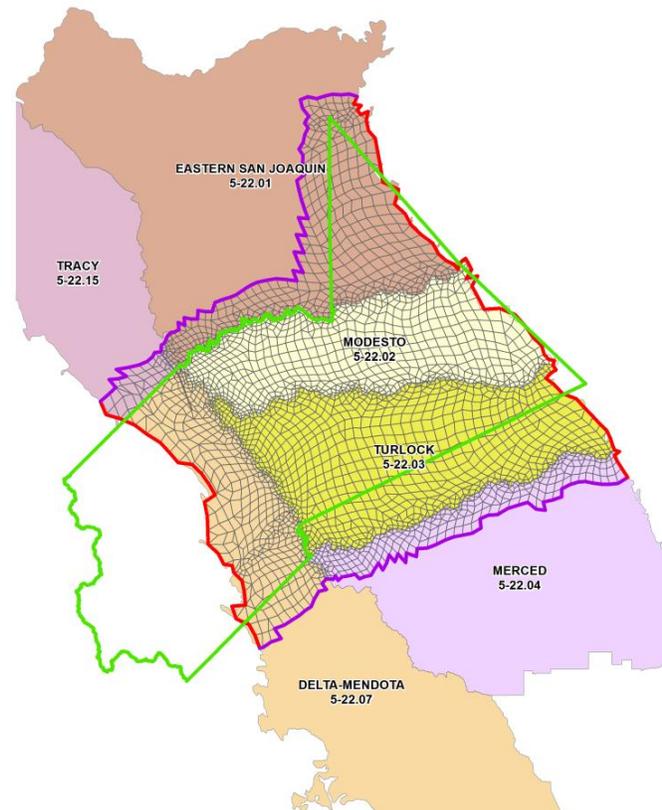


Stanislaus County Discretionary Well Permitting and Management Program Environmental Impact Report Workshop #4

January 31, 2018

Stanislaus County Farm Bureau
1201 L Street
Modesto, California



JACOBSON | JAMES
& associates, inc

Acknowledgments – Workshop #4

This workshop is part of a project that is financed under the Water Quality, Supply, and Infrastructure Improvement Act of 2014, (Sustainable Groundwater Planning Grant Program), administered by State of California, Department of Water Resources

Local Contributors Include:

Stanislaus County	City of Patterson	Oakdale ID	Rock Creek WD
City of Modesto	City of Newman	Eastside WD	Trinitas Farming
City of Turlock	City of Waterford	Del Puerto WD	MCCV
City of Ceres	City of Hughson	West Stanislaus ID	Agricultural Preservation Alliance, Inc.
City of Riverbank	Turlock ID	Central Calif. ID	
City of Oakdale	Modesto ID	Patterson ID	

Acknowledgments – PEIR Preparation

- ✓ **Jacobson James & Associates – Mike Tietze, Nick Anchor, Juliet Hutchins, Linda Mercurio**
- ✓ **Tetra Tech – John Boch, Steve Carlton, Sujoy Roy, Clifford Jarman, Ann Zoidis, Julia Mates, Genevieve Kaiser, Angela Lortie**
- ✓ **Stanislaus County - Walt Ward**

Presenters

- **Mike Tietze, P.G., C.E.G., C.H.G. – JJ&A Principal**
- **Juliet Hutchins – JJ&A Staff Geologist**
- **Linda Mercurio, PMP – JJ&A Project Manager**

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Agenda

- ✓ **Background and Objectives**
 - **Stanislaus County Groundwater Ordinance Overview and History**
 - **PEIR Objectives and Benefits**
 - **Future Use of PEIR**
- ✓ **PEIR Approach**
 - **Purpose of CEQA and PEIR**
 - **Special Considerations**
 - **Analysis Approach**
 - **Initial Study Findings**
 - **Structure and Contents**
- ✓ **PEIR Findings**
 - **Hydrologic Effects Analysis**
 - **Impact Analysis Results**



Background and Objectives

- ✓ Stanislaus County Groundwater Ordinance - Overview and History
- ✓ PEIR Objectives and Benefits
- ✓ Future Use of PEIR

Groundwater Ordinance Overview and History

Prior to adoption of the Groundwater Ordinance, options considered to address unsustainable groundwater management practices included:

- ✓ Continuing with existing programs
- ✓ Placing an emergency moratorium on new wells
- ✓ Adopting a Zoning Ordinance
 - Zoning overlays
 - Zoning changes
- ✓ Adopting a Groundwater Ordinance
 - Export Prohibition
 - Sustainable Groundwater Management
 - Well Permitting Program



Groundwater Ordinance Overview and History

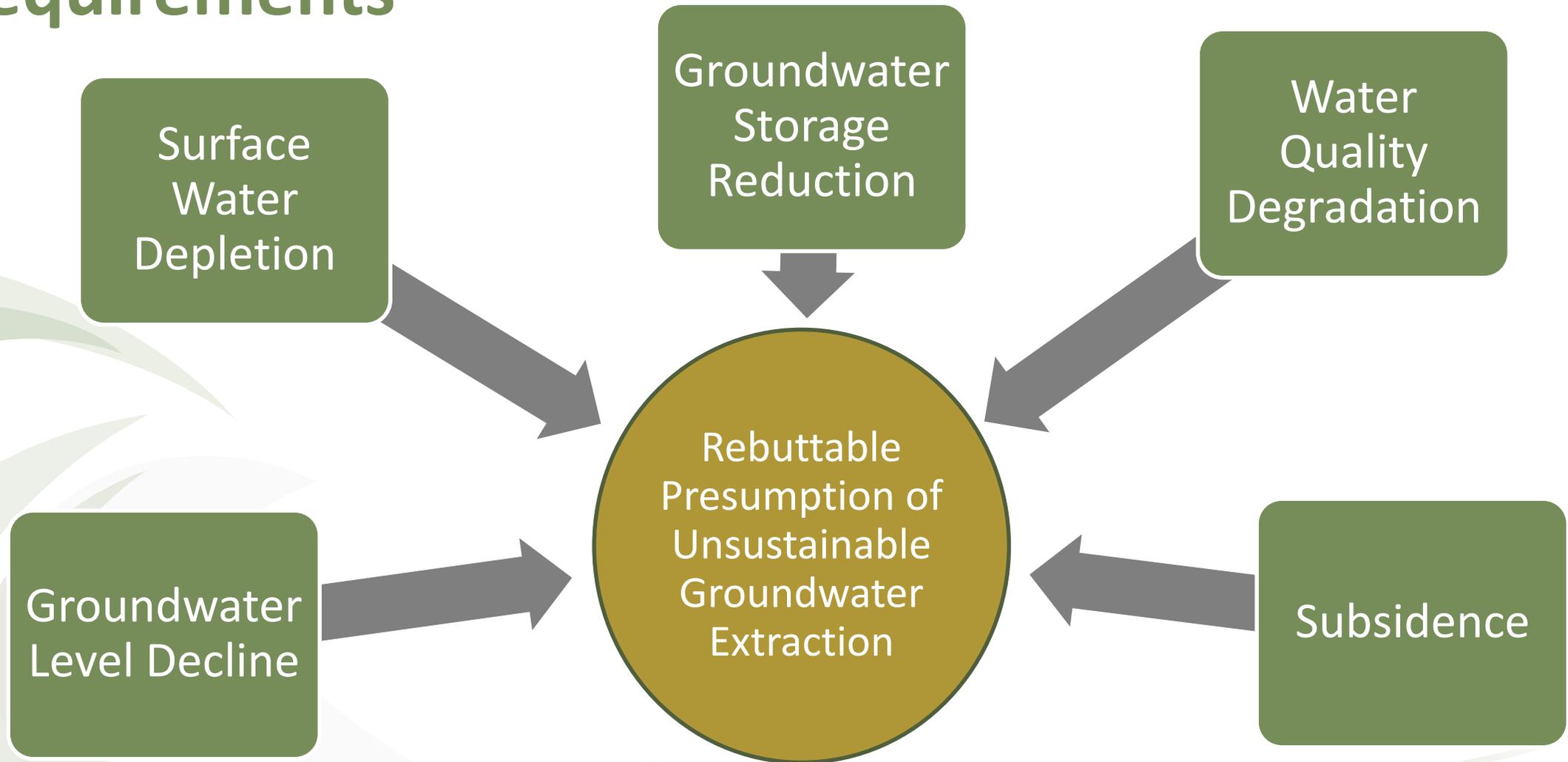


- ✓ Adopted in November 2014 to promote sustainable groundwater management.
- ✓ Aligned with California Sustainable Groundwater Management Act
- ✓ Prohibits unsustainable groundwater extraction
- ✓ Specifies exemptions from ordinance
- ✓ Requires applicants for new non-exempt wells to provide substantial evidence that proposed well will be operated in a sustainable fashion
- ✓ Requires implementation of a discretionary well permitting program

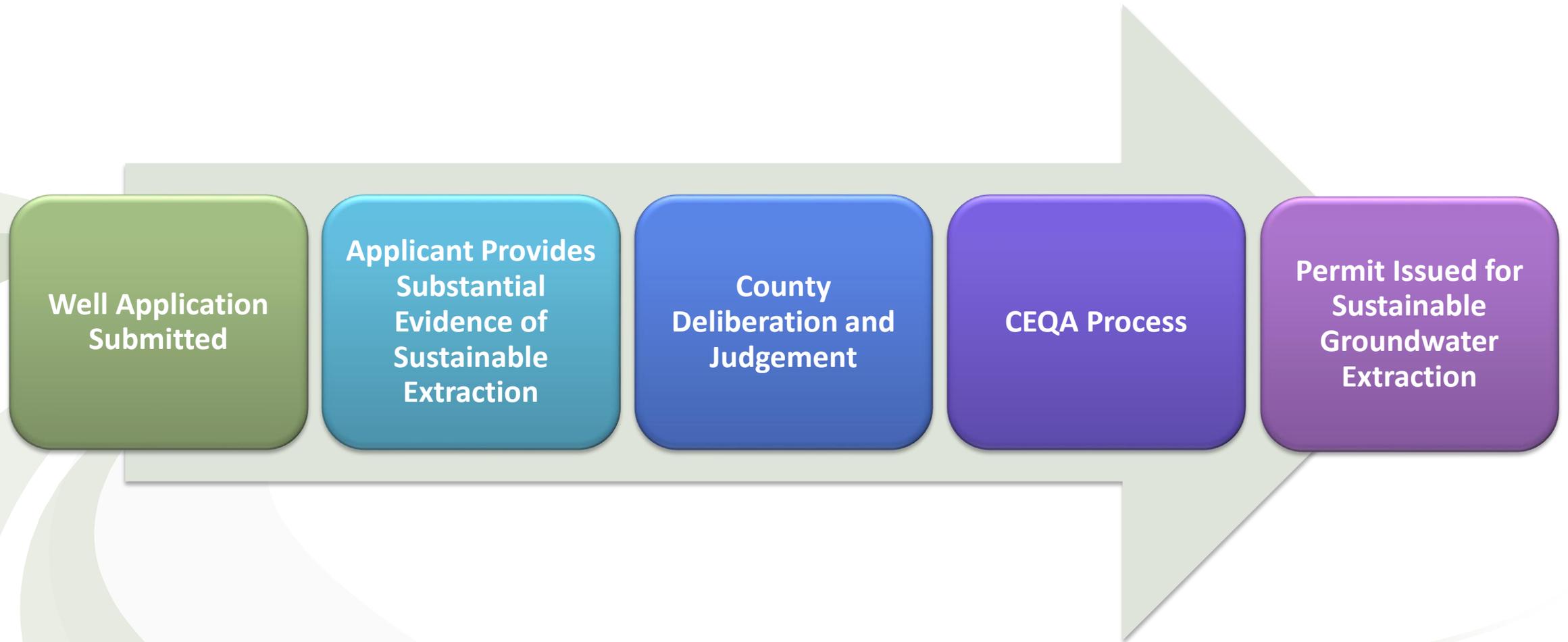
County Groundwater Ordinance - Aligned with SGMA

- ✓ The County GW Ordinance and SGMA BOTH:
 - Address potential adverse effects associated with unsustainable groundwater use.
 - Are intended to protect existing infrastructure, wells, groundwater storage reserves, surface water resources, and water quality; prevent adverse environmental and economic impacts
 - May influence future land use decisions.
- ✓ Intent of well permitting program set forth in the Ordinance is to prevent “Undesirable Results” as defined in the Ordinance and SGMA:
 - Chronic lowering of groundwater levels
 - Decrease in groundwater storage
 - Degraded water quality, including migration of contaminant plumes
 - Land subsidence
 - Surface water depletion

Groundwater Ordinance - Substantial Evidence Requirements



Groundwater Ordinance – Well Application Program Implementation



Ordinance Applicability - Pre-GSP Adoption



Ordinance Prohibition DOES Apply

- ✓ Unincorporated Areas within Stanislaus County
- ✓ Extraction of groundwater from non-exempt wells for which applications were filed after November 25, 2014

Ordinance Prohibition DOES NOT Apply

- ✓ Incorporated areas
- ✓ Wells designed as replacement wells.
- ✓ Water resource management practices of public water agencies and rate payers in compliance with GMP
- ✓ “*De minimus*” extraction rates (less than 2 AF/YR)

Ordinance Applicability - Post-GSP Adoption



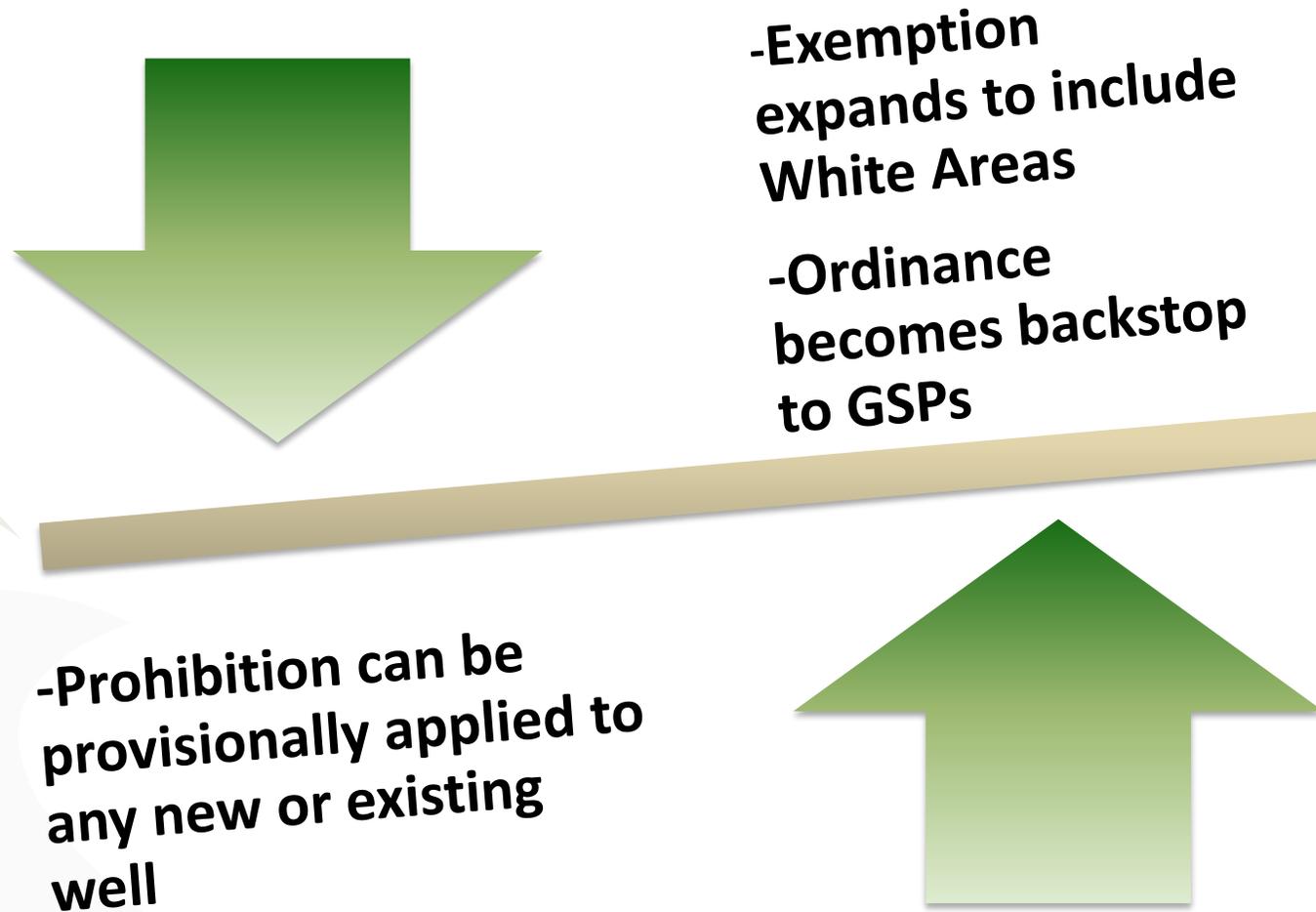
Ordinance Prohibition DOES Apply

- ✓ Unsustainable extraction of groundwater from any new or existing well, as determined by the County.

Ordinance Prohibition DOES NOT Apply

- ✓ Water resource management practices of public water agencies and rate payers in compliance with GSP (All new well applications will be exempt.)
- ✓ “*De minimus*” extraction rates (less than 2 AF/YR)

Post-GSP Applicability of Ordinance Prohibition

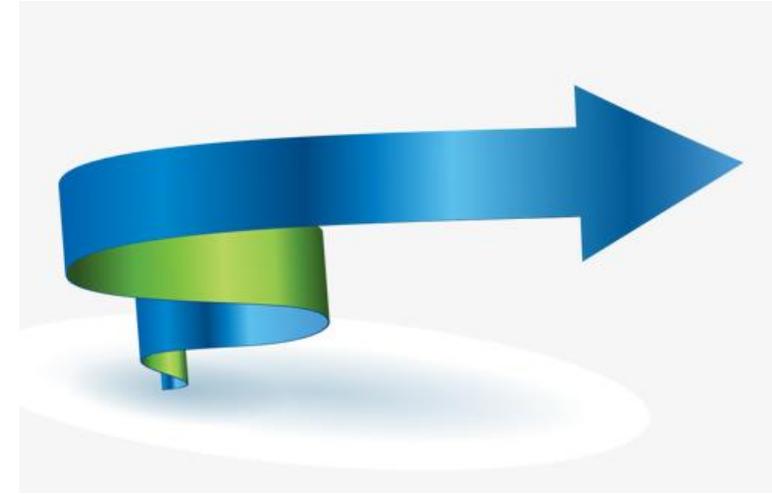


PEIR Objectives and Benefits

- ✓ **Streamline the Well Permit Application Process**
 - Provide a CEQA checklist and Tier I document for future applications and CEQA analyses to reference
 - Refine groundwater management zone concept
- ✓ **Provide a more robust technical basis for Ordinance implementation**
 - Better understanding of hydrologic conditions, trends and effects
 - Improve defensibility of Ordinance implementation
- ✓ **Provide data to help facilitate future groundwater sustainability planning**
 - Data compilation and model development
 - Preliminary analysis and issue identification



Future Use of PEIR



- ✓ Provides a standard and streamlined framework for future CEQA evaluation
- ✓ Subsequent CEQA reviews will be able to “tier off” of the PEIR
- ✓ Eliminates need to consider select resource areas and threshold questions where impacts are shown to be less than significant
- ✓ Defines conditions under which other resource areas and threshold questions can be assumed to be less than significant
- ✓ Develops standard threshold questions for “Undesirable Results”
- ✓ Defines information to be considered in future studies

PEIR Approach

- ✓ Purpose of CEQA and PEIR
- ✓ Special Considerations
- ✓ Analysis Approach
- ✓ Significance Findings of Initial Study
- ✓ PEIR Structure and Contents

Purpose of CEQA

Inform

- On the potential, significant environmental effects of proposed activities

Identify

- Ways environmental damage can be avoided or significantly reduced

Prevent

- Damage to environment through use of alternatives/mitigation measures

Disclose

- Reasons a gov't agency approved project if there are significant environmental effects

Purpose of a PEIR for a Program of this Type

Broad Consideration of Alternatives

- Consideration of broader alternatives, giving County greater flexibility to implement GW management strategies

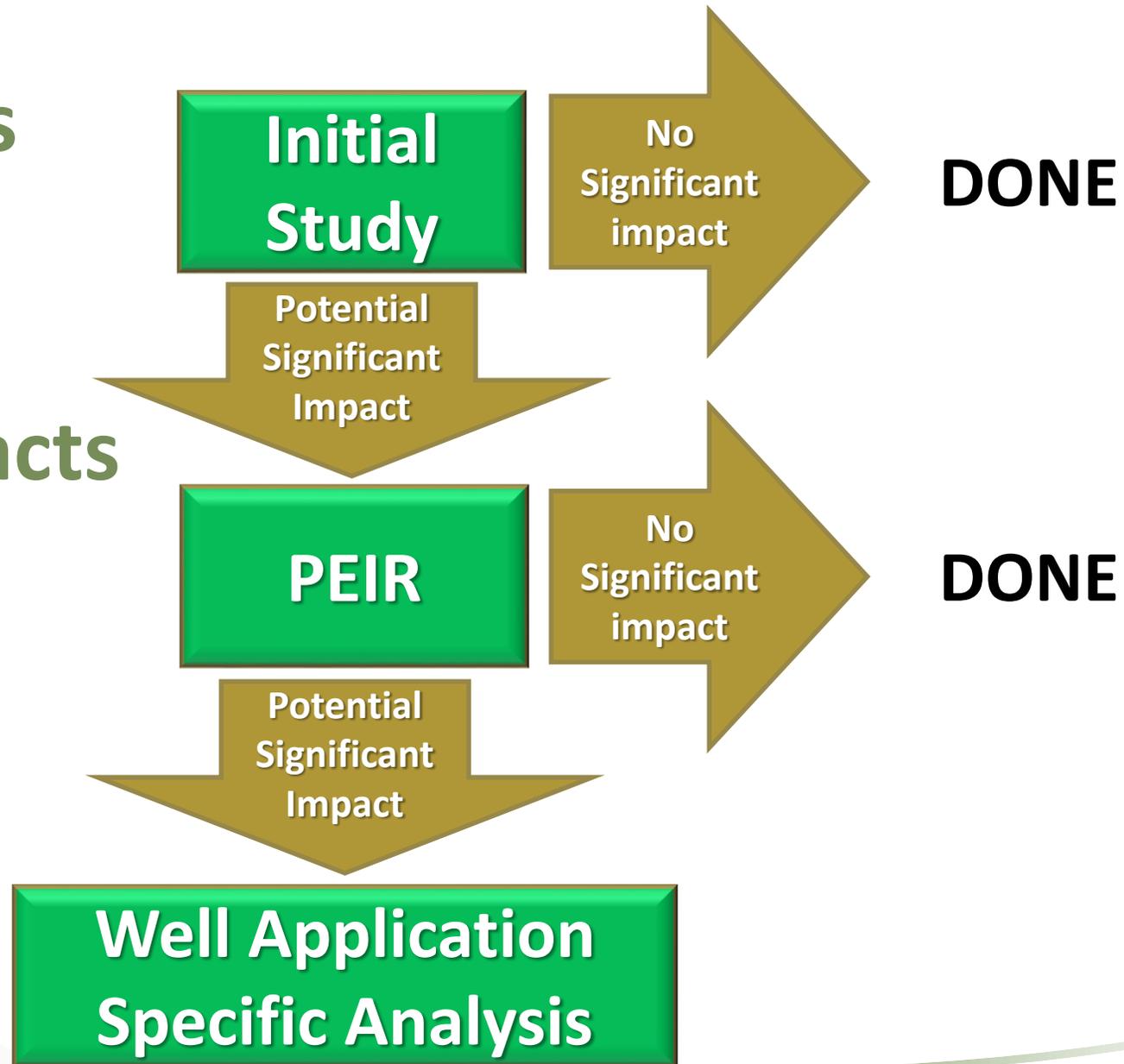
Program-Wide

- Development of program-wide mitigation strategies (e.g., GW Management zones)
- Consideration of cumulative impacts

Comprehensive Consideration

- Program level consideration of key issues so that they do not need to be revisited during evaluation of individual well applications.

Analysis Process and Function of PEIR for Well Permitting Impacts



Summary of Scoping Comments

- ✓ Ripping of slope soils for planting of nut trees loosens soils that can be transported into stream beds, reducing capacity of channels and increasing flooding potential
- ✓ The infiltration of river water into wells constructed within 1,000 feet of a river can affect downstream surface water rights holders
- ✓ The document needs to address the long-term effects of climate change on the county's environment and surface and groundwater supplies



Summary of Scoping Comments

The County should:

- ✓ Follow DWR's regulations in regard to GSPs for study of land subsidence impacts in the PEIR
- ✓ Broadly define its studies of hydrology/water quality impacts to ensure data gathered through the PEIR can be applied to all GW users in the county that must comply with SGMA
- ✓ Consider application of city noise ordinances to wells near their jurisdictions

In addition, the County's:

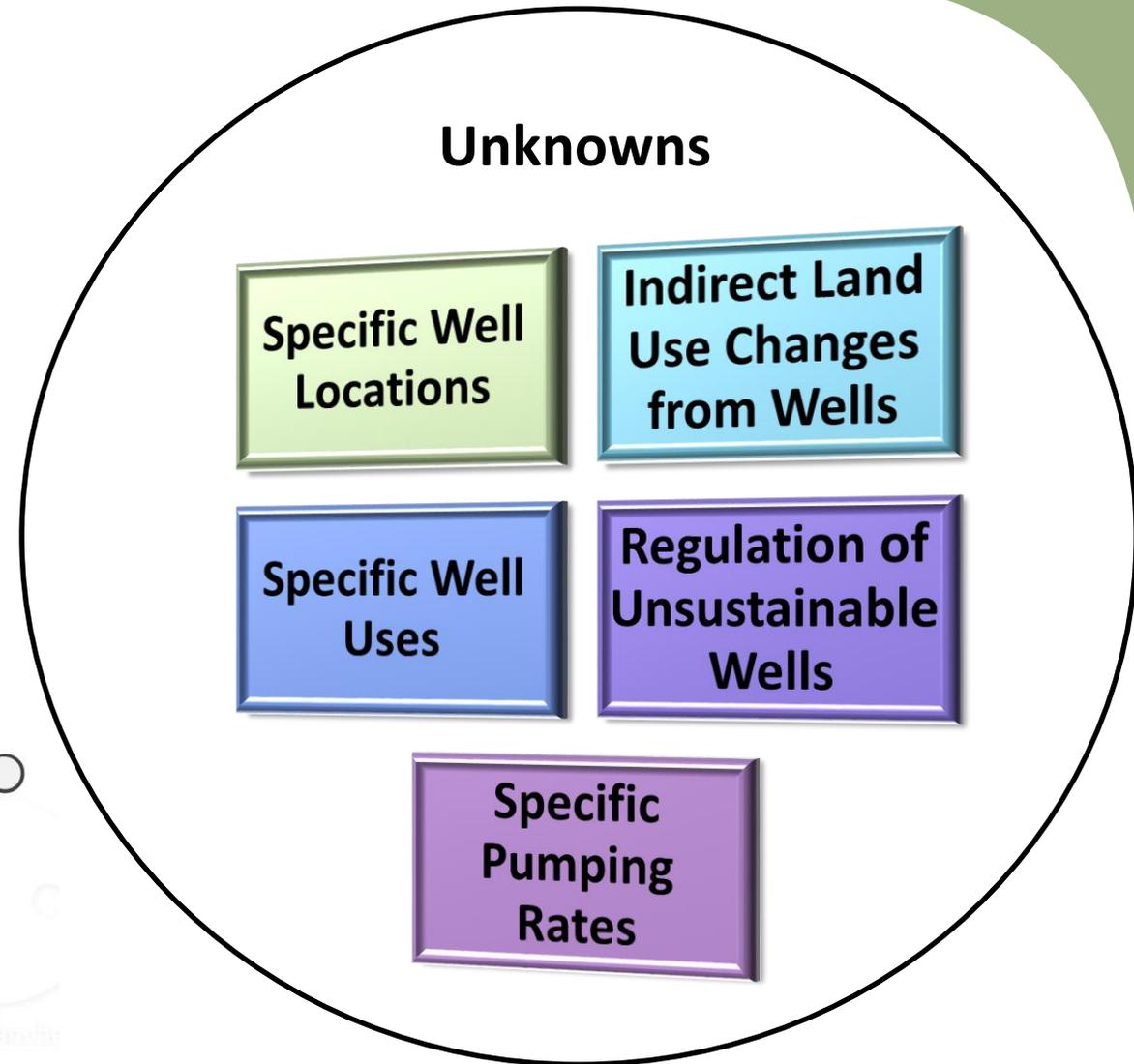
- ✓ Analysis of Population & Housing impacts should account for impacts of seasonal population growth on housing and businesses
- ✓ Analysis of Public Services impacts should consider the contribution seasonal workers make to the demand for housing and public services

Special Considerations

- ✓ The State CEQA guidelines indicate adoption of Ordinance is exempt from CEQA review, so none was conducted
- ✓ The PEIR is a voluntary document
- ✓ CEQA allows flexibility in tailoring programmatic documents to best support planning objectives
- ✓ The PEIR focuses on evaluating impacts associated with implementing the Ordinance, but does not evaluate the Ordinance itself

Special Considerations

- ✓ Details for specific wells are unknown, but general impacts can still be evaluated.
- ✓ The PEIR focuses on understanding *regional* conditions affected by future actions (foreseeable direct and indirect)



Special Considerations

CEQA requires that an environmental analysis include the whole of an action and its potential consequences. Impacts evaluated include:

Direct Actions

- Impacts associated with well construction and operation.

Indirect Actions

- Impacts associated with future changes in land use or operations made possible by the well.

Special Considerations

The following were not considered in the impact analysis:

Potential restrictions on pumping imposed under the Ordinance

- These effects are an outcome of regulatory requirements intended to protect the environment, and are not an impact under CEQA.

Unforeseeable tertiary actions such as population growth or land use changes

- Shifts in population growth or changes in land use and their associated environmental effects are considered too speculative for analysis in the PEIR.

PEIR Analysis Approach – Create a Handbook

The PEIR is written as a “handbook” to facilitate use as a Tier 1 document

Streamlined

- A streamlined set of impact assessment threshold questions was developed

Regional Characterization

- Regional characterization of hydrogeologic and water resources conditions

Programmatic Mitigation

- Measures were developed to guide mitigation at project level

By collecting and referencing relevant information in a single document, the PEIR creates a technical basis for more uniform assessment of well applications.

PEIR Analysis Approach – Focus of Analysis

- ✓ Impact analysis narrowly focused on well permitting and regulation
- ✓ Cumulative effects analysis considered current trends, demand forecasts, SGMA compliance, and Ordinance implementation
- ✓ The list of resource areas evaluated was narrowed in the Initial Study
- ✓ For impacts related to “Undesirable Results,” new threshold questions were developed
- ✓ A further focused and narrowed list of questions will be a product of the PEIR that can be used for future well permitting and other related CEQA analyses, fulfilling the objective of the PEIR to streamline and inform future analyses.

PEIR Analysis Approach – Focused CEQA Questions

To align impact evaluation with “Undesirable Results” in the Groundwater Ordinance and SGMA, some threshold questions were edited or added:

- ✓ **Biological Resources** - Expanded to include impacts to GDEs and GW-connected streams, lakes, and reservoirs
- ✓ **Geology & Soils** - Edited for a reference to subsidence
- ✓ **Hydrology & Water Quality** - Edited to address water quality and questions added regarding drawdown and depletion



PEIR Analysis Approach – Project Description

The action being evaluated is implementation of well permitting and management under the Groundwater Ordinance

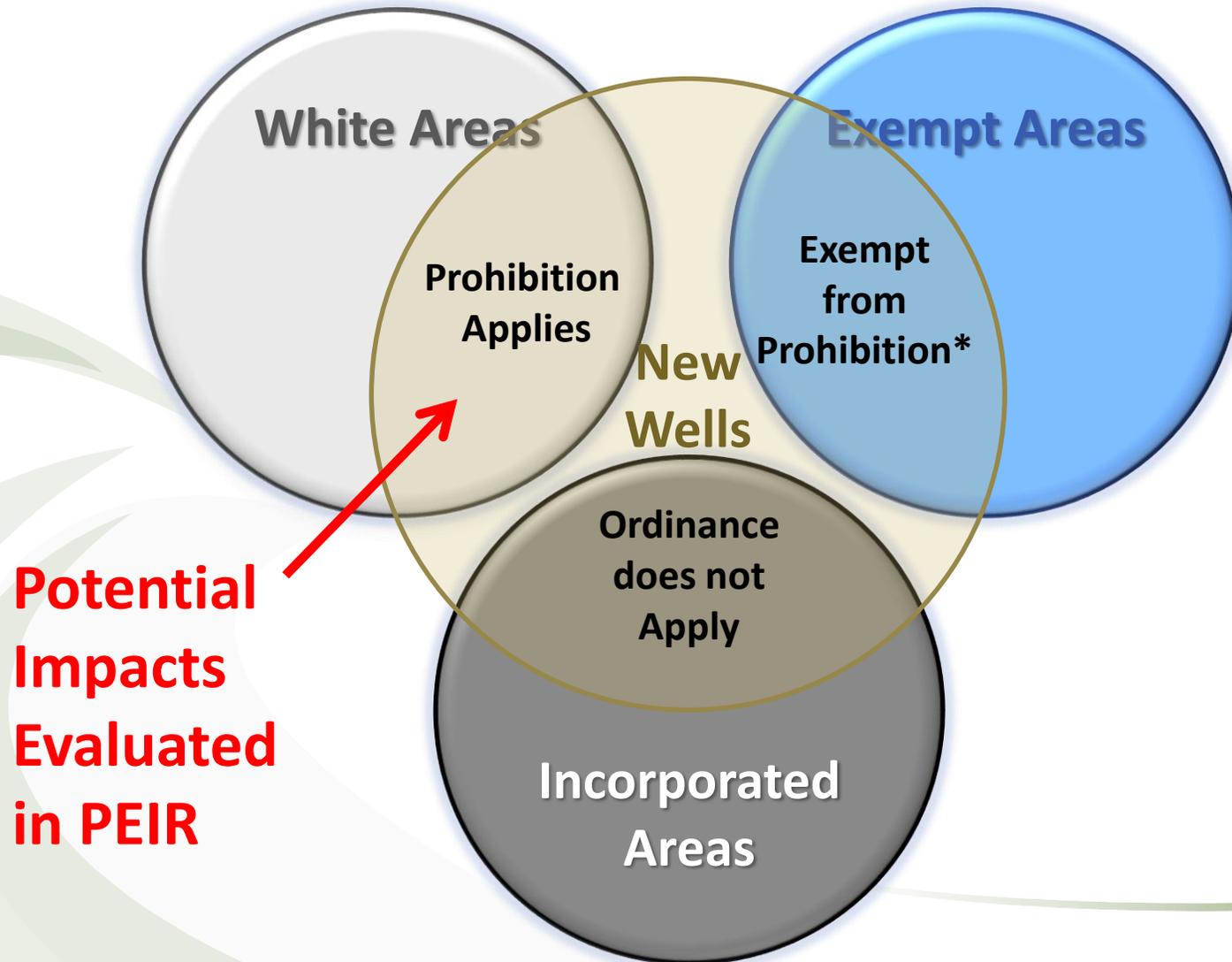
- ✓ Future well permitting is the primary focus
 - For impact evaluation, it is estimated up to 10 permits may be issued annually until GSPs are adopted
 - Post GSP adoption, permits will be ministerial
- ✓ The baseline for impact evaluation is continuation of current conditions without well permitting
- ✓ An evaluation of reasonably foreseeable trends is included as context for cumulative impact analysis, but this does not serve as the “no project” baseline

PEIR Analysis Approach - Project Description

Regulation of Unsustainable Wells after GSPs are Adopted

- ✓ Post GSP exercise of the “lookback” provision will be evaluated
- ✓ GSAs are responsible to adopt GSPs and regulate unsustainable wells; therefore it is unlikely the County will need to do so under the Ordinance
- ✓ Potential effects include:
 - Decreased impact to Hydrology & Water Quality, Geology & Soils, and Biological Resources
 - Potentially less water available for agricultural use
 - Potentially increased demand on utilities and service systems
- ✓ Therefore, the PEIR impact evaluation will focus on adverse effects to Agricultural Resources and Utilities & Service Systems

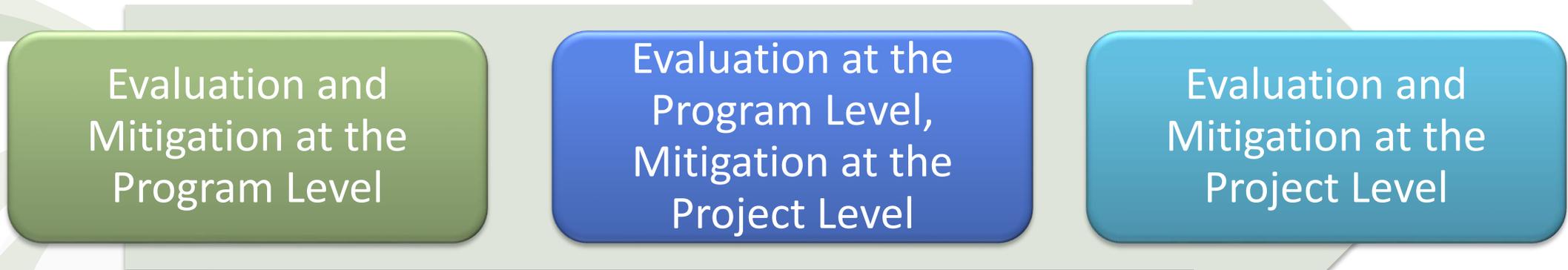
PEIR Analysis Approach - Pre-GSP Applicability



* The exemption applies to Public Water Agencies in compliance with a GMP and their rate payers. Non-rate payers are subject to the prohibition, and issuance of discretionary permits to non-rate payers will be evaluated in the PEIR.

PEIR Analysis Approach – Level of Evaluation/Mitigation

Different impacts warrant different handling, depending on their nature, and whether impacts can be predicted at the program level and mitigation can be prescribed at the program level.



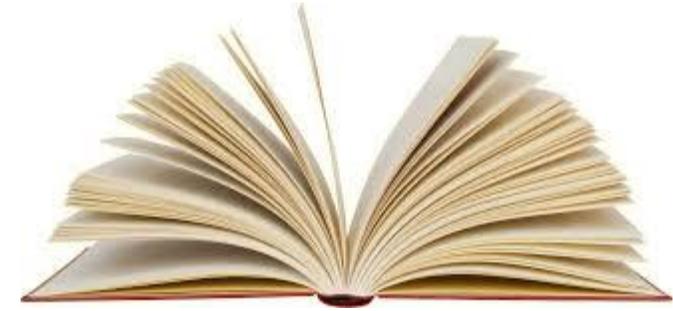
The PEIR will present a “roadmap” for CEQA analysis of future projects

Significance Findings of Initial Study



- **No Significant Impact – no further evaluation**
 - ✓ Aesthetics, Mineral Resources, Population & Housing, Public Services, Recreation, and Transportation & Traffic
- **Potential Significant Impact – carried forward**
 - ✓ Agriculture & Forestry Resources, Air Quality, Biological Resources, Cultural Resources, Geology & Soils, Greenhouse Gas Emissions, Hazards & Hazardous Materials, Hydrology & Water Quality, Land Use & Planning, Noise, and Utilities & Service Systems

PEIR Structure and Contents



- ✓ **Project Description** – overview of the program being evaluated.
- ✓ **Environmental Setting** – describes conditions associated with the program location and surrounding area.
- ✓ **Environmental Impacts** – describes approach to analysis of potential environmental impacts associated with the program, evaluation of impacts, and associated mitigation measures.
- ✓ **Alternatives** – describes the alternatives considered, including “no project” scenario and 3 alternatives for limiting drawdown impacts.
- ✓ **Other CEQA Considerations** – describes cumulative impacts, growth inducing impacts, significant and unavoidable impacts, and significant irreversible environmental changes/effects found not to be significant.

Significance Findings of PEIR

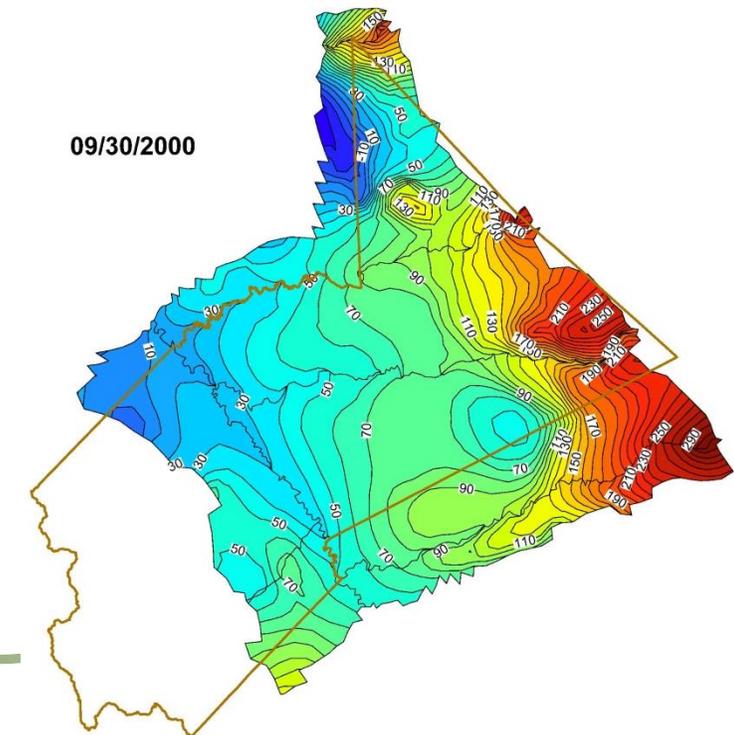
- **Less than Significant Impact – no mitigation needed**
 - ✓ Agriculture & Forestry Resources, Air Quality, Greenhouse Gas Emissions, Hazards & Hazardous Materials, and Utilities & Service Systems
- **Potential Significant Impact – mitigation measures under consideration**
 - ✓ Biological Resources, Cultural Resources, Geology & Soils, Hydrology & Water Quality, Land Use & Planning, and Noise

Impact Analysis Results

- ✓ Hydrologic Effects Analysis
- ✓ Impact Analysis Results

Principal Findings of Hydrologic Model

- ✓ Model calibration suited for use in PEIR, but outputs should be considered indicative and advisory for other purposes.
- ✓ Groundwater levels in the confined aquifer system beneath the Corcoran Clay may be regionally deeper than previously understood. CASGEM data include water level signals from both the shallow and deeper aquifer systems.
- ✓ 2000 to 2015: Modesto and Turlock Subbasins received less inflow from/provided more outflow to Delta-Mendota and Merced Subbasins
- ✓ 2000 to 2015: increased streamflow depletion
- ✓ Groundwater storage variable, but lowest in WY 2015 after the recent drought
- ✓ Agricultural pumping ~ 80 to 90 % of demand



Principal Findings of Hydrologic Model

Groundwater Budget Component	Water Budget (acre-feet)			
	WY 2000	WY 2005	WY 2010	WY 2015
Recharge from Diversion Losses	221,557	238,861	172,716	123,954
Net Inflow from (+) or Discharge to (-) Streams	(203,954)	(52,546)	3,540	39,064
Deep Percolation to Groundwater	494,024	499,864	402,912	294,733
Net Underflow In (+)/Out (-)	159,912	159,478	70,834	65,310
Agricultural Pumping	(535,574)	(486,577)	(446,357)	(876,345)
Municipal Pumping	(99,309)	(108,410)	(95,899)	(89,812)
Rural Domestic Pumping	(13,251)	(13,558)	(13,686)	(14,164)
Change in Storage	23,405	237,177	94,012	(456,361)

Hydrologic Effects Model Forecast Scenarios

Upper-Bound Demand Increase

- UWMP forecast Increases:
 - 2.7% per year, except Modesto
 - Modesto 0.4% per year
- Continuation of 2000 to 2015 ag conversion in eastern county (3,100 acres/year)

Lower Bond Demand Increase

- 25% of UWMP forecast increases:
 - 0.7% per year, except Modesto
 - Modesto 0.1% per year
- 25% of 2000 to 2015 ag conversion in eastern county (610 acres/year)

Well Permitting (Shallow Wells)

- 10 new discretionary wells per year added to “White Areas”
- Upper Aquifer System
- 400 AFY each net pumping

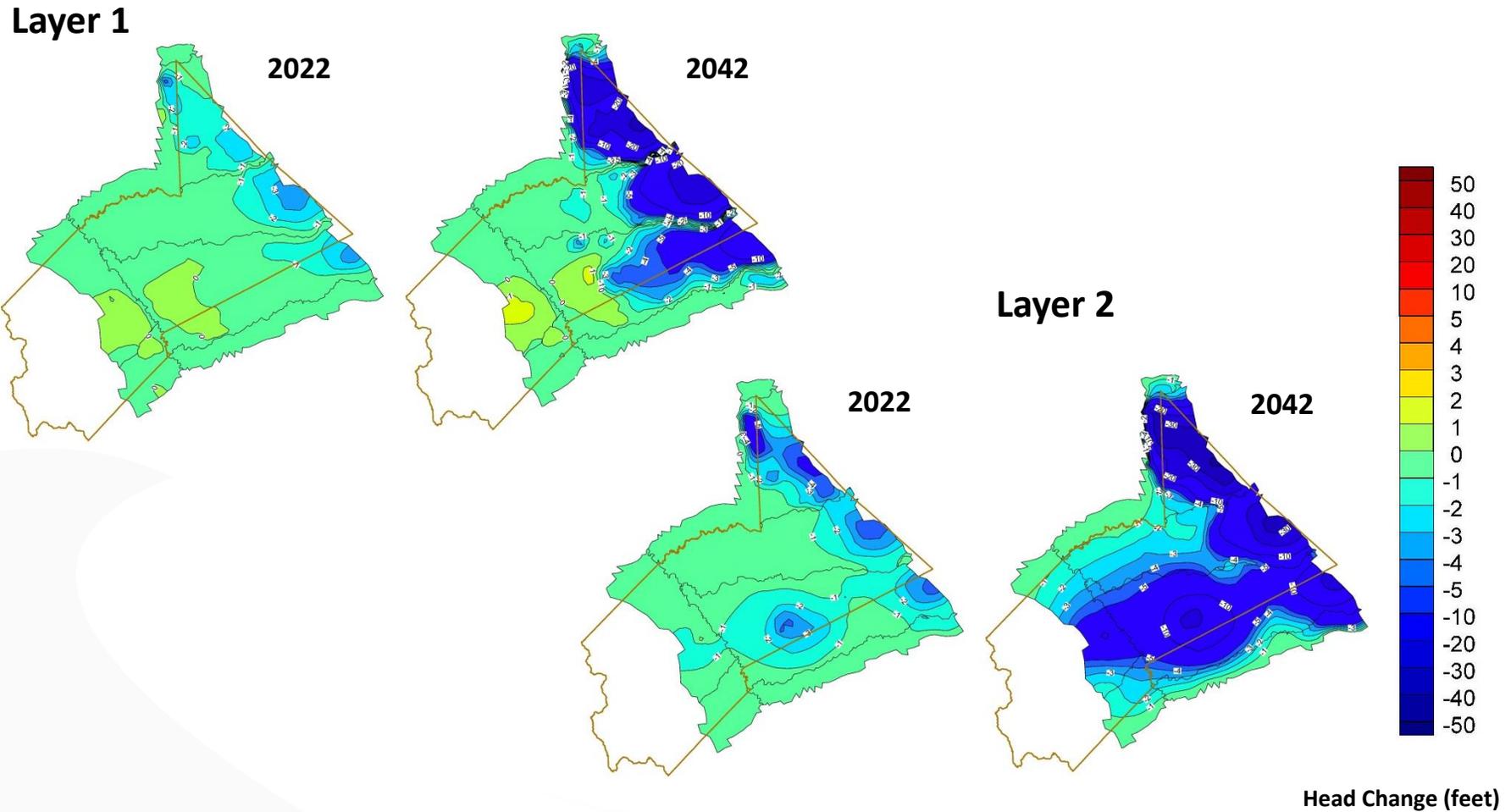
Well Permitting (Deep Wells)

- 10 new discretionary wells per year added to “White Areas”
- Lower Aquifer System
- 400 AFY each net pumping

Conjunctive Use

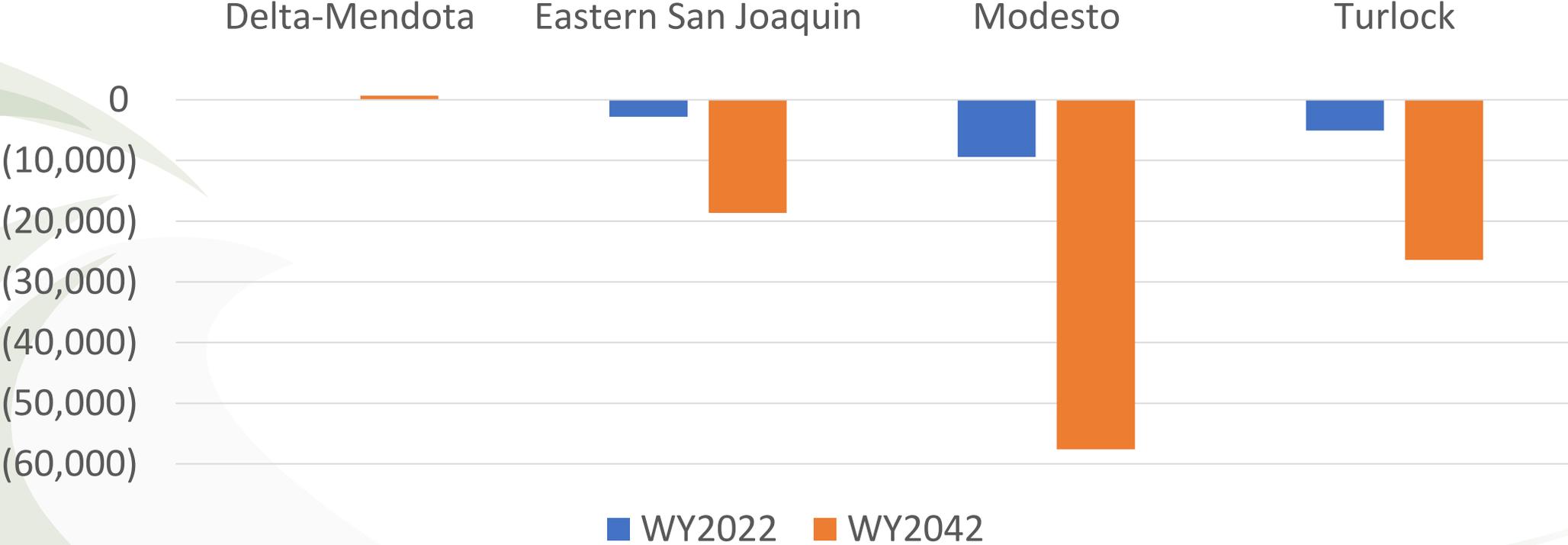
- Upper Bound Demand Increase
- Up to 16,700 AFY diverted from Tuolumne River and delivered to Turlock and Ceres

Scenario 2 – Upper Reasonable Demand Increase- Projected Drawdown



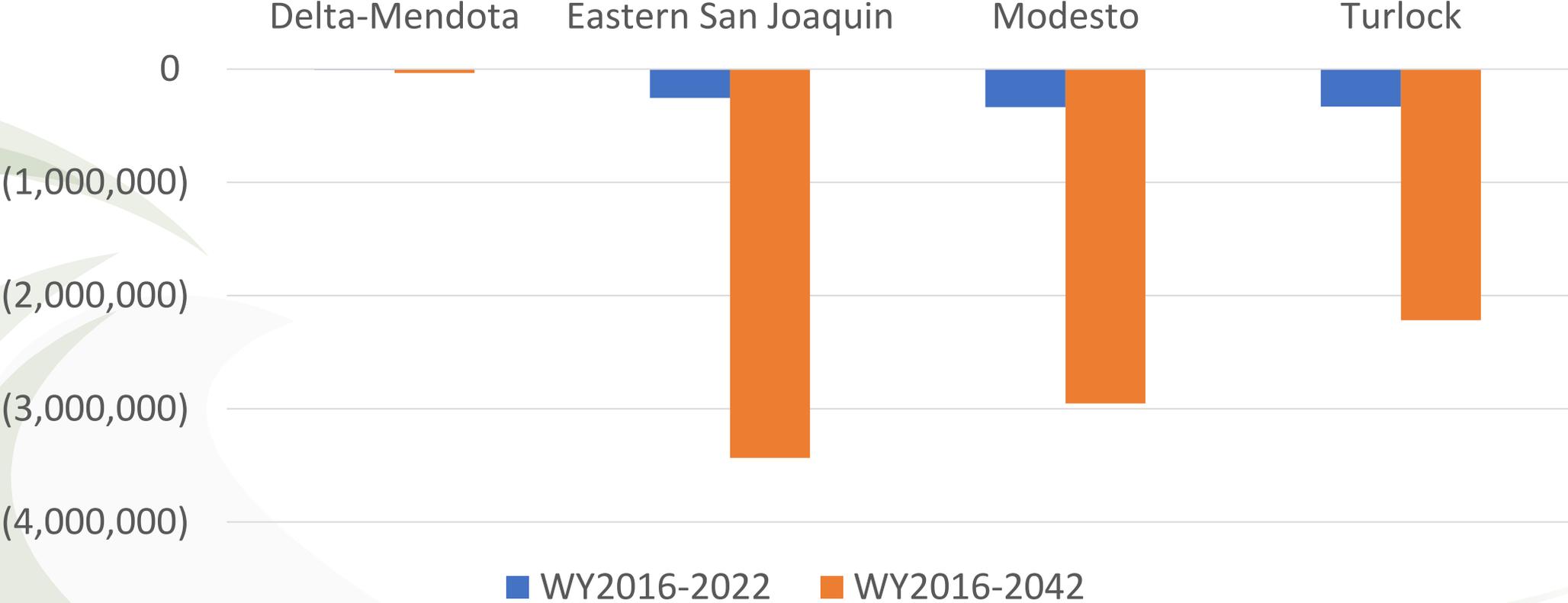
Scenario 2 – Upper Reasonable Demand Increase, Water Budget Forecast

Projected Change in GW Discharge to Streams by Subbasin in AFY

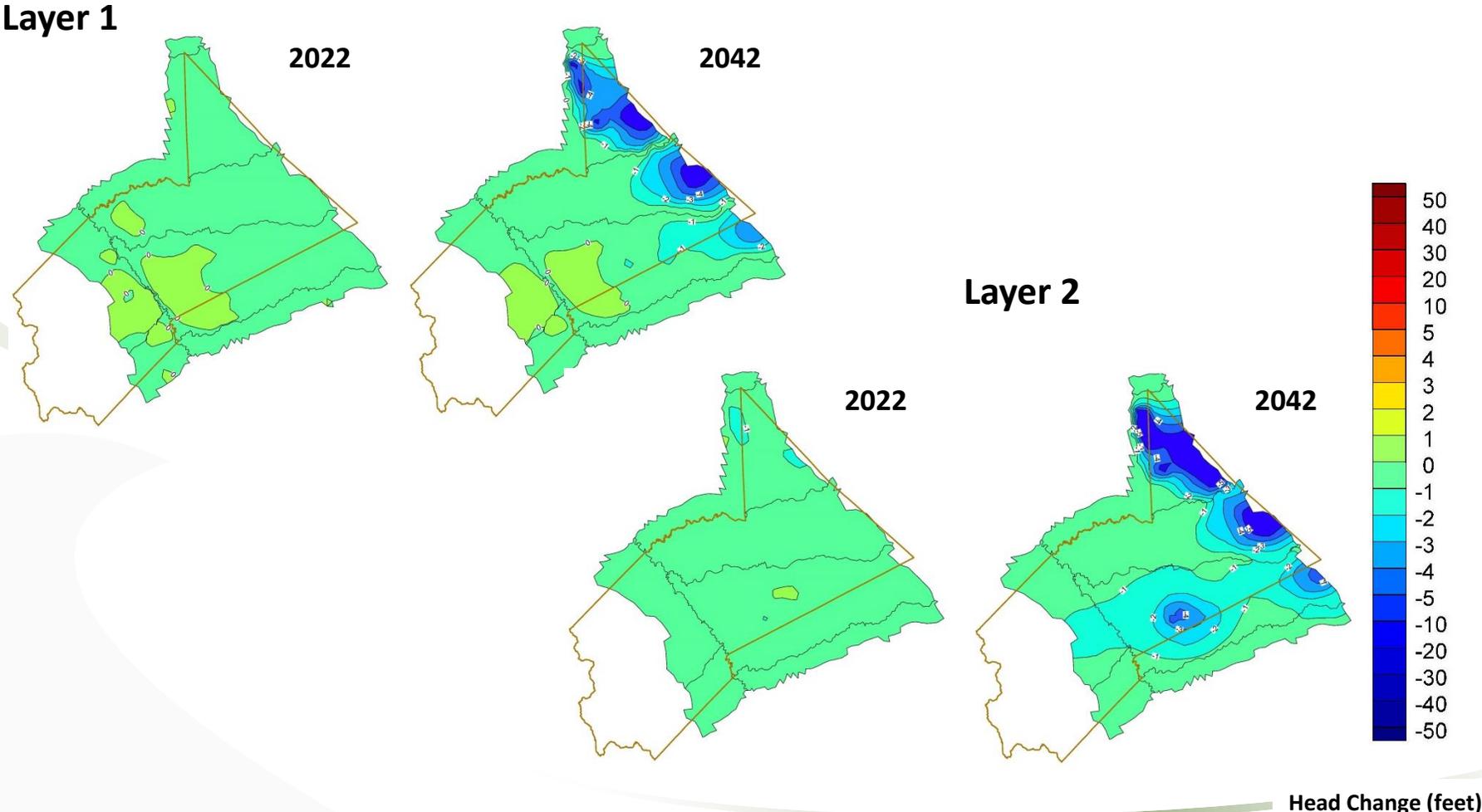


Scenario 2 – Upper Reasonable Demand Increase, Water Budget - Forecast

Projected Cumulative Storage Change by Subbasin in AF

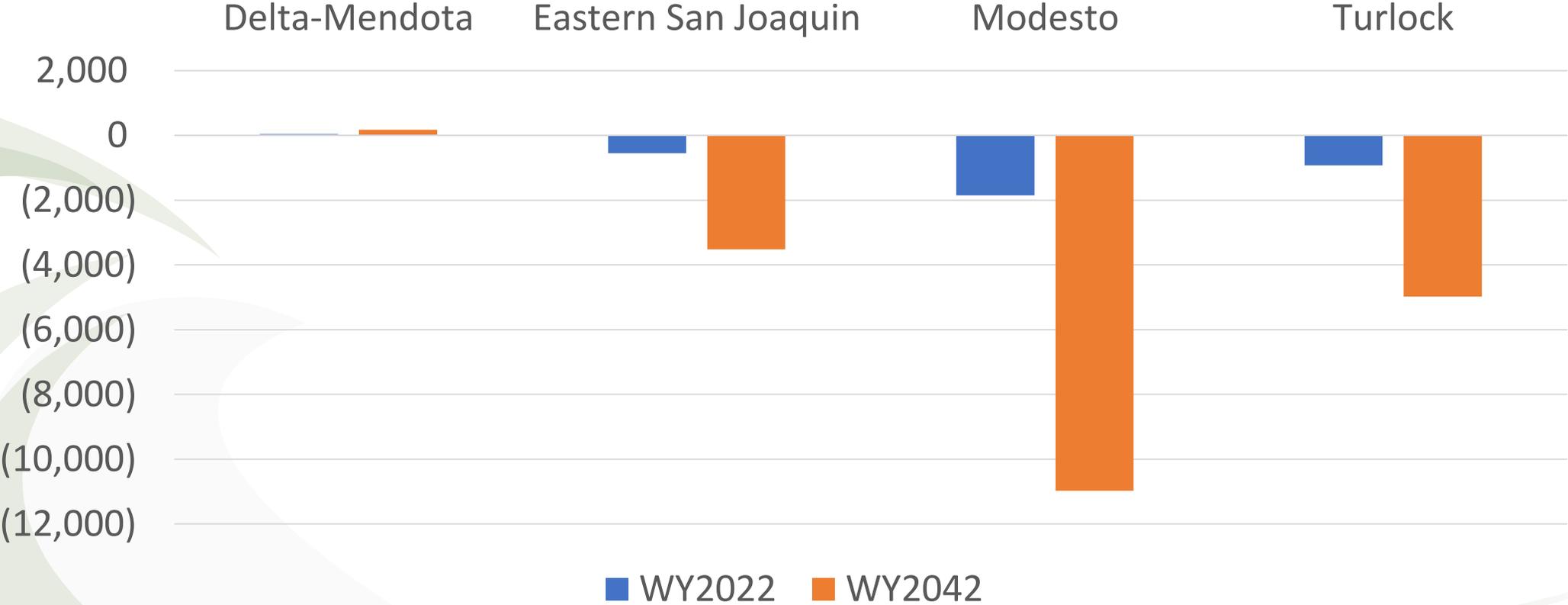


Scenario 3 – Lower Reasonable Demand Increase - Projected Drawdown



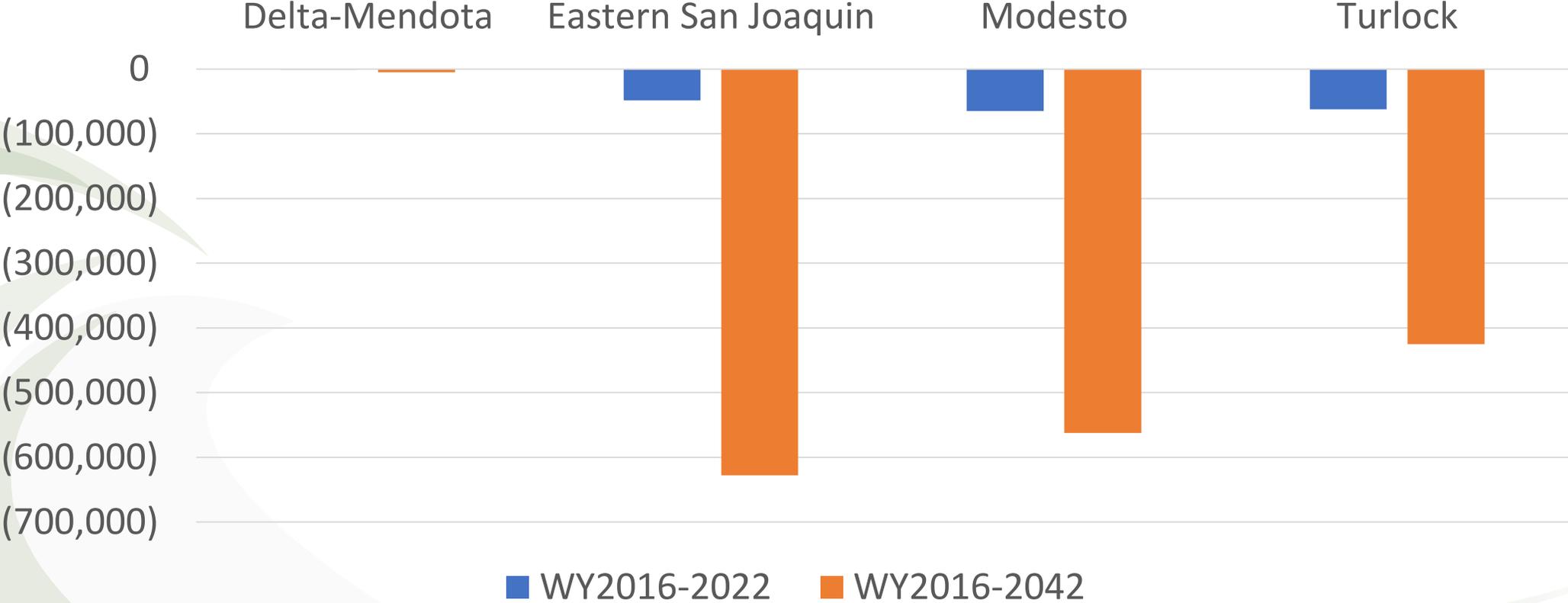
Scenario 3 – Lower Reasonable Demand Increase, Water Budget - Forecast

Change in GW Discharge to Streams by Subbasin in AFY

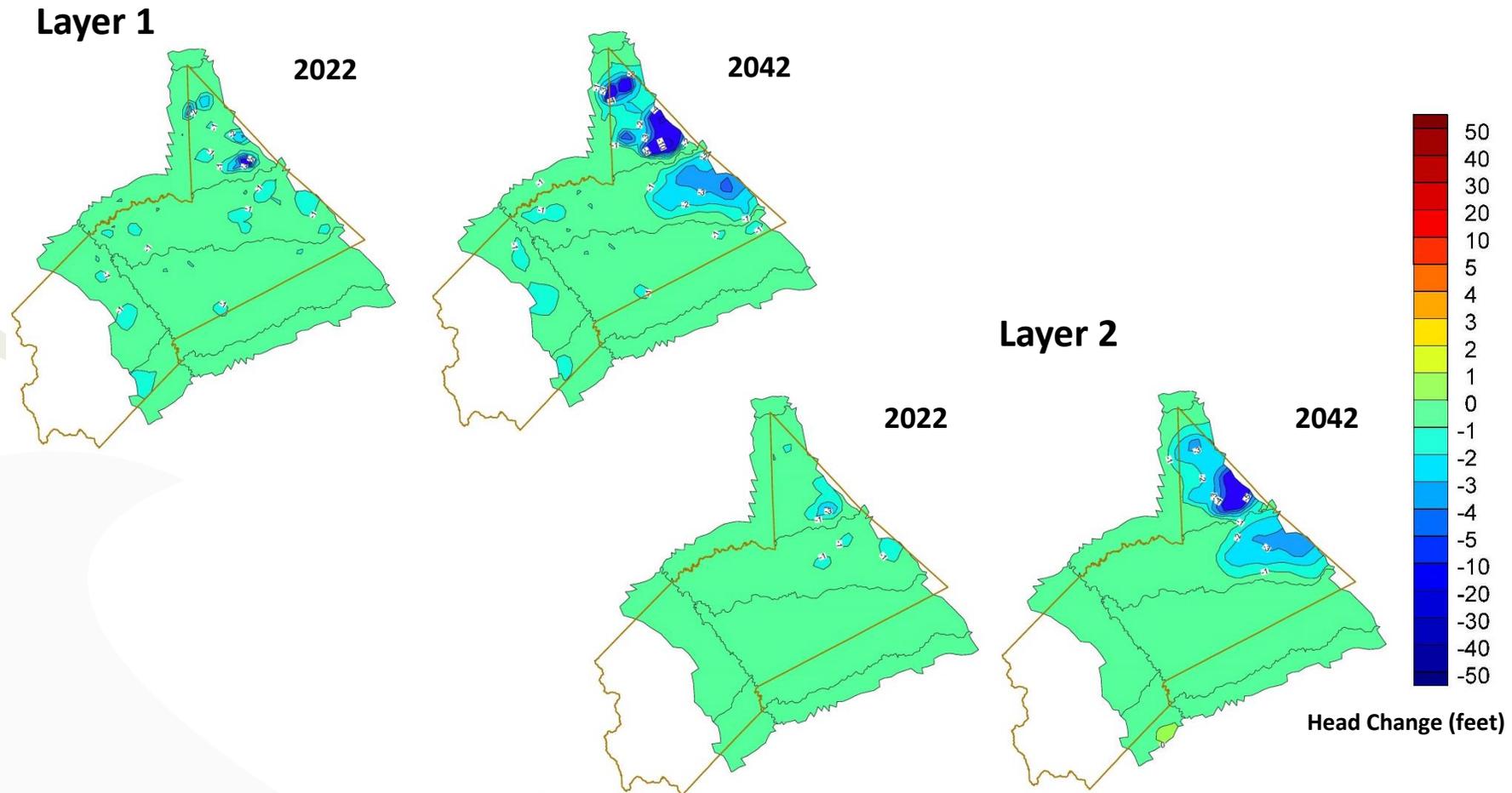


Scenario 3 – Lower Reasonable Demand Increase, Water Budget -Forecast

Cumulative Storage Change by Subbasin in AF

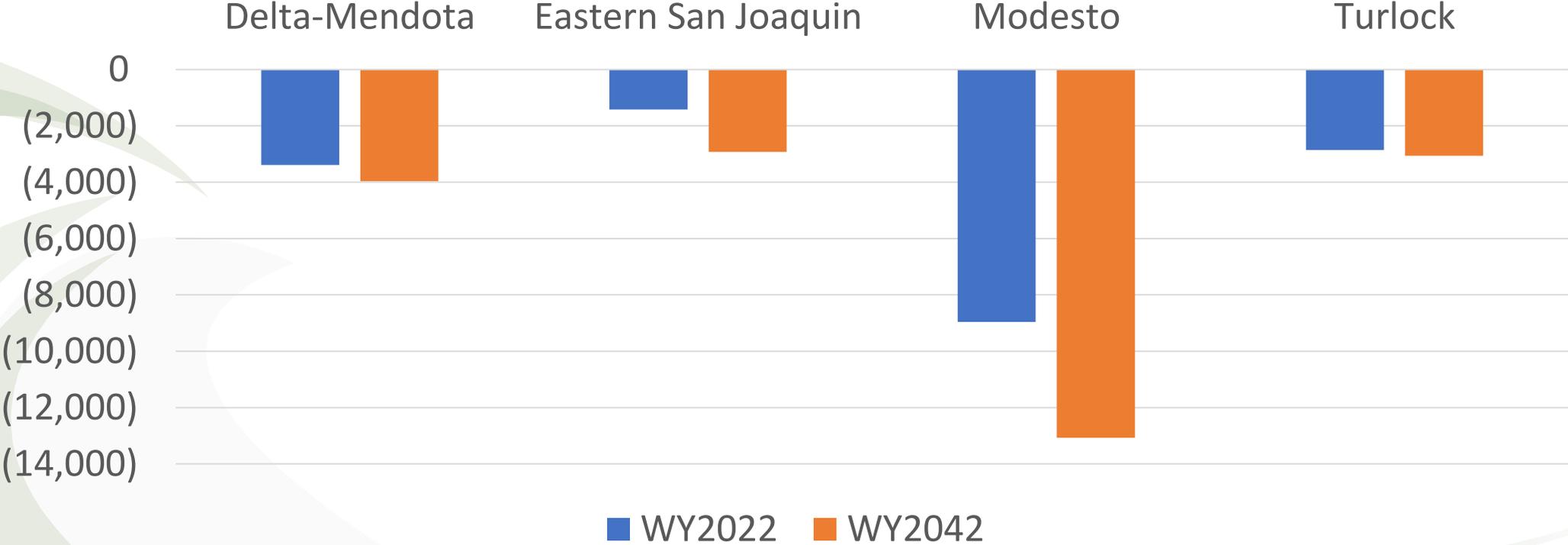


Scenario 4a – Shallow Discretionary Wells - Projected Drawdown



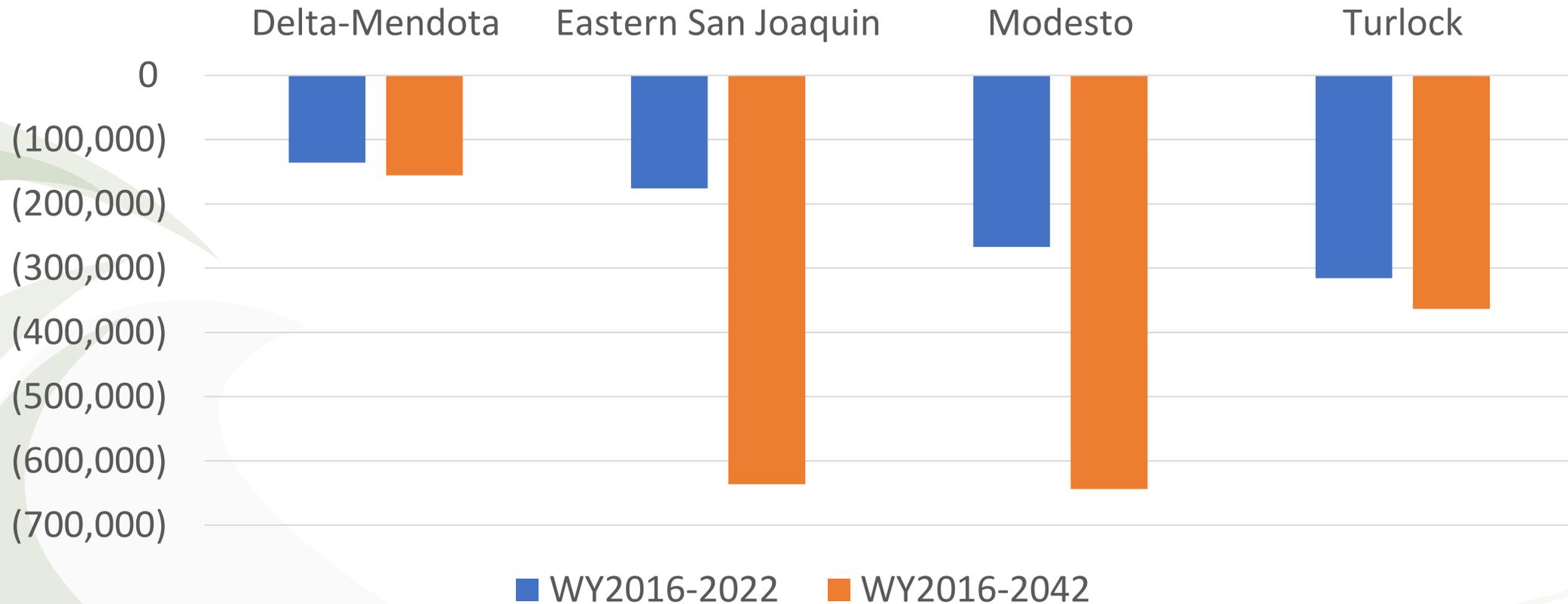
Scenario 4a – Shallow Discretionary Wells, Water Budget Forecast

**Projected Change in GW Discharge to Streams by Subbasin in
AFY**



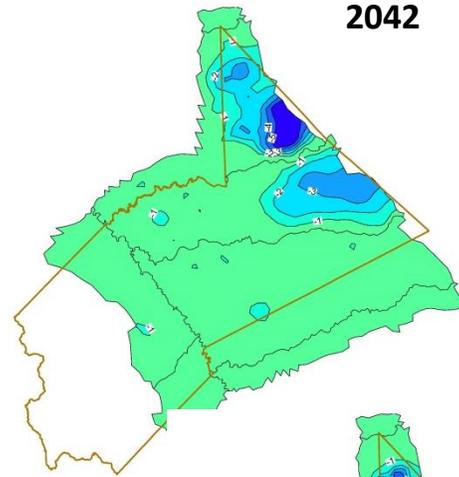
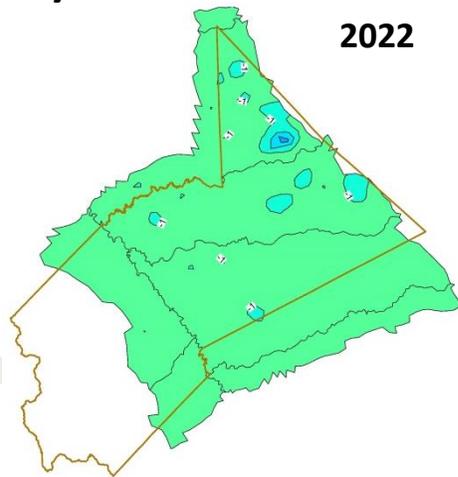
Scenario 4a – Shallow Discretionary Wells, Water Budget Forecast

Projected Cumulative Storage Change by Subbasin in AF

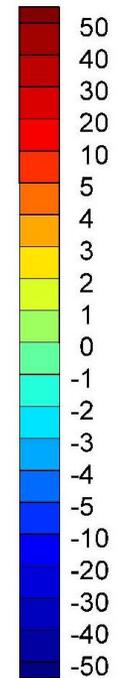
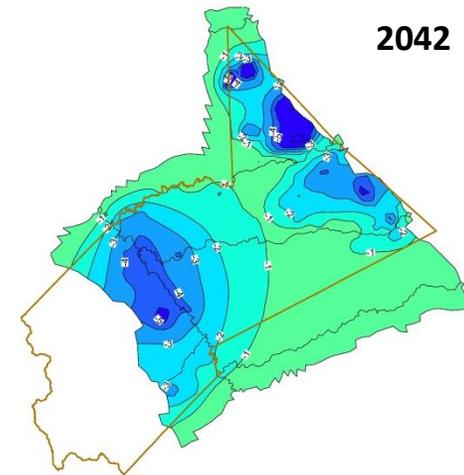
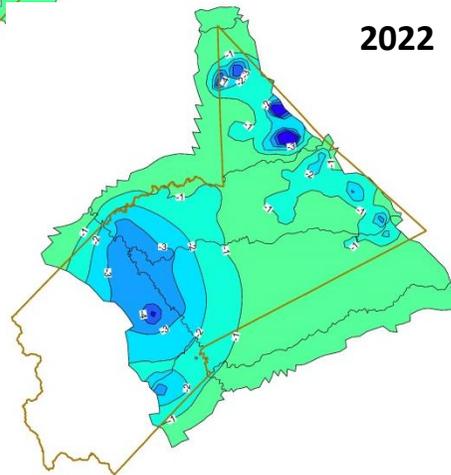


Scenario 4b – Deeper Discretionary Wells, Projected Drawdown

Layer 1



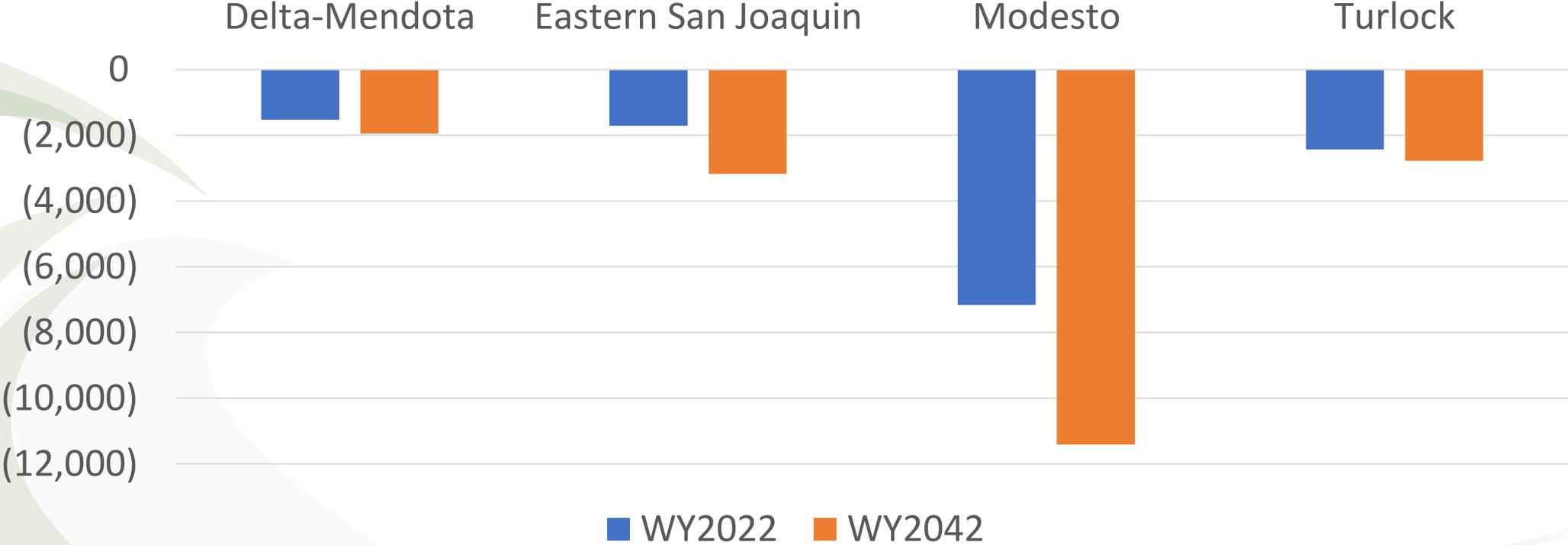
Layer 2



Head Change (feet)

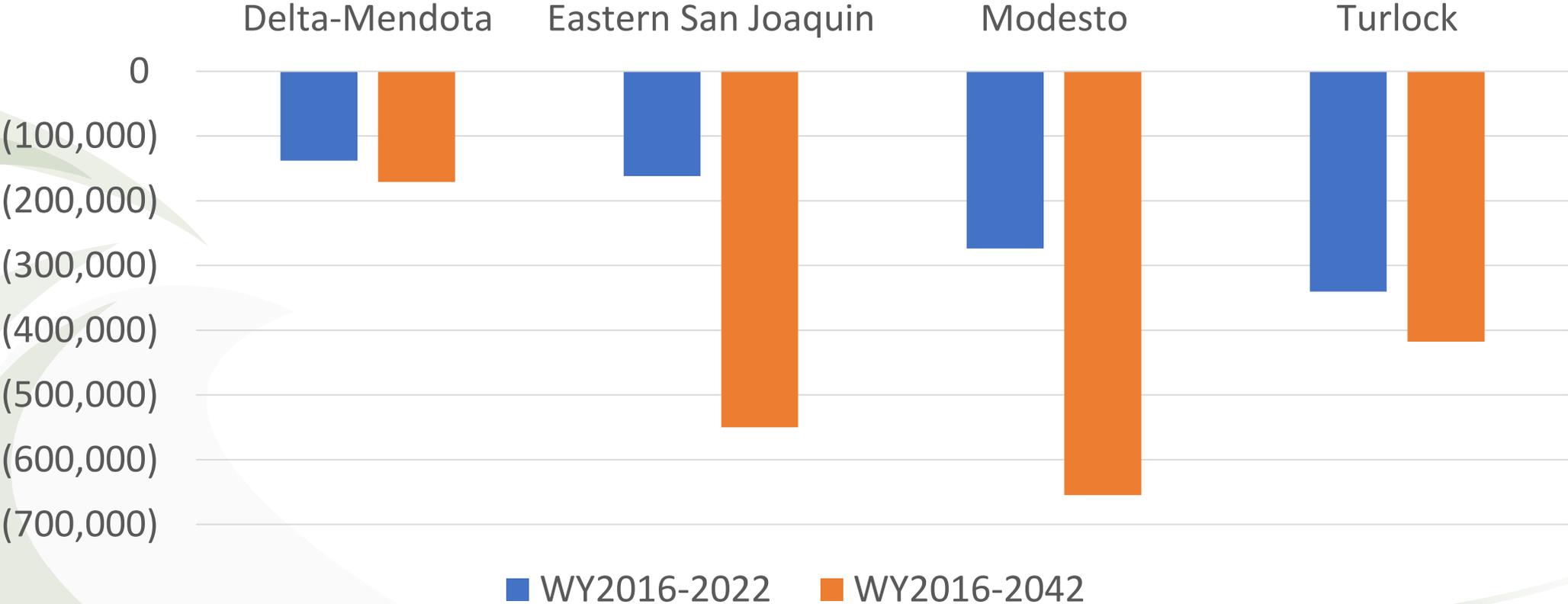
Scenario 4b – Deeper Discretionary Wells, Water Budget Forecast

Projected Change in GW Discharge to Streams by Subbasin in
AFY



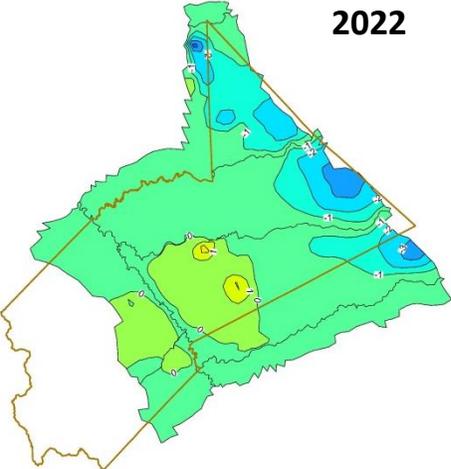
Scenario 4b – Deeper Discretionary Wells, Water Budget Forecast

Projected Cumulative Storage Change by Subbasin in AF

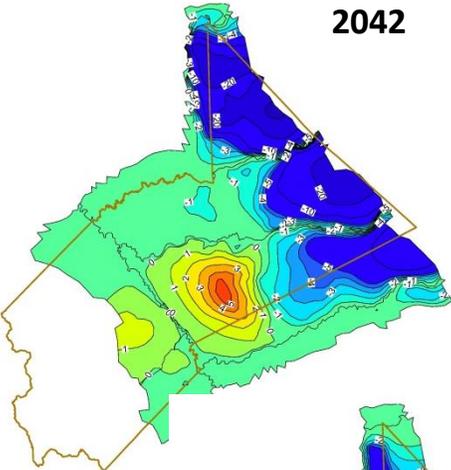


Scenario 5 – Conjunctive Use, Drawdown Predictions

Layer 1

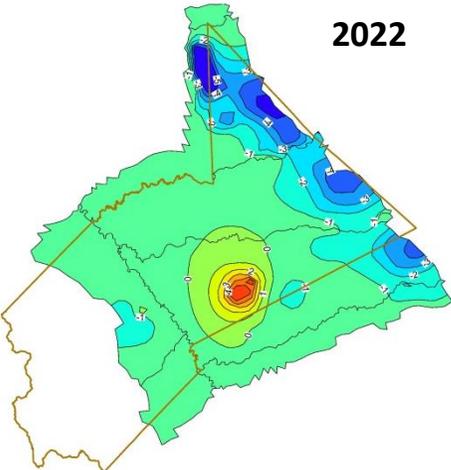


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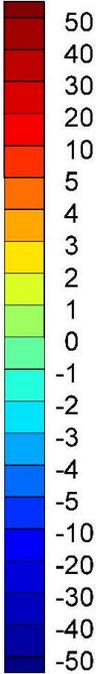
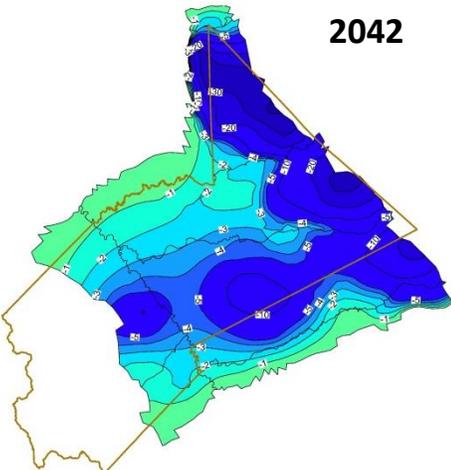


Layer 2

2022



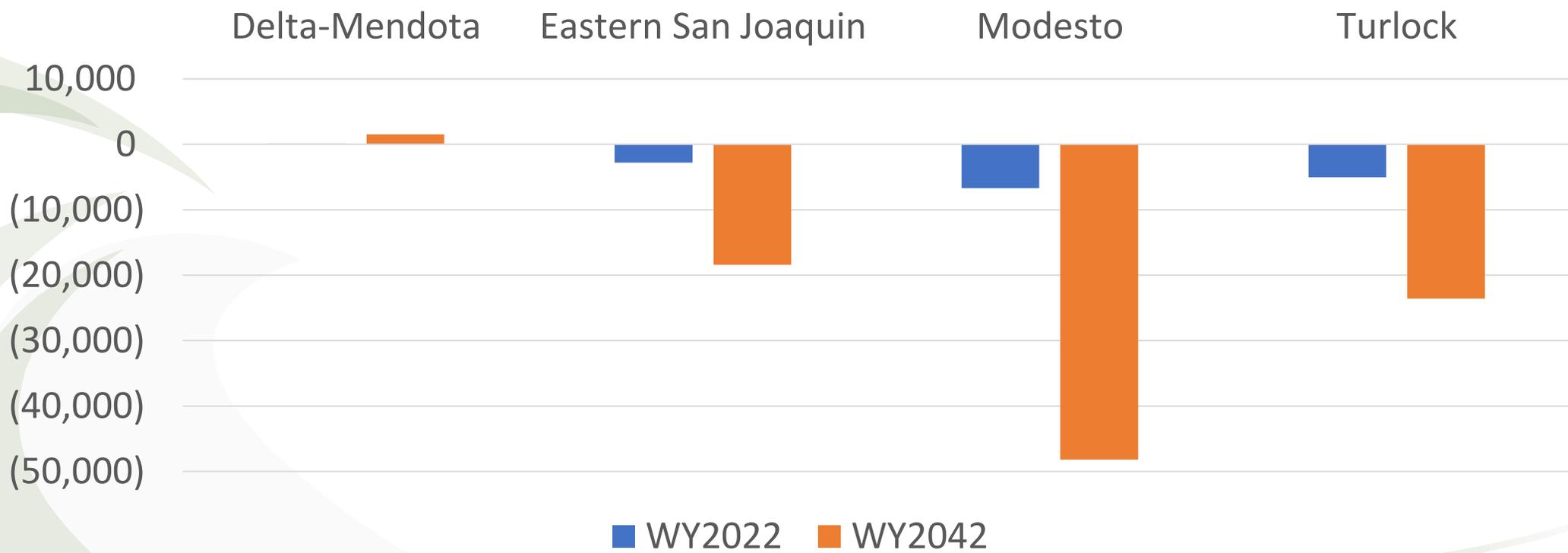
2042



Head Change (feet)

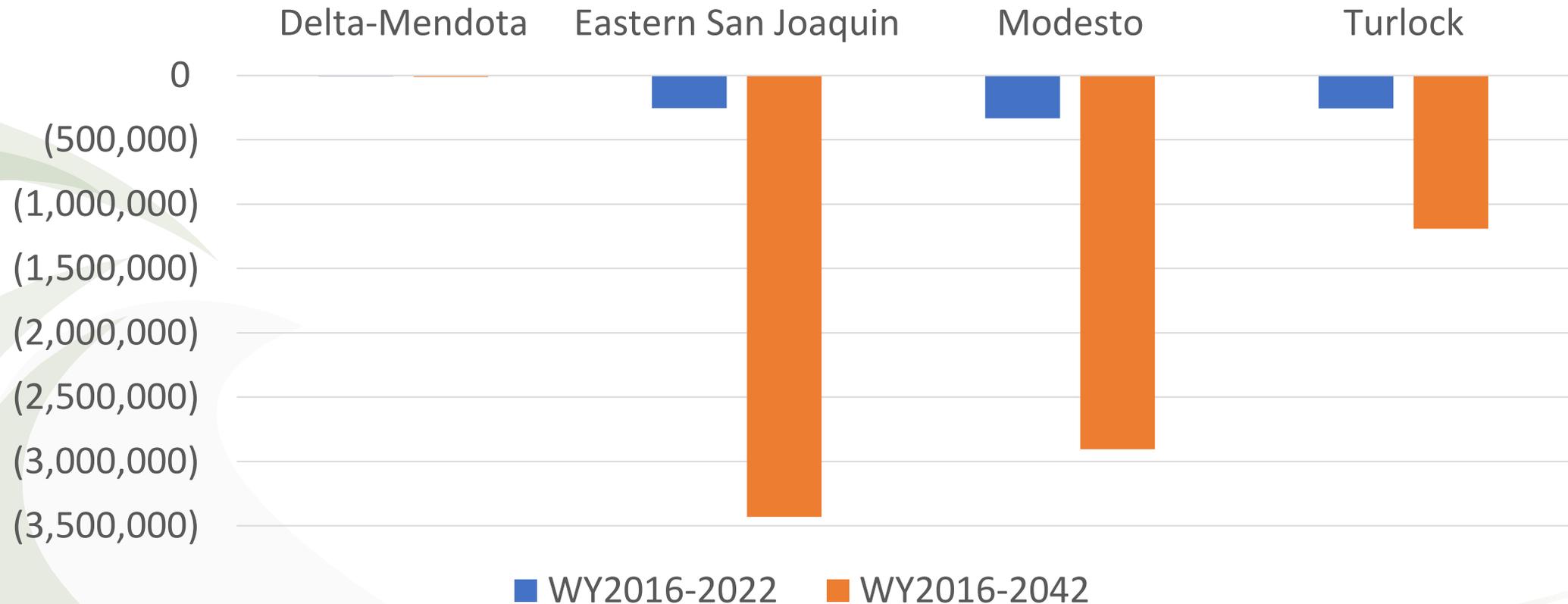
Scenario 5 – Conjunctive Use Project, Water Budget Forecast

Predicted Change in GW Discharge to Streams by Subbasin in
AFY



Scenario 5 – Conjunctive Use Project, Water Budget Forecast

Predicted Cumulative Storage Change by Subbasin in AF



Principal Findings of Forecast Analysis

- ✓ Groundwater extraction from shallow aquifer resulted in higher streamflow depletion than from the deeper aquifer
- ✓ Groundwater drawdown from municipal pumping was greatest in cities that rely primarily on wells completed in the deeper aquifer system
- ✓ The greatest drawdown was predicted under Scenario 2, which is based on worst case assumptions regarding demand growth
- ✓ Scenario 5 illustrates the effectiveness of conjunctive use projects to help alleviate local drawdown
 - Simulated surface water supply rates moderate drawdown resulting from worst case demand growth (Scenario 2)
 - May be capable fully offsetting effects of more limited demand growth

Agricultural Resources (Less than Significant Impact)

- ✓ Potential adverse effects from denying a permit or limiting groundwater extraction
 - Results in inability to supply water for a desired change in agricultural use, not usually conversion of farmland land to non-agricultural use.
 - Regulatory restrictions to protect natural resources are not an impact under CEQA
- ✓ Regulation of unsustainable wells after GSP adoption could decrease water availability
 - Potential effects include: change in agricultural use, decreased productivity, or conversion of farmland to non-agricultural use
 - Regulation is GSA responsibility and unlikely to be undertaken by the County
 - Other State and County measures and policies are in place to decrease pressure on conversion of farmland to non-agricultural use



Air Resources (Less than Significant Impact)

- ✓ Criteria Pollutant emissions during well construction calculated to be less than significance thresholds (100 lb/day).
- ✓ Well pumps would be electric or powered by permitted stationary sources.
- ✓ Operating emissions will be less than significance thresholds (10 T/year).
- ✓ Conversion of rangeland to agricultural use could increase PM10 emissions, but increases would be regulated under APCD Rules 4550, 2201 and 4103, and remain within acceptable thresholds.



Greenhouse Gas Emissions (Less than Significant Impact)

- ✓ Greenhouse Gas emissions during well construction calculated to be less than significance threshold of 110 T/year
- ✓ Well pumps would be electric or powered by permitted stationary sources and operating emissions will be less than significance thresholds
- ✓ Greenhouse gas emissions from conversion of rangeland to agricultural use well below threshold of 25,000 T/year
- ✓ Typical practices/BMPs for agricultural operations would further reduce GHG emissions, consistent with State and APCD policies

Hazards & Hazardous Materials (Less than Significant Impact)

- ✓ Types and quantities of hazardous materials used in the water well industry are limited – non-toxic and degradable materials are preferred when possible
- ✓ Existing regulatory requirements limit likelihood of upsets and spills
- ✓ New wells unlikely to be located near schools and other sensitive receptors



Utilities & Service Systems

(Less than Significant Impact)

- ✓ Denying a permit, limiting pumping, or regulating unsustainable wells could decrease groundwater availability, putting additional pressure on other supplies
 - Regulatory restrictions to protect natural resources are not an impact under CEQA
 - Regulation is a GSA responsibility and unlikely to be undertaken by the County
 - Water purveyors are not required to provide water service beyond their planned capacity or outside established service territories.
 - Surface water diversions are regulated by the SWRCB to protect water rights and environmental water uses
 - New surface water diversions are subject to SWRCB review and approval

Biological Resources - Non Hydrologic Impacts (Less than Significant Impact with Mitigation)

- ✓ Well construction and conversion of rangeland could damage or destroy habitat, or adversely effect special status species
- ✓ Biological resource impacts can only be evaluated on a site-specific basis
- ✓ The Well Permitting Program requires desk-top review for potentially sensitive species/habitats, and biological site reconnaissance
- ✓ Other mitigation measures may be adopted, as needed, such as:
 - Surveys, Monitoring, Avoidance and minimization measures, Work schedules, Restoration, and/or Offset, among others



Cultural Resources (Less than Significant Impact with Mitigation)

- ✓ Ground-disturbing activities during well construction or conversion of rangeland could disturb archaeological, historical, or paleontological resources
- ✓ Potential impacts can only be evaluated at a site-specific level
- ✓ The Well Permitting Program requires desk-top review for recorded resources
- ✓ Other mitigation measures may be adopted, as needed, such as:
 - Surveys, Monitoring, Avoidance and Stop work requirements if unexpected resources are encountered during construction



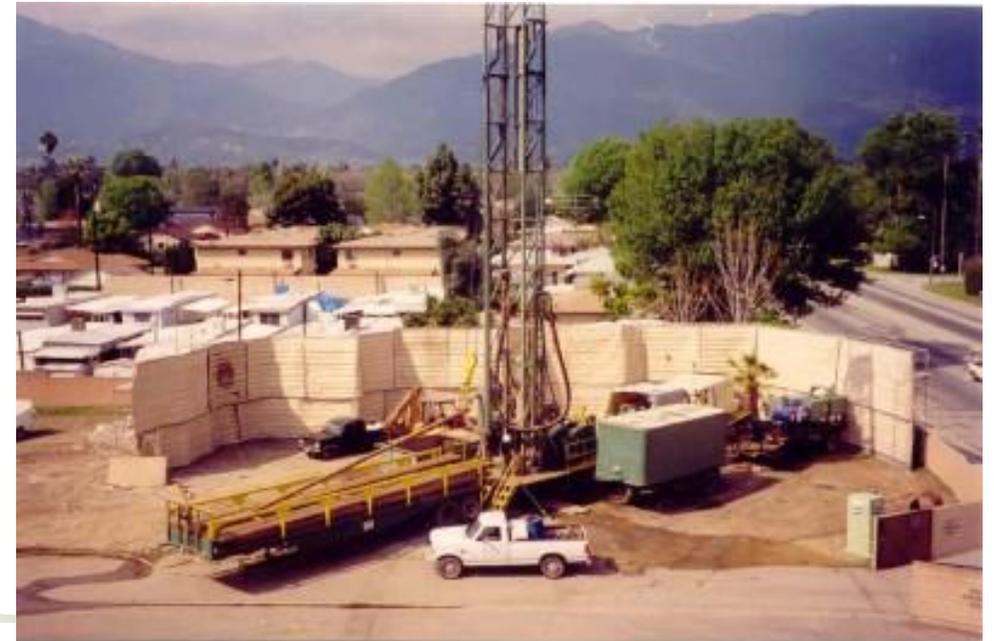
Land Use & Planning (Less than Significant Impact with Mitigation)

- ✓ The Well Permitting Program is generally consistent with General Plan goals and policies; however, this impact cannot be fully evaluated at the program level
- ✓ Evaluation for individual well permit applications requires the following:
 - Evaluating compatibility with General Plan goals, policies, and implementation measures protecting environmental resources and avoiding adverse effects
 - Documenting additional reviews and approvals required under the General Plan and other county policies



Noise (Less than Significant Impact with Mitigation)

- ✓ Agricultural activities exempt from the County Noise Ordinance
- ✓ Because locations of new wells are not known, potential proximity to sensitive receptors on non-agricultural land be ruled out at the program level and must be evaluated for individual permit applications.
- ✓ If drilling operations are conducted within 200 feet of a potentially sensitive receptor on non-agriculturally zoned land, noise mitigation must be implemented



Biological Resources – Hydrologic Impacts

Impacts to Beneficial Surface Water Use (GDEs)

(Less than Significant Impact with Mitigation)

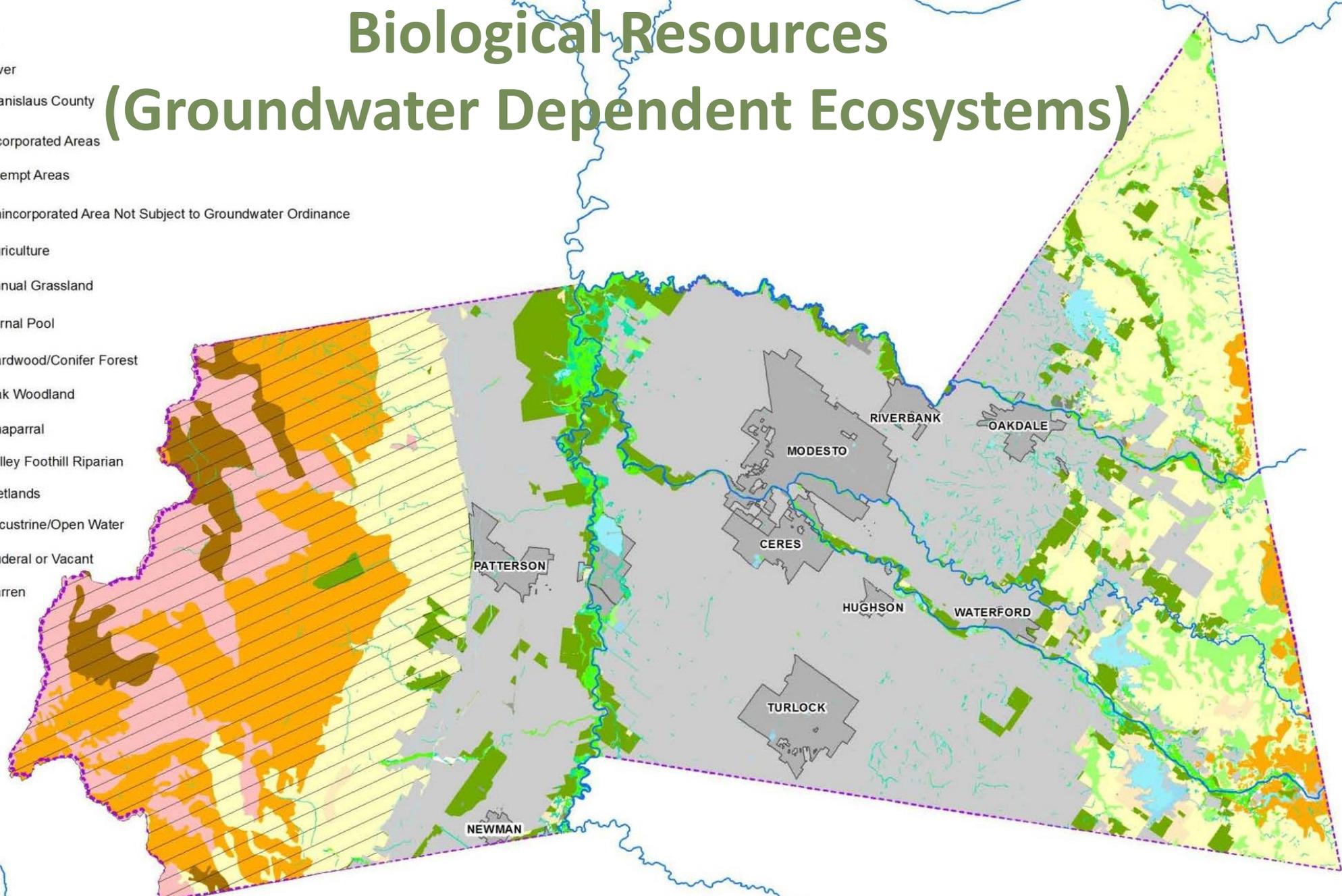
- ✓ Potential impacts to surface water flow, aquatic habitat and riparian habitat
 - Established Surface Water Protection Zones will decrease potential depletion
 - River flows maintained by reservoir releases for water rights and ecological needs
 - Drawdown beneath riparian habitat will be minimized due to river effects
- ✓ Impacts to other GDEs
 - Requirement to identify GDEs within 3 miles of proposed wells and conduct a GDE impact study if predicted drawdown exceeds 1 foot expected to be protective for most riparian zones, wetlands, oak woodlands and other GDEs
 - Mitigation measure to identify GDEs potentially sensitive to less than 1 foot of drawdown being considered

Biological Resources

(Groundwater Dependent Ecosystems)

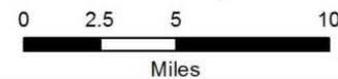
Legend

- River
- Stanislaus County
- Incorporated Areas
- Exempt Areas
- Unincorporated Area Not Subject to Groundwater Ordinance
- Agriculture
- Annual Grassland
- Vernal Pool
- Hardwood/Conifer Forest
- Oak Woodland
- Chaparral
- Valley Foothill Riparian
- Wetlands
- Lacustrine/Open Water
- Ruderal or Vacant
- Barren



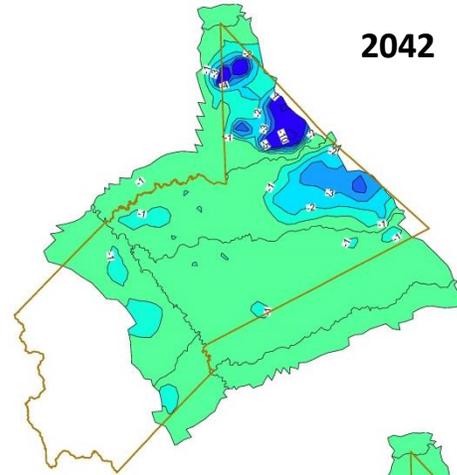
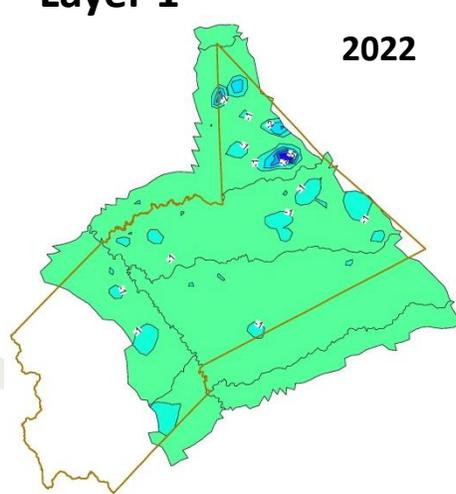
Sources: Witham, Holland, and Vollmar. 2014. Vernal Pool Distribution. CSU Stanislaus. 2004. San Joaquin Valley Landcover. Geographic Information Center, Chico Research Foundation. 2016. Vegetation- Great Valley Ecoregion. USFWS 2017. National Wetland Inventory.

Notes: The Groundwater Ordinance does not apply to incorporated areas. Wetlands and GDEs such as oak woodland are shown in the exempt areas due to potential for affects for regional aquifer drawdowns. National Wetland Inventory wetlands depicted include freshwater emergent, freshwater forested/shrub, and lacustrine.

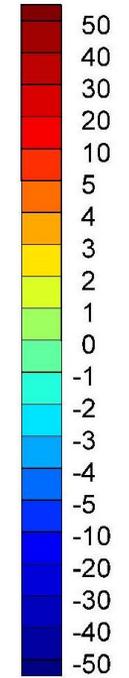
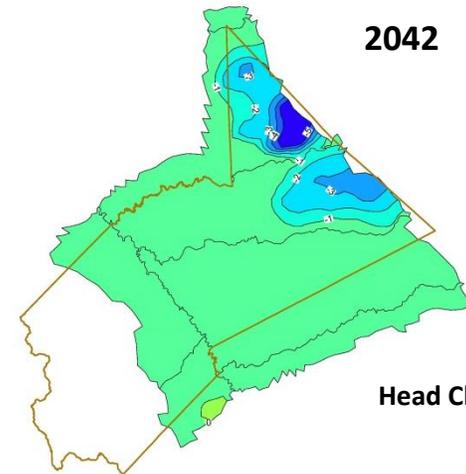
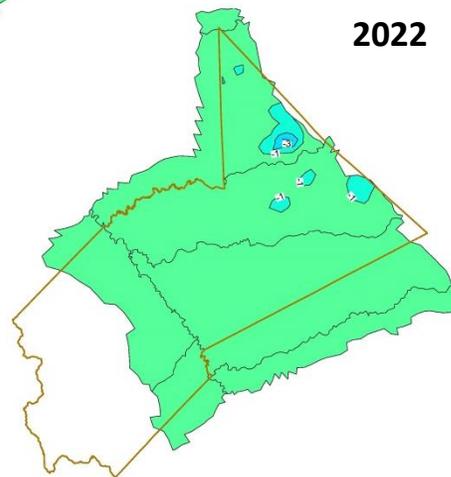


Drawdown Analysis for Evaluation of GDE Impacts (Shallow Wells)

Layer 1



Layer 2



Head Change (feet)

Geology & Soils – Hydrologic Impacts

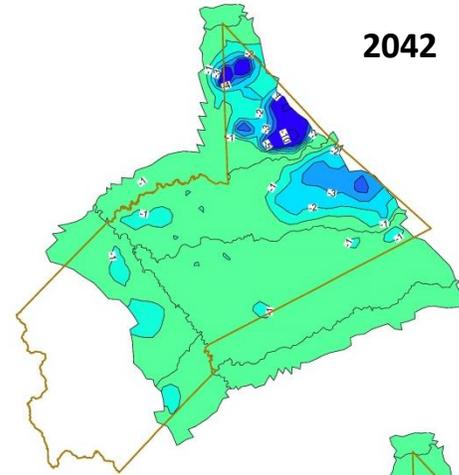
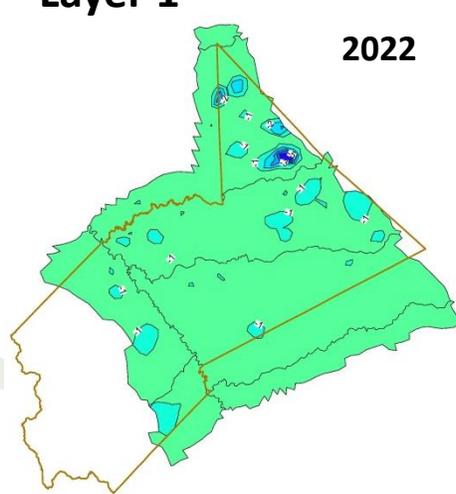
Subsidence

(Less than Significant Impact with Mitigation)

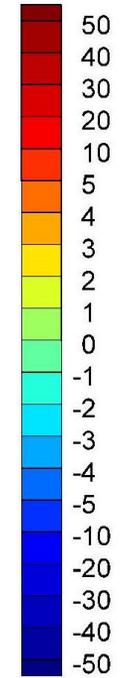
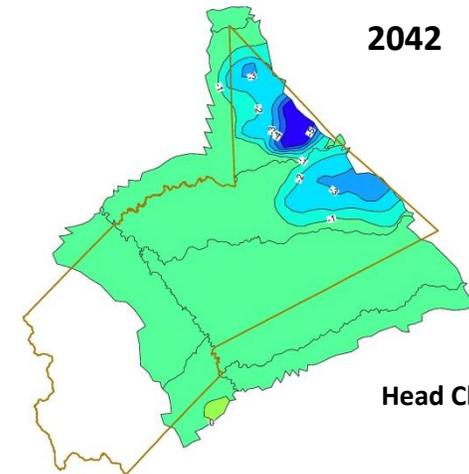
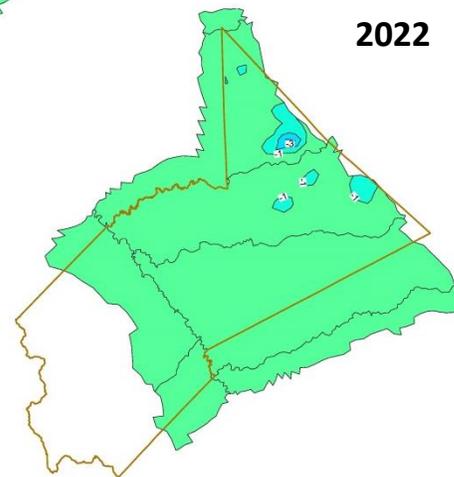
- ✓ Subsidence is geologically unlikely outside the area underlain by the Corcoran Clay
- ✓ Pumping from shallow unconfined aquifer not expected to result in significant regional subsidence, but local subsidence cannot be ruled out at program level
- ✓ Pumping from deeper confined aquifer could result in regional and local subsidence and must be evaluated for individual applications
- ✓ Well permitting and mitigation requirements within 2 miles of Corcoran Clay:
 - Subsidence screening evaluation for proposed new wells
 - Subsidence monitoring if predicted drawdown exceeds 10 feet in upper aquifer or 5 feet in deeper aquifer within 2 miles of Corcoran Clay subcrop area
 - Subsidence investigation and mitigation if significant subsidence could occur

Drawdown Analysis for Evaluation of Subsidence Effects (Shallow Wells)

Layer 1



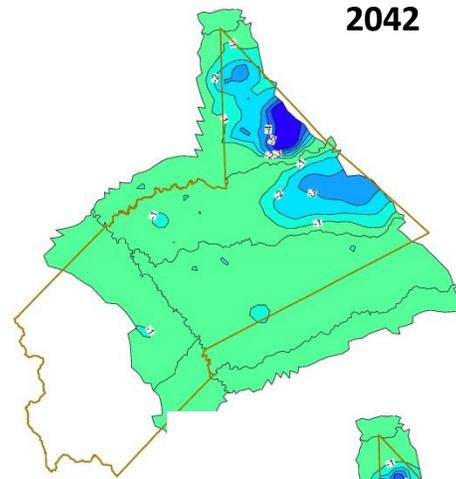
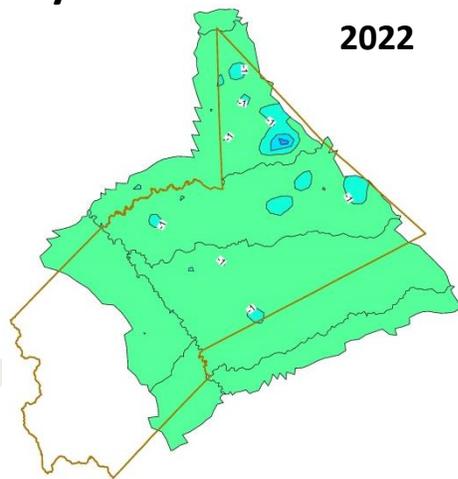
Layer 2



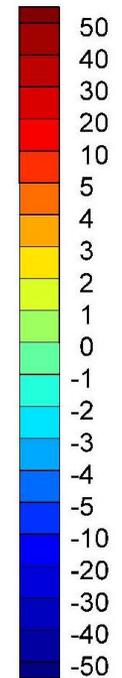
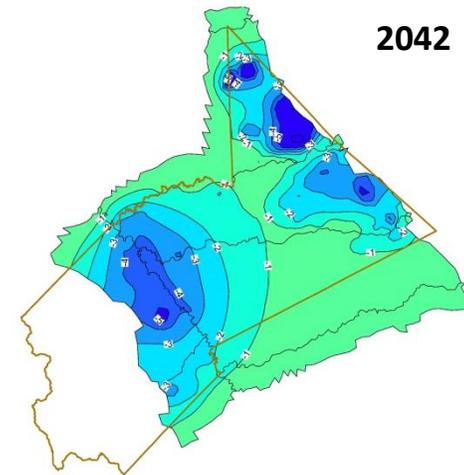
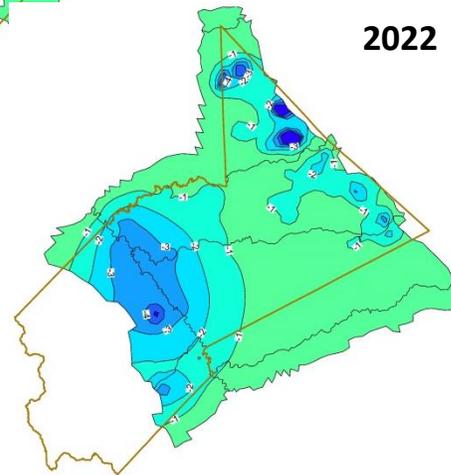
Head Change (feet)

Drawdown Analysis for Evaluation of Subsidence Effects (Deeper Wells)

Layer 1



Layer 2



Head Change (feet)

Hydrology & Water Quality

Groundwater Quality Degradation (Less than Significant Impact)

- ✓ Hazardous material use in water well industry is limited; non-toxic and degradable products are preferred when possible
- ✓ Water Quality Protection Zones adopted under the Well Permitting Program
 - Restrict construction of wells that cross connect aquifers of differing quality
- ✓ Water Quality Investigation Zones adopted under the Well Permitting Program
 - Investigations required near areas of degraded water quality or reported contamination sites
 - Mitigation measures required as needed to assure that lower quality groundwater will not be captured or migrate, and to prevent interference with cleanup efforts

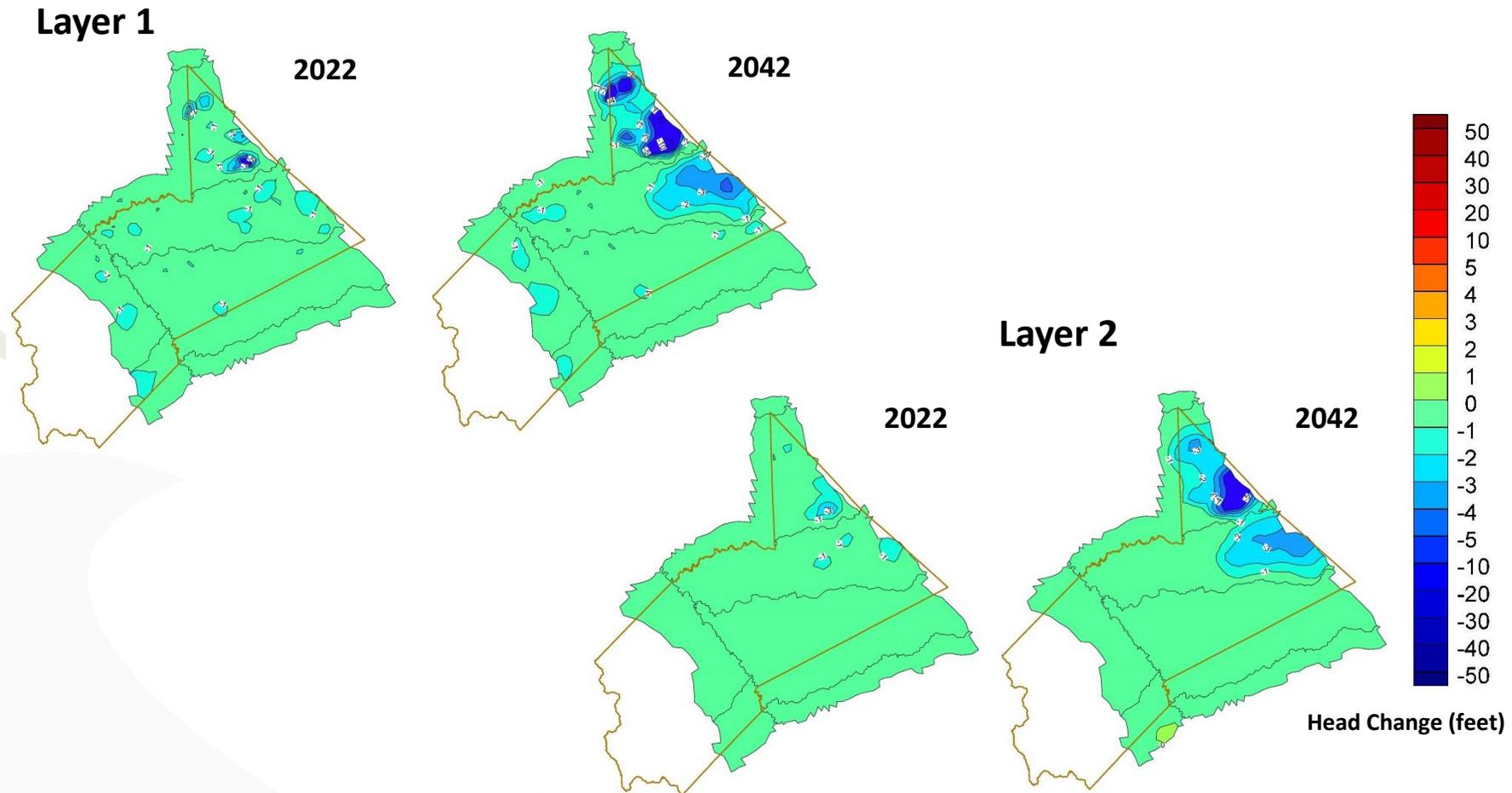
Hydrology & Water Quality

Interference Drawdown

(Less than Significant Impact with Mitigation)

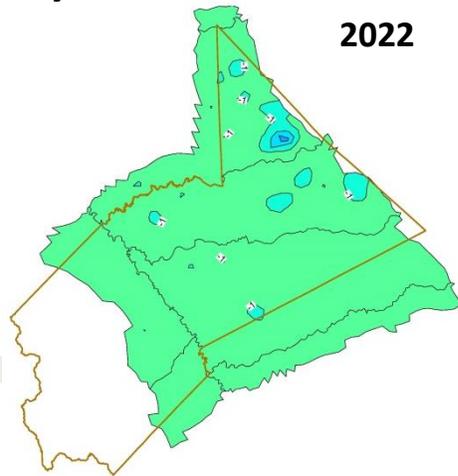
- ✓ Regional drawdown interference to agricultural, municipal and industrial wells is predicted to be less than significant (<20 feet), but local drawdown from new wells permitted under the program could exceed this threshold
- ✓ Regional drawdown interference to domestic wells is predicted to exceed 5 feet in eastern Stanislaus County, and local drawdown near new wells could be > 5 feet in other areas, which could result in significant adverse effects
- ✓ The Well Permitting Program requires that evaluation of interference drawdown for each permit application, and an Interference Drawdown and Monitoring and Mitigation Program if thresholds are exceeded

Drawdown Analysis for Evaluation of Interference Drawdown (Shallow Wells)

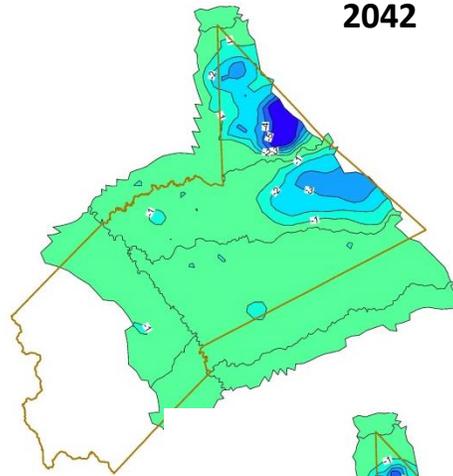


Drawdown Analysis for Evaluation of Interference Drawdown (Deeper Wells)

Layer 1

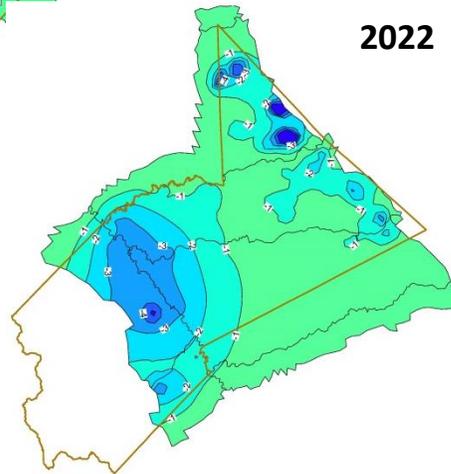


2042

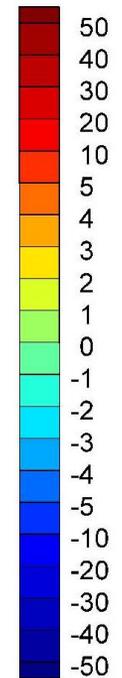
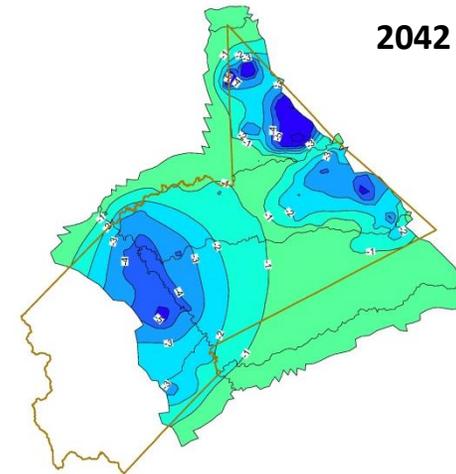


Layer 2

2022



2042



Head Change (feet)

Hydrology & Water Quality

Groundwater Storage Depletion

(Less than Significant Impact with Mitigation)

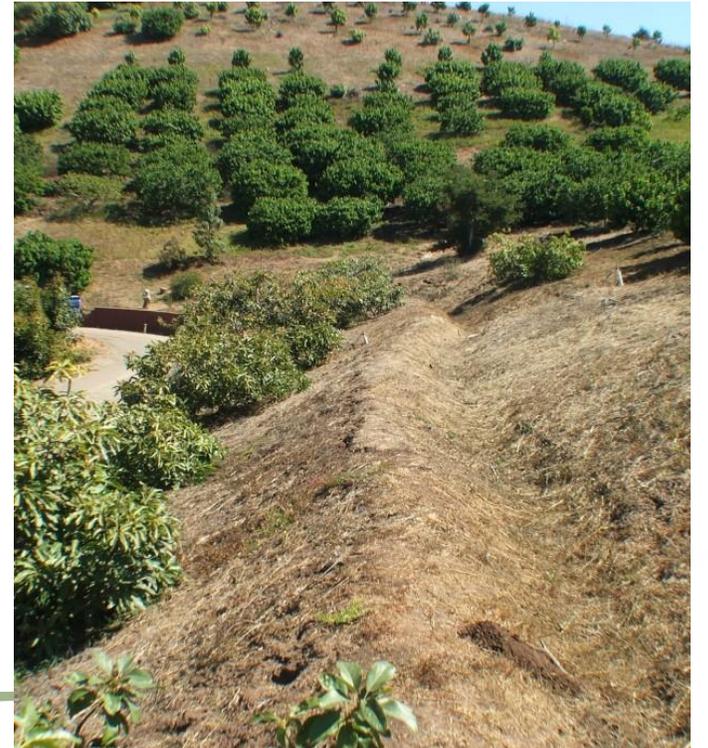
- ✓ Predicted drawdown is $< 10\%$ of aquifer thickness
- ✓ Groundwater level monitoring required if projected water use volume $> 10\%$ of storage volume beneath property
- ✓ Pumping management plan required if actual drawdown $> 5\%$ of aquifer thickness, and curtailment if drawdown $> 10\%$
- ✓ Groundwater Level Management Zones adopted under Well Permitting Program
 - Where “undesirable results” are occurring or groundwater levels predicted to decrease $> 10\%$ of aquifer thickness over 50-year implementation horizon
 - Groundwater offset or Groundwater Resources Investigation required
 - Groundwater level management zone established in one portion of northern triangle; mitigation measure to evaluate remainder of County under consideration

Hydrology & Water Quality

Surface Hydrologic Changes

(Less than Significant Impact)

- ✓ Well construction and agricultural conversion could result in hydrologic changes that increase the potential for off-site erosion, sedimentation or flooding
- ✓ Proposed mitigation
 - Require hydrologic evaluation for new well permit applications
 - Prepare a Drainage, Erosion and Sedimentation Control Plan, if warranted



Cumulative Hydrologic Impacts (Less than Significant Impact)

- ✓ Chronic drawdown, storage depletion, subsidence and GDE impacts are cumulative effects to which well permitting could make an incremental contribution
- ✓ Addressed to extent possible in the Well Permitting Program and through the establishment of Groundwater Level Management Zones
- ✓ Well permitting program cannot regulate existing or exempt groundwater uses
- ✓ Future demand scenarios are uncertain at this time
 - GSPs not yet prepared
 - Unimpaired flow requirements uncertain
- ✓ Nevertheless, SGMA is a regulatory certainty
 - Requires GSAs to prepare, adopt and implement GSPs; Provides for state intervention if GSPs are inadequate or inadequately implemented

Questions?