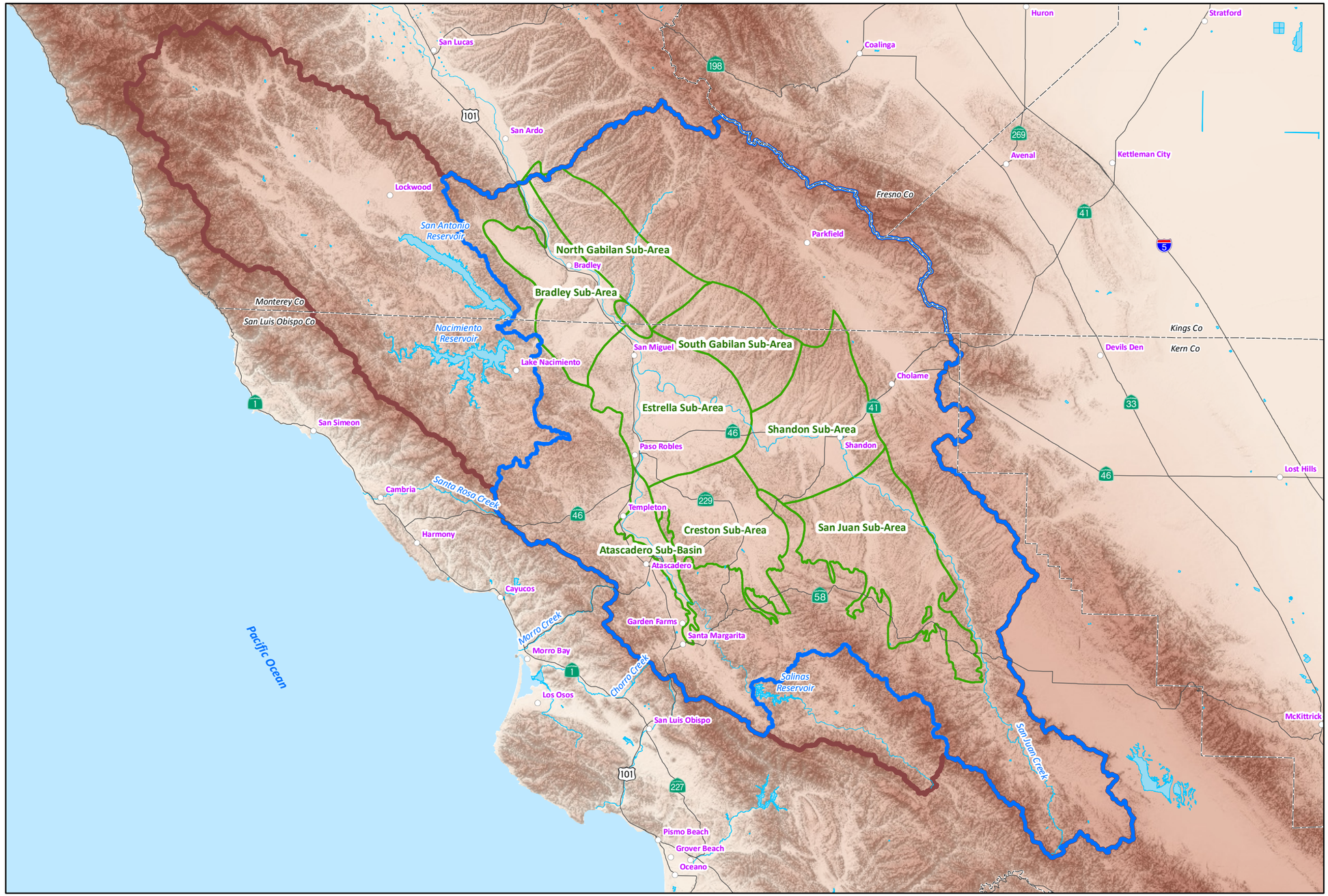
FIGURES

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

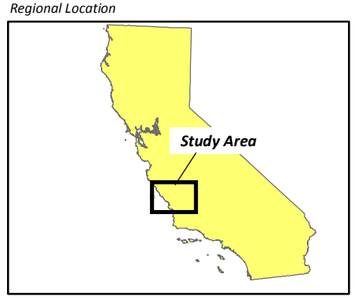


PROJECT LOCATION

EXPLANATION

- Paso Robles Groundwater Basin Boundary with Sub-Areas (Source: Fugro and Cleath, 2002)
- Paso Robles Area Watershed Model Boundary
- Paso Robles Area Watershed Boundary
- County Boundary

Regional Location



19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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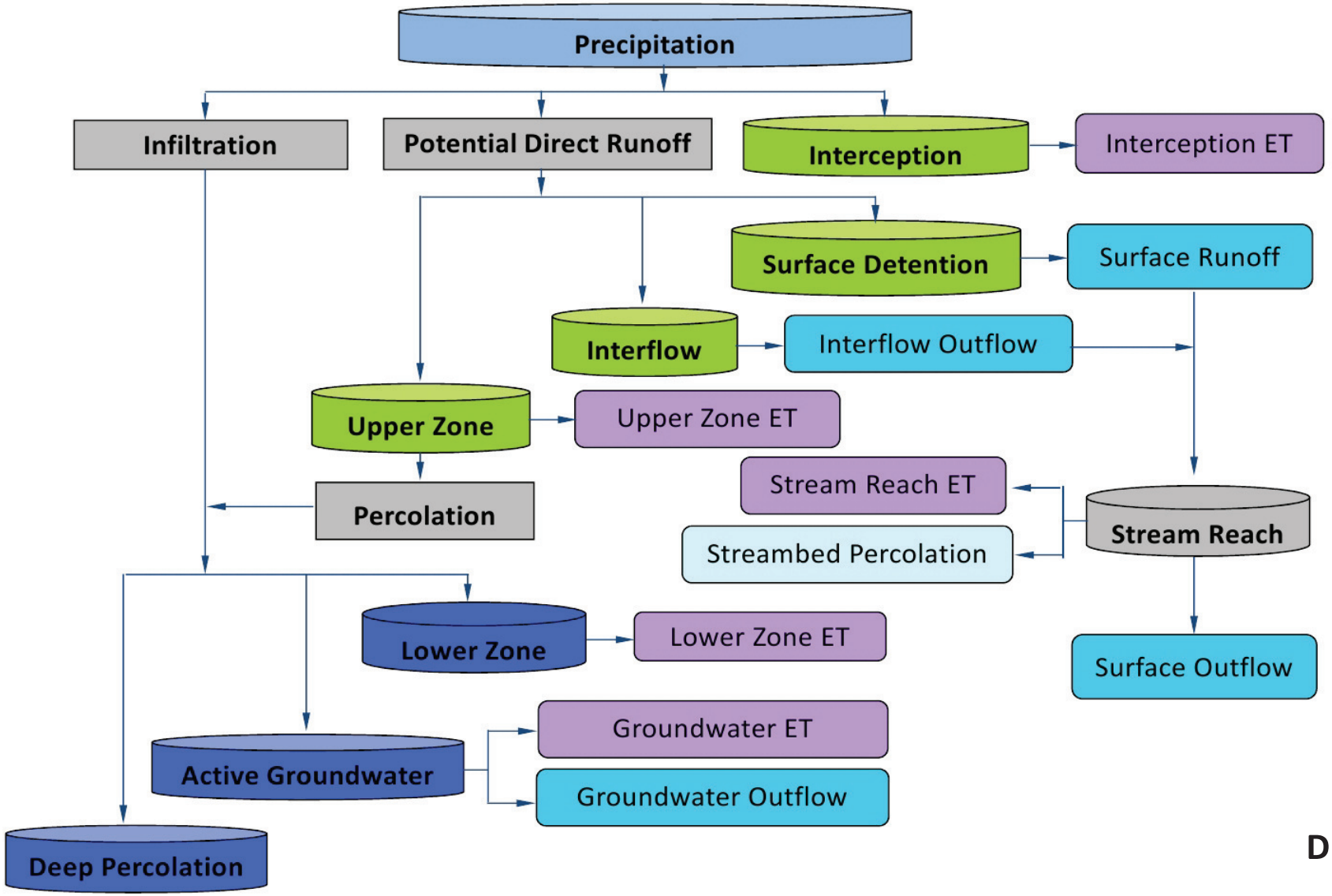
Figure 1

GIS_proj/co_slo_paso_robles_model/6_Fig_1_Gen_Project_Loc_12-14.mxd



DRAFT

HSPF Diagram

19-Dec-14

X:\Projects\County of San Luis Obispo\Paso Robles GW Basin Model Update_2012\12_Report\01) Draft\Figures\Fig 2_HSPF.ai

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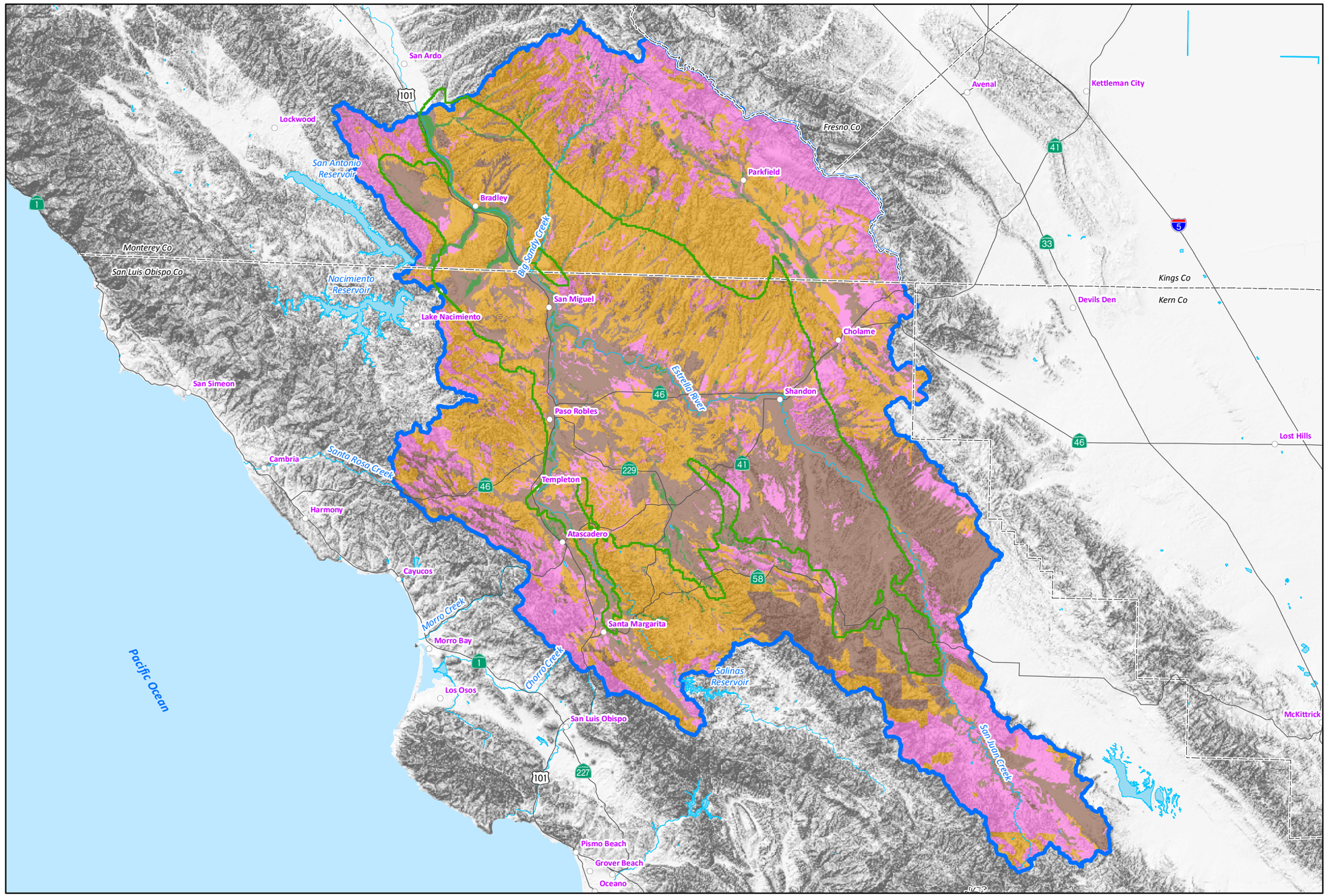
Figure 2

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



HYDROLOGIC SOIL TYPES IN THE PASO ROBLES AREA WATERSHED

EXPLANATION

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Source: ESRI, 2012
NRCS SSURGO data table
MUAGGATT, field HYDGRPDCD

Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)

Paso Robles Area Watershed Boundary

County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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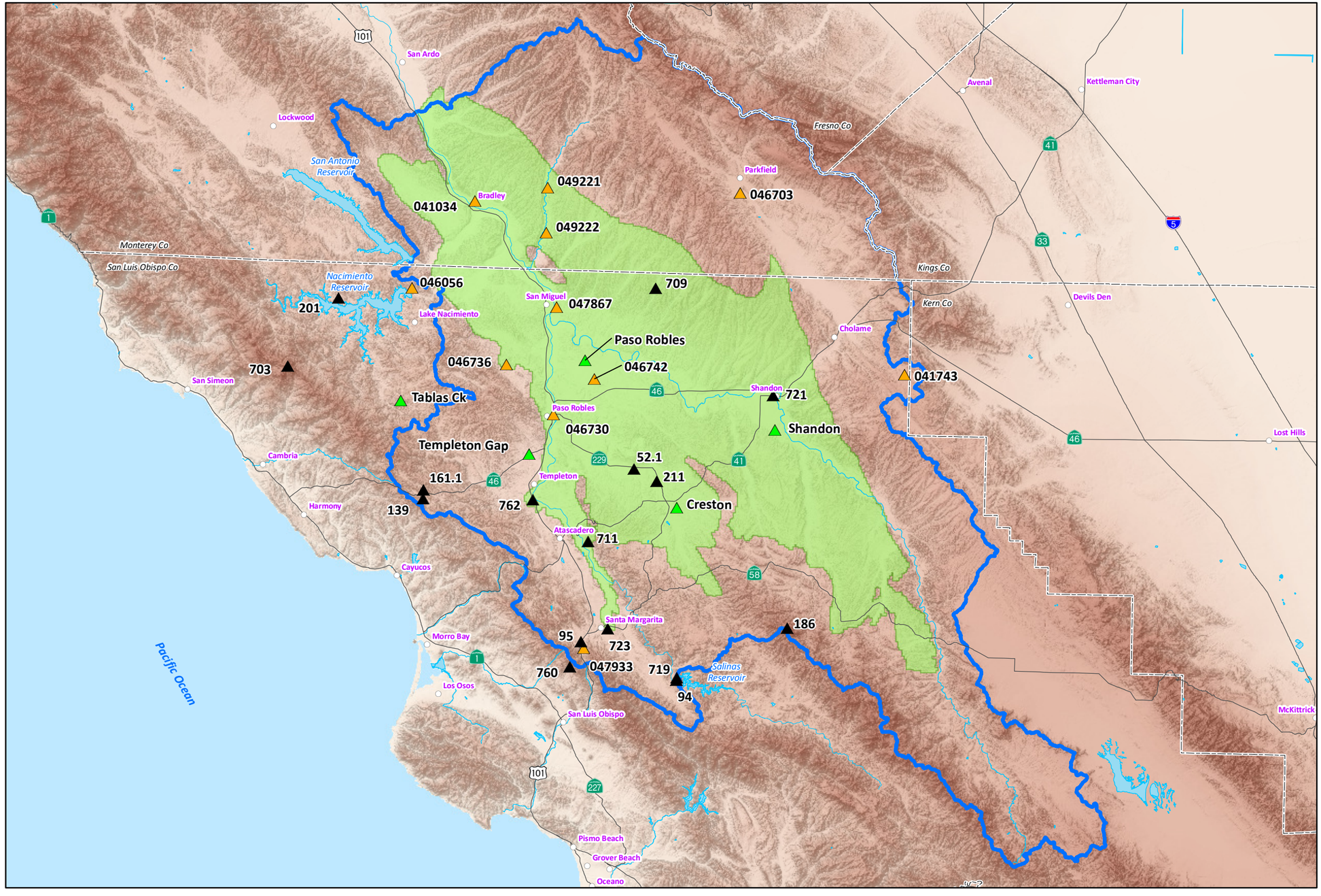
Figure 3

GIS_proj/co_slo_paso_robles_model/6_Fig_3_Soils_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

PRECIPITATION STATION LOCATIONS



EXPLANATION

Precipitation Station

- SLOCFCWCD
- NOAA
- Western Water Group

Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)

Paso Robles Area Watershed Boundary

County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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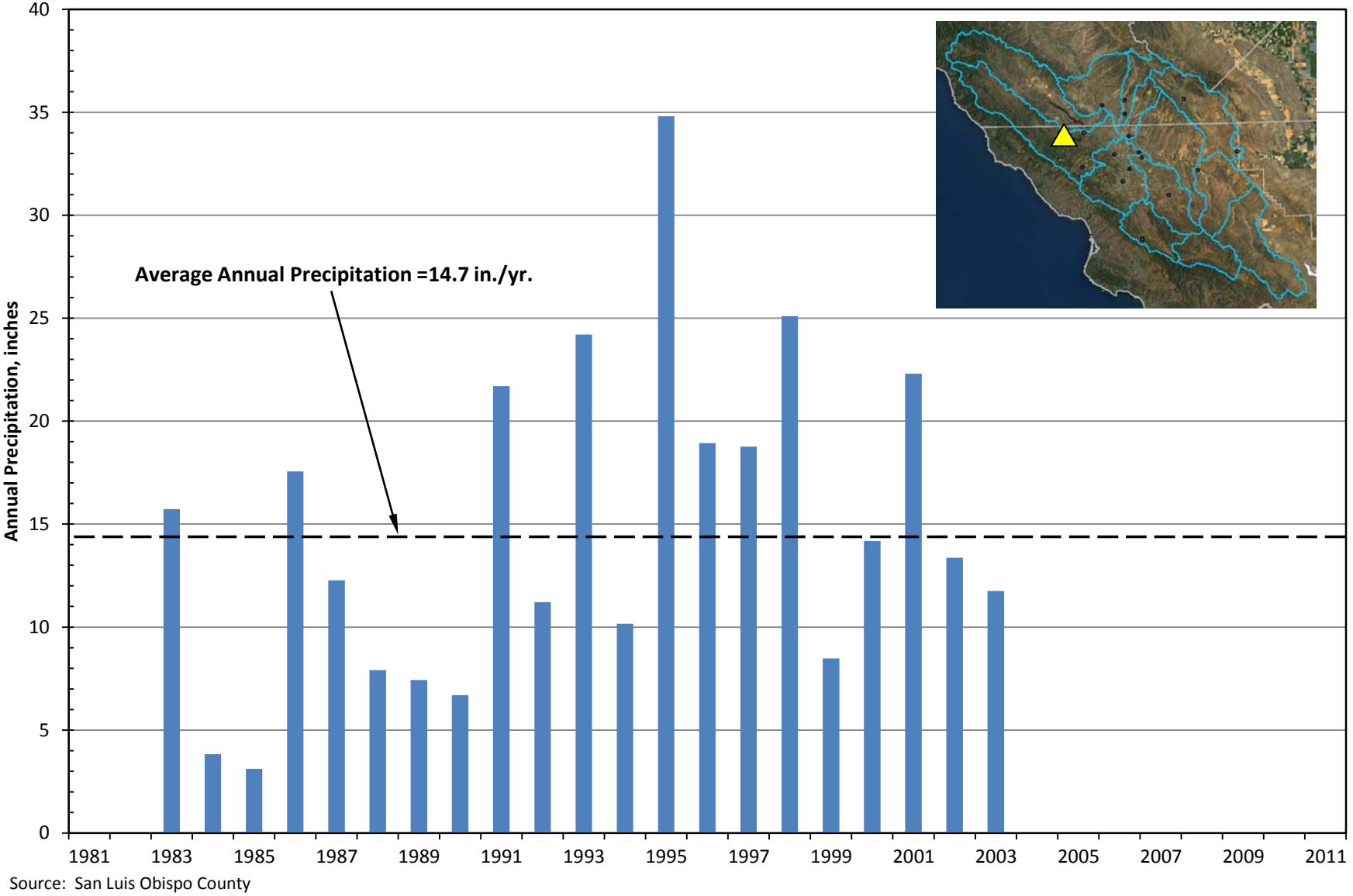
Figure 4

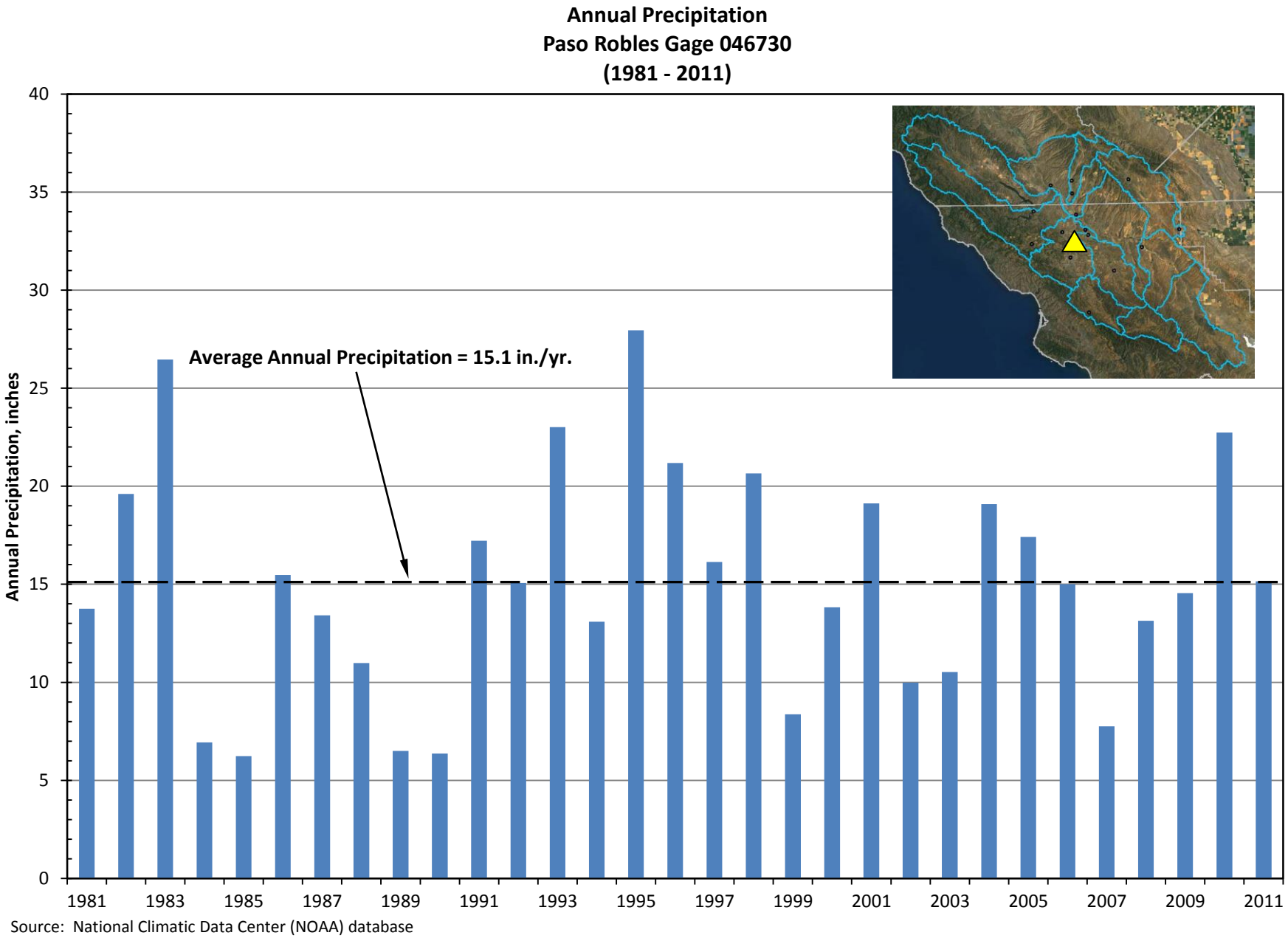
GIS_proj/co_slo_paso_robles_model/6_Fig_4_Precip_stn_locs_12-14.mxd

Annual Precipitation
Oak Shores (Station #201)
(1981 - 2011)



Source: San Luis Obispo County

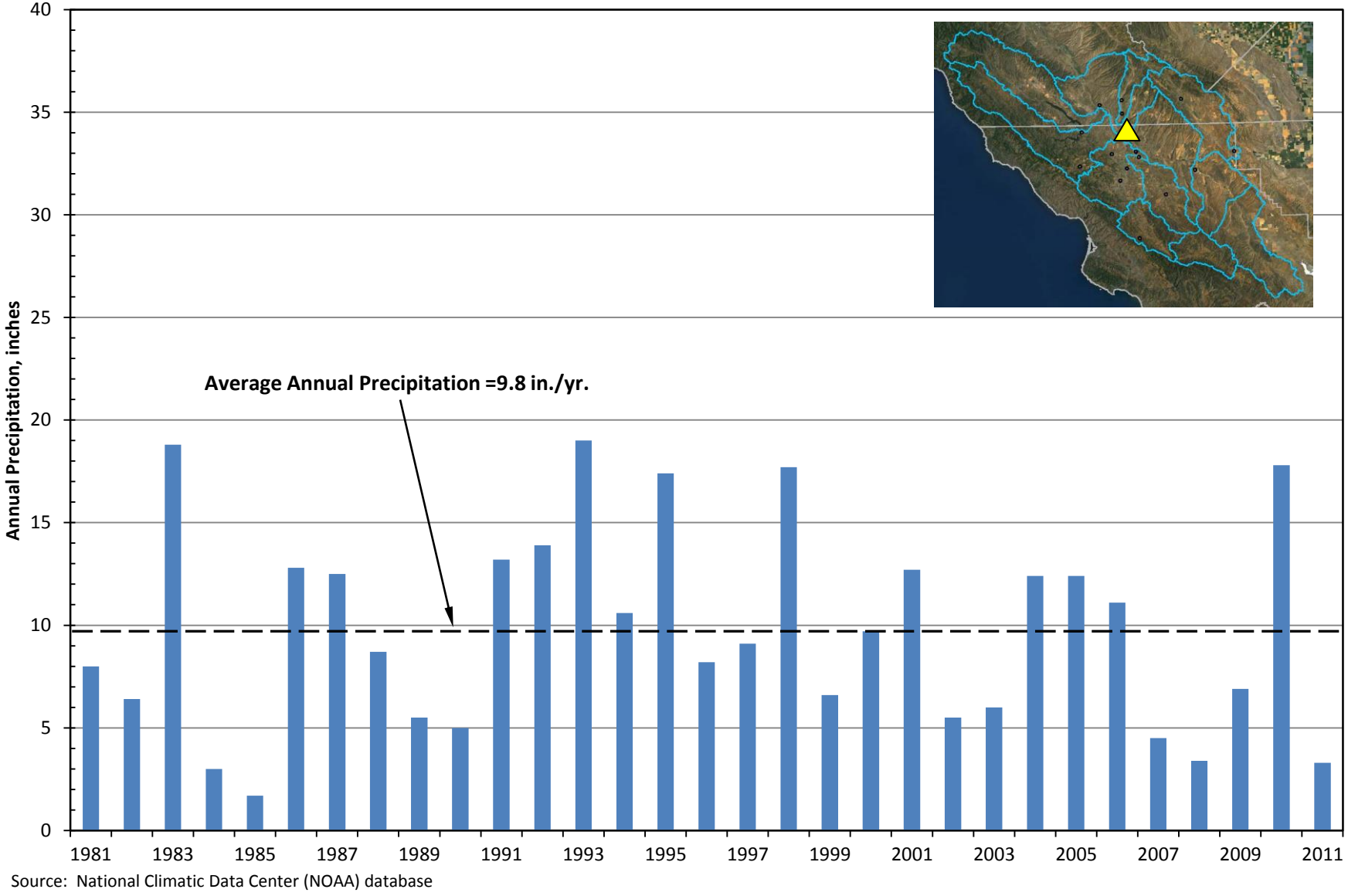
Figure 5



Source: National Climatic Data Center (NOAA) database

Figure 6

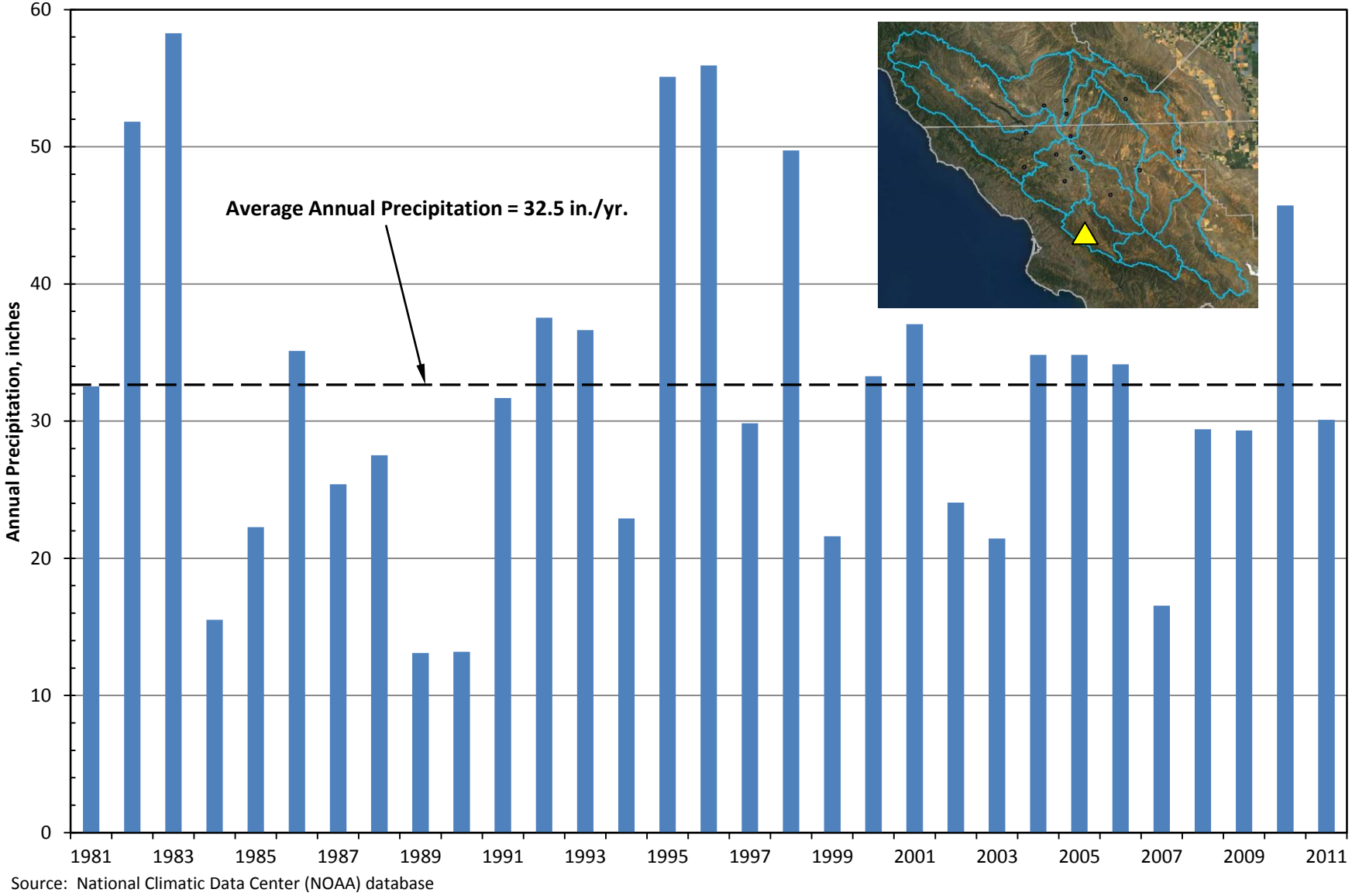
Annual Precipitation
San Miguel Wolf Ranch 047867
(1981 - 2011)



Source: National Climatic Data Center (NOAA) database

Figure 7

Annual Precipitation
Santa Margarita Booster Gage 047933
(1981 - 2011)



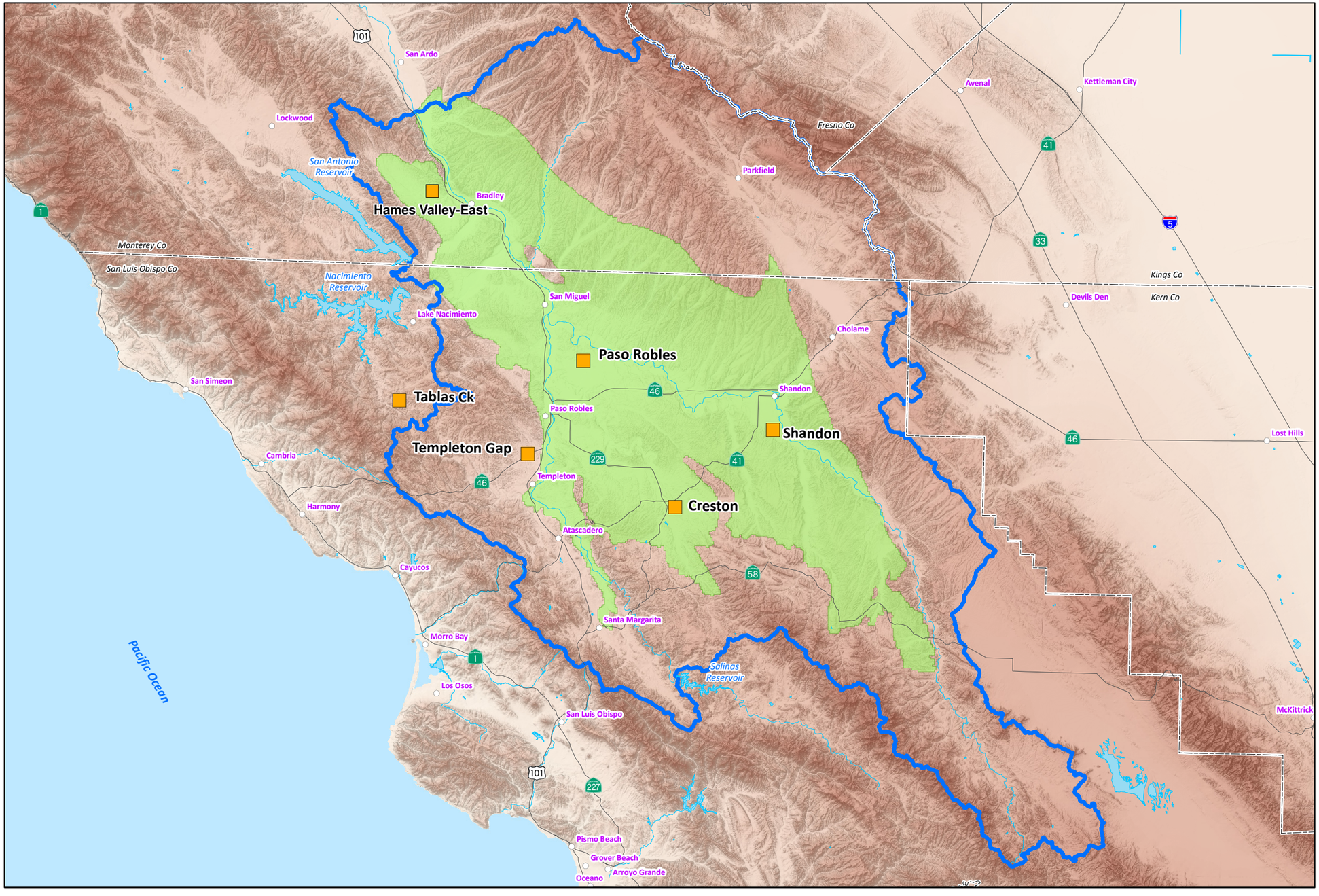
Source: National Climatic Data Center (NOAA) database

Figure 8

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

EVAPOTRANSPIRATION STATION LOCATIONS



EXPLANATION

- Evapotranspiration Station (Source: Western Water Group, 2012)
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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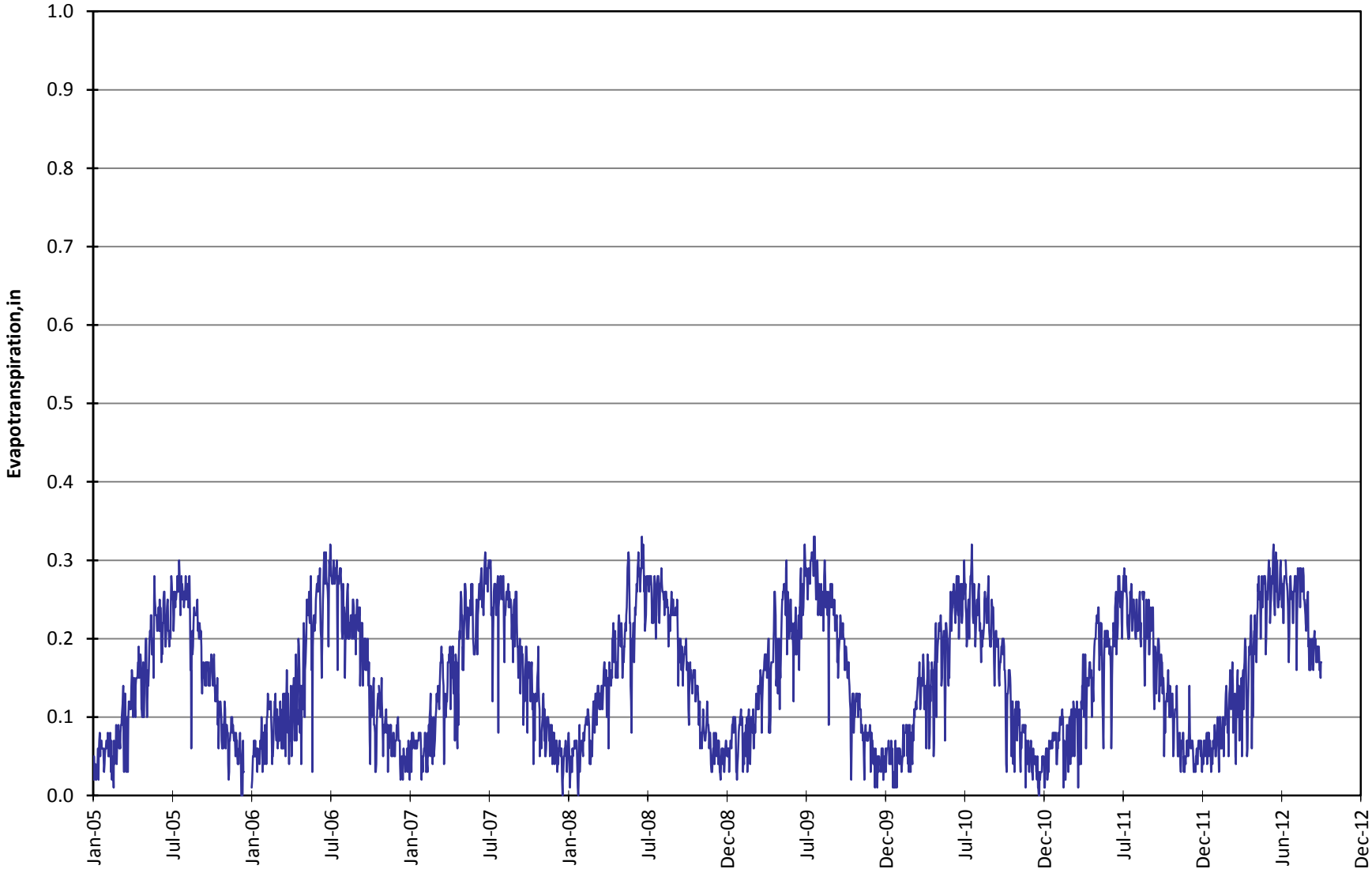
Figure 9

GIS_proj/co_slo_paso_robles_model/6_Fig_9_ET_stn_locs_12-14.mxd

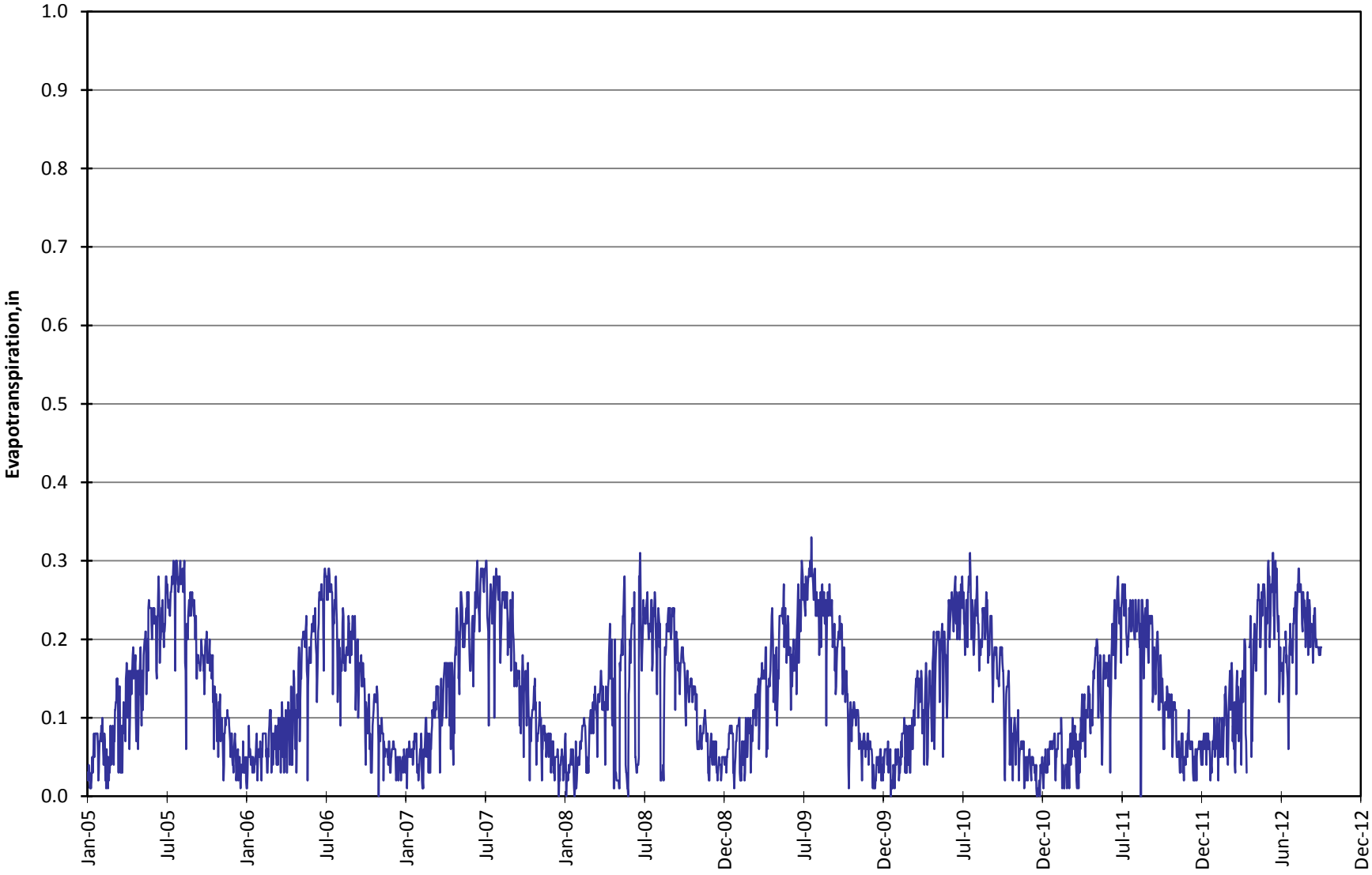
Historical (Daily) Evapotranspiration
Paso Robles (2005 - 2012)



Source: Western Weather Group

Figure 10

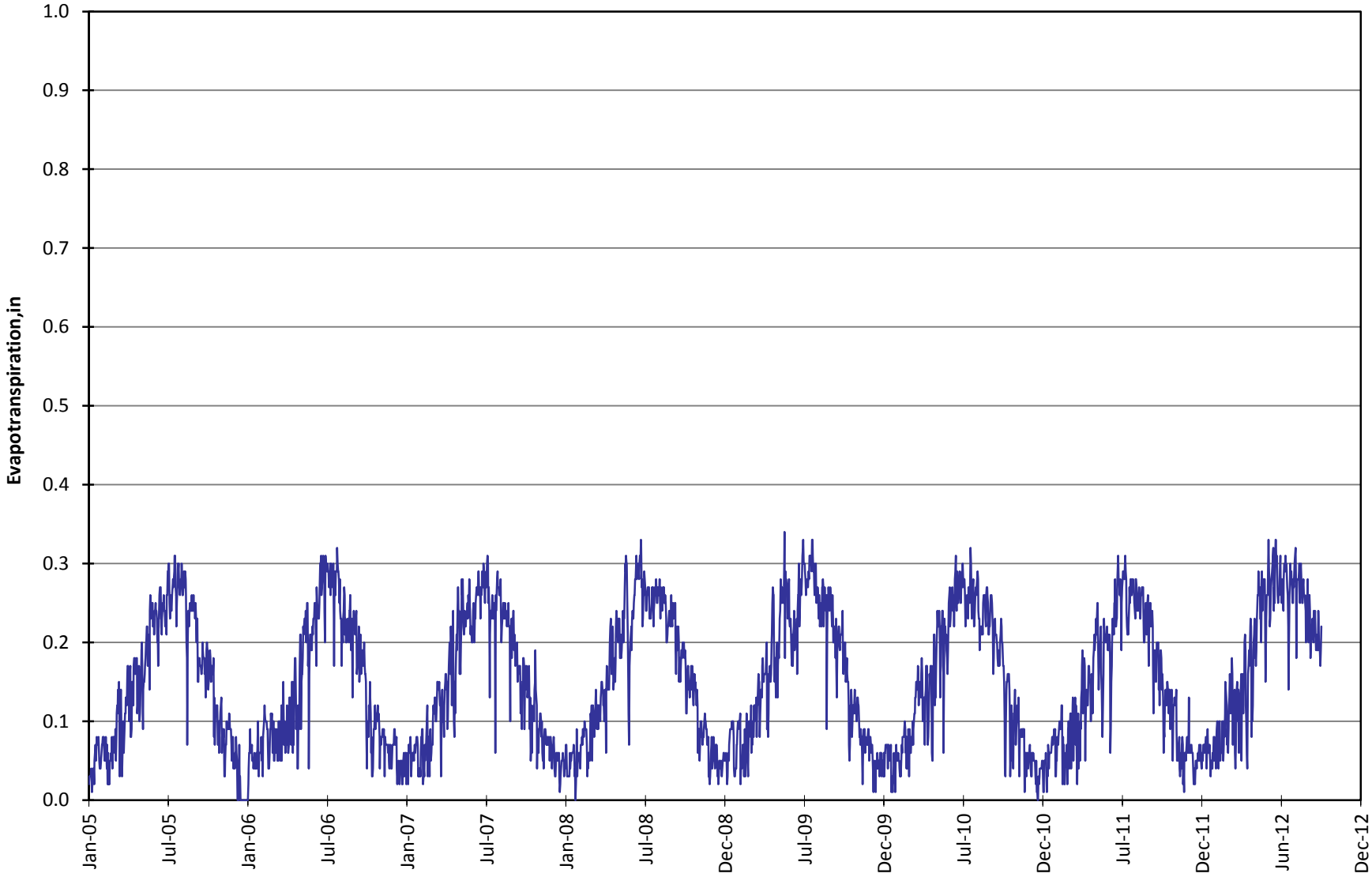
Historical (Daily) Evapotranspiration
Tablas Creek (2005 - 2012)



Source: Western Weather Group

Figure 11

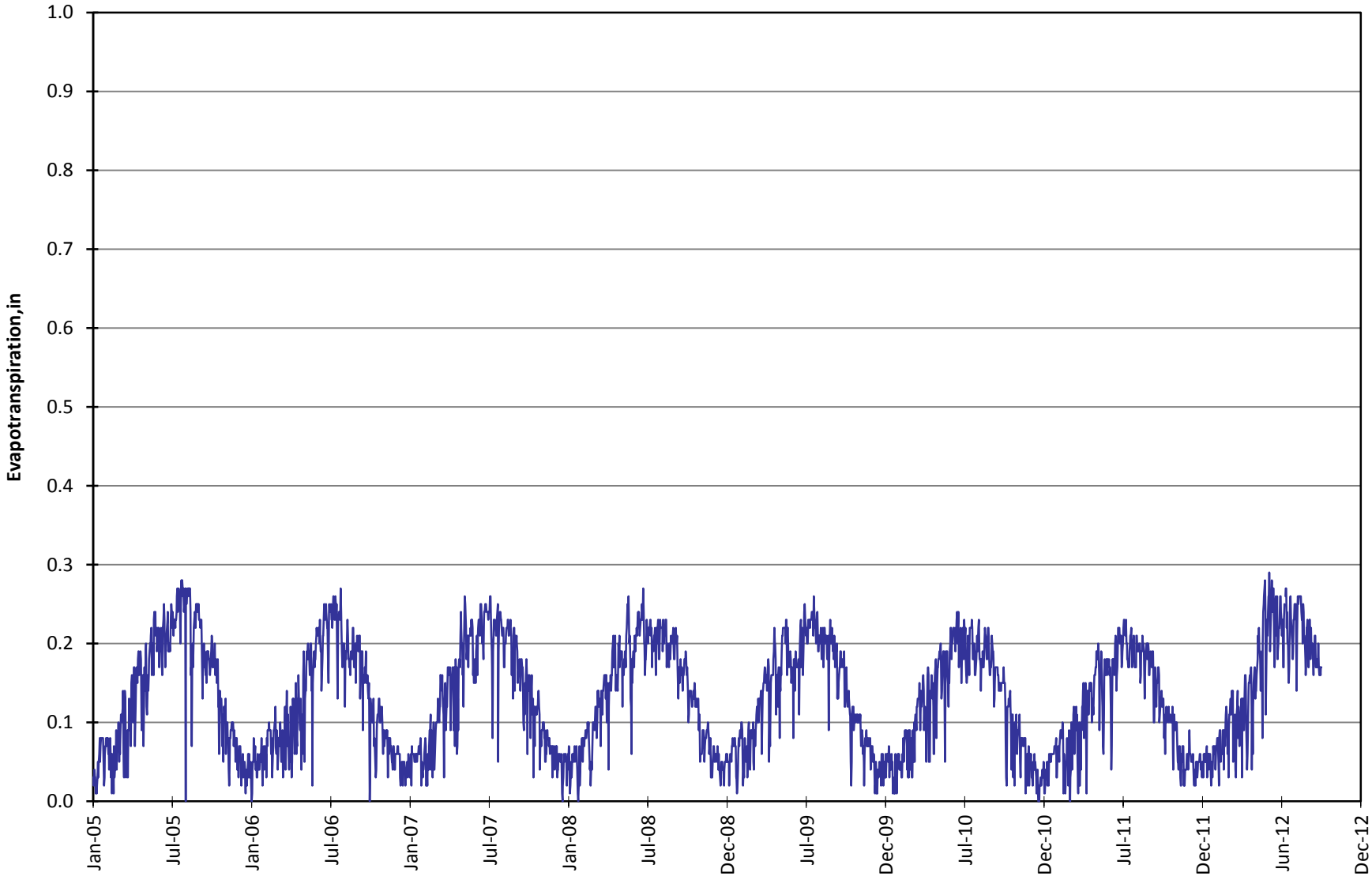
Historical (Daily) Evapotranspiration
Shandon (2005 - 2012)



Source: Western Weather Group

Figure 12

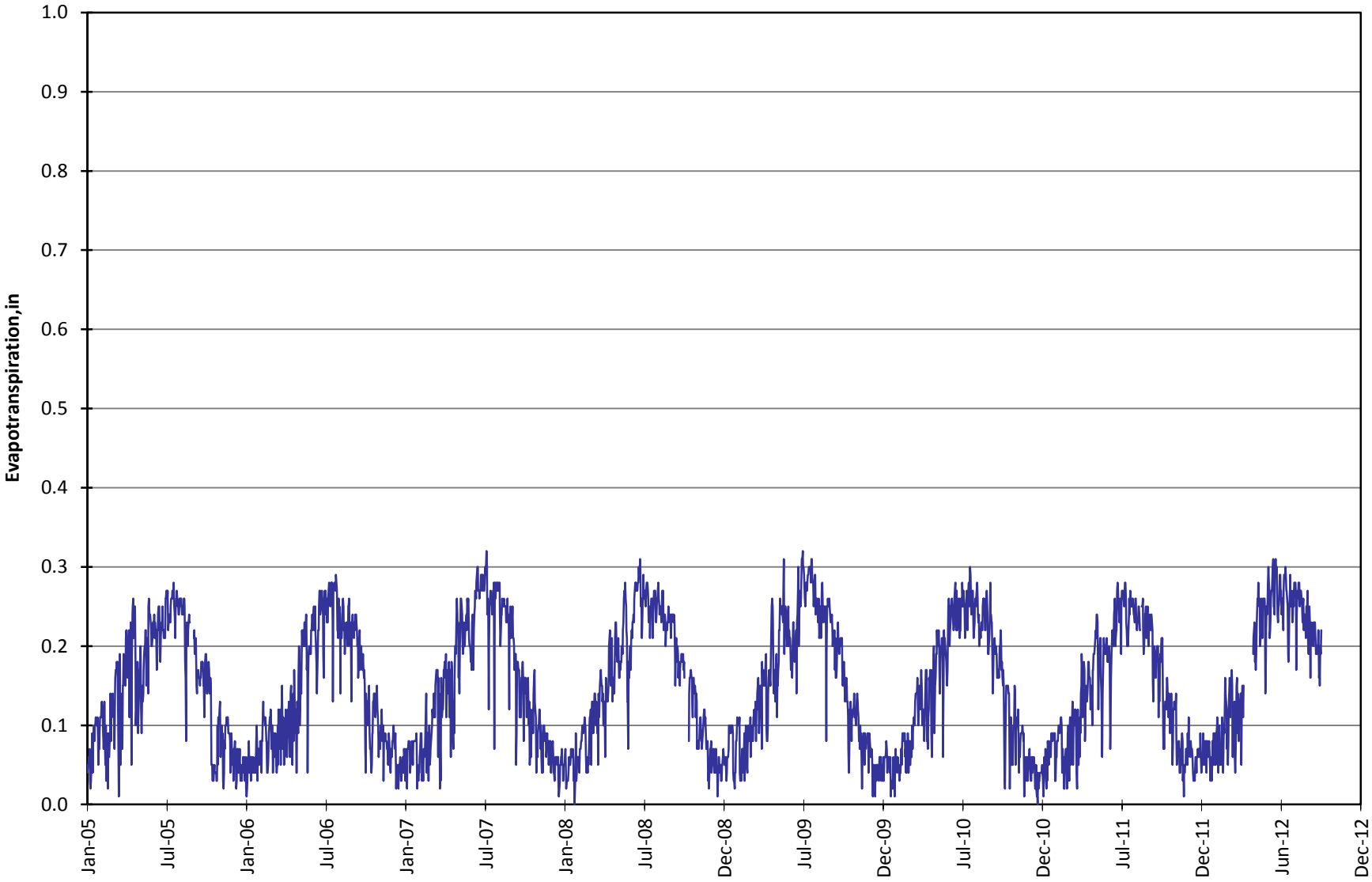
Historical (Daily) Evapotranspiration
Templeton Gap (2005 - 2012)



Source: Western Weather Group

Figure 13

Historical (Daily) Evapotranspiration
Creston (2005 - 2012)

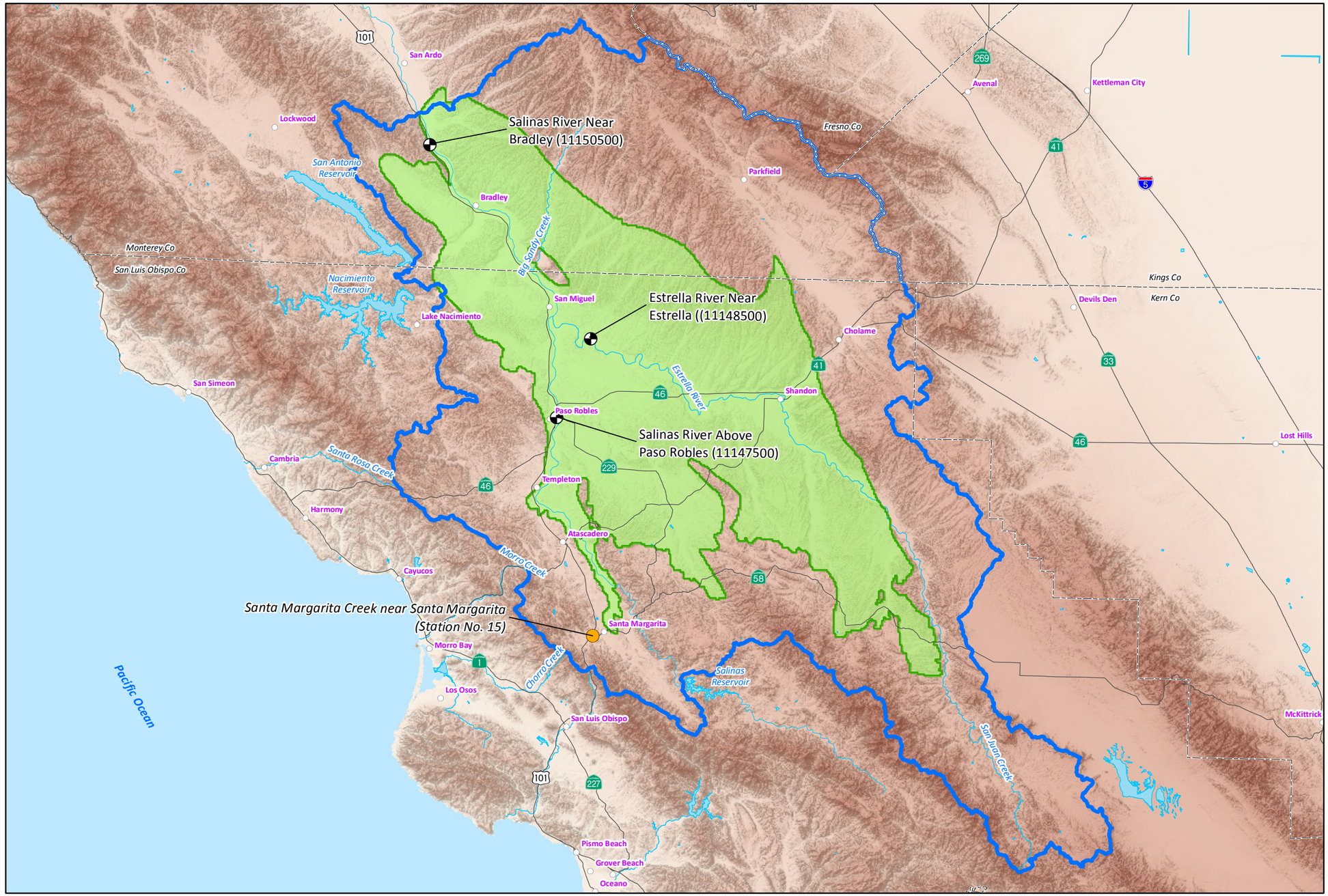


Source: Western Weather Group

Figure 14

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



STREAM GAGING STATIONS USED FOR WATERSHED MODEL CALIBRATION

EXPLANATION

- USGS Gaging Station
- SLOFC&WCD Gaging Station
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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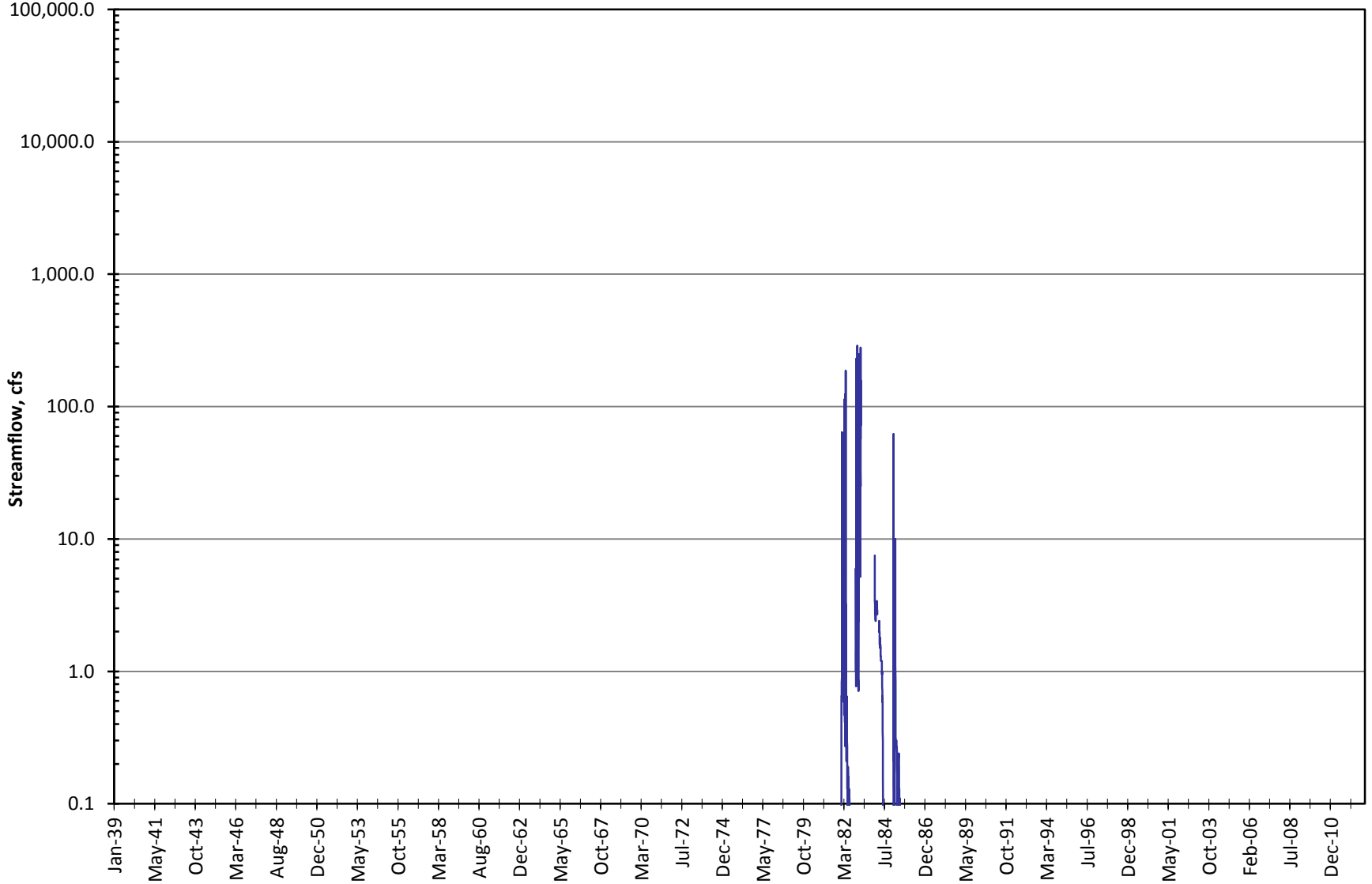
Figure 15

GIS_proj/co_slo_paso_robles_model/6_Fig_15_gaging_stns_9-14.mxd

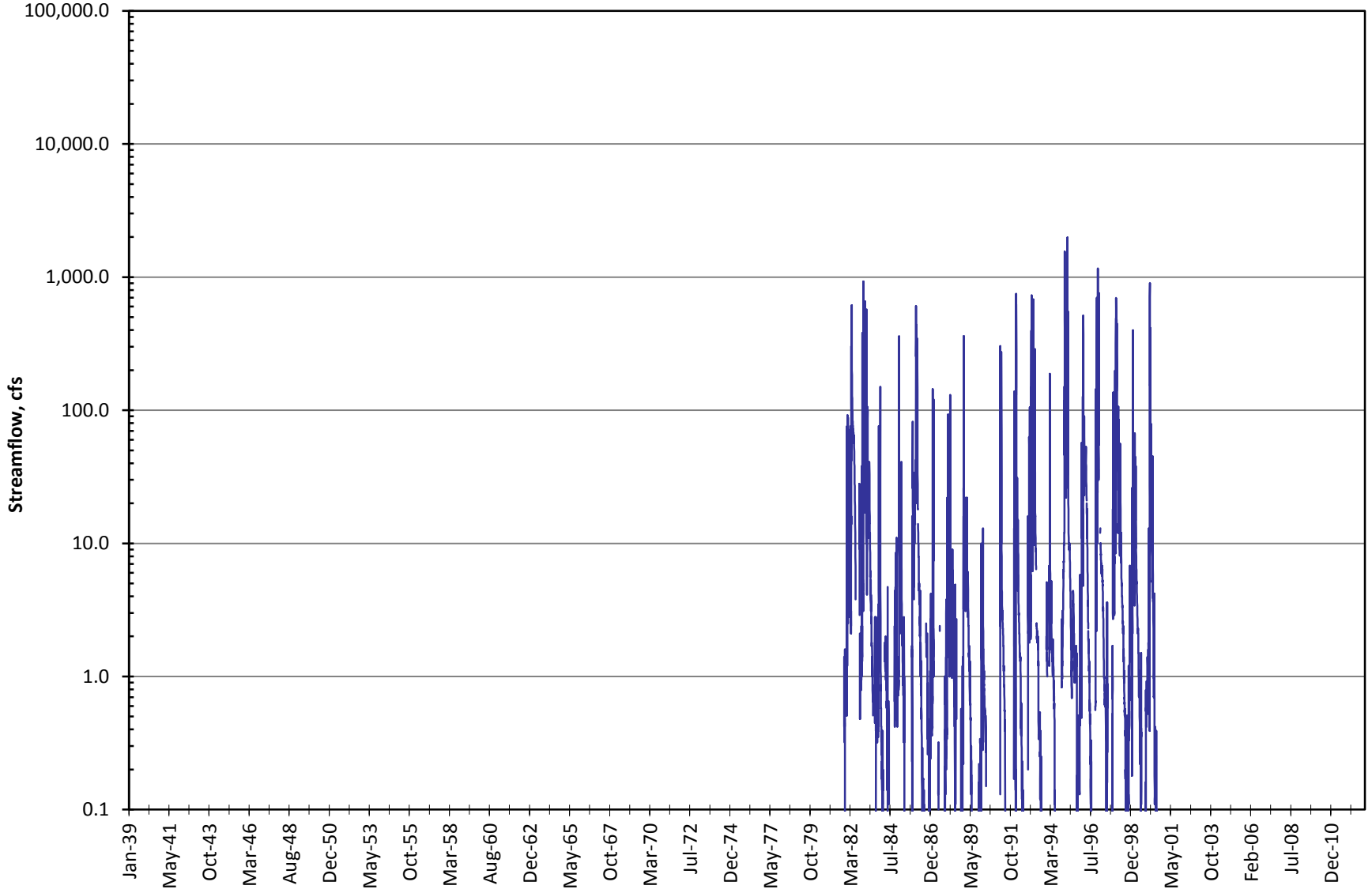
Historical (Daily) Streamflow
Yerba Buena Creek in Santa Margarita
(1981 - 1985)



Source: USGS NWIS (downloaded Nov-11)

Figure 16

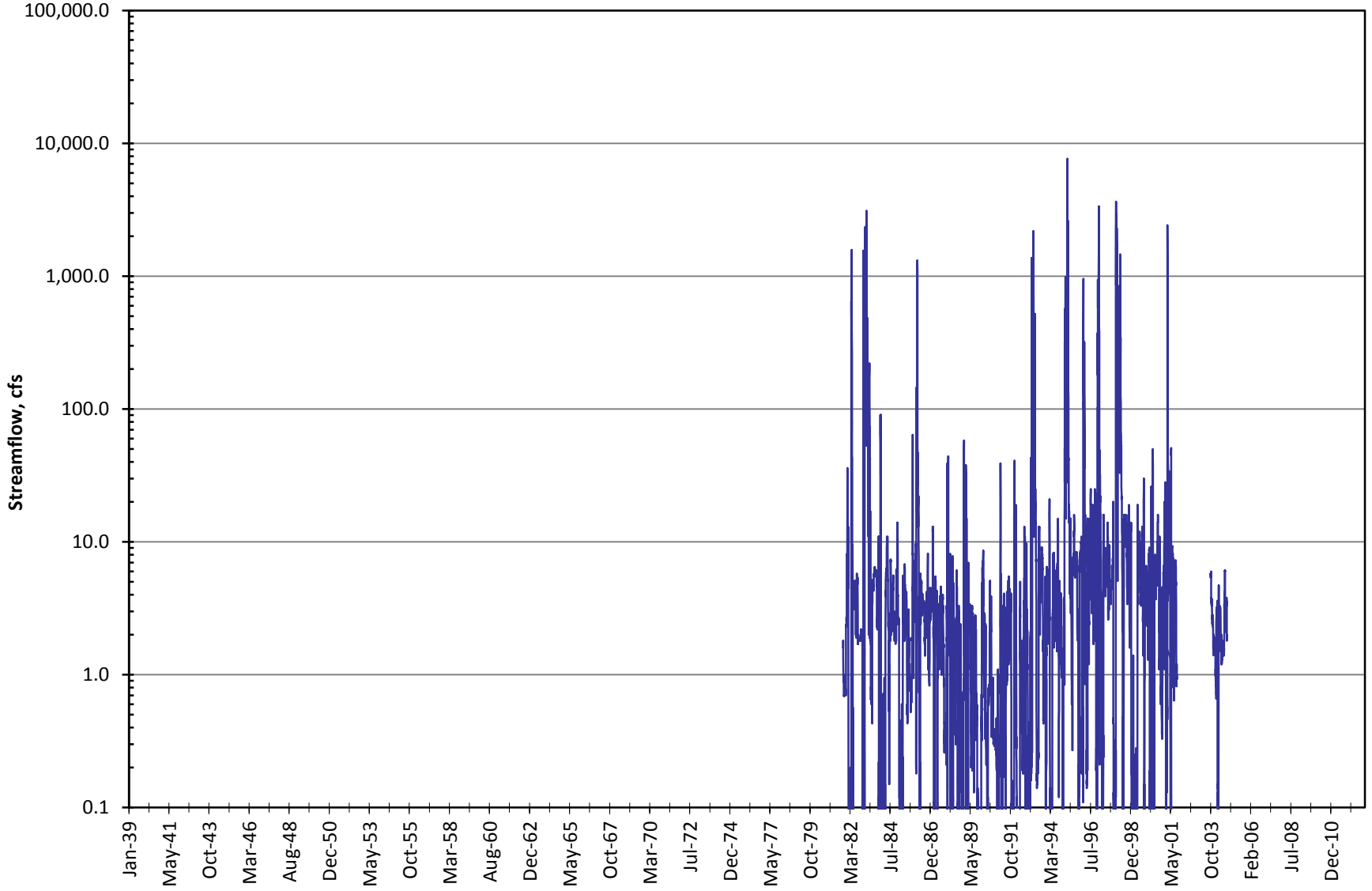
Historical (Daily) Streamflow
Santa Margarita Creek near Santa Margarita
(1981 - 2000)



Source: USGS NWIS (downloaded Nov-11)

Figure 17

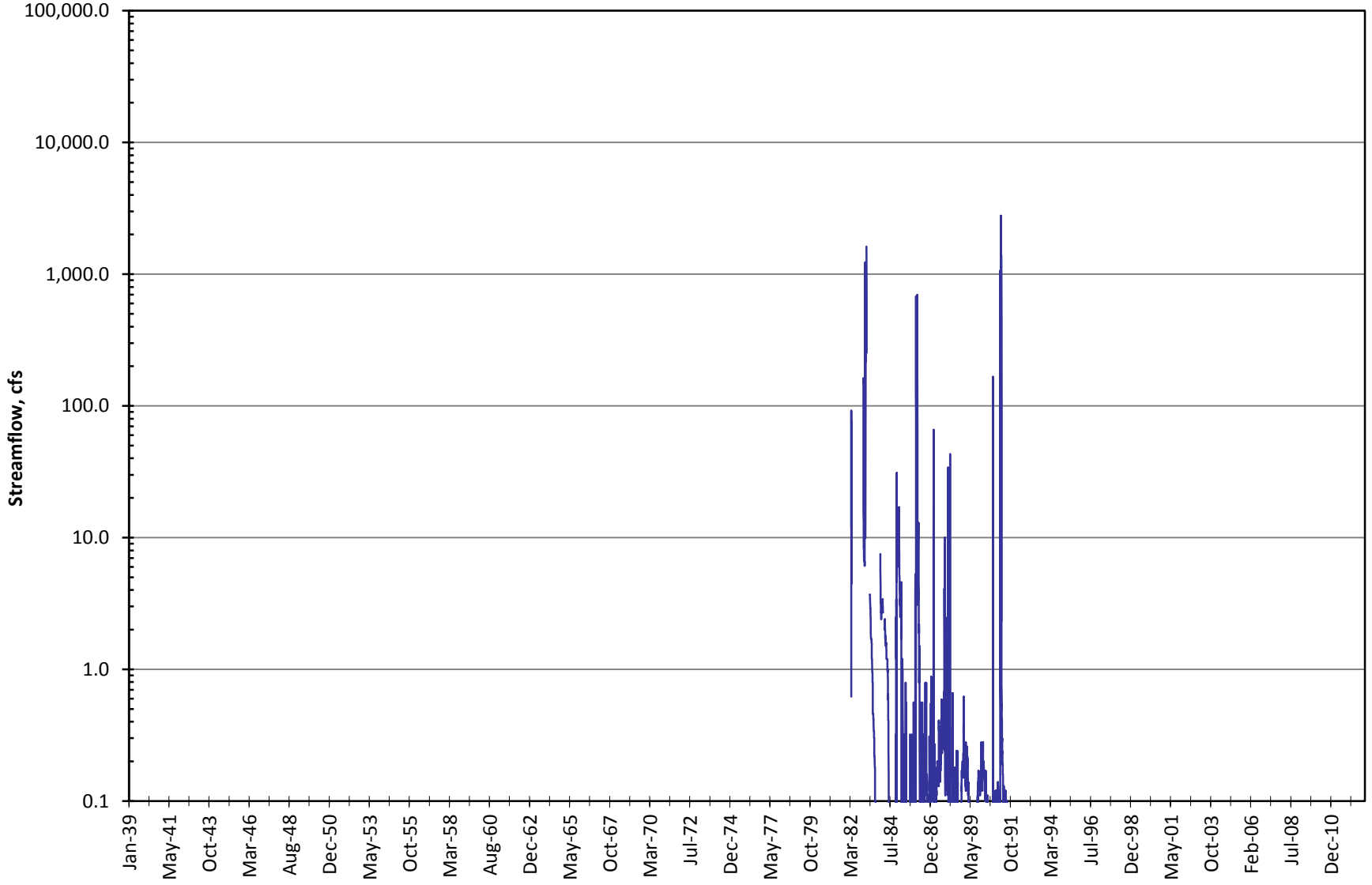
Historical (Daily) Streamflow
Salinas River below Salinas Dam near Pozo
(1981 - 2004)



Source: USGS NWIS (downloaded Nov-11)

Figure 18

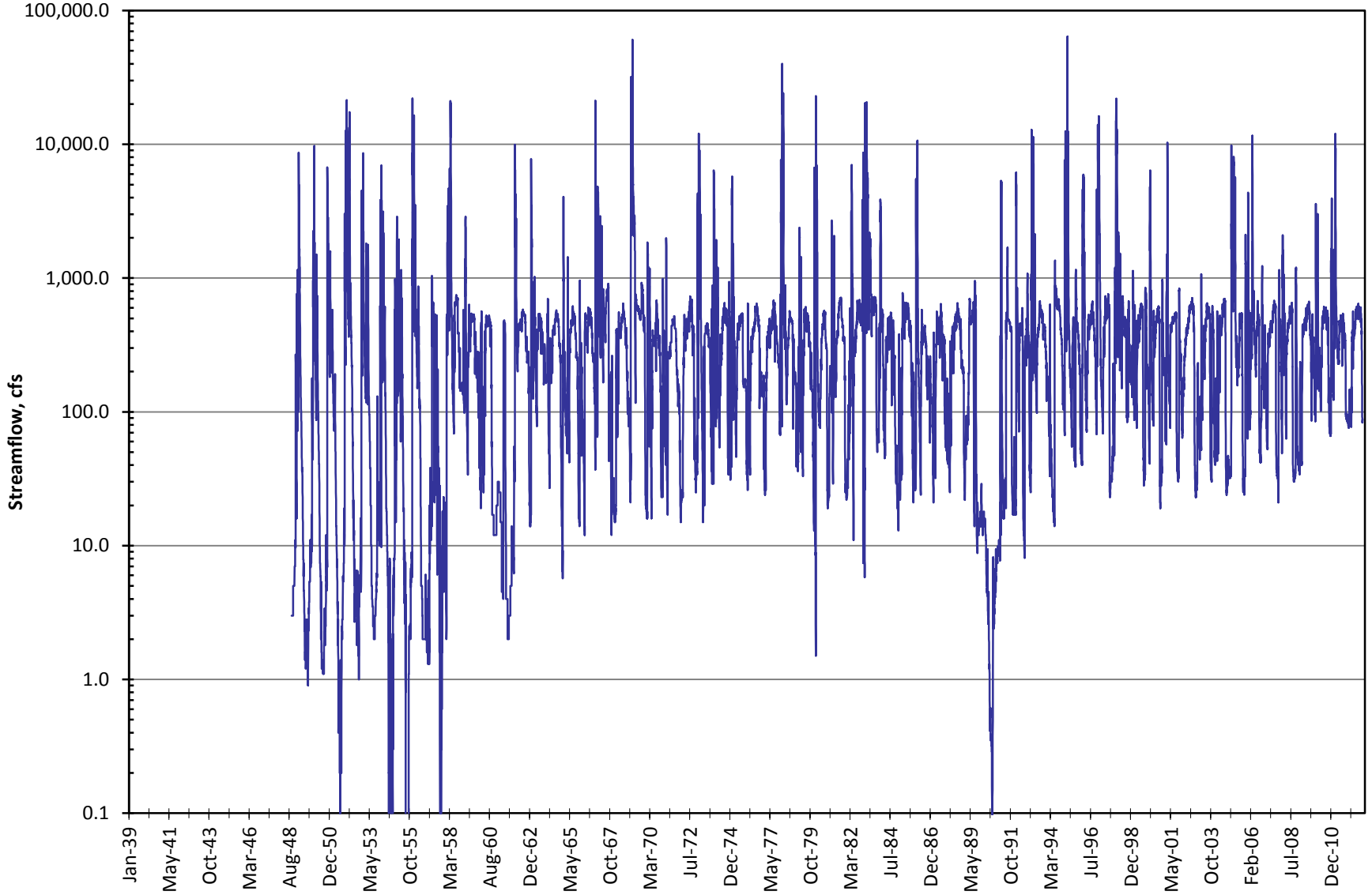
Historical (Daily) Streamflow
Cholame Creek at Palo Prieta (Bitterwater Rd) near Cholame
(1981 - 1991)



Source: USGS NWIS (downloaded Nov-11)

Figure 19

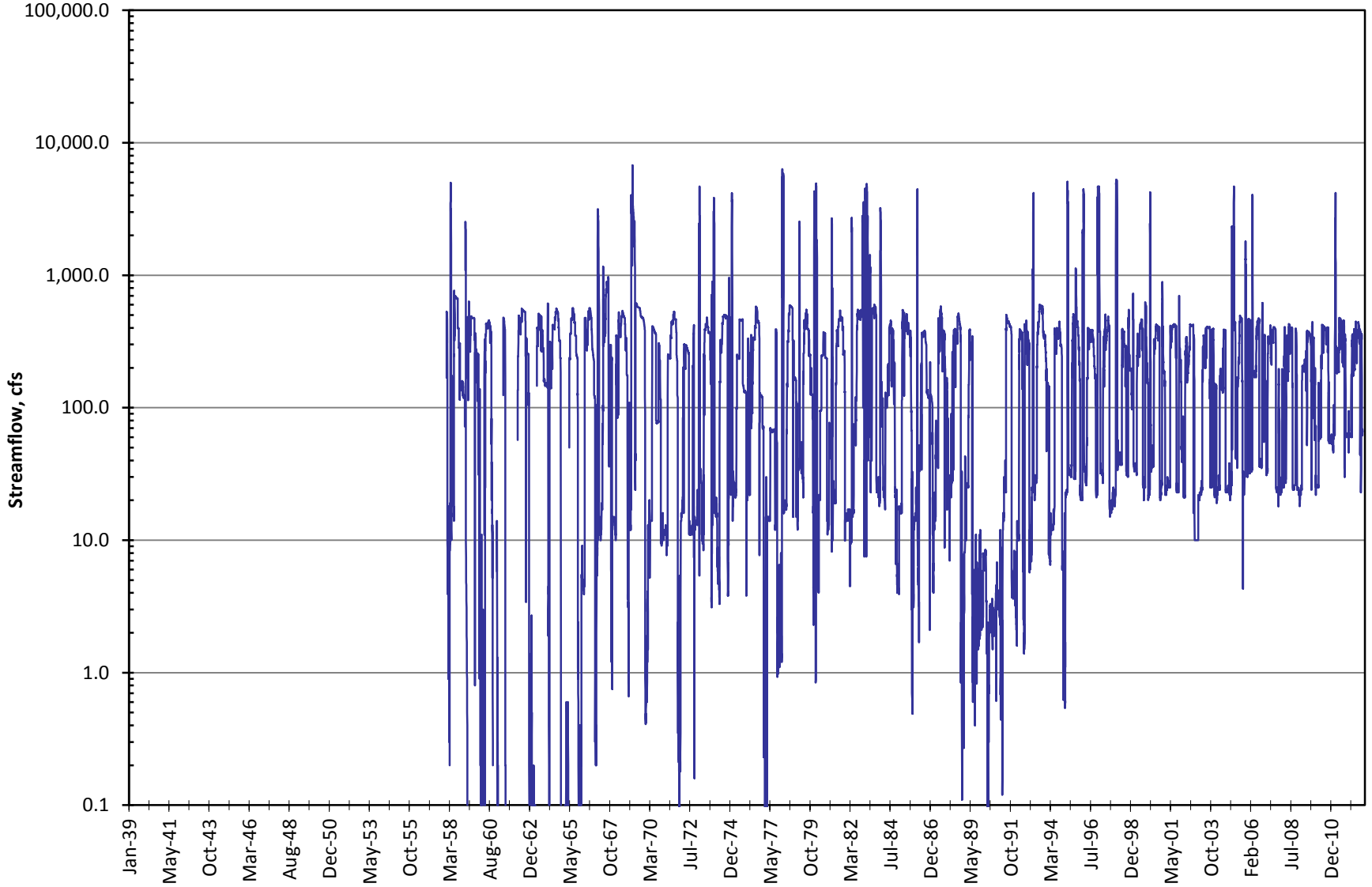
Historical (Daily) Streamflow
Salinas River near Bradley (11150500)
(1948 - 2012)



Source: USGS NWIS (downloaded Nov-11)

Figure 20

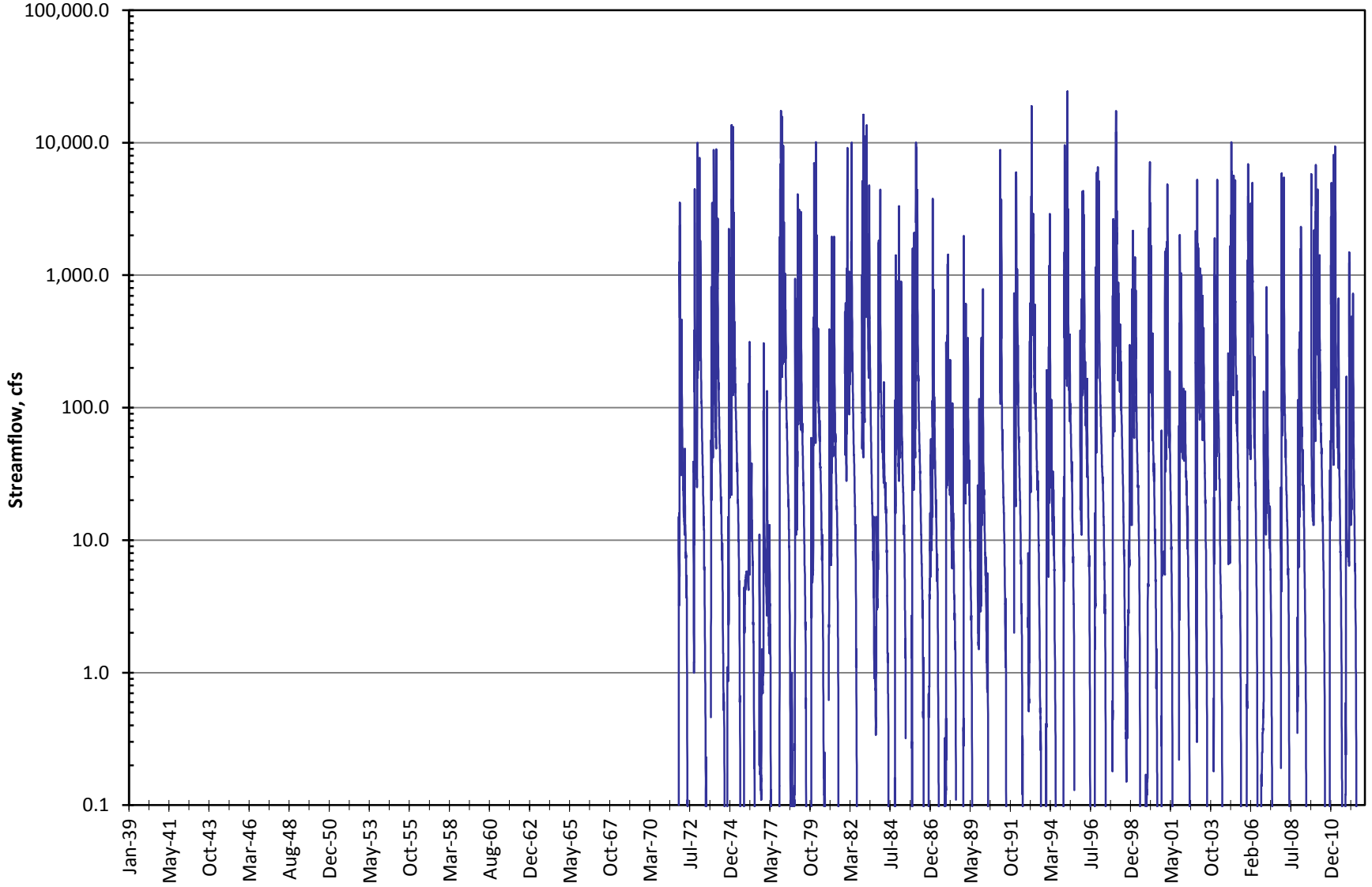
Historical (Daily) Streamflow
Nacimiento River below Nacimiento Dam near Bradley (11149400)
(1957 - 2012)



Source: USGS NWIS (downloaded Nov-11)

Figure 21

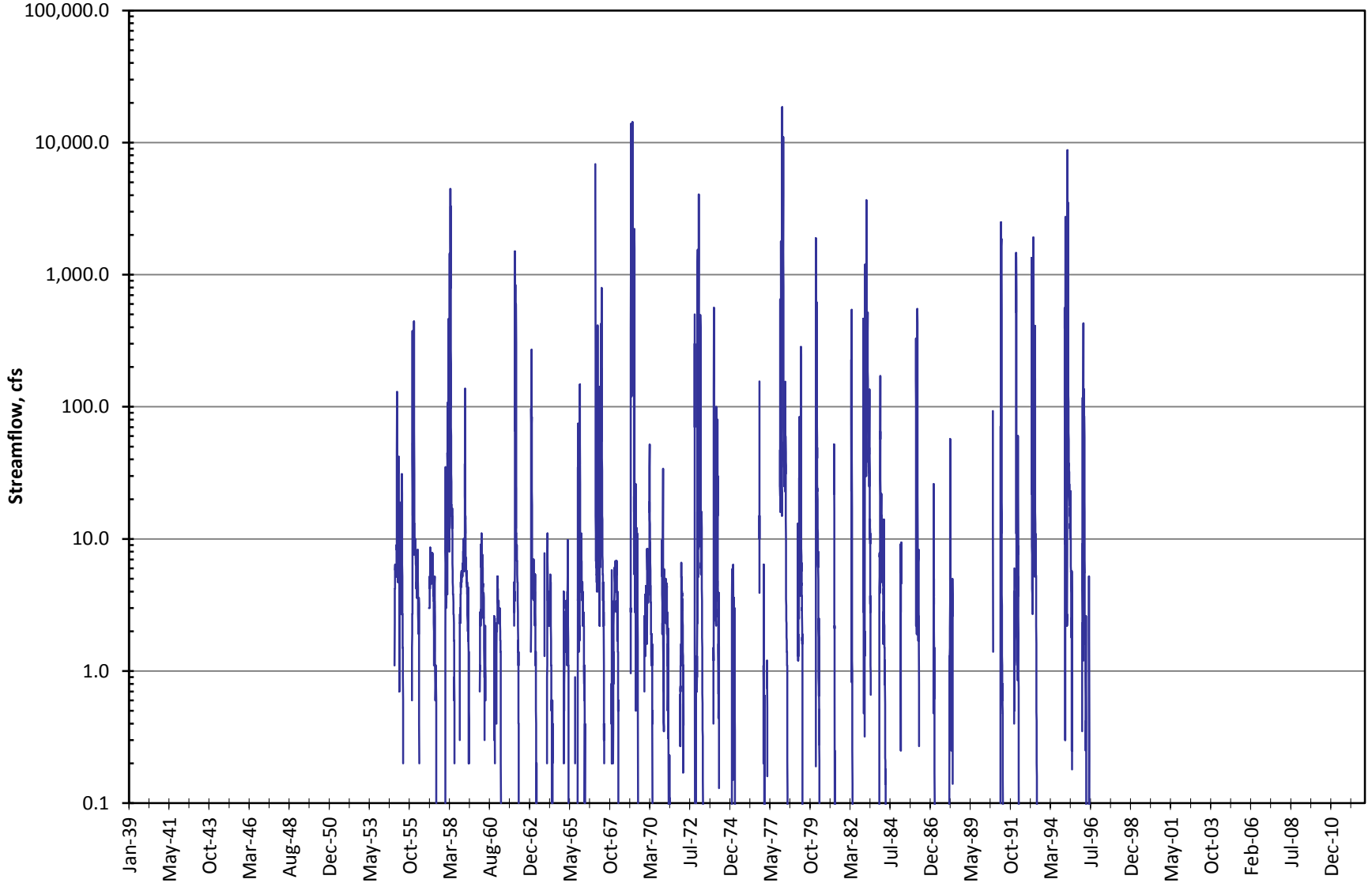
Historical (Daily) Streamflow
Nacimiento River below Sapaque Creek near Bryson (11148900)
(1971 - 2012)



Source: USGS NWIS (downloaded Nov-11)

Figure 22

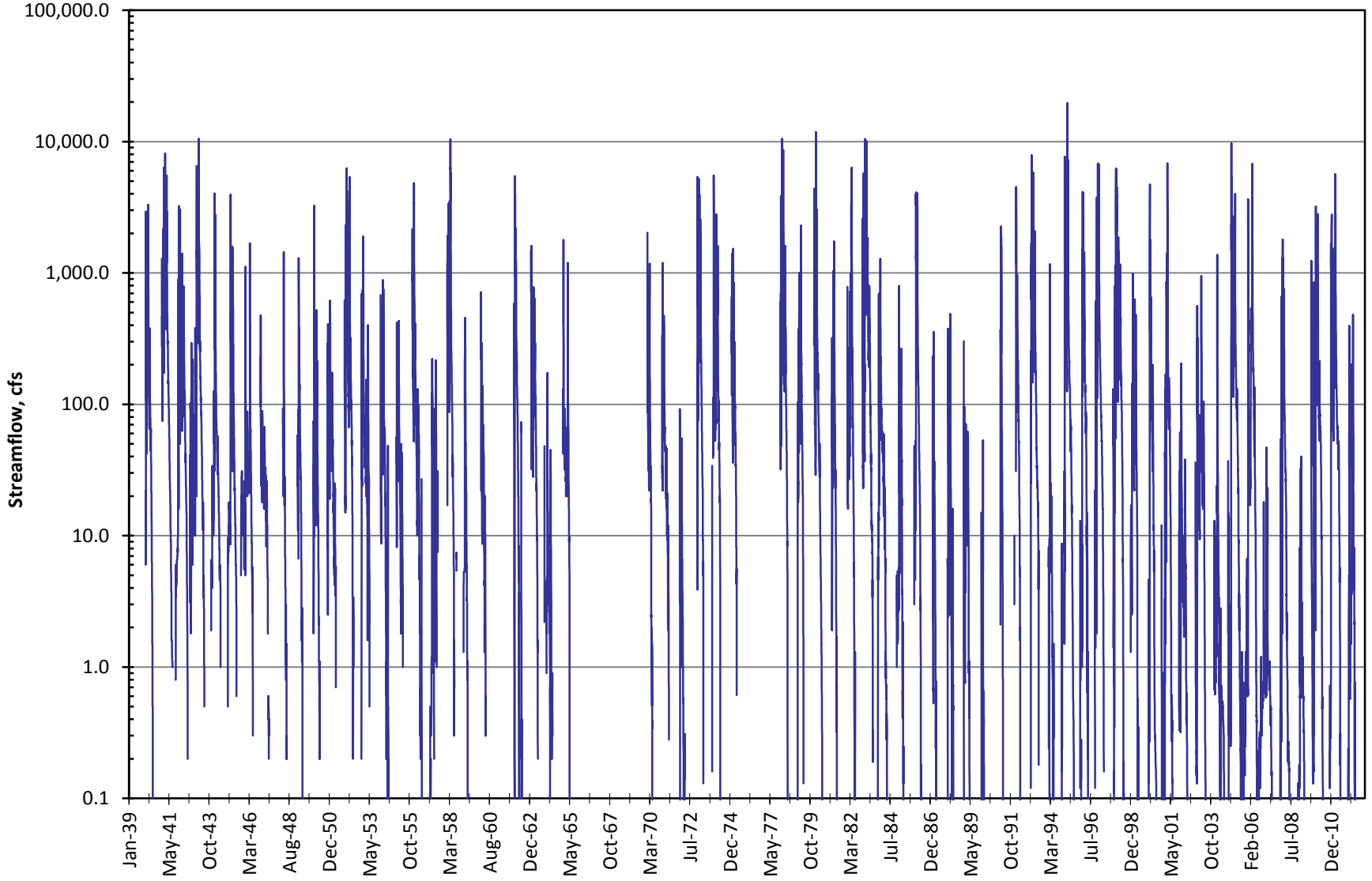
Historical (Daily) Streamflow
Estrella River near Estrella (11148500)
(1956 - 1996)



Source: USGS NWIS (downloaded Nov-11)

Figure 23

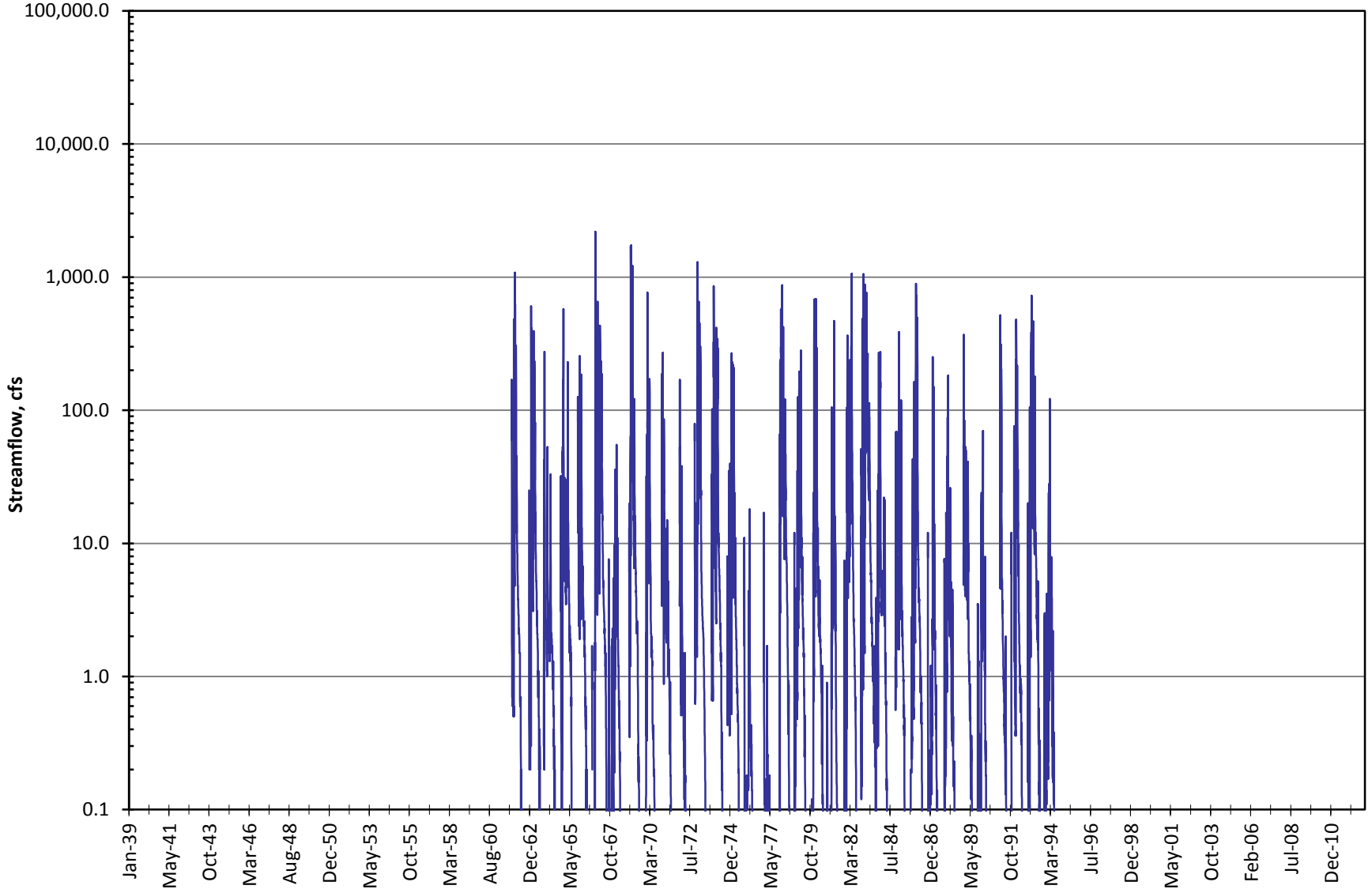
Historical (Daily) Streamflow
Salinas River above Paso Robles (11147500)
(1939 - 2012)



Source: USGS NWIS (downloaded Nov-11)

Figure 24

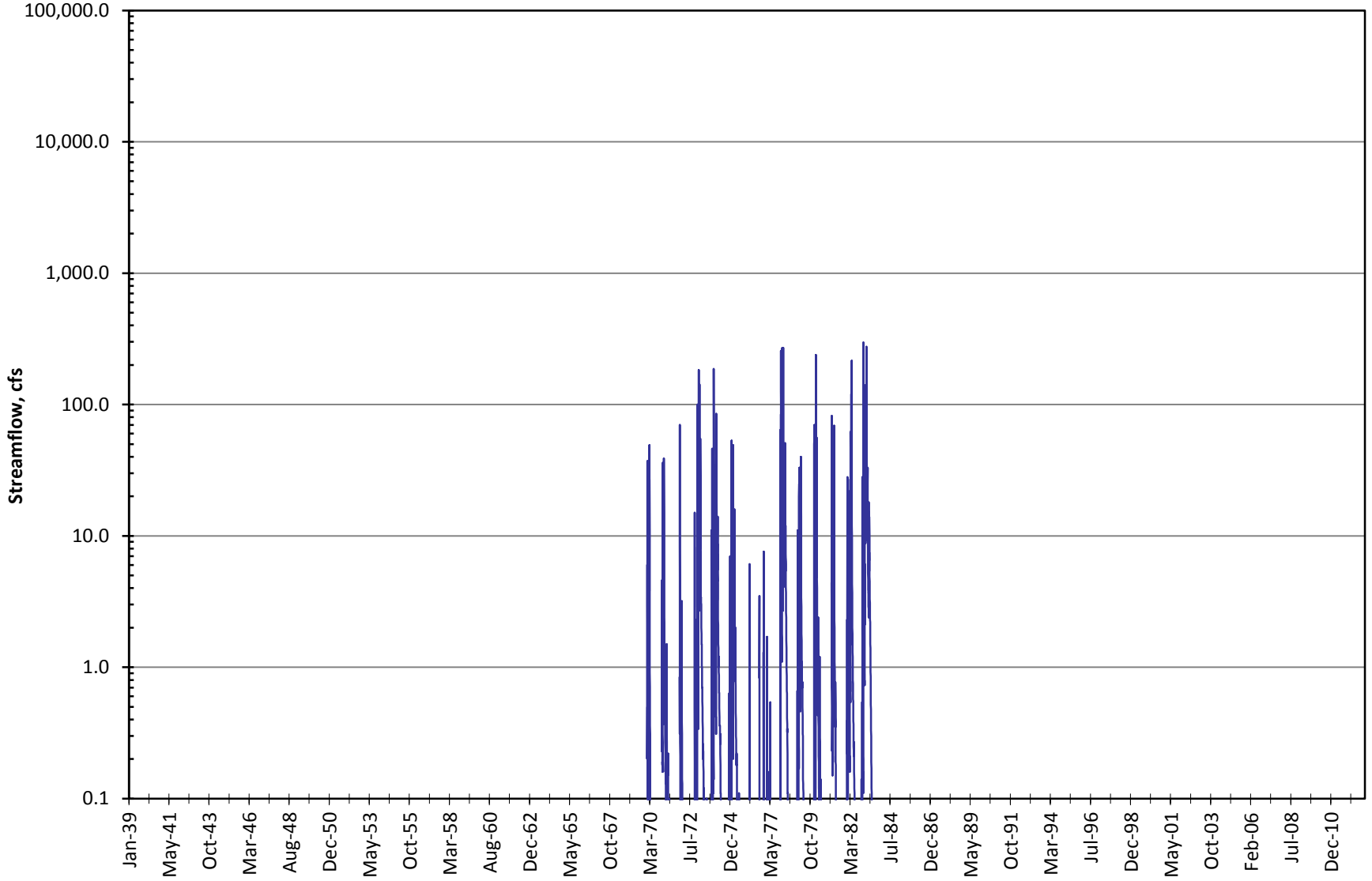
Historical (Daily) Streamflow
Santa Rita Creek near Templeton (11147070)
(1961 - 1994)



Source: USGS NWIS (downloaded Nov-11)

Figure 25

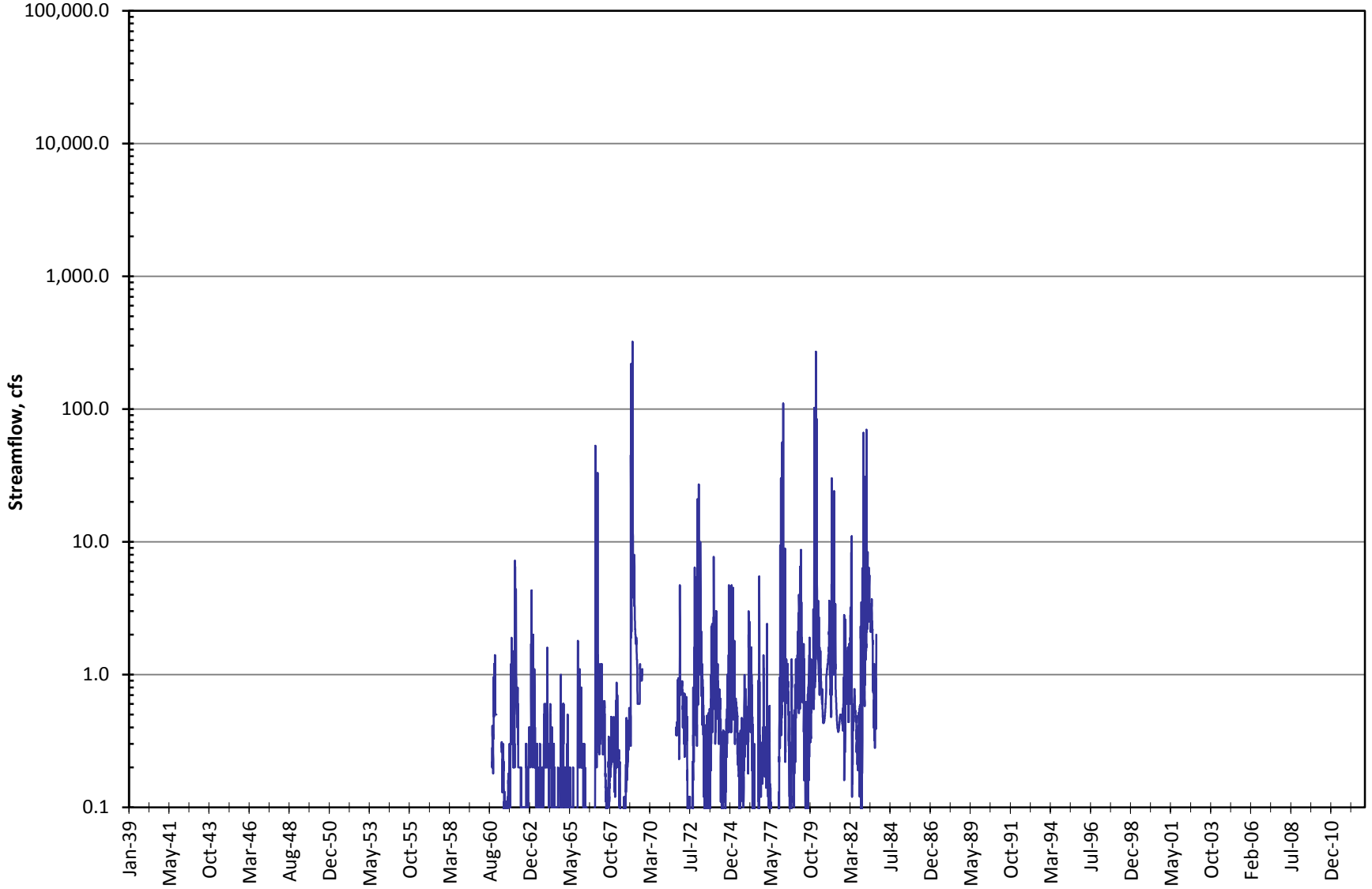
Historical (Daily) Streamflow
Salsipuedes Creek near Pozo (11144200)
(1969 - 1983)



Source: USGS NWIS (downloaded Nov-11)

Figure 26

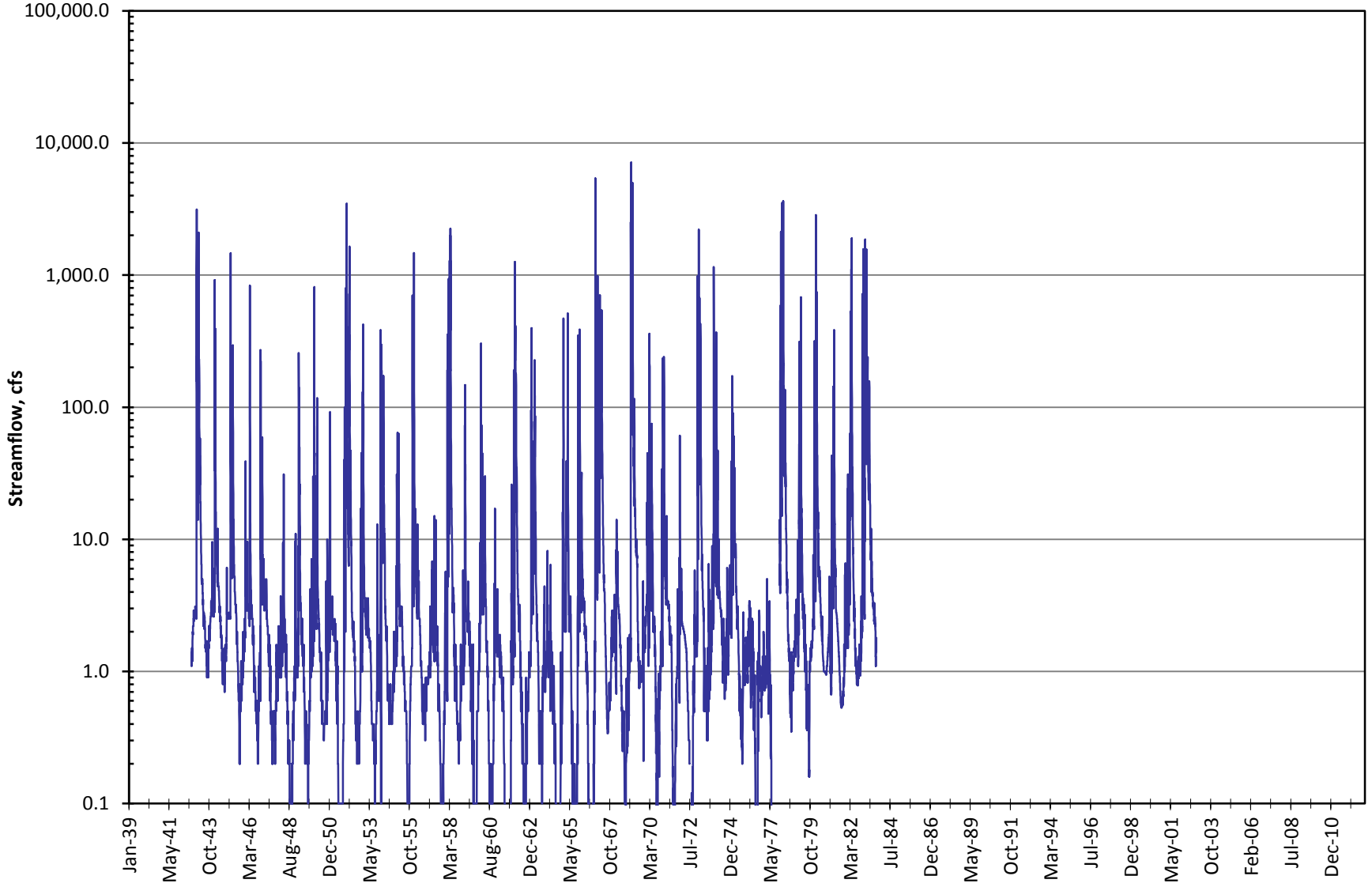
Historical (Daily) Streamflow
Toro Creek near Pozo (11144000)
(1960 - 1983)



Source: USGS NWIS (downloaded Nov-11)

Figure 27

Historical (Daily) Streamflow
Salinas River near Pozo (11143500)
(1942 - 1983)

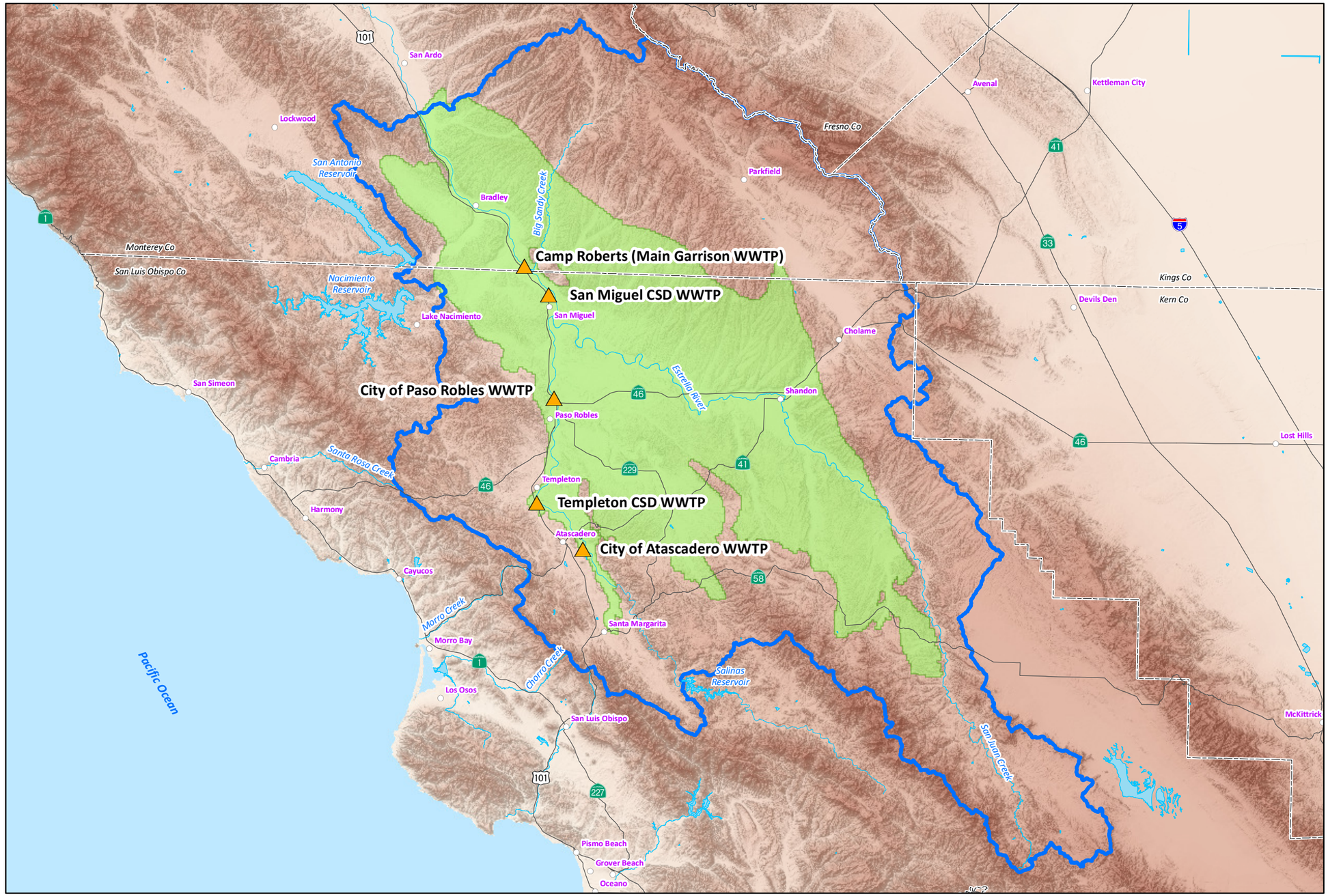


Source: USGS NWIS (downloaded Nov-11)

Figure 28

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



WASTEWATER TREATMENT PLANT LOCATIONS

EXPLANATION

- Wastewater Treament Plant Location
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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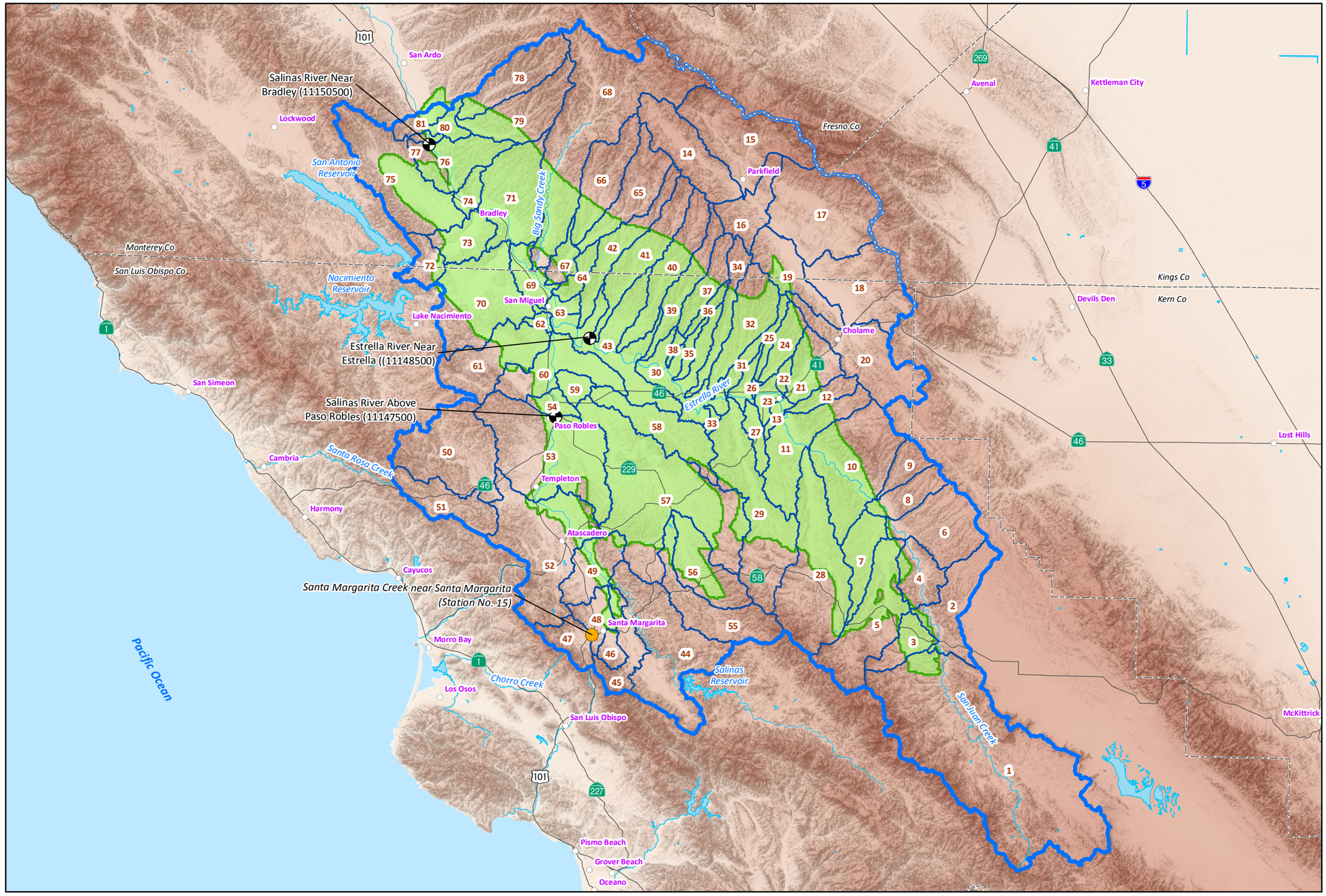
Figure 29

GIS_proj/co_slo_paso_robles_model/6_Fig_29_wastewater_TP_locs_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

TRIBUTARY SUB-WATERSHEDS OF THE PASO ROBLES AREA WATERSHED



EXPLANATION

- Paso Robles Area Watershed Boundary
- 34 — Sub-Watershed Boundary and Designation
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- USGS Gaging Station
- SLOFC&WCD Gaging Station
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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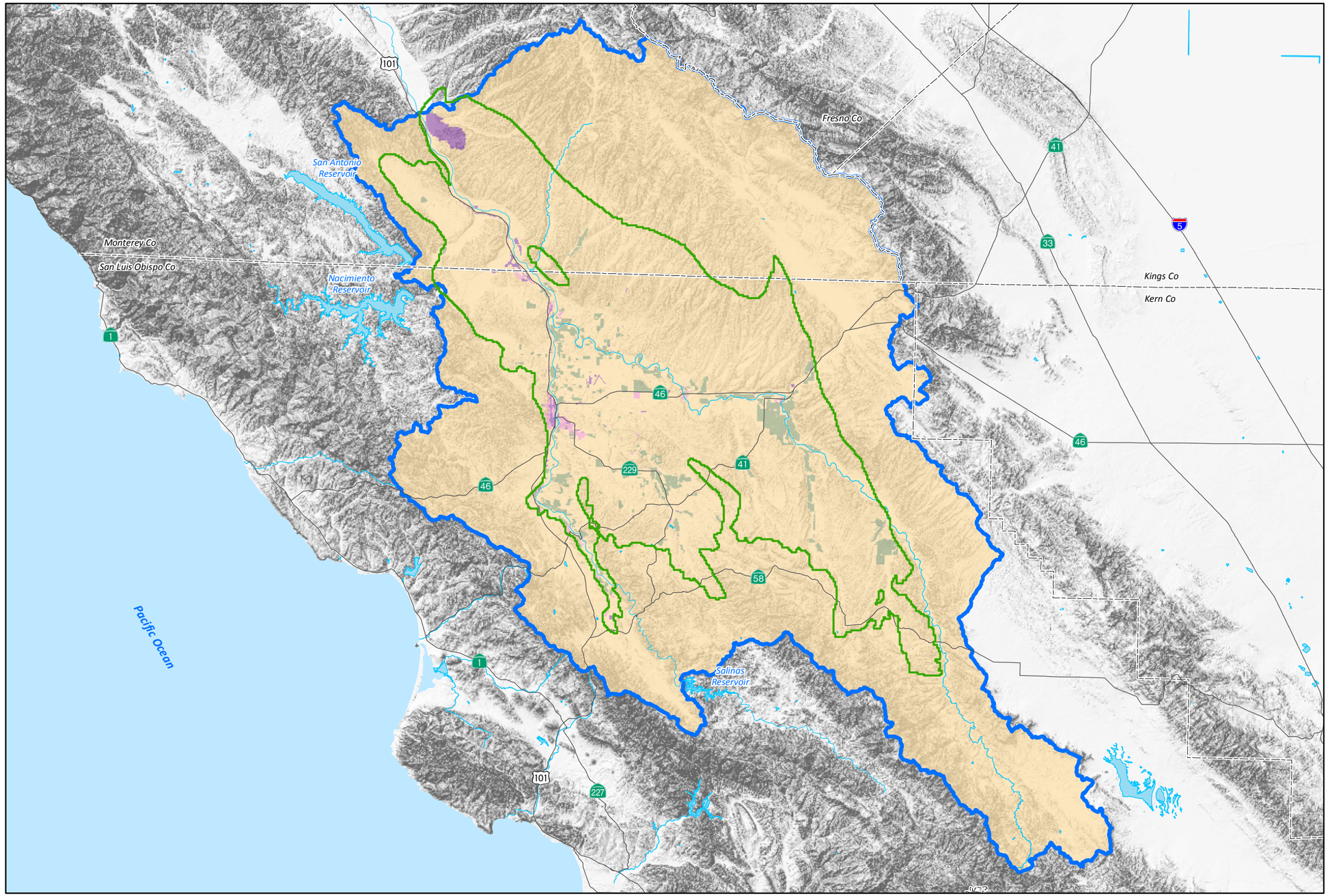
Figure 30

GIS_proj/co_slo_paso_robles_model/6_Fig_30_subwatersheds_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

1985 LAND USE CONDITIONS IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

1985 Land Use Classification
(Source: DWR, 1987)

- Agriculture / Park / Golf Course
- Commercial / Industrial / PublicFacility
- Low Density Residential
- Open Space / Dry Agriculture / Water Body

- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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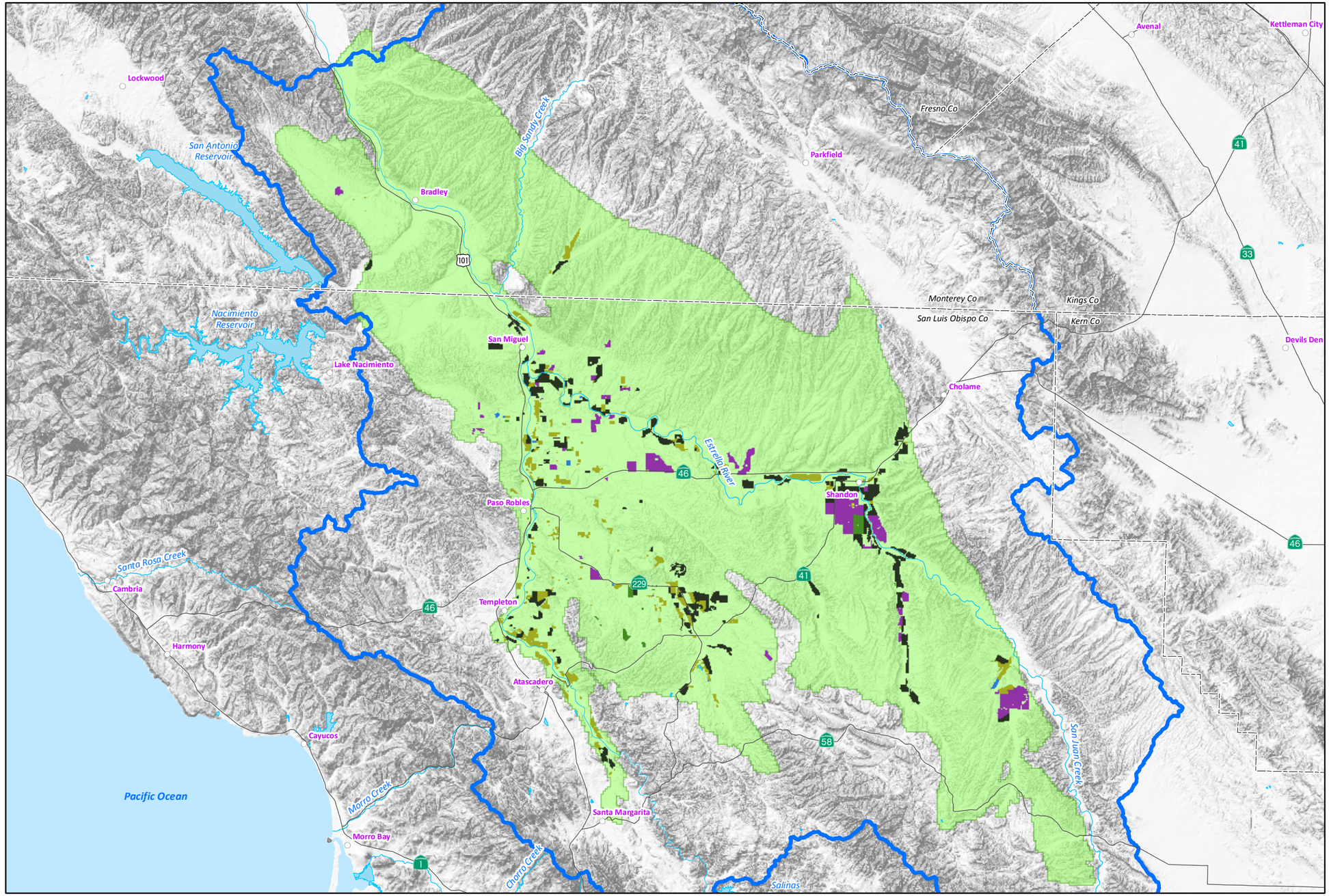
Figure 31a

GIS_proj/co_slo_paso_robles_model/6_Fig_31a_1985_land_use_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

1985 IRRIGATED AGRICULTURAL TYPES IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

1985 Land Use Irrigated Agricultural Types (Source: DWR, 1987)

- Alfalfa
- Deciduous
- Pasture
- Truck / Vegetable
- Vineyard

Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)

Paso Robles Area Watershed Boundary

County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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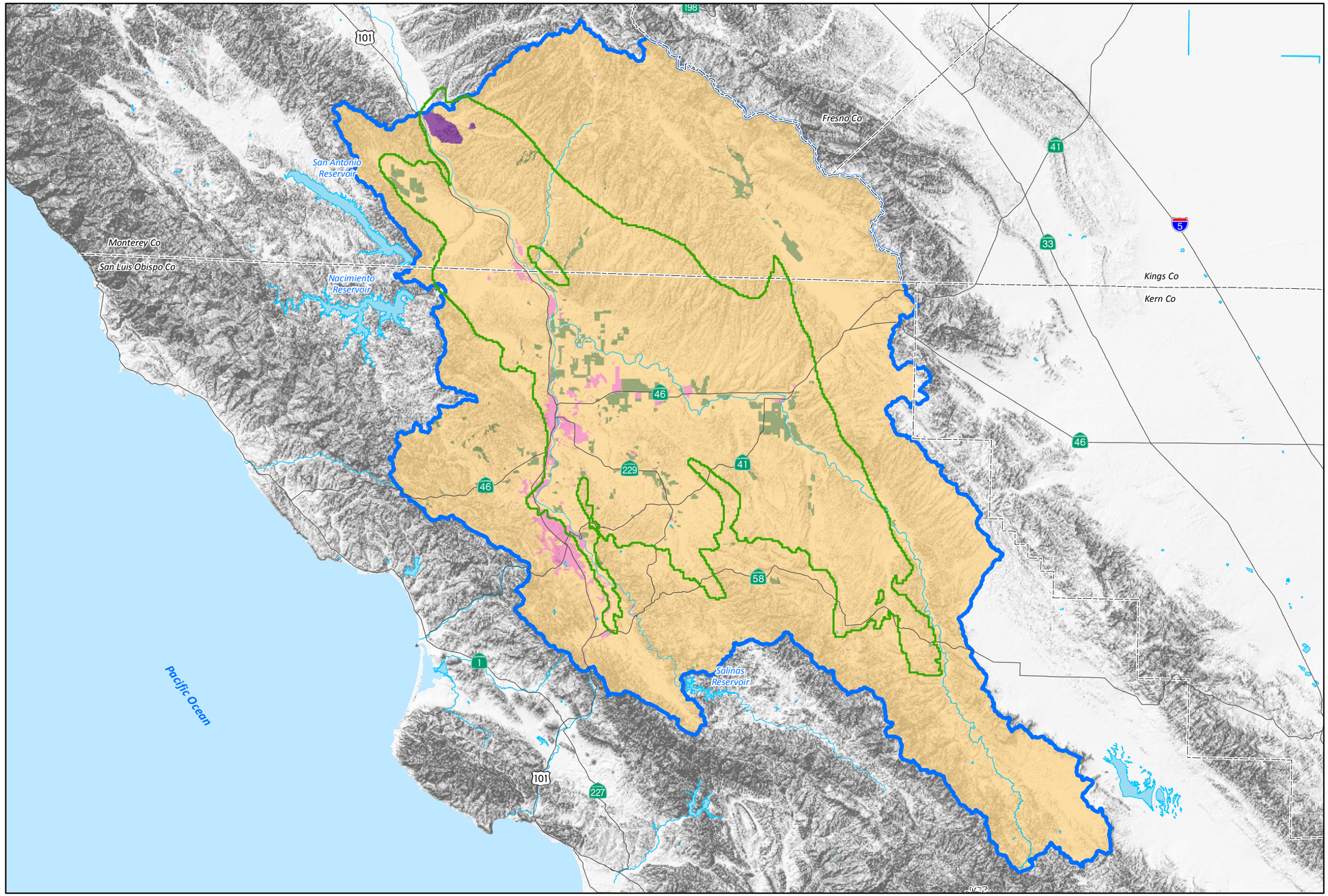
Figure 31b

GIS_proj/co_slo_paso_robles_model/6_Fig_31b_1985_Ag_areas_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

1997 LAND USE CONDITIONS IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

1997 Land Use Classification (Source: DWR 1997 Monterey and 1996 San Luis Obispo.)

- Agriculture / Park / Golf Course
- Commercial / Industrial / PublicFacility
- Low Density Residential
- Open Space / Dry Agriculture / Water Body

- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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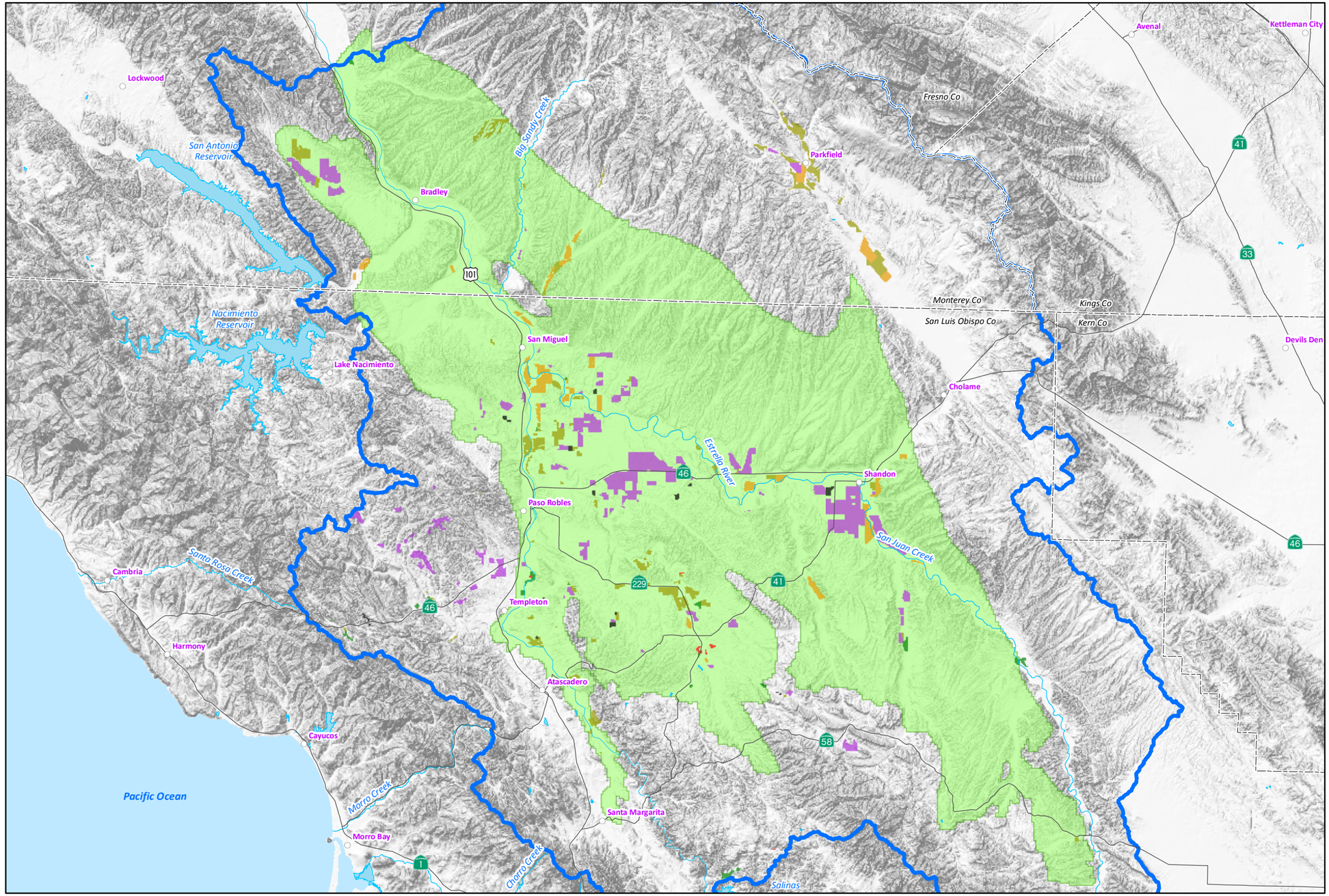
Figure 32a

GIS_proj/co_slo_paso_robles_model/6_Fig_32a_1997_land_use_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

1997 IRRIGATED AGRICULTURAL TYPES IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

1997 Land Use Irrigated Agricultural Types (Source: DWR 1997 Monterey and 1996 San Luis Obispo.)

- Alfalfa
- Deciduous
- Nursery
- Pasture
- Truck
- Vineyard

- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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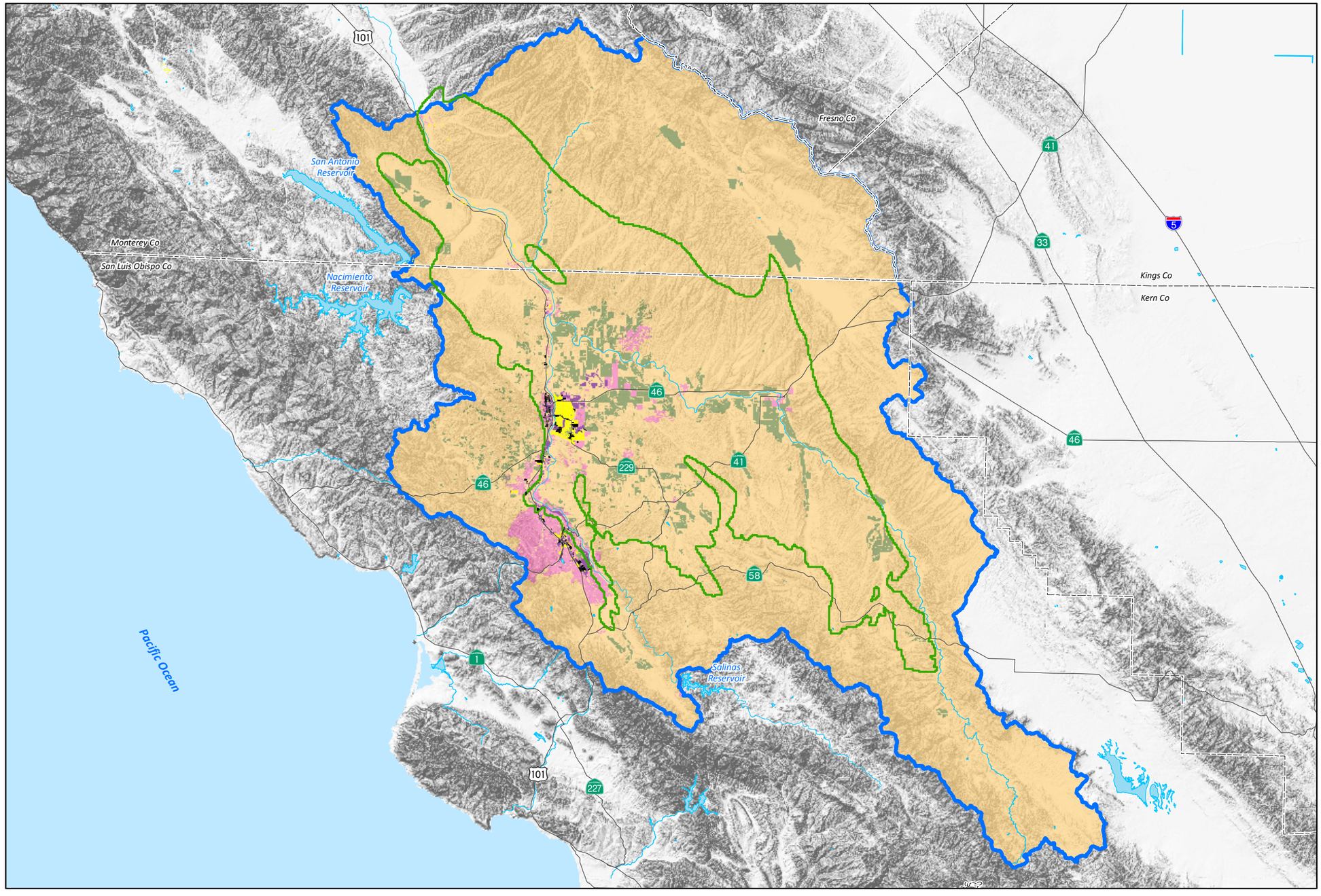
Figure 32b

GIS_proj/co_slo_paso_robles_model/6_Fig_32b_1997_Ag_areas_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

2011 LAND USE CONDITIONS IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

2011 Land Use Classification
(Source: City of Atascadero,
City of Paso Robles,
County of San Luis Obispo
Agricultural Commissioner
Monterey County Agricultural
Commissioner.
USDA GeoDataGateway
* Includes modifications
made by GEOSCIENCE and
Todd Groundwater, 2012)

- Agriculture / Park / Golf Course
- Commercial / Industrial / PublicFacility
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Open Space / Dry Agriculture / Water Body
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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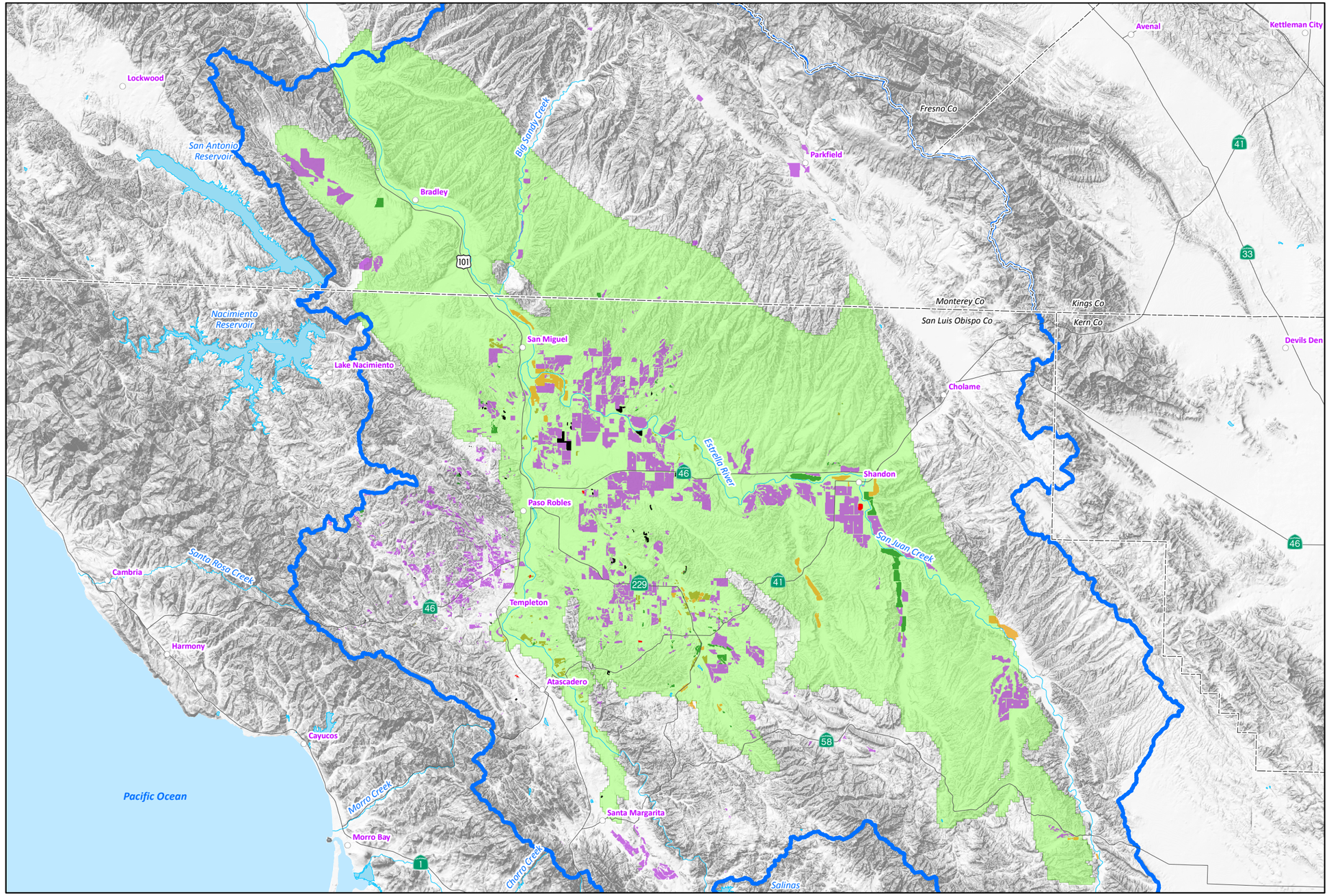
Figure 33a

GIS_proj/co_slo_paso_robles_model/6_Fig_33a_2011_land_use_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

2011 IRRIGATED AGRICULTURAL TYPES IN THE PASO ROBLES AREA WATERSHED



EXPLANATION

2011 Land Use Irrigated Agricultural Types
(Source: City of Atascadero, City of Paso Robles, County of San Luis Obispo Agricultural Commissioner Monterey County Agricultural Commissioner. USDA GeoDataGateway
* Includes modifications made by GEOSCIENCE and Todd Groundwater, 2012)

- Alfalfa
- Deciduous
- Nursery
- Pasture
- Truck
- Vineyard

- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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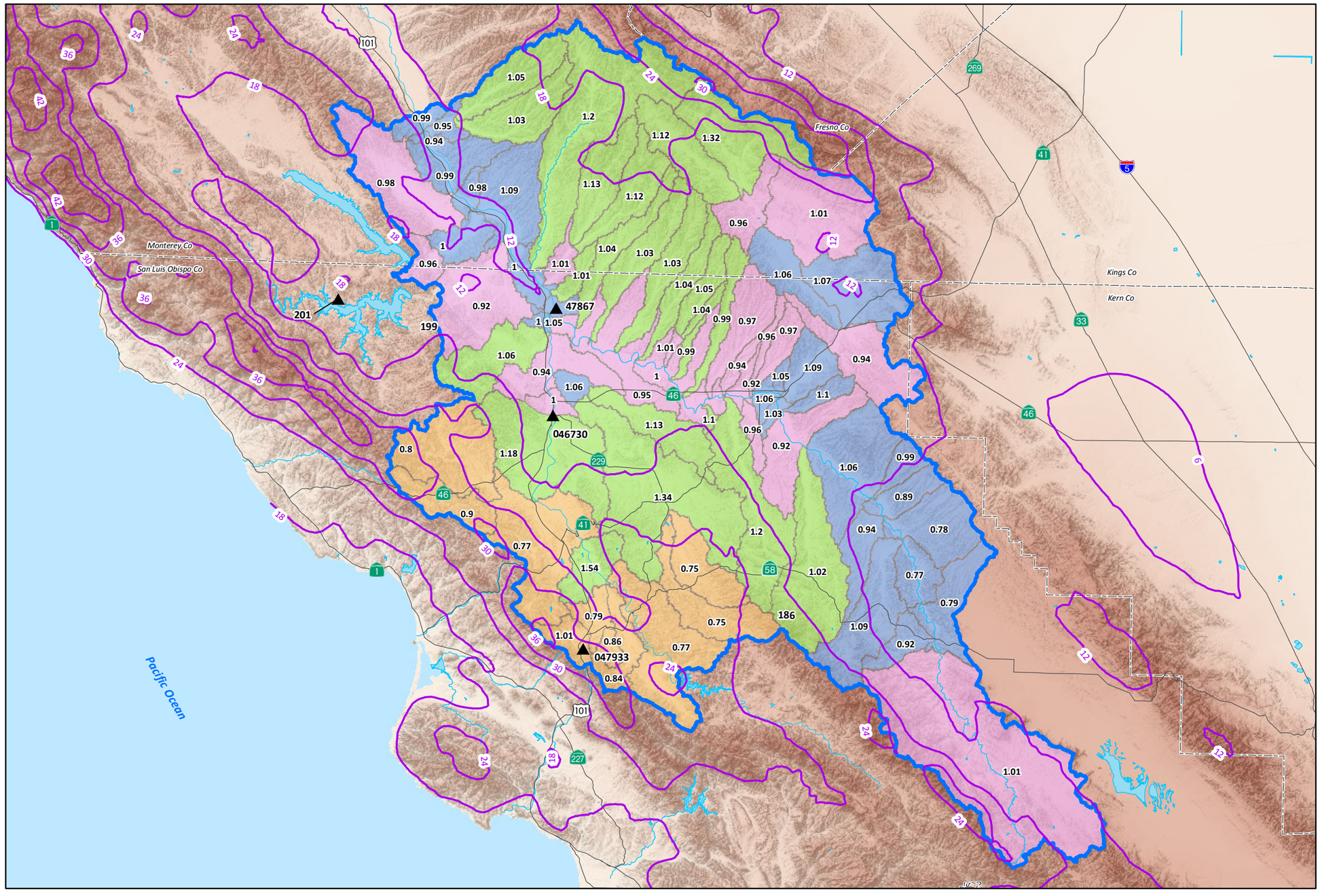
Figure 33b

GIS_proj/co_slo_paso_robles_model/6_Fig_33b_2011_Ag_areas_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



PRISM PRECIPITATION ADJUSTMENT FACTORS

EXPLANATION

▲ Precipitation Station

Colors of Sub-Watersheds Represent Similar PRISM Precipitation (1981-2010) Within Each Sub-Watershed As The Respective Precipitation Station Shown Below

- Station No. 201
- Station No. 46730
- Station No. 47867
- Station No. 47933

Paso Robles Area Watershed Boundary

1.06 Sub-Watershed Boundary and Precipitation Adjustment Factor (See Table 8)

— 12 — PRISM Precipitation, in.

County Boundary

19-Dec-14

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NORTH

0 5 10 20 Miles

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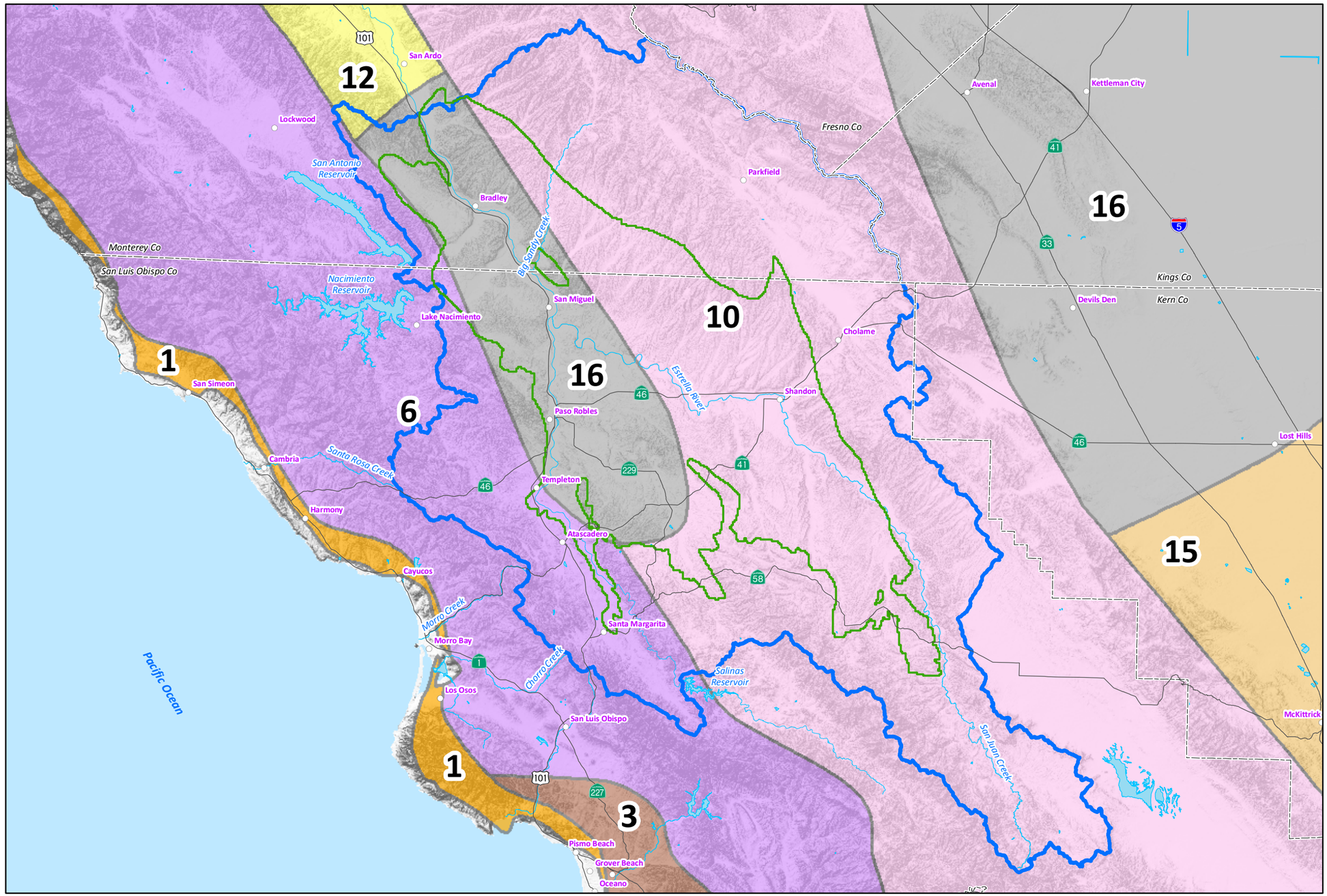
Figure 34

GIS_proj/co_slo_paso_robles_model/6_Fig_34_precip_adjust_factors_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



REFERENCE EVAPOTRANSPIRATION (ETo) ZONES

EXPLANATION

Evapotranspiration (ETo) Zones
(Source: CIMIS, 2013)

- 1 — Coastal Plains Heavy Fog Belt
- 3 — Coastal Valleys and Plains and North Coast Mountains
- 6 — Upland Central Coast and Los Angeles Basin
- 10 — North Central Plateau & Central Coast Range
- 12 — East Side Sacramento-San Joaquin Valley
- 15 — Northern & Southern San Joaquin Valley
- 16 — Westside San Joaquin Valley & Mountains East & West of Imperial Valley

- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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Figure 35

GIS_proj/co_slo_paso_robles_model/6_Fig_35_ET_zones_12-14.mxd

Hydrograph of Measured and Model-Simulated Monthly Streamflow at the Salinas River near Bradley Gaging Station (11150500) - Water Years 1981 - 2011

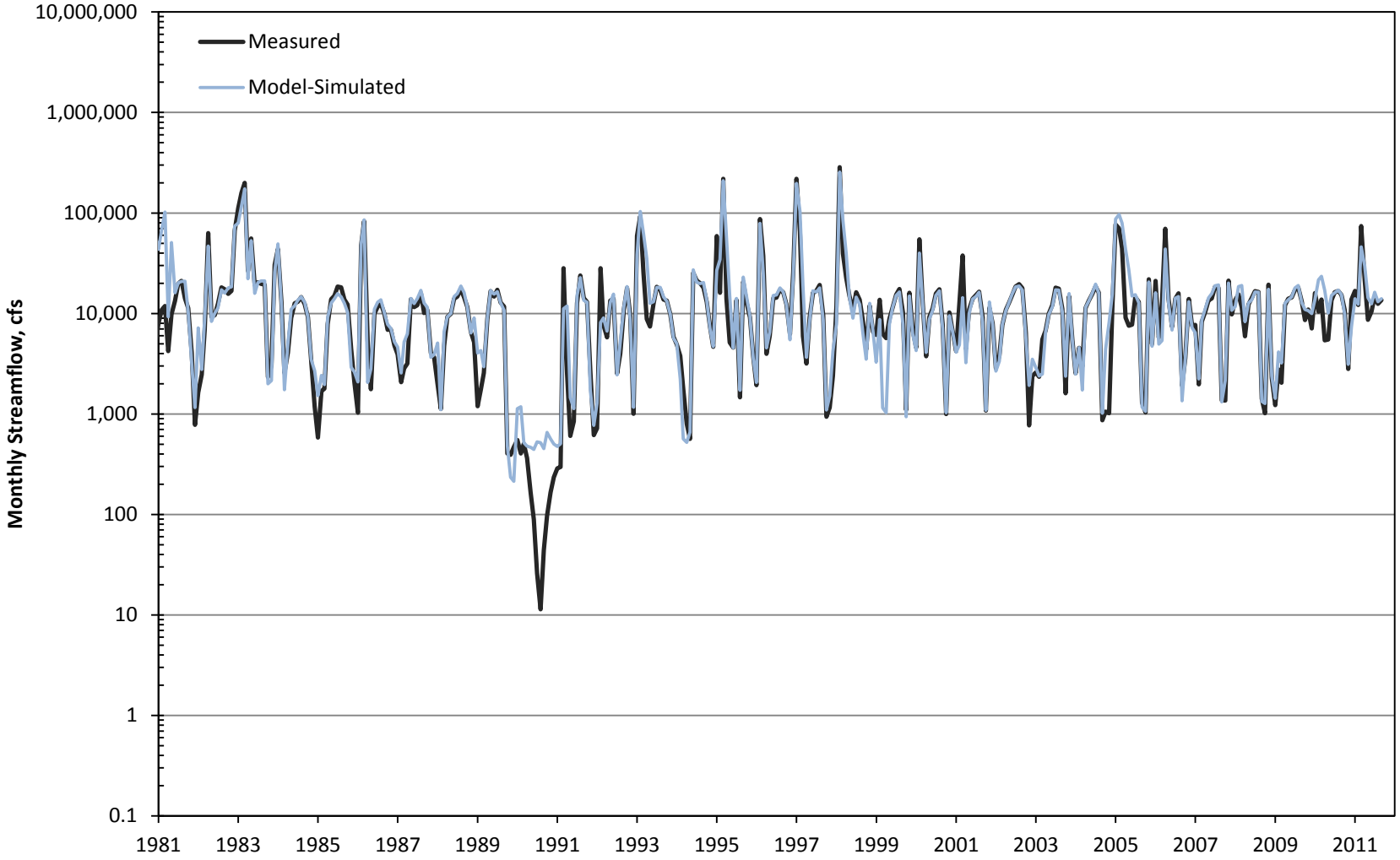


Figure 36

Hydrograph of Measured and Model-Simulated Monthly Streamflow at the Salinas River above Paso Robles Gaging Station (11147500) - Water Years 1981 - 2011

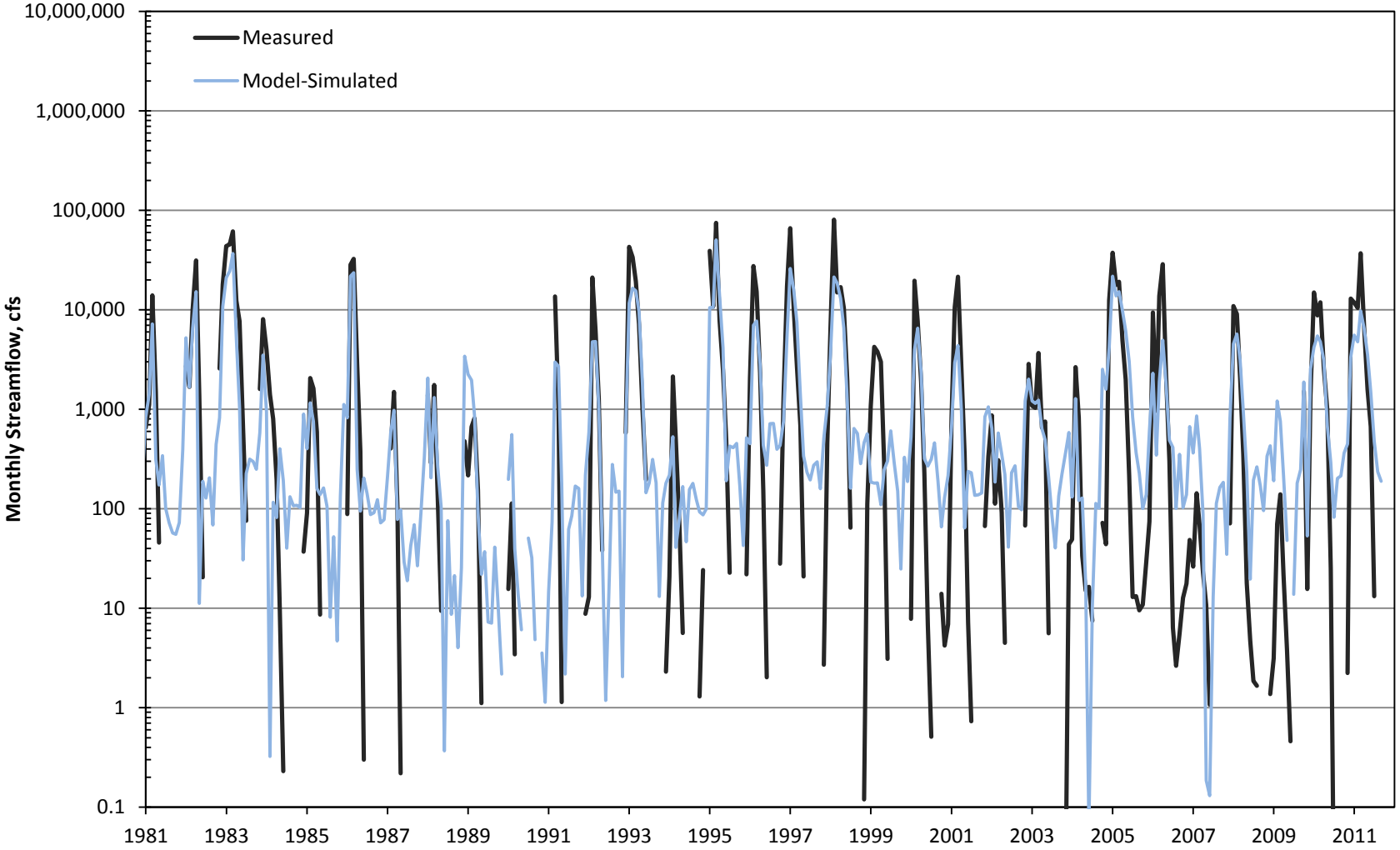


Figure 37

Hydrograph of Measured and Model-Simulated Monthly Streamflow at the Estrella River near Estrella Gaging Station (11148500) - Water Years 1981 - 2011

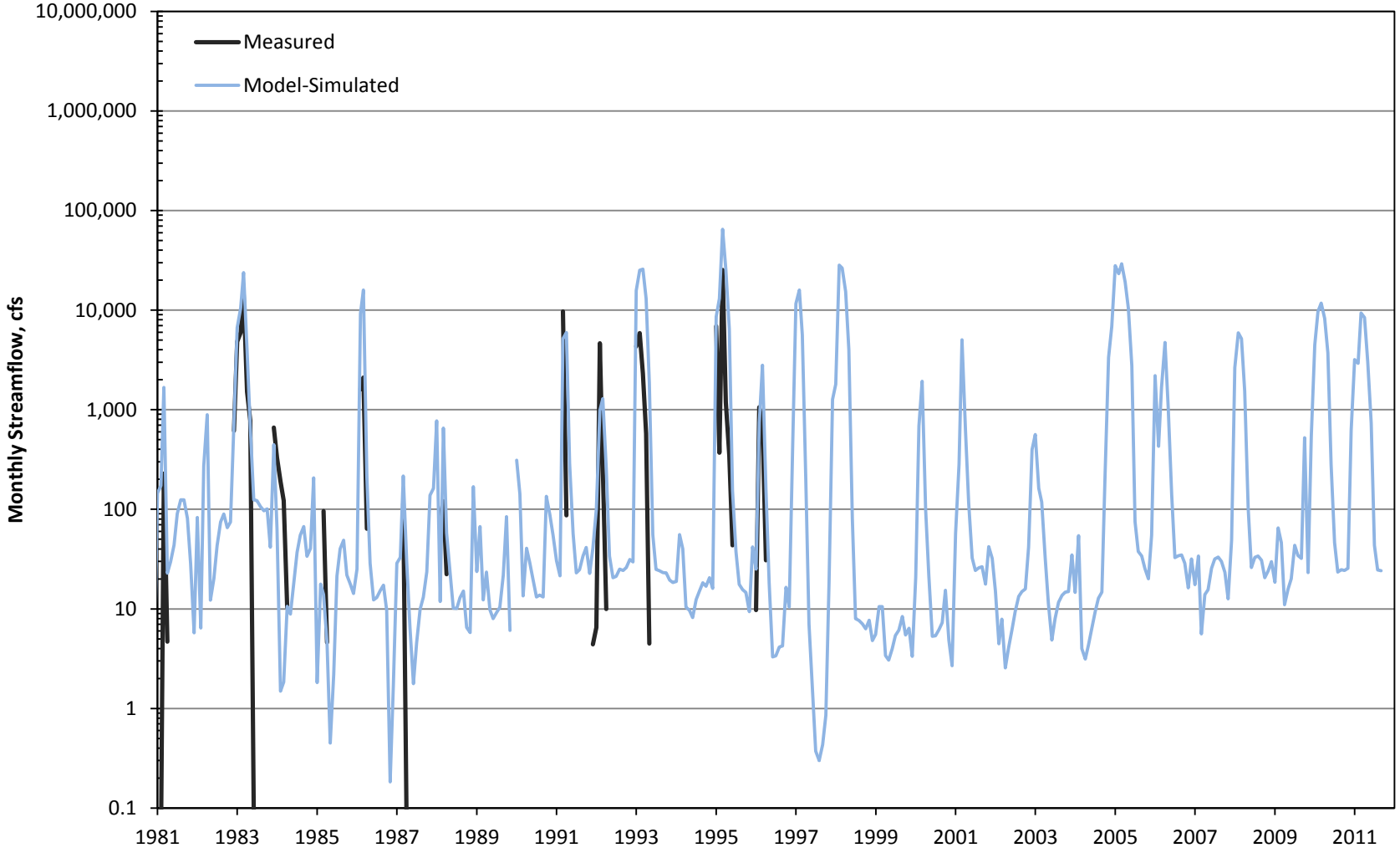


Figure 38

Hydrograph of Measured and Model-Simulated Monthly Streamflow at the Santa Margarita Creek near Santa Margarita Gaging Station (No. 15) - Water Years 1981 - 2011

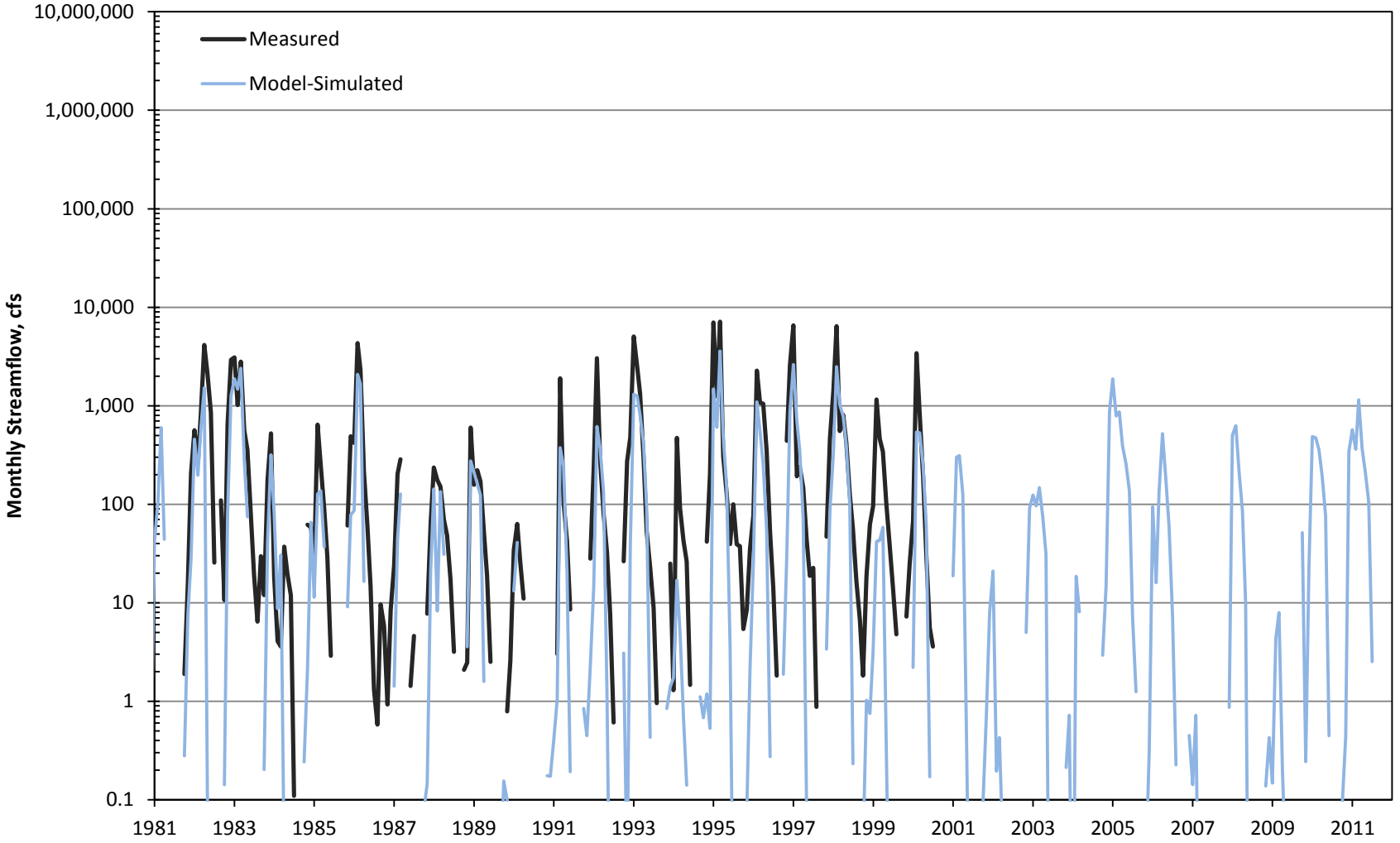


Figure 39

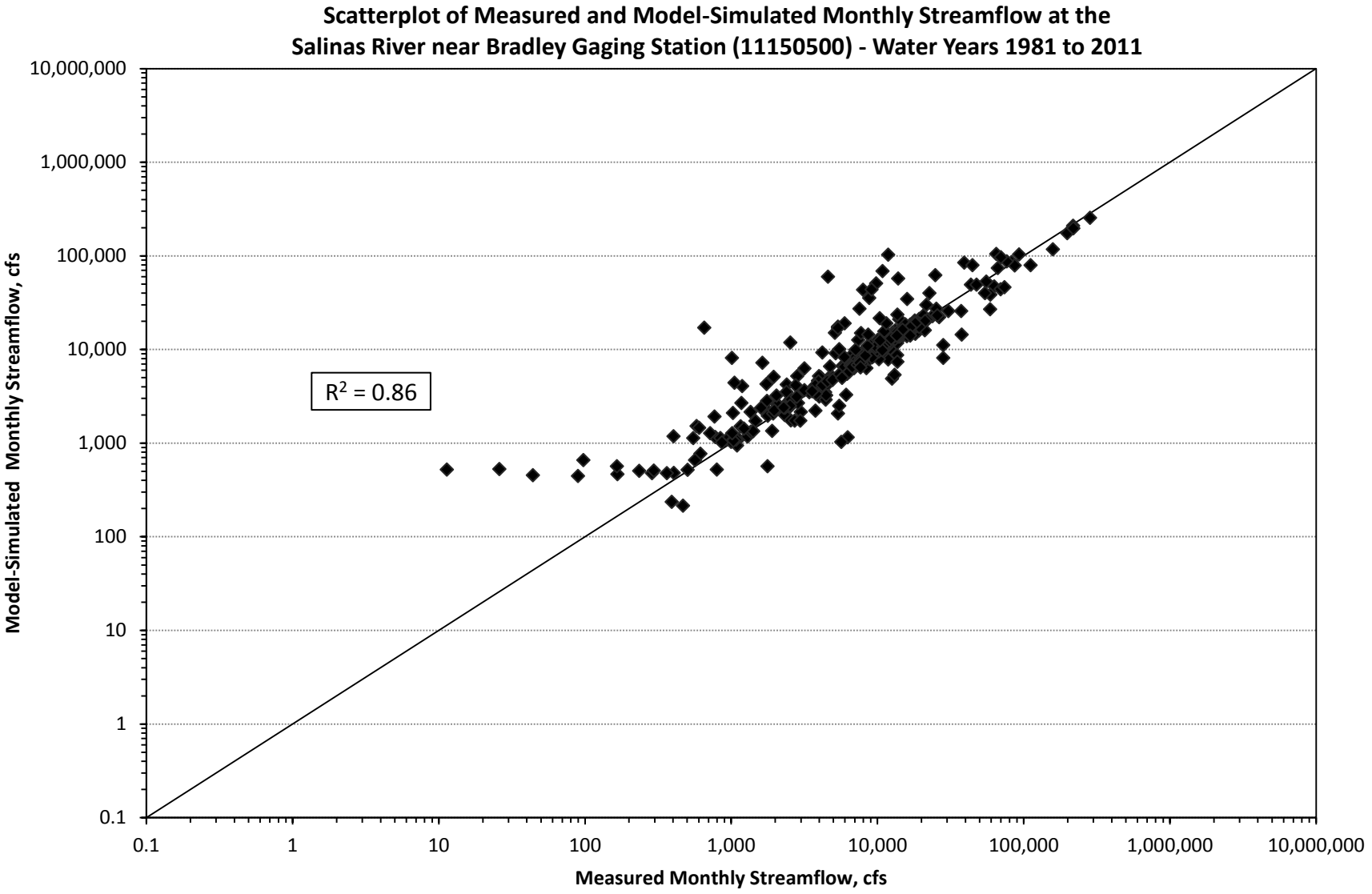

Scatterplot of Measured and Model-Simulated Monthly Streamflow at the Salinas River near Bradley Gaging Station (11150500) - Water Years 1981 to 2011
Model-Simulated Monthly Streamflow, cfs
Measured Monthly Streamflow, cfs
R² = 0.86
10,000,000
1,000,000
100,000
10,000
1,000
100
10
1
0.1
0.1
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000

Figure 40

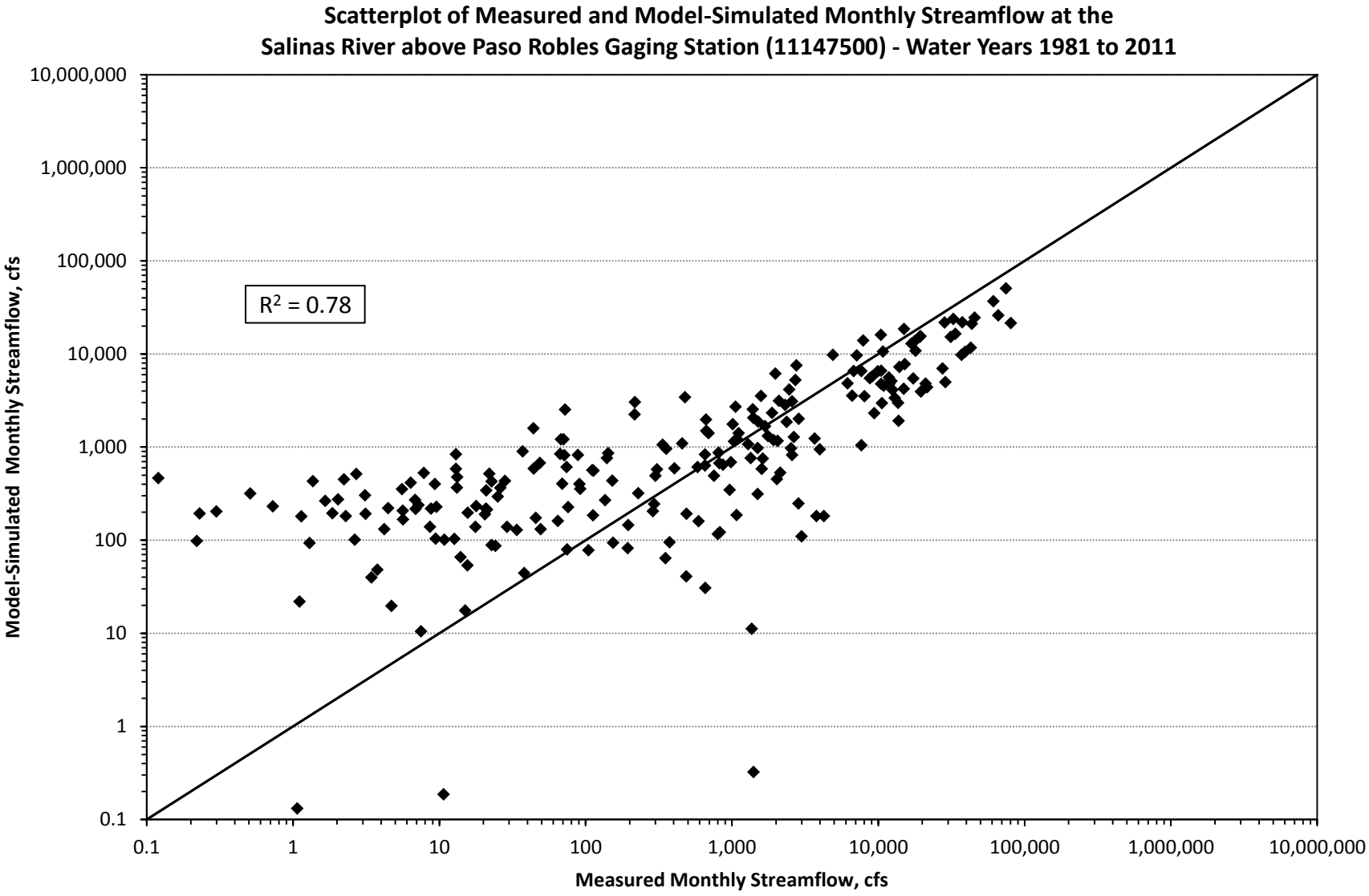

Scatterplot of Measured and Model-Simulated Monthly Streamflow at the
Salinas River above Paso Robles Gaging Station (11147500) - Water Years 1981 to 2011
R2 = 0.78
Model-Simulated Monthly Streamflow, cfs
Measured Monthly Streamflow, cfs
10,000,000
1,000,000
100,000
10,000
1,000
100
10
1
0.1
0.1
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000

Figure 41

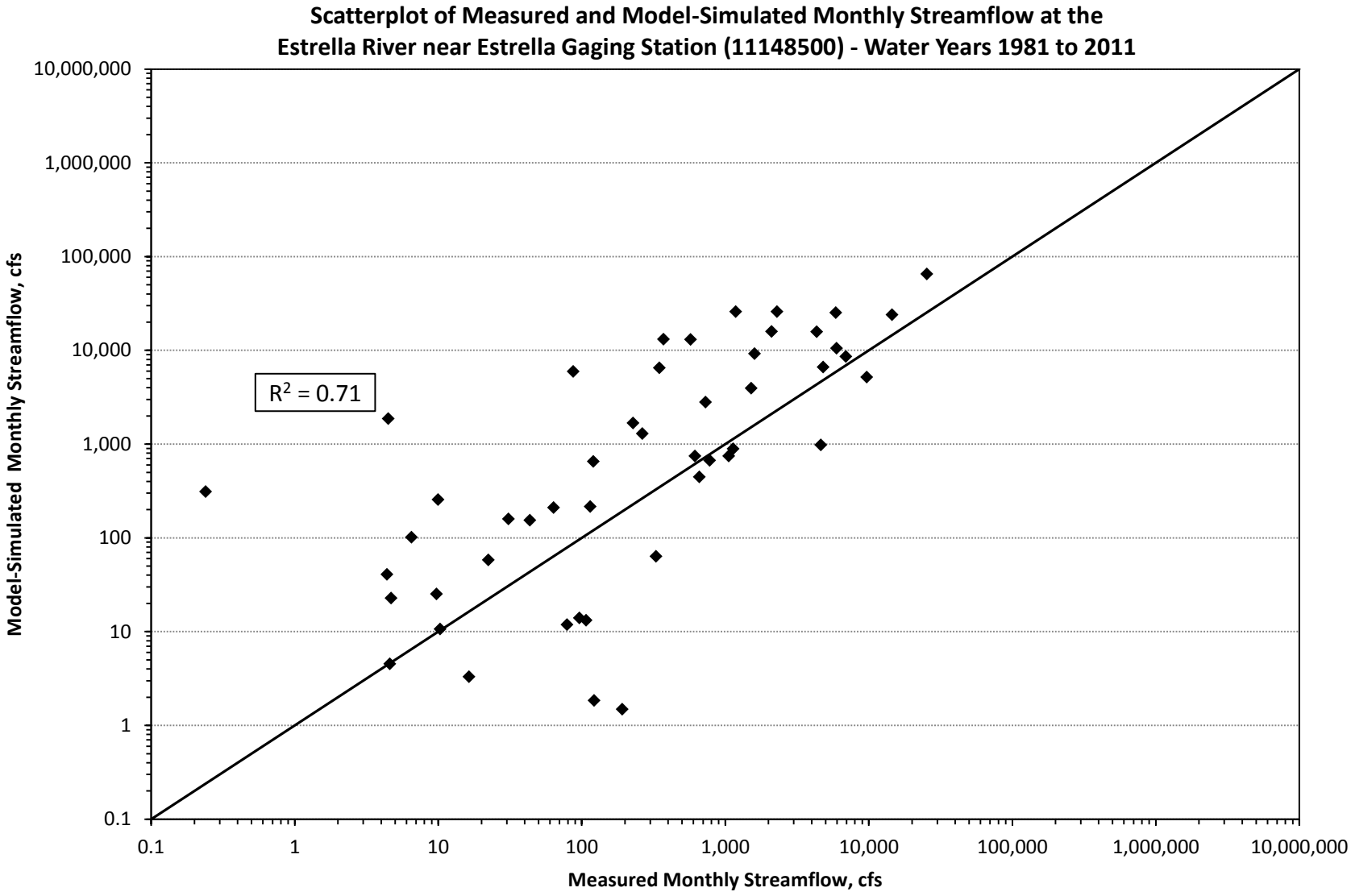

Scatterplot of Measured and Model-Simulated Monthly Streamflow at the Estrella River near Estrella Gaging Station (11148500) - Water Years 1981 to 2011
Model-Simulated Monthly Streamflow, cfs
Measured Monthly Streamflow, cfs
R2 = 0.71
10,000,000
1,000,000
100,000
10,000
1,000
100
10
1
0.1
0.1
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000

Figure 42

Scatterplot of Measured and Model-Simulated Monthly Streamflow at the Santa Margarita Creek near Santa Margarita Gaging Station (No. 15) - Water Years 1981 to 2011

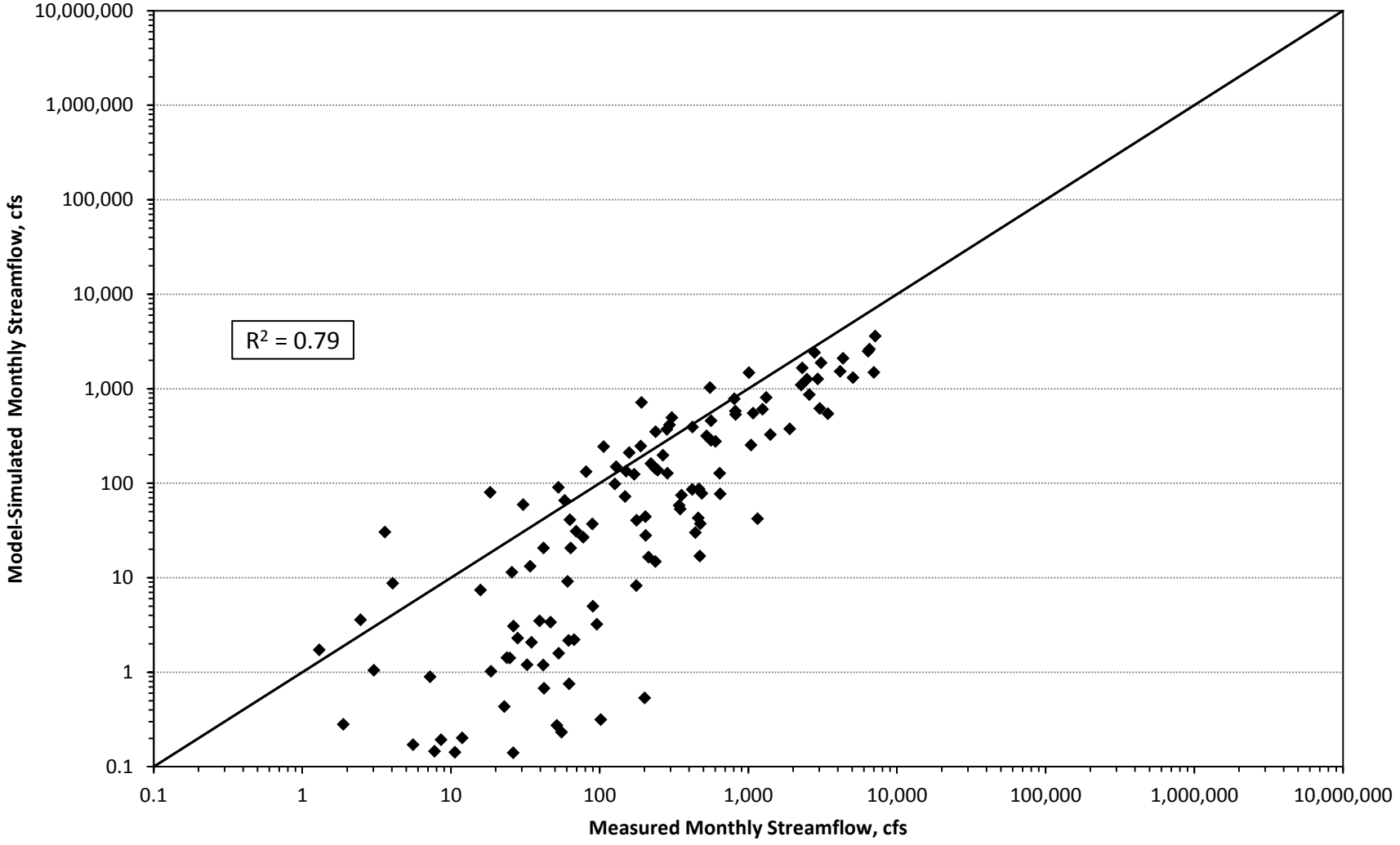


Figure 43

Annual Recharge from Deep from Deep Percolation of Discharged Treated Wastewater Effluent
Water Years 1981-2011

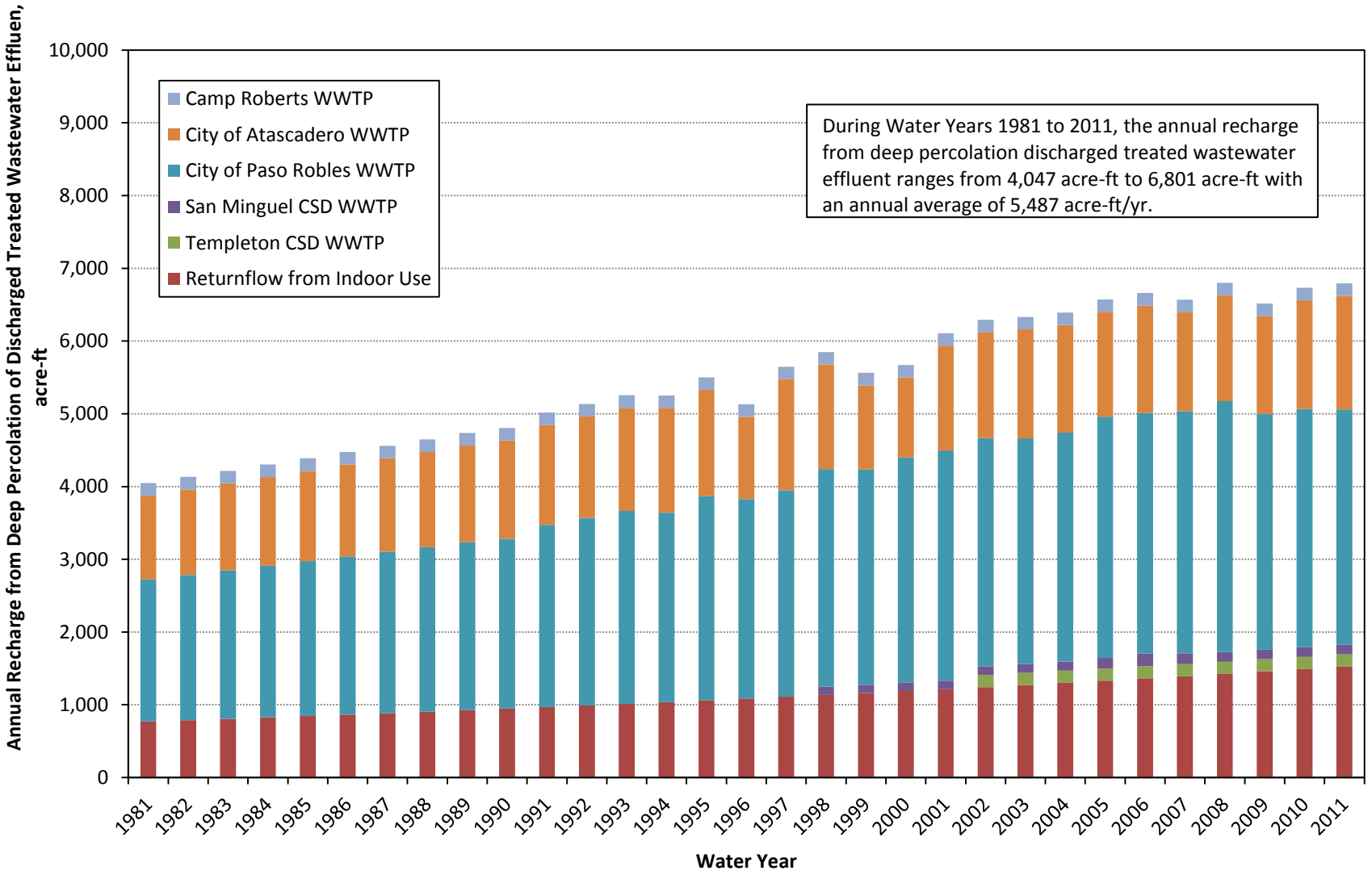


Figure 44

Annual Recharge from Deep Percolation of Urban Water and Sewer Pipe Leakage
Water Years 1981-2011

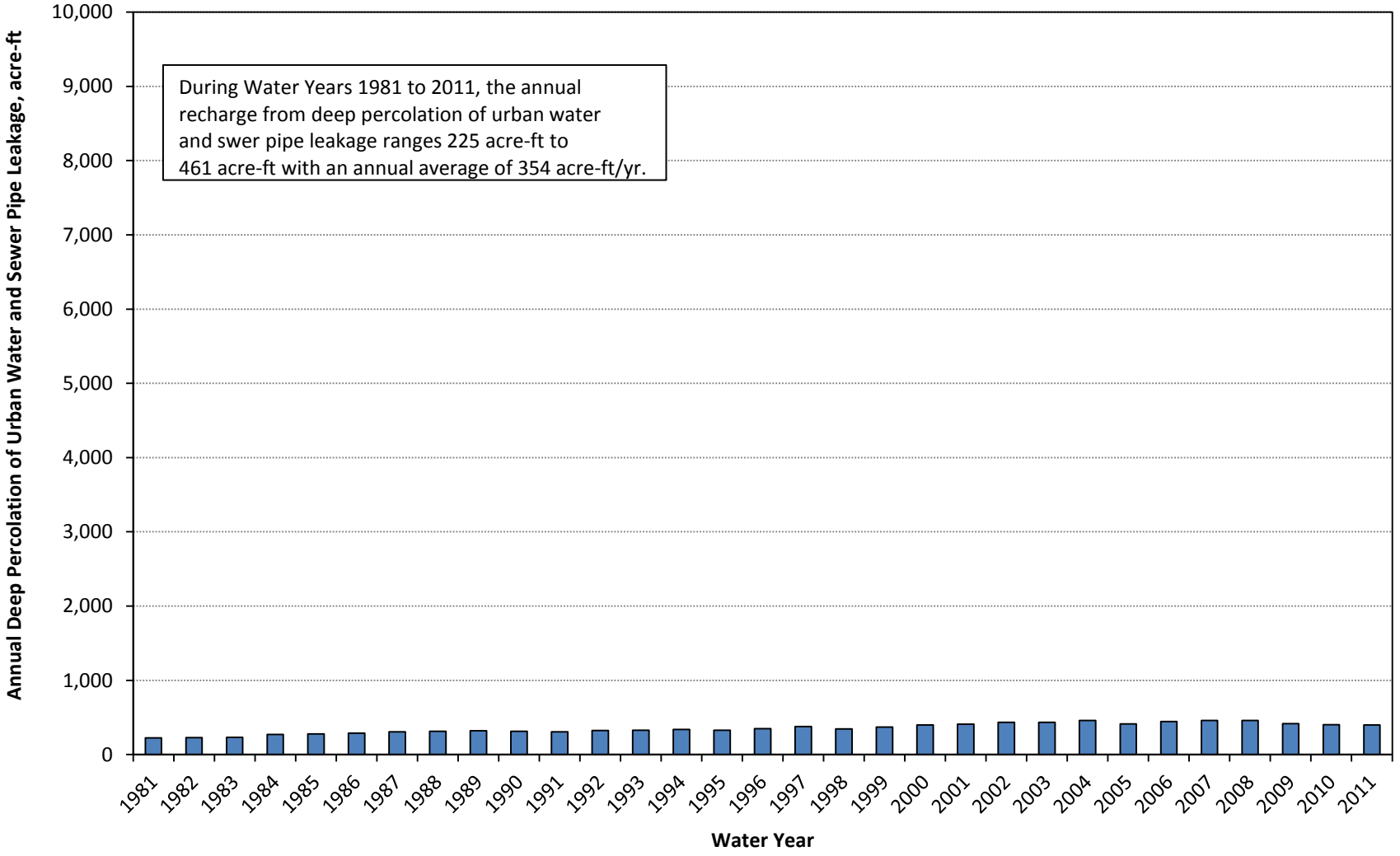
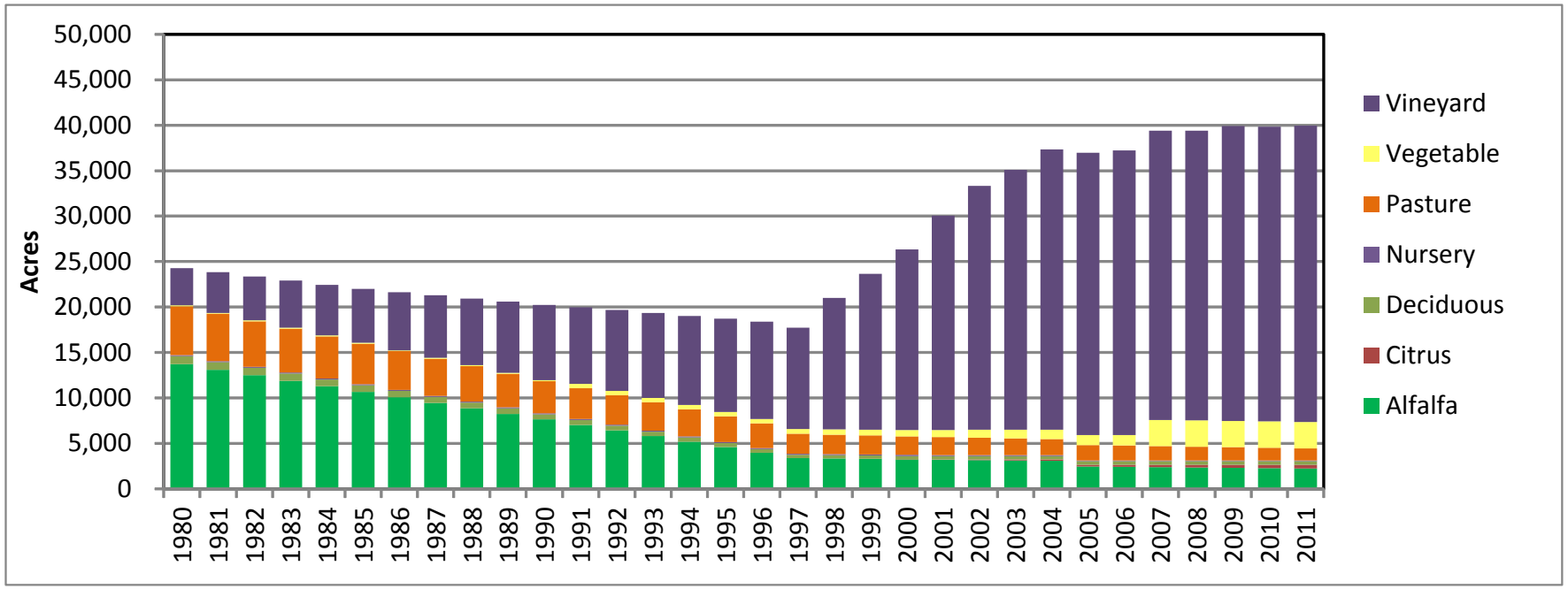


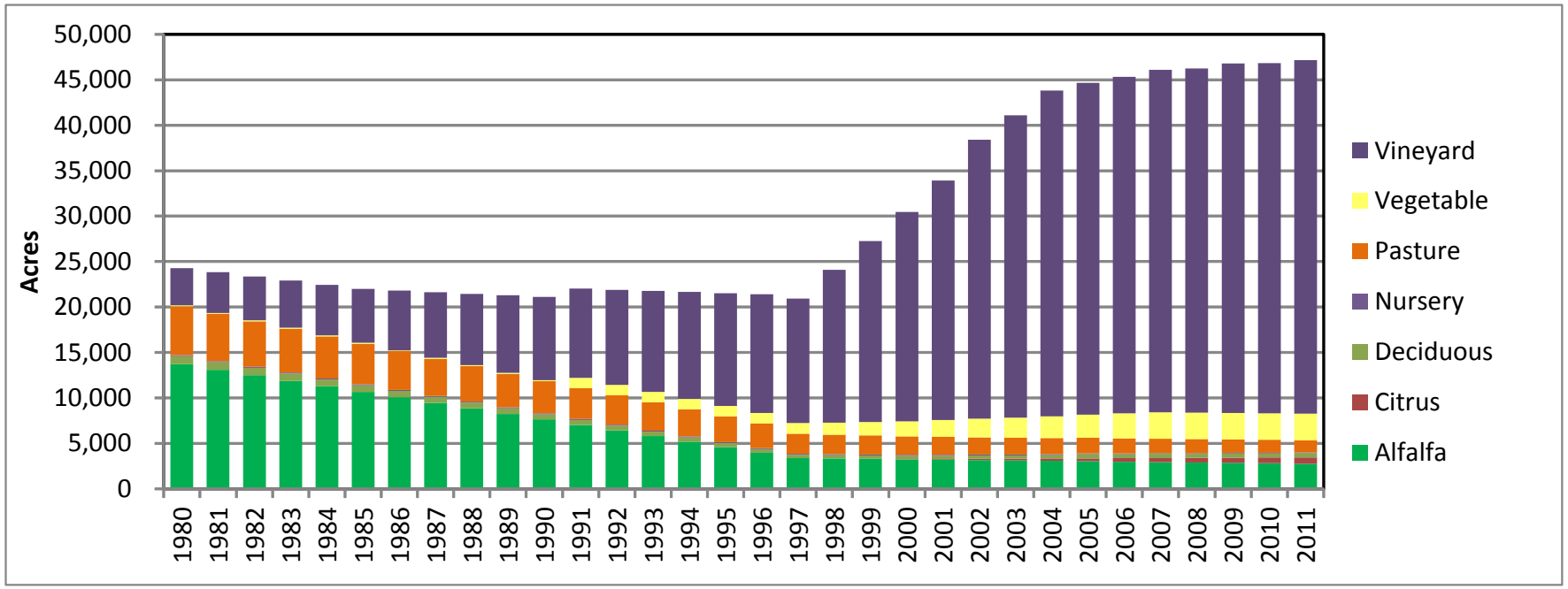
Figure 45



19-Dec-14

TODD GROUNDWATER

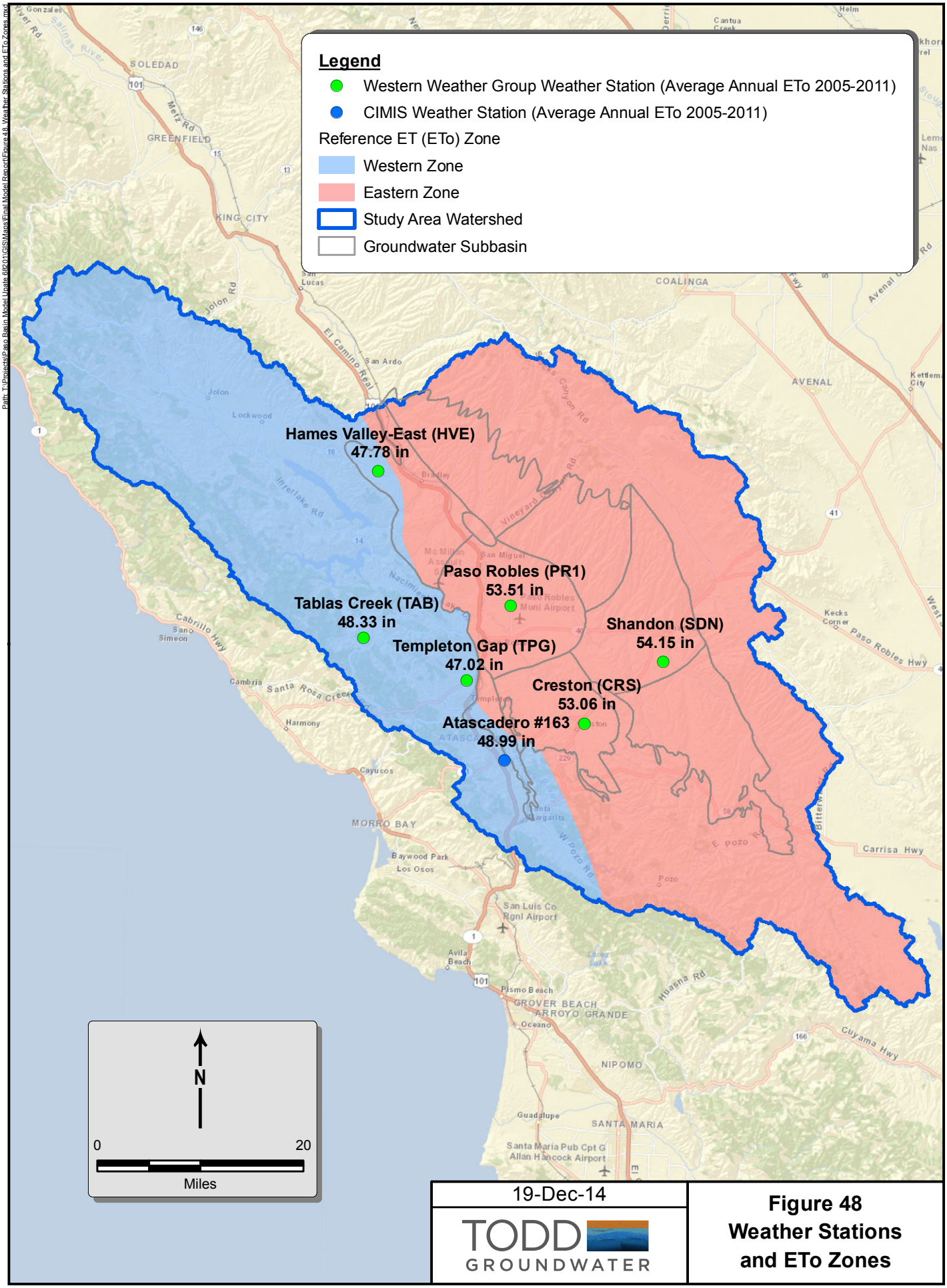
Figure 46
Annual Irrigated Crop Acreages in Groundwater Basin



19-Dec-14

TODD GROUNDWATER

Figure 47
Annual Irrigated Crop Acreages in Watershed

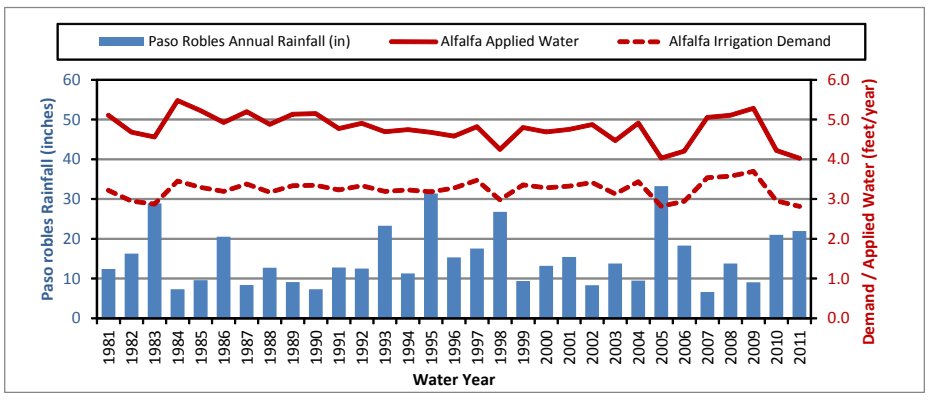


19-Dec-14

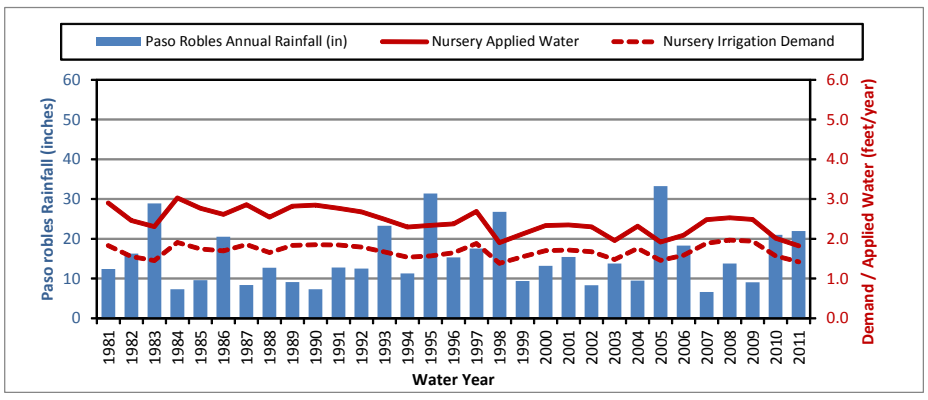
TODD GROUNDWATER

Figure 48
Weather Stations and ETo Zones

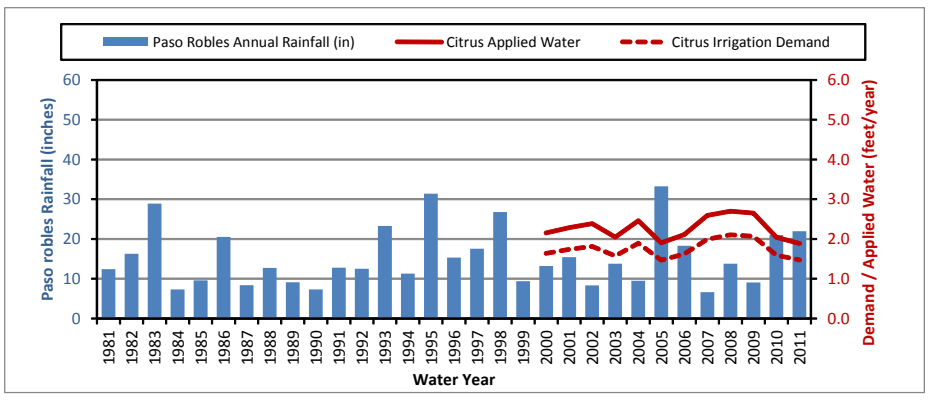
Alfalfa



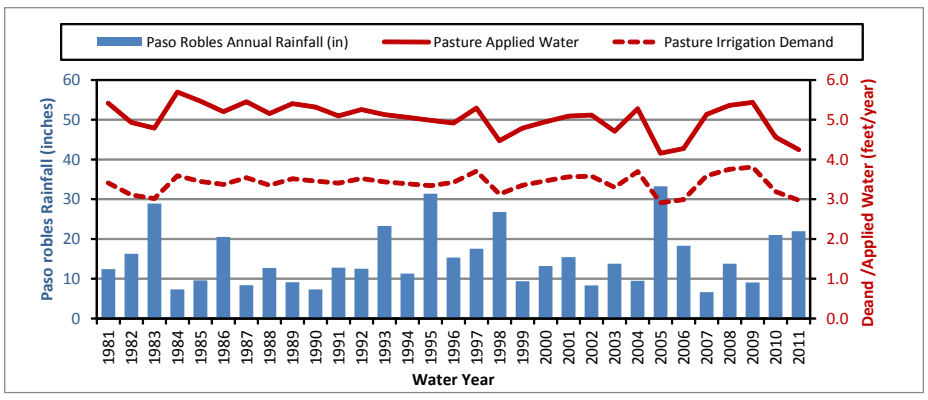
Nursery



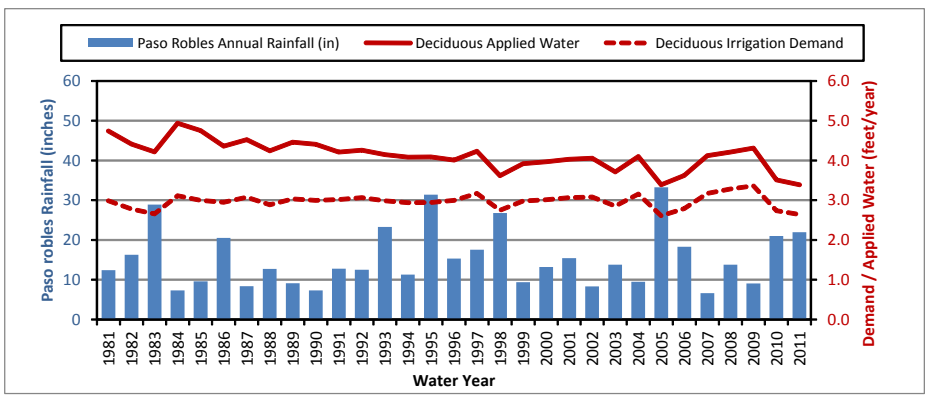
Citrus



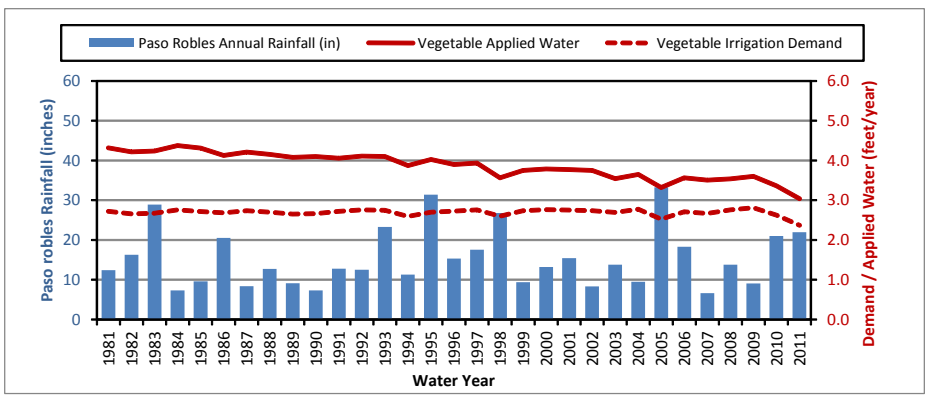
Pasture



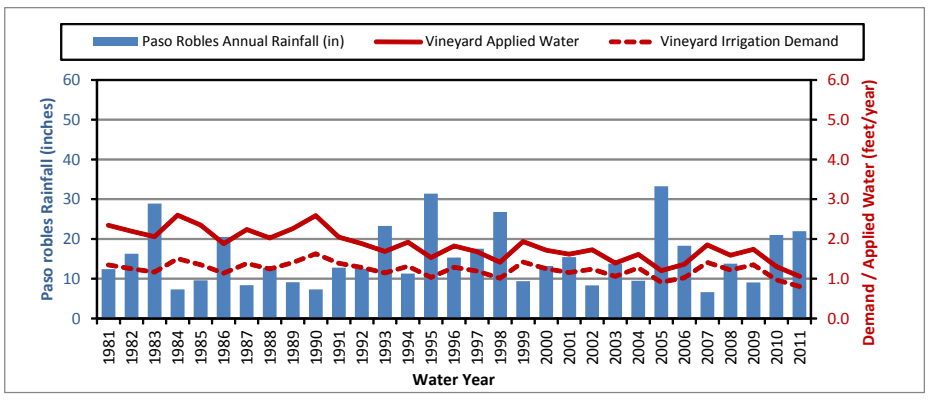
Deciduous



Vegetable



Vineyard

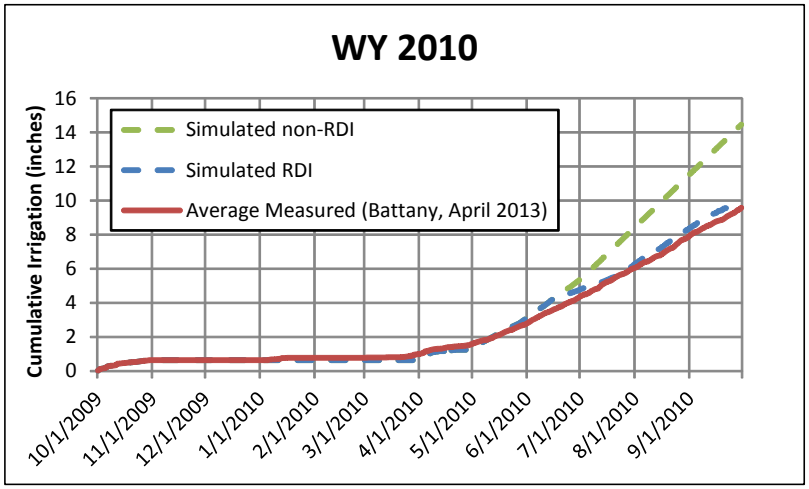


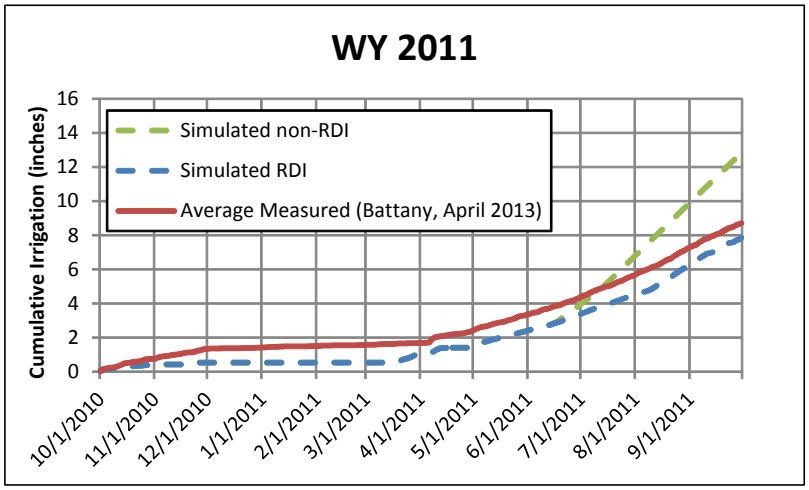
19-Dec-14

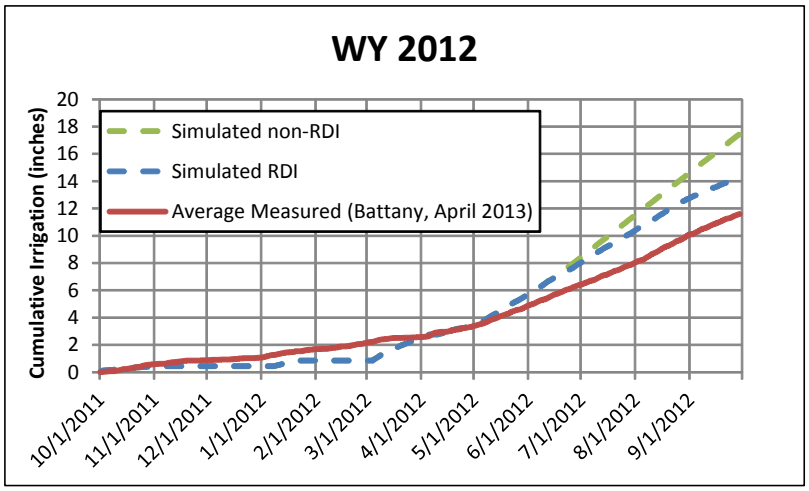
TODD GROUNDWATER

Figure 49
Agricultural Irrigation Demand and Applied Water Rates

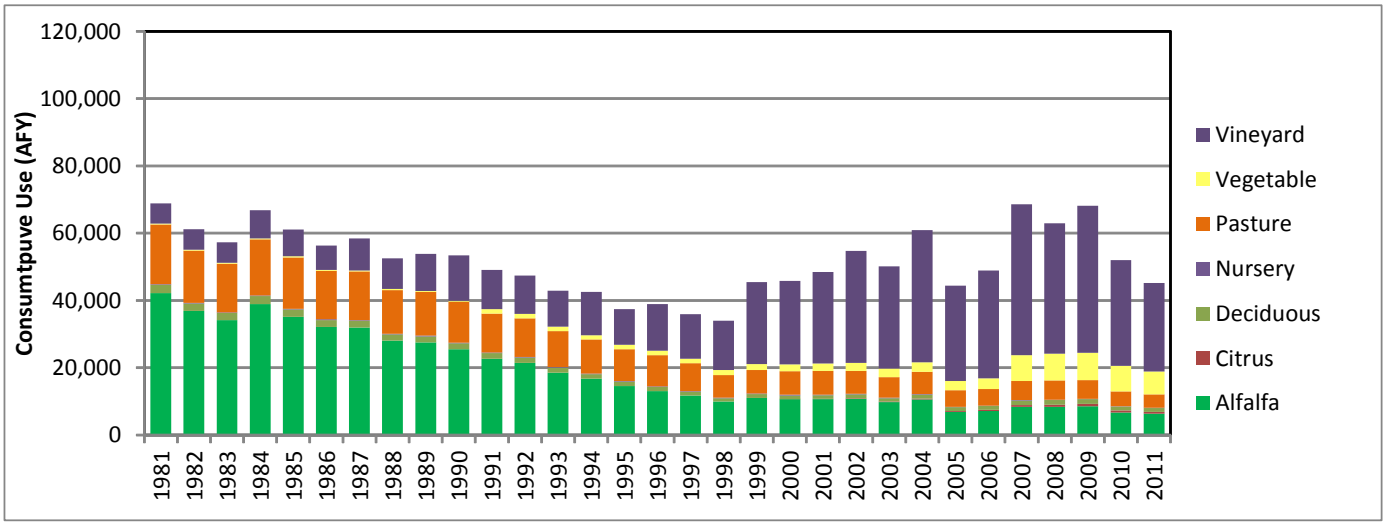
Path: T:\Projects\Paso Basin Model Update 8820\GIS\Maps\Final Model Report\Figure 50 Simulated vs. Measured Vineyard Irrigation Rates (WYs 2010-2012).mxd



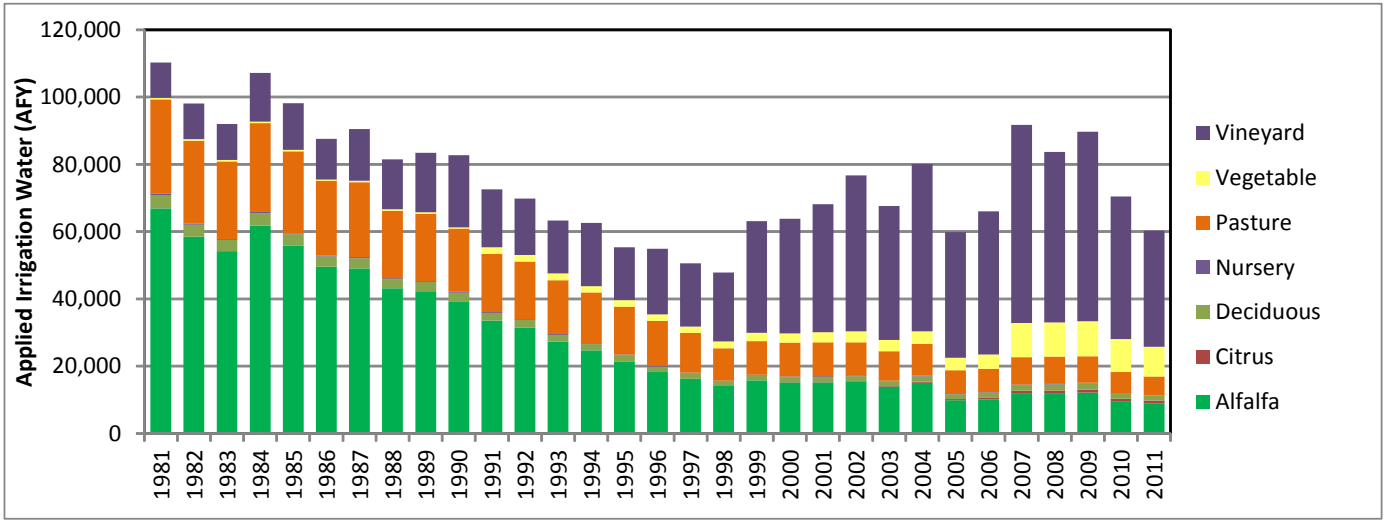




19-Dec-14	**Figure 50** **Simulated vs. Measured Vineyard Irrigation Rates (WYs 2010-2012)**
TODD GROUNDWATER	



Irrigation Demand (Groundwater Basin)

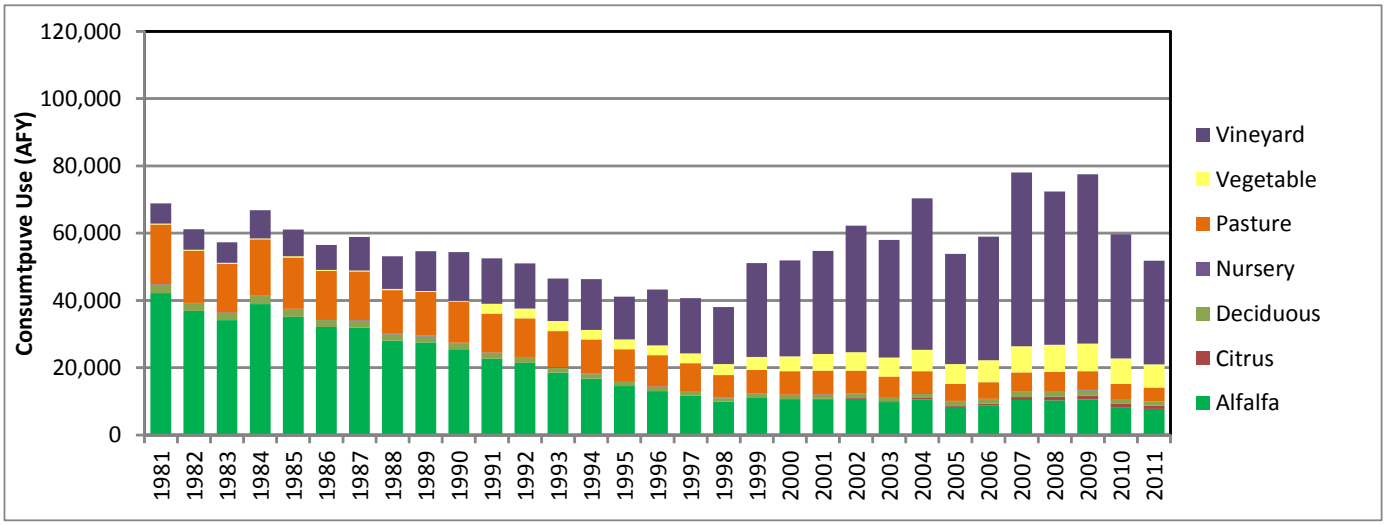


Applied Water (Groundwater Basin)

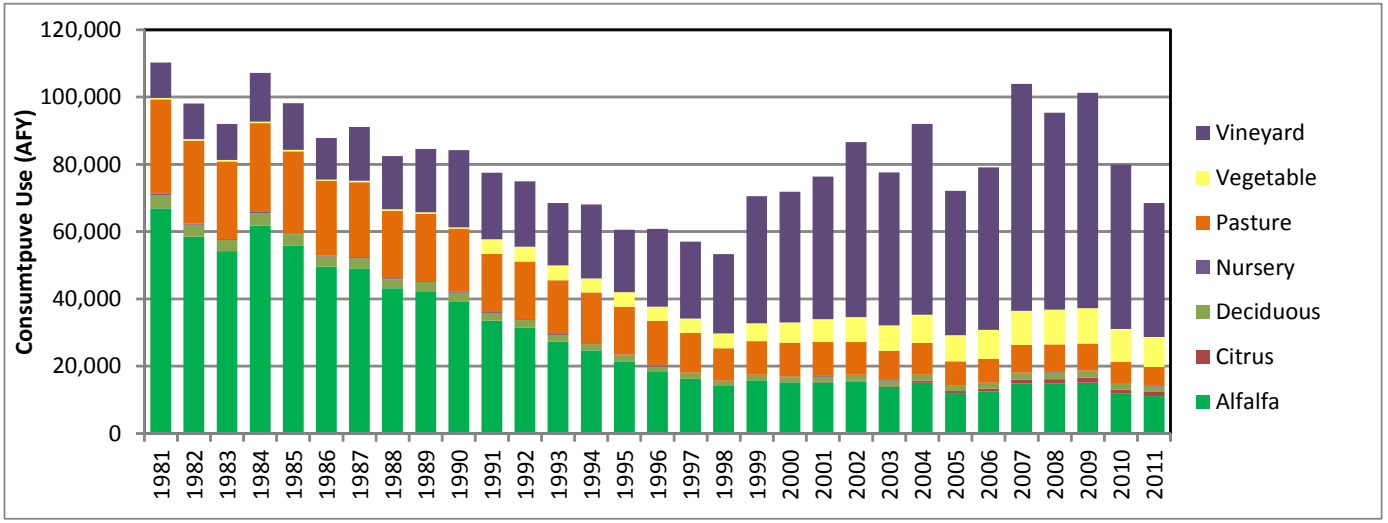
19-Dec-14

TODD GROUNDWATER

Figure 51
Agricultural Irrigation Demand and Applied Water Volume by Crop in Groundwater Basin



Irrigation Demand (Watershed)

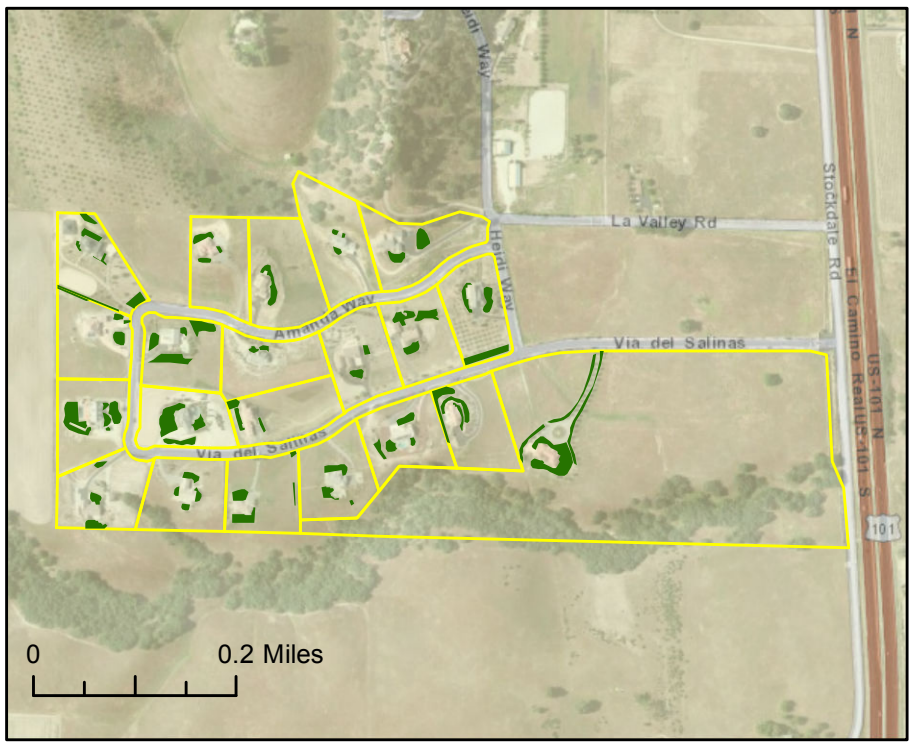


Applied Water (Watershed)

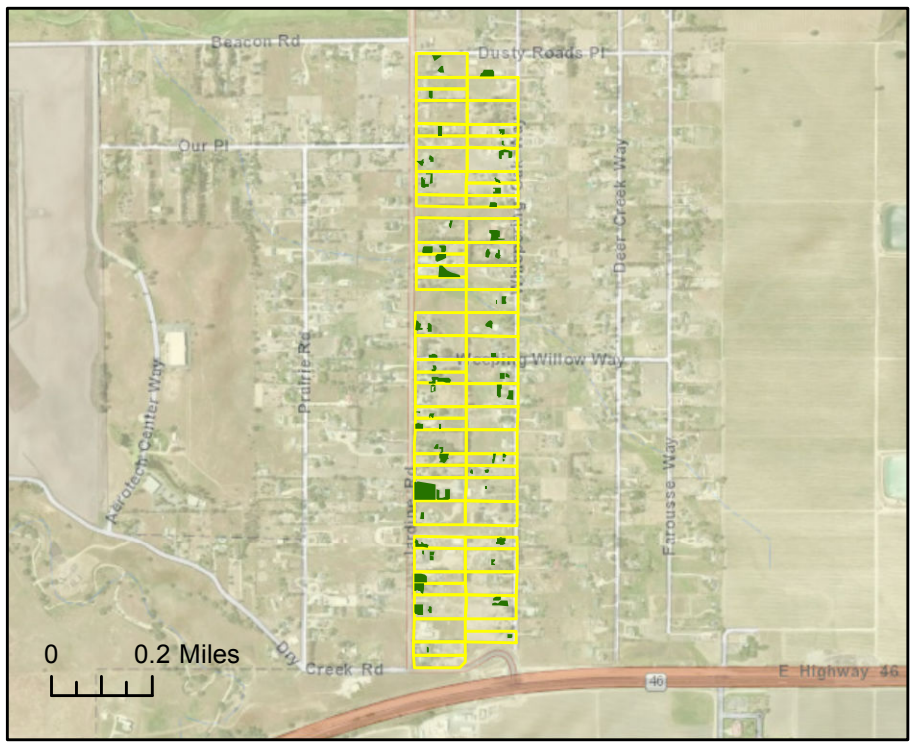
19-Dec-14

TODD GROUNDWATER

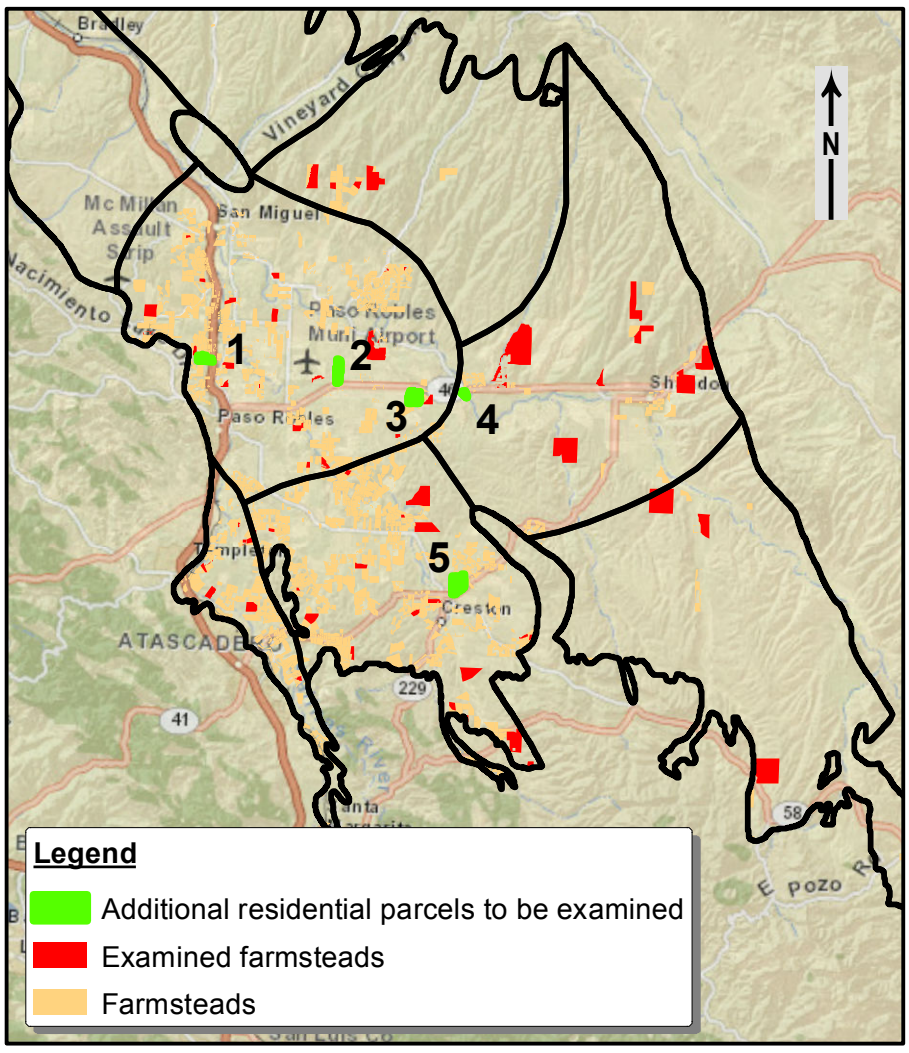
Figure 52
Agricultural Irrigation Demand and Applied Water Volume by Crop in Watershed

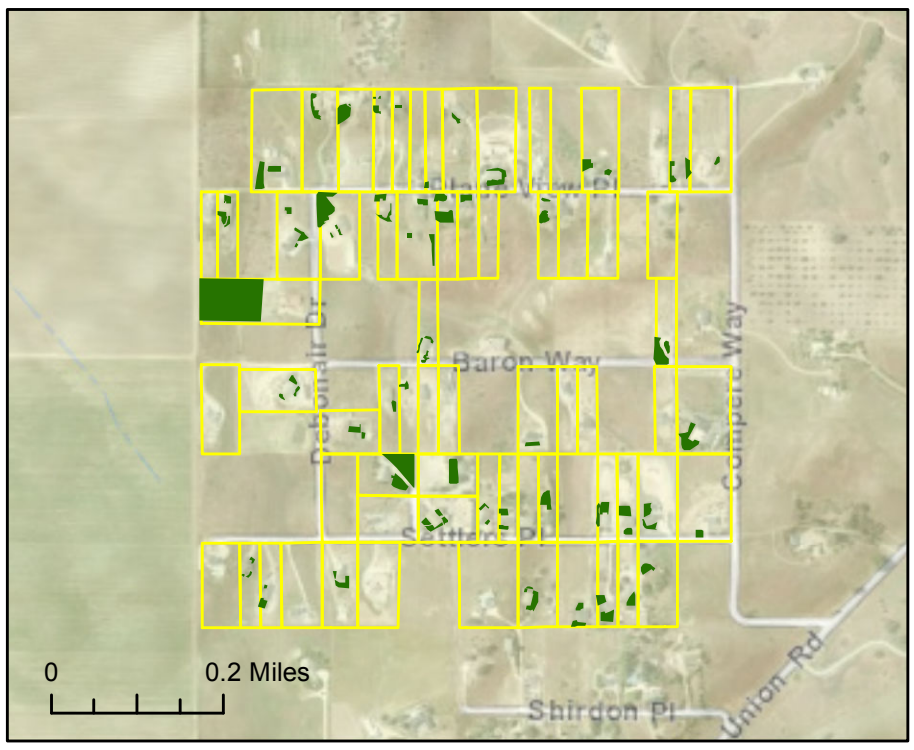


1. Via Del Salinas Area

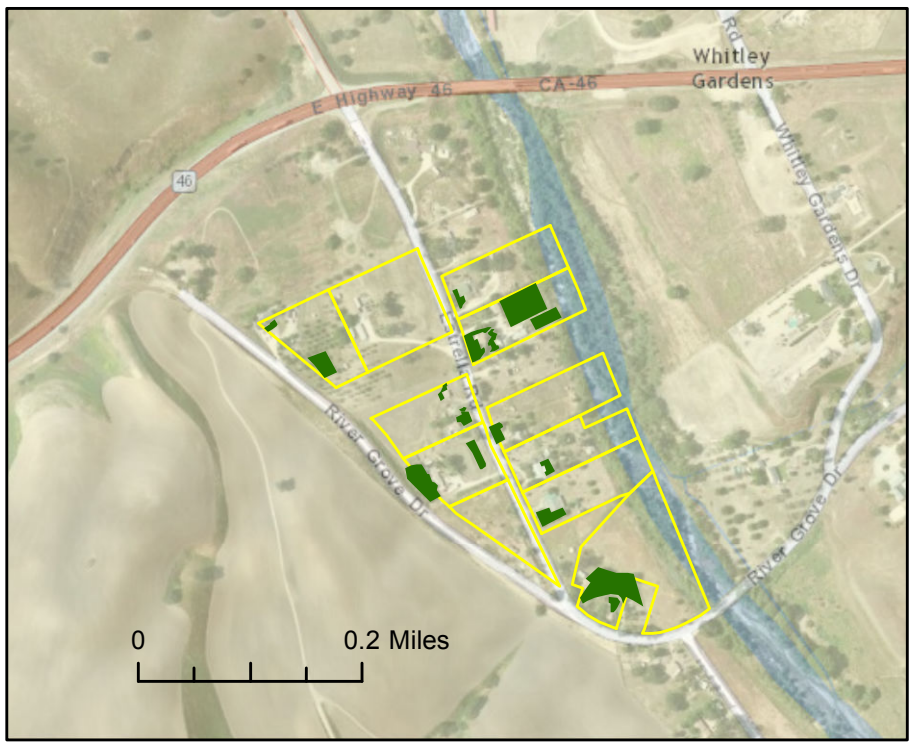


2. Jardine Area

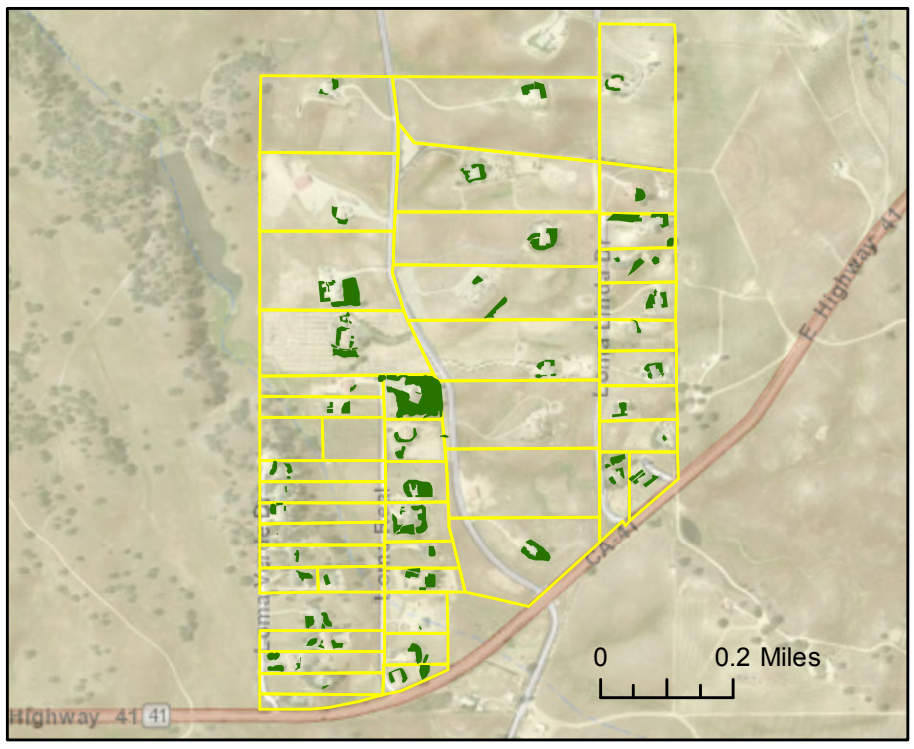




3. Compere Way Area



4. Green River Area



5. Rancho Loma Linda Area

Legend

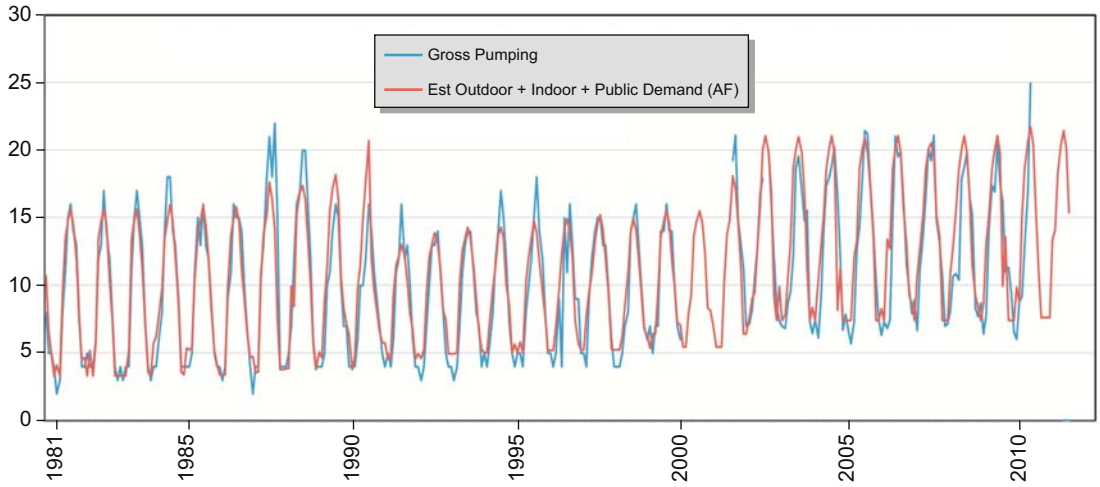
Irrigated landscaping

19-Dec-14

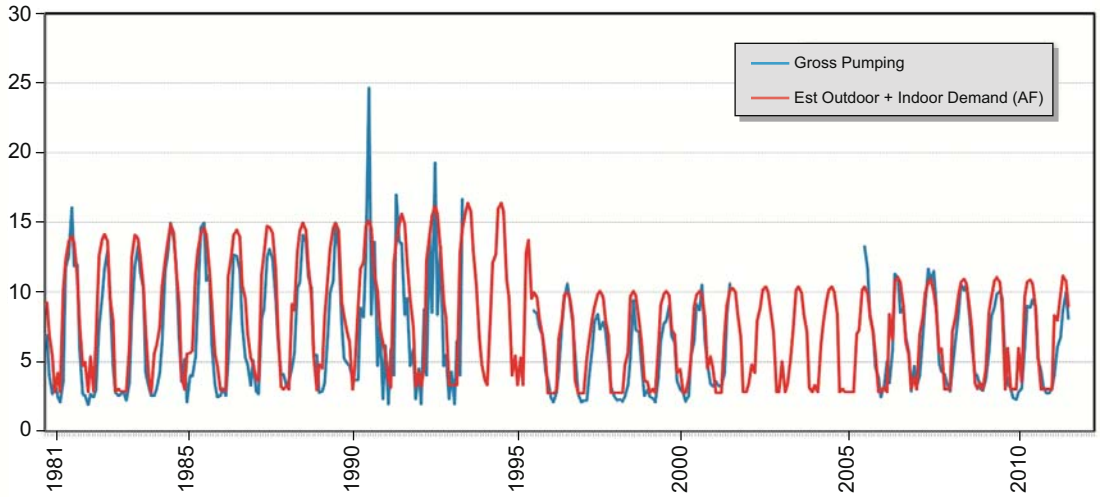
TODD GROUNDWATER

Figure 53
Selected Rural Residential Parcels
Paso Robles Basin

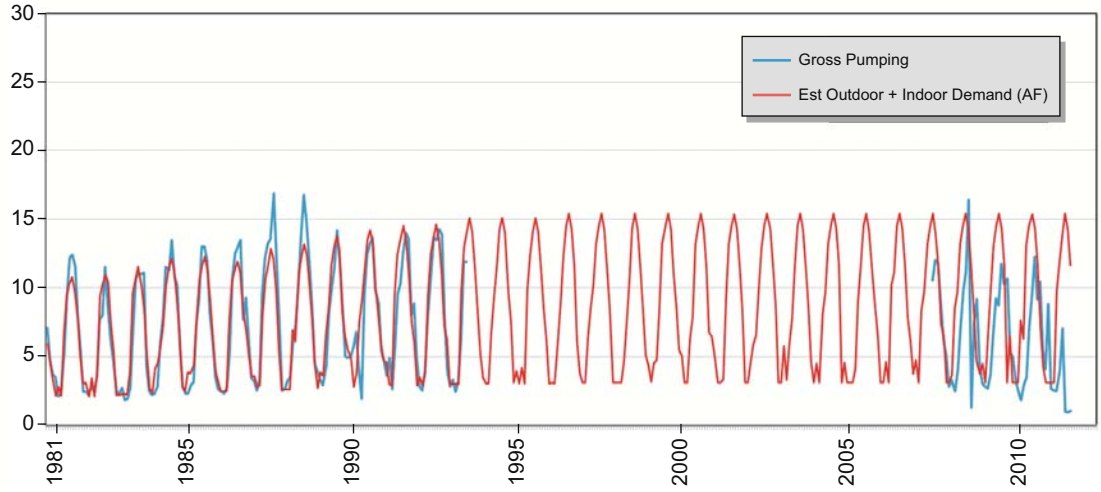
Shandon Gross Pumping and Estimated Indoor and Outdoor Demands, AF



Garden Farms Gross Pumping and Estimated Indoor and Outdoor Demands, AF



Green River Gross Pumping and Estimated Indoor and Outdoor Demands, AF



19-Dec-14

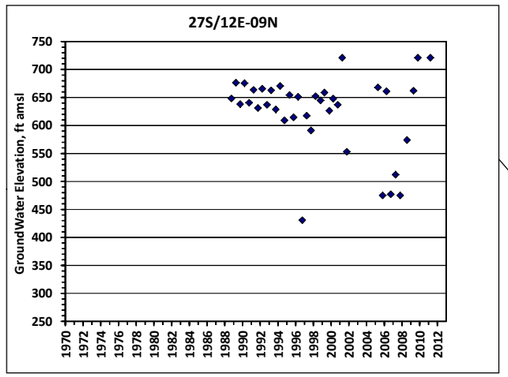
TODD GROUNDWATER

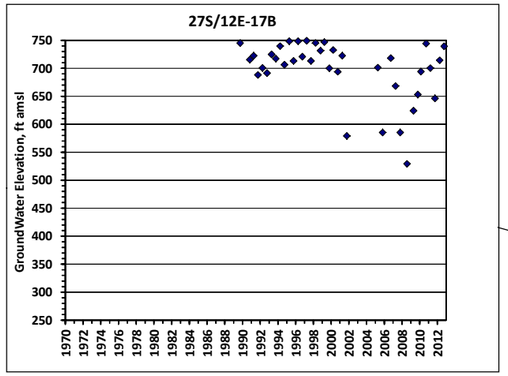
Figure 54
Evaluation of Rural Water Demand

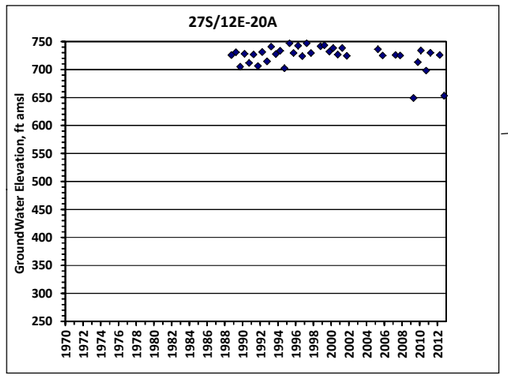
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

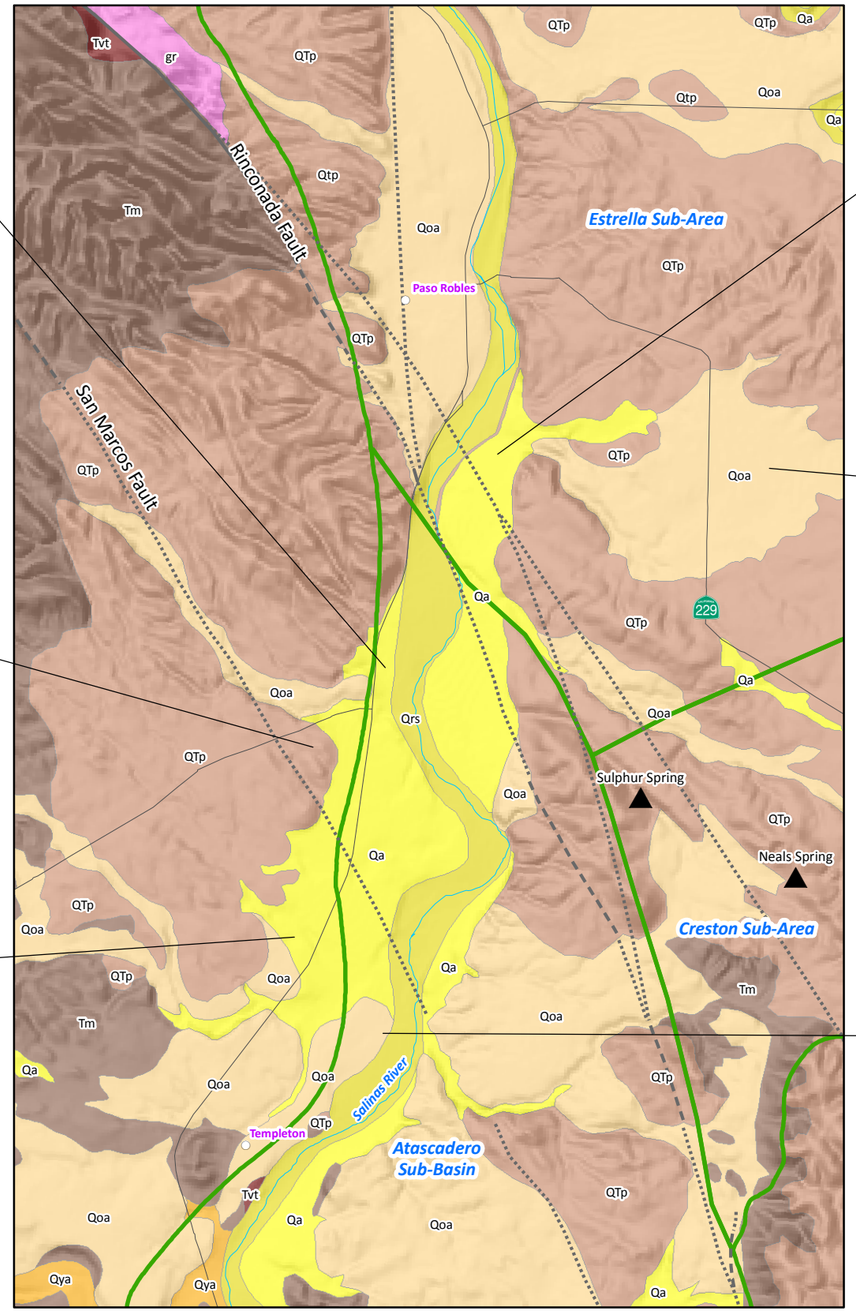
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

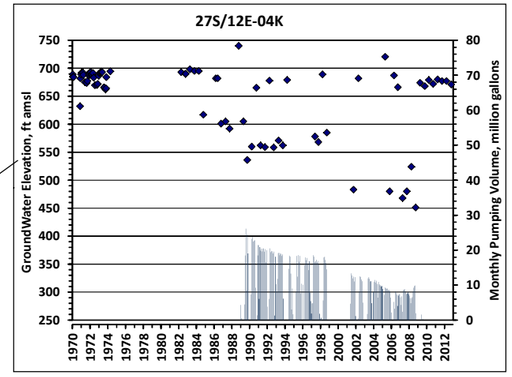
AQUIFER SYSTEM CONCEPTUALIZATION EVALUATION

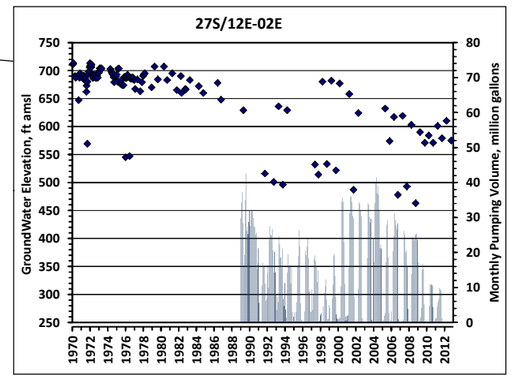


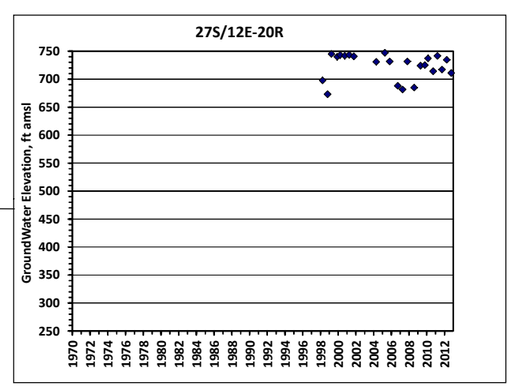












EXPLANATION

Paso Robles Groundwater Basin Boundary with Sub-Areas (Source: Fugro and Cleath, 2002)

Spring Location

Fault (solid where known, dashed where inferred, dotted where concealed)

Reproduced with permission, Division of Mines and Geology, CD-ROM 2000-006 (2000), Digital database of faults from the Fault Activity Map of California and Adjacent Areas.

Geologic Formations
(Source: San Luis Obispo County Planning & Building Department, 2007)

- Qrs — Recent Channel Alluvium
- Qa — Recent Alluvium (undifferentiated)
- Qya — Younger Alluvium
- Qoa — Older Alluvium
- QTp — Paso Robles Formation
- Tm — Monterey Formation
- Tvt — Vaqueros Formation
- gr — Quartz Diorite or Granodiorite

NORTH

0 0.5 1 2 Miles

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

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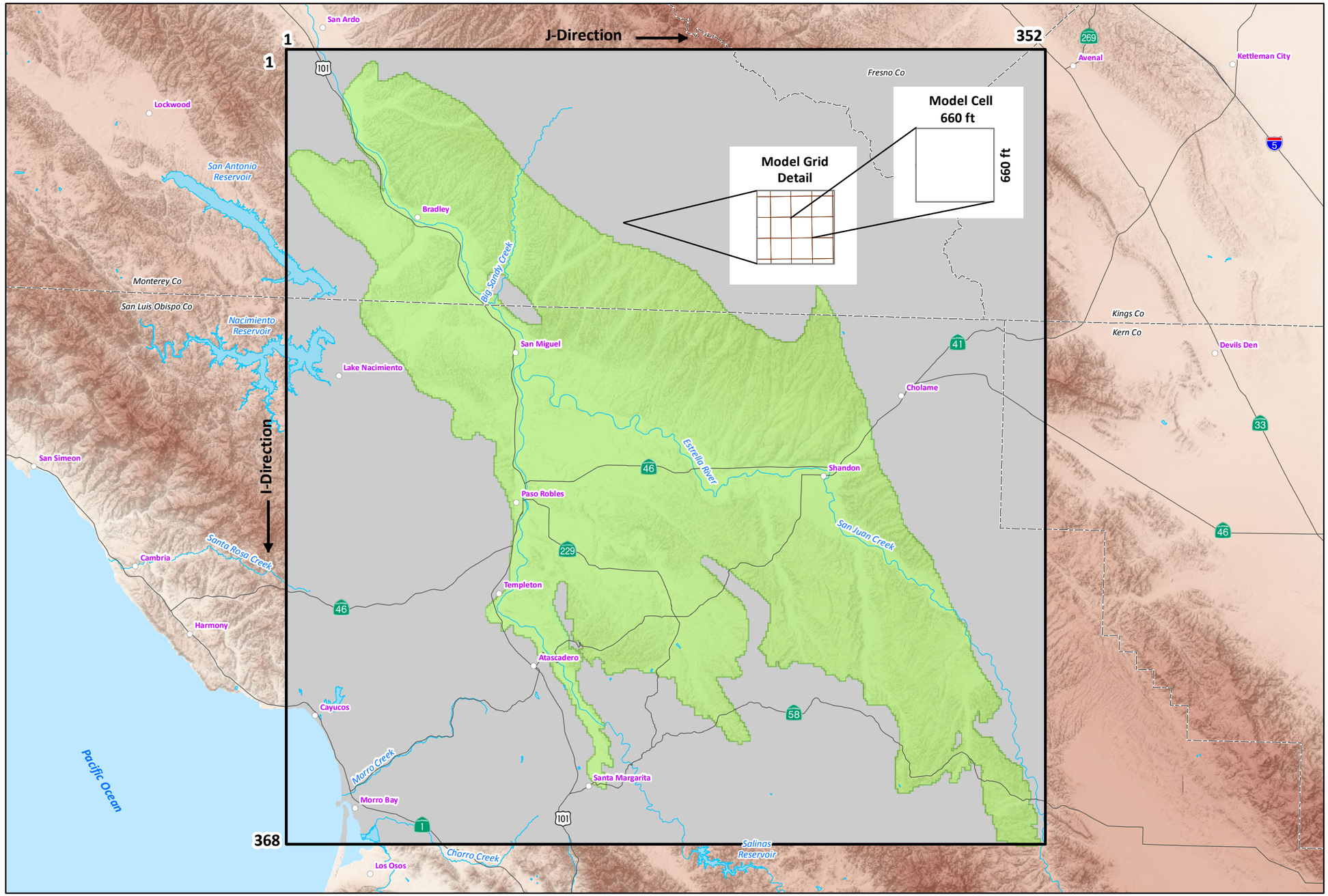
Figure 55

GIS_proj/co_slo_paso_robles_model/6_Fig_55_aquifer_system_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



PASO ROBLES GROUNDWATER BASIN MODEL GRID AND BOUNDARY

EXPLANATION

- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

19-Dec-14

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NORTH

0 3 6 12 Miles

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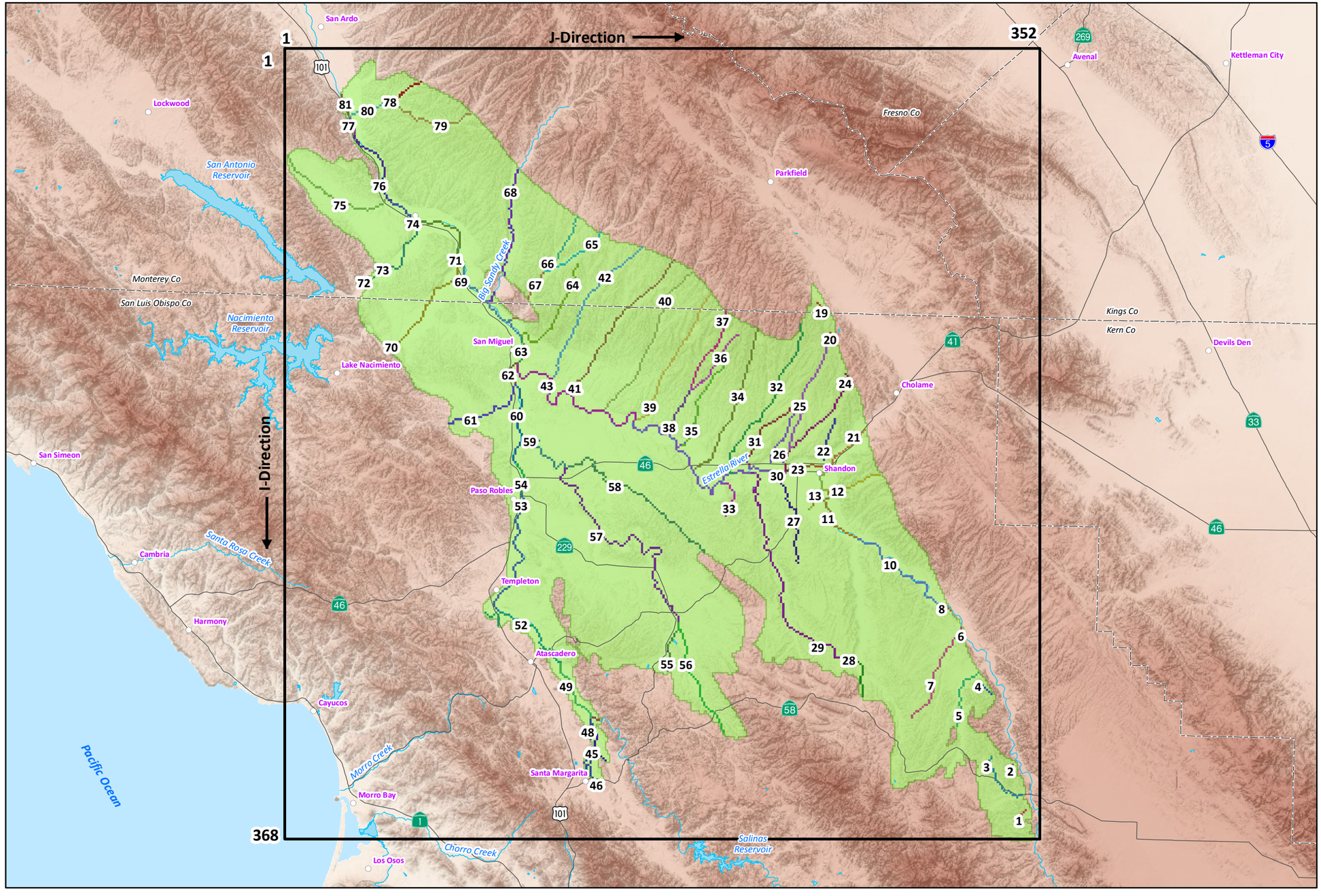
Figure 56

GIS_proj/co_slo_paso_robles_model/6_Fig_56_model_grid_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF RECHARGE FROM DEEP PERCOLATION OF STREAMBED SEEPAGE

EXPLANATION

34 — Stream Segment Number (same as sub-watershed number)

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

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Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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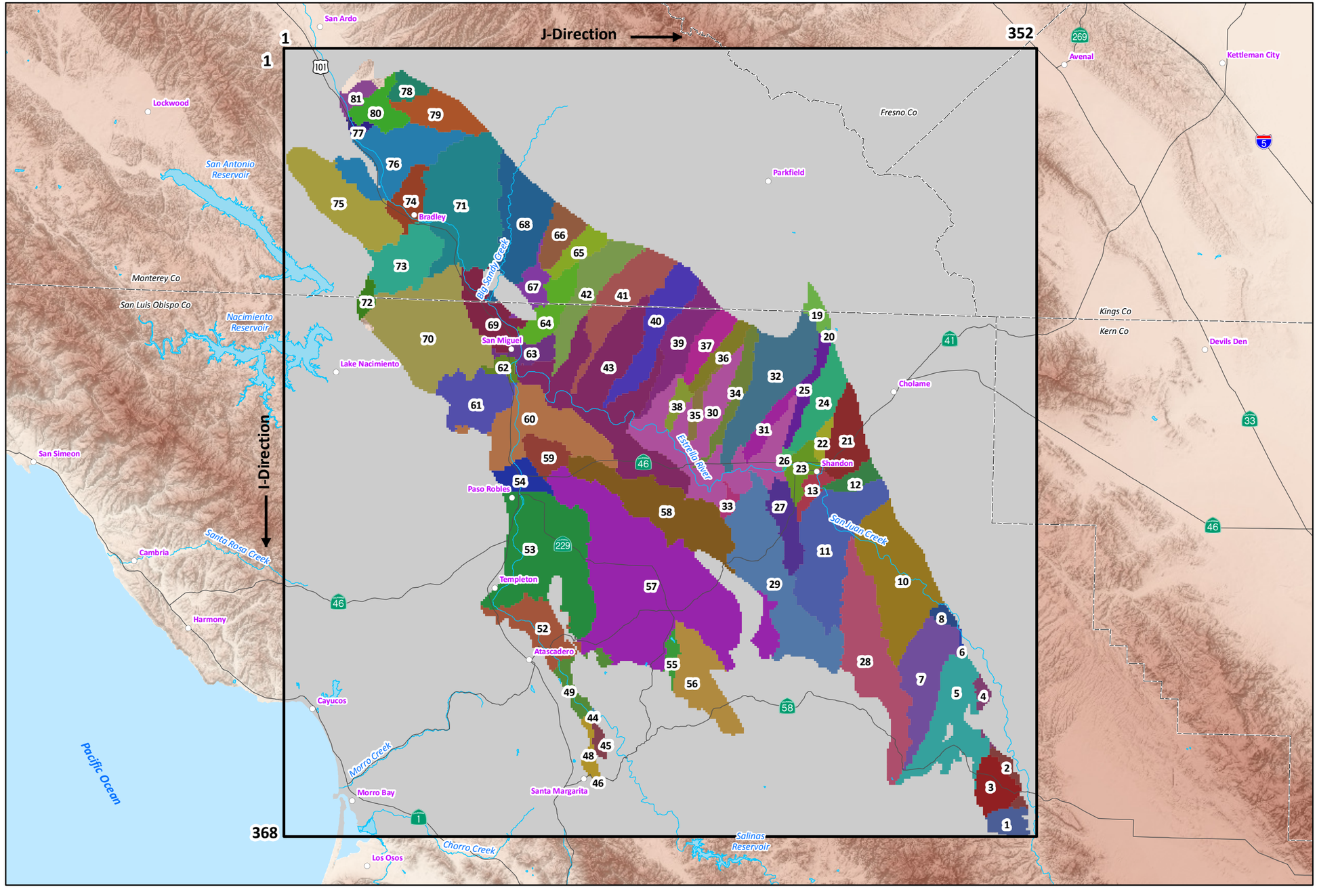
Figure 57

GIS_proj/co_slo_paso_robles_model/6_Fig_57_rech_deep_perc_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF RECHARGE FROM DEEP PERCOLATION OF DIRECT PRECIPITATION AND RETURN FLOW FROM APPLIED WATER

EXPLANATION

various colors — Location of Recharge from Deep Percolation of Direct Precipitation and Return Flow from Applied Water

34 — Deep Percolation Zone Number (same as sub-watershed number)

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

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NORTH

0 3 6 12 Miles

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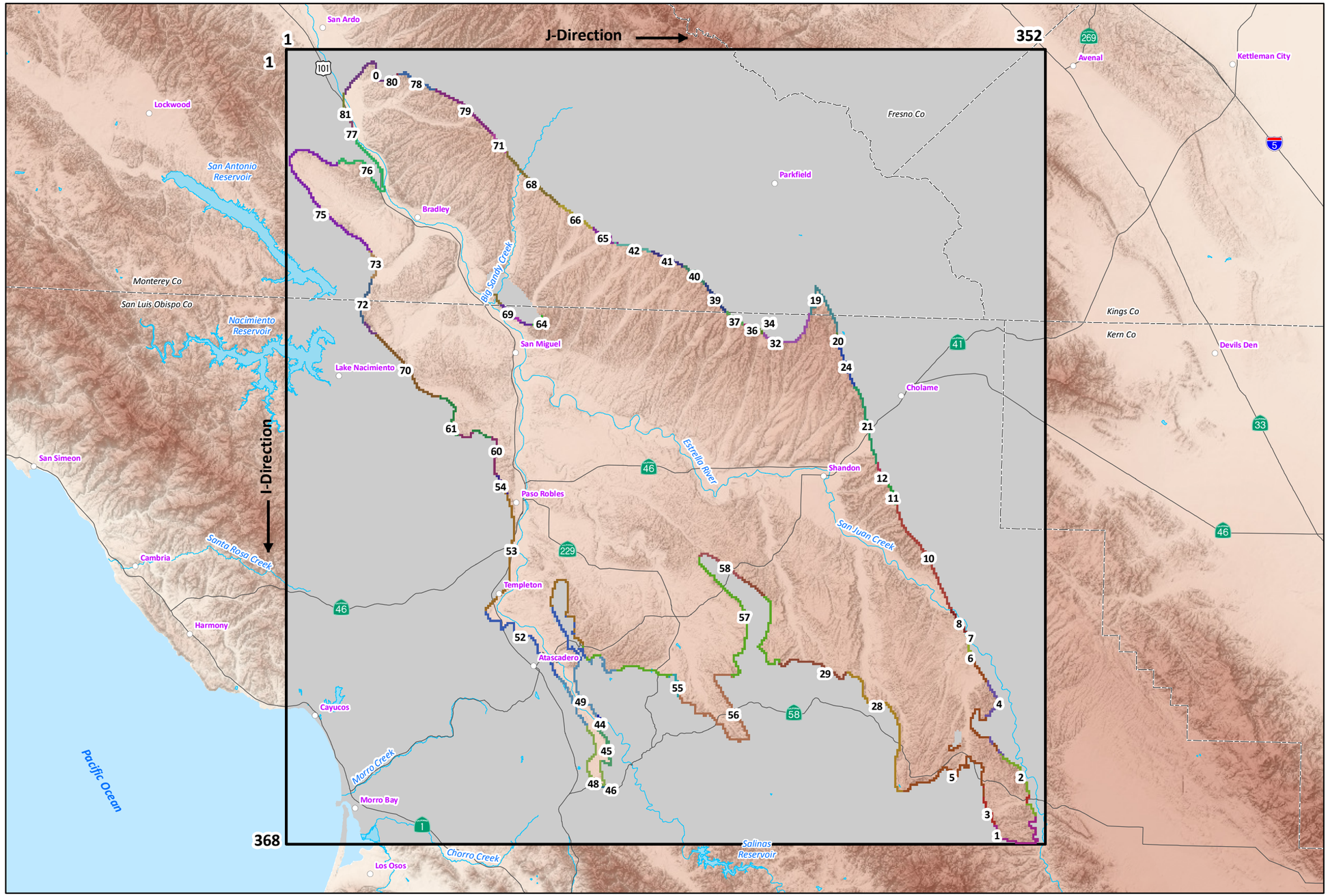
Figure 58

GIS_proj/co_slo_paso_robles_model/6_Fig_58_rech_precip_return_flow_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF RECHARGE FROM SUBSURFACE INFLOW THROUGH THE BASIN BOUNDARY

EXPLANATION

various colors	Location of Recharge from Subsurface Inflow through the Basin Boundary
34	Subsurface Inflow Zone Number (same as sub-watershed number)
	Paso Robles Groundwater Basin Model Domain
	Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

19-Dec-14

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NORTH

0 3 6 12 Miles

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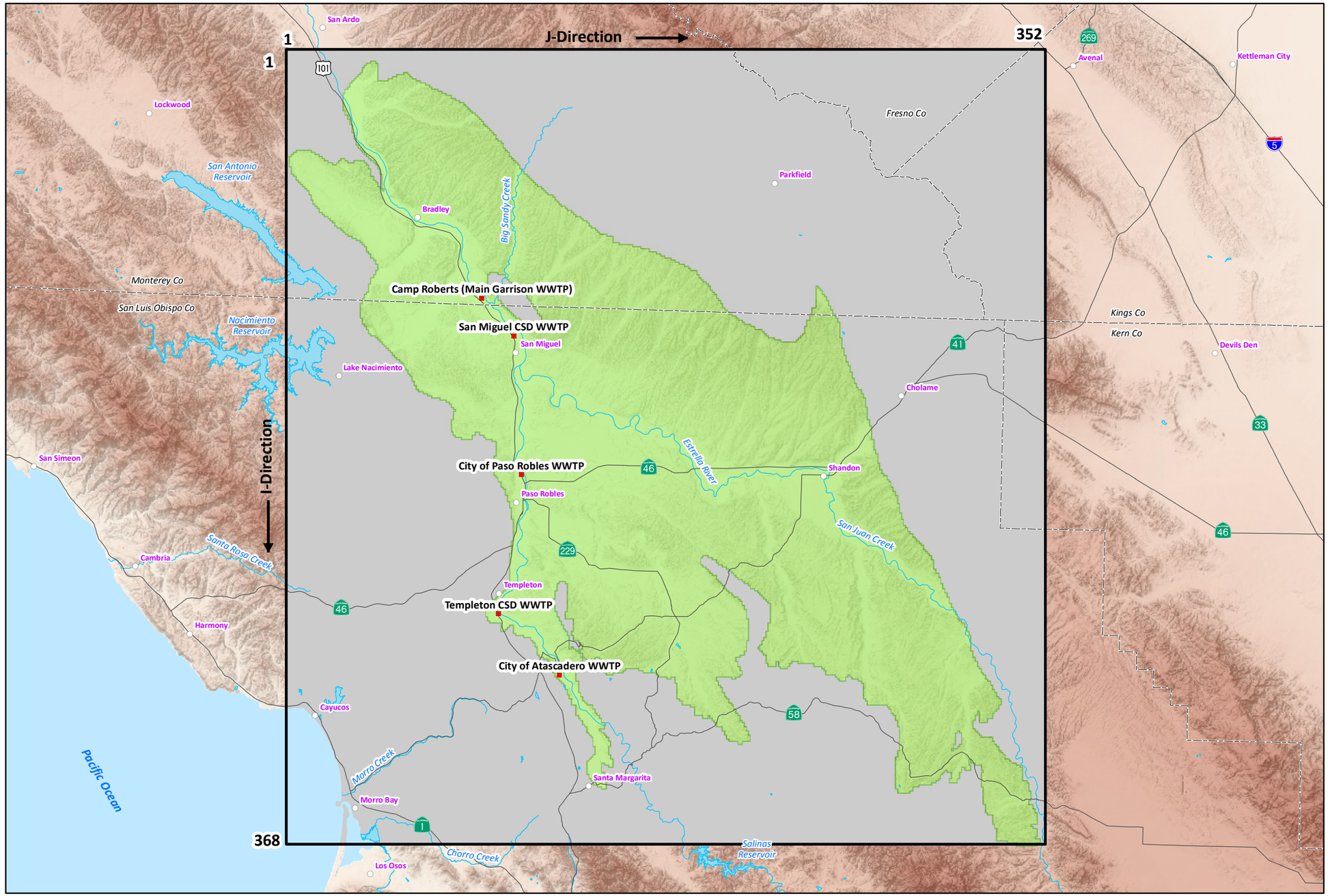
Figure 59

GIS_proj/co_slo_paso_robles_model/6_Fig_59_rech_subsurface_inflow_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF RECHARGE FROM DEEP PERCOLATION OF DISCHARGED TREATED WASTEWATER EFFLUENT

EXPLANATION

- Wastewater Treatment Pond Cell
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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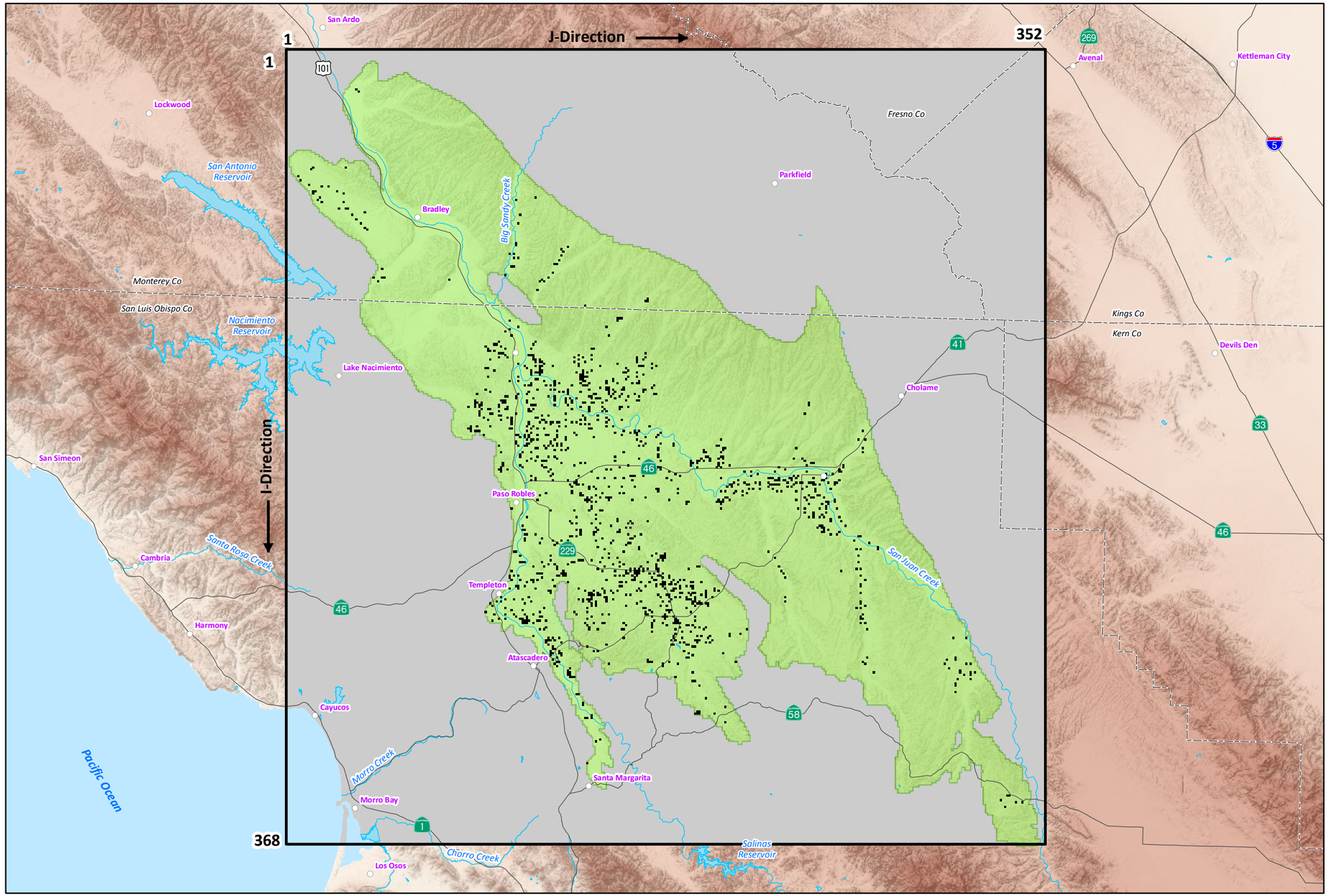
Figure 60

GIS_proj/co_slo_paso_robles_model/6_Fig_60_rech_wastewater_effluent_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF AGRICULTURAL GROUNDWATER PUMPING

EXPLANATION

- Agricultural Groundwater Pumping Cell
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

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NORTH

0 3 6 12 Miles

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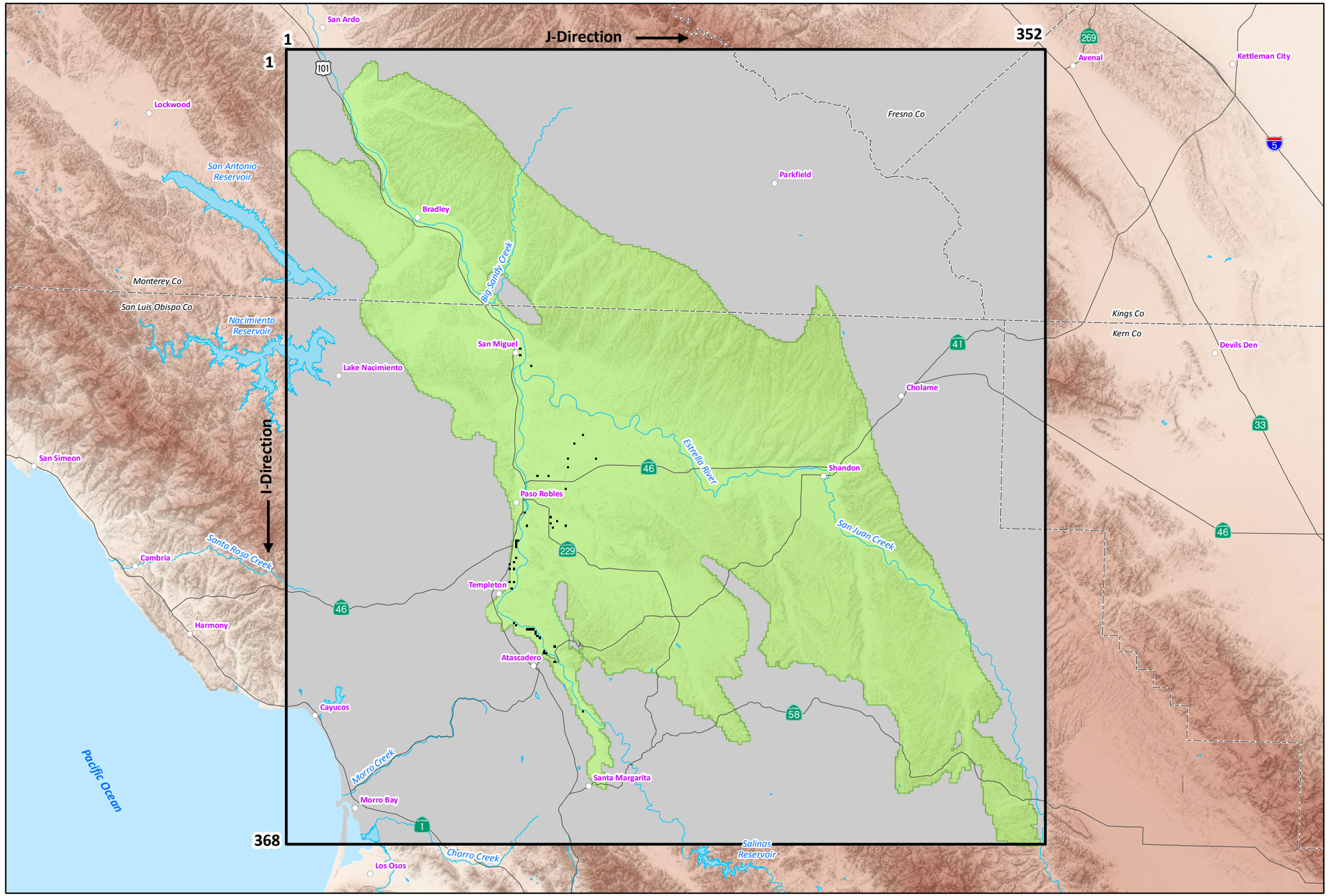
Figure 61

GIS_proj/co_slo_paso_robles_model/6_Fig_61_ag_gw_pumping_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF MUNICIPAL GROUNDWATER PUMPING

EXPLANATION

- Municipal Groundwater Pumping Cell
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

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NORTH

0 3 6 12 Miles

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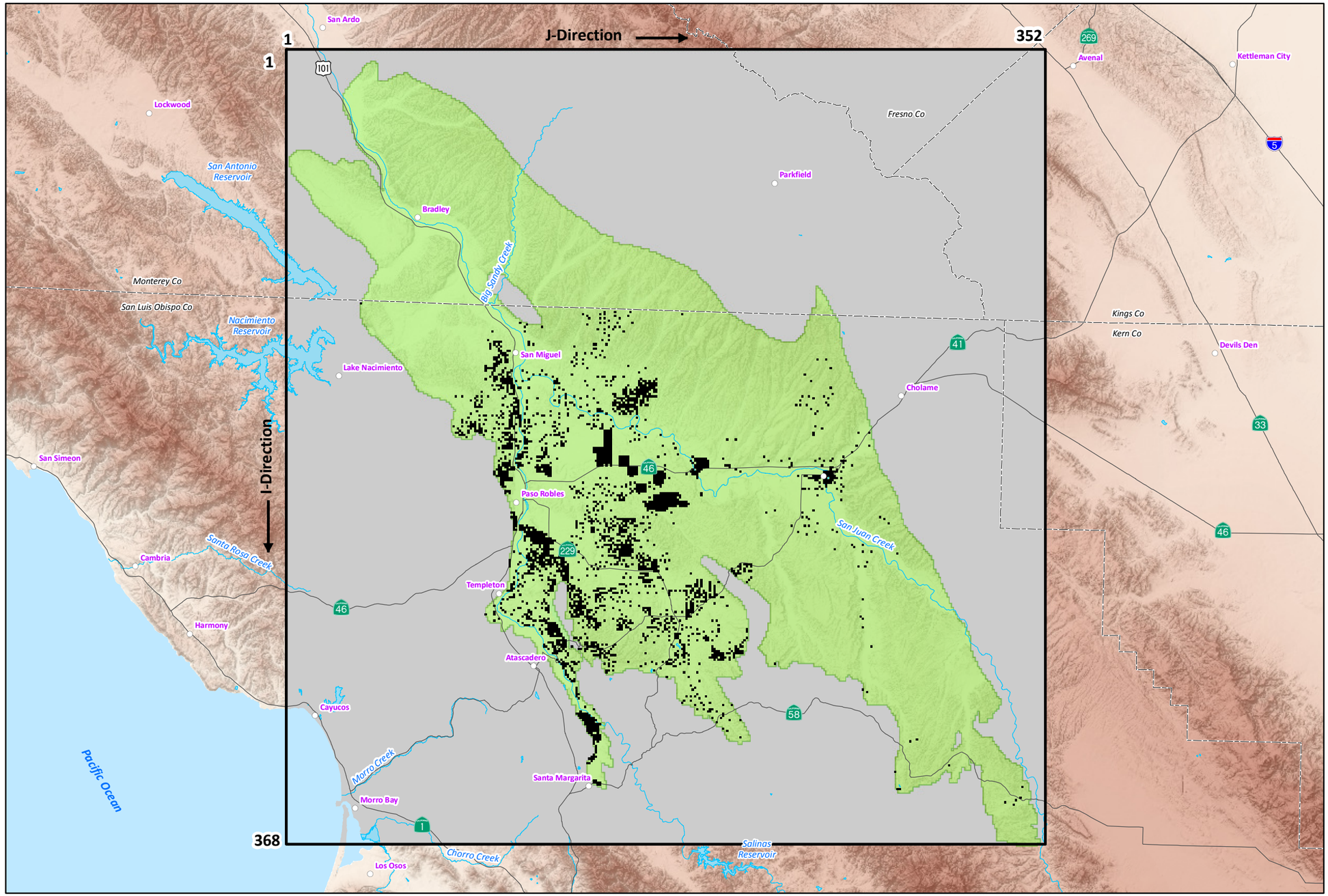
Figure 62

GIS_proj/co_slo_paso_robles_model/6_Fig_62_municipal_gw_pumping_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF PRIVATE DOMESTIC GROUNDWATER PUMPING

EXPLANATION

- Private Domestic Groundwater Pumping Cell
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

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Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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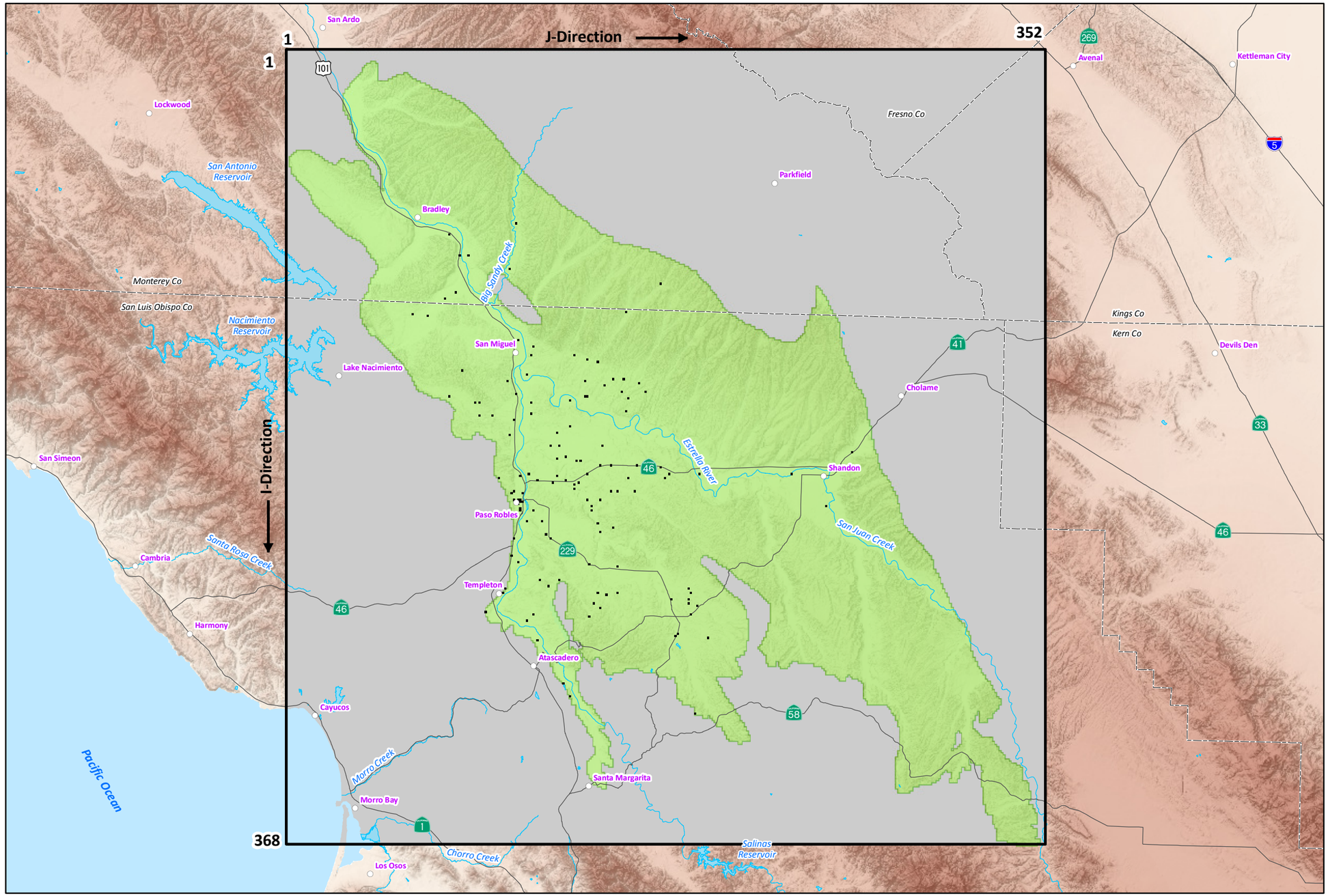
Figure 63

GIS_proj/co_slo_paso_robles_model/6_Fig_63_private_dom_gw_pumping_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF SMALL COMMERCIAL GROUNDWATER PUMPING

EXPLANATION

- Small Commercial Groundwater Pumping Cell
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

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Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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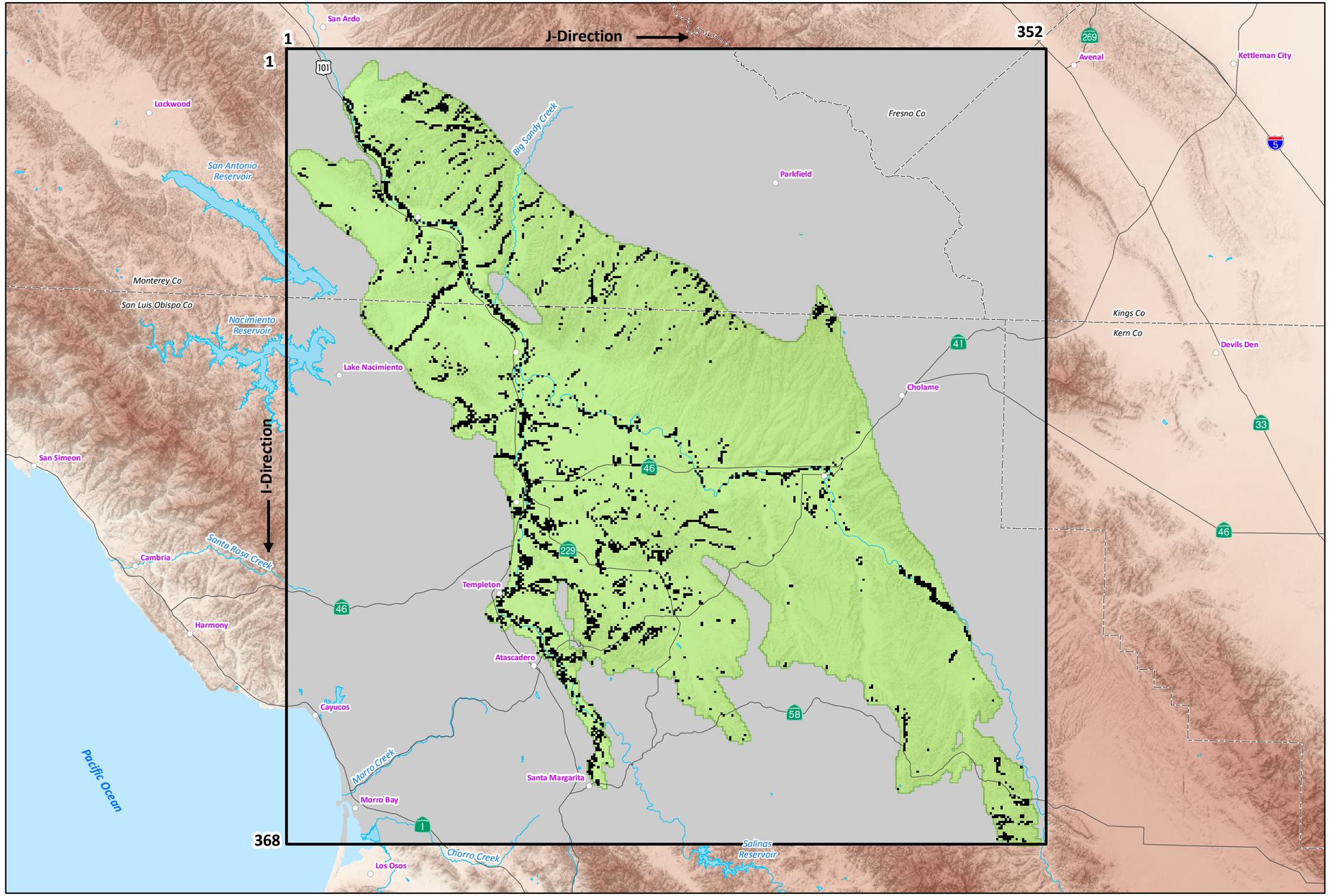
Figure 64

GIS_proj/co_slo_paso_robles_model/6_Fig_64_small_com_gw_pumping_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF EVAPOTRANSPIRATION BY RIPARIAN VEGETATION

EXPLANATION

- Evapotranspiration by Riperian Vegetation
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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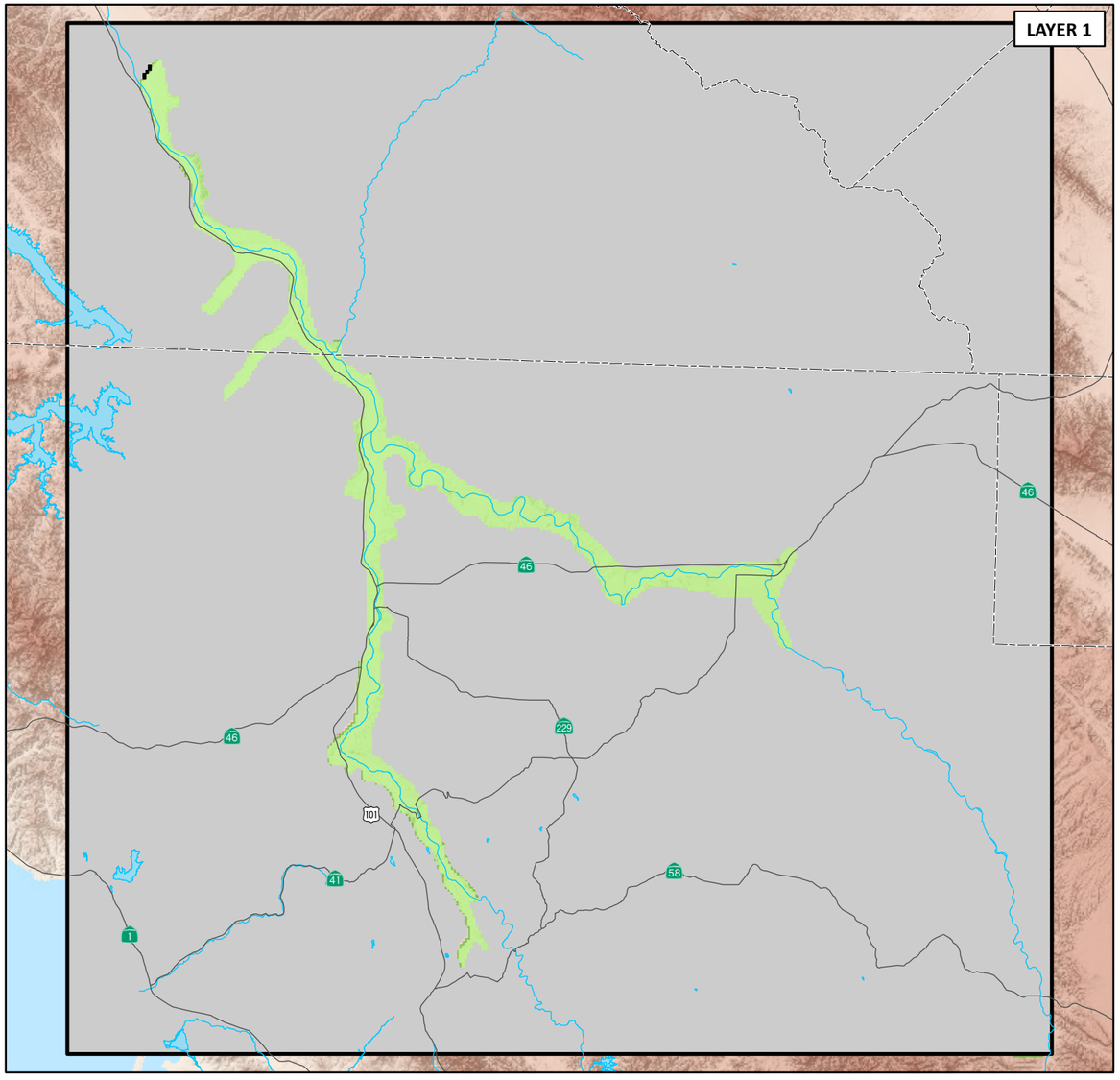
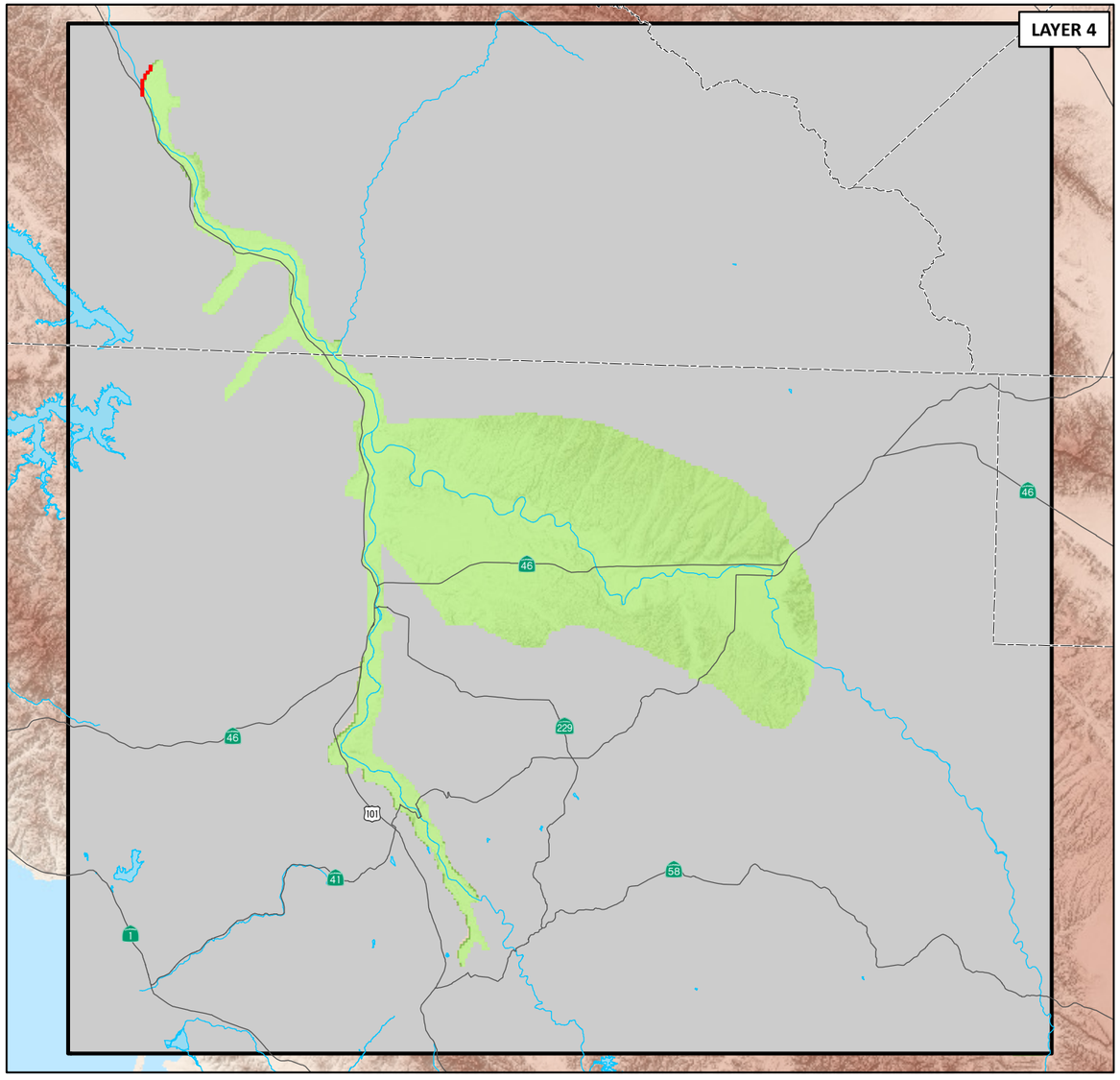
Figure 65

GIS_proj/co_slo_paso_robles_model/6_Fig_65_ET_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE





NORTH

0 5 10 20 Miles

EXPLANATION

- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- Location of Subsurface Outlow Through Basin Boundary Within Layer 1
- Location of Subsurface Outlow Through Basin Boundary Within Layer 4
- County Boundary

LOCATION OF SUBSURFACE OUTFLOW THROUGH BASIN BOUNDARY

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Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

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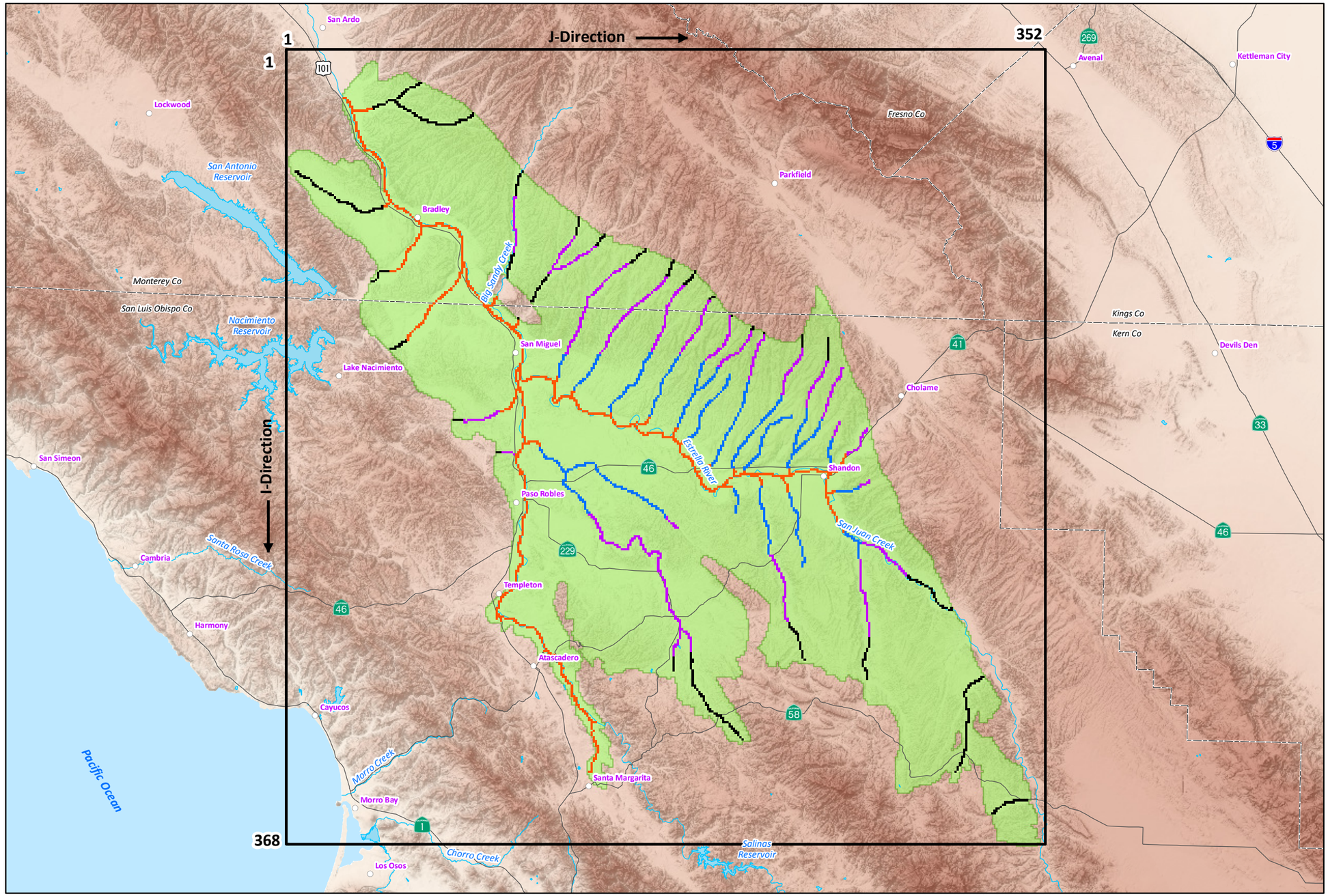
Figure 66

GIS_proj/co_slo_paso_robles_model/6_Fig_66_subsurface_outflow_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



LOCATION OF MODEL STREAM NETWORK

EXPLANATION

- Model Layer 1 Stream
- Model Layer 2 Stream
- Model Layer 3 Stream
- Model Layer 4 Stream
- Paso Robles Groundwater Basin Model Domain
- Paso Robles Groundwater Basin Model Active Area
- Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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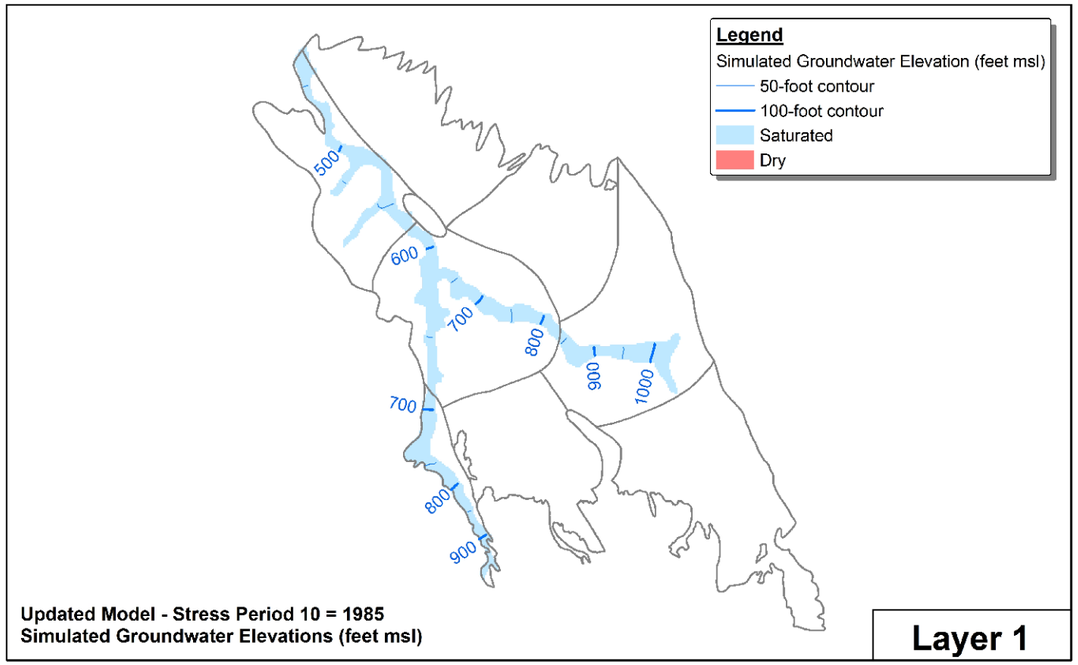
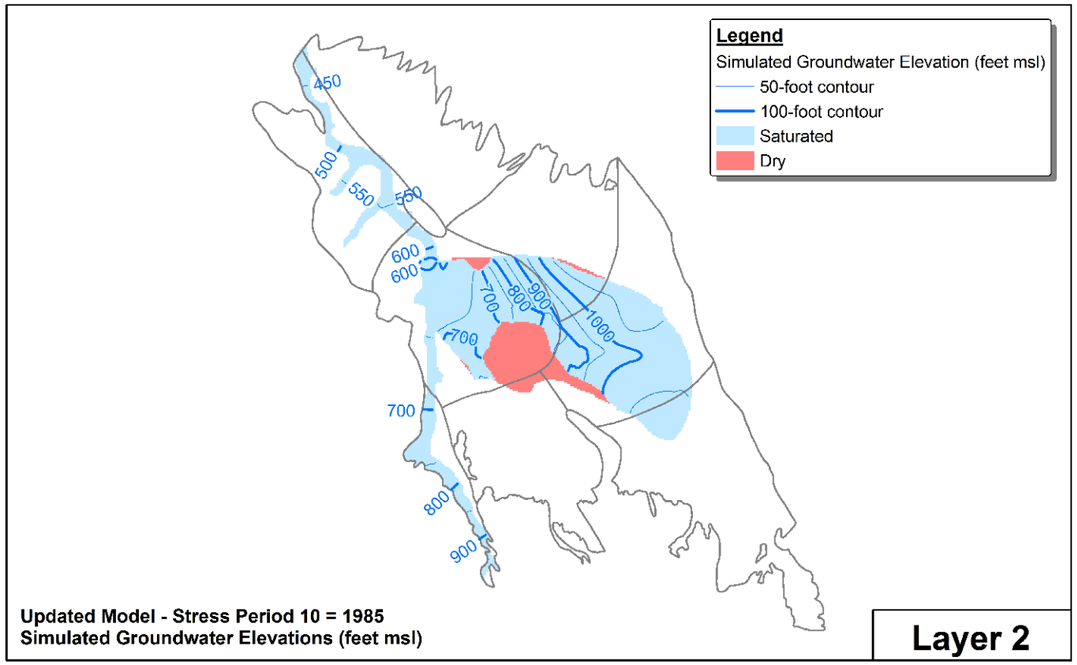
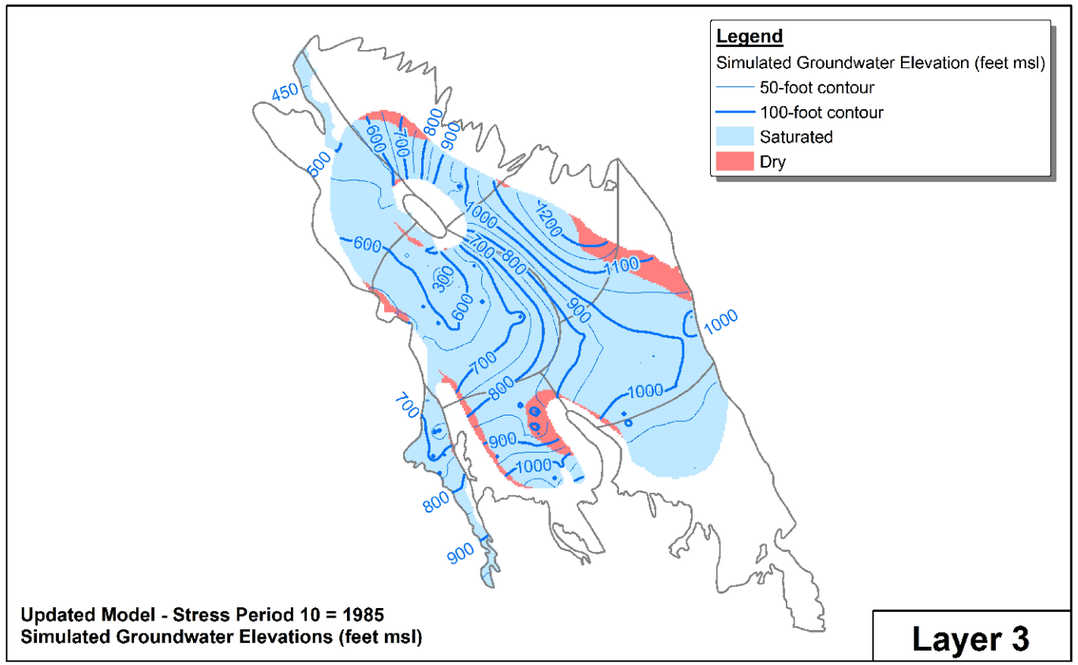
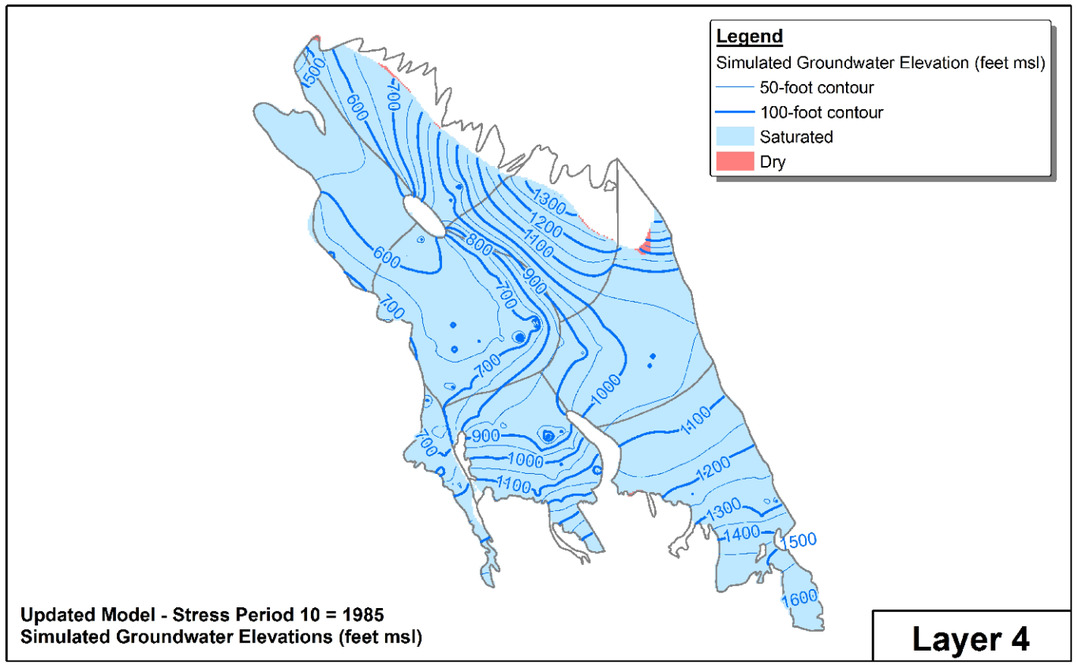
Figure 67

GIS_proj/co_slo_paso_robles_model/6_Fig_67_model_stream_network_12-14.mxd





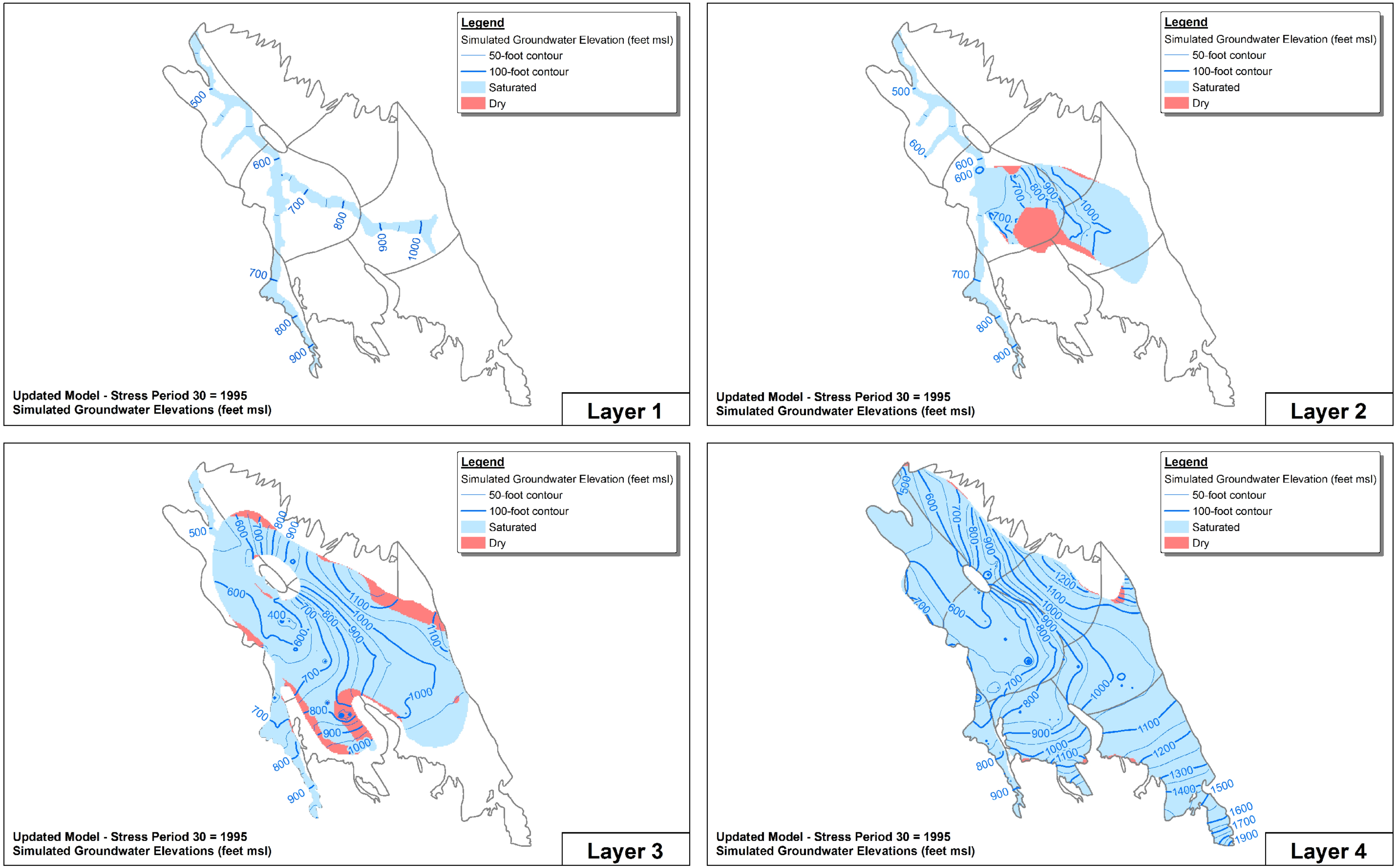




19-Dec-14

TODD GROUNDWATER

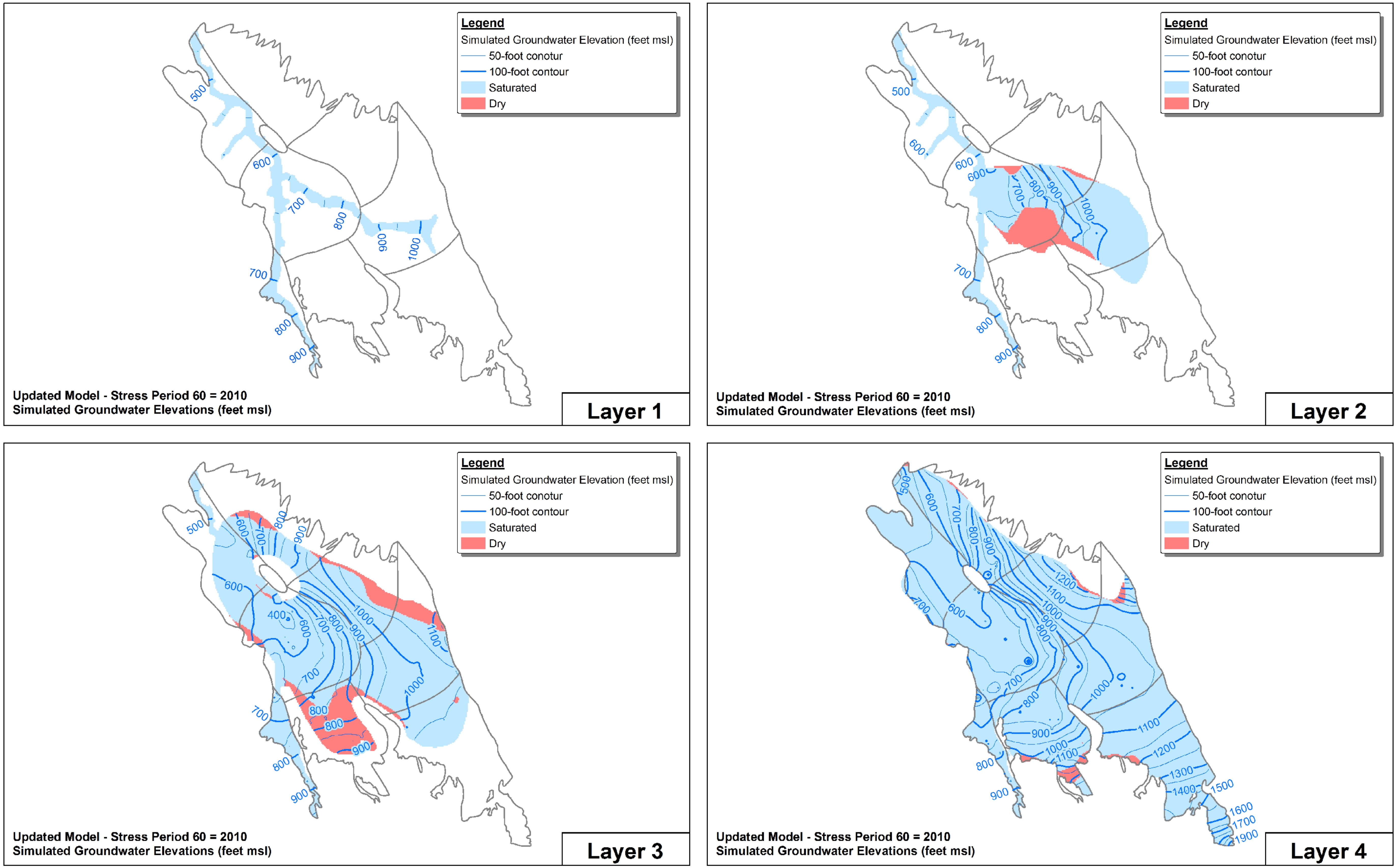
Figure 68
Updated Model Simulated Groundwater Elevations after 5 Years (1985)



19-Dec-14

TODD GROUNDWATER

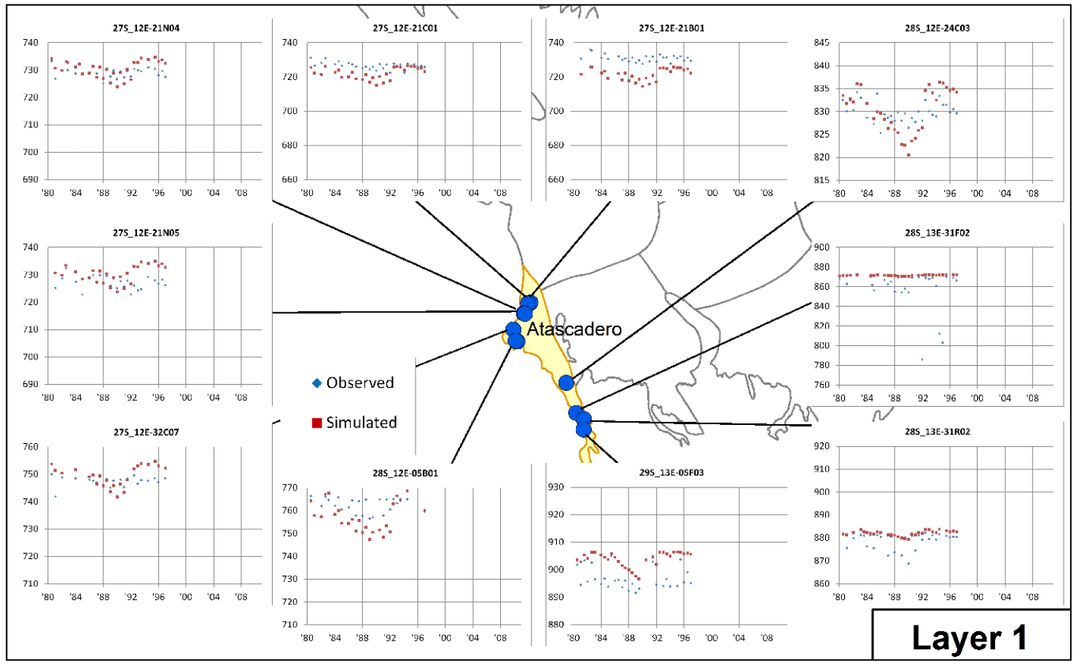
Figure 69
Updated Model Simulated Groundwater Elevations after 15 Years (1995)



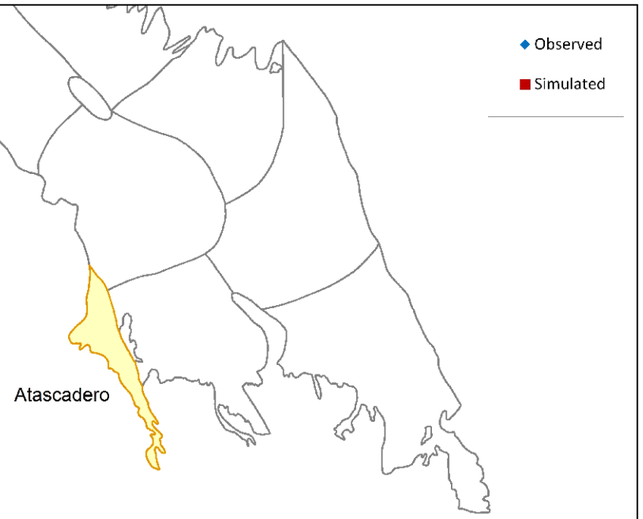
19-Dec-14

TODD GROUNDWATER

Figure 70
Updated Model Simulated Groundwater Elevations after 30 Years (2010)

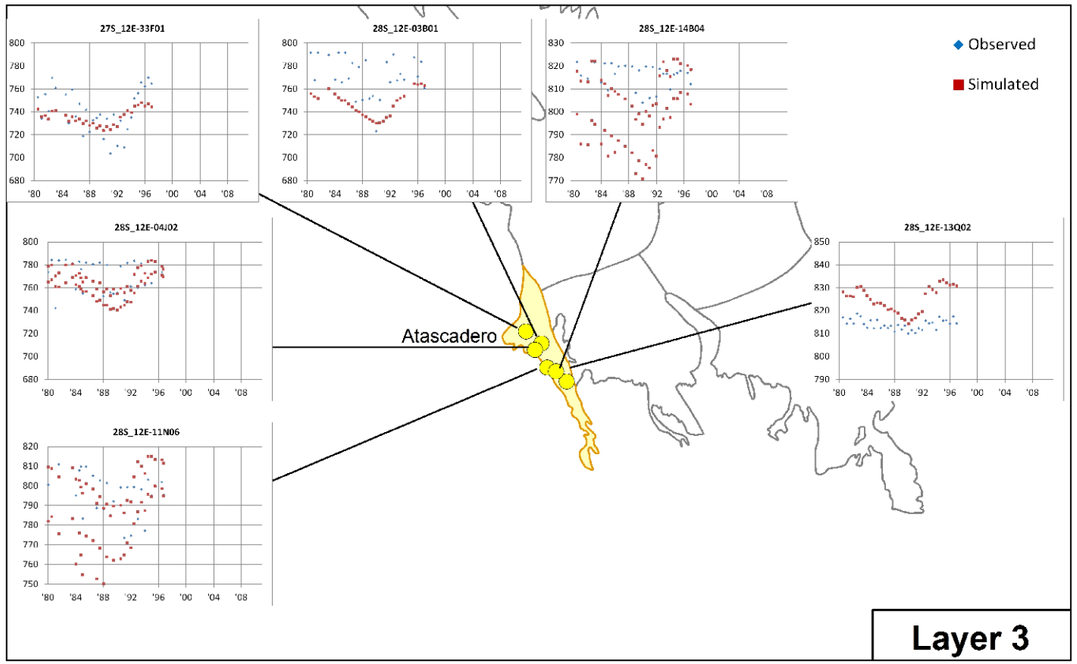


Layer 1

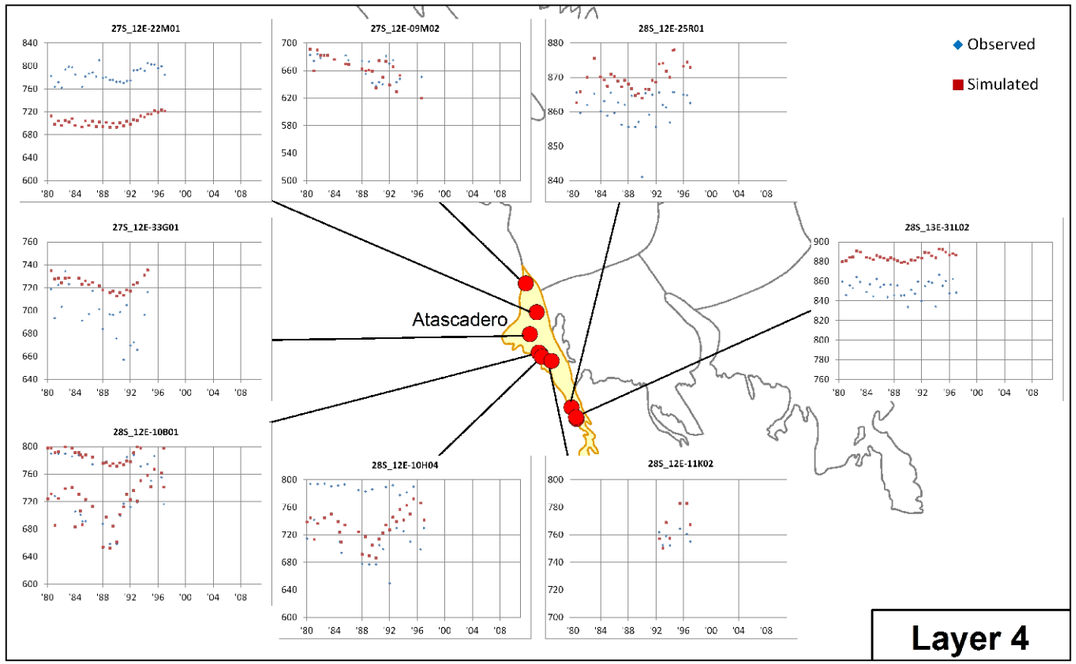


Original Model - Atascadero Subbasin

Layer 2



Layer 3

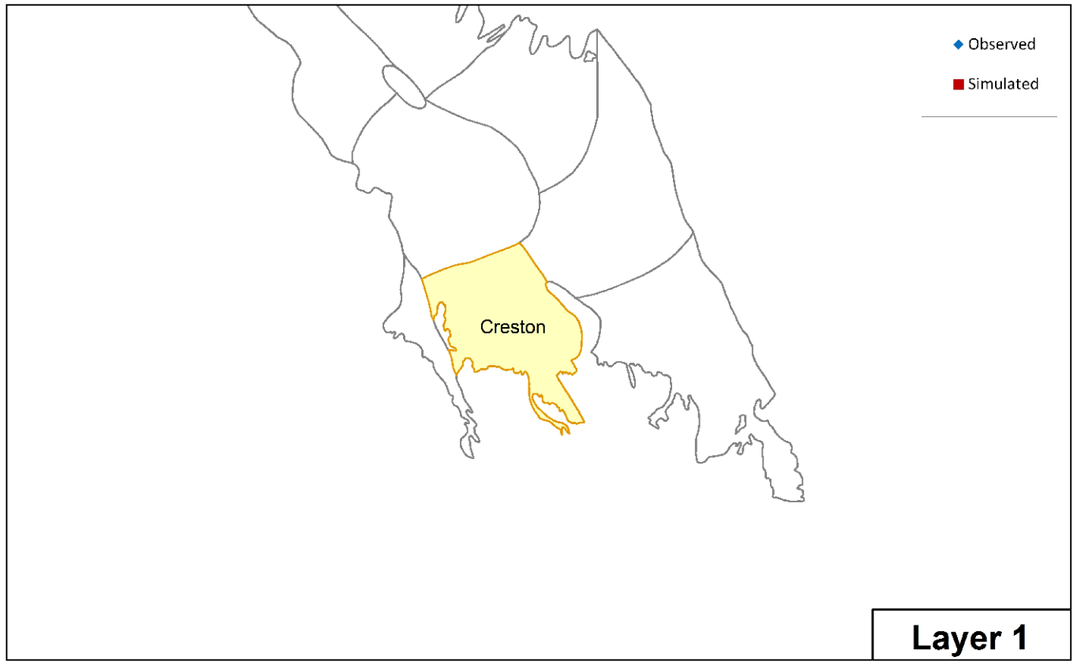


Layer 4

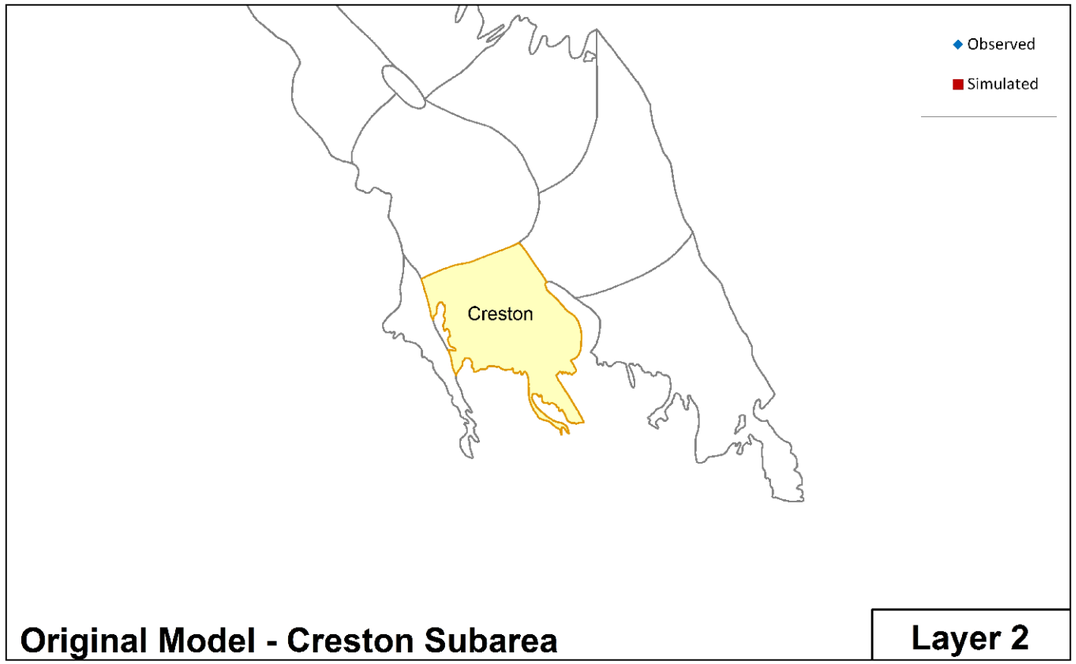
19-Dec-14

TODD GROUNDWATER

Figure 71
Original Model Observed vs. Simulated Groundwater Elevations - Atascadero Subarea

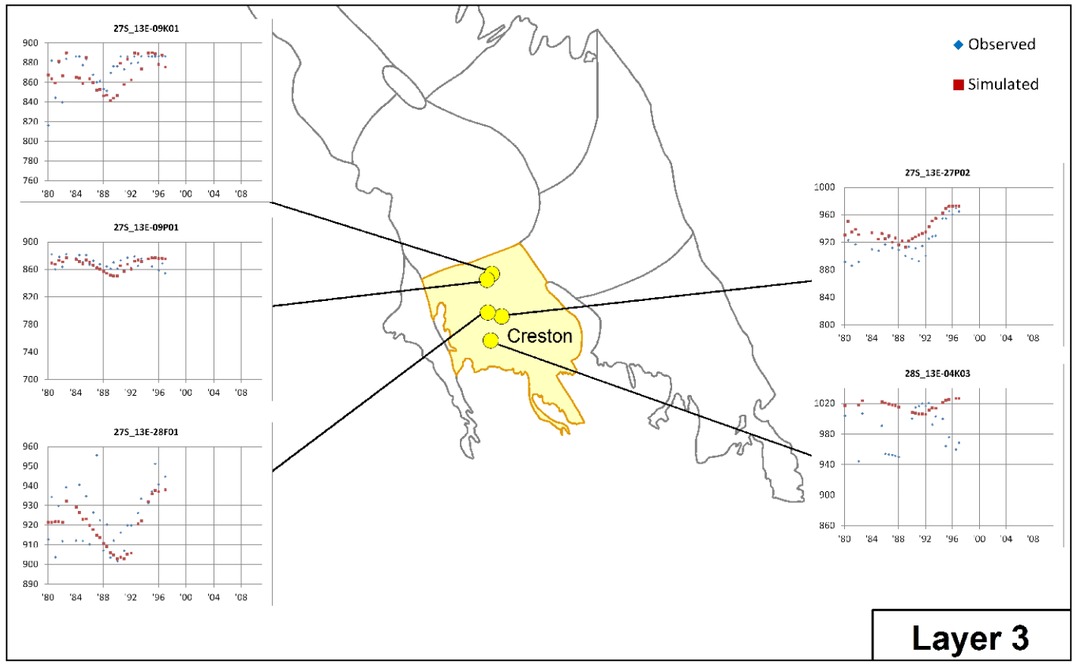


Layer 1

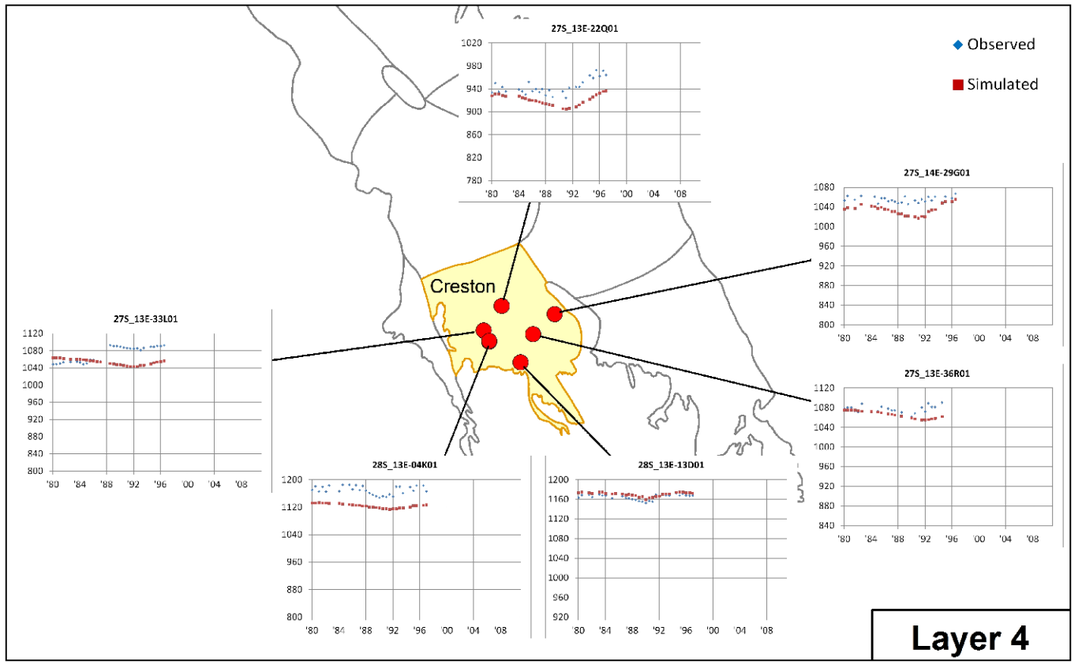


Original Model - Creston Subarea

Layer 2



Layer 3

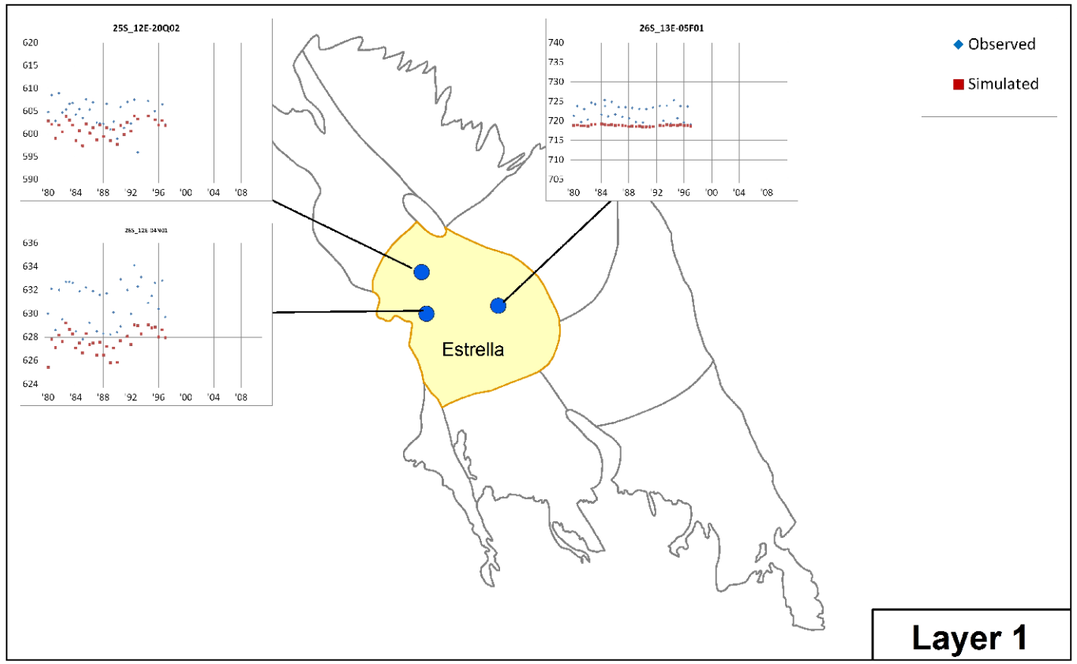


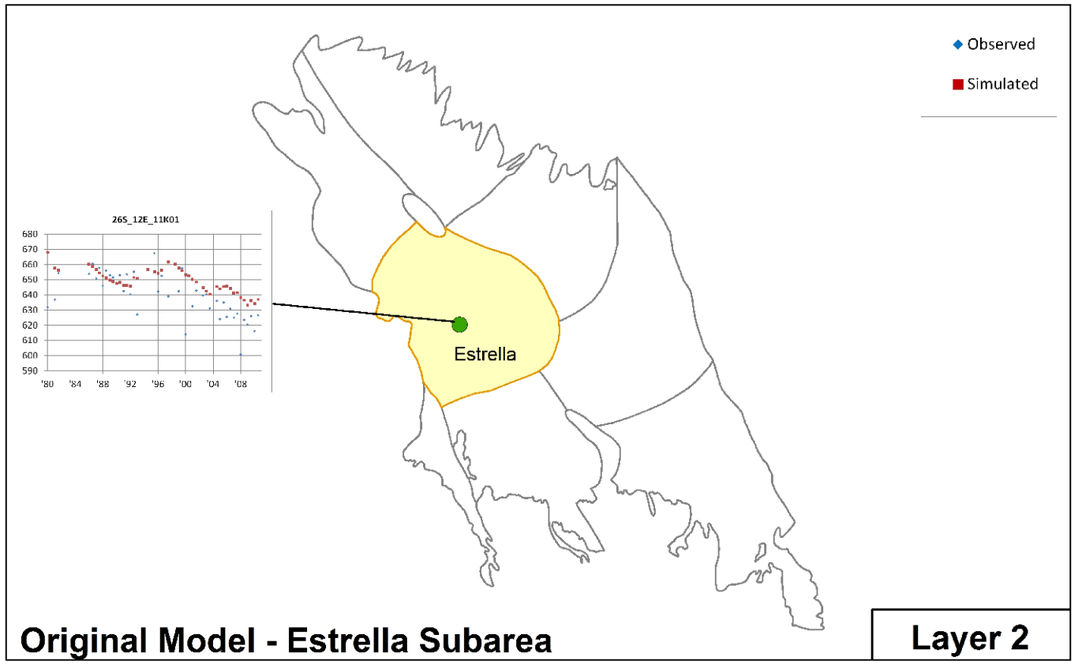
Layer 4

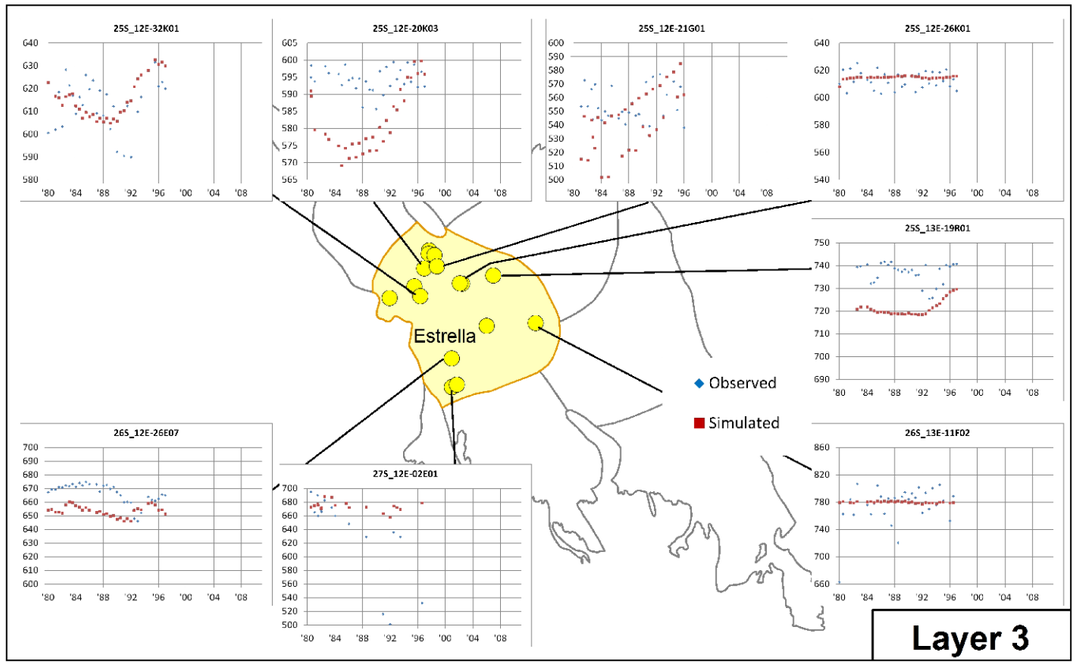
19-Dec-14

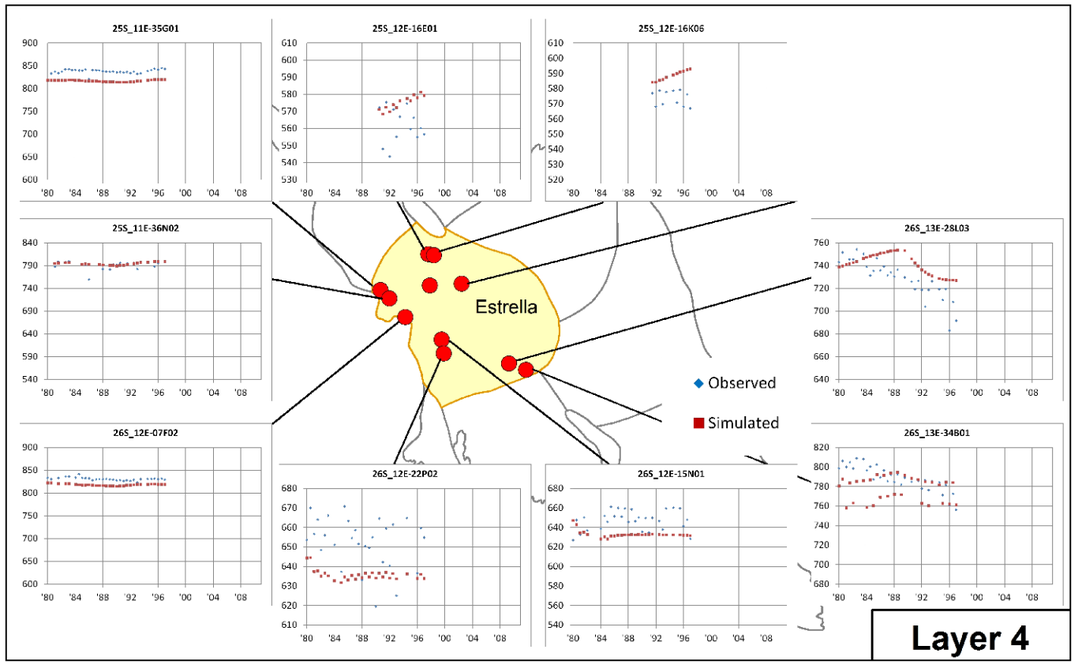
TODD GROUNDWATER

Figure 72
Original Model Observed vs. Simulated Groundwater Elevations - Creston Subarea





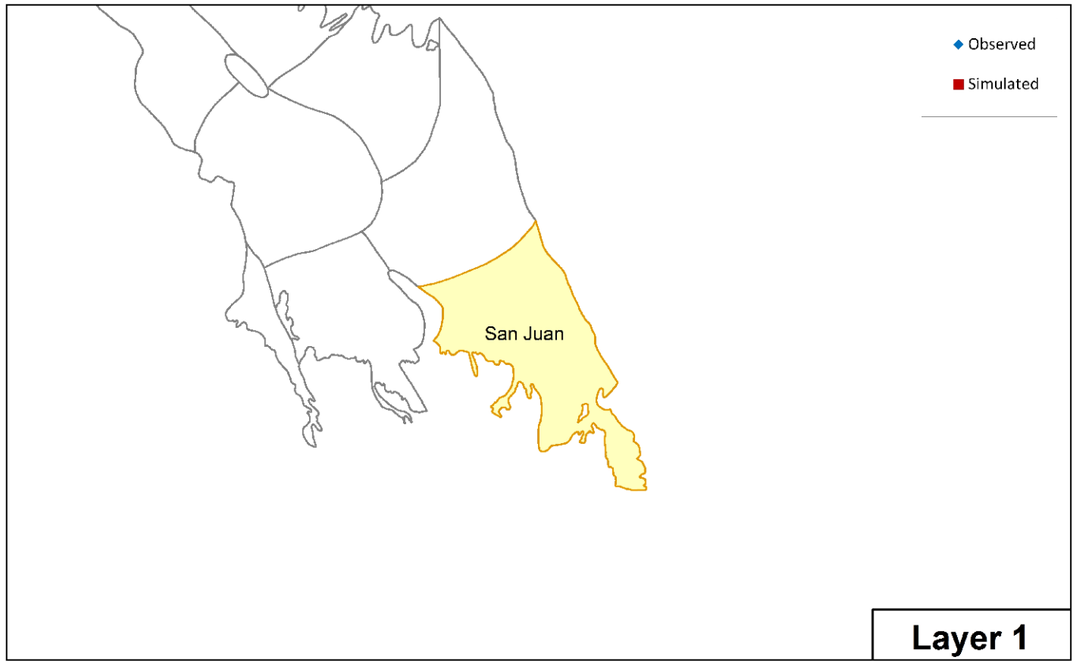




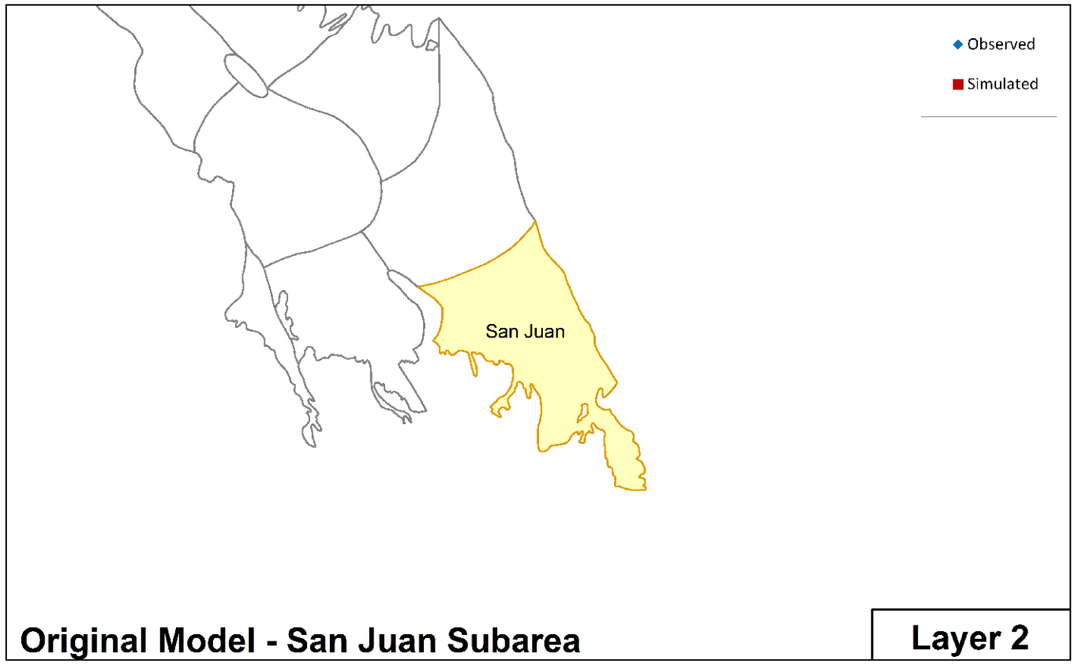
19-Dec-14

TODD GROUNDWATER

Figure 73
Original Model Observed vs. Simulated Groundwater Elevations - Estrella Subarea

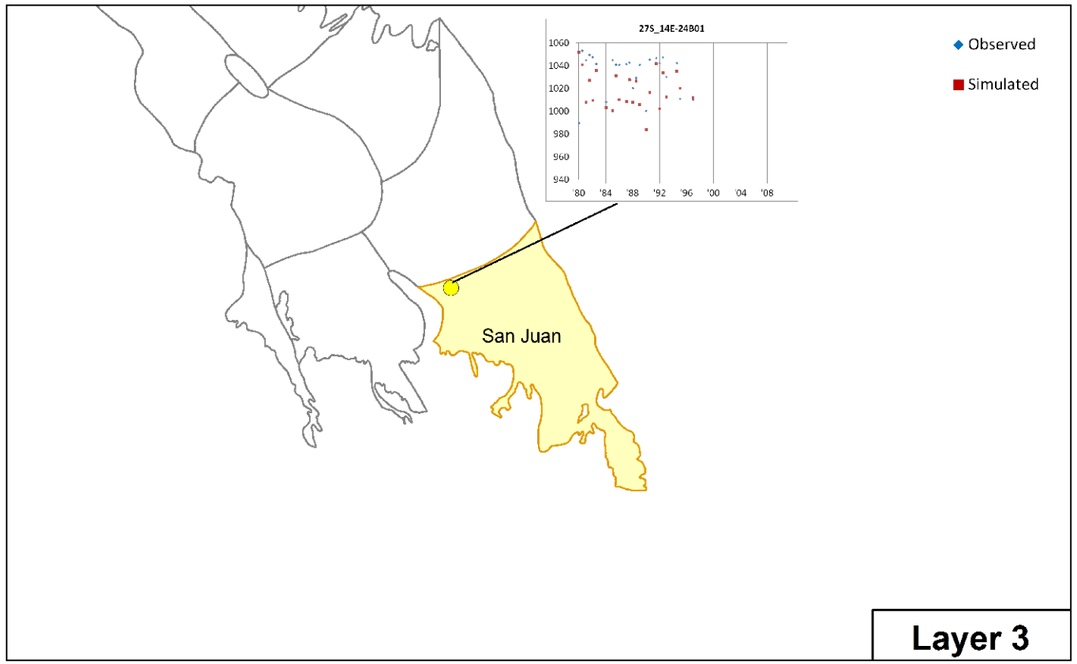


Layer 1

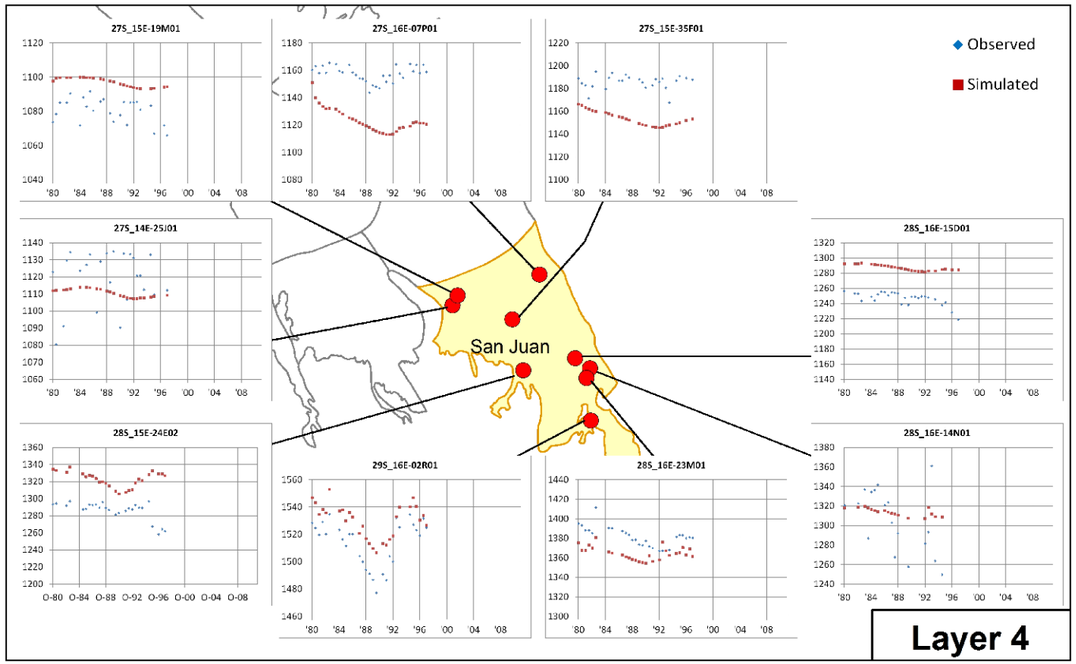


Original Model - San Juan Subarea

Layer 2



Layer 3

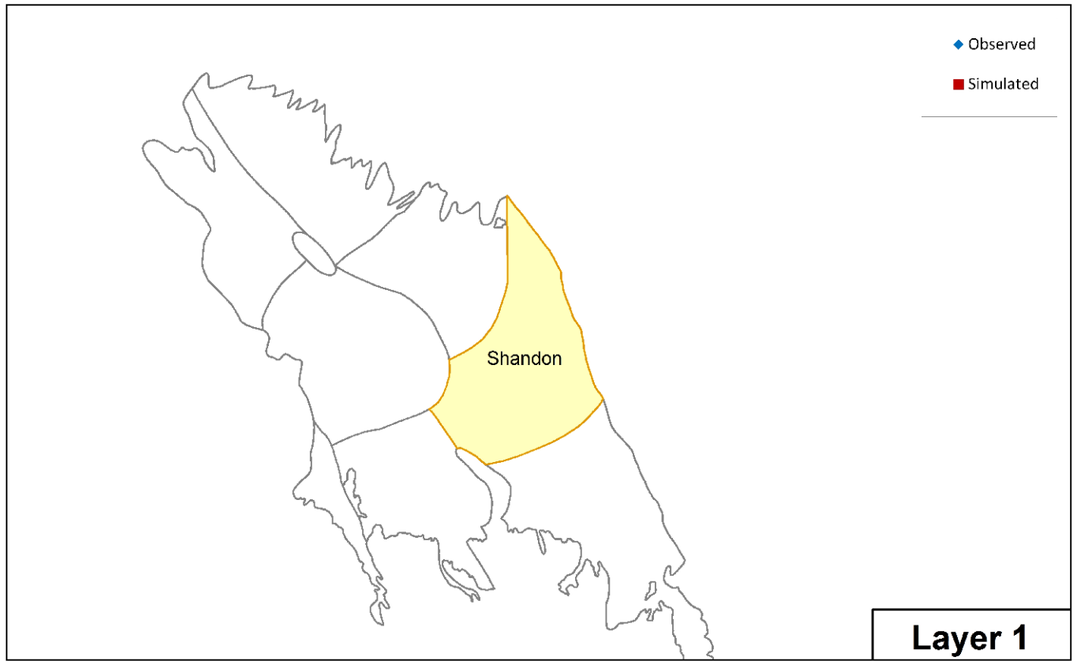


Layer 4

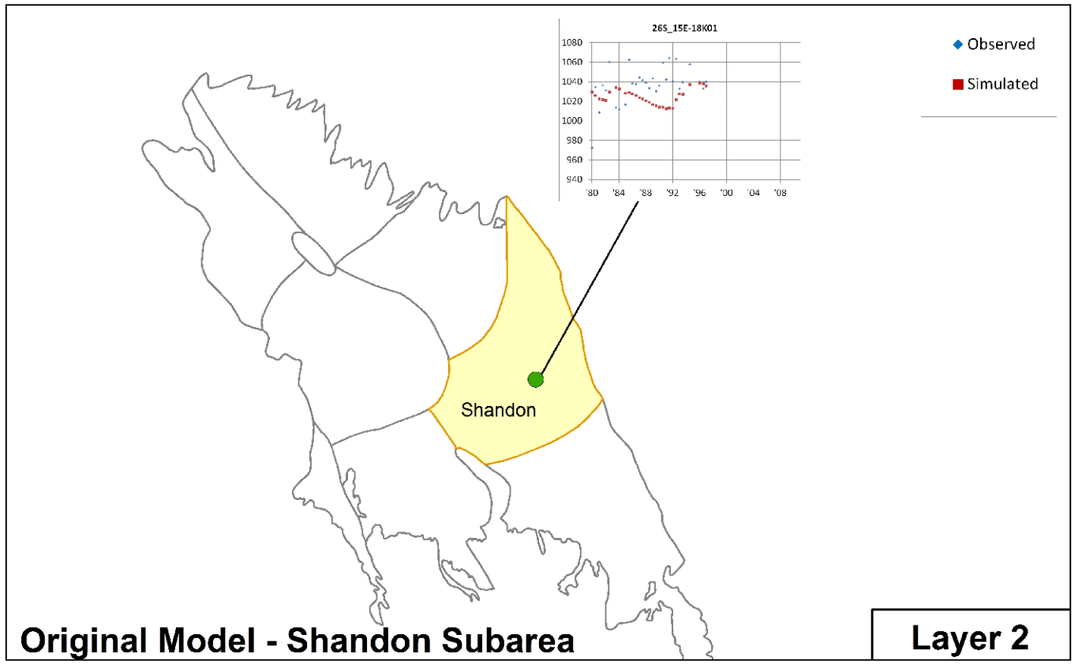
19-Dec-14

TODD GROUNDWATER

Figure 74
Original Model Observed vs. Simulated Groundwater Elevations - San Juan Subarea

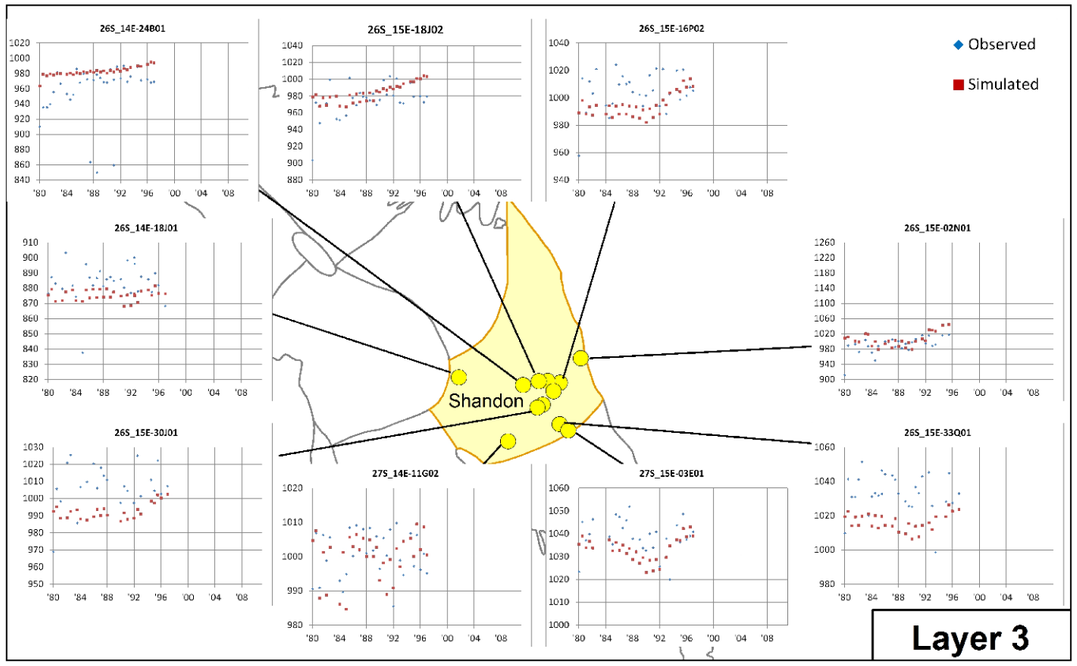


Layer 1

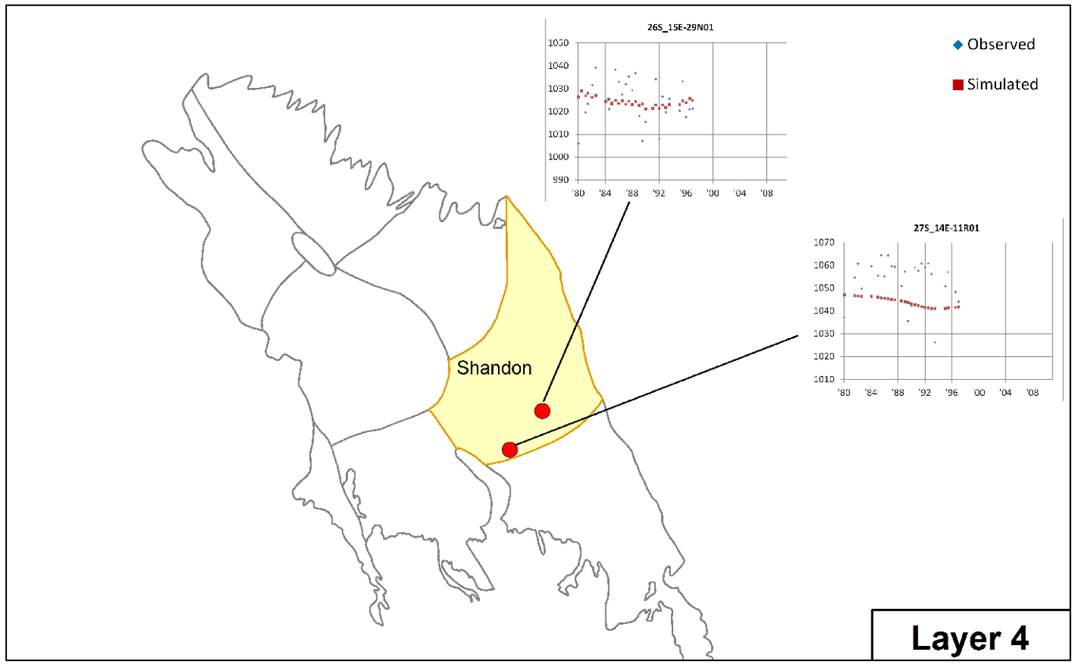


Original Model - Shandon Subarea

Layer 2



Layer 3

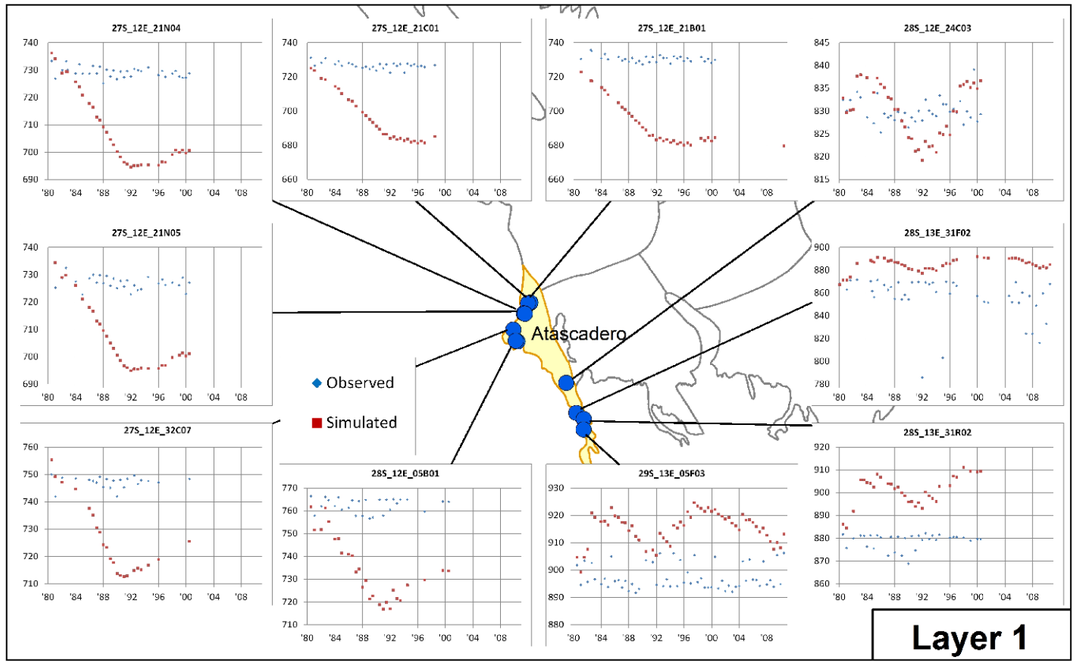


Layer 4

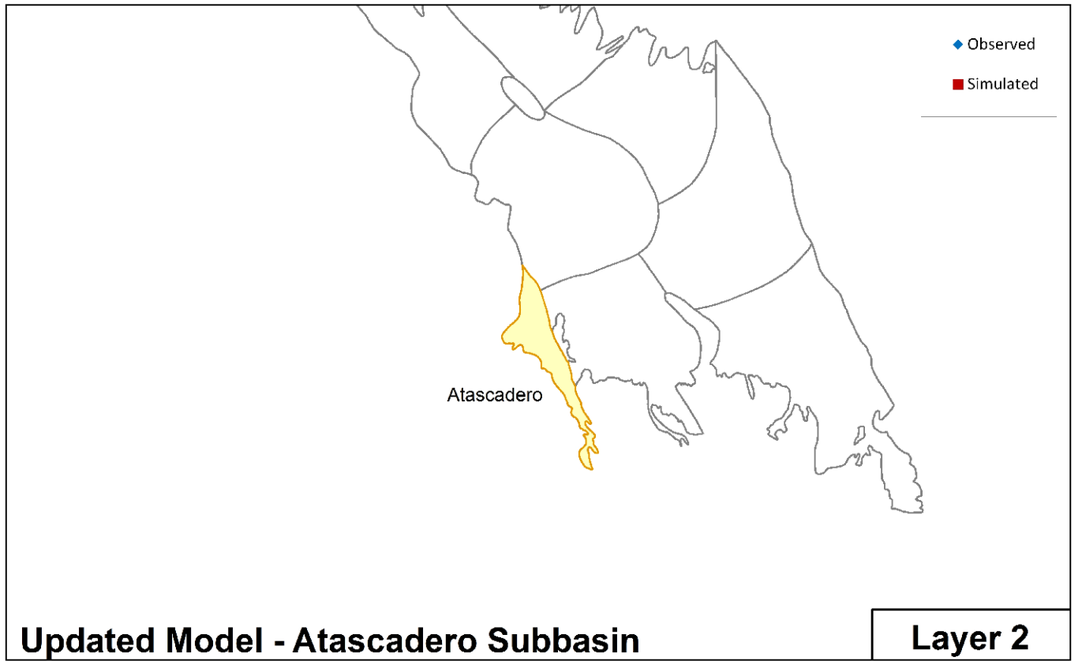
19-Dec-14

TODD GROUNDWATER

Figure 75
Original Model Observed vs. Simulated Groundwater Elevations - Shandon Subarea

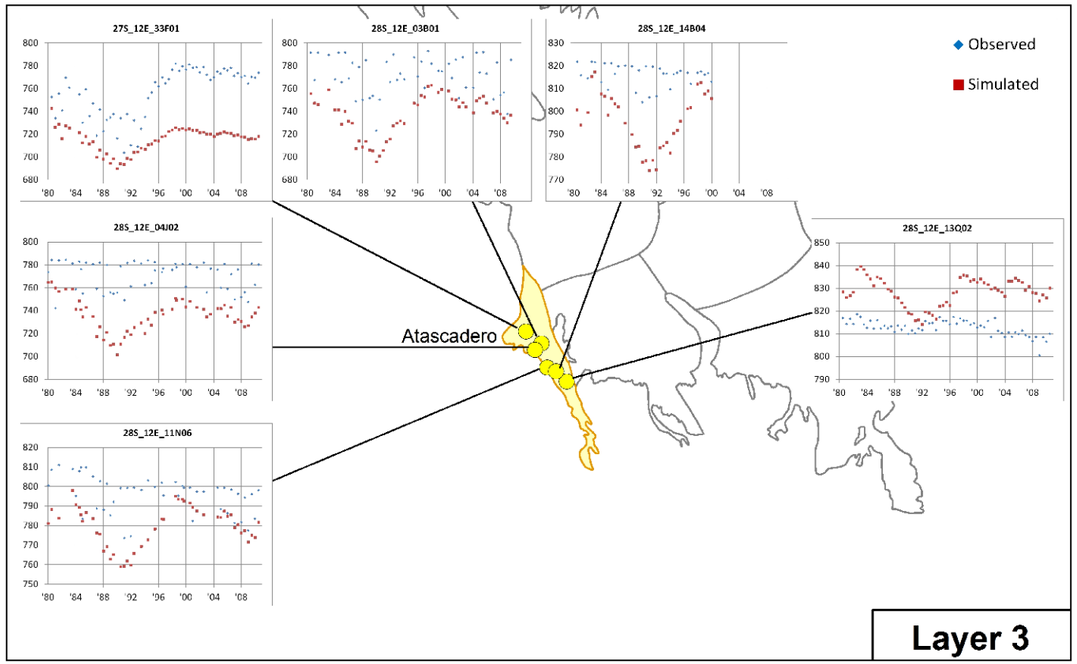


Layer 1

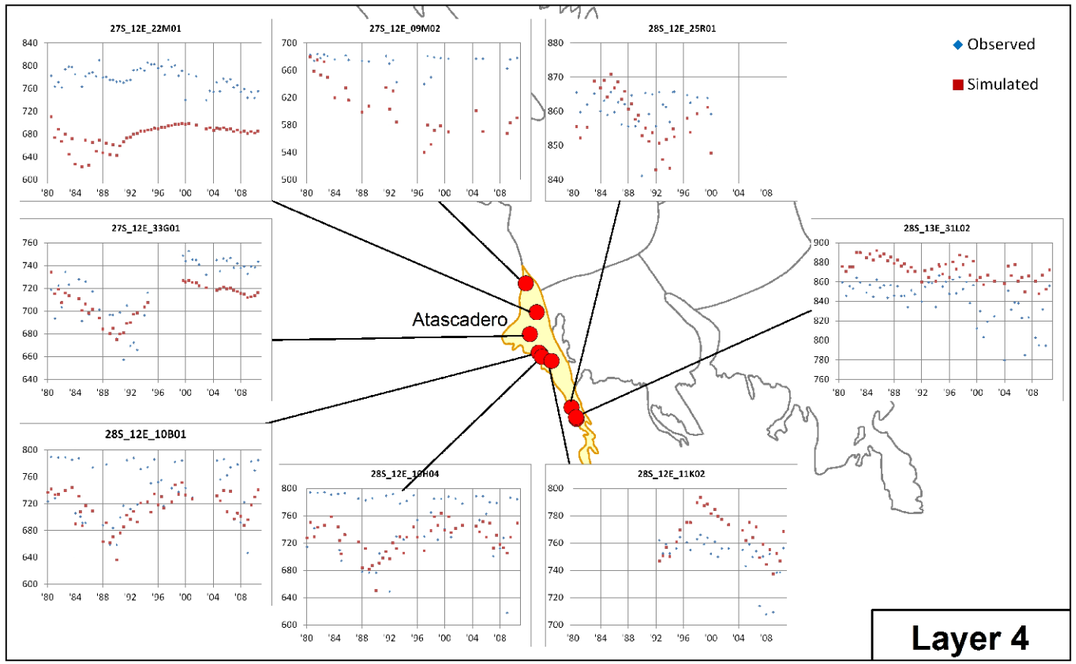


Updated Model - Atascadero Subbasin

Layer 2



Layer 3

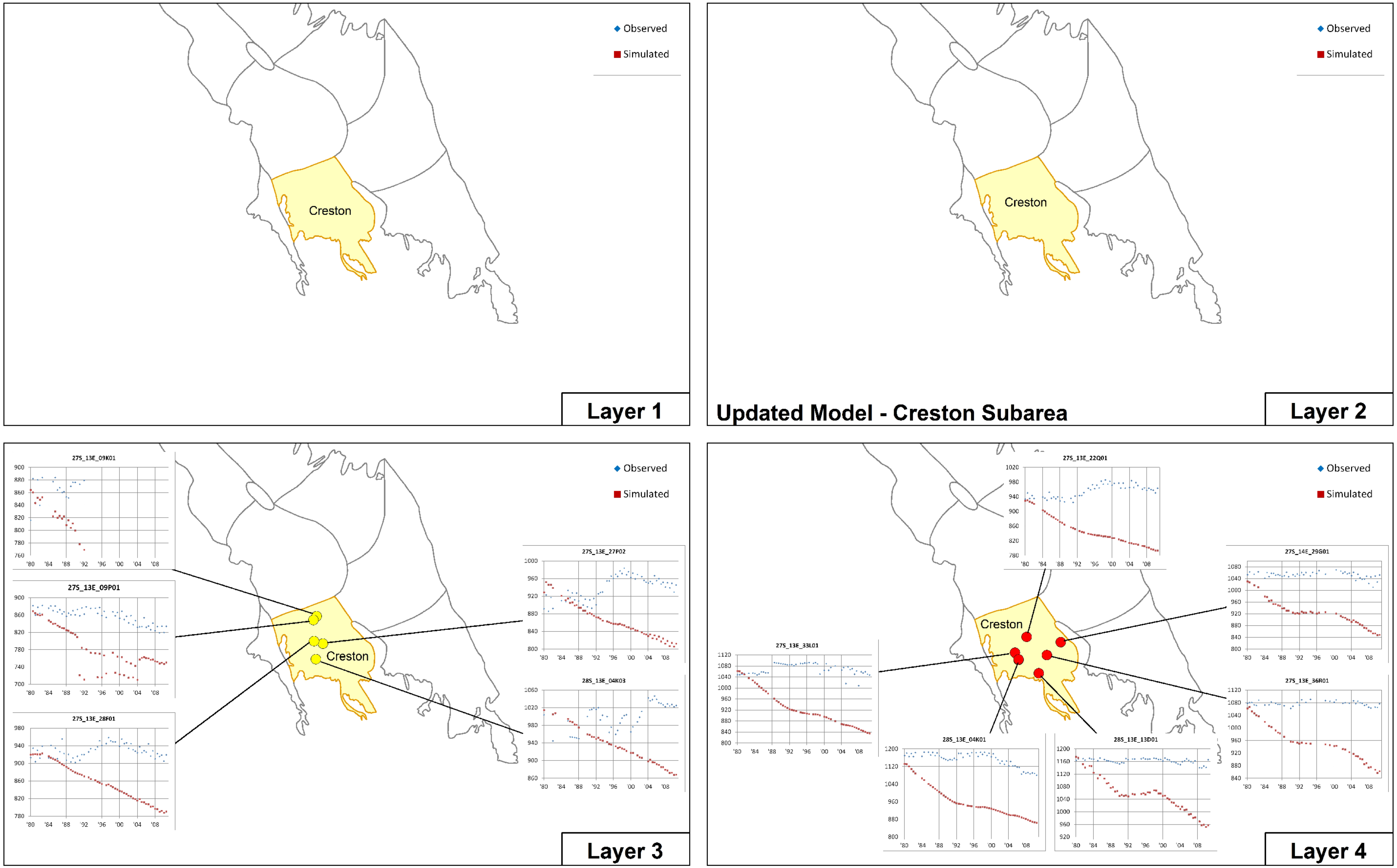


Layer 4

19-Dec-14

TODD GROUNDWATER

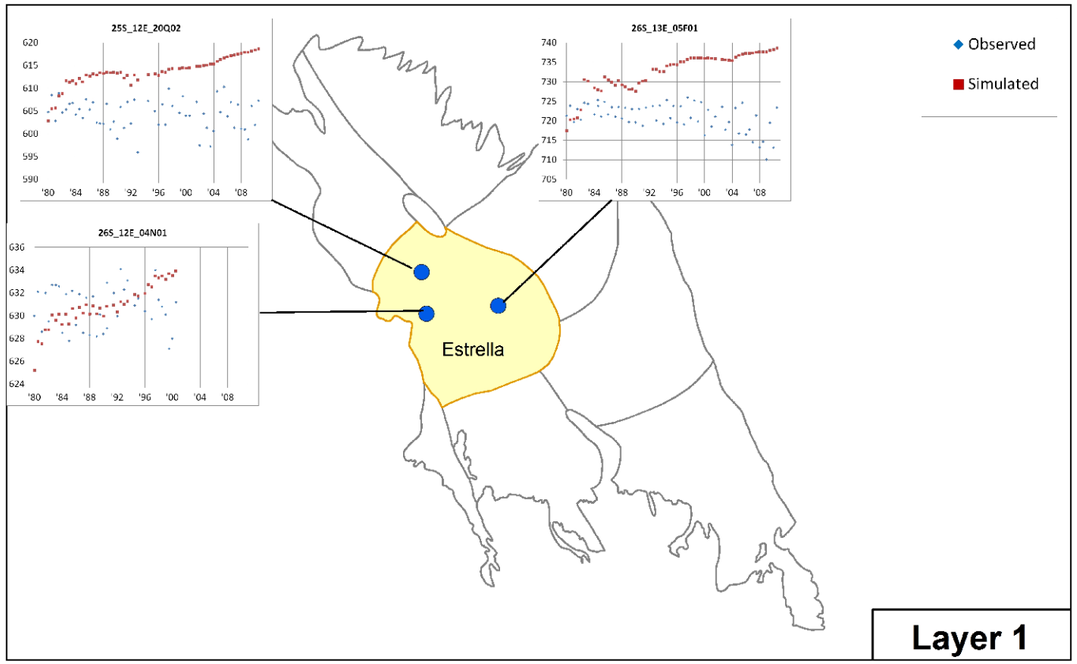
Figure 76
Updated Model Observed vs. Simulated Groundwater Elevations - Atascadero Subarea

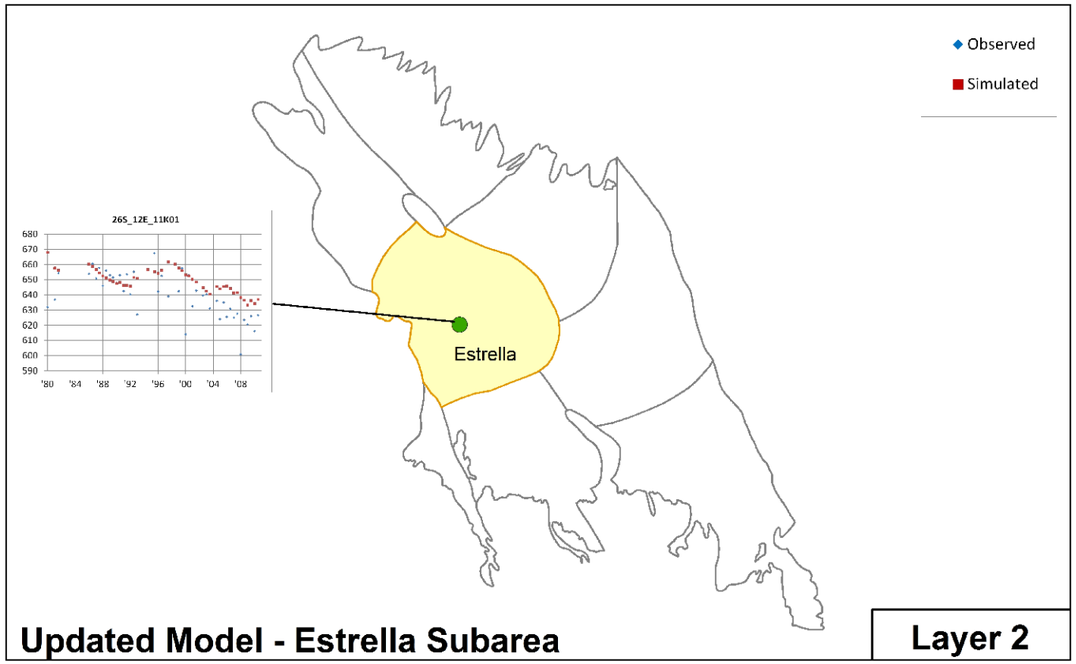


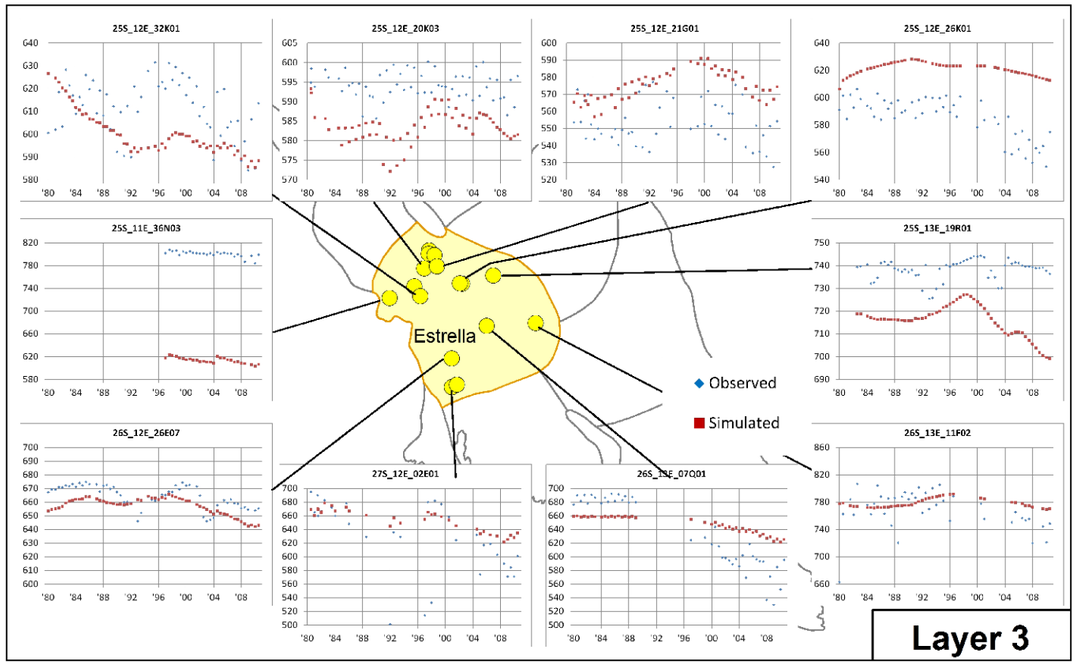
19-Dec-14

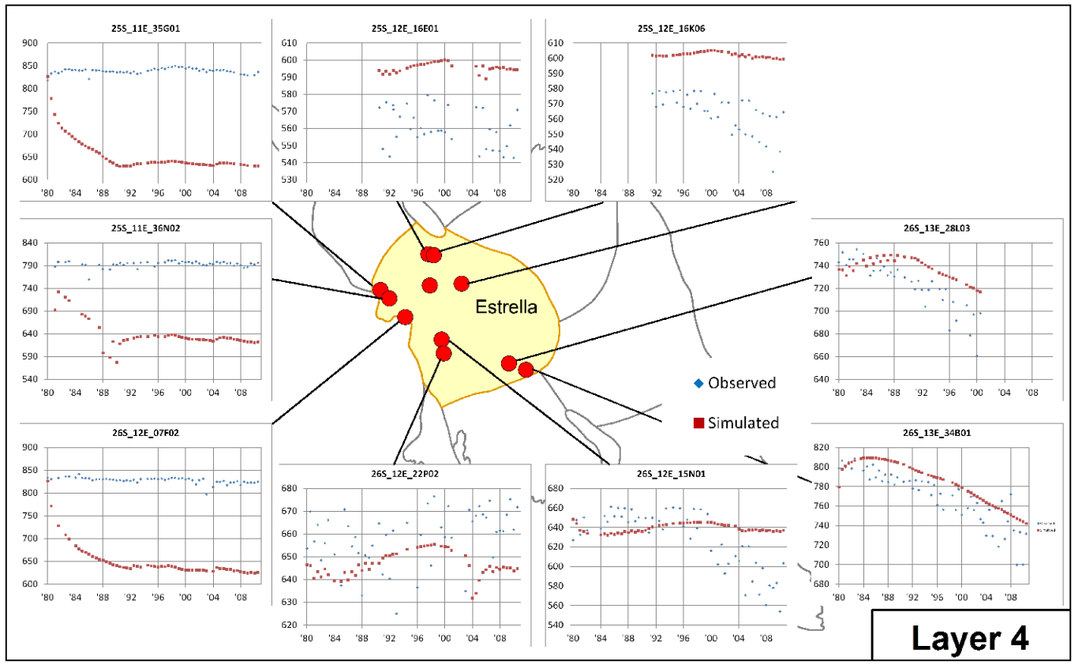
TODD GROUNDWATER

Figure 77
Updated Model Observed vs. Simulated Groundwater Elevations - Creston Subarea





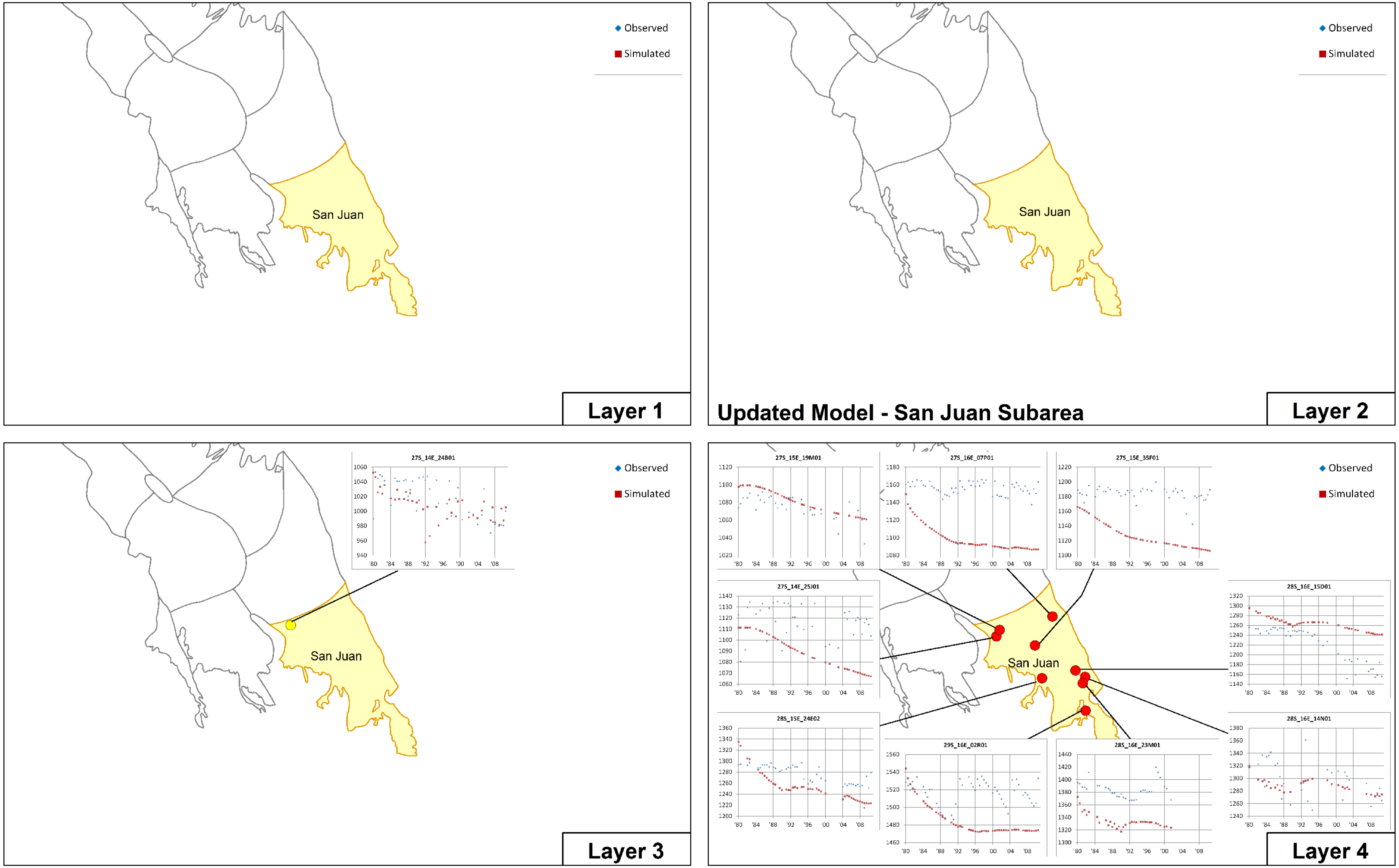




19-Dec-14

TODD GROUNDWATER

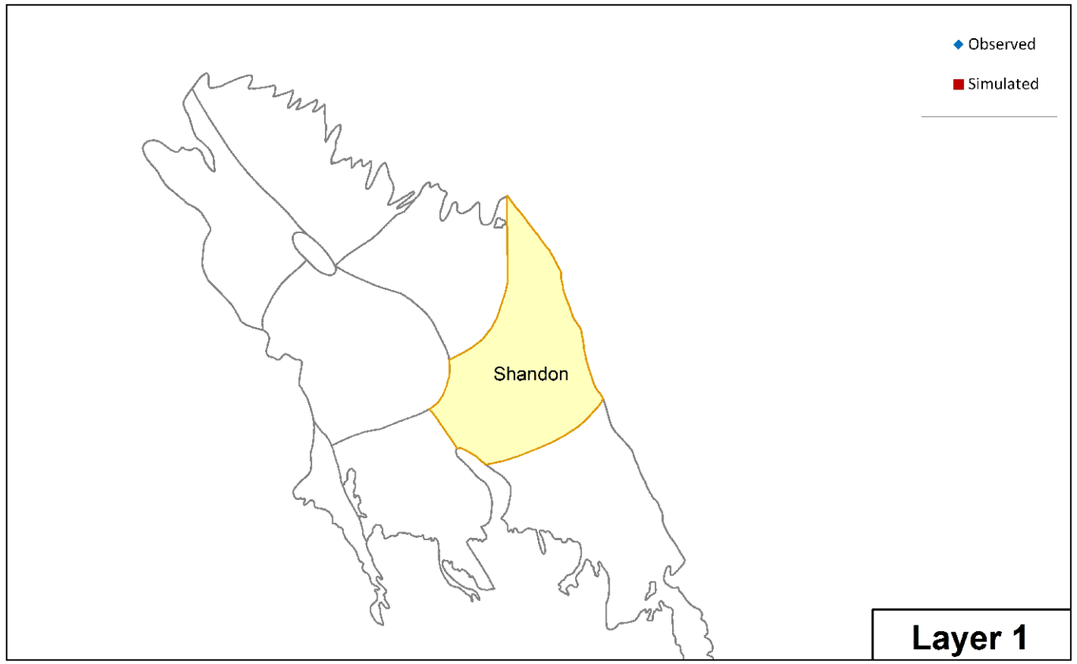
Figure 78
Updated Model Observed vs. Simulated Groundwater Elevations - Estrella Subarea

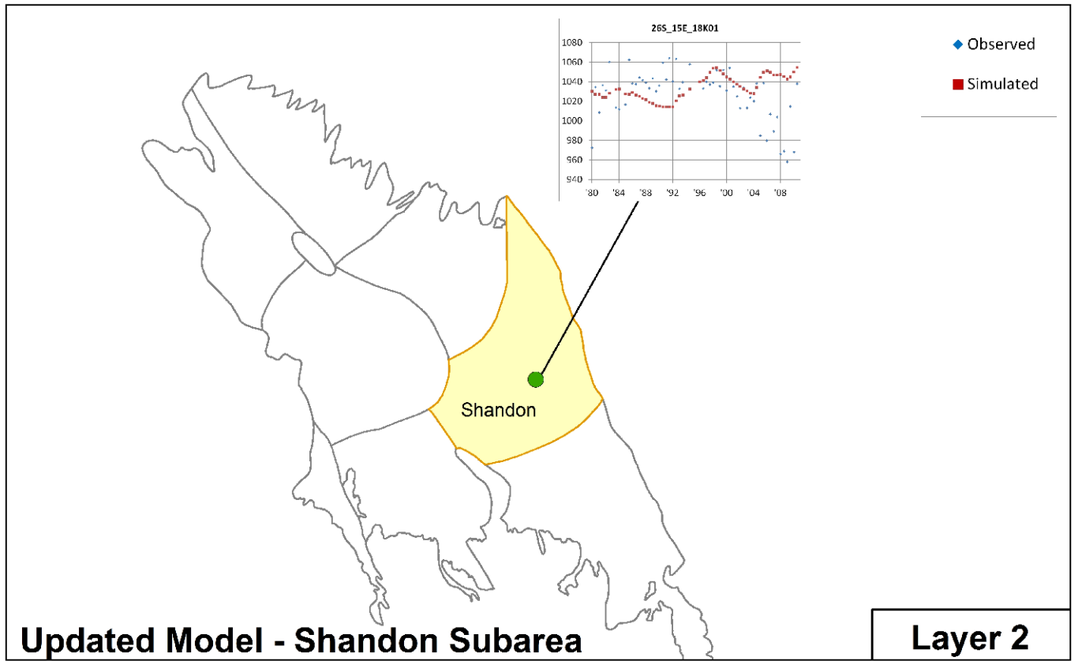


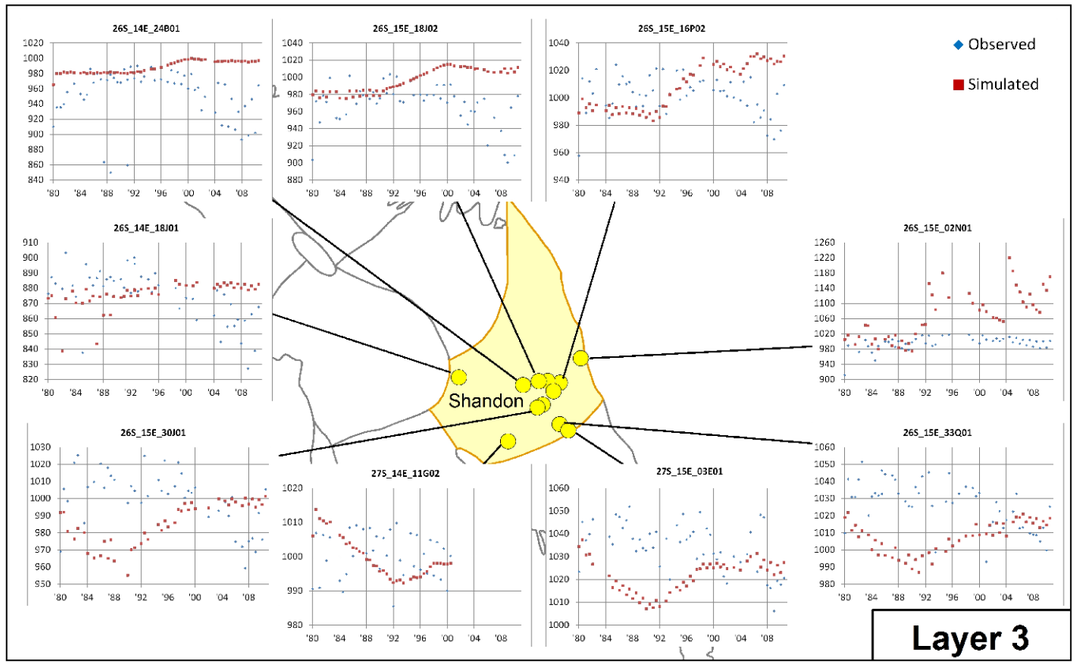
19-Dec-14

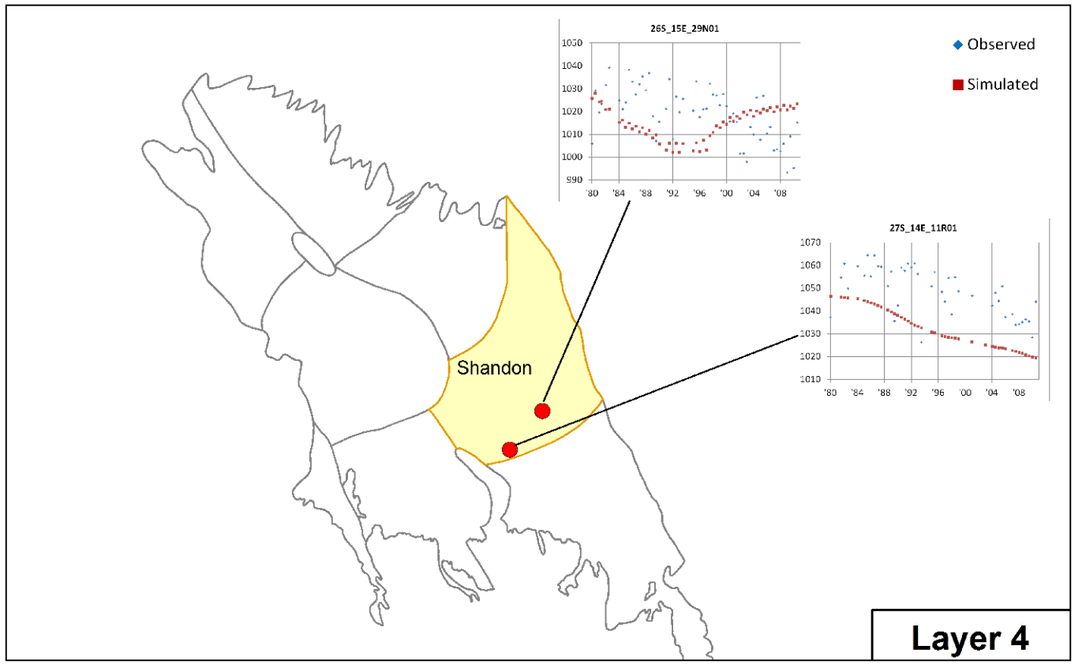
TODD GROUNDWATER

Figure 79
Updated Model Observed vs. Simulated Groundwater Elevations - San Juan Subarea





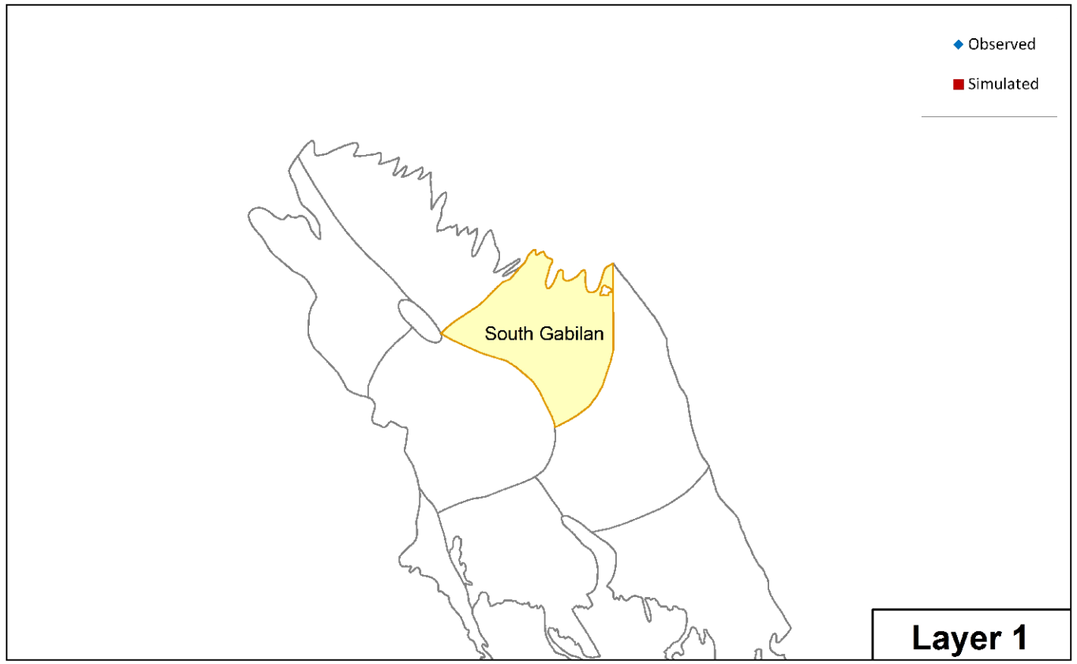


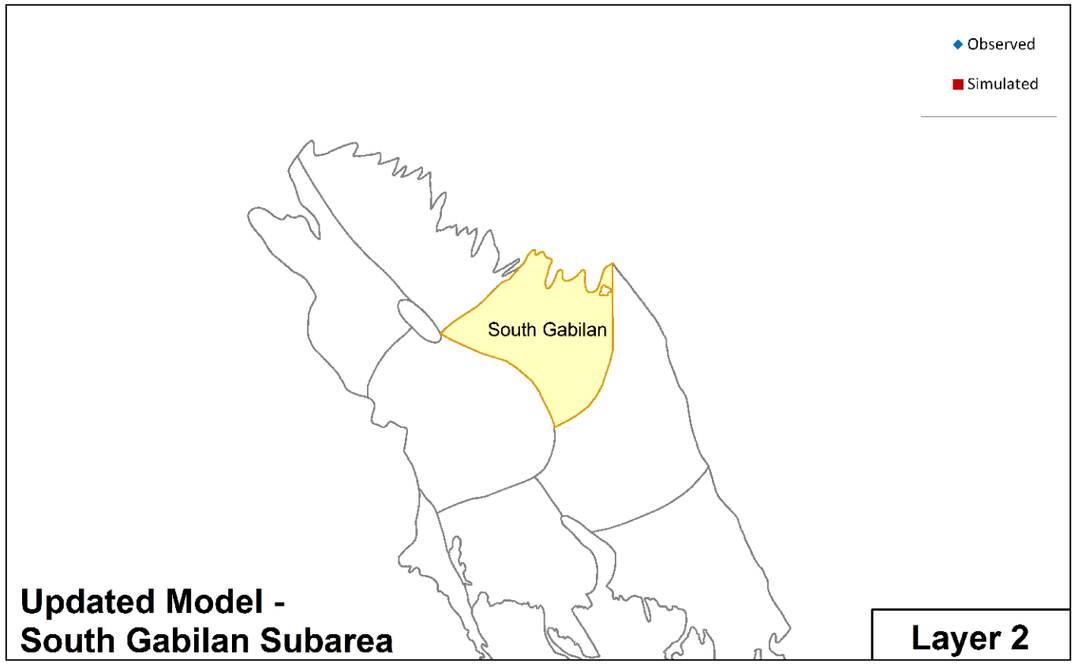


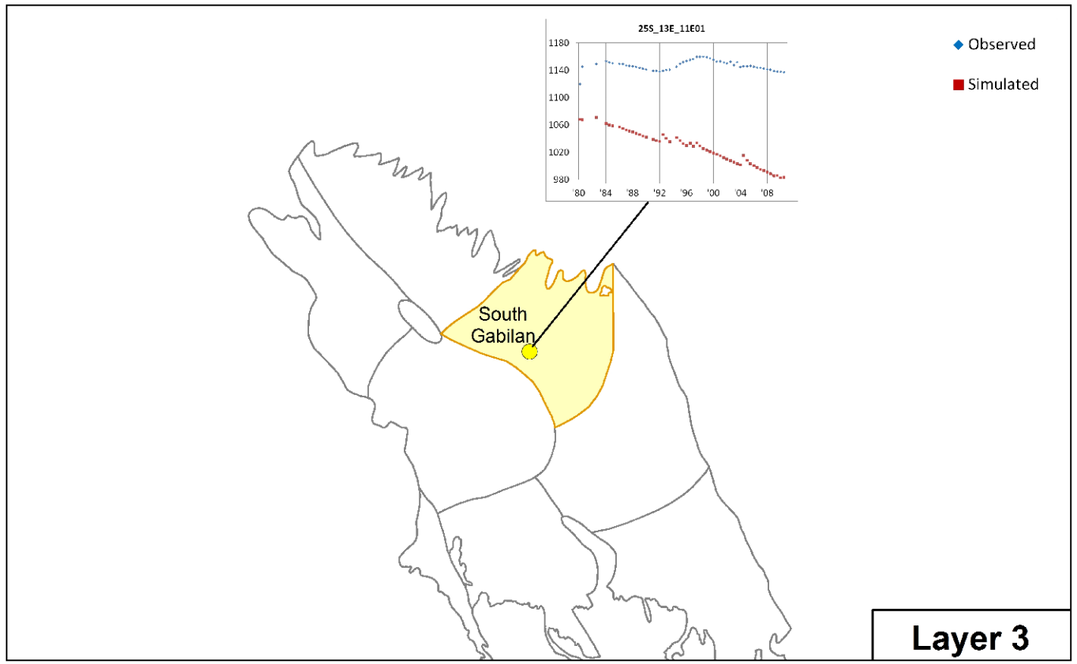
19-Dec-14

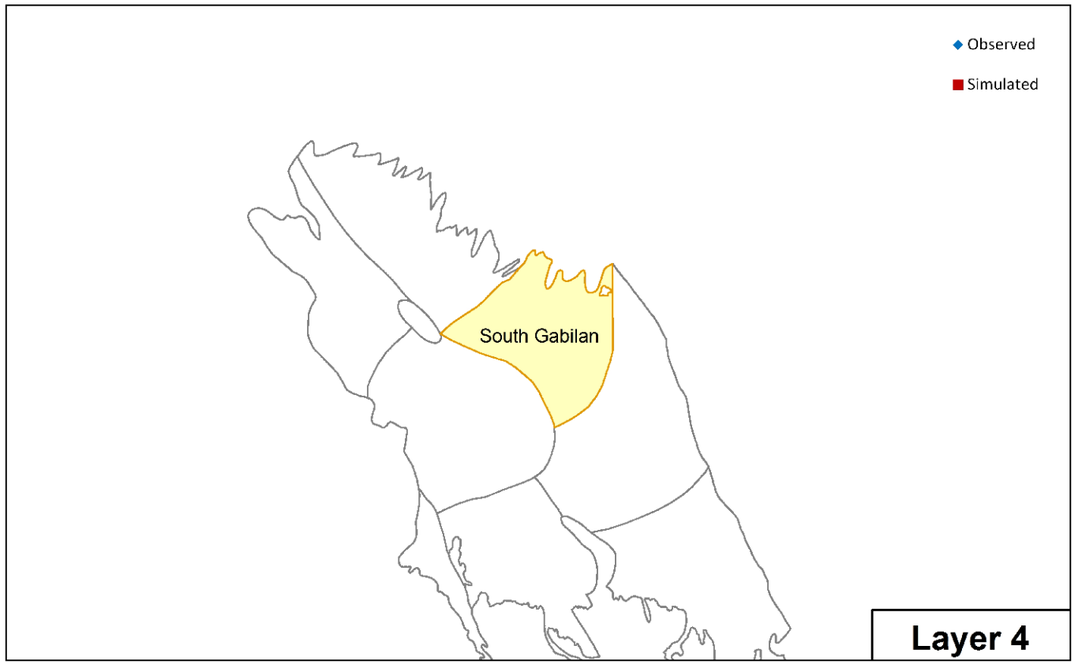
TODD GROUNDWATER

Figure 80
Updated Model Observed vs. Simulated Groundwater Elevations - Shandon Subarea









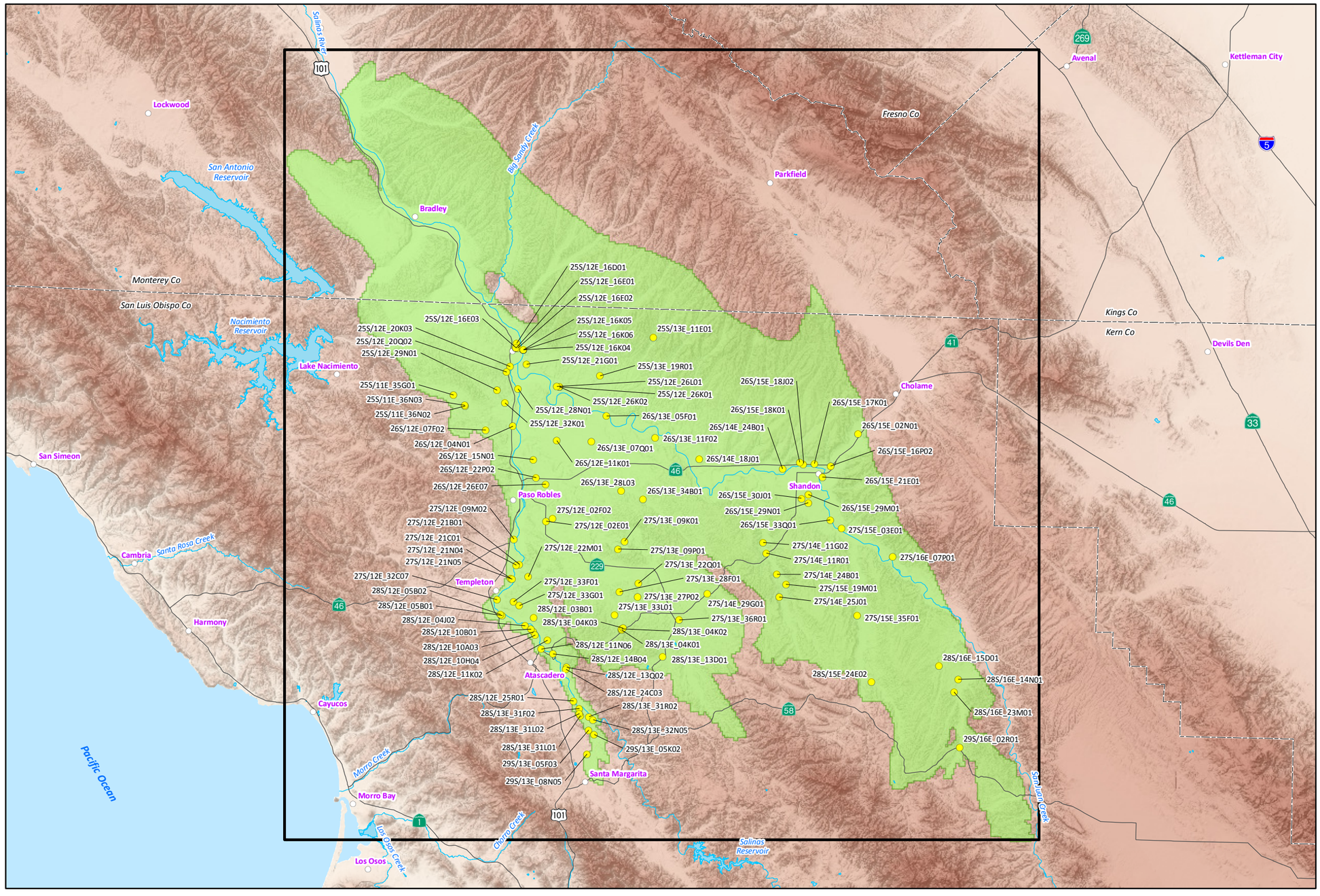
19-Dec-14

TODD GROUNDWATER

Figure 81
Updated Model Observed vs. Simulated Groundwater Elevations-South Gabilan Subarea

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



GROUNDWATER FLOW MODEL CALIBRATION TARGET WELLS

EXPLANATION

Target Well Location

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 3 6 12 Miles

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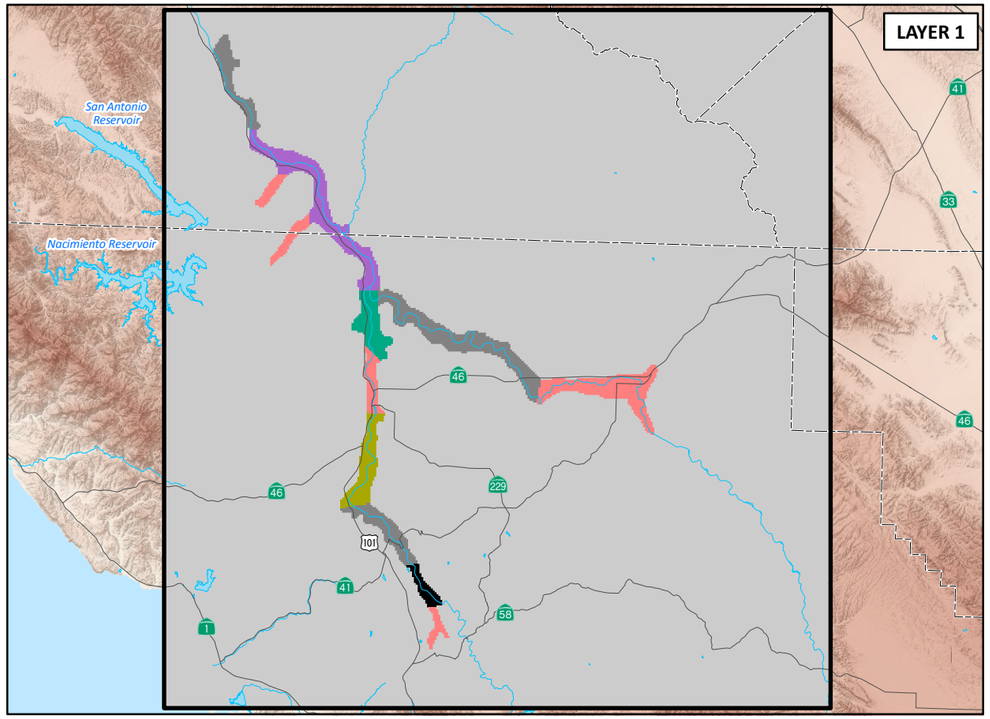
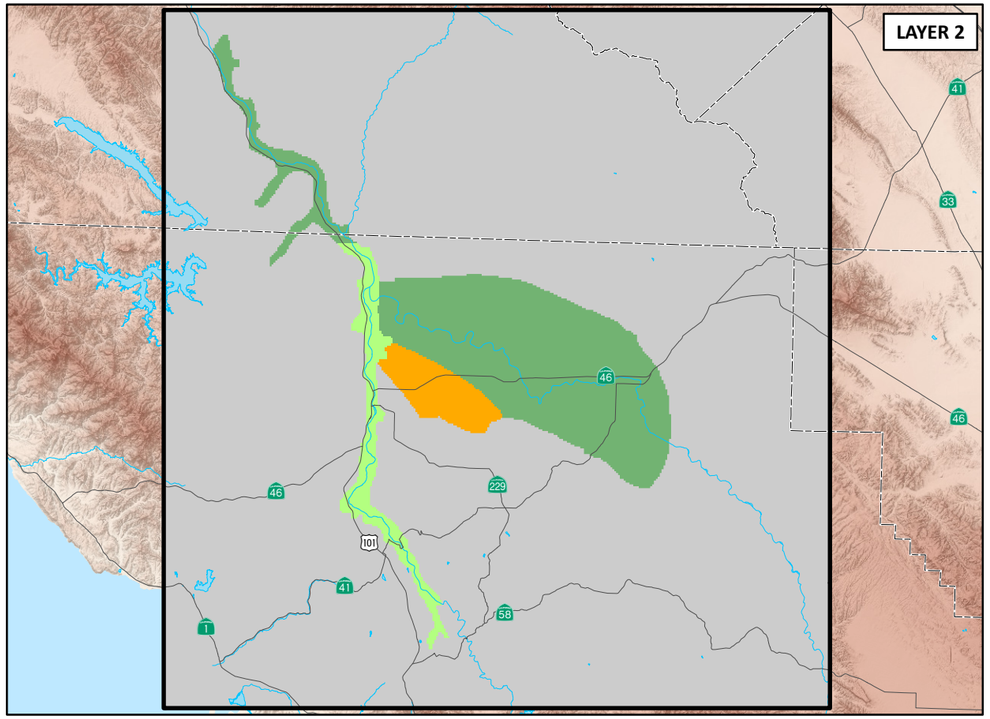
Figure 82

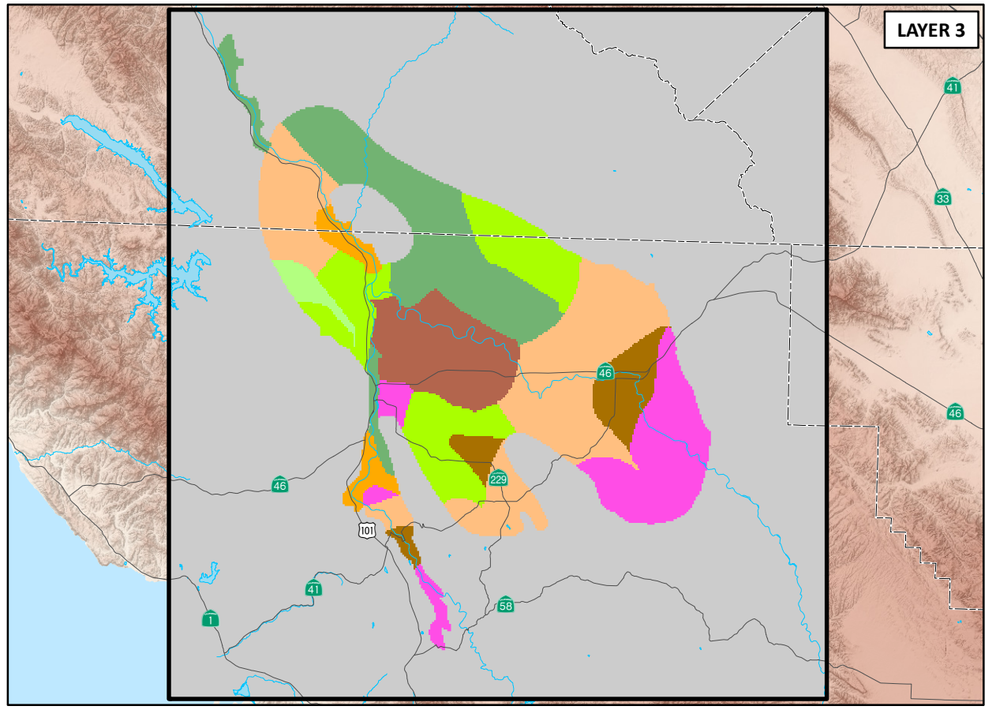
GIS_proj/co_slo_paso_robles_model/6_Fig_82_well_locs_12-14.mxd

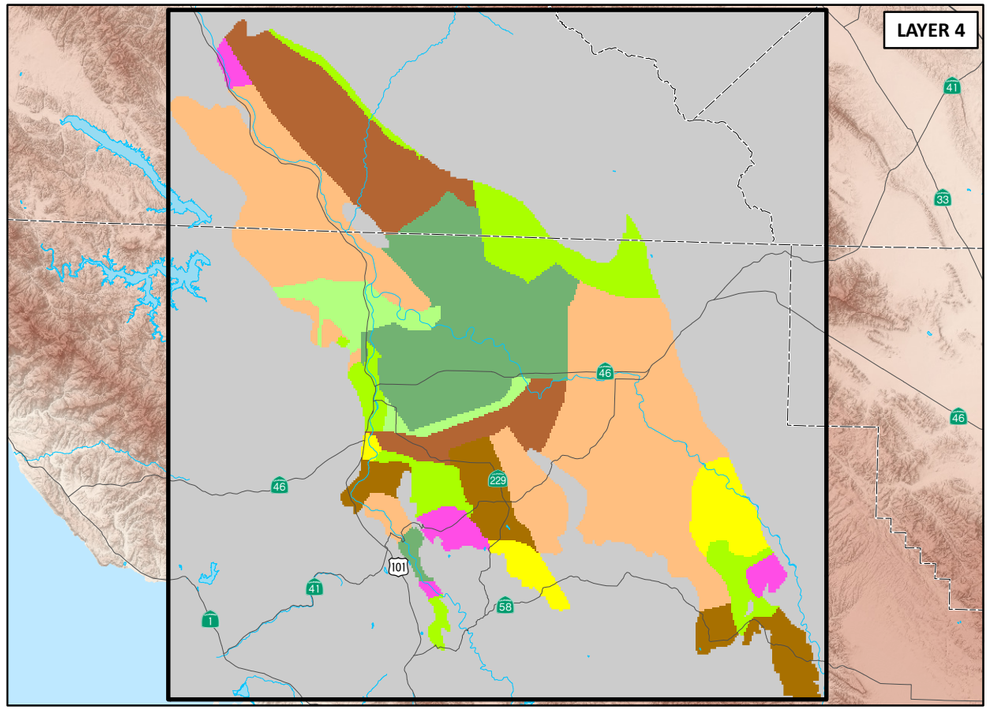
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE









HORIZONTAL HYDRAULIC CONDUCTIVITY FOR RECALIBRATED BASIN MODEL LAYERS 1 THROUGH 4

EXPLANATION

Hydraulic Conductivity (ft/day)

<0.25	20 - 50
0.25 - 0.5	50 - 100
0.5 - 0.75	100 - 200
0.75 - 1	200 - 300
1 - 2	350
2 - 5	450
5 - 10	550
10 - 20	

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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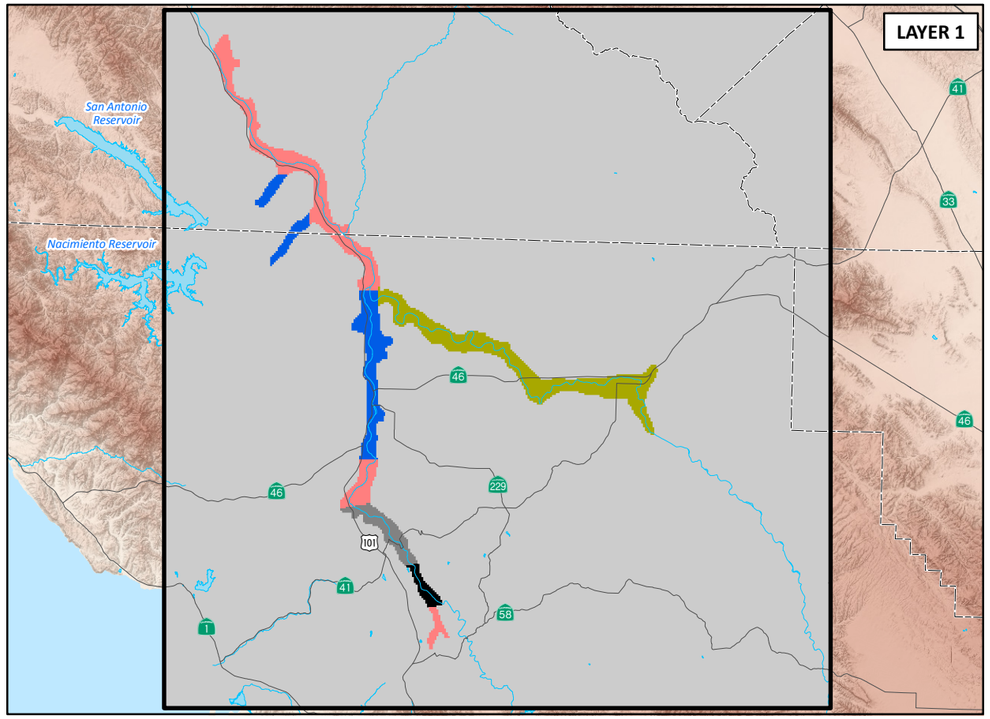
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

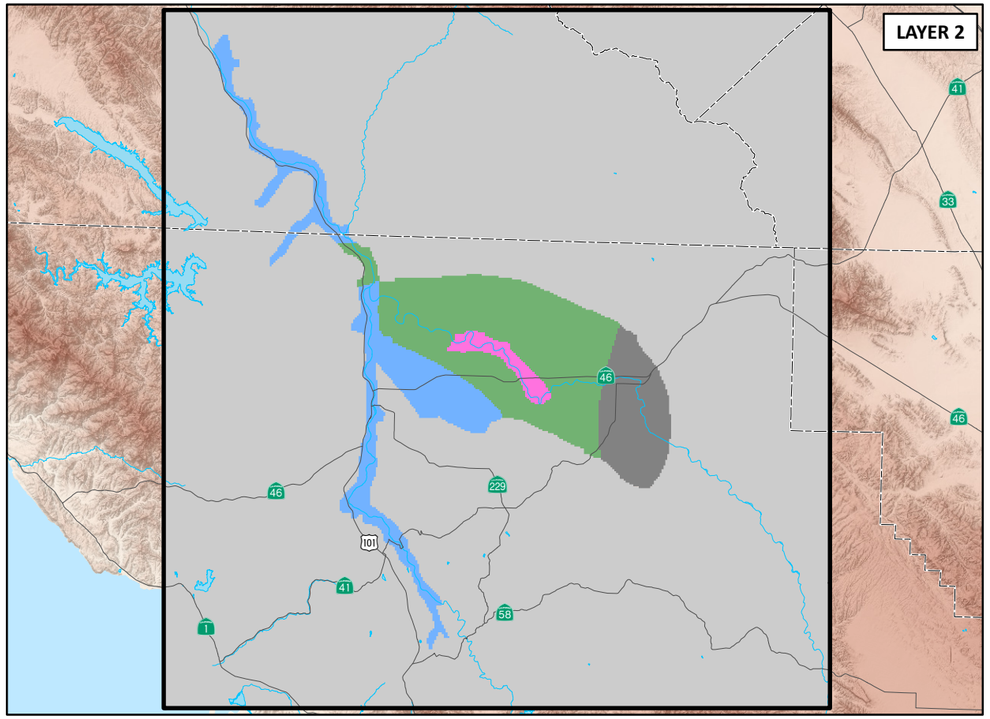
Figure 83

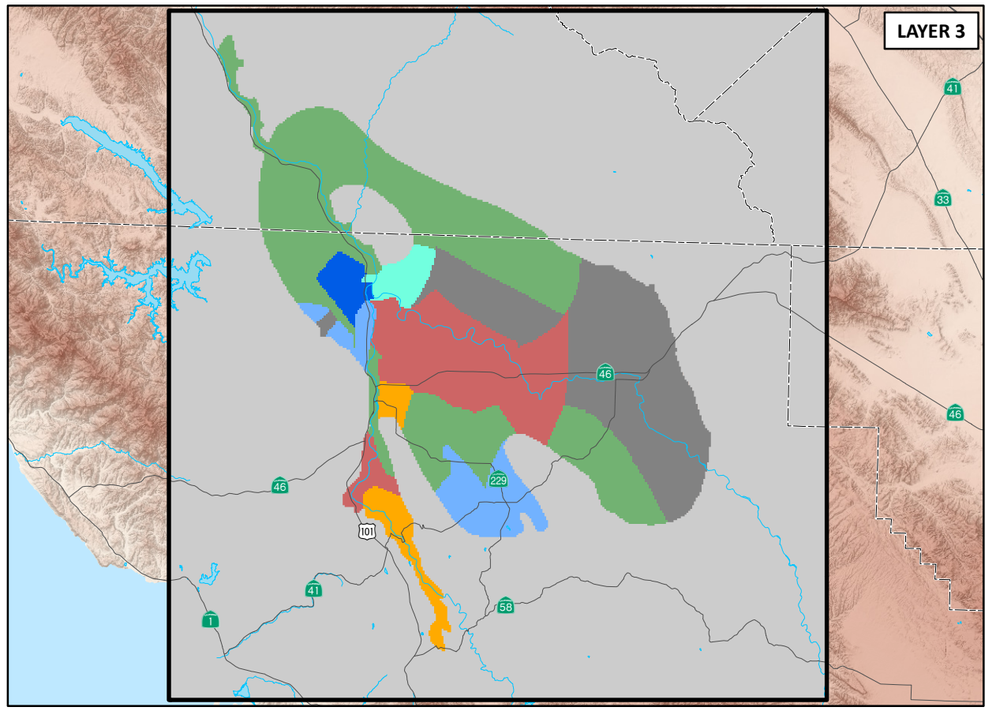
GIS_proj/co_slo_paso_robles_model/6_Fig_83_horiz_conductivity_12-14.mxd

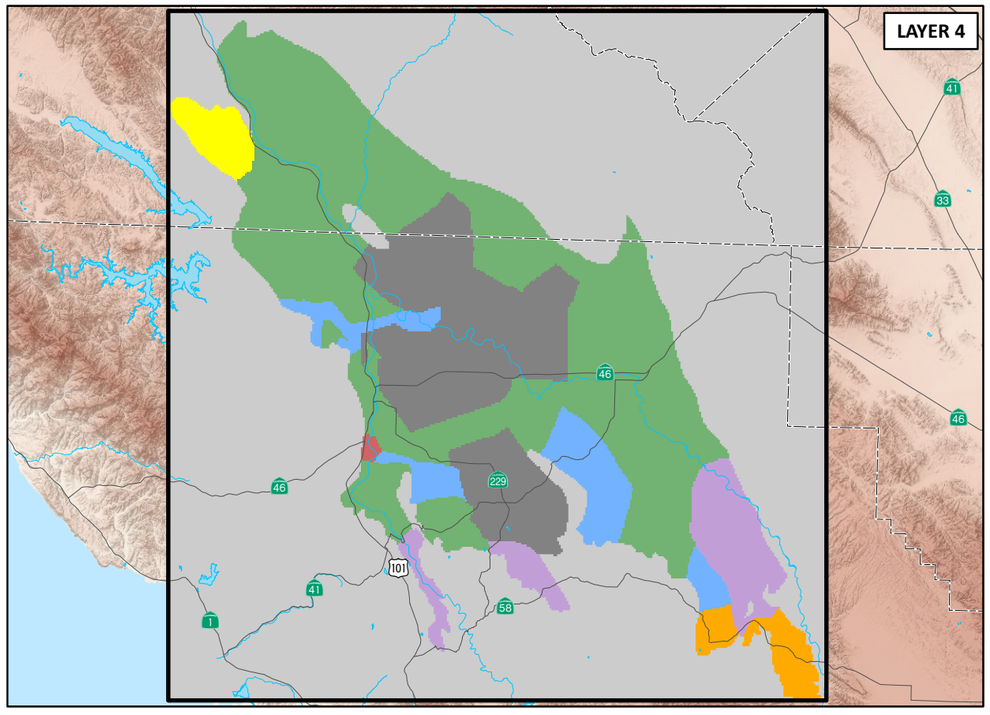
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE









VERTICAL HYDRAULIC CONDUCTIVITY FOR RECALIBRATED BASIN MODEL LAYERS 1 THROUGH 4

EXPLANATION

Vertical Hydraulic Conductivity (ft/day)

<0.002	0.15
0.002 - 0.01	0.2
0.01 - 0.02	0.4
0.02 - 0.03	0.5
0.03 - 0.1	0.8
0.125	1

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

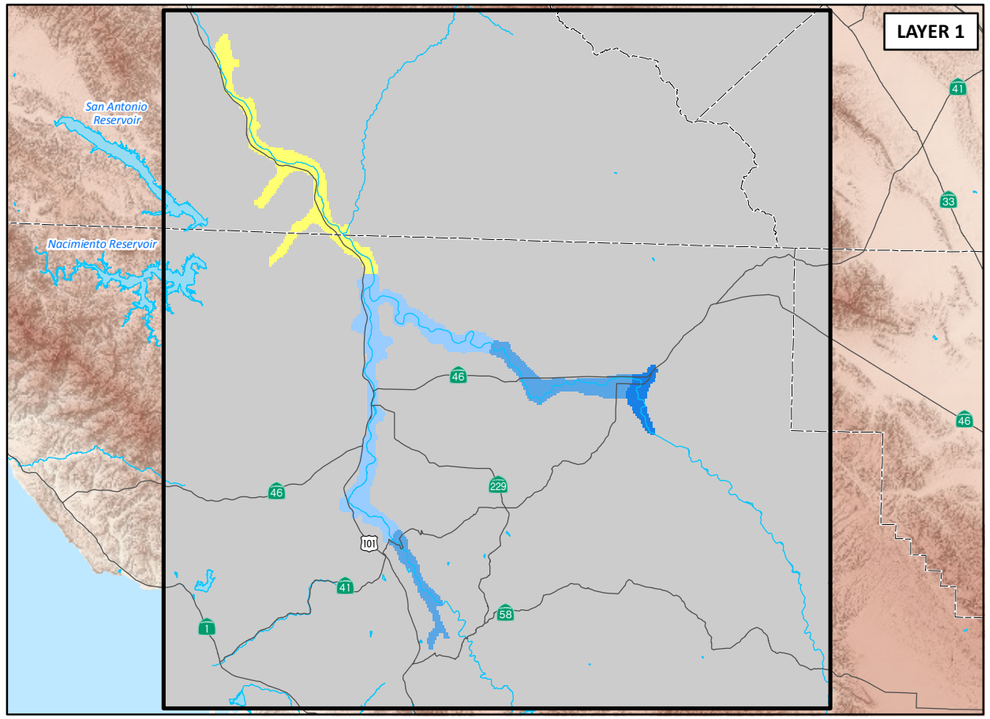
Figure 84

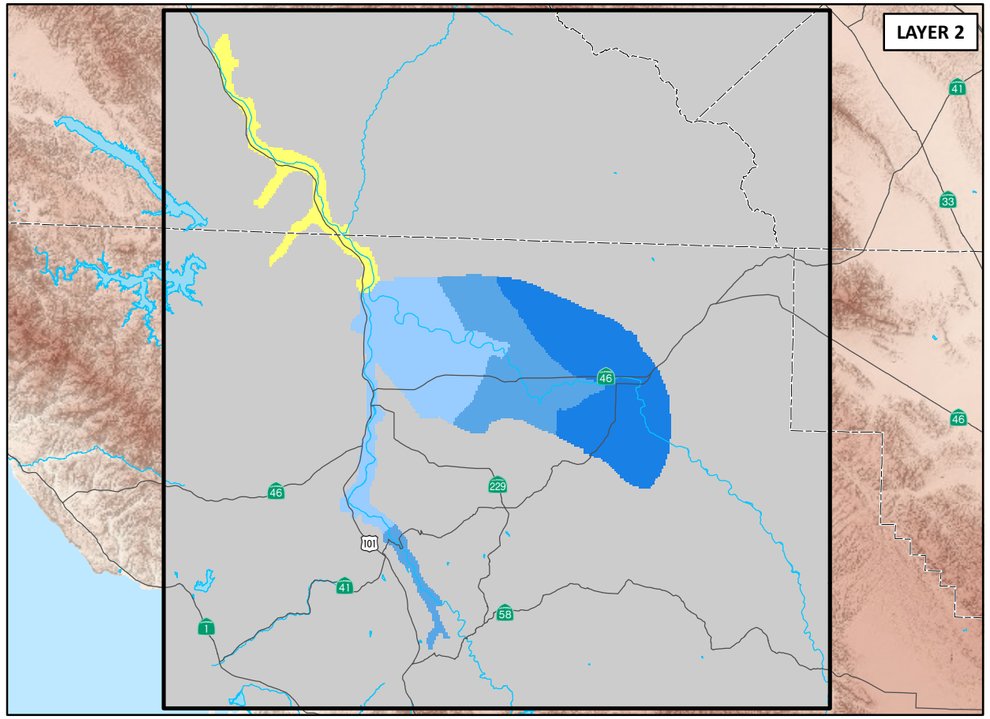
GIS_proj/co_slo_paso_robles_model/6_Fig_84_vert_conductivity_12-14.mxd

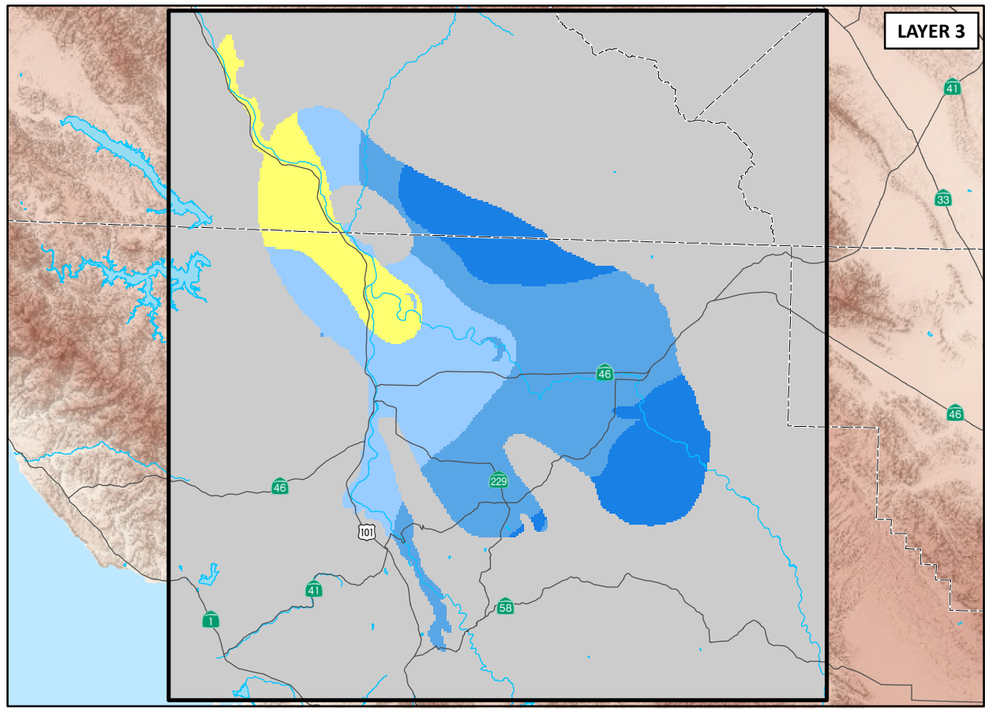
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

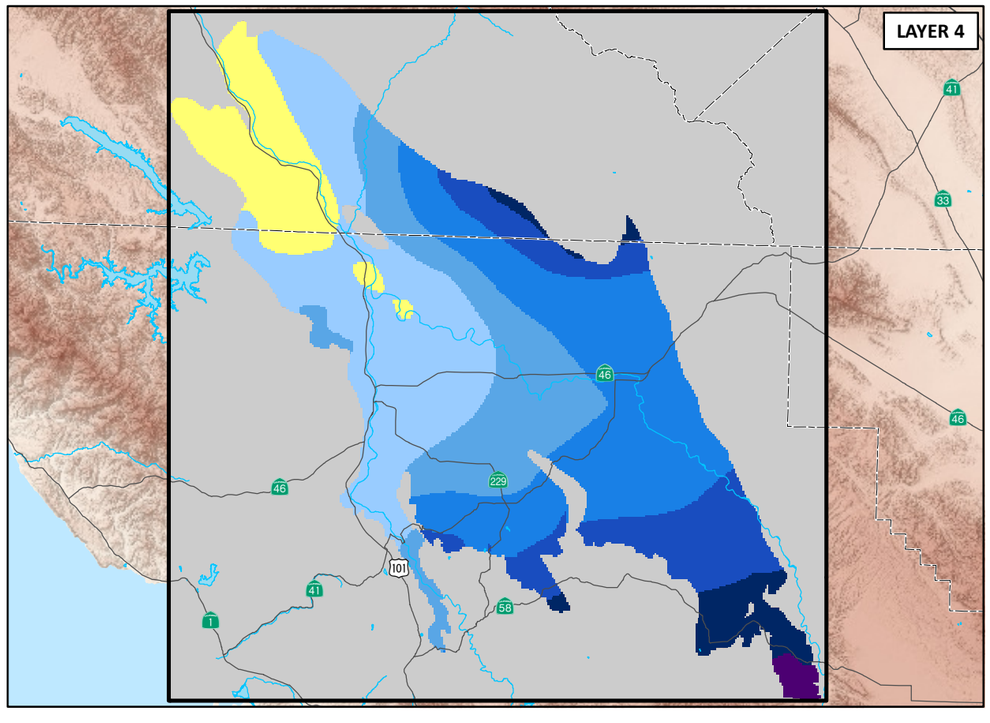
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

REVISED INITIAL GROUNDWATER ELEVATIONS (OCTOBER 1980)









EXPLANATION

Initial Groundwater Elevation (ft amsl)

- 400 - 600
- 600 - 800
- 800 - 1,000
- 1,000 - 1,200
- 1,200 - 1,400
- 1,400 - 1,600
- 1,600 - 1,625

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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Figure 85

19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

GIS_proj/co_slo_paso_robles_model/6_Fig_85_init_gw_elev_Oct1980_4panel_12-14.mxd

Annual Recharge from Deep Percolation of Streambed Seepage
Water Years 1981-2011

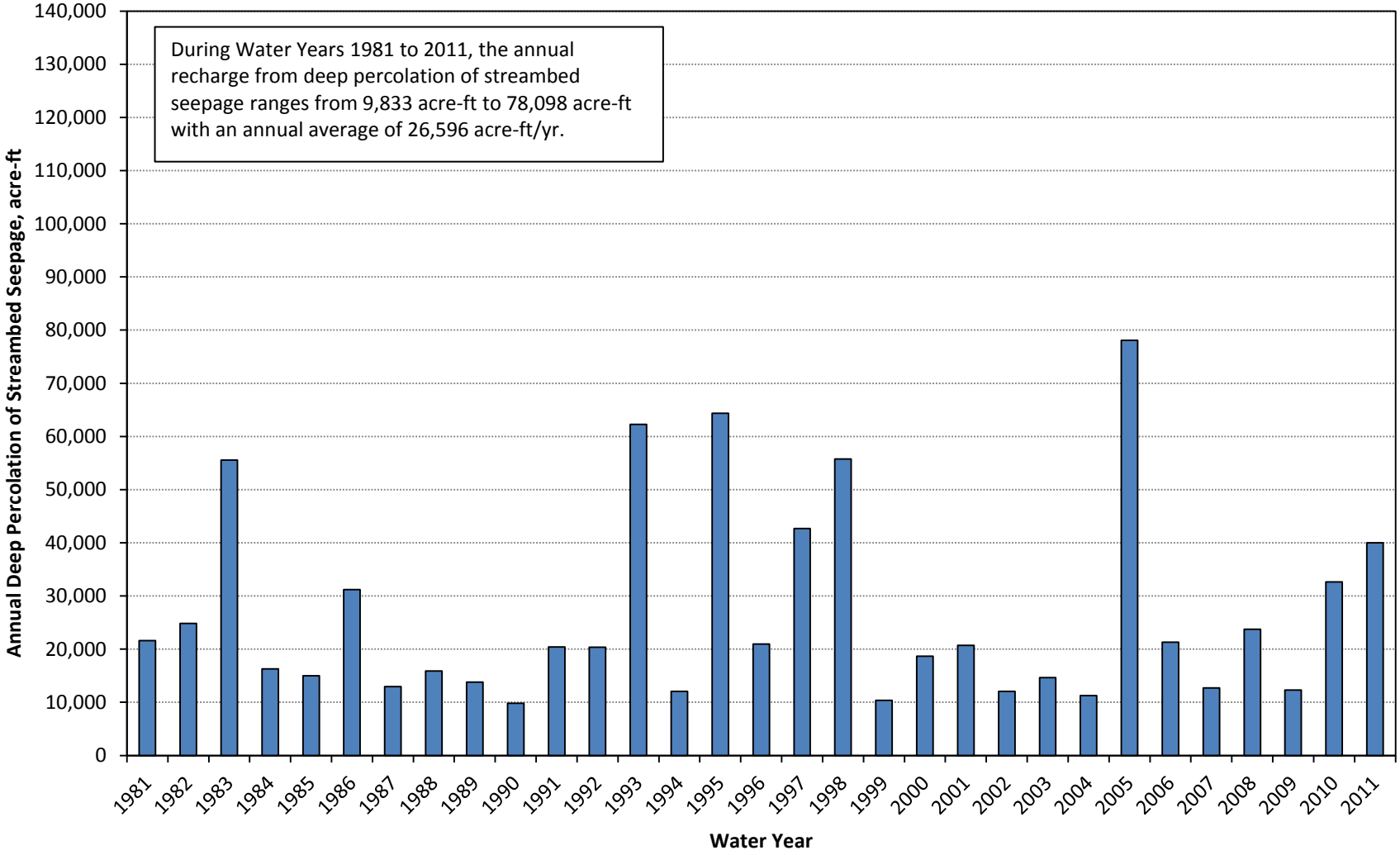


Figure 86

Annual Recharge from Deep Percolation of Direct Precipitation and Return Flow from Applied Water
Water Years 1981-2011

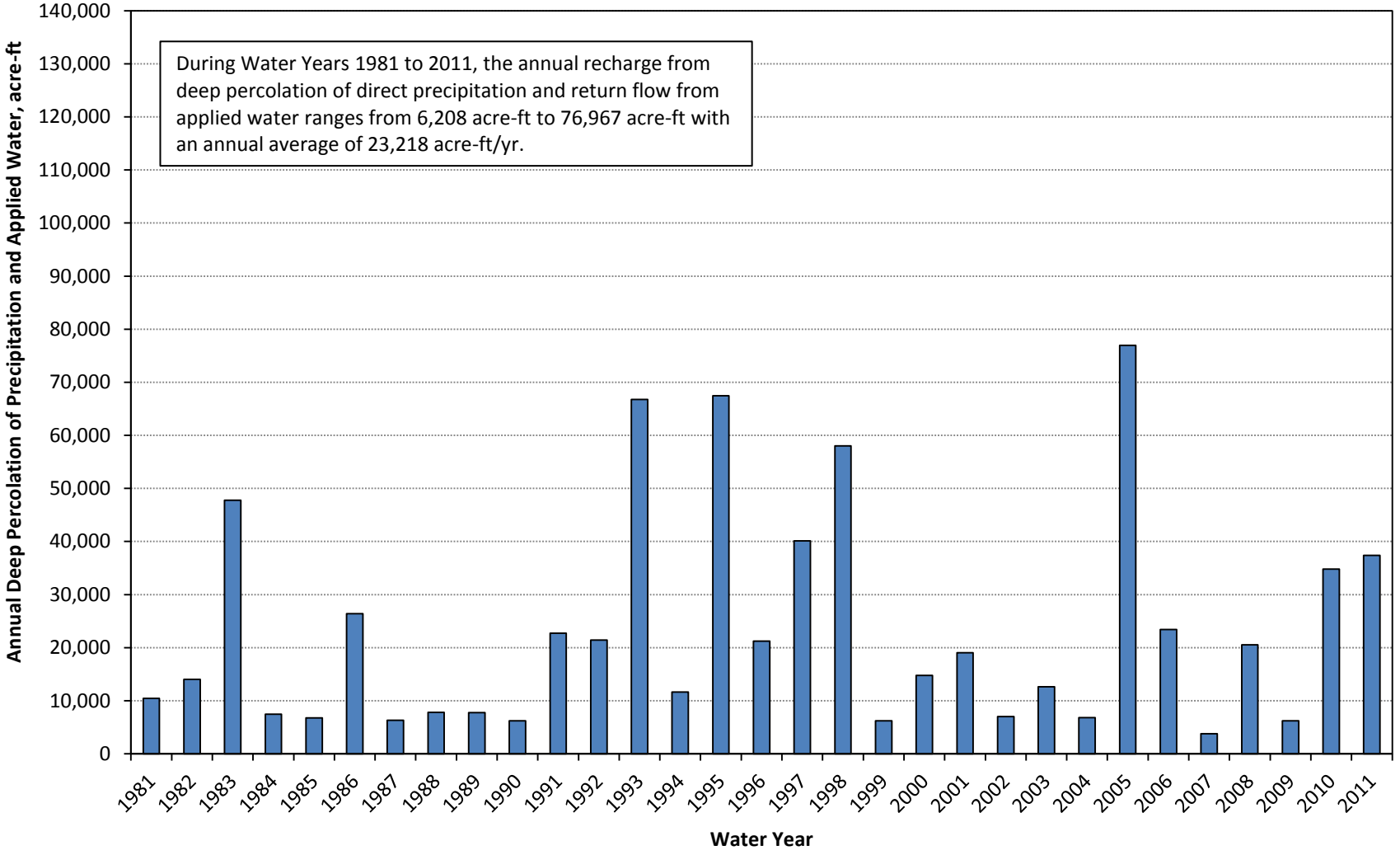


Figure 87

Annual Recharge from Subsurface Inflow through Basin Boundary
Water Years 1981-2011

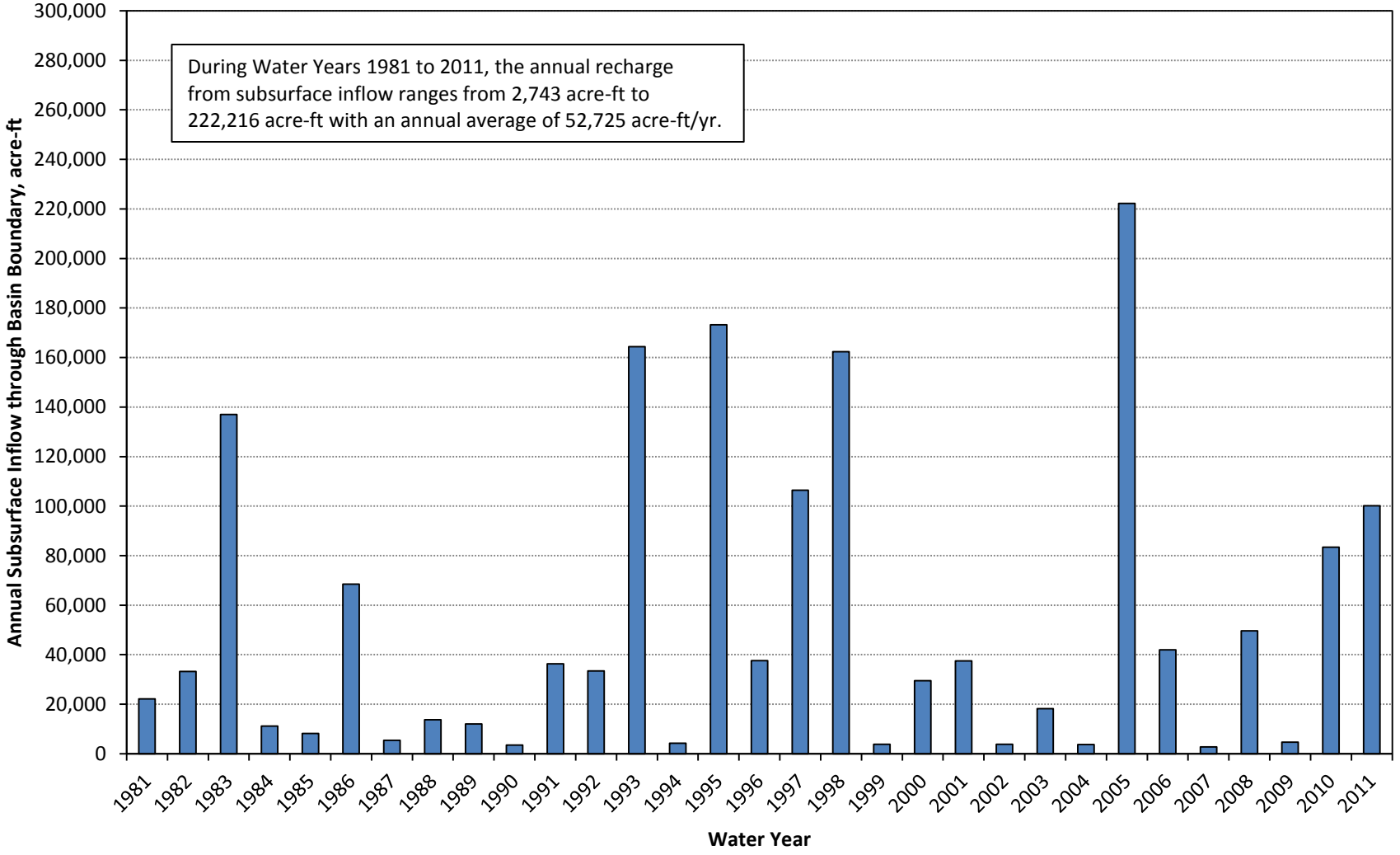


Figure 88

Annual Discharge from Subsurface Outflow through Basin Boundary
Water Years 1981-2011

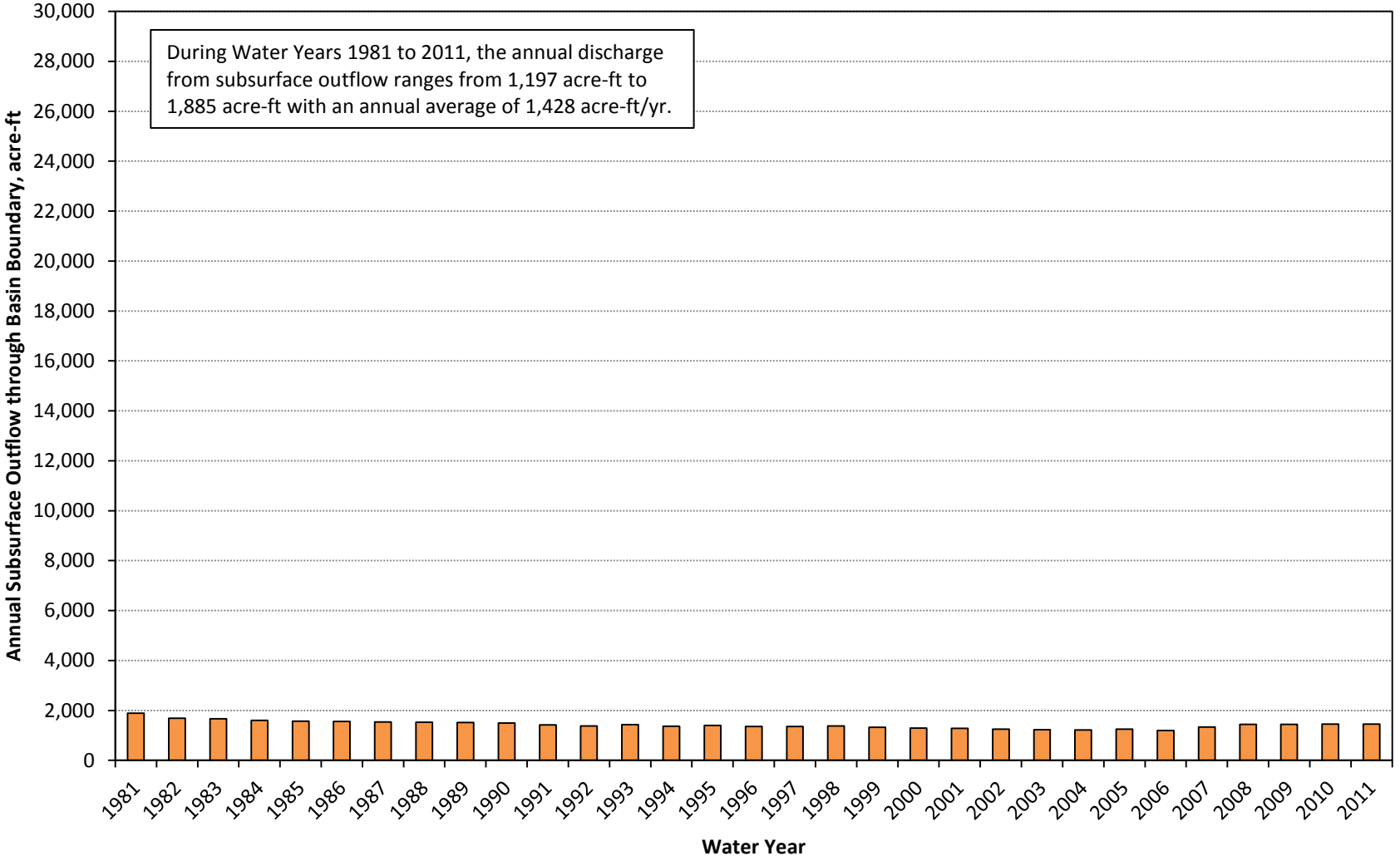


Figure 89

Annual Groundwater Discharge to Rivers
Water Years 1981-2011

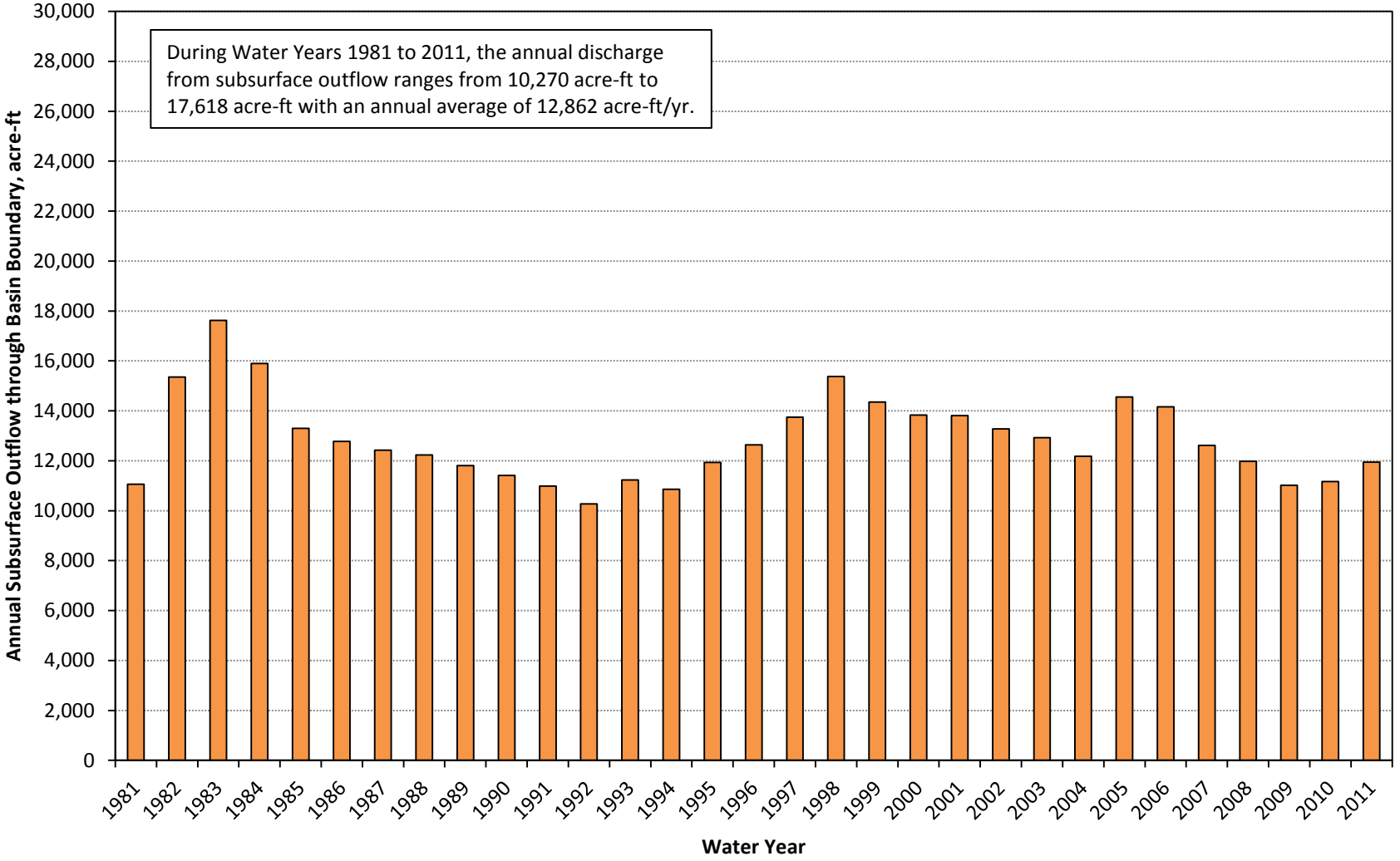


Figure 90

Annual Inflow for Paso Robles Groundwater Basin
Water Years 1981-2011

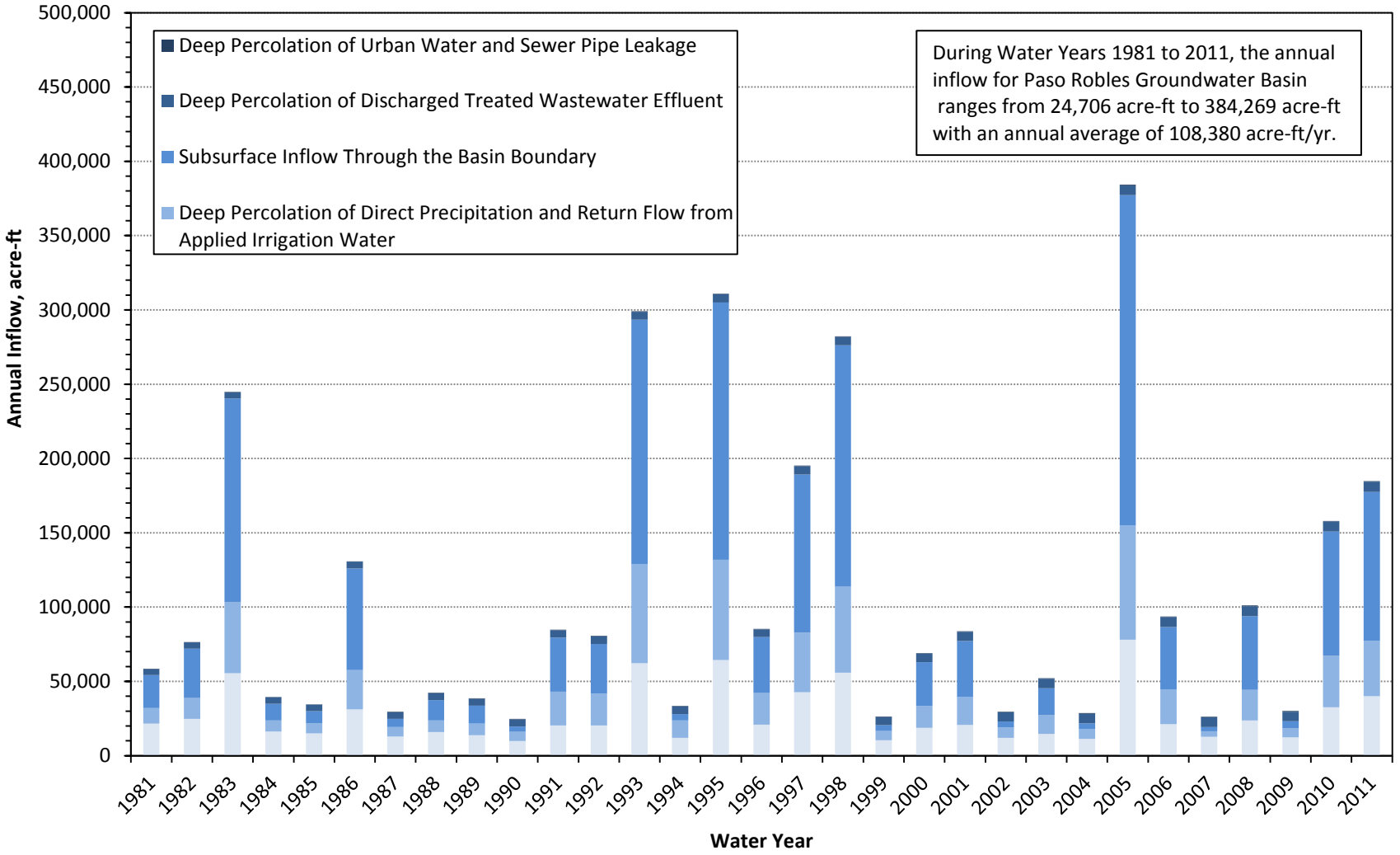


Figure 91

Annual Outflow for Paso Robles Groundwater Basin
Water Years 1981-2011

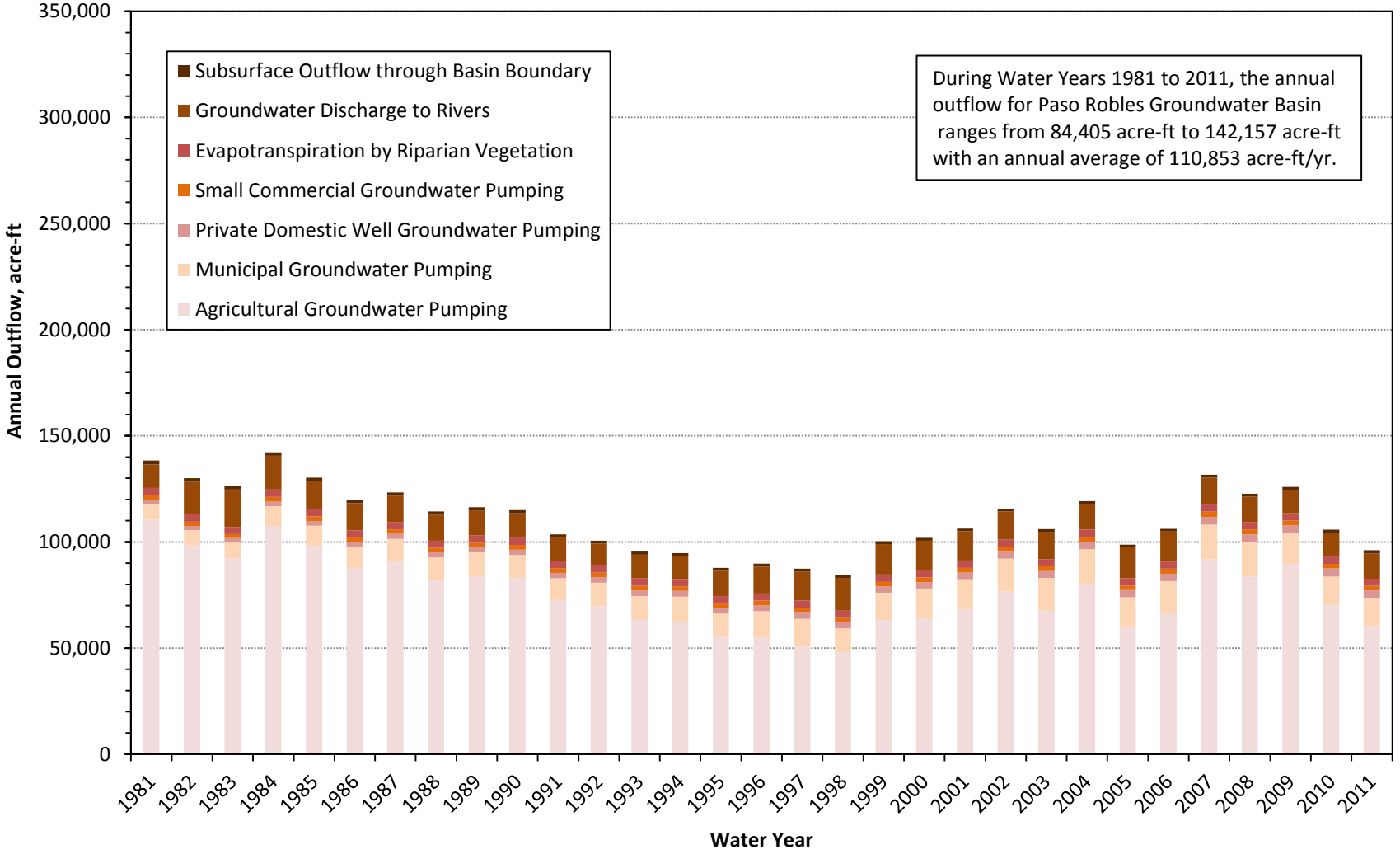
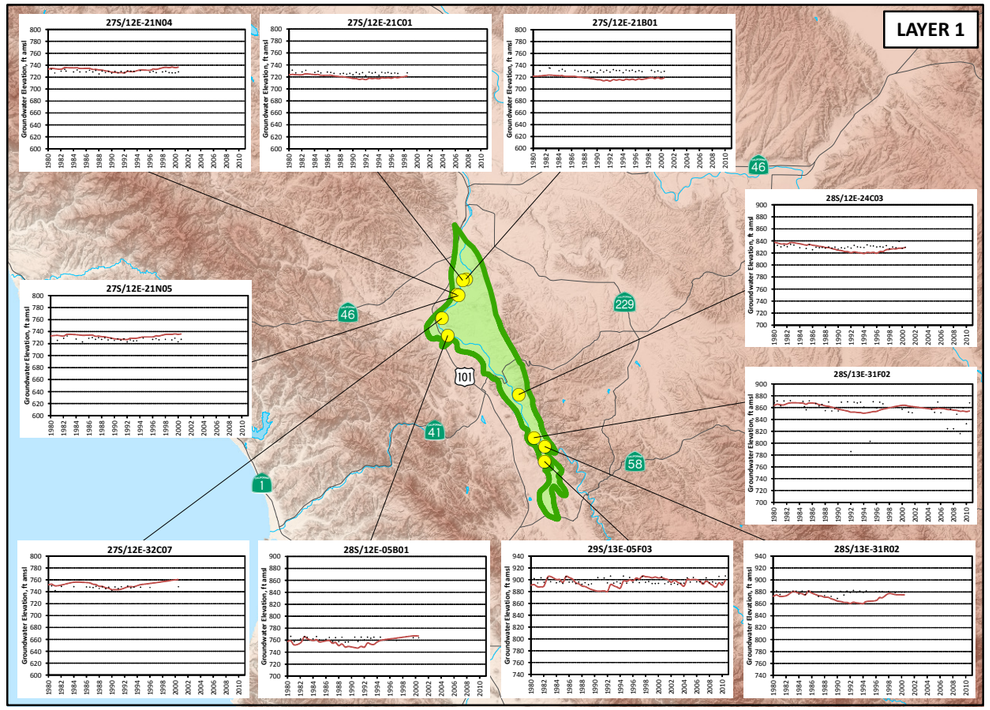


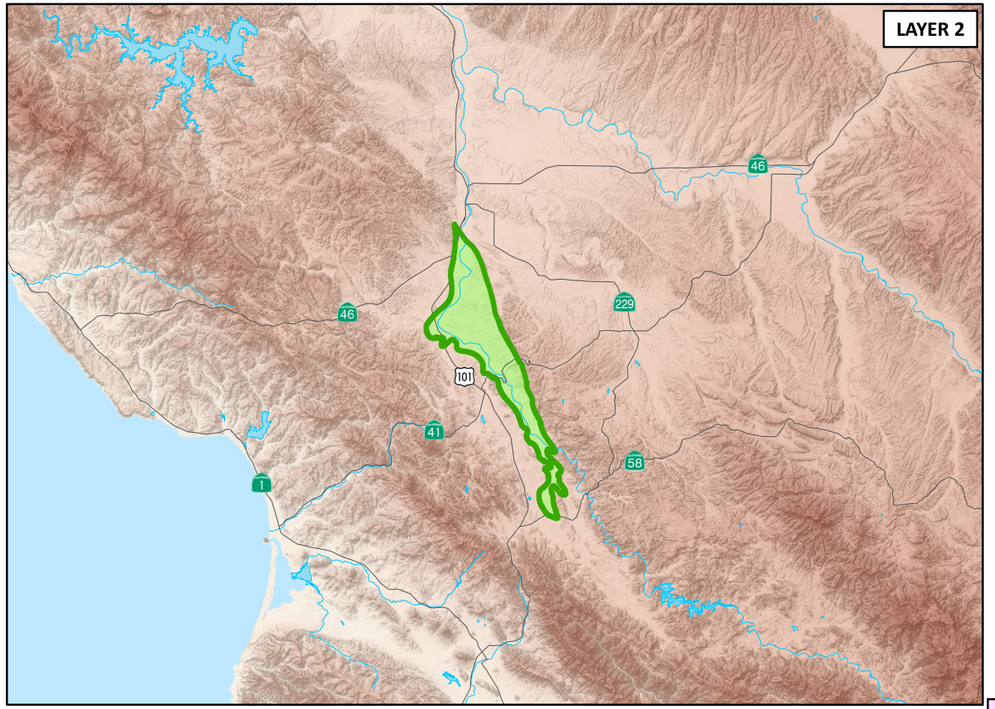
Figure 92

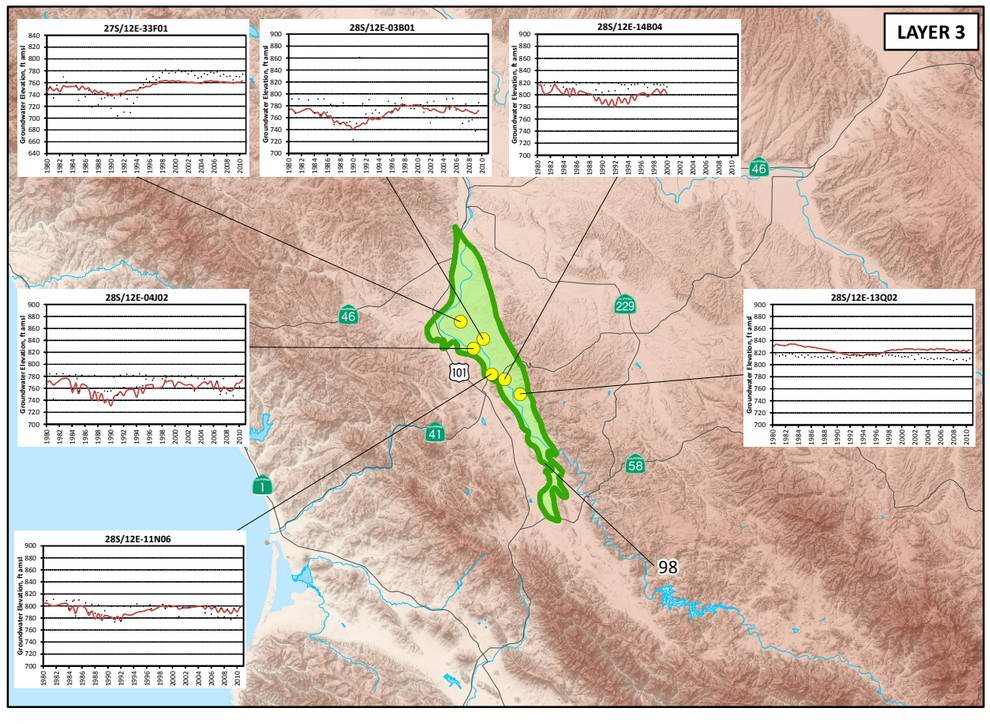
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

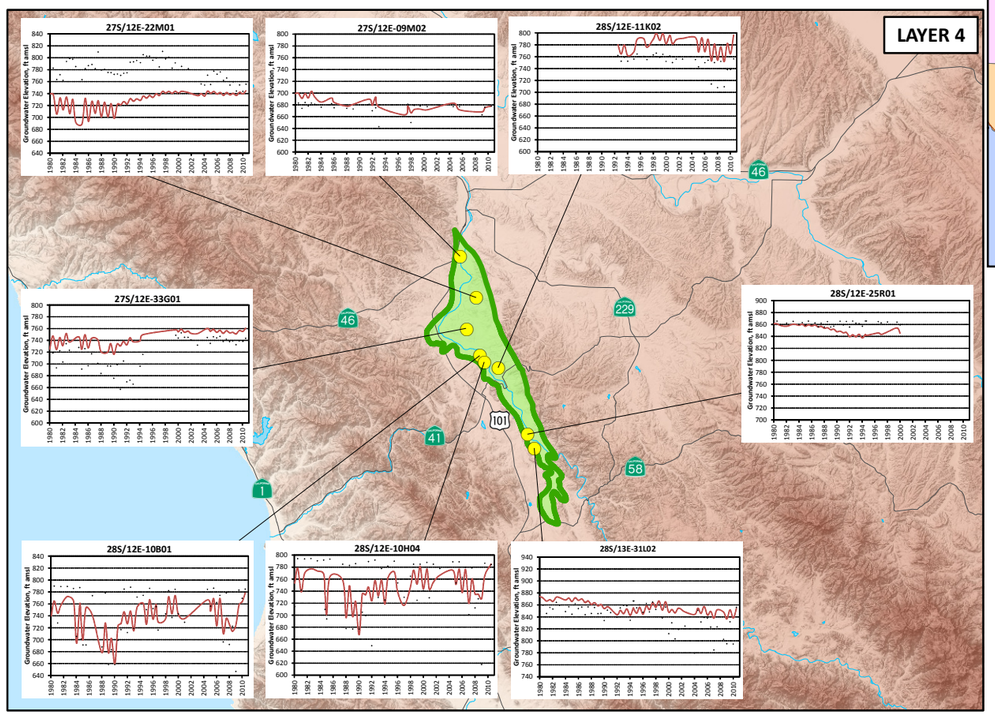
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL ATASCADERO SUB-BASIN





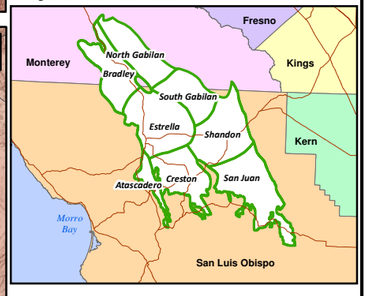




EXPLANATION

- Well Designation Within Subbasin
- Observed
- Model Generated
- Paso Robles Groundwater Basin with Sub-Area (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 93

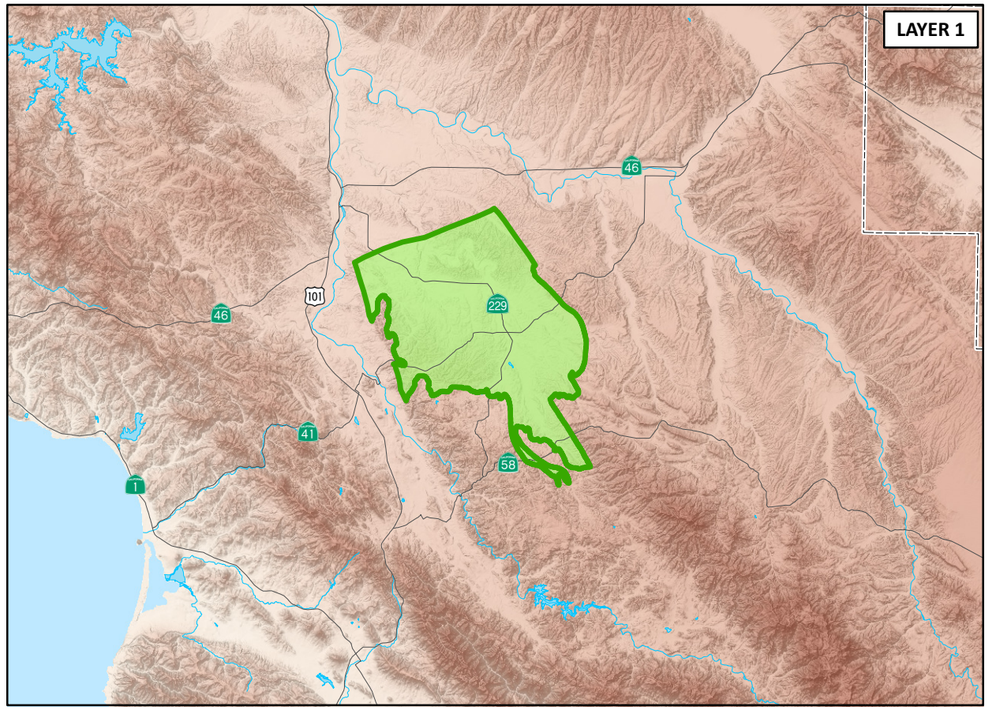
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

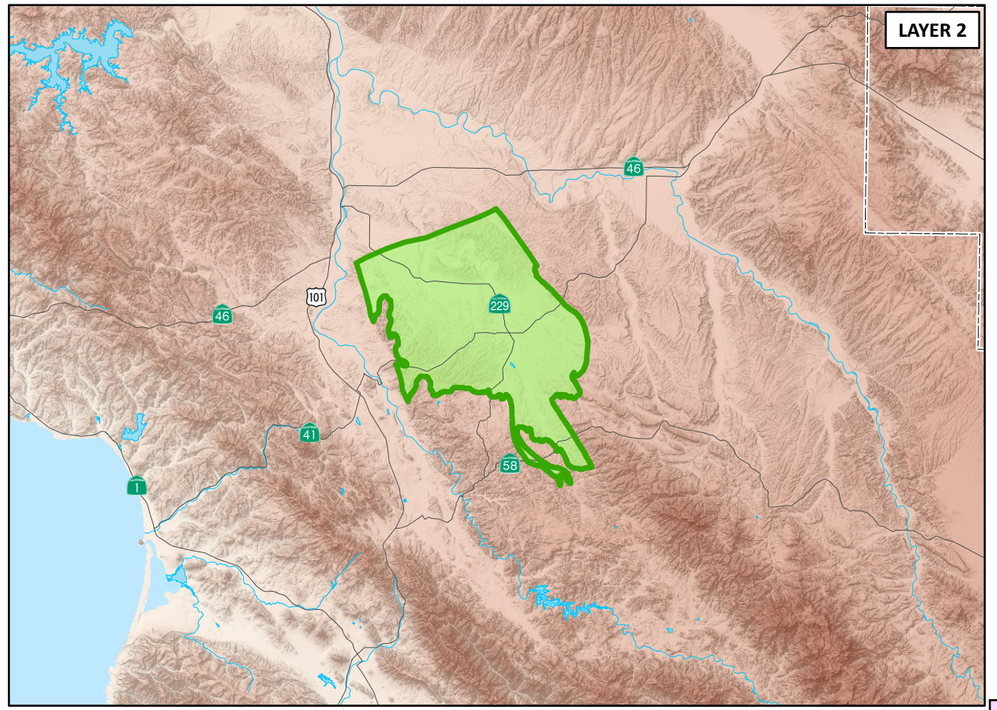
GIS_proj/co_slo_paso_robles_model/6_Fig_93_Hydrograph_AtascaderoSubbasin_12-14.mxd

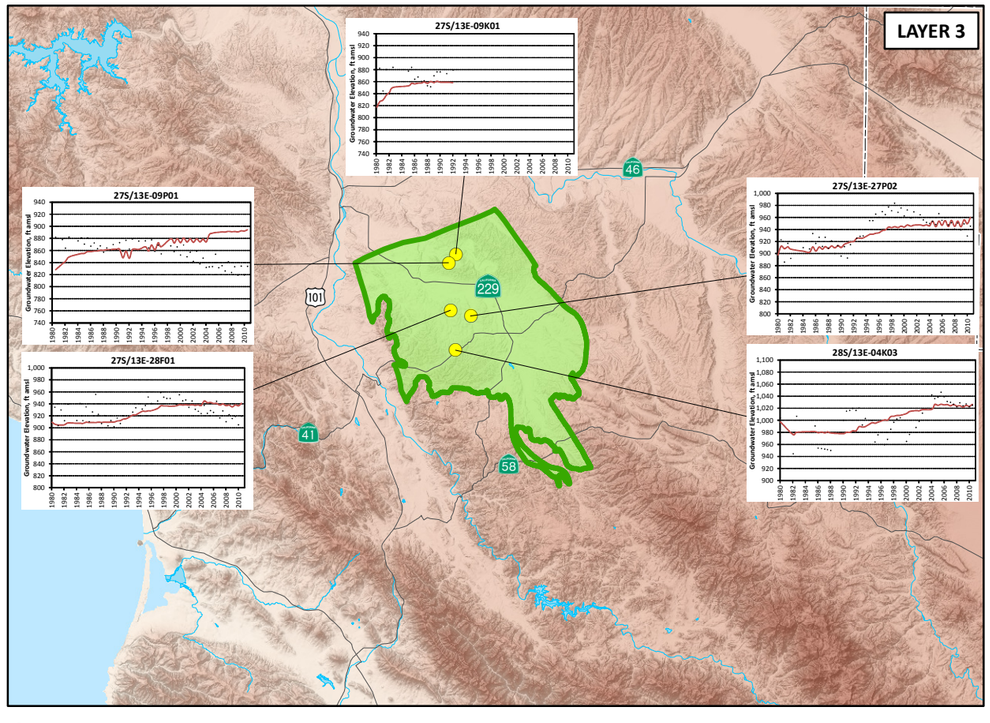
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

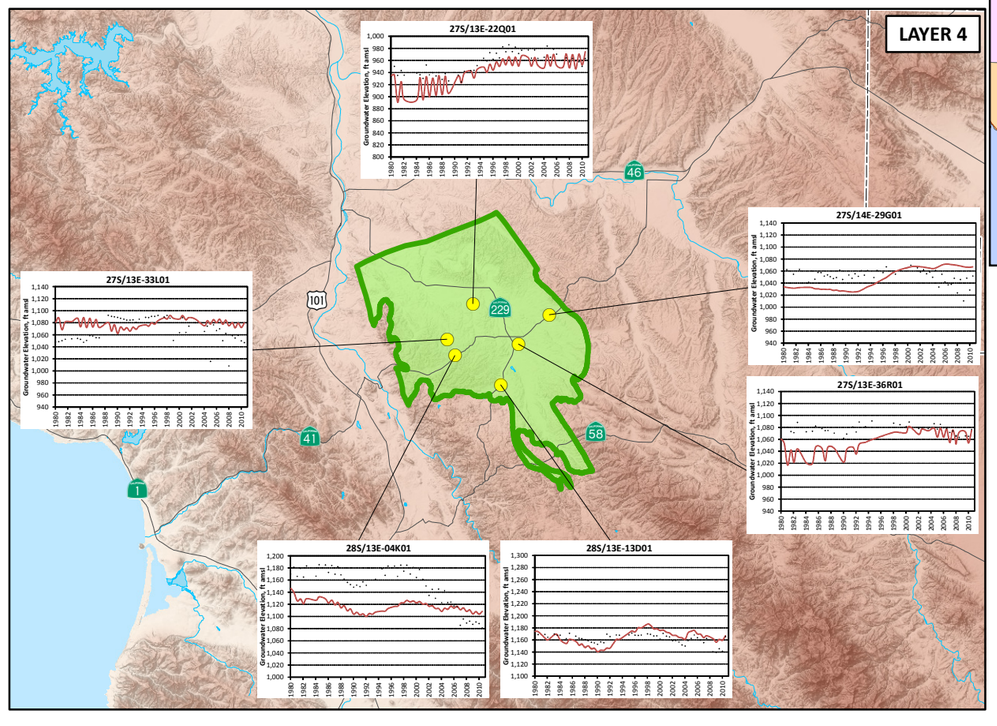
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL CRESTON SUB-AREA





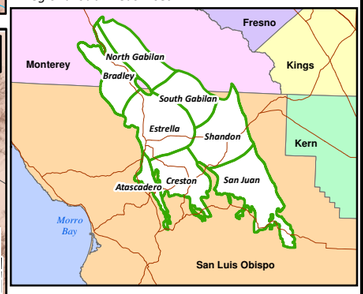




EXPLANATION

- Well Designation Within Sub-area
- Observed
- Model Generated
- Paso Robles Groundwater Basin with Sub-Area (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 94

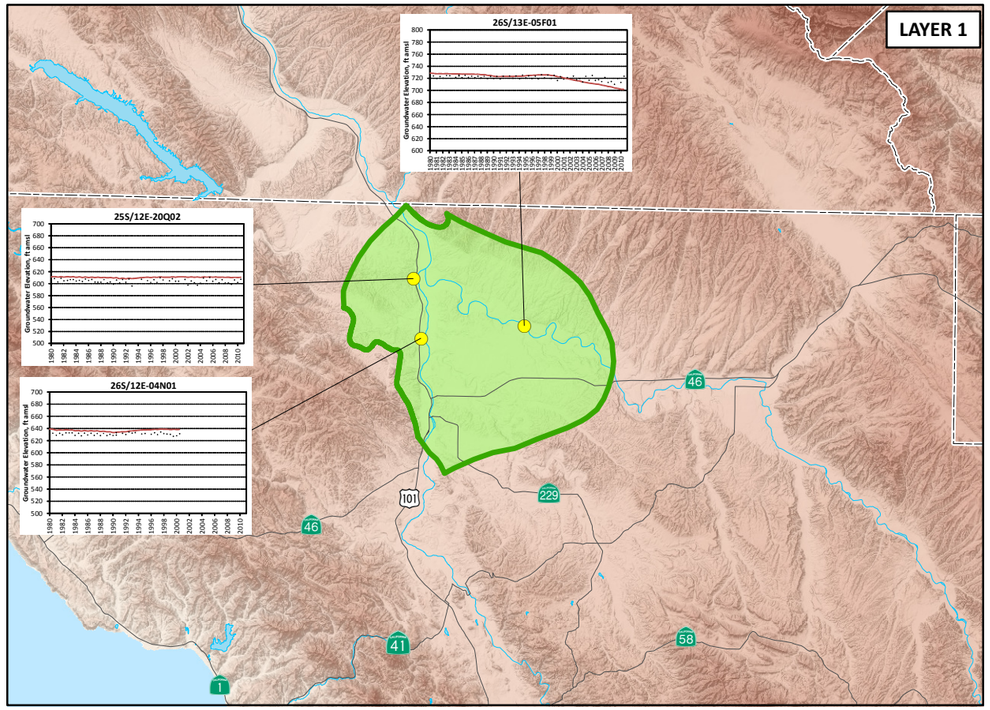
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

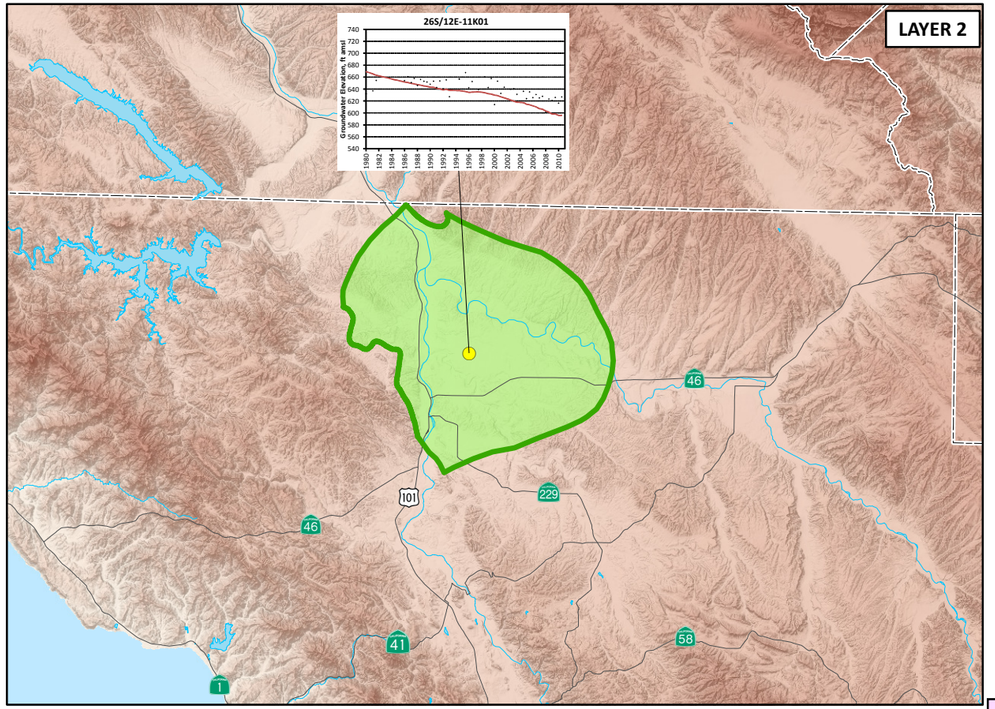
GIS_proj/co_slo_paso_robles_model/6_Fig_94_Hydrograph_CrestonSubarea_12-14.mxd

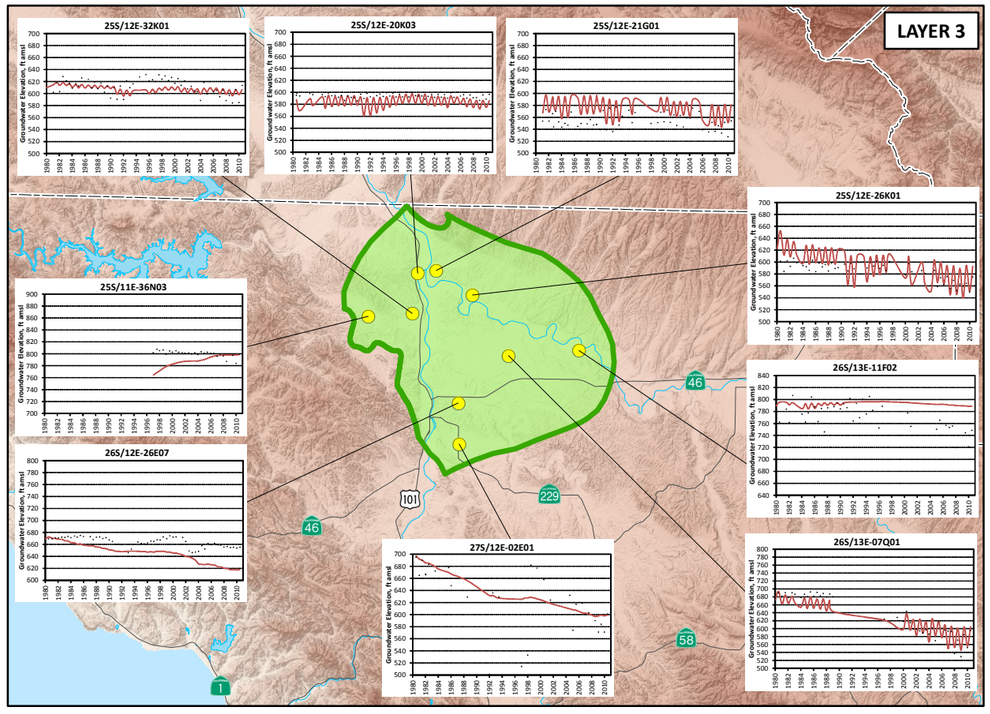
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

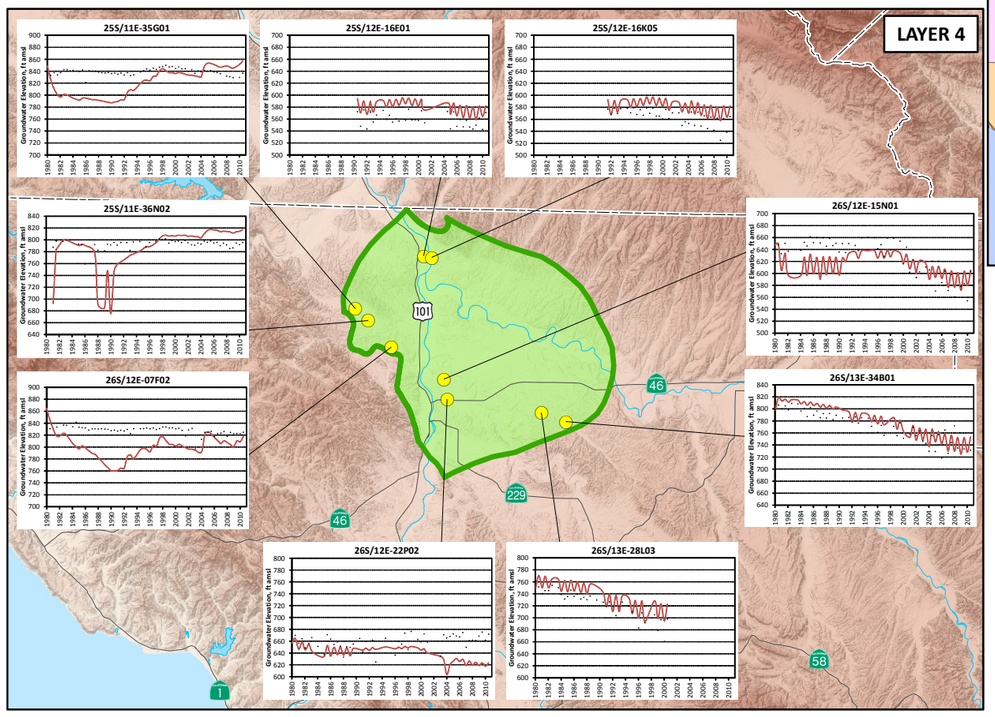
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL ESTRELLA SUB-AREA





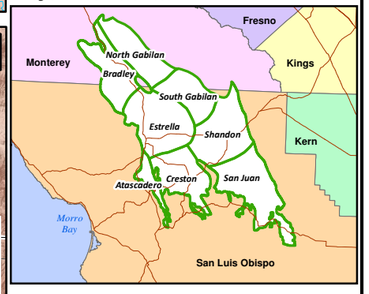




EXPLANATION

- Well Designation Within Sub-area
- Observed
- Model Generated
- Paso Robles Groundwater Basin with Sub-Area (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 95

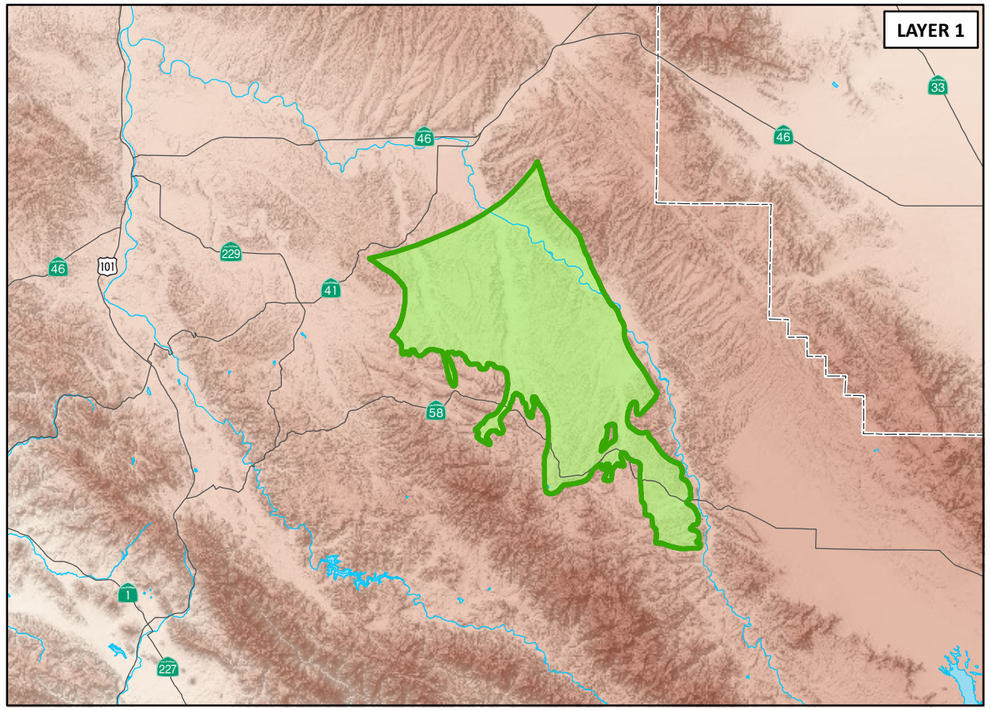
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

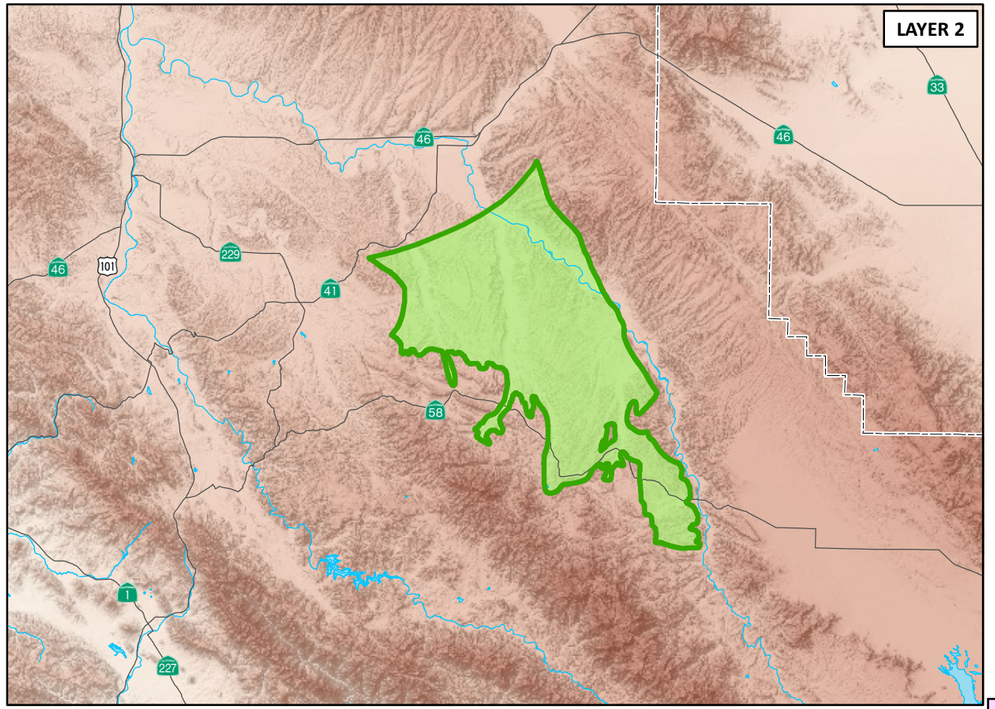
GIS_proj/co_slo_paso_robles_model/6_Fig_95_Hydrograph_EstrellaSubarea_12-14.mxd

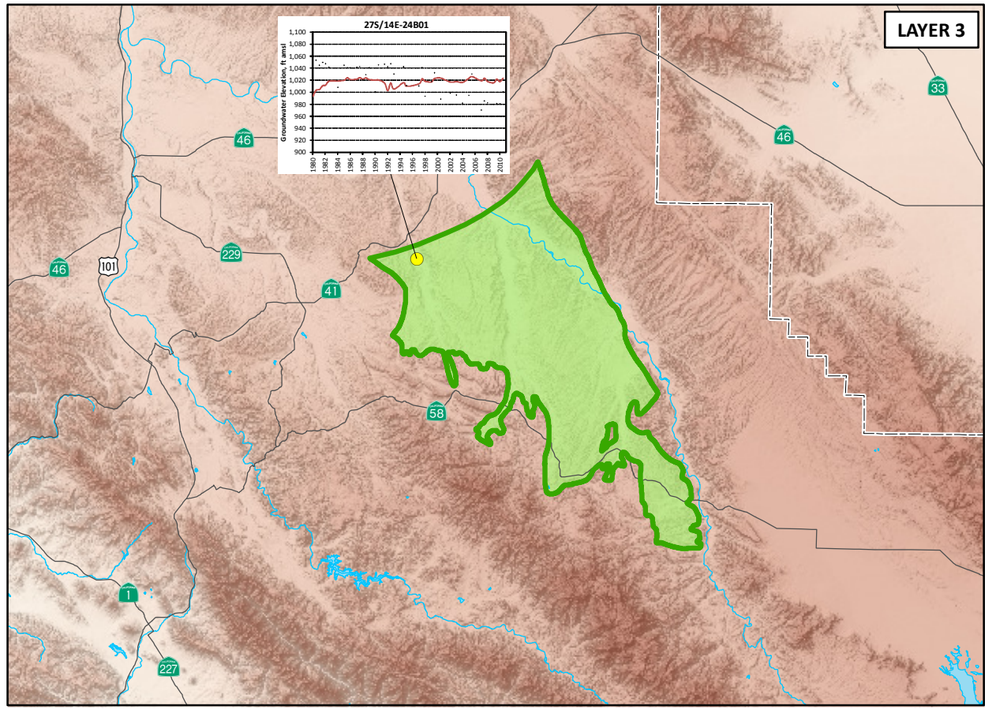
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

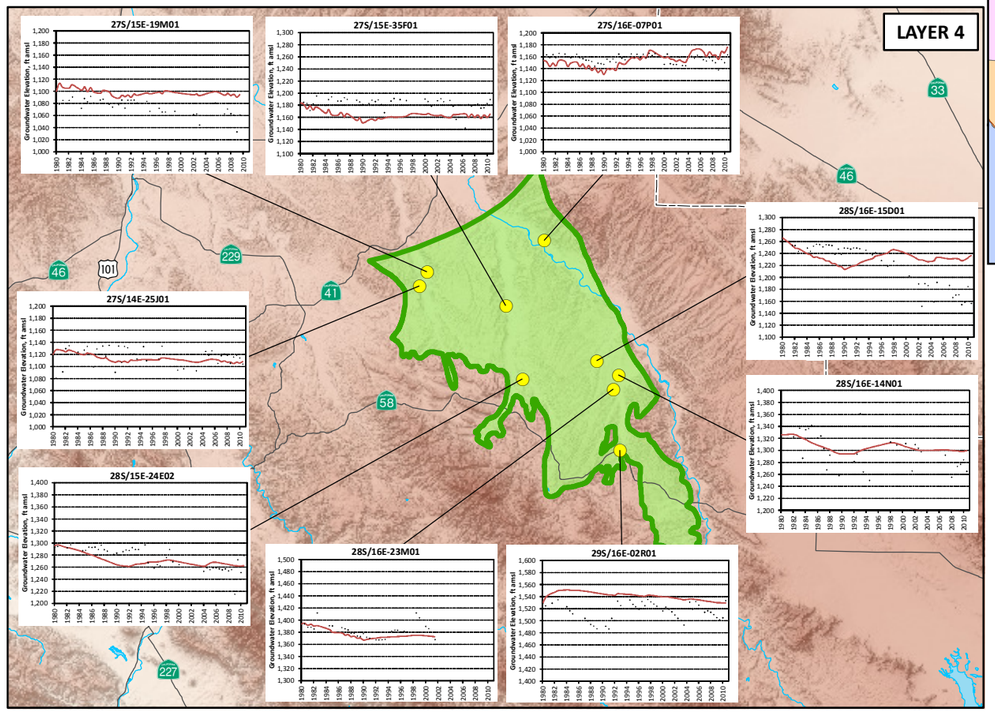
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL SAN JUAN SUB-AREA





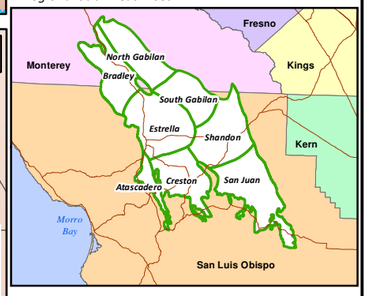




EXPLANATION

- Well Designation Within Sub-area
- Observed
- Model Generated
- Paso Robles Groundwater Basin with Sub-Area (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 96

GIS_proj/co_slo_paso_robles_model/6_Fig_96_Hydrograph_SanJuanSubarea_12-14.mxd

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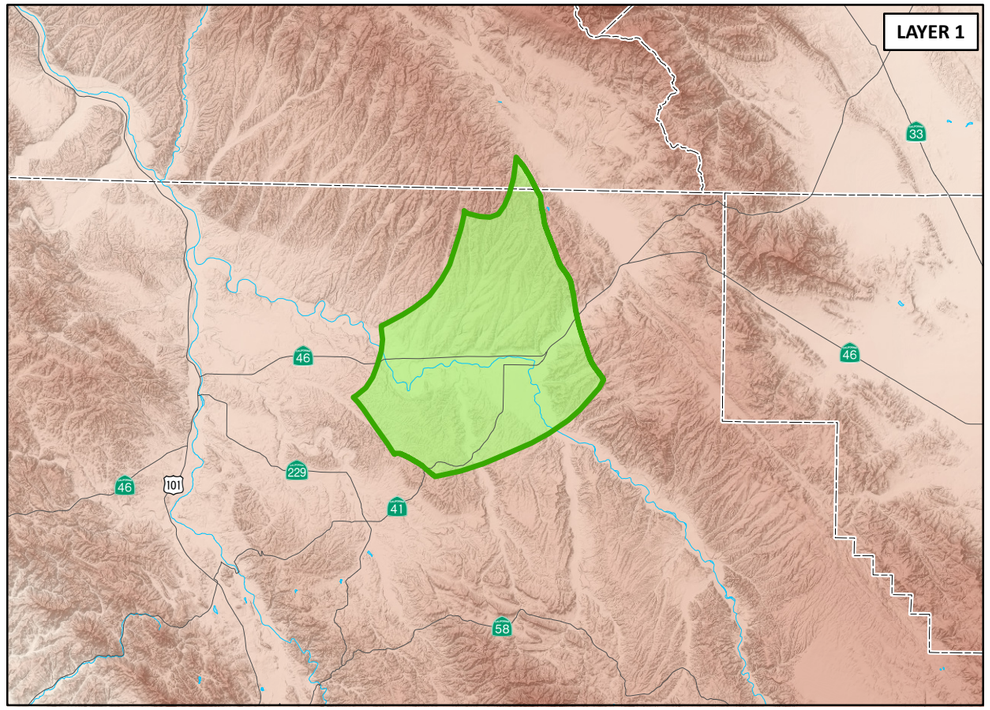
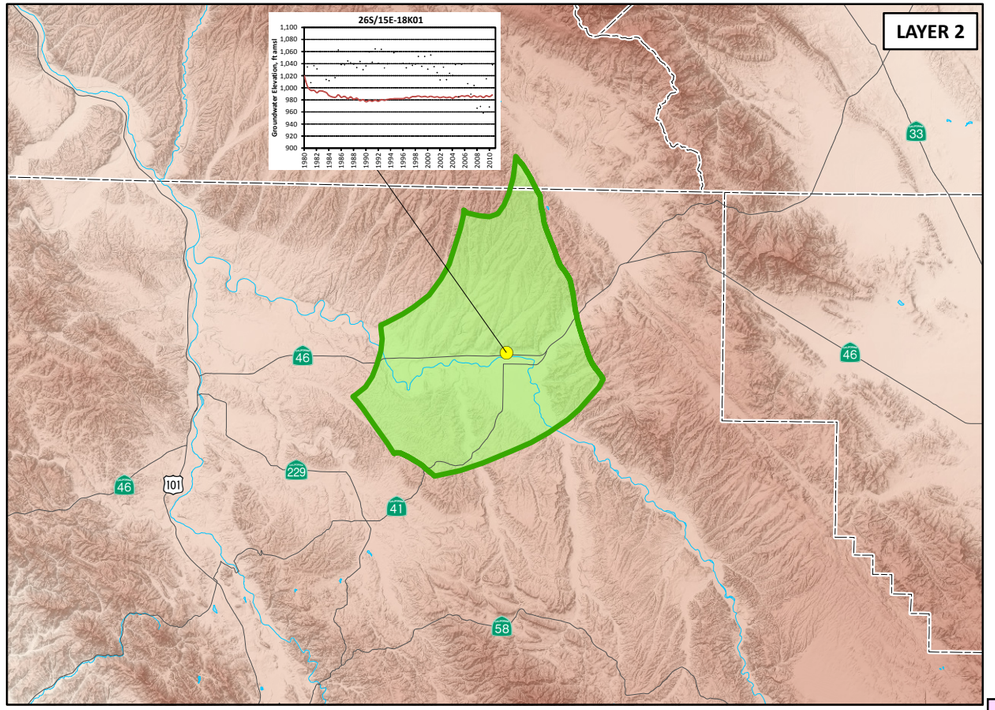
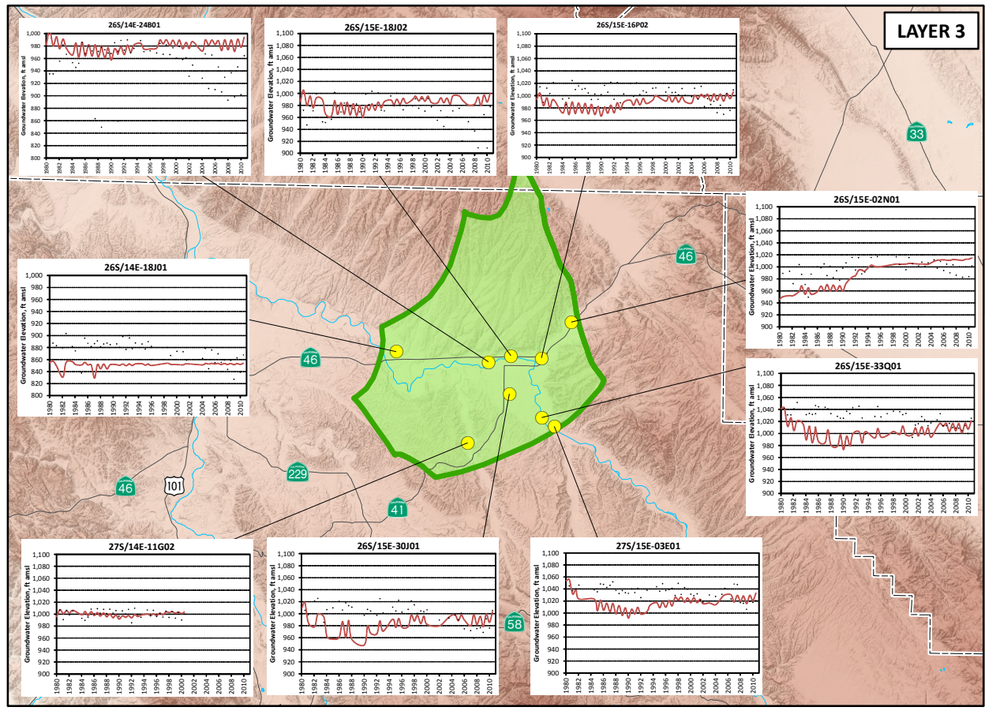
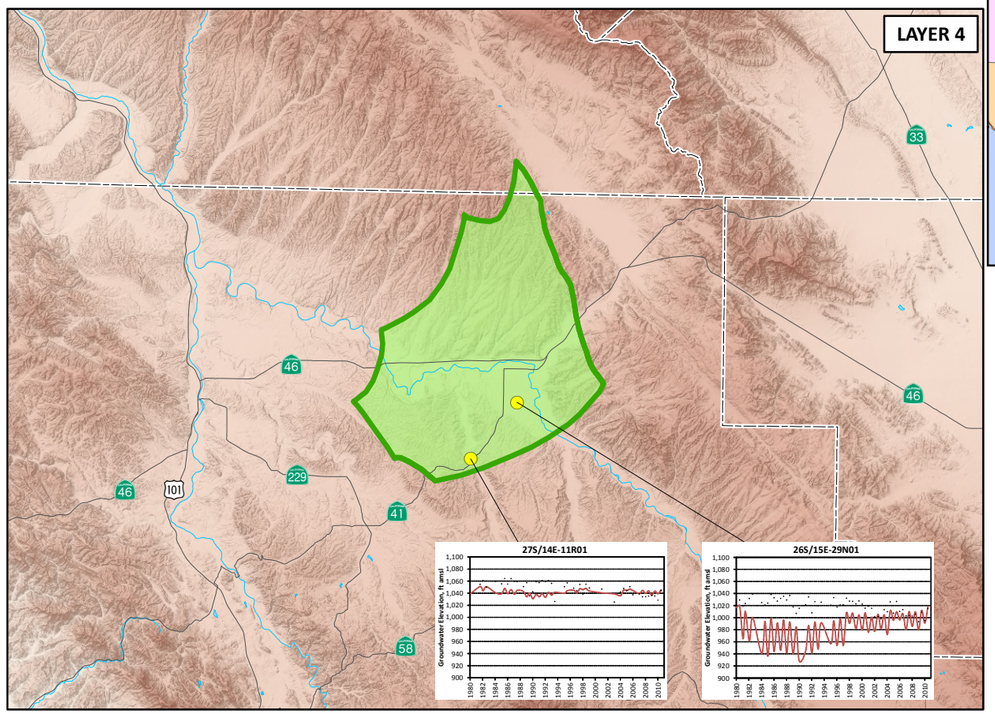
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL SHANDON SUB-AREA





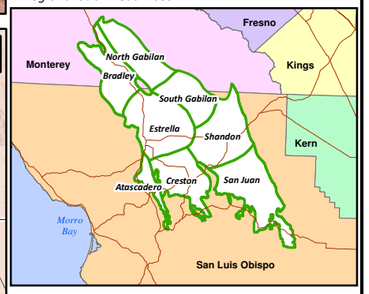




EXPLANATION

- Well Designation Within Sub-area
- Observed
- Model Generated
- Paso Robles Sub-Area Boundary (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 97

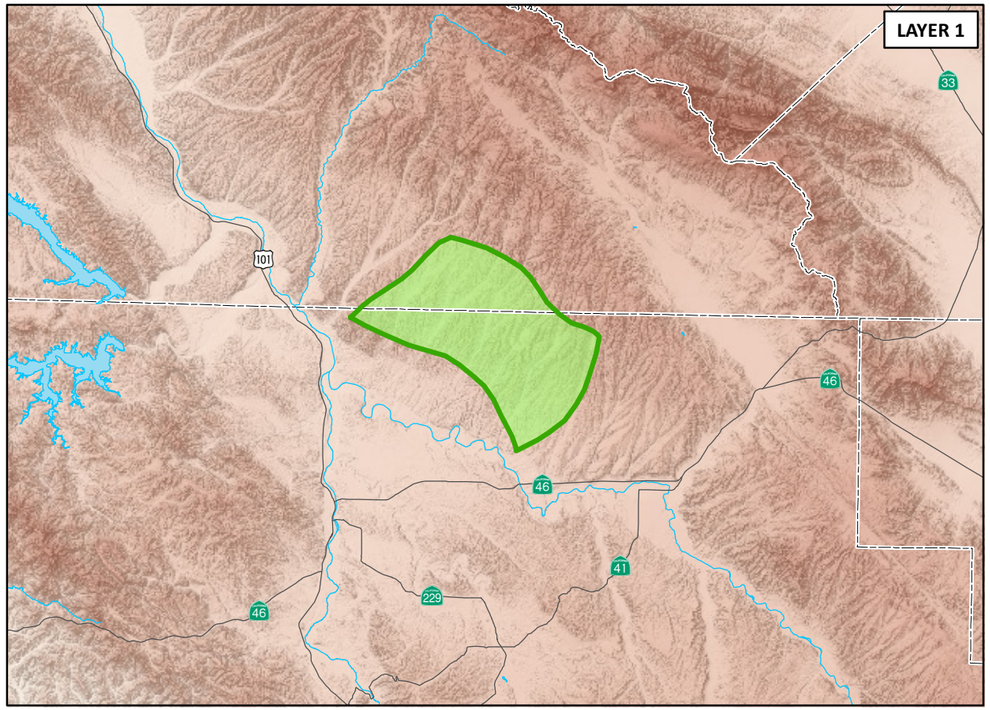
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

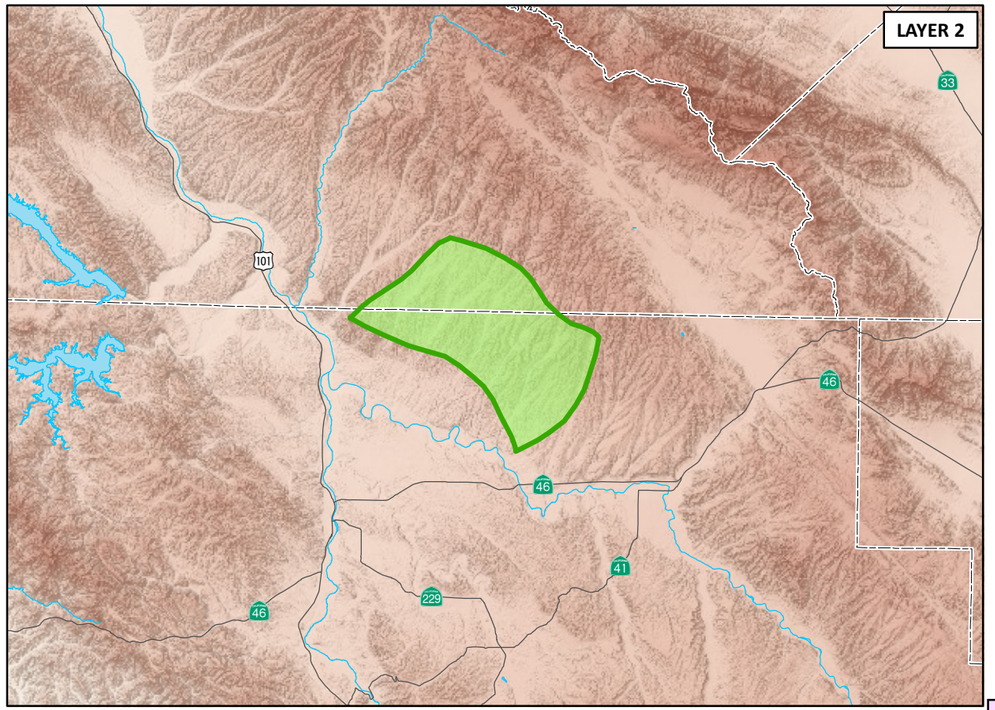
GIS_proj/co_slo_paso_robles_model/6_Fig_97_Hydrograph_ShandonSubarea_12-14.mxd

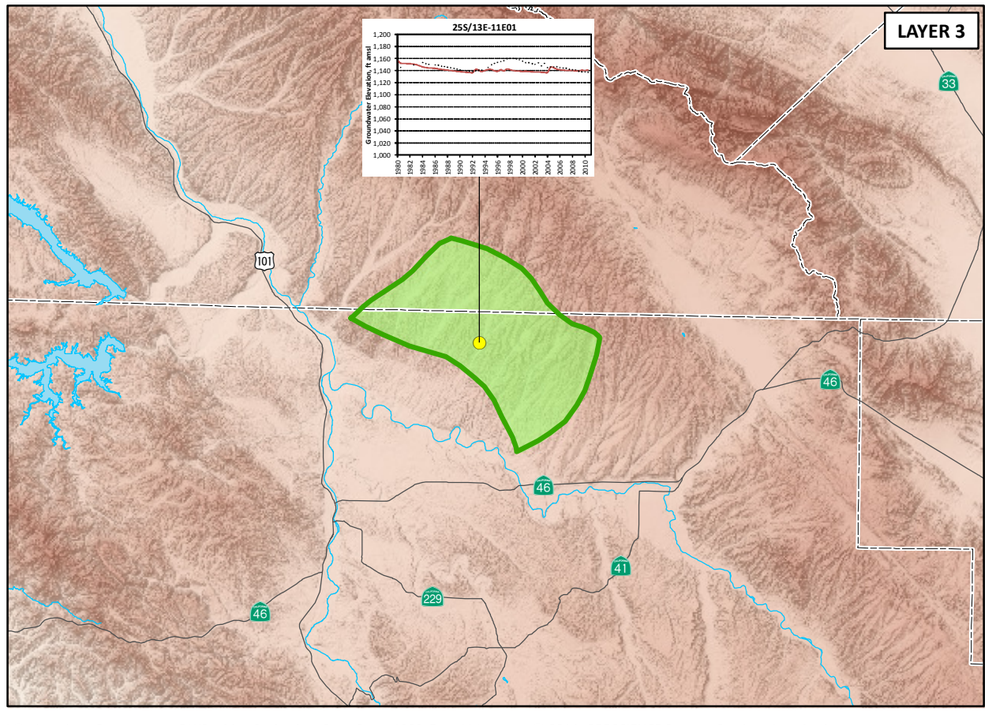
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

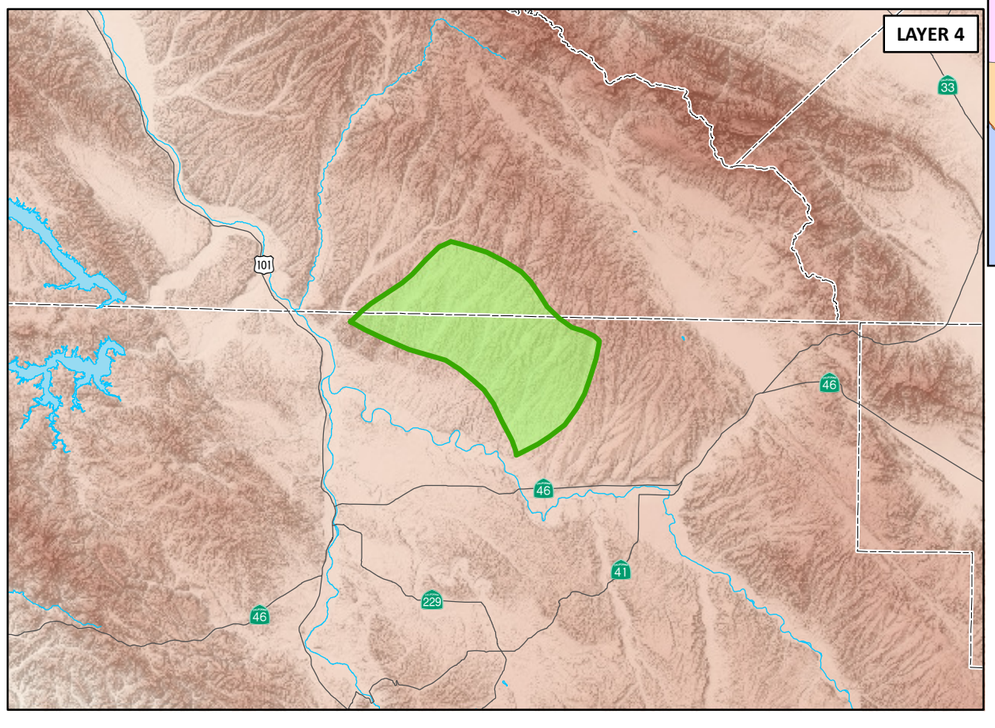
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

HYDROGRAPHS FOR RECALIBRATED BASIN MODEL SOUTH GABILAN SUB-AREA





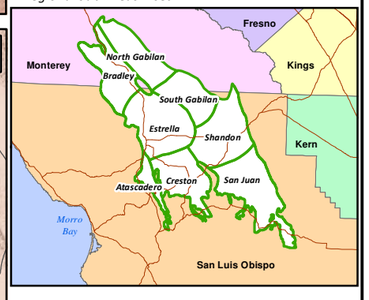




EXPLANATION

- Well Designation Within Sub-area
- Observed
- Model Generated
- Paso Robles Groundwater Basin with Sub-Area (Source: Fugro and Cleath, 2002)
- County Boundary

Regional Sub-Areas Inset



NORTH

0 4 8 Miles

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Figure 98

19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

GIS_proj/co_slo_paso_robles_model/6_Fig_98_Hydrograph_SouthGabilanSubarea_12-14.mxd

Comparison of Measured Versus Model-Calculated Groundwater Elevations
Transient Model Calibration (Water Years 1981-2011)

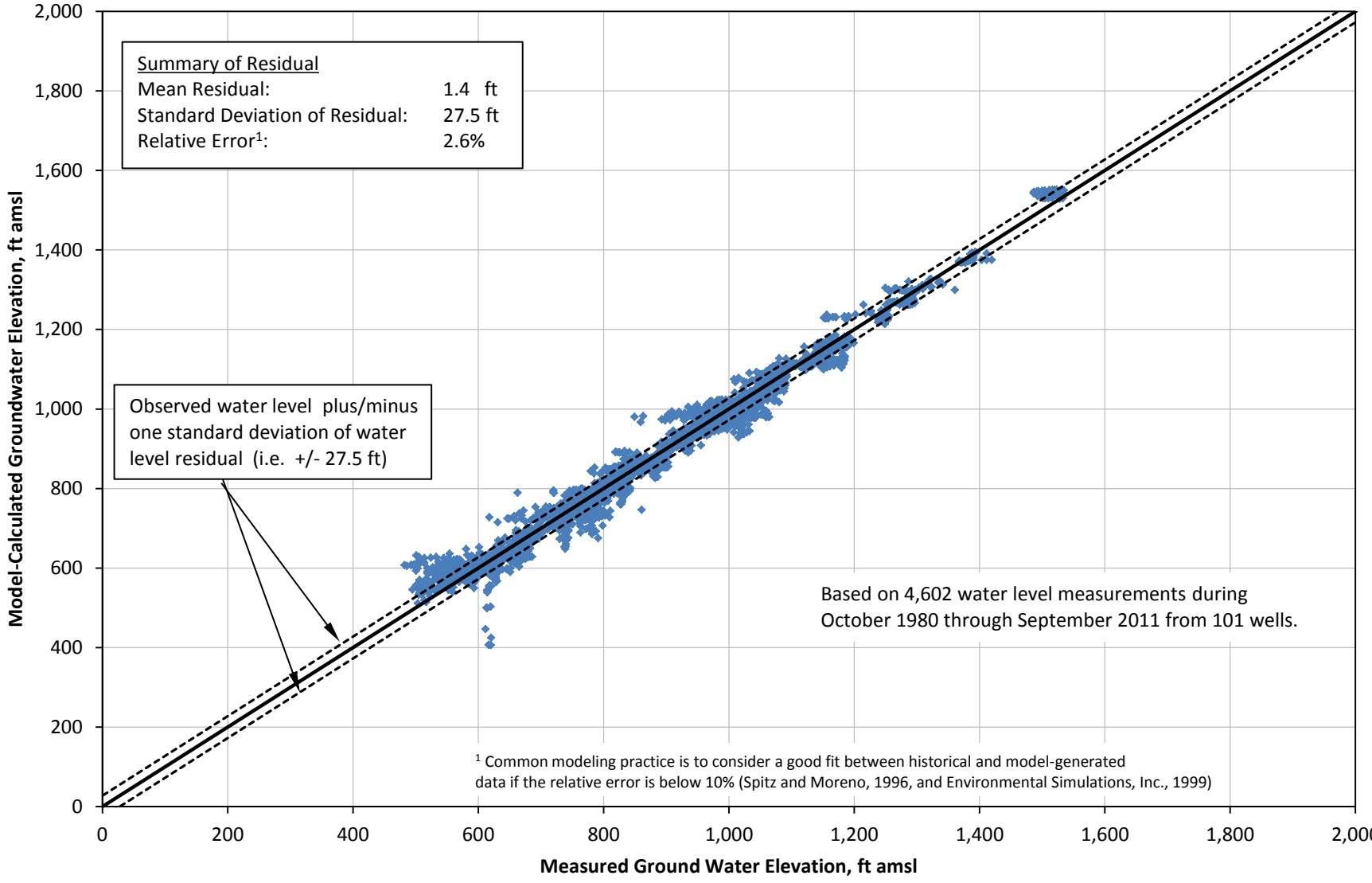


Figure 99

Temporal Distribution of Groundwater Level Residuals (Water Years 1981-2011)

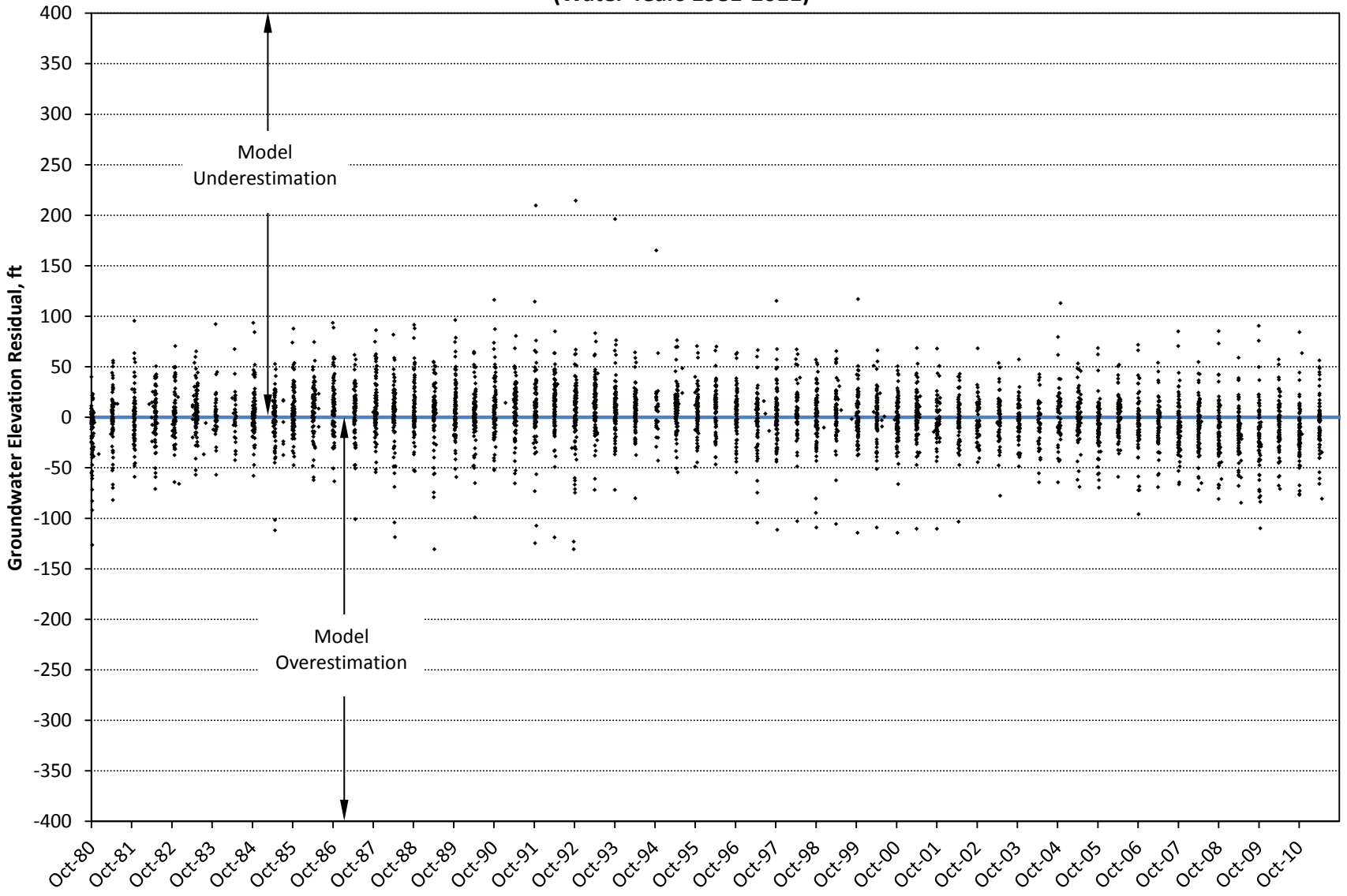


Figure 100

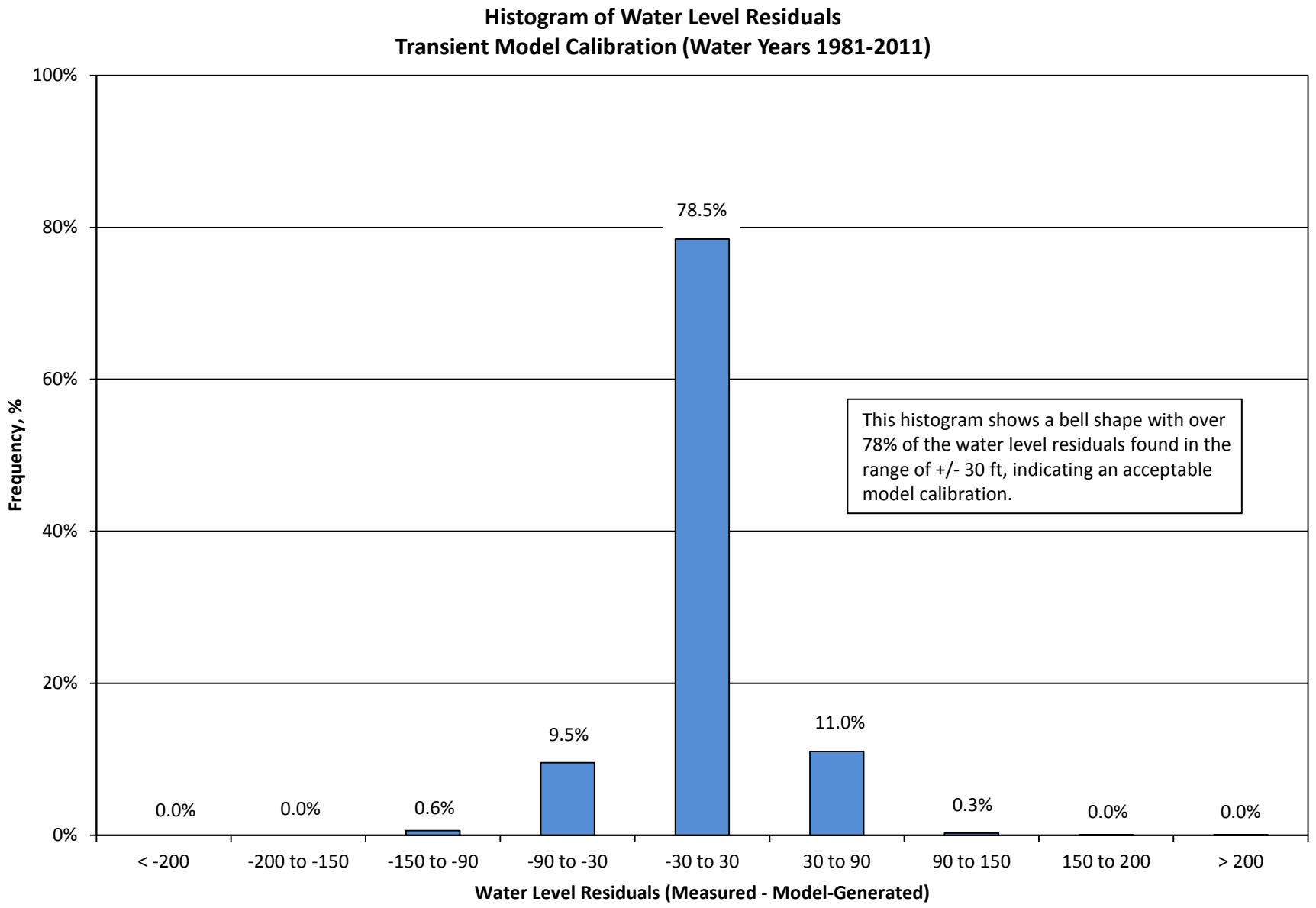

Histogram of Water Level Residuals
Transient Model Calibration (Water Years 1981-2011)
100%
80%
60%
40%
20%
0%
Frequency, %
78.5%
11.0%
9.5%
0.6%
0.3%
0.0%
0.0%
0.0%
0.0%
This histogram shows a bell shape with over 78% of the water level residuals found in the range of +/- 30 ft, indicating an acceptable model calibration.
< -200
-200 to -150
-150 to -90
-90 to -30
-30 to 30
30 to 90
90 to 150
150 to 200
> 200
Water Level Residuals (Measured - Model-Generated)

Figure 101

Normalized Sensitivity of Selected Model Parameters

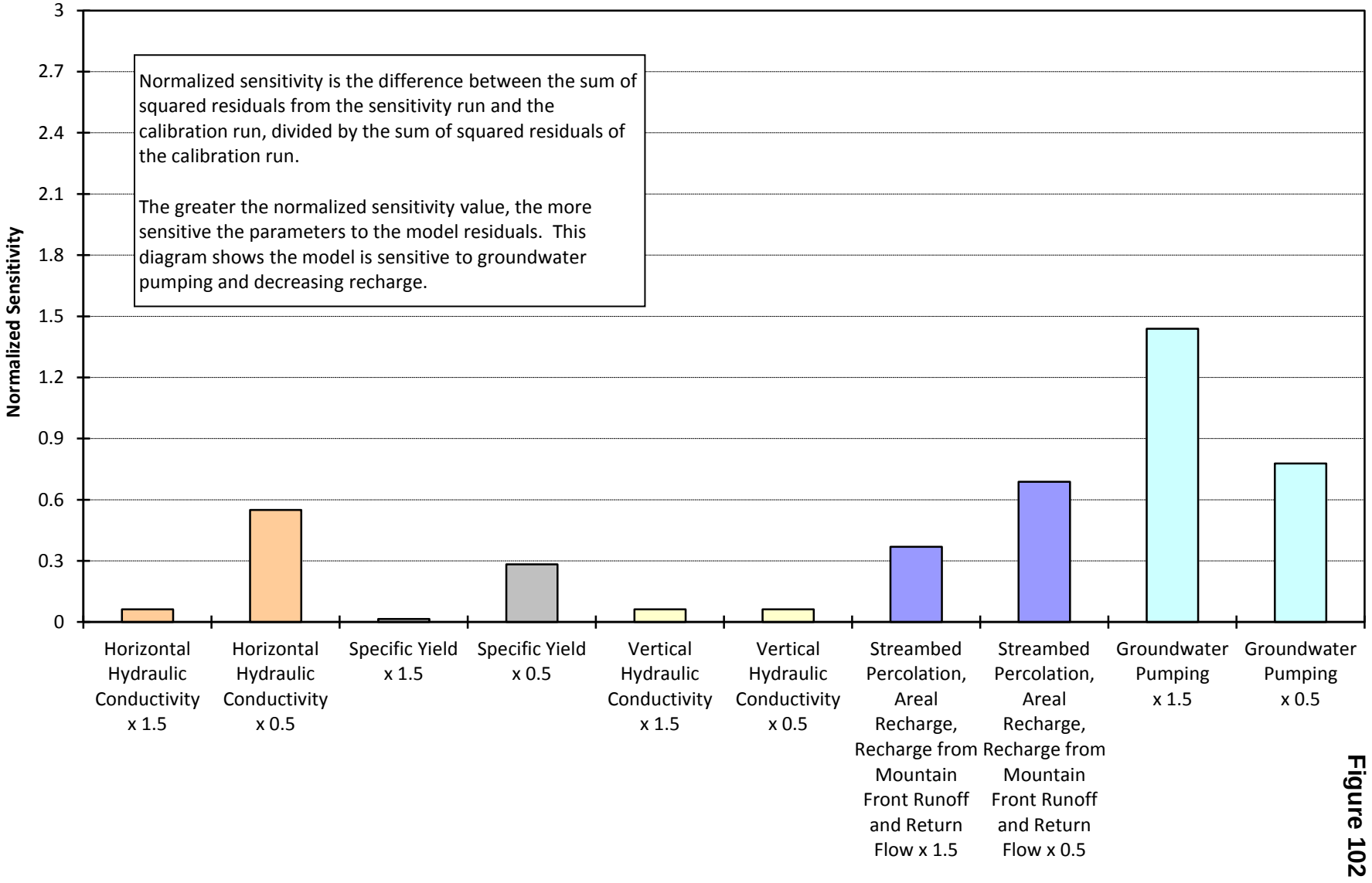


Figure 102

Annual Precipitation and Cumulative Departure from Mean Annual Precipitation
Paso Robles Station 046730 (Water Years 1907-2011)

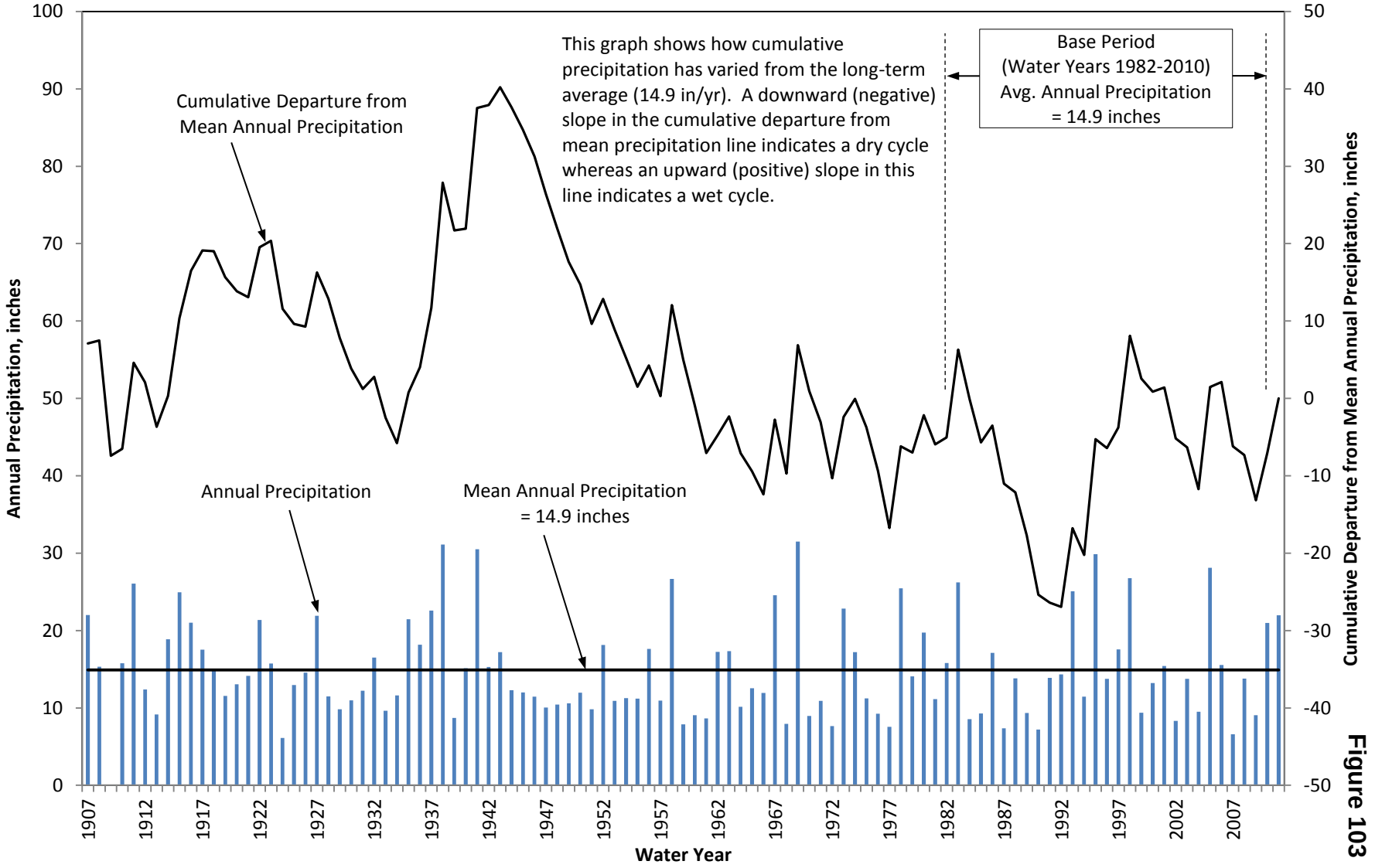
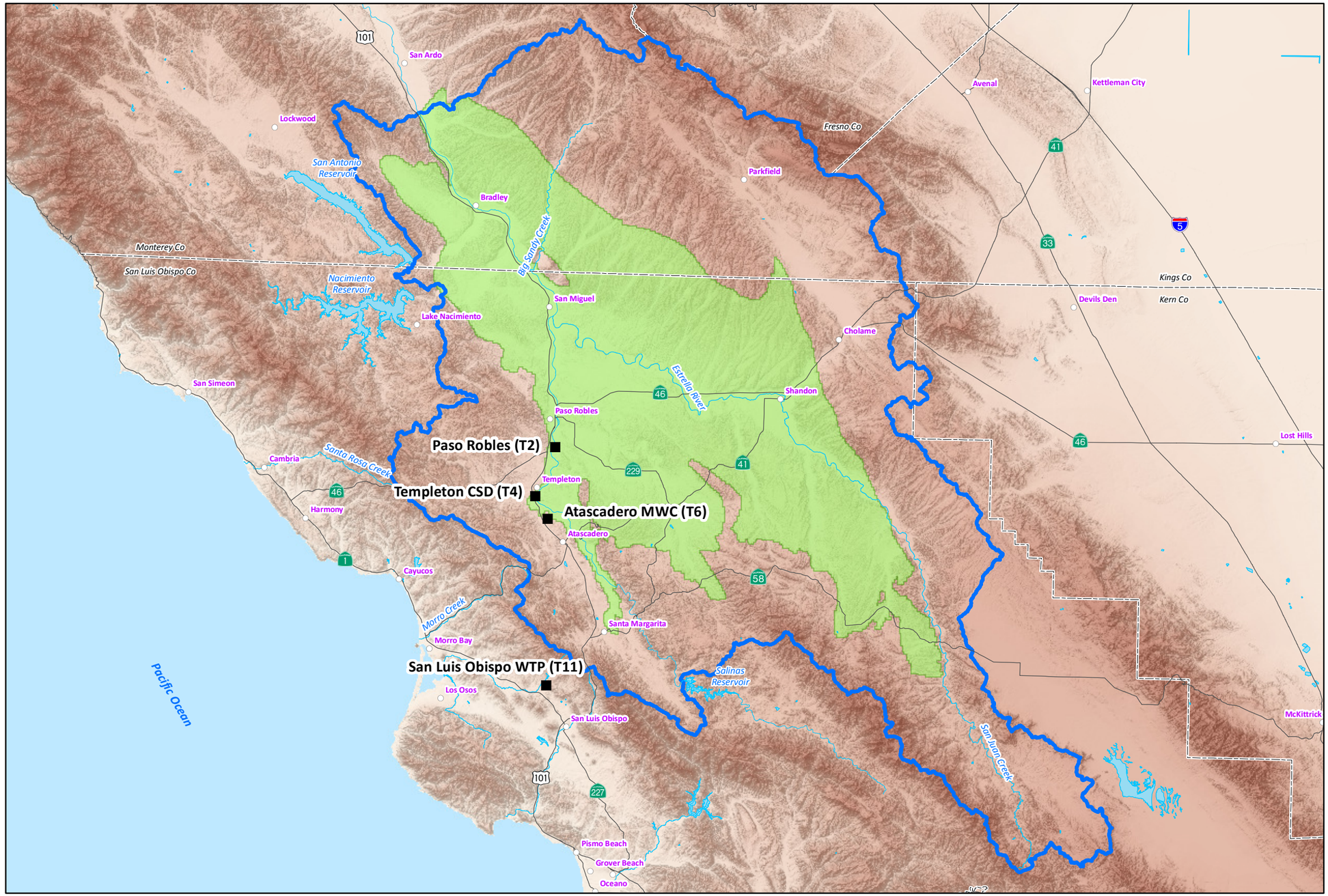


Figure 103

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



NACIMIENTO WATER PROJECT TURNOUT LOCATIONS

EXPLANATION

- Nacimiento Water Project Turnout
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 5 10 20 Miles

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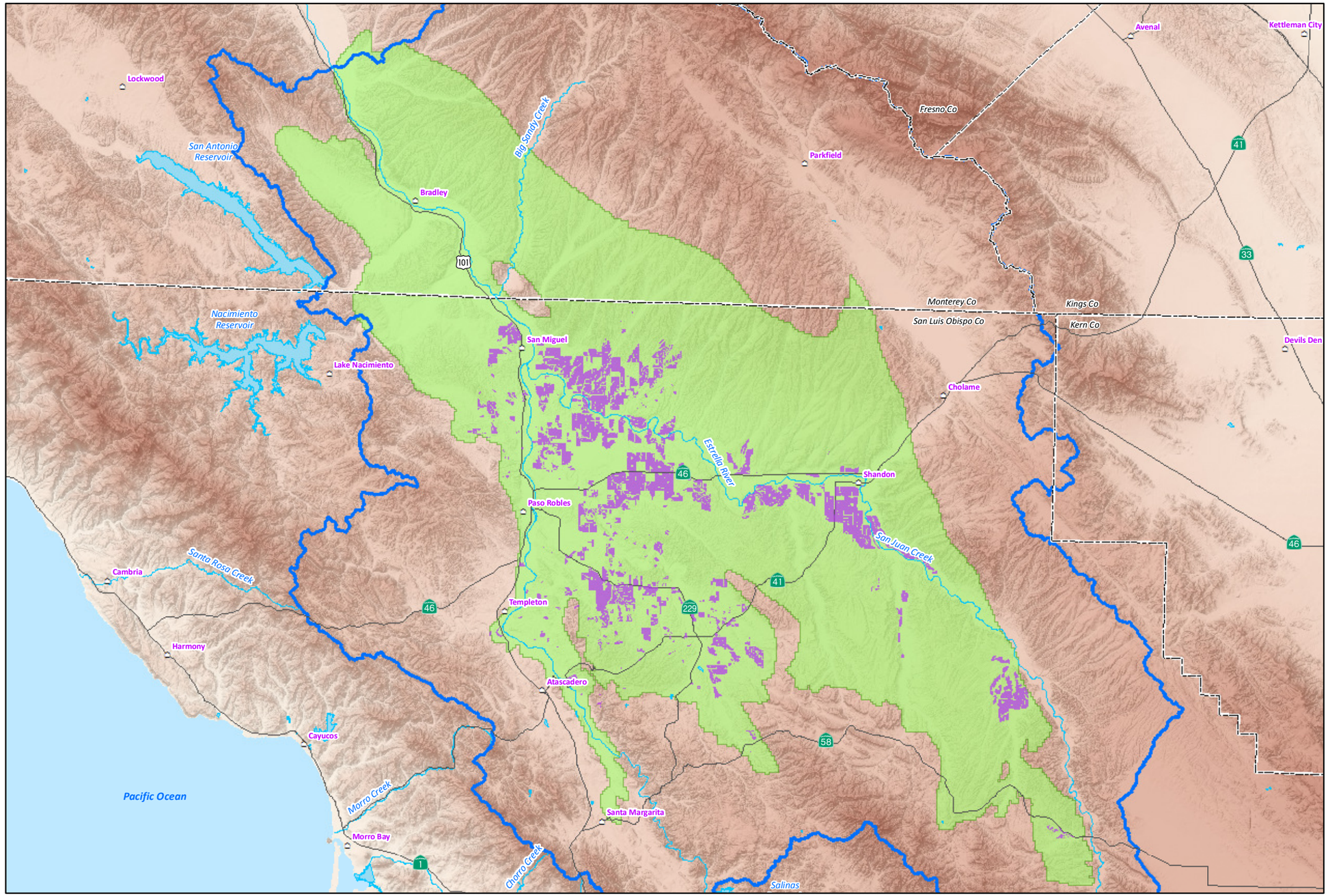
Figure 104

GIS_proj/co_slo_paso_robles_model/6_Fig_104_nacimiento_turnout_locs_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



PROJECTED 2013 VINEYARDS IN THE PASO ROBLES GROUNDWATER BASIN

EXPLANATION

Projected 2013 Vineyards in the Paso Robles Groundwater Basin (Source: SLOCFCWCD, 2013)

- Vineyard
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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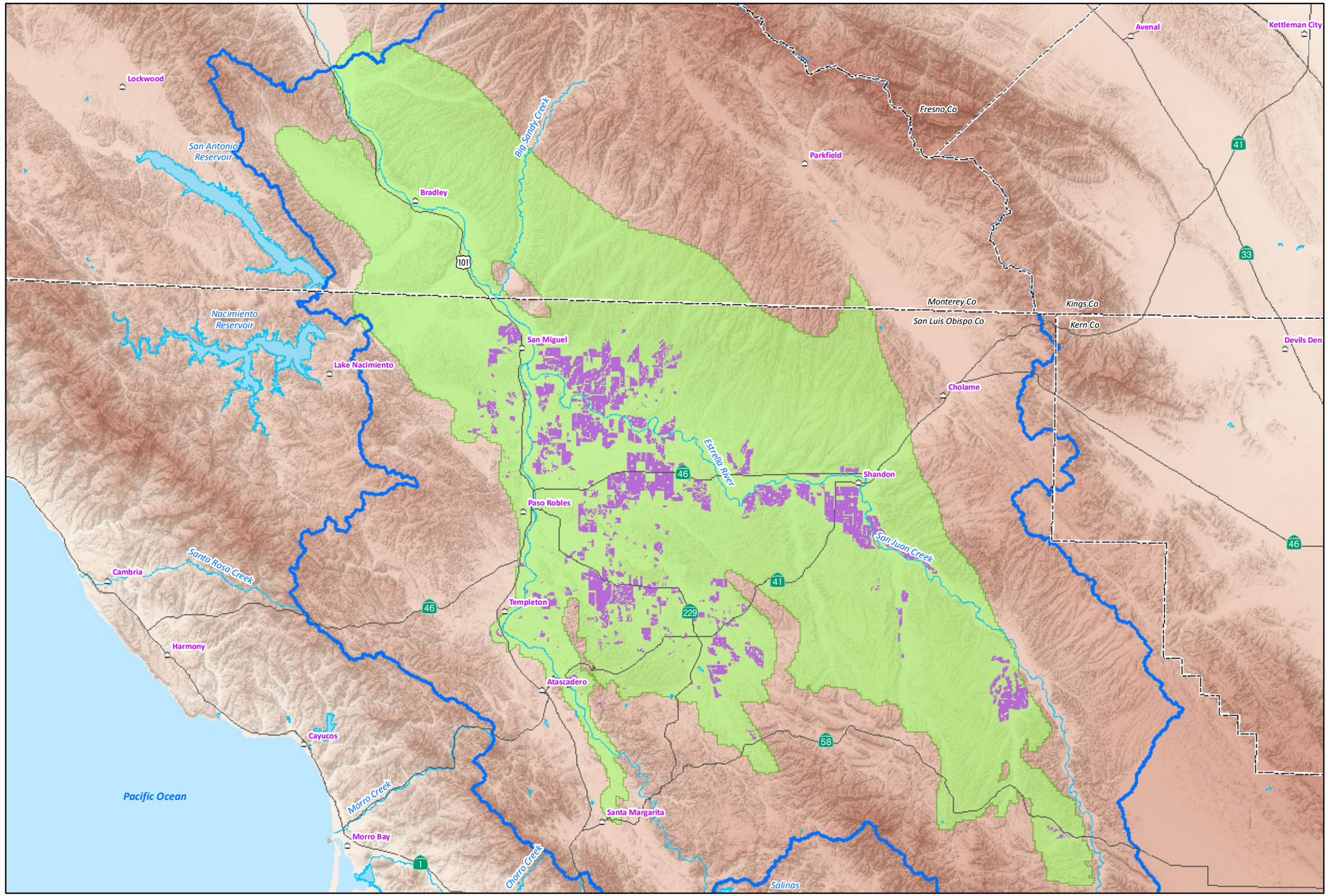
Figure 105

GIS_proj/co_slo_paso_robles_model/6_Fig_105_2013_vineyard_areas_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

PROJECTED 2014 VINEYARDS IN THE PASO ROBLES GROUNDWATER BASIN



EXPLANATION

Projected 2014 Vineyards in the Paso Robles Groundwater Basin (Source: SLOCFCWCD, 2013)

- Vineyard
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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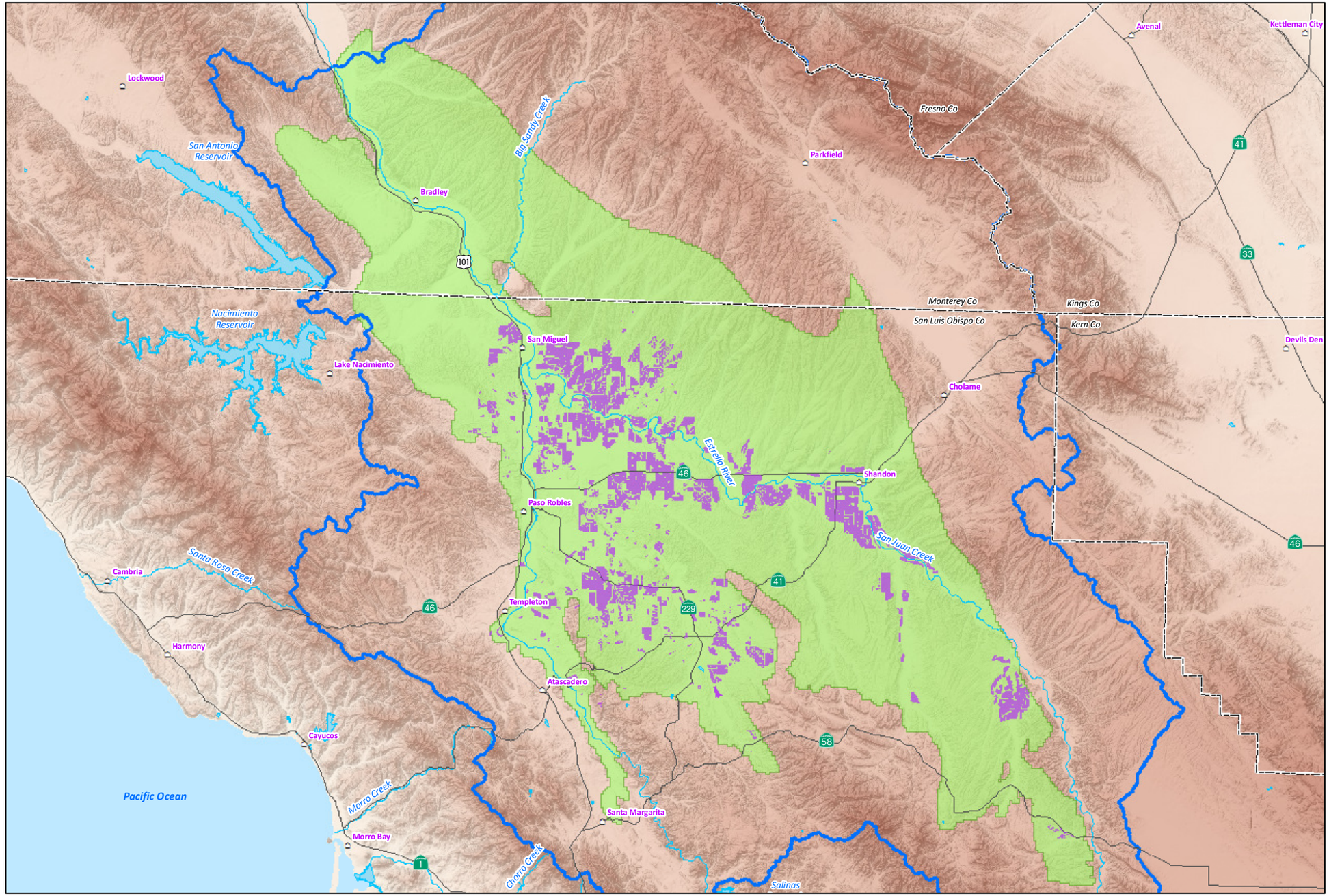
Figure 106

GIS_proj/co_slo_paso_robles_model/6_Fig_106_2014_vineyard_areas_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE



PROJECTED 2017 VINEYARDS IN THE PASO ROBLES GROUNDWATER BASIN

EXPLANATION

Projected 2017 Vineyards in the Paso Robles Groundwater Basin (Source: SLOCFCWCD, 2013)

- Vineyard
- Paso Robles Groundwater Basin Model Active Area (Source: Fugro, ETIC Engineers and Cleath, 2005)
- Paso Robles Area Watershed Boundary
- County Boundary

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

NORTH

0 2.5 5 10 Miles

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Figure 107

GIS_proj/co_slo_paso_robles_model/6_Fig_107_2017_vineyard_areas_12-14.mxd

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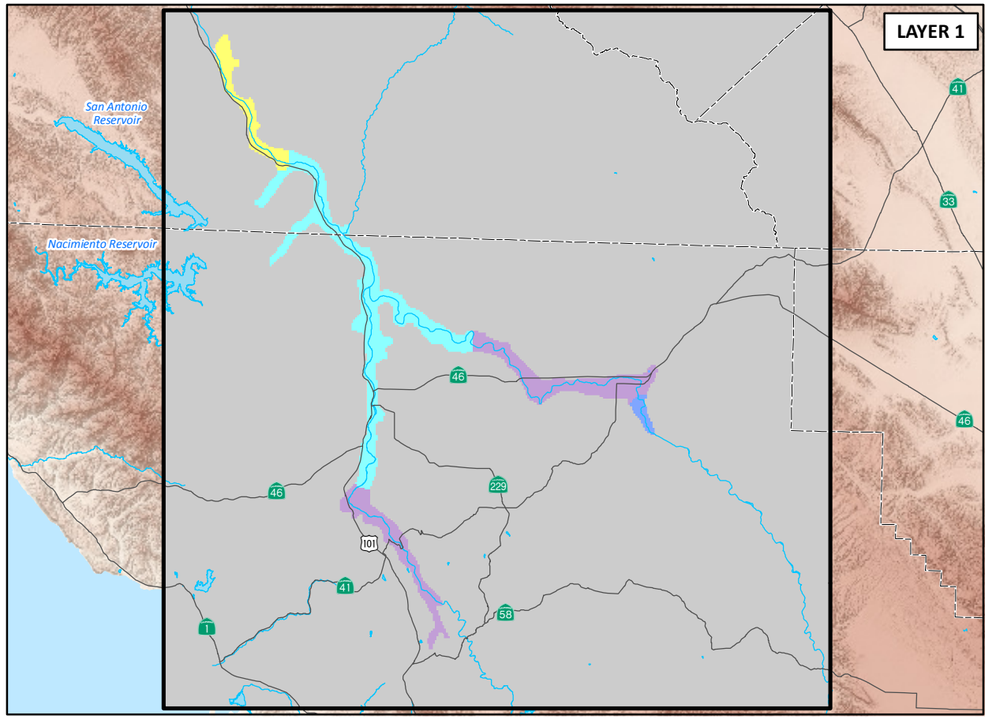
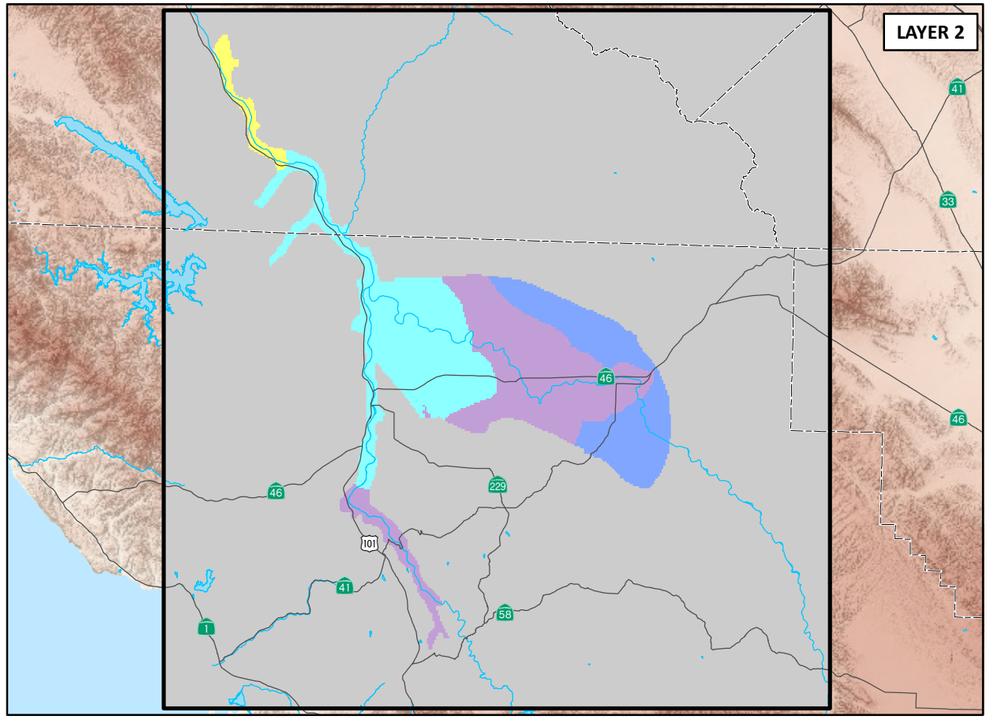
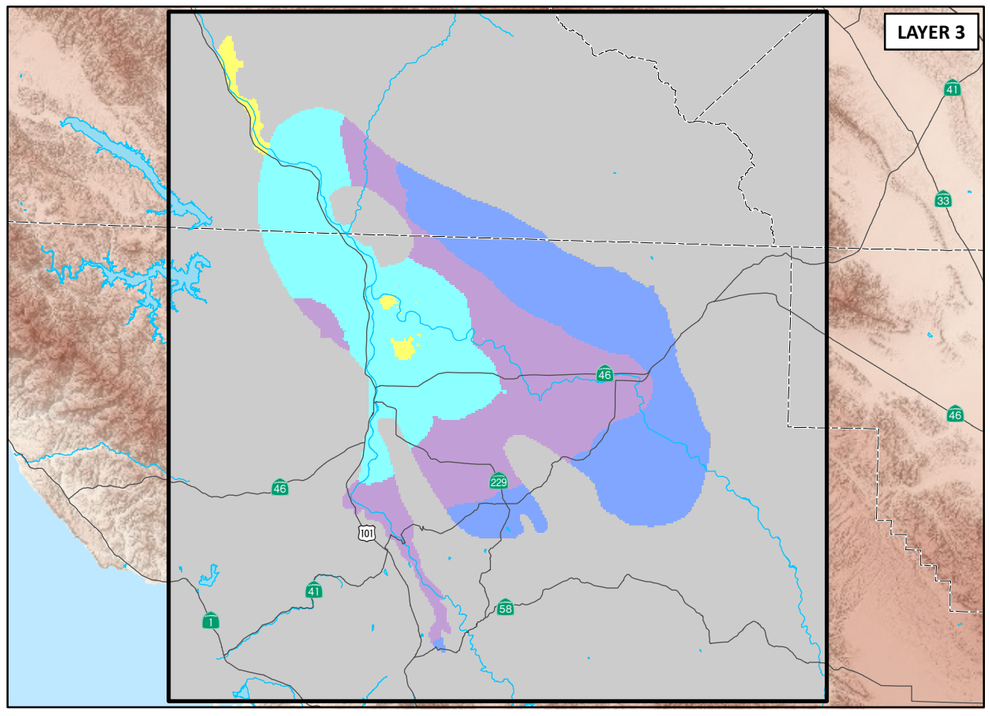
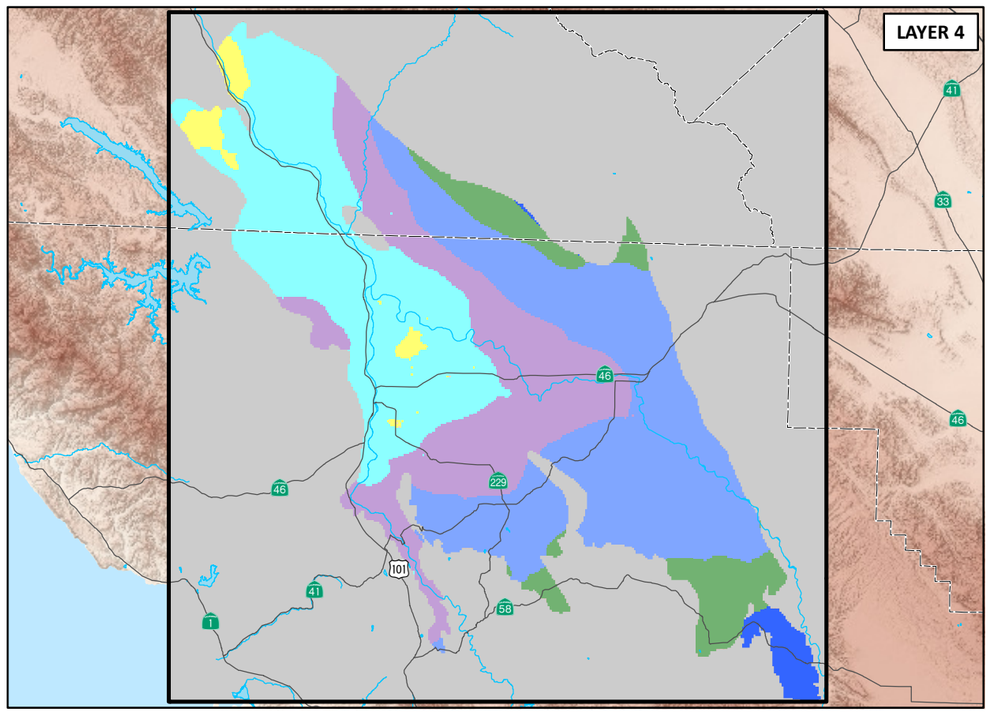
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE









INITIAL GROUNDWATER ELEVATIONS USED FOR PREDICTIVE MODEL RUNS END OF TRANSIENT CALIBRATION (SEPTEMBER 2011)

EXPLANATION

Initial Groundwater Elevation (ft amsl)

- 400 - 500
- 500 - 750
- 750 - 1,000
- 1,000 - 1,250
- 1,250 - 1,500
- 1,500 - 1,750

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

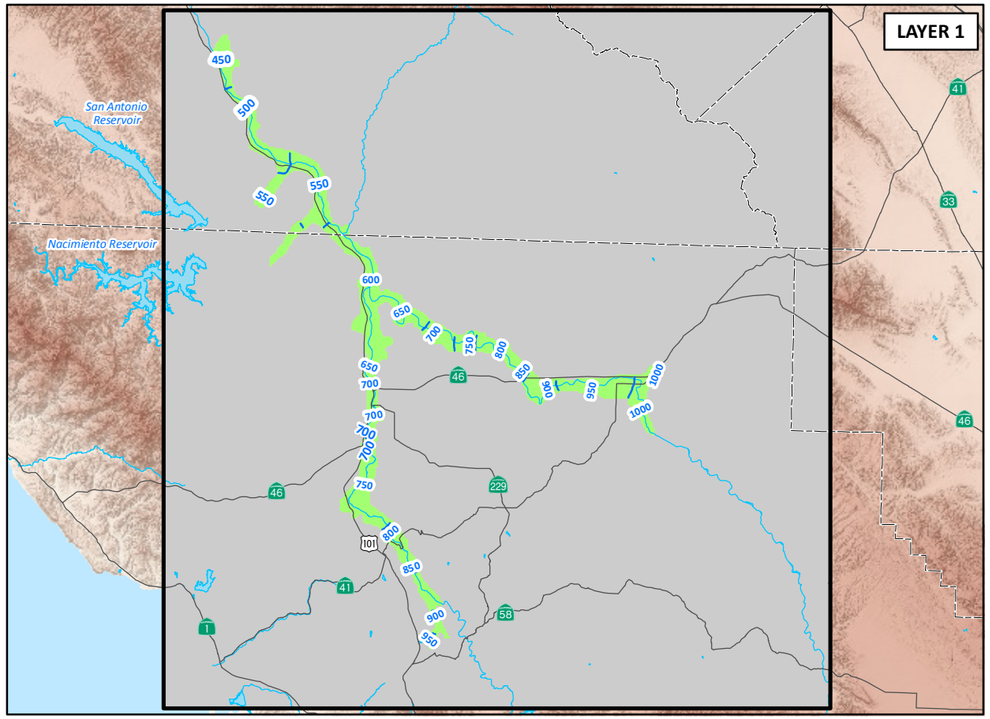
Figure 108

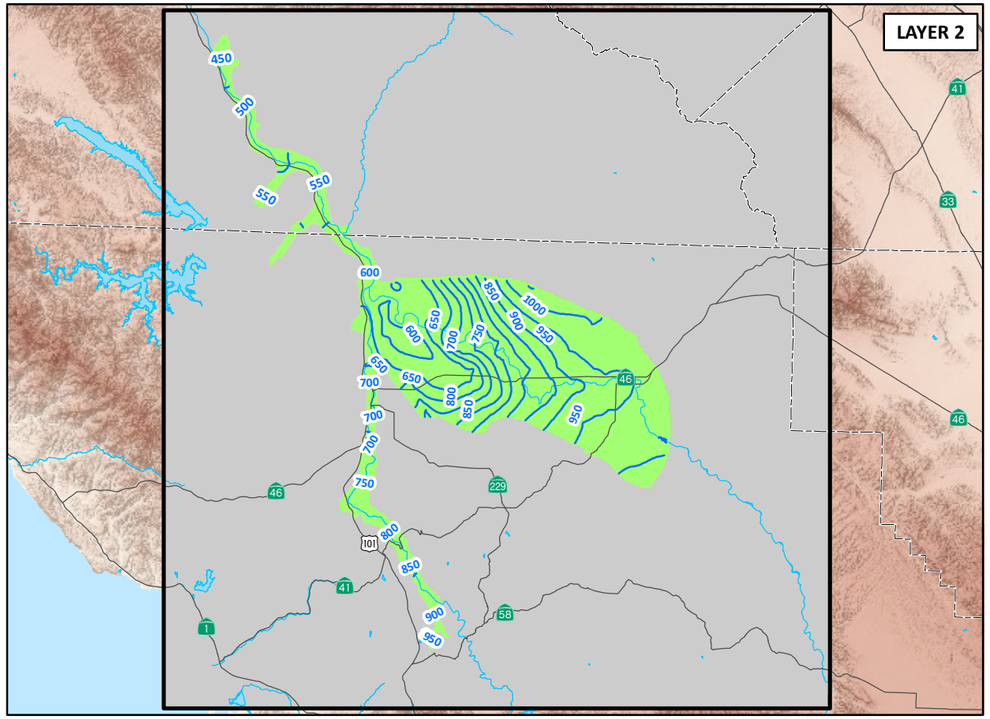
GIS_proj/co_slo_paso_robles_model/6_Fig_108_gw_elev_transient_calib_4panel_12-14.mxd

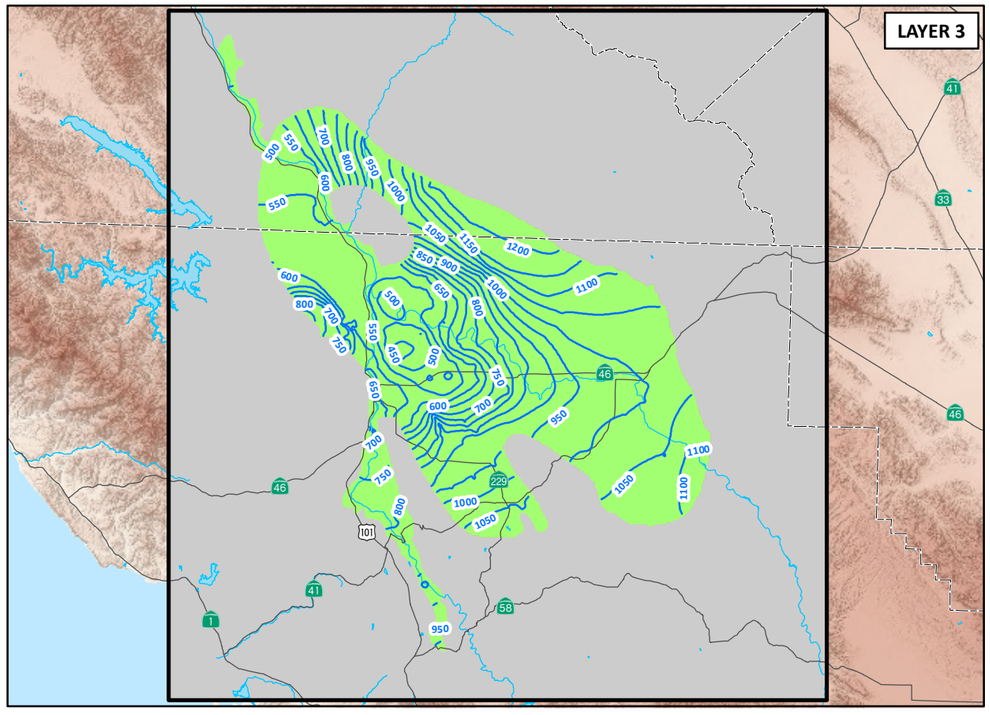
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

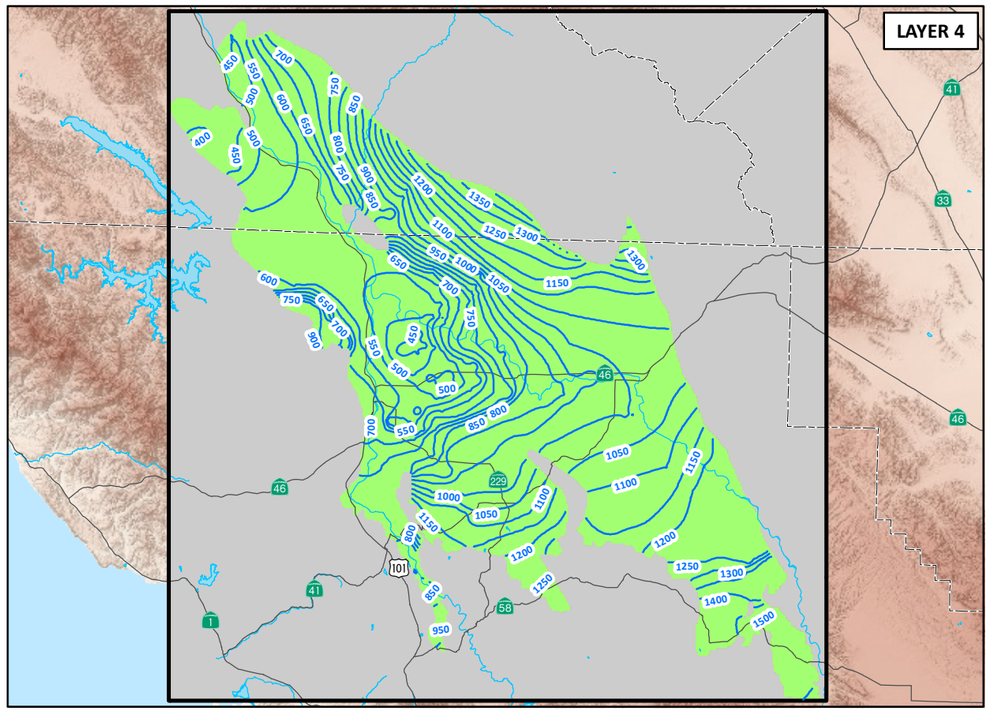
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

MODEL-GENERATED GROUNDWATER ELEVATIONS IN SEPTEMBER 2040 MODEL RUN 1









EXPLANATION

1150 — Groundwater Elevations (ft amsl)

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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Figure 109

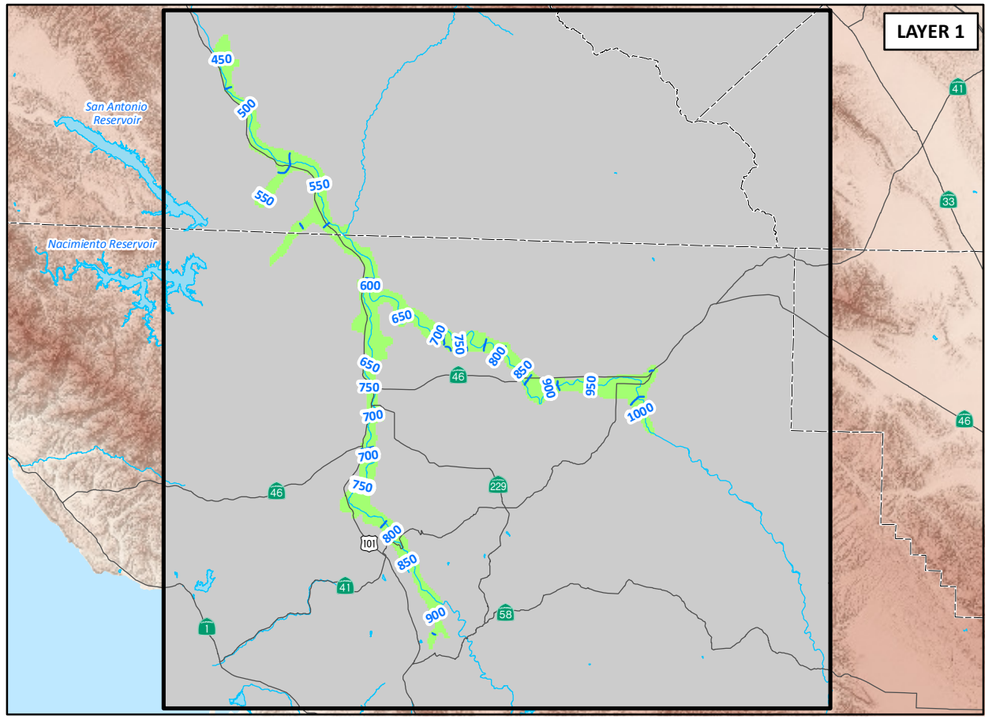
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

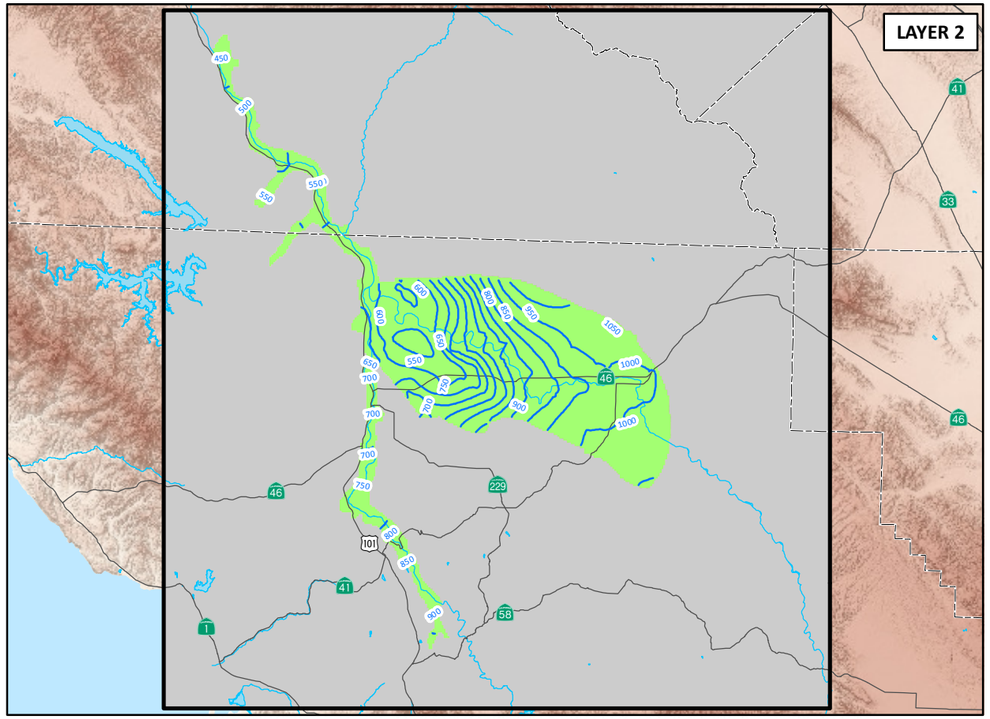
GIS_proj/co_slo_paso_robles_model/6_Fig_109_scen1_gw_elev_2040_4panel_12-14.mxd

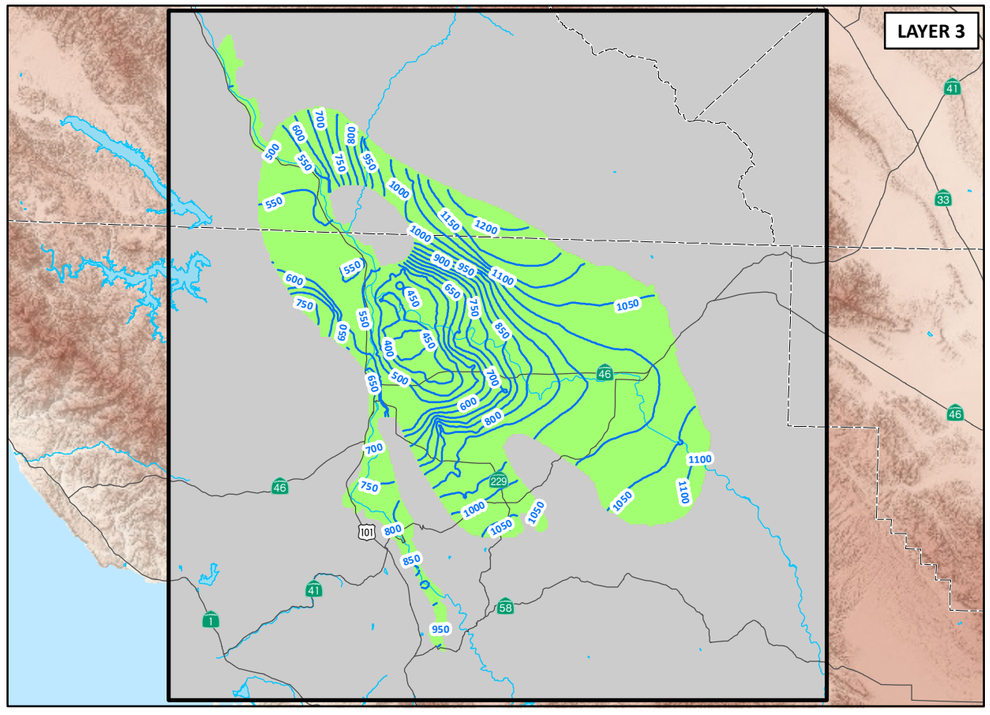
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

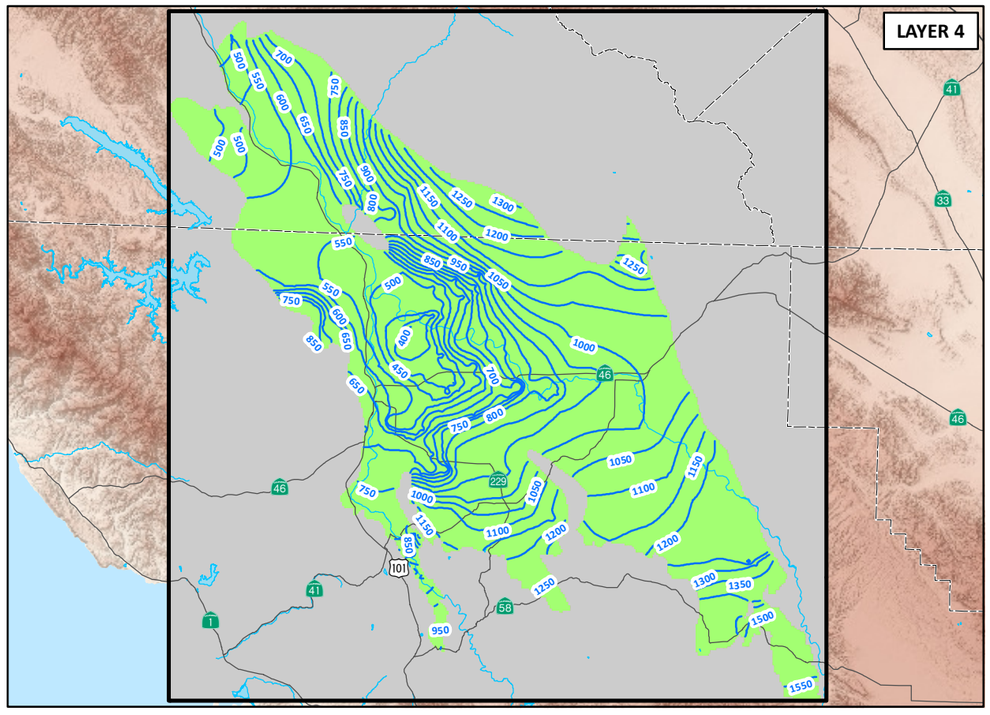
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

MODEL-GENERATED GROUNDWATER ELEVATIONS IN SEPTEMBER 2040 MODEL RUN 2









EXPLANATION

1150 — Groundwater Elevations (ft amsl)

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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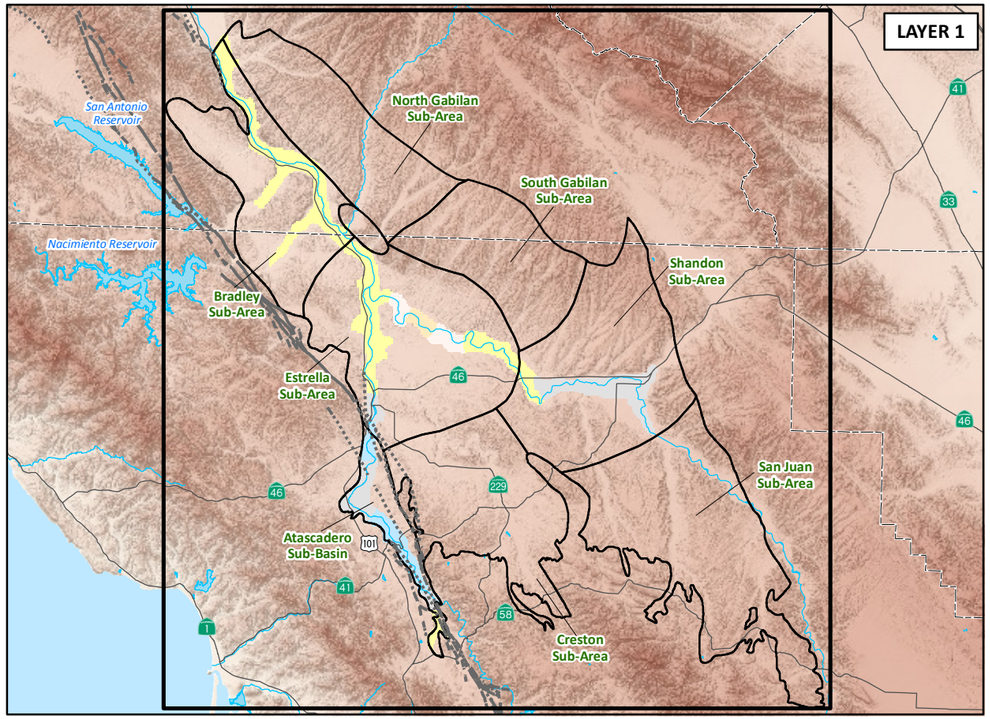
Figure 110

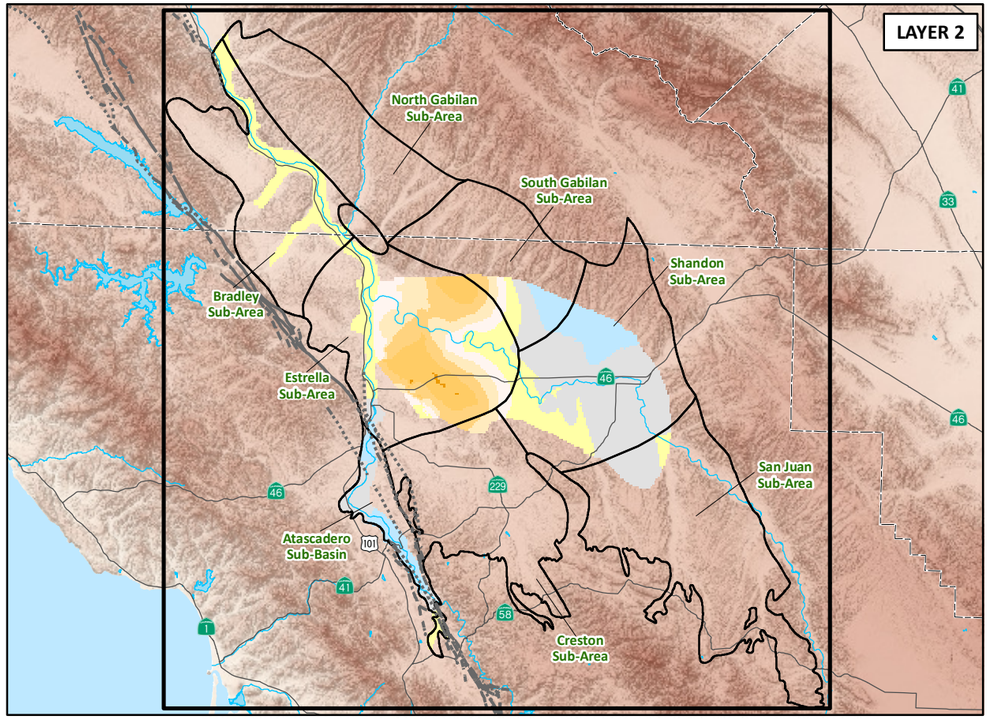
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

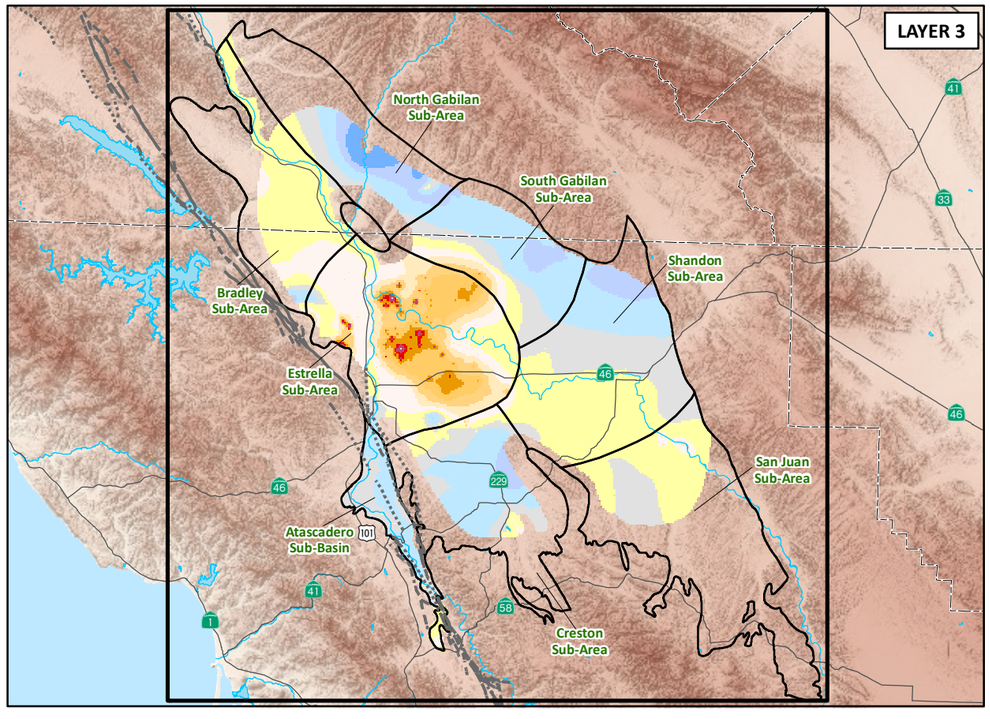
GIS_proj/co_slo_paso_robles_model/6_Fig_110_scen2_gw_elev_2040_4panel_12-14.mxd

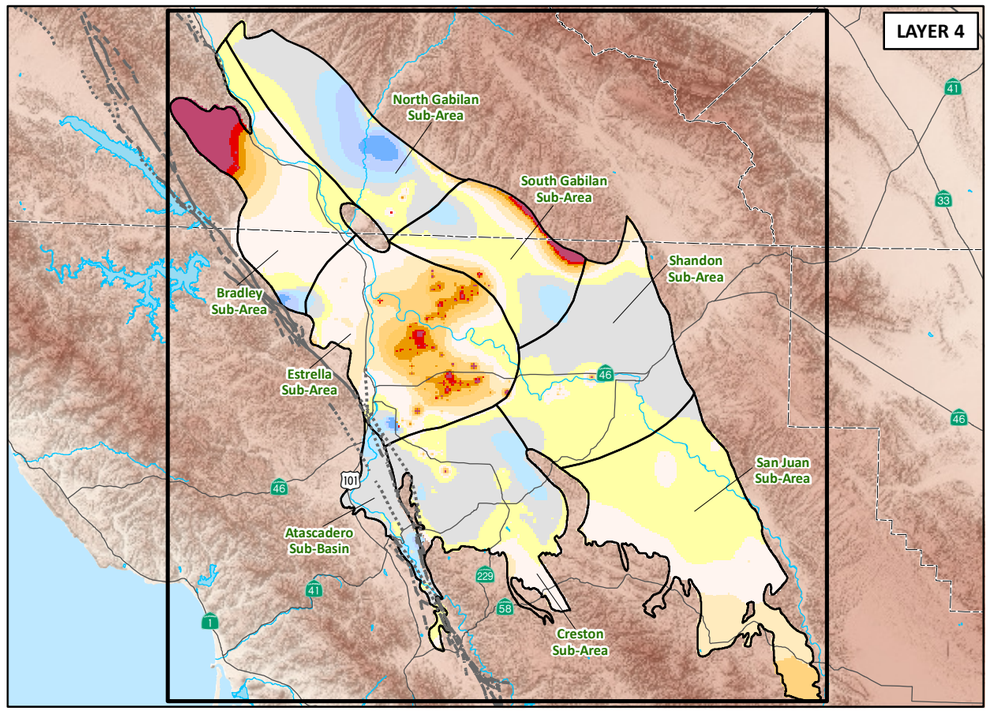
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE









MODEL-GENERATED CHANGES IN GROUNDWATER ELEVATIONS BETWEEN WATER YEAR 2011 AND 2040 MODEL RUN 1

EXPLANATION

Model-Generated Changes in Groundwater Elevations (ft)

- More than -70 ft
- -69 to -60 ft
- -59 to -50
- -49 to -40 ft
- -39 to -30 ft
- -29 to -20 ft
- -19 to -10 ft
- -9 to 0 ft
- 1 to 10 ft
- 10 to 20 ft
- 21 to 30 ft
- More than 30 ft

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Boundary with Sub-Areas (Source: Fugro and Cleath, 2002)

Fault (solid where known, dashed where inferred, dotted where concealed)

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County Boundary

NORTH

0 5 10 Miles

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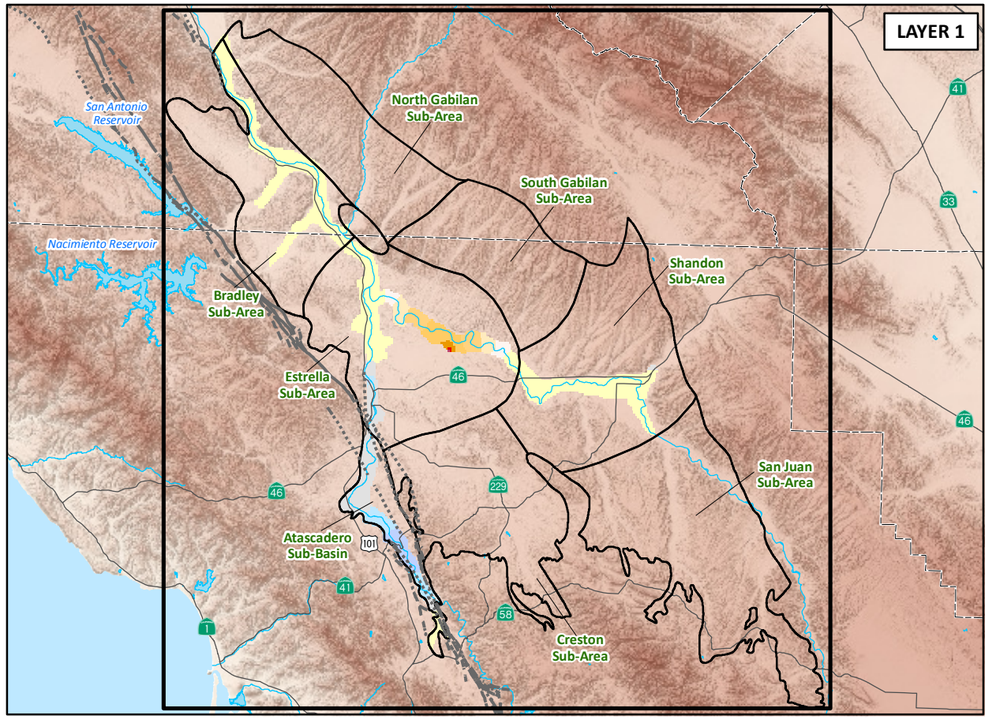
Figure 111

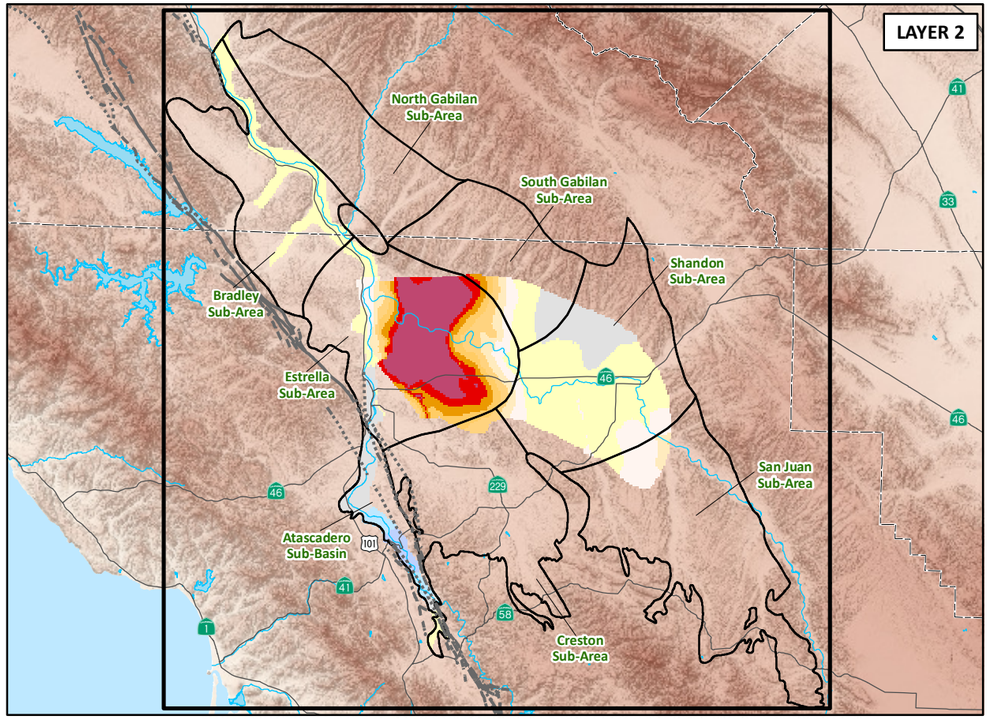
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

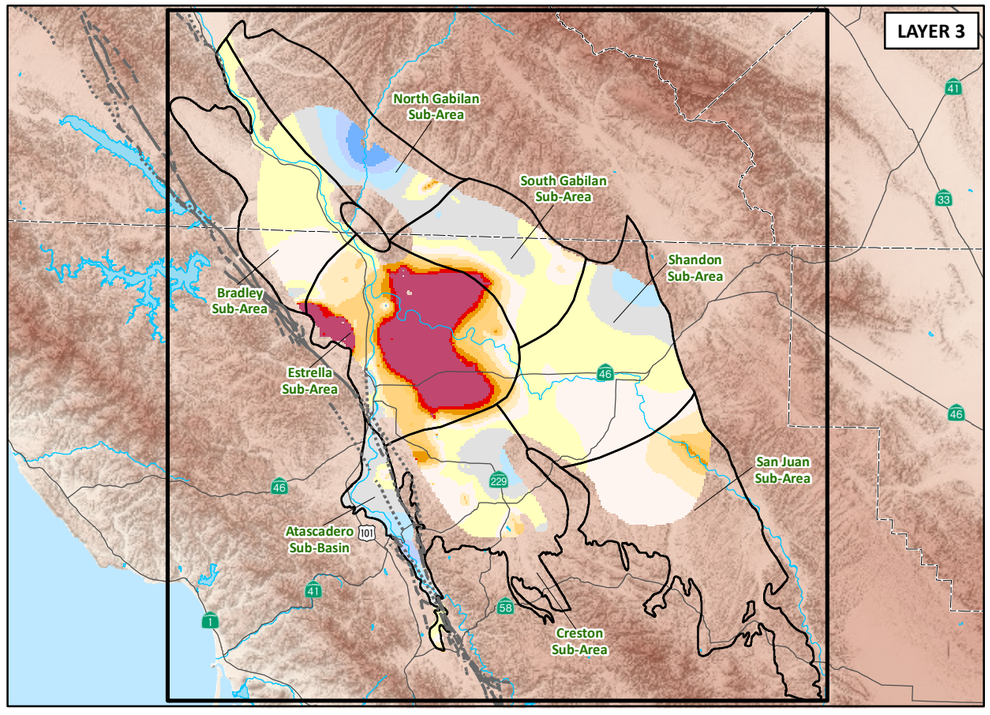
GIS_proj/co_slo_paso_robles_model/6_Fig_111_gw_elev_change_flood_2011-2040_scen1_4panel_12-14.mxd

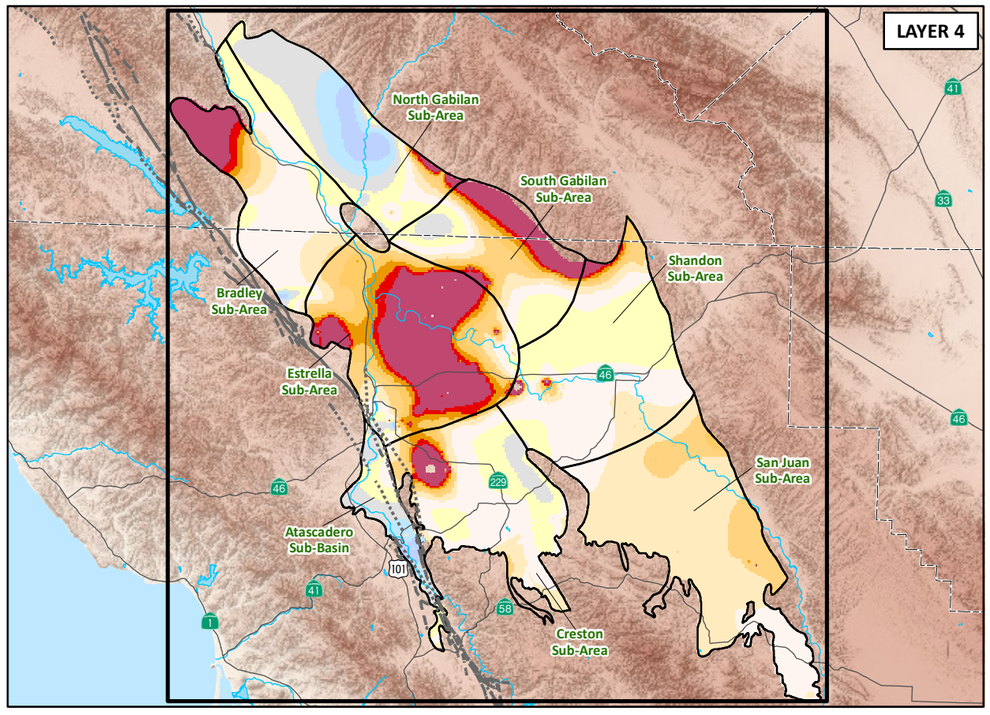
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE









MODEL-GENERATED CHANGES IN GROUNDWATER ELEVATIONS BETWEEN WATER YEAR 2011 AND 2040 MODEL RUN 2

EXPLANATION

Model-Generated Changes in Groundwater Elevations (ft)

- More than -70 ft
- -69 to -60 ft
- -59 to -50
- -49 to -40 ft
- -39 to -30 ft
- -29 to -20 ft
- -19 to -10 ft
- -9 to 0 ft
- 1 to 10 ft
- 10 to 20 ft
- 21 to 30 ft
- More than 30 ft

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Boundary with Sub-Areas (Source: Fugro and Cleath, 2002)

Fault (solid where known, dashed where inferred, dotted where concealed)

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County Boundary

NORTH

0 5 10 Miles

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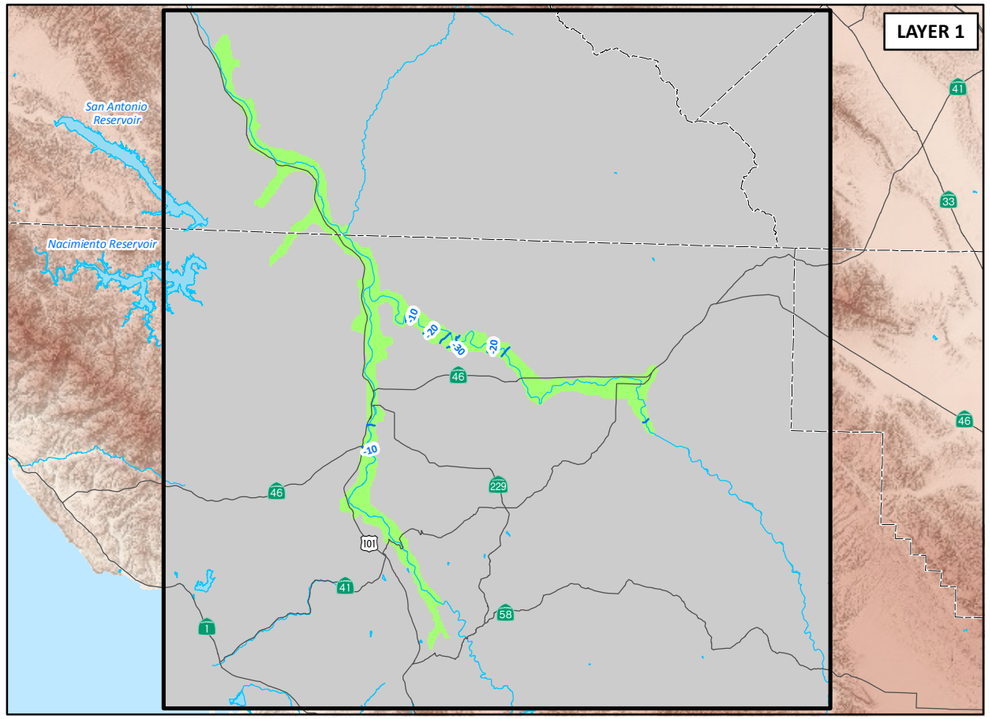
Figure 112

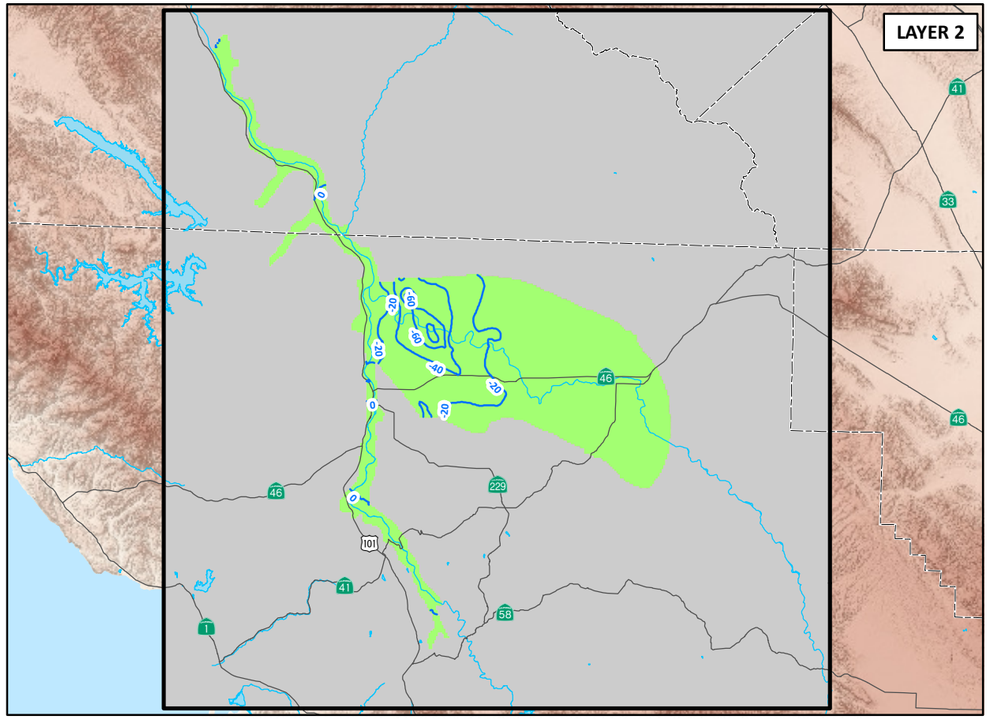
GIS_proj/co_slo_paso_robles_model/6_Fig_112_gw_elev_change_flood_2011-2040_scen2_4panel_12-14.mxd

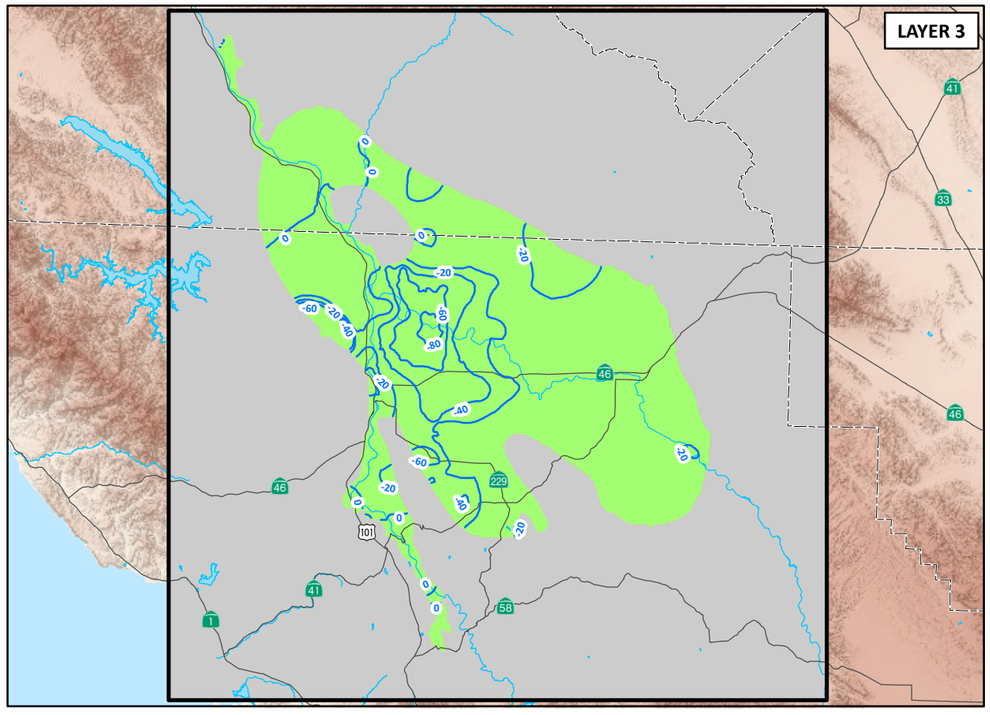
SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

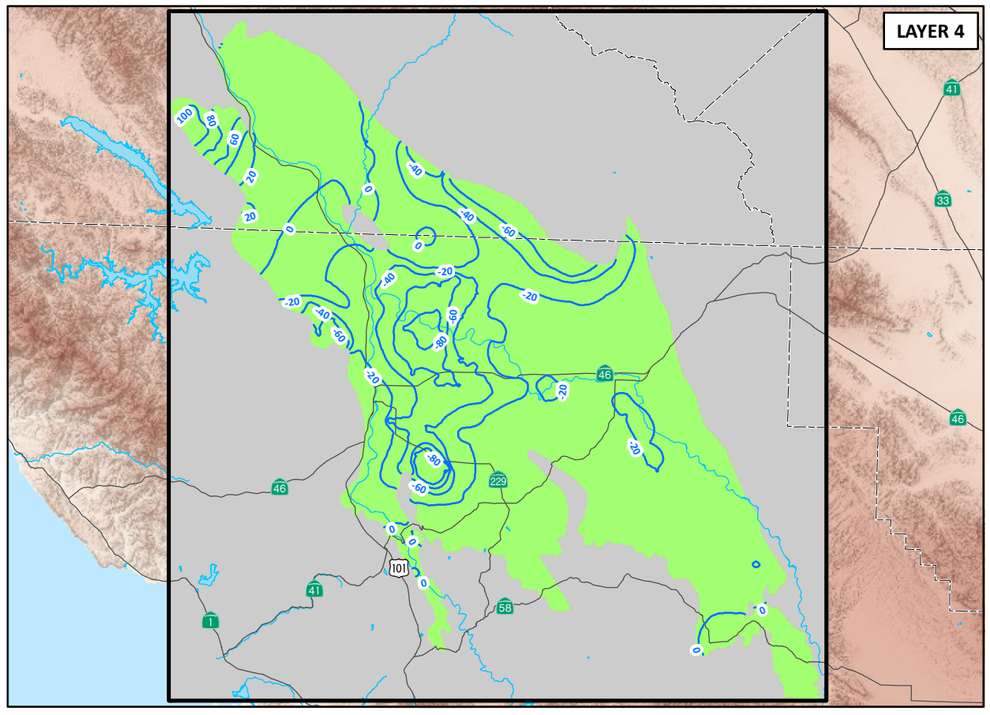
PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

MODEL-GENERATED DIFFERENCES IN GROUNDWATER ELEVATIONS BETWEEN MODEL RUN 1 AND MODEL RUN 2 END OF PREDICTIVE PERIOD (SEPTEMBER 2040)









EXPLANATION

10 — Model-Generated Differences in Groundwater Elevations (ft)

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

Paso Robles Groundwater Basin Model Inactive Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 5 10 Miles

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Figure 113

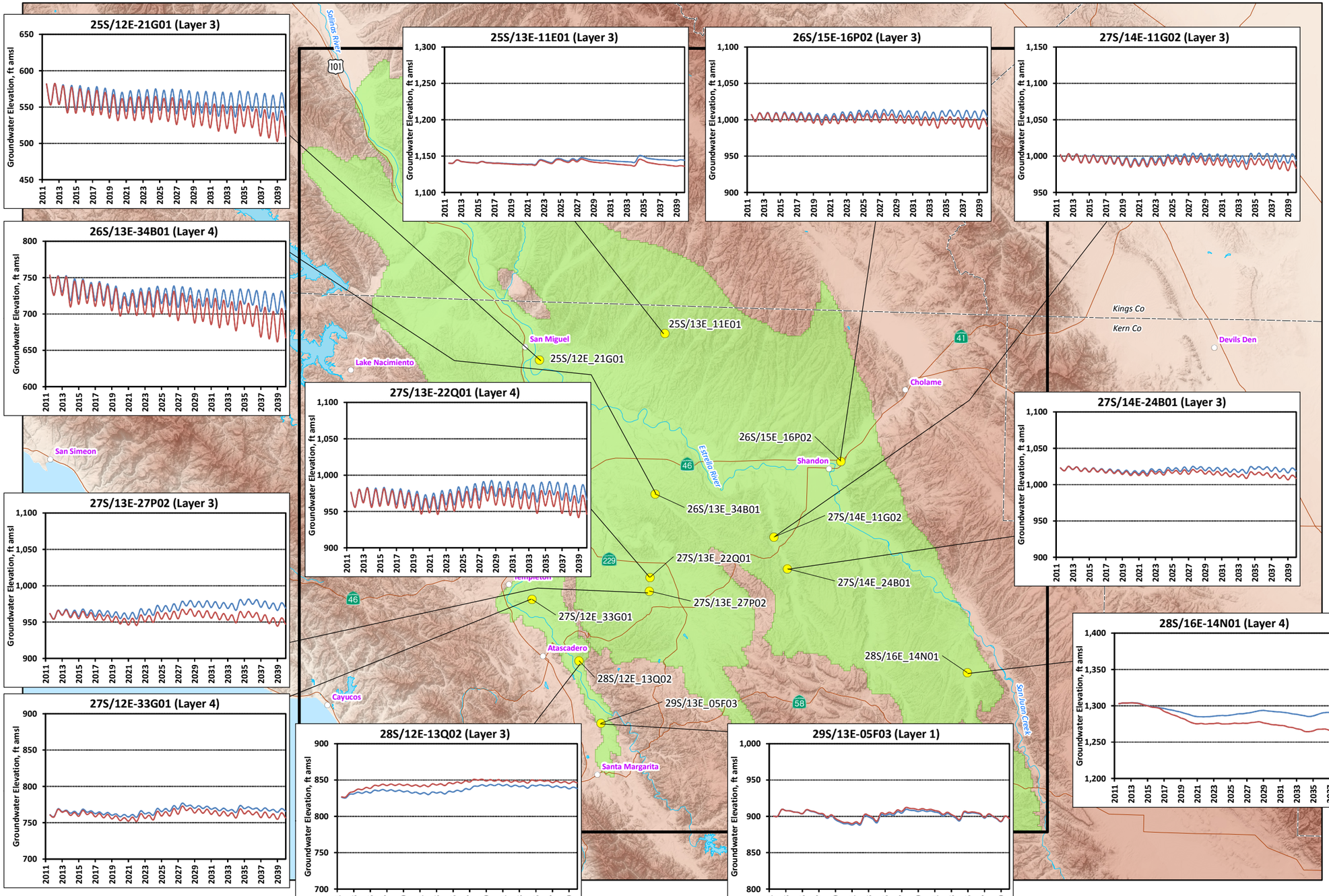
19-Dec-14 Prepared by: DWB. Map Projection: State Plane 1983, Zone V. feet.

GIS_proj/co_slo_paso_robles_model/6_Fig_113_difference_gw_elev_2040_scen1and2_4panel_12-14.mxd

SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PASO ROBLES GROUNDWATER BASIN MODEL UPDATE

SELECTED HYDROGRAPHS UNDER MODEL RUN 1 AND MODEL RUN 2 CONDITIONS (WATER YEARS 2012 TO 2040)



EXPLANATION

Model Run 1

Model Run 2

Well Location

Paso Robles Groundwater Basin Model Domain

Paso Robles Groundwater Basin Model Active Area

(Source: Fugro, ETIC Engineers and Cleath, 2005)

County Boundary

NORTH

0 2.5 5 10 Miles

19-Dec-14

Prepared by: DWB. Map Projection: State Plane 1983, Zone V.

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Figure 114

GIS_proj/co_slo_paso_robles_model/6_Fig_114_hydrographs_scen1andscen2_12-14.mxd

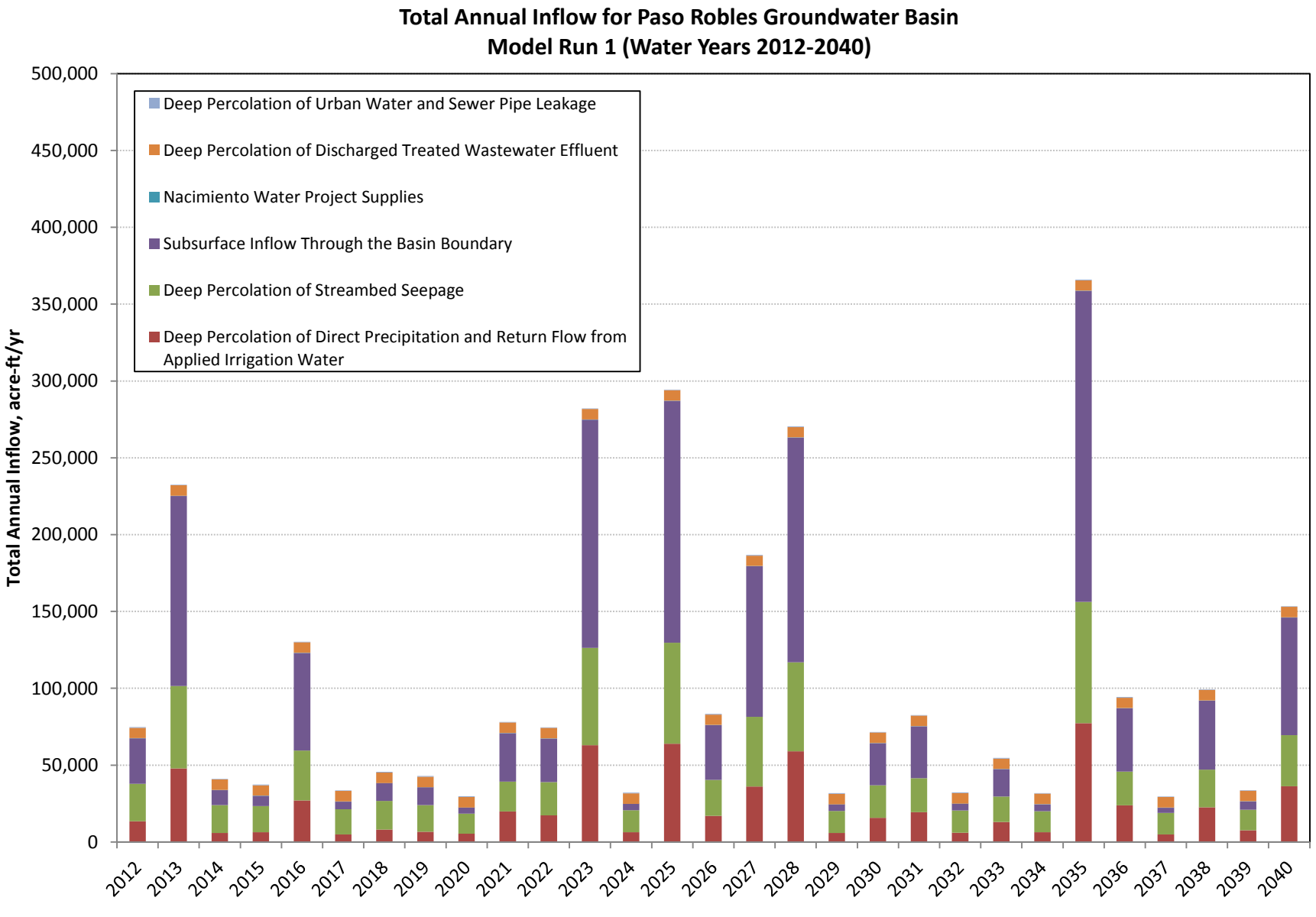


Figure 115

GEOSCIENCE Support Services, Inc.
Todd Groundwater

Total Annual Inflow for Paso Robles Groundwater Basin
Model Run 2 (Water Years 2012-2040)

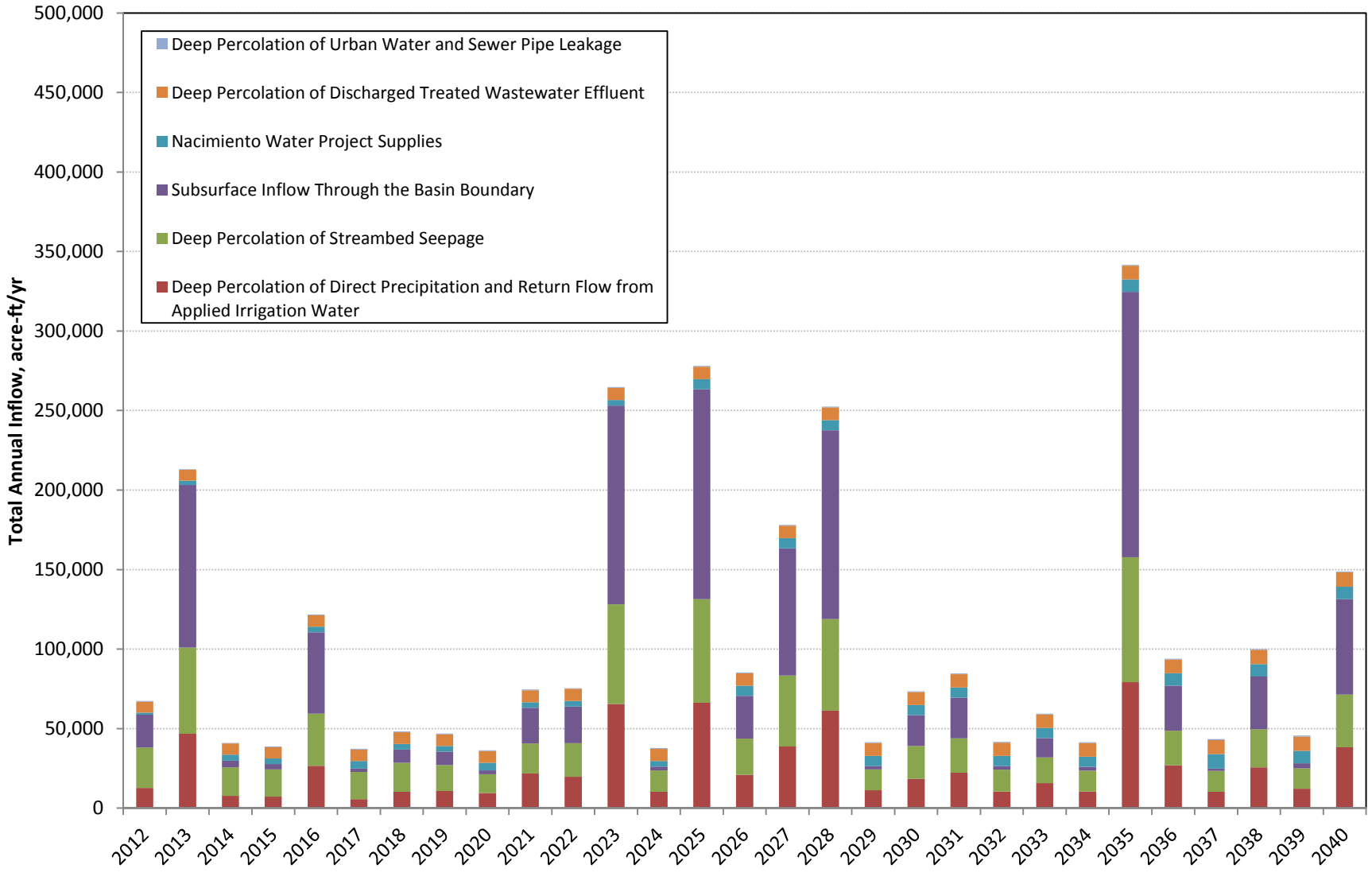


Figure 116

GEOSCIENCE Support Services, Inc.
Todd Groundwater

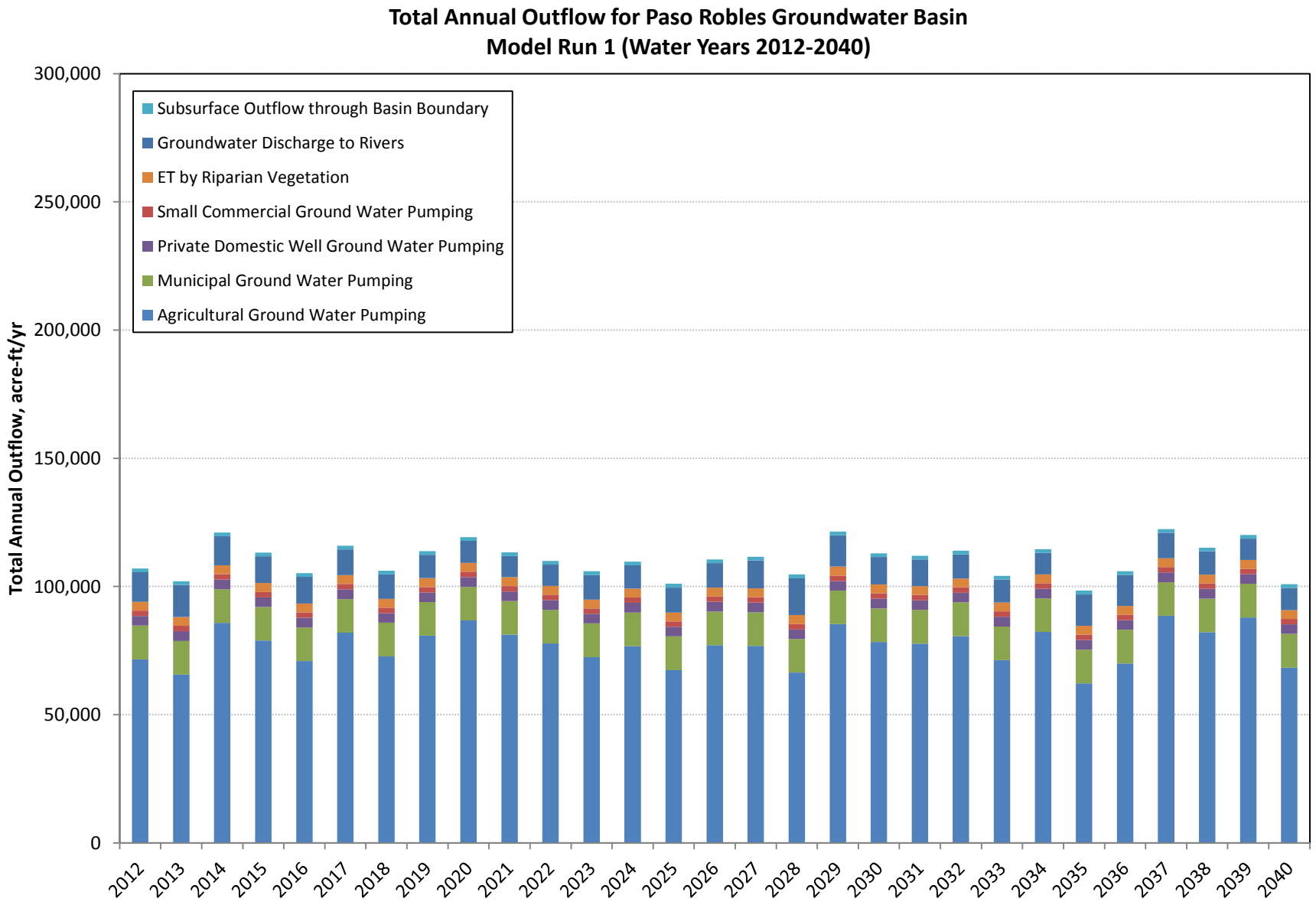


Figure 117

GEOSCIENCE Support Services, Inc.
Todd Groundwater

Total Annual Outflow for Paso Robles Groundwater Basin
Model Run 2 (Water Years 2012-2040)

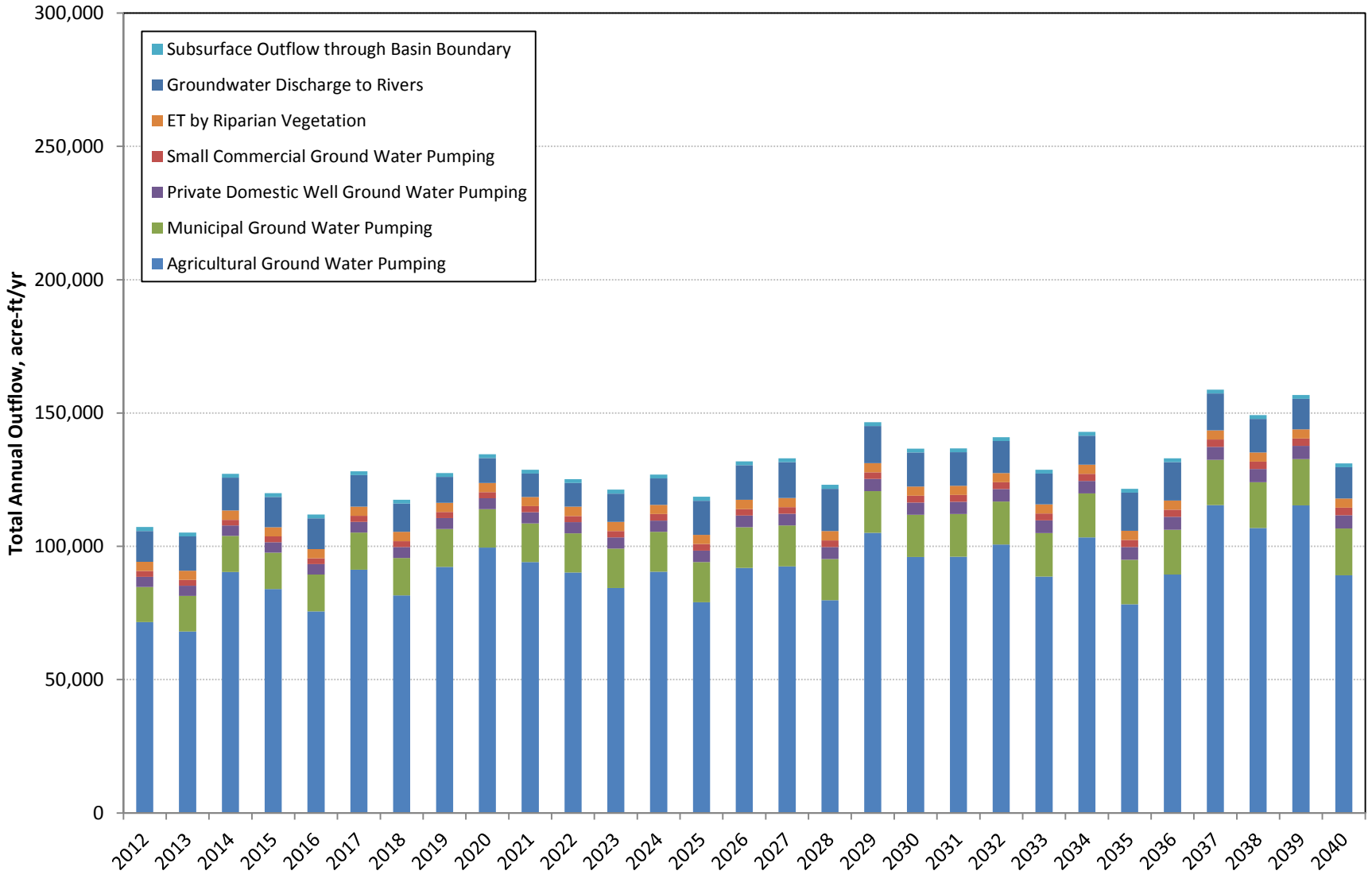
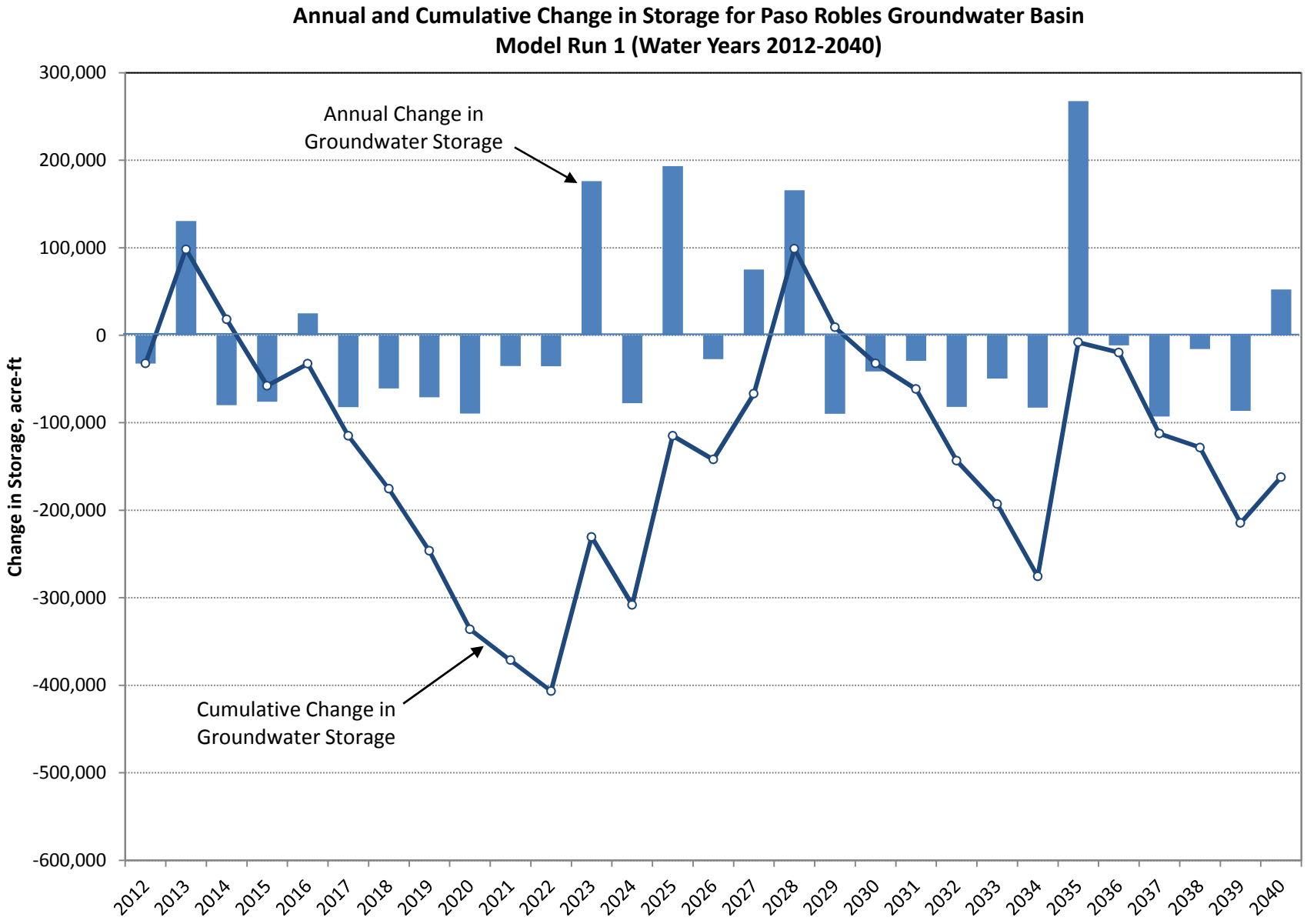


Figure 118


Annual and Cumulative Change in Storage for Paso Robles Groundwater Basin
Model Run 1 (Water Years 2012-2040)
Change in Storage, acre-ft
300,000
200,000
100,000
0
-100,000
-200,000
-300,000
-400,000
-500,000
-600,000
Annual Change in Groundwater Storage
Cumulative Change in Groundwater Storage
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
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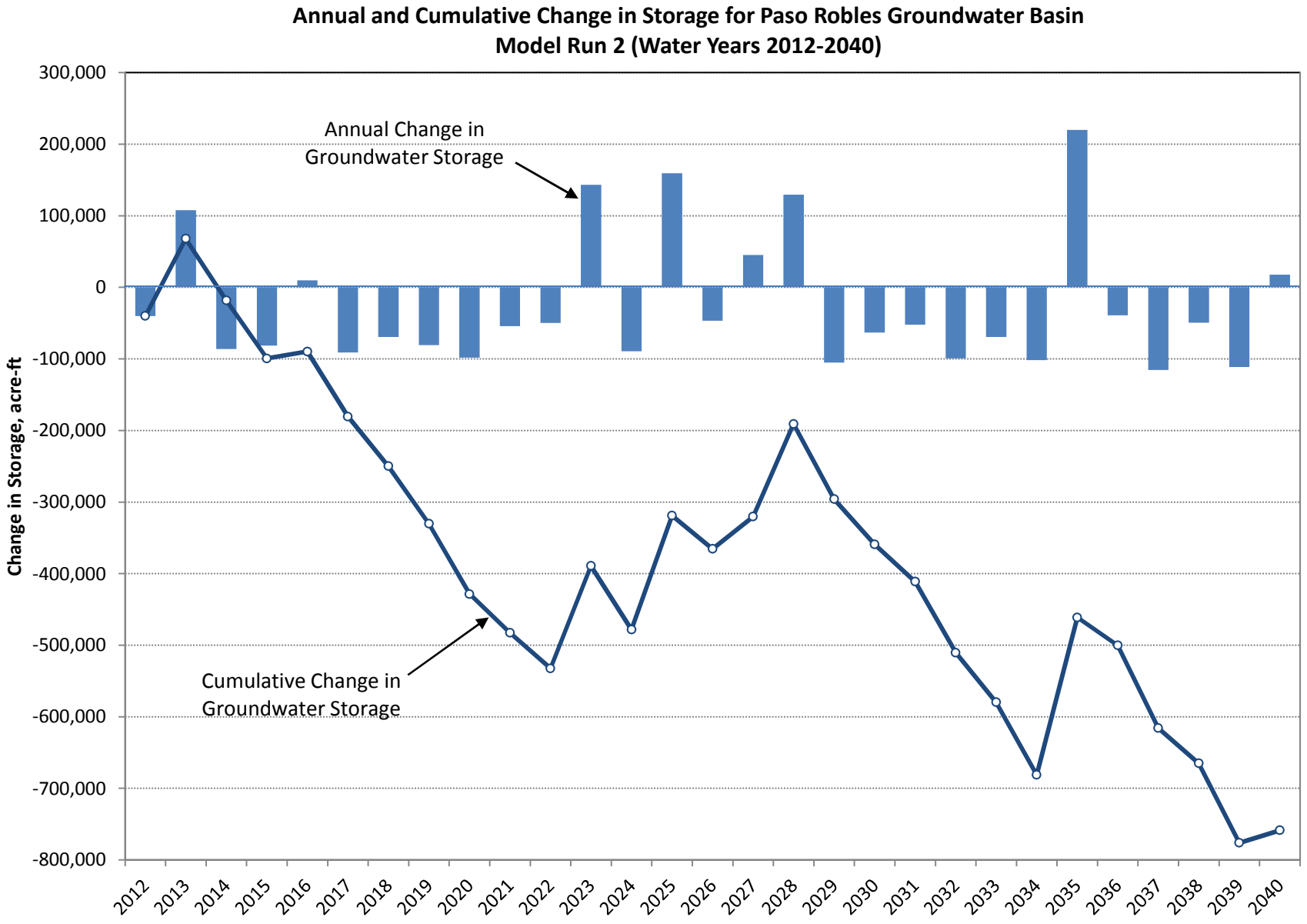
2040

Figure 119


Annual and Cumulative Change in Storage for Paso Robles Groundwater Basin
Model Run 2 (Water Years 2012-2040)
Change in Storage, acre-ft
300,000
200,000
100,000
0
-100,000
-200,000
-300,000
-400,000
-500,000
-600,000
-700,000
-800,000
Annual Change in Groundwater Storage
Cumulative Change in Groundwater Storage
2012
2013
2014
2015
2016
2017
2018
2019
2020
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2022
2023
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Figure 120