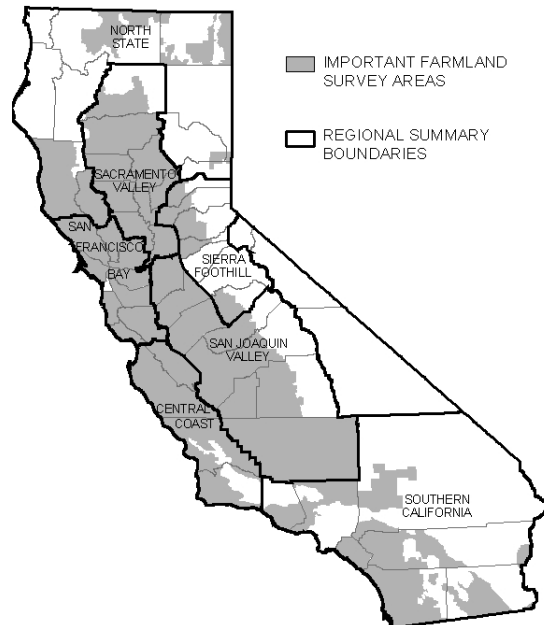
2016 and 2018 Statewide and Regional Summaries: Values for the individual years included in Tables B-2 and B-3 on pages 80 and 81, respectively, are extracted from Part I of the tables in Appendix A. These tables also indicate the proportion of each county that lies within the FMMP survey area—mapping typically ends at the boundaries of National Forests, for example. Table B-4 (page 82) shows this same information for 2018, grouped by region.

Appendix C: County and Regional Conversion Summaries

Appendix C, on page 83, groups counties into geographic regions as seen in Figure 6 (below) and is provided in the following tables. Much of the analysis in Chapter 4 is based on the data in Appendix C.

- Table C-1** Classifies sources of new urban land for the period, by county and region.
- Table C-2** Identifies conversions in or out of agriculture, aside from urbanization, capturing the ebb and flow of agricultural land use change over time.
- Table C-3** Documents net agricultural change from all factors, grouped by region and ranked by acreage.

FIGURE 6: REGIONS USED FOR FMMP ANALYSIS



Appendix D: Rural Land Use Mapping Tables

Appendix D, on page 87, contains tables that include data on changes associated with a more detailed subdivision of the Other Land category. Data are available for nine project counties currently.

General Items

Simplifying Assumptions: To conduct comparative analysis, certain simplifying assumptions have been made. For example, Unique Farmland is an irrigated farmland category, even though a small percentage of land within the Unique Farmland category supports high value nonirrigated crops, such as some coastal vineyards. Conversely, Farmland of Local Importance is a nonirrigated category although it also supports some irrigated pasture on lower-quality soils.

Statistical Notes: As changes are made to the land use data, there are instances where residual pieces of land are left that are smaller than the 10- or 40-acre minimum land use mapping unit. To maintain map unit consistency, these small units are absorbed into the most appropriate adjacent land use type.

Land use from FMMP and digital soil data from the USDA are merged to generate the Important Farmland Data. Tabular data are reported in whole numbers; small variations in category totals may result from rounding to whole numbers. Particularly large or anomalous changes are footnoted at the bottom of each table.



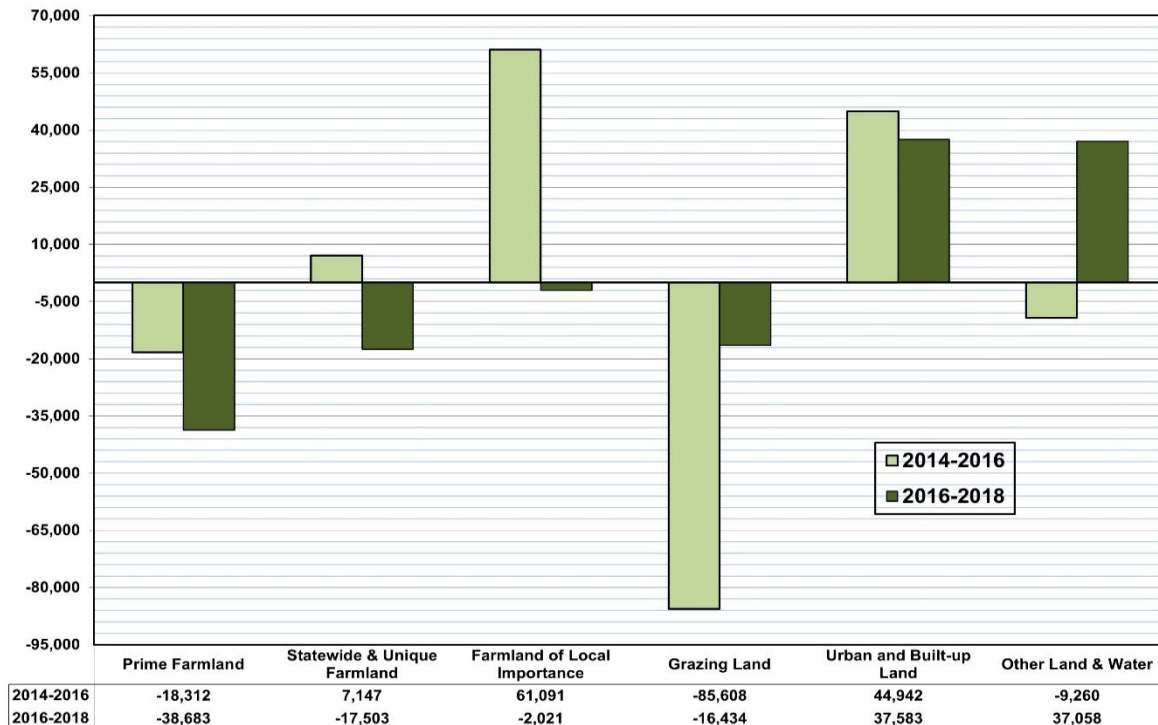
CHAPTER 4: LAND USE CONVERSION SUMMARY

THE RATE OF URBANIZATION DECLINED SLIGHTLY, WHILE THE NET IRRIGATED FARMLAND LOSS INCREASED SUBSTANTIALLY. LAND IDLING OR CONVERSION ON HIGH QUALITY SOILS WAS ONLY SLIGHTLY OFFSET BY AN INCREASE OF IRRIGATED PLANTINGS ON LESSER QUALITY SOILS.

Between 2016 and 2018, urban development impacted 37,583 acres, less than the 44,942 acres urbanized between 2014 and 2016. Southern California reclaimed its top urbanizing spot from the San Joaquin Valley with 21,046 acres versus 14,290 acres (Table C-1, page 84). Statewide, approximately 30 percent of urban conversions were derived from irrigated farmland, and 52 percent from dryland farming and Grazing Land. The statewide 2016-2018 conversion summary, Table B-1, is located on page 79. Comparative changes in Important Farmland categories for the two most recent update cycles are shown in Figure 7, below.

A total of 56,186 net acres were removed from irrigated land uses during the 2016-2018 update, a substantial increase compared with the 11,165-acre irrigated land loss posted in 2016. The net loss of Prime Farmland this update was 111 percent greater than last update, 38,683 acres lost compared to 18,312 acres lost the previous update. These irrigated land conversion statistics reflect the impact of a range of factors—land idling, urbanization, habitat conversion, and low-density rural development. Conversions from irrigated land to Grazing Land and

FIGURE 7: STATEWIDE IMPORTANT FARMLAND CONVERSION SUMMARY (ACRES)



Farmland of Local Importance exceeded conversions from irrigated land to urban land by a wide margin, 117,927 acres idled versus 11,465 acres urbanized. Land idling, when irrigated land is converted to nonirrigated land due to a lack of irrigation over time, was partially offset by the development of new irrigated lands.

Urban and Built-up Land Growth by County
2016-2018 Source Data: Appendix Table C-1 (Page 84)

Southern California and San Joaquin Valley counties captured nine spots on the top ten urbanizing list during the 2016-2018 Important Farmland update.

TABLE 5: COUNTY URBANIZATION RANKS
Urbanization from All Categories
 Top Ten Counties - net acres

2014-2016		2016-2018	
Kern	7,583	Riverside	8,139
Fresno	4,885	Kern	5,906
Riverside	4,573	Imperial	4,352
San Bernardino	3,502	Fresno	3,958
Los Angeles	3,444	Los Angeles	3,866
Kings	2,879	San Joaquin	2,211
San Diego	2,047	San Bernardino	2,027
Imperial	1,823	San Diego	1,877
San Mateo	1,793	Sacramento	1,740
Tulare	1,671	Tulare	1,497

Urbanization primarily took the form of new homes, commercial buildings, or solar facilities. The top ten counties hosted 95 percent of statewide urban growth during the 2016-2018 update, significantly higher than the 76 percent they claimed during the previous update. Riverside County captured the top spot this update (Table 5) and has perennially been one of the top urbanizing counties. Kern County remained close to the top in the second spot. Meanwhile, Imperial County shot up to third place due to solar facility

development. Similarly, Los Angeles County also featured solar development. Finally, Sacramento County was the lone county from outside Southern California or the San Joaquin Valley to make the top ten list.

Regional rankings were once again dominated by Southern California and the San Joaquin Valley (Table 6 and Appendix Table C-1 on page 84). Southern California experienced a 23 percent increase in urbanization to claim the top spot in the regional rankings. Meanwhile, the San Joaquin Valley had a 33 percent decrease in urbanization this update and fell to second place. Last update was the first time that the San Joaquin Valley had ever held the top urbanizing spot however avoiding a trend this update. The

San Joaquin Valley, Sacramento Valley, Sierra Foothill, and North State regions all experienced a decrease in urbanization this update. The San Francisco Bay region held steady. Lastly, the Central Coast showed an uptick in urbanization.

TABLE 6: REGIONAL URBANIZATION RANKING
Urbanization From All Categories
 net acres

2014-2016		2016-2018	
San Joaquin Valley	21,276	Southern California	21,046
Southern California	17,125	San Joaquin Valley	14,290
Sierra Foothill	2,254	Central Coast	1,489
Sacramento Valley	1,450	San Francisco Bay	1,295
San Francisco Bay	1,320	Sacramento Valley	245
Central Coast	1,233	Sierra Foothill	45
North State	284	North State	-827

Energy Infrastructure: *Solar facilities were a notable category of urban land use conversion.*

The construction of solar facilities during the update made major contributions to the urban totals in multiple counties, particularly in the San Joaquin Valley, Southern California, and the Central Coast regions. Solar facilities are a significant cause of the conversion of irrigated farmland and yet often coexist alongside actively irrigated farmland. On the other hand, solar projects can avoid converting the best quality farmland by being sited in arid or barren areas or on farmland with resource limitations such as a lack of fresh water for irrigation or salt-affected soils.

TABLE 7
SOLAR AS THE SOURCE OF URBAN 2012-2018

2012-2014 County	2012-2014 Urban Acres due to Solar	2014-2016 County	2014-2016 Urban Acres due to Solar	2016-2018 County	2016-2018 Urban Acres due to Solar
Imperial	7,022	Kern	6,853	Kern	4,310
Kern	4,002	Fresno	2,820	Imperial	3,974
San Luis Obispo	3,670	Kings	2,798	Los Angeles	2,588
San Bernardino	1,817	Los Angeles	2,139	Fresno	2,500
Tulare	1,149	Imperial	1,781	Monterey	836
Los Angeles	841	Merced	836	Riverside	716
Fresno	353	San Bernardino	655	Tulare	644
Kings	340	Tulare	608	San Benito	506
San Diego	203	San Luis Obispo	406	Santa Barbara	337
Sacramento	153	Riverside	247	San Bernardino	182
All Other Counties	259	All Other Counties	601	All Other Counties	599
Total	19,809	Total	19,744	Total	17,192

Solar facility development accounted for 17,192 acres of urban development between 2016 and 2018 (Table 7). This figure represents 46 percent of all urbanization in the State during that period. In Imperial County, 91 percent of the new urban acres were for solar facilities. Likewise, in Kern County, solar facilities were the source of 73 percent of the new urban land. Finally, Los Angeles, Fresno, San Benito, and Santa Barbara counties all had urbanization percentages due to solar projects that were in the 60 percent range.

Additions of solar facilities have made a large contribution to the urbanization of the State for the last three map update cycles (Table 7). Solar projects have ranged in size from tens of acres in the case of small projects associated with commercial facilities to utility-scale projects measured in hundreds of acres. It should be noted that solar projects built in the State that are sited in areas that lie outside of the FMMP survey area, such as portions of the Mojave Desert, are not included in the statistics provided in Table 7.

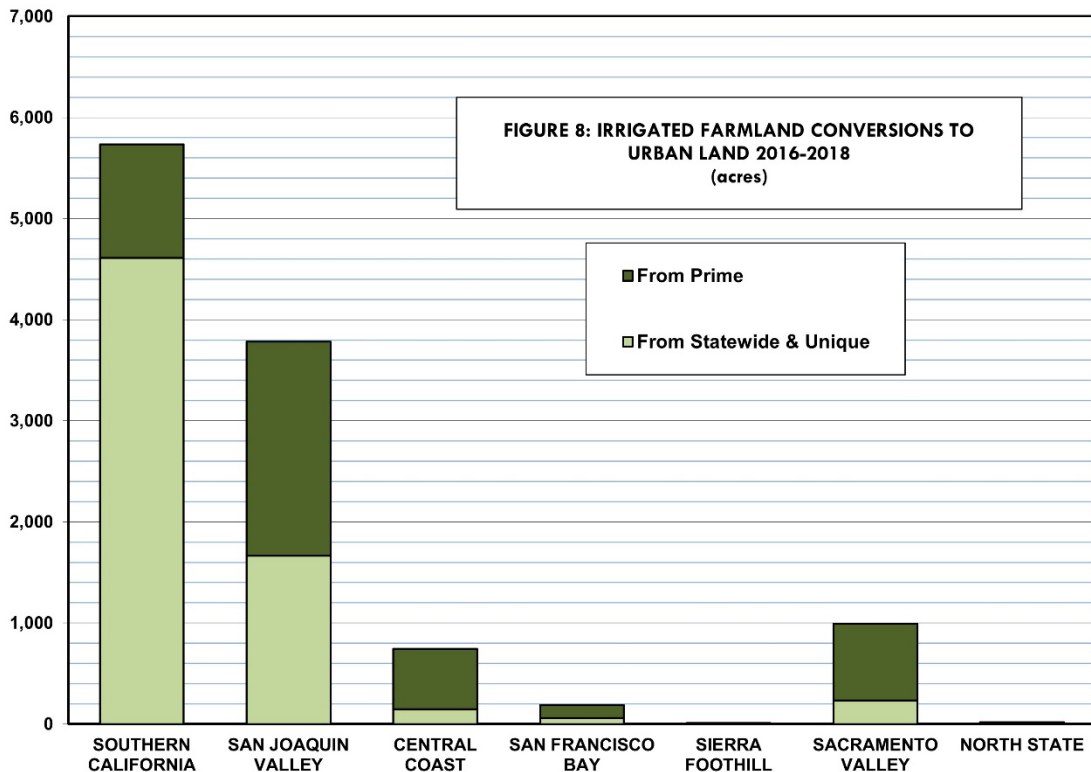
Urbanization of Irrigated Farmland: *Urbanization's impact on irrigated farmland was virtually the same as during the prior mapping cycle (Table 8 and Appendix Table C-1 on page 84).*

Conversions from irrigated farmland to urban land totaled 11,465 acres in the 2016-2018 update compared to 11,132 acres in the previous update. This type of conversion was dominant in Imperial County (4,172 acres) in the form of the addition or expansion of large solar facilities. Meanwhile, Fresno (929 acres) and Kern (773 acres) counties were also ranked at the top of irrigated farmland to urban land conversions. Further, Kern County also exhibited the largest amount of conversion of Prime Farmland directly to urban land (707 acres).

TABLE 8: IRRIGATED FARMLAND TO URBAN RANKS

Irrigated Farmland to Urban Top Ten Counties - net acres			
2014-2016		2016-2018	
Kern	2,409	Imperial	4,172
Kings	1,956	Fresno	929
Los Angeles	1188	Kern	773
Merced	857	San Joaquin	697
Stanislaus	674	Orange	567
San Joaquin	558	Merced	479
Fresno	513	Santa Barbara	473
San Bernardino	499	Riverside	440
Tulare	433	Yolo	402
Riverside	360	Madera	372

At a regional level, 15 percent of new urban land in the San Joaquin Valley came from Prime Farmland, and an additional 12 percent came from Farmland of Statewide Importance and Unique Farmland during the 2016-2018 period. Further, 5 percent of new urban land in Southern California came from Prime Farmland, and an additional 22 percent came from Farmland of Statewide Importance and Unique Farmland. The



relative location and type of irrigated farmland converted to urban uses are shown below in Figure 8.

Statewide, 30 percent of urbanization took place on irrigated farmland (12 percent on Prime Farmland and another 18 percent on a combination of Farmland of Statewide Importance and Unique Farmland). Another 52 percent came from dryland farming and grazing uses.

Non-Urbanization Irrigated Farmland Conversion 2016-2018 Source Data: Appendix Table C-2 (Page 85)

California saw significant dry pasture and natural vegetation land converted to irrigated farmland during this period, primarily in the San Joaquin and Sacramento Valleys. However, this was offset by even more substantial conversions from irrigated farmland to idled farmland.

A major goal of the Farmland Mapping and Monitoring Program (FMMP) and a primary reason Important Farmland Data are produced every two years is to track long-term trends in irrigated agricultural land use. Aside from urbanization, economic and resource availability factors also lead to lands either being brought into irrigated agricultural production or being removed from an irrigated agricultural use.

Appendix Table C-2 (page 85) documents the extent to which these factors affected irrigated farmland during the 2016-2018 mapping cycle.

Land Converted to Irrigated Agriculture: Land is converted to irrigated agricultural use when dry pastures or natural vegetation are converted into irrigated cropland or when idled farmland is brought back into irrigated production. Statewide conversions to irrigated categories (Prime, Statewide, or Unique Farmland) totaled 108,909 acres between 2016 and 2018, a decrease of 16 percent from the prior cycle. The San Joaquin Valley, by itself, accounted for 49 percent of all the land brought into irrigated uses in the State (Figure 10, next page). The Sacramento Valley was the runner-up, capturing 21 percent of the new irrigated agriculture in the State. In third

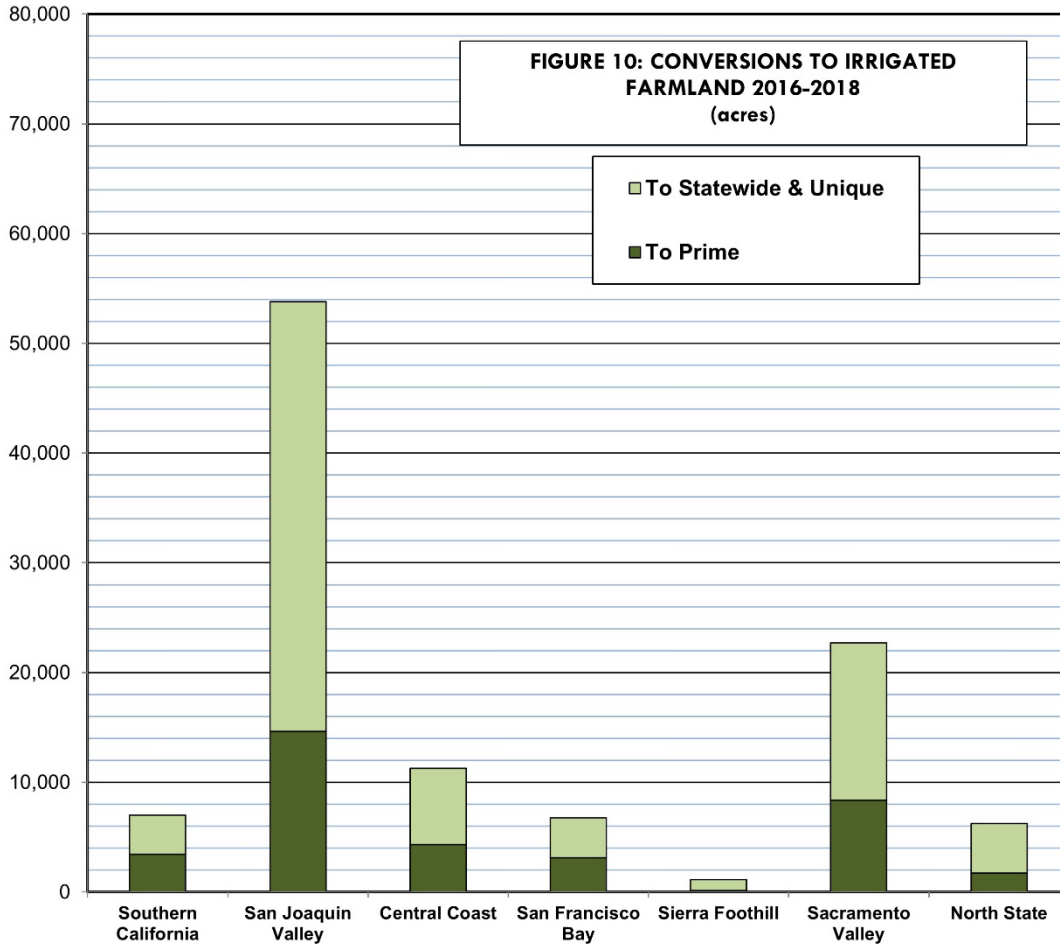
FIGURE 9: YOUNG ALMOND ORCHARD



place was the Central Coast which had 10 percent of all the new irrigated farmland. Finally, Southern California, the San Francisco Bay, and the North State all had roughly equal additions of irrigated farmland, each around 6 percent. However, it is notable that 67 percent of the land brought into irrigated

agricultural use did not meet the criteria for Prime Farmland.

Throughout the history of the FMMP, newly irrigated land has ranged between 65 percent and 70 percent non-Prime Farmland.



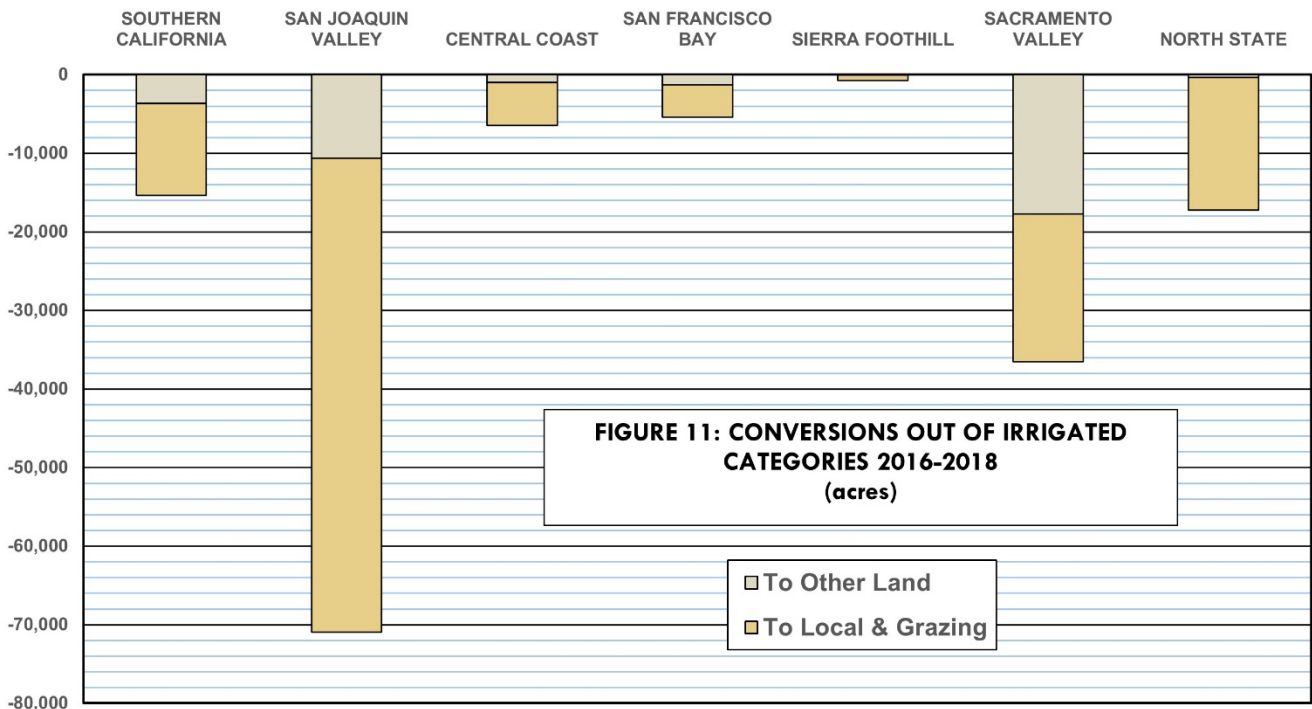
In the San Joaquin Valley, there were 53,816 acres of new irrigated farmland added between 2016 and 2018. However, new irrigated plantings did not exceed 10,000 acres in any county unlike last update where three counties surpassed this threshold. However, Tulare (9,063 acres) and Stanislaus (8,075 acres) counties came close. Further, all the San Joaquin Valley counties except Kings County had irrigated land expansions greater than 5,000 acres.

The Sacramento Valley added 22,700 acres of new irrigated farmland which put the region in second place. Glenn, Sacramento, and Yolo counties each had irrigated land expansions greater than 4,000 acres.

Elsewhere in the State, San Luis Obispo and Santa Barbara counties each added over 3,000 acres of irrigated farmland. Finally, Riverside, Monterey, Solano, and Butte counties all had additions of new irrigated land in the 2,000-acre range.

Land removed from irrigated agriculture: This type of conversion generally takes place due to the idling of irrigated farmland where there is a lack of irrigation over time or due to a switch to dryland farming. It also occurs to a much lesser extent due to the delineation of Other Land. The San Joaquin Valley experienced a majority of land idling, where irrigated land (designated as Prime, Statewide or Unique) converted to the non-irrigated designations of Grazing Land or Farmland of Local Importance. Conversion of irrigated farmland to Grazing Land or Farmland of Local Importance due to idling or long-term dryland farming increased by 8 percent compared with the last mapping cycle to 117,927 acres. For comparison, reclassifications of this type stood at 108,773 acres in the 2014-2016 update.

In the San Joaquin Valley, there were 60,329 acres of land converted from irrigated farmland to Grazing Land or Farmland of Local Importance, comprising 51 percent of the statewide total (Figure 11). Three counties in the San Joaquin Valley had 10,000 or more acres that were removed from irrigated agriculture due to idling or dryland crop production: Kings, Kern, and Fresno. A loss of 24,044 acres of irrigated farmland in Kings County led all counties, representing 20 percent of the statewide total for this conversion type. In Kern and Fresno counties, losses of irrigated lands totaled 10,917 acres and 10,279 acres, respectively. Further, Merced County had 7,464 acres removed from irrigated agriculture. Irrigated farmland conversions that occurred in the San Joaquin Valley were likely to be associated with water resource limitations, market conditions, and salinity-related land idling. Ongoing water resource



uncertainties raise the concern of substantial additional irrigated farmland conversion in the future.

The Sacramento Valley experienced the next most conversions due to land idling or dryland farming with 18,812 acres converted from irrigated farmland to Grazing Land or Farmland of Local Importance. Yolo (6,923 acres), Sacramento (3,206 acres), and Colusa (2,850 acres) counties had the highest amount of irrigated farmland idling in the region. Meanwhile, Glenn, Sutter, and Tehama counties each had irrigated farmland conversions of over 1,000 acres.

The North State exhibited the third most conversion of irrigated land due to idling or dryland farming with 16,854 acres going out of irrigated production. Modoc County accounted for 52 percent of the irrigated farmland conversion in this region with 8,801 acres shifted from irrigated land to Grazing Land or Farmland of Local Importance. Also notable was Siskiyou County with 5,054 acres of irrigated farmland going out of production.

Next, Southern California lost 11,705 acres of irrigated farmland through idling or dryland farming. San Diego County led the way with the conversion of 3,916 acres of irrigated farmland. Imperial and Riverside counties were also notable with 2,326 acres and 2,626 acres of irrigated land shifted to Grazing Land or Farmland of Local Importance, respectively.

The rest of the regions in the State all had lesser amounts of irrigated land idling with the Central Coast and the San Francisco Bay regions converting 5,483 acres and 4,073 acres, respectively. San Luis Obispo County broke the 2,000-acre threshold with 2,243 acres downgraded from irrigated land to Grazing Land or Farmland of Local Importance.

Finally, lands are removed from irrigated agriculture and reclassified as Other Land due to delineation of a variety of land uses such as low-density residential development, farmsteads, rural commercial, agricultural staging areas, confined livestock operations, surface mining, ecological restoration, improved delineation of riparian areas, and others. This type of conversion of irrigated land is less frequent but is typically more permanent in nature than farmland idling.

Between 2016 and 2018, 34,700 acres statewide were reclassified from irrigated agriculture to Other Land. This represented 23 percent of the total land removed from irrigated agriculture (152,627 acres removed, aside from urbanization) this update. The Sacramento Valley accounted for 17,710 acres of that reclassification, 51 percent of the statewide total. Likewise, the San Joaquin Valley accounted for 10,650 acres of conversion to Other Land or 31 percent of the statewide total.

Counties with Rural Land Mapping Enhancements 2016-2018 Source Data: Appendix D (Page 87)

Between 2016 and 2018, the expansion of Rural Land Mapping categories held steady with an increase of 6,209 acres (Appendix D Tables), compared with 5,744 acres the prior update.

Approximately 27 percent of the Important Farmland survey area is classified as Other Land. Because the Other Land category encompasses a disparate group of land uses and conversions to Other Land are most often geographically separated from urban centers, users requested more specific information about this conversion type. In response, beginning in 2002, five subcategories were developed for Other Land: Rural Residential Land, Semi-Agricultural and Rural Commercial, Confined Animal Agriculture, Vacant or Disturbed Land, and Nonagricultural and Natural Vegetation. These rural land subcategories are mapped in all eight San Joaquin Valley counties. Mendocino County was added to the FMMP survey area in 2006 upon the release of its USDA soil survey and is also mapped using the more detailed classifications. Rural land mapping may be expanded in the future, dependent upon program resources. Definitions for the Rural Land Mapping categories are shown on page 7.

The Confined Animal Agriculture category continued a trend, decreasing by 1,012 acres in the 2016- 2018 update. The footprint of dairies decreased in most Rural Land counties as facilities were abandoned or converted to cropland. However, exceptions included Kern, Tulare, and Mendocino counties where Confined Animal Agriculture acreage increased.

The Semi-Agricultural and Rural Commercial category expanded by 2,196 acres. This land use type has the smallest footprint of the Rural Land Mapping categories. Therefore, any increase is, proportionally, a larger percentage increase than in other categories. Many of these additions were not necessarily due to a land use change, rather due to the delineation of low-density commercial operations, farmsteads, and agricultural staging or storage areas with the use of high-resolution imagery.

Rural Residential Land increased by 1,554 acres from 2016 to 2018 compared to 2,925 acres last update. The largest additions of Rural Residential Land were seen in Madera (1,682 acres) and Merced (602 acres) counties. Also notable, an increased density of structures resulted in the conversion of 1,506 acres of Rural Residential Land to Urban Land among rural land counties during the 2016-2018 update.

The Nonagricultural and Natural Vegetation category decreased by 1,090 acres this update. These conversions were focused on Kern and Tulare counties and primarily involved conversions from Nonagricultural and Natural Vegetation to urban land and irrigated farmland.

Vacant or Disturbed Land can be a category of transition. While 11,183 acres were placed in this category during the update, 6,622 acres also converted out of disturbed land uses—primarily to urban land (56 percent) and irrigated farmland (26 percent). In total, there was a 4,561-acre net increase in acreage in the Vacant or Disturbed Land category during the 2016-2018 update. It is not always apparent to what land use these disturbed areas will be put in the future. Long-term biennial tracking of land use conversion by FMMP provides a time series that ultimately captures what occurs in these transitional areas.

Net Change in Irrigated Farmland 2016-2018 Source Data: Appendix Table C-3 (Page 86)

Statewide, irrigated farmland decreased by 56,186 net acres during the 2016-2018 update (Table B-1). This figure is substantially higher than the 11,165-acre net loss during the 2014-2016 update.

Thirty counties in the FMMP survey area showed a net loss of irrigated farmland. The San Joaquin Valley had the highest net loss of irrigated land with a decrease of 21,377 acres. This was followed by net losses of irrigated land in the Sacramento Valley (-15,125 acres), Southern California (-14,263 acres), and the North State (-10,994 acres). Land idling, when irrigated land converted to nonirrigated land due to a lack of irrigation over time, was the major contributing factor to irrigated land decreases during recent map updates, particularly in San Joaquin Valley counties. Kings County, by itself, accounted for about half of the net farmland loss in the San Joaquin Valley. The top ten counties showing a net loss of irrigated land are highlighted below in Table 9.

In contrast to the net loss of irrigated farmland in some counties, 17 counties in the FMMP survey area saw net increases in their irrigated farmland totals during the 2016-2018 update. The top ten of these counties are displayed in Table 10. The top four counties with net increases of irrigated farmland were all located in the

TABLE 9: DECREASES OF IRRIGATED LAND RANKS

Net Losses of Irrigated Land
Top Ten Counties - net acres

2014-2016		2016-2018	
Kings	-27,644	Kings	-20,359
Fresno	-8,084	Yolo	-8,968
Kern	-4,605	Merced	-7,399
Los Angeles	-2,974	Modoc	-7,200
San Diego	-2,636	Imperial	-6,885
Santa Clara	-1,106	Kern	-6,076
Sierra Valley	-1,074	Fresno	-5,047
Riverside	-855	Colusa	-4,293
Modoc	-737	San Diego	-3,616
Mendocino	-606	Siskiyou	-3,374

TABLE 10: INCREASES OF IRRIGATED LAND RANKS

Net Increases of Irrigated Land
Top Ten Counties - net acres

2014-2016		2016-2018	
Stanislaus	8,836	Stanislaus	6,044
Madera	4,939	Tulare	4,047
San Joaquin	4,607	Madera	3,744
Tehama	3,481	San Joaquin	3,669
San Luis Obispo	2,938	Glenn	2,579
Yolo	2,371	Tehama	2,322
Solano	1,806	Solano	1,884
Siskiyou	1,690	Santa Barbara	1,680
Glenn	1,471	Butte	1,434
Tulare	1,461	Sonoma	1,193

San Joaquin Valley—Stanislaus, Tulare, Madera, and San Joaquin counties. Stanislaus County has had the largest net increase in irrigated farmland for the last three update cycles. The Sacramento Valley also had a strong showing with Glenn, Tehama, and Butte counties making the top ten list for largest net increases of irrigated land.

Long-Term Net Land Use Change *During the 17 biennial reporting cycles spanning 34 years since FMMP was established, over 1.6 million acres of agricultural land in California were converted to nonagricultural purposes (Table 11). This represents an area larger in size than Ventura County.*

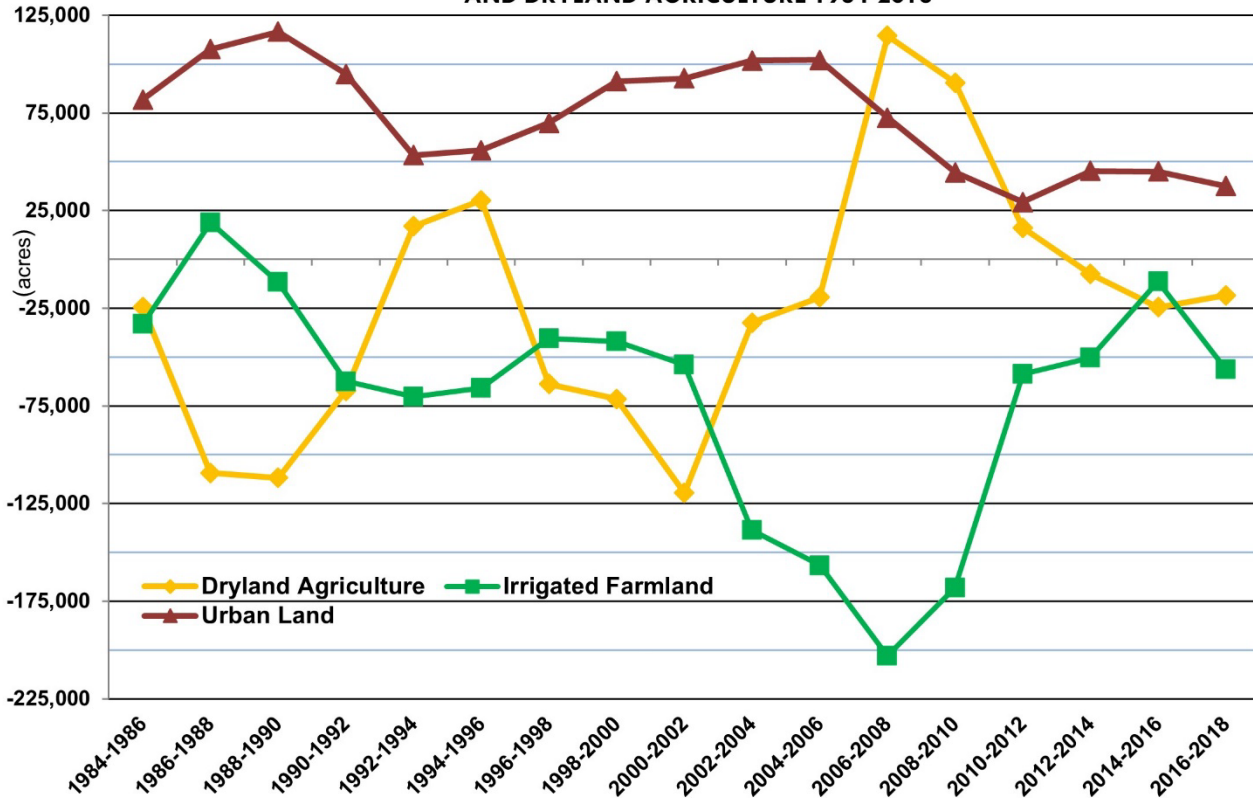
TABLE 11
NET IMPORTANT FARMLAND CONVERSION
1984-2018

	Total Change	Annual Average
	(acres)	
Prime Farmland	-816,123	-24,004
Farmland of Statewide Importance	-455,287	-13,391
Unique Farmland	100,646	2,960
Additional Irrigated Farmland (1)	-32,576	-958
Farmland of Local Importance	21,702	638
Grazing Land	-423,565	-12,458
Urban and Built-up Land	1,241,930	36,527
Other Land	351,139	10,328
Water	12,708	374

(1) Represents irrigated land conversions in counties that were without soil surveys in early years of FMMP mapping.

FMMP data have been capturing trends in agricultural and urban land conversion since 1984. The largest losses from agricultural land have been from Prime Farmland (-816,123 acres), Farmland of Statewide Importance (-455,287 acres), and Grazing Land (-423,565 acres). Water resource limitations, salinity issues, market conditions, and urbanization at the periphery of cities in California's agricultural valleys led to the loss of Prime Farmland and Farmland of Statewide Farmland. Unique Farmland registered a net increase of over 100,000 acres over the 34-year period primarily due to the expansion of orchards and vineyards. Figure 12 on the next page illustrates that irrigated farmland acreage in California has decreased in every update cycle except 1986-1988. Dryland farming and Grazing have frequently moved in the opposite direction of irrigated land, as multi-year hydrologic and economic factors influence how much land growers put into production. Urbanization declined in the periods of recession—the early-to-mid-1990s and the late 2000s and is still trending at a relatively low level.

FIGURE 12: NET CHANGE IN URBAN LAND, IRRIGATED FARMLAND, AND DRYLAND AGRICULTURE 1984-2018



As 2018-2020 mapping proceeds, water resource limitations and the development of infrastructure to support the next generation of Californians are anticipated to impact the State's agricultural land resources. The Department of Conservation will continue to support informed planning decisions with accurate agricultural land resource data, capturing these trends as they evolve.