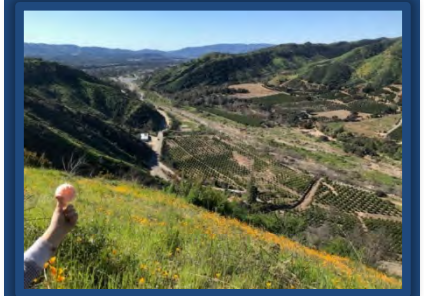
Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

UVRGA BOARD MEETING
APRIL 8, 2021

ITEM 10B
SUSTAINABLE MANGEMENT CRITERIA



GOALS FOR TODAY

1. SMC Status Review

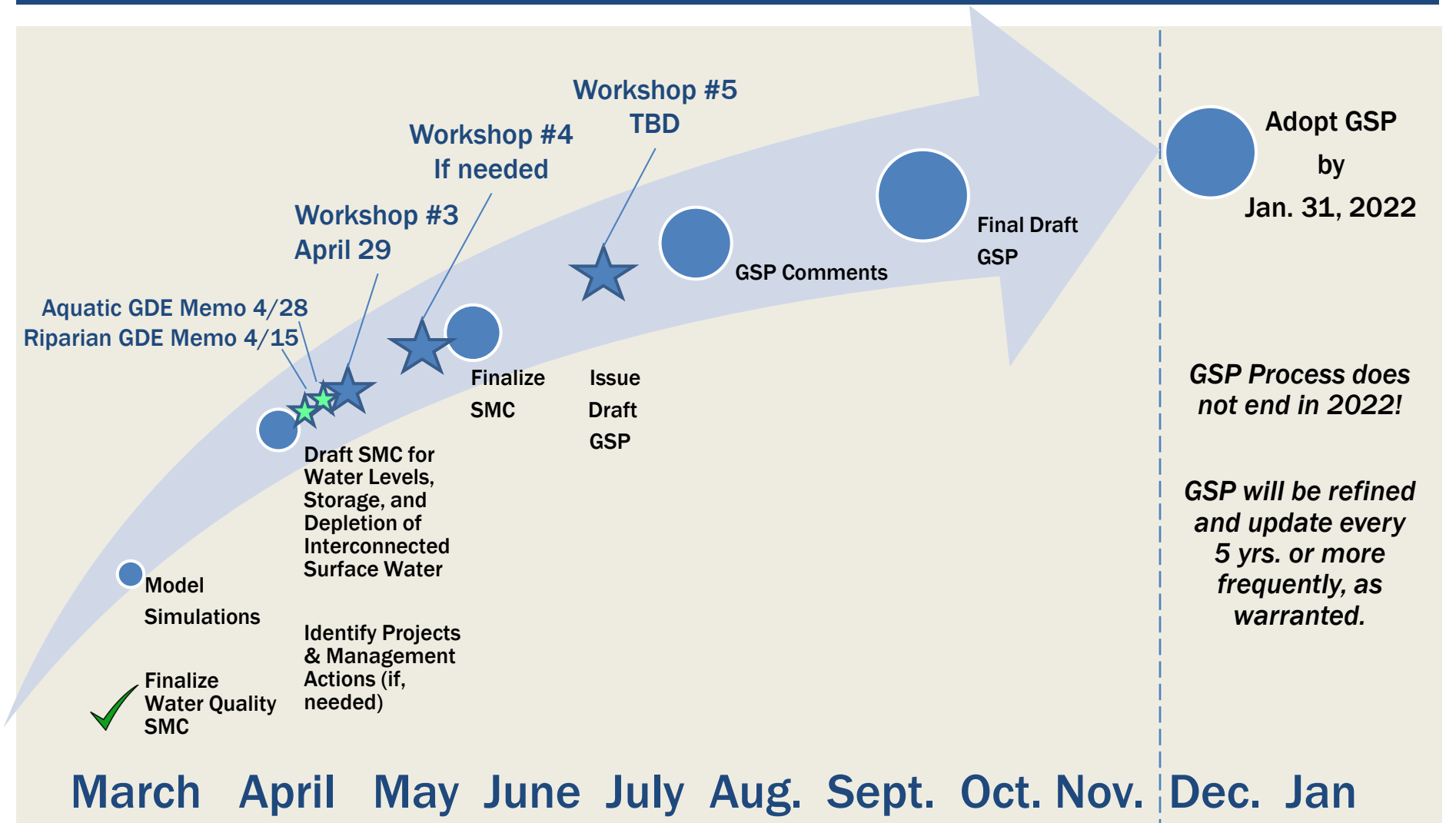
2. Review Riparian Groundwater Dependent Ecosystem Assessment Results

3. Discuss Chronic Groundwater Level Decline & Groundwater Storage Sustainability Indicators

SMC DEVELOPMENT STATUS

Surface Water Depletion	Reduction of Storage	Degraded Quality	Seawater Intrusion	Land Subsidence	Lowering GW Levels
Discuss April 22	*Discuss Today*	*Approved March 11*	*Screened Out*		*Discuss Today*

SCHEDULE


Workshop #5
TBD
Workshop #4
If needed
Workshop #3
April 29
Aquatic GDE Memo 4/28
Riparian GDE Memo 4/15
Finalize
SMC
Issue
Draft
GSP
GSP Comments
Final Draft
GSP
Adopt GSP
by
Jan. 31, 2022
Draft SMC for
Water Levels,
Storage, and
Depletion of
Interconnected
Surface Water
Model
Simulations
Identify Projects
& Management
Actions (if,
needed)
Finalize
Water Quality
SMC
GSP Process does
not end in 2022!
GSP will be refined
and update every
5 yrs. or more
frequently, as
warranted.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan

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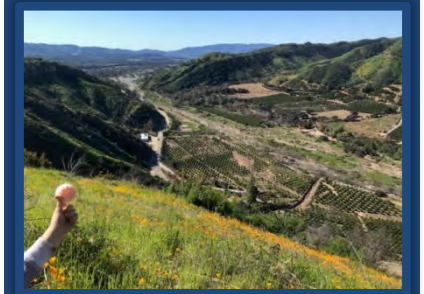
GDE ASSESSMENT



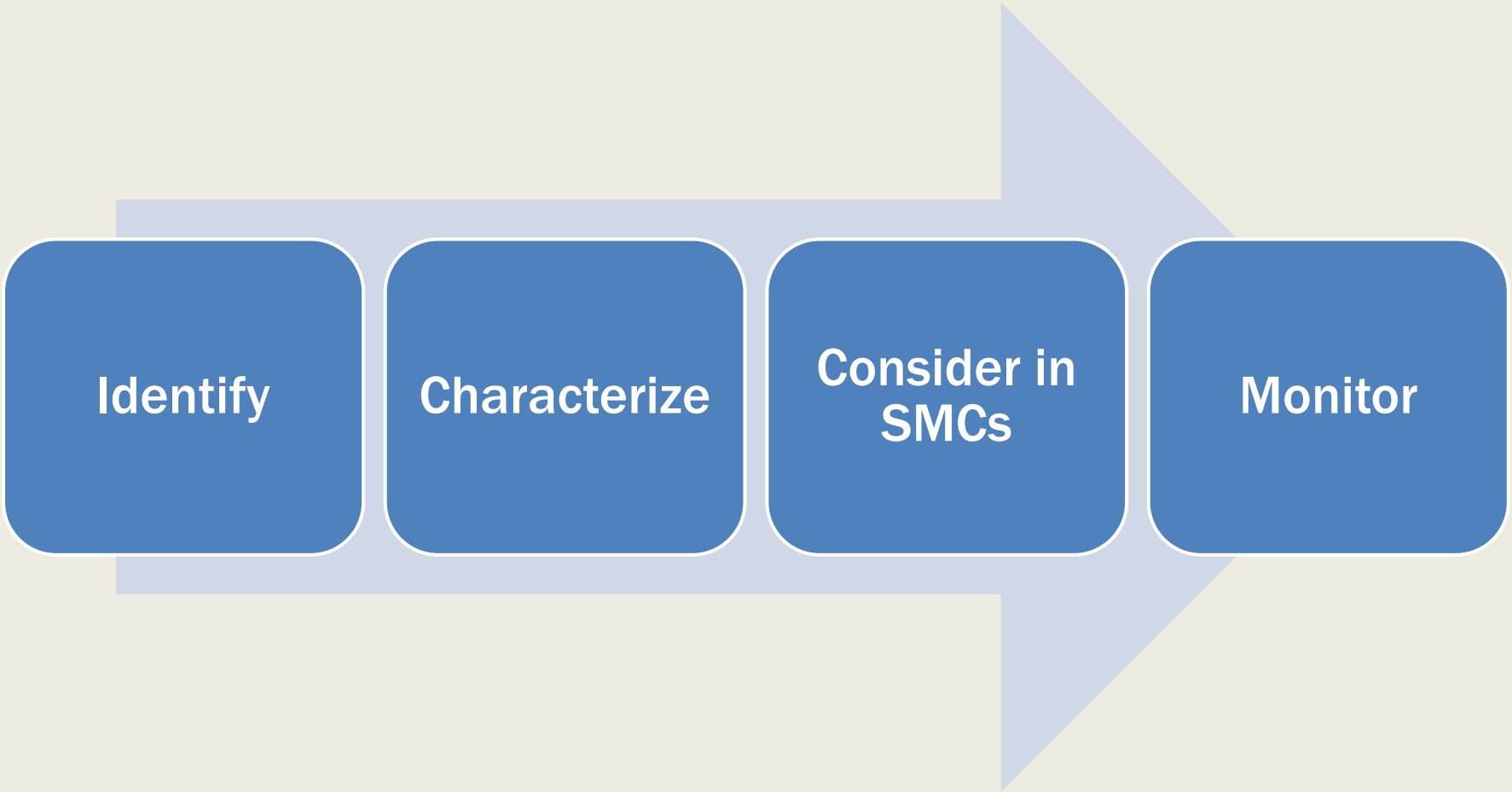
WHAT ARE GDES?

- SGMA Definition: "*Ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.*"
  - Riparian plant communities and species that rely on plant communities
    - Applicable Sustainability Indicator: GW Levels/Storage
  - Aquatic communities where surface water is interconnected with groundwater
    - Applicable Sustainability Indicator: Depletion of ISW

KEY GDE REQUIREMENTS

- Identify GDEs
  - GSP Reg. §354.16(g) - Basin Setting: "Identification of groundwater dependent ecosystems within the basin"
- Consider GDEs when developing SMCs
  - GSP Reg. §354.26(b)(3) – Undesirable Results: "Potential effects on the beneficial uses and users of groundwater…"
    - *GDEs are beneficial user of water*
  - GSP Reg. §354.28(b)(4) - Minimum Thresholds: "How minimum thresholds may affect the interests of beneficial uses and users of groundwater…"
    - *GDEs are beneficial user of water*

ADDRESSING GDES IN THE GSP



No DWR BMP. UVRGA generally followed guidance published by The Nature Conservancy

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GDE IDENTIFICATION AND CHARACTERIZATION

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Upper Ventura River Groundwater Agency

Riparian Groundwater Dependent Ecosystem Assessment

Overview

- GDE Identification
- GDE Characterization
- GDE Susceptibility

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GDE Identification

Screening of Potential GDEs

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Introduction

- Groundwater Dependent Ecosystem:
  - ecological communities of species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface - SGMA, 23 CCR § 351(m)
- The Nature Conservancy Guidance
  - Potential GDEs, rooting depths, groundwater levels, group and characterize

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GDE Screening Methods

- Potential GDEs
  - Initial visual analysis of Natural Communities Commonly Associated with Groundwater (NCCAG) dataset
- Maximum rooting depths
  - Literature review and community/species-specific depths
- Groundwater levels
  - Three water years to model depth to water (DTW) for wet, average, and dry conditions
  - High and low DTW for each year
- Spatial analysis
  - Intersection of rooting depths and groundwater level
- Additional assessment
  - Additional analysis of results (imagery and intersected data)
- Group GDEs into “units”

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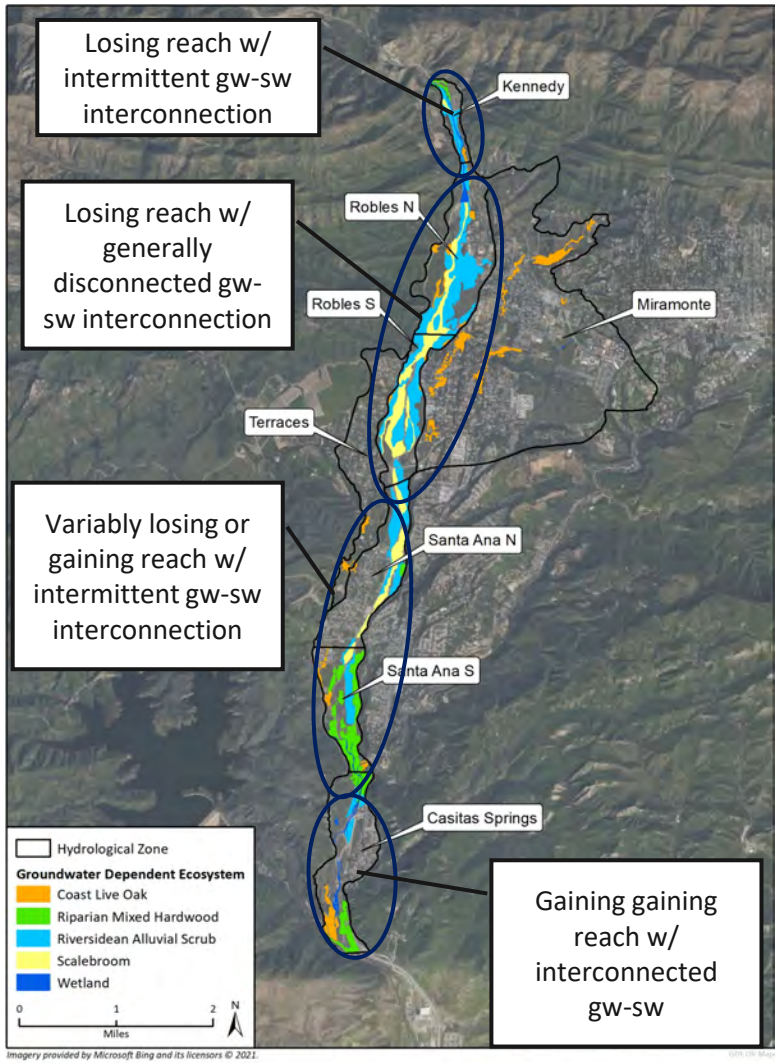
NCCAG Potential GDEs



- Losing reaches dominated by Scalebroom and Riversidean Alluvial Scrub
- Areas known as interconnected groundwater and surface water dominated by Riparian Mixed Hardwood

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Screening Methods – Spatial Analysis Criteria

Unlikely groundwater dependent	Rooting depth never deeper than highest GW Levels	Exclude from GDE map
Possible groundwater dependent	Rooting depth deeper than DTW for any high GW Levels	Further evaluation of GW level and root depth
Likely groundwater dependent	Rooting depth deeper than DTW for all low GW Levels	Verify groundwater dependency

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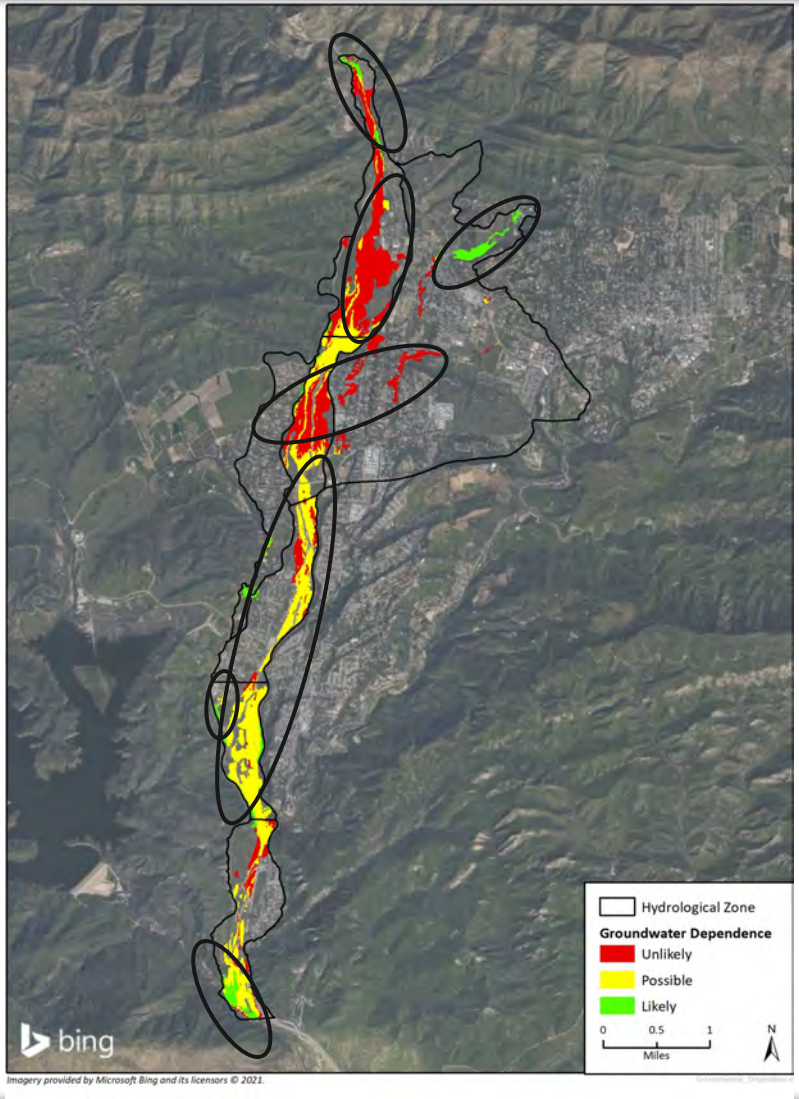
Potential GDEs – Screening Results



- "Unlikely" (red areas) indicates no root-groundwater intersection
- "Possible" (yellow areas) indicates at least 1 root-groundwater intersection
- "Likely" (green areas) indicate root-groundwater intersection during all low GW levels

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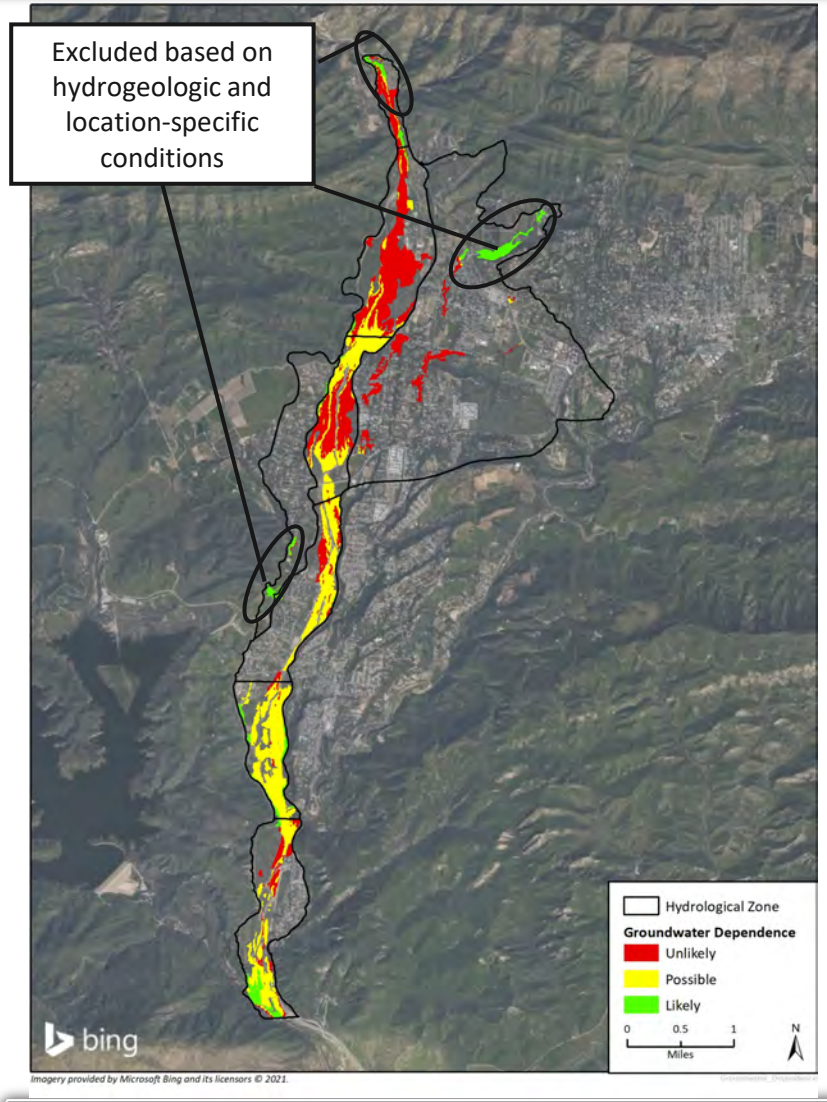
Potential GDEs – Screening Results



- Exclusion of Coast Live Oak in Mira Monte, Kennedy, and Terraces hydrogeologic areas
  - Surface water, irrigation, or perched groundwater
- Exclusion of Riparian Mixed Hardwood in Kennedy hydrogeologic area
  - Surface water dependence

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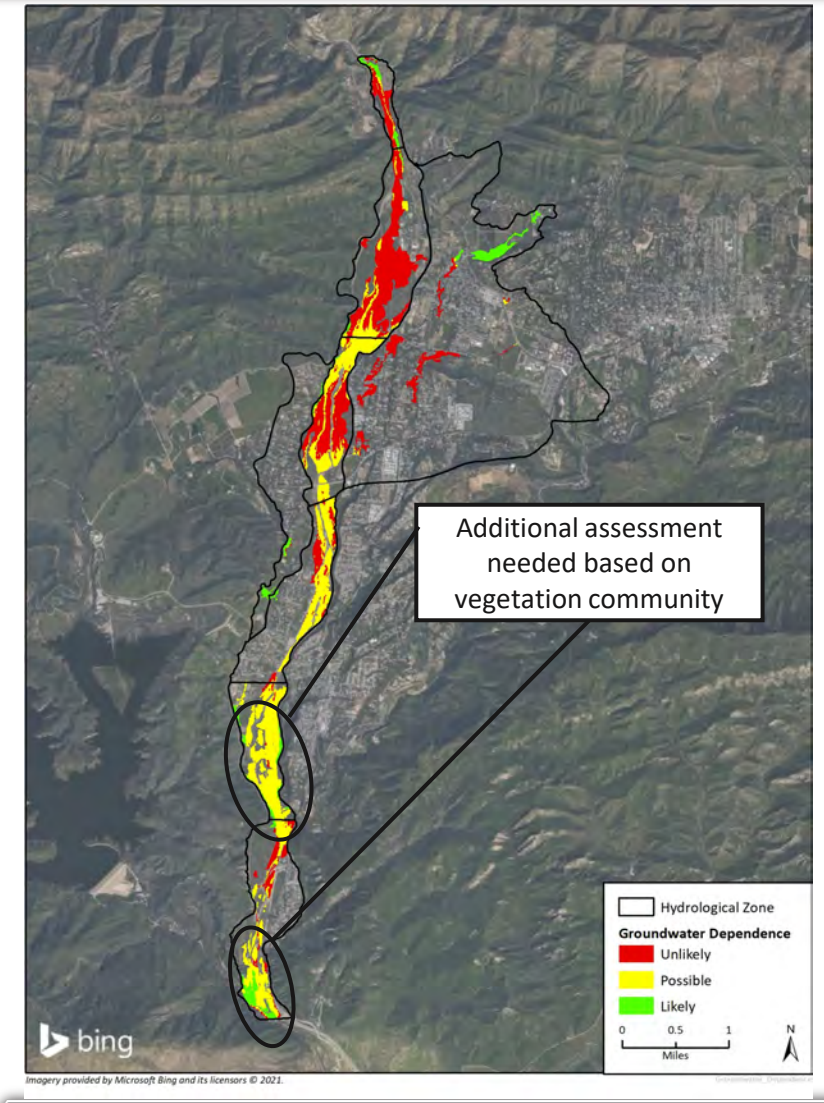
Potential GDEs – "Possible" Evaluation



- Additional assessment needed based on vegetation communities
  - Especially in South Santa Ana area
  - Note DTW were modeled

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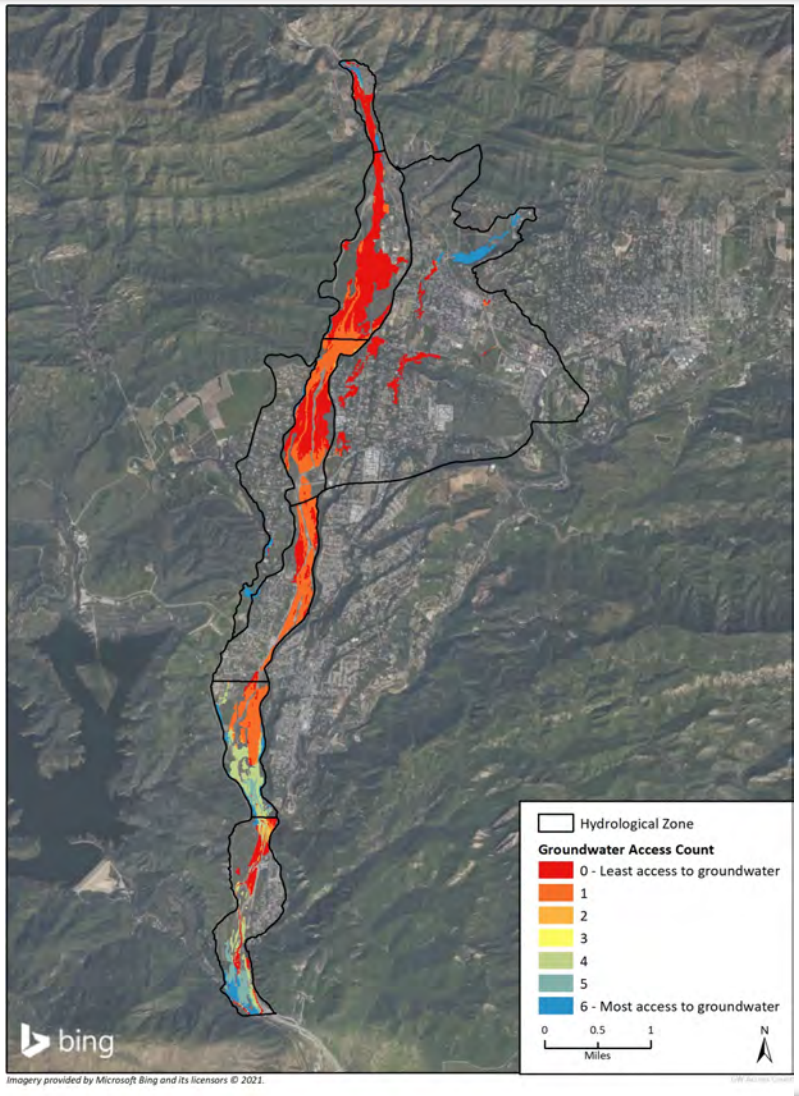
Potential GDEs – "Possible" Evaluation



- Groundwater access counts
- Wet, average, and dry water years
  - High and low for each

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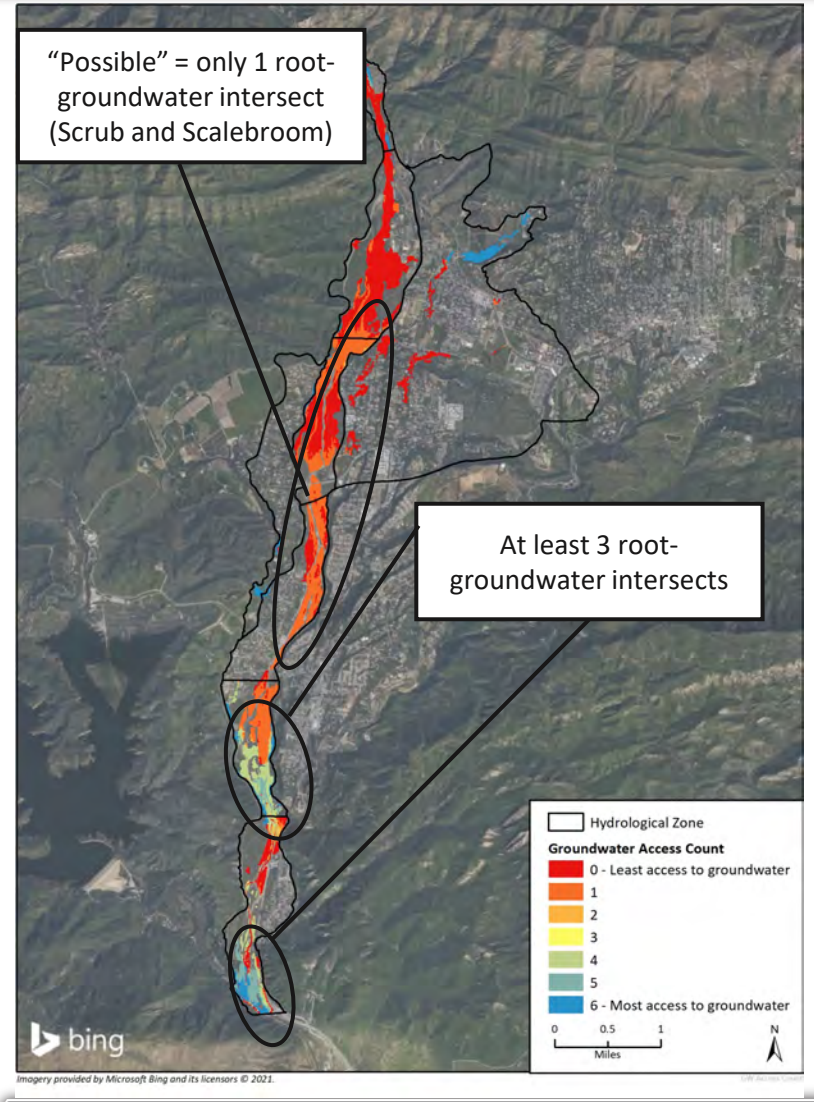
Potential GDEs – "Possible" Evaluation



- 1 root-groundwater intersect for the Robles North, Robles South, and Santa Ana North hydrogeologic areas
  - DTW was well below roots in most hydrologic conditions
- >3 root-groundwater intersects for the Santa Ana South and Casitas Springs hydrogeologic areas
- Inclusion of all Riparian Mixed Hardwood GDEs

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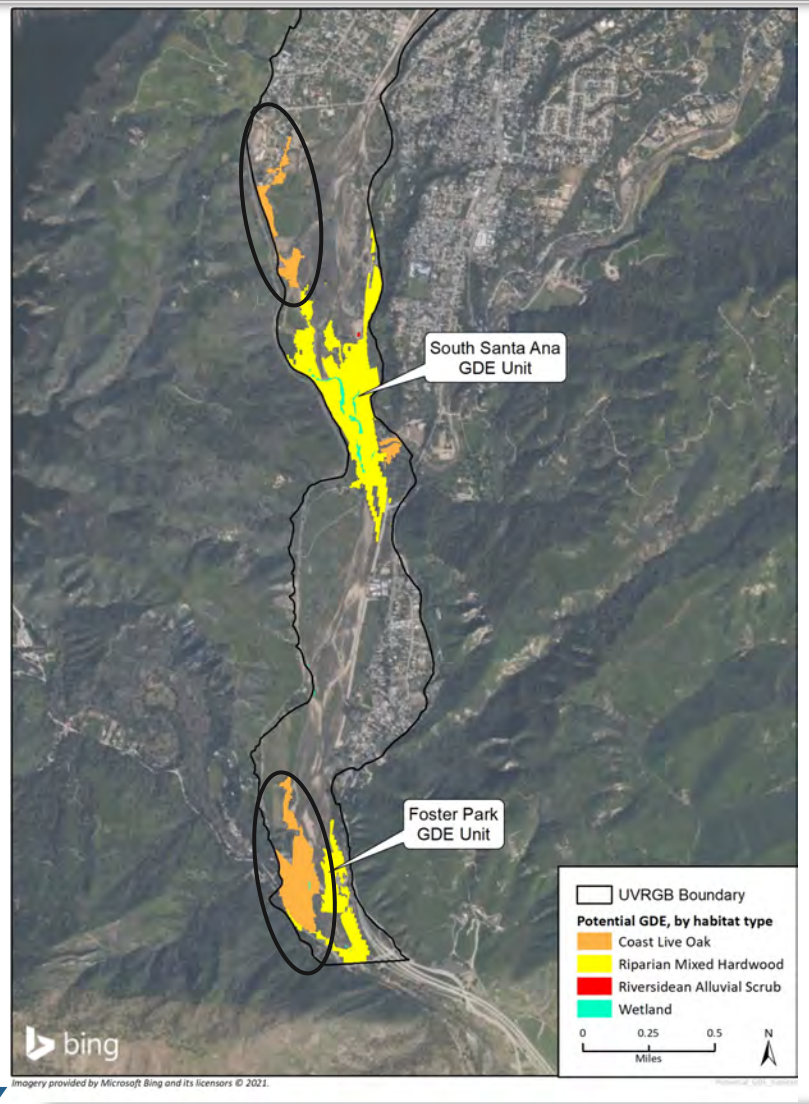
rincon

UVRGB GDE Units



- Grouped GDEs into 2 units
- South Santa Ana GDE Unit
  - Coast Live Oak, Riparian Mixed Hardwood, Wetland, Riversidean Alluvial Scrub
- Foster Park GDE Unit
  - Coast Live Oak, Riparian Mixed Hardwood, Wetland
- Uncertain of groundwater dependency of Coast Live Oak

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GDE Characterization

Composition and ecological value of GDE units

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GDE Unit Characterization

- Special Status Species:
  - Pacific Lamprey
  - Southern California DPS Steelhead
  - California red-legged frog
  - Southwestern pond turtle
  - Two-striped gartersnake
  - Southwestern willow flycatcher
  - Least bell's vireo
  - Yellow Warbler
- Critical Habitat:
  - Southwestern willow flycatcher
  - Southern California DPS Steelhead
  - California red-legged frog
- Sensitive Natural Communities:
  - Southern California Steelhead Stream
  - Southern Sycamore Alder Riparian Woodland

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GDE Unit Ecological Value

- Regionally important habitat
- GDE units provide habitat beyond that designated as “critical habitat”

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GDE Susceptibility

Potential effects caused by changing groundwater conditions

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GDE Susceptibility – NDVI, NDMI, and Level

Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI)

- Satellite-derived index that represents the greenness and water content of vegetation
- Increase in values indicates increase in vegetative growth, and a decrease indicates a decrease in vegetative growth

Groundwater Levels

- Available DTW from monitoring wells in or close to the GDE units

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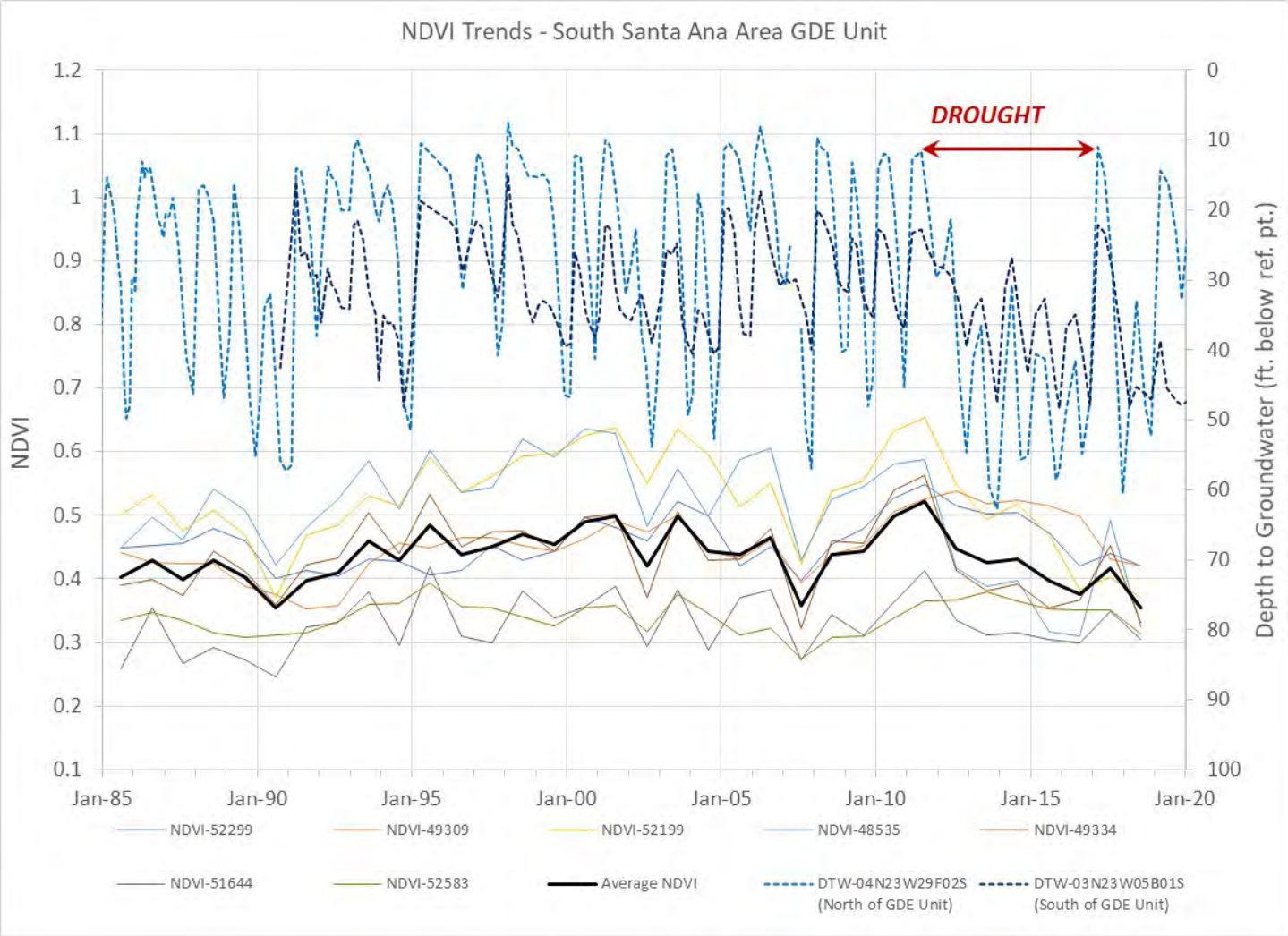
GDE Susceptibility – South Santa Ana GDE Unit



South Santa Ana NDVI

- Close correlation with DTW
- Low values in recent drought like historic dry periods
- Noticeable decline in drought with signs of rebound

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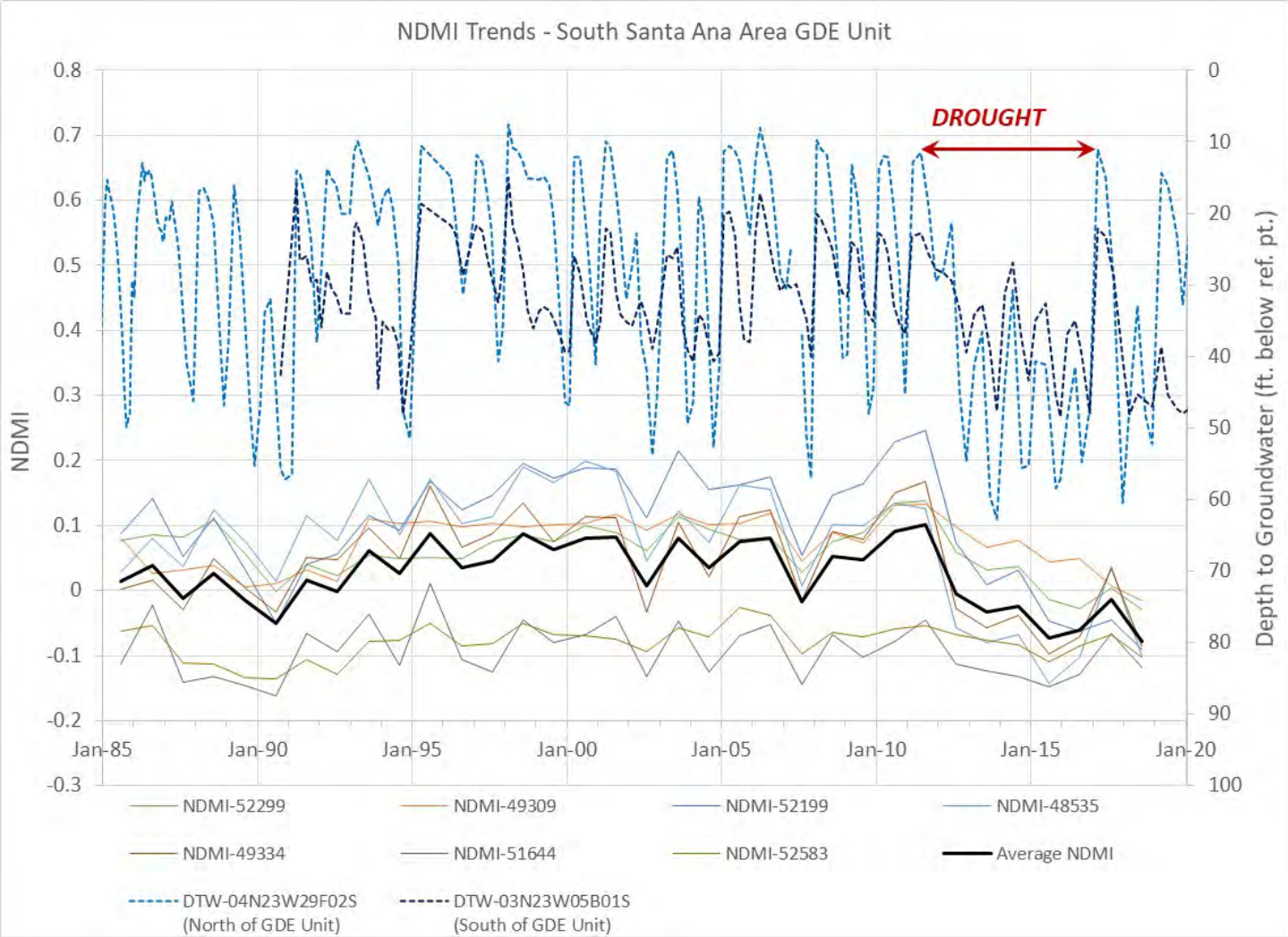
GDE Susceptibility – South Santa Ana GDE Unit



South Santa Ana NDMI

- Similar trends to NDVI

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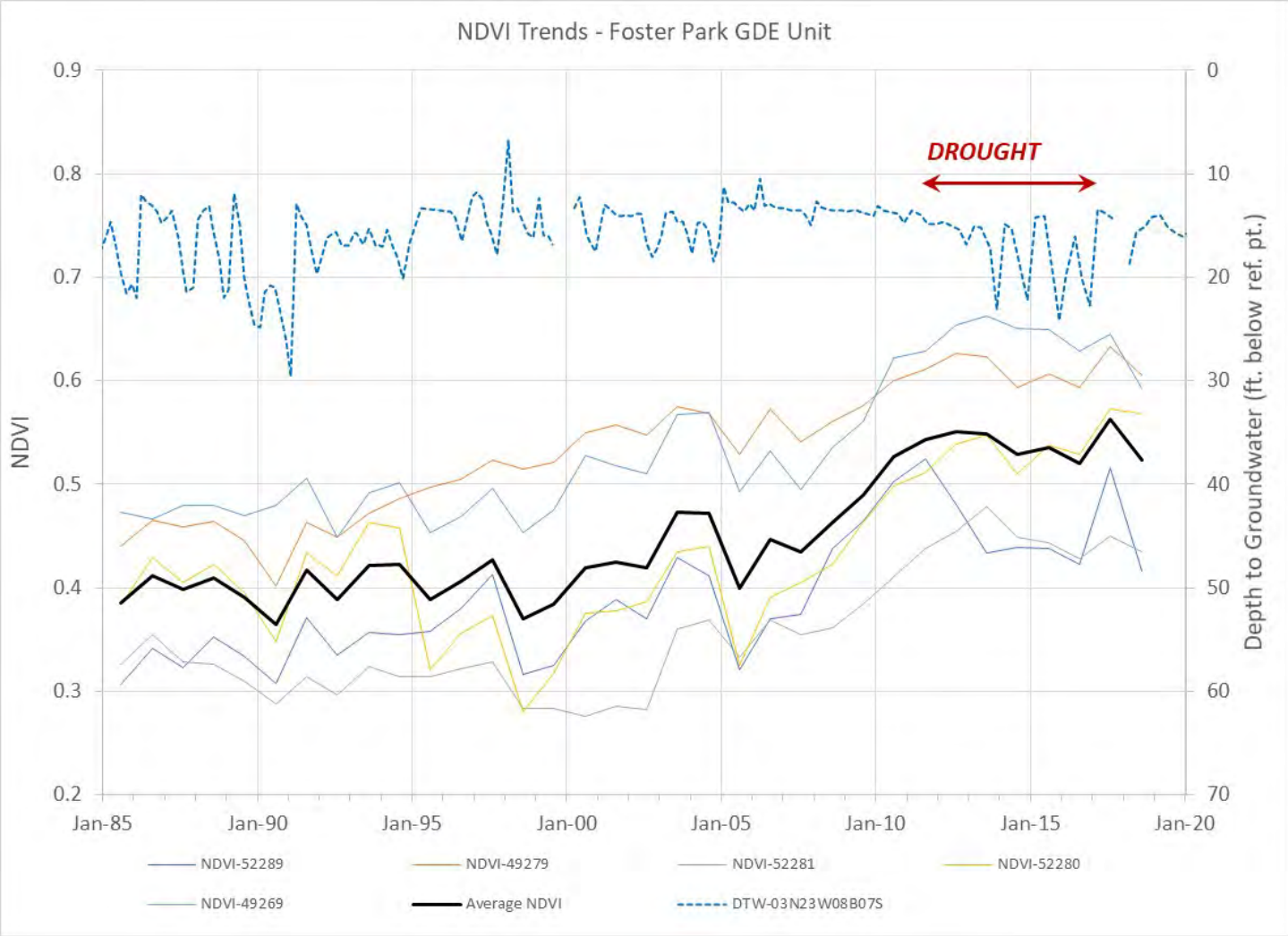
GDE Susceptibility – Foster Park GDE Unit



Foster Park NDVI

- Long-term rising trend
- Close correlation with DTW
- High values recently

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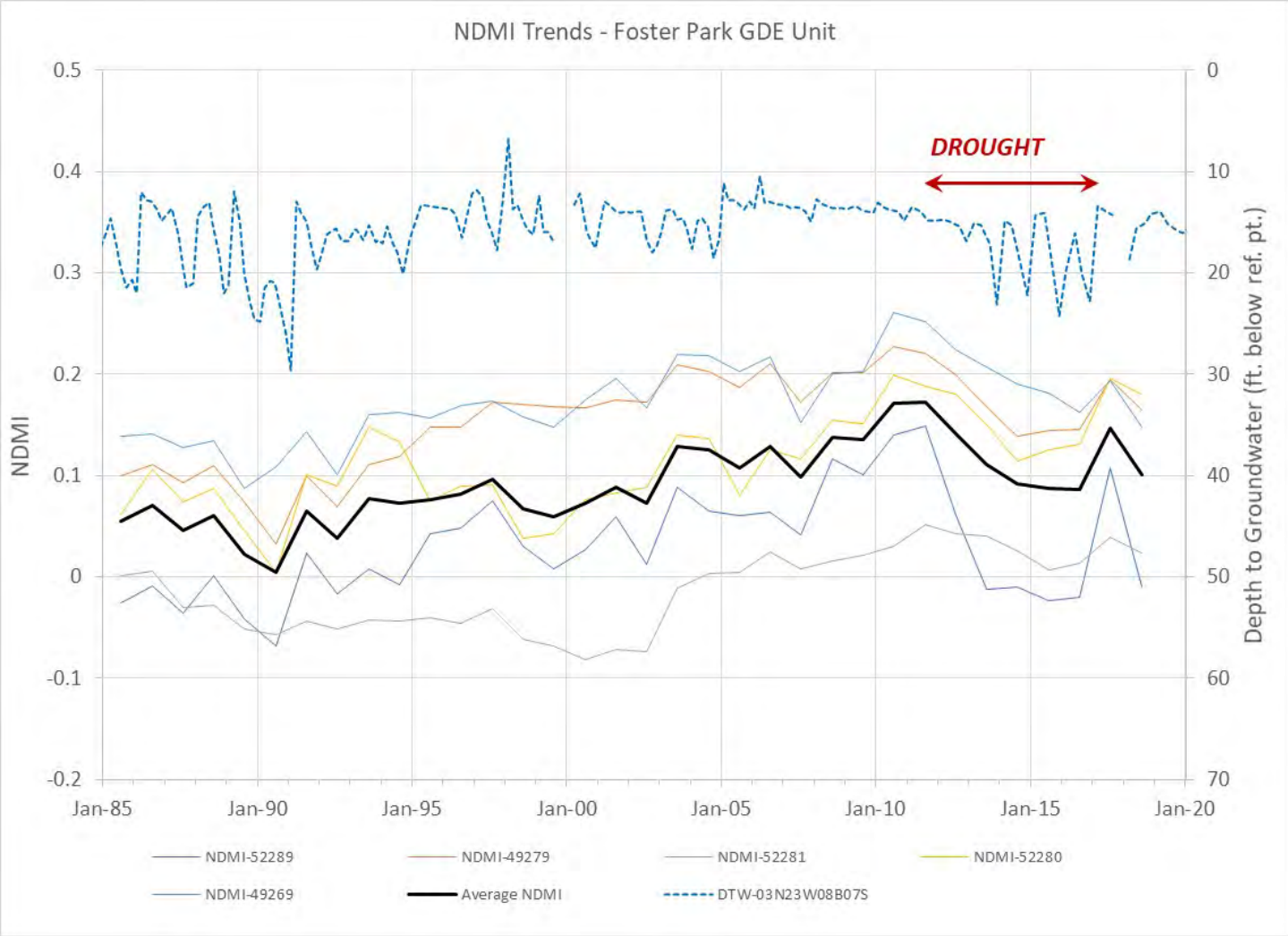
GDE Susceptibility – Foster Park GDE Unit



Foster Park NDMI

- Similar trend to NDVI
- Recent drought more pronounced

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Findings

- Data indicate historic impacts to GDEs are not permanent or prolonged
  - NDVI and NDMI rebound following drought
  - Visual analysis confirms rebound with no noticeable density or plant composition changes
  - Quickly rebounding groundwater level and NDVI/NDMI follow hydrologic conditions (i.e., precipitation in the watershed)
- *To the extent pumping and hydrologic conditions are similar going forward, we do not expect there to be significant effects to GDEs*

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Monitoring Considerations

- Monitor:
  - Groundwater elevations in GDE Units
  - NDVI and NDMI data
  - Aerial imagery of vegetation communities
- Be aware of stakeholder monitoring and implementation programs
  - e.g., restoration projects, invasive species removal, etc.

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Questions?

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Additional Slides

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Coast Live Oak Communities in GDE Units

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Coast Live Oak Communities in GDE Units

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 4/2011

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 4/2013

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 12/2013

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 1/2014

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 12/2014

Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 5/2015

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 2/2016

Noticeable changes to canopy density observed

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 5/2016

Appears canopy density rebound

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 10/2016

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 12/2017

Noticeable changes to canopy density observed again

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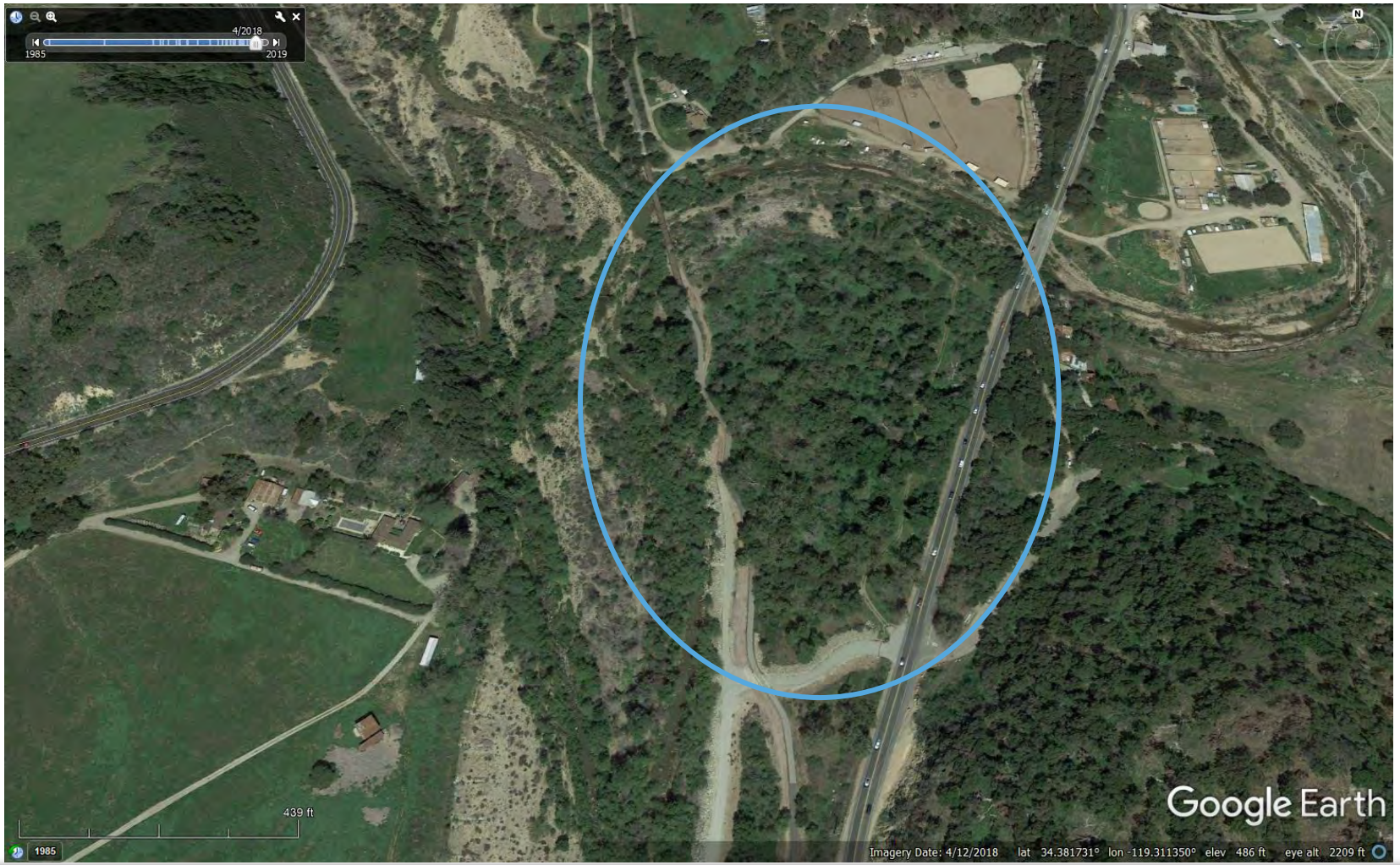
Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 4/2018



Canopy and shrub density appears to rebound again moving forward

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 11/2018

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Aerial Imagery (before, during, and after drought)

South Santa Ana GDE Unit: 8/2019

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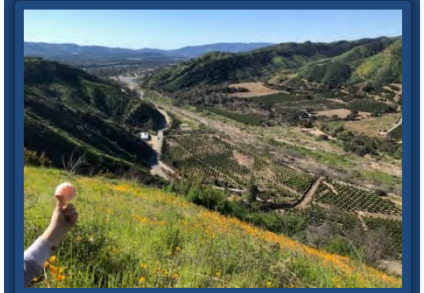
PROPOSED SCM



CHRONIC LOWERING OF GW LEVELS UNDESIRABLE RESULTS

- Undesirable Result (Water Code §10721):

  Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

CHRONIC LOWERING OF GW LEVELS UNDESIRABLE RESULTS

- DWR's interprets the regulation as meaning that GSAs must address undesirable results that occur during temporary periods of low GW levels:

  "Even assuming that groundwater levels and storage recover during wetter periods…that notion is not a substitute for a determination by the Agency to demonstrate that undesirable results have been avoided during times when groundwater levels and the associated groundwater in storage have declined without adequate evidence."

CHRONIC LOWERING OF GW LEVELS UNDESIRABLE RESULTS

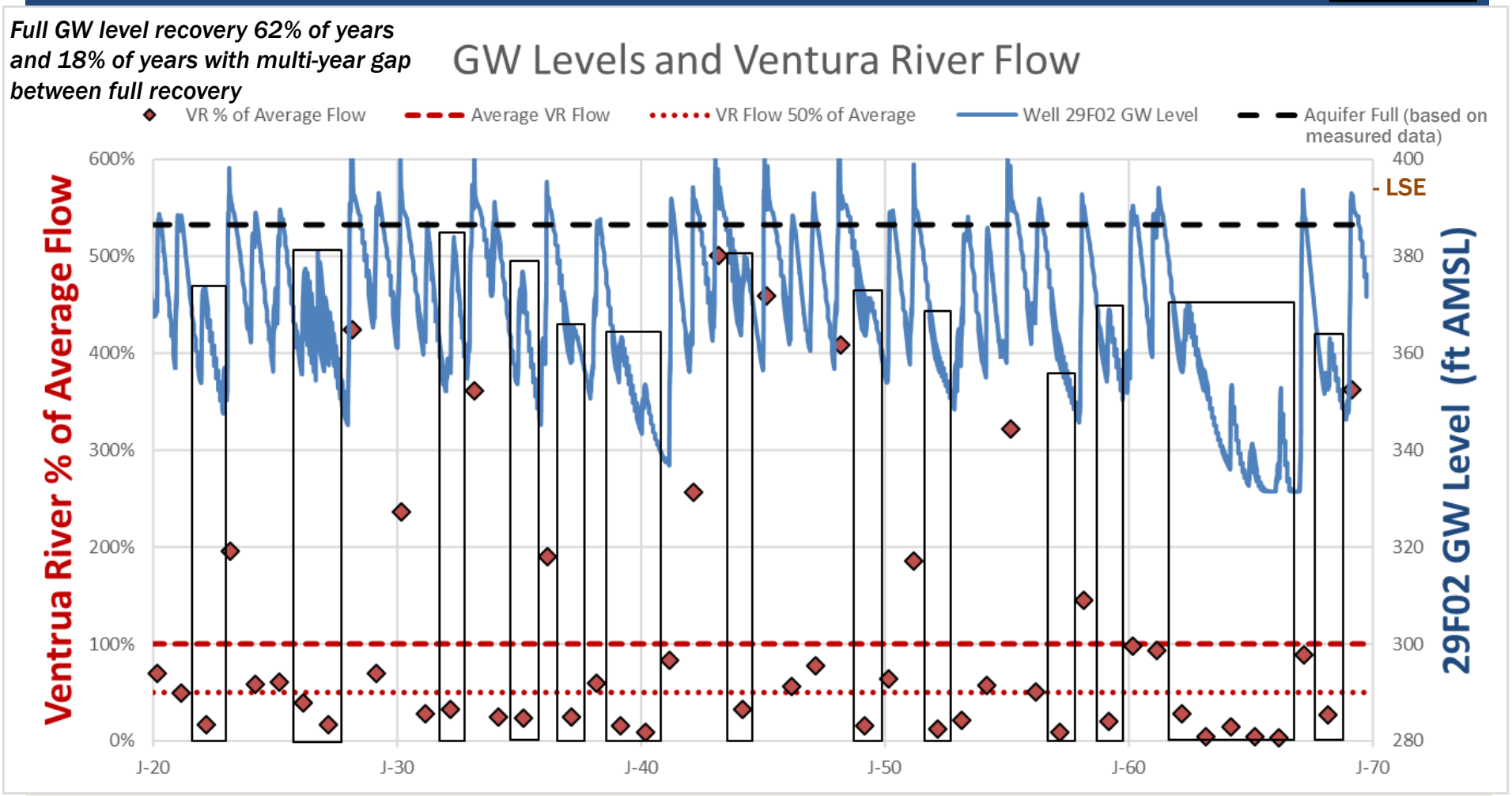
- Two elements to address based on regulations and DWR's interpretation:

1. Demonstrate absence of chronically declining GW levels
2. Address any undesirable results that could occur during periods when groundwater levels and storage decline

VENTURA RIVER FLOWS AND GROUNDWATER ELEVATIONS

Lowering GW Levels

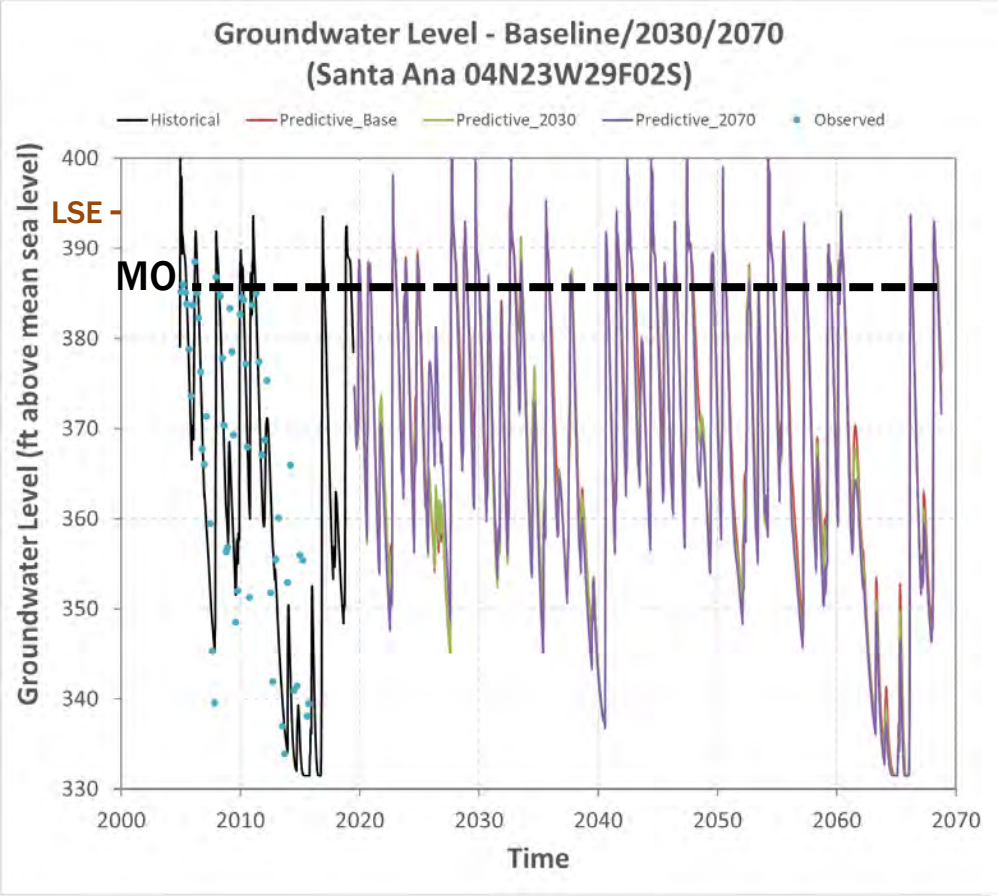
Full GW level recovery 62% of years and 18% of years with multi-year gap between full recovery



No chronic decline- GW levels are predicted to fully recover when VR flow is >=50% of average.

DEMONSTRATING LACK OF CHRONIC GW LEVEL DECLINES

- Lack of chronic decline can be demonstrated by simply confirming historical pattern of frequent aquifer re-filling continues
- Measurable Objective (MO) is logically set at the typical high GW level historically observed in years when aquifer fills
  - MO usually should be met with spring high GW level when VR flow is > 50% of mean



AVOIDING UNDESIRABLE RESULTS DURING LOW GW LEVEL / STORAGE PERIODS

Potential Significant and Unreasonable Effects:

- Reduced well yields / dry wells
  - No reported S&U effects with low GW levels
  - Domestic wells likely susceptible at lower GW levels
- Impacts to riparian GDEs
  - Rincon concluded that riparian plant communities experienced stress during periods of low groundwater levels, but have rebounded.
  - Rincon concluded that deeper groundwater levels could lead to more widespread or longstanding effects.
- ***Conclusion: Minimum Threshold set at historical low GW levels will be reasonably protective against S&U effects***

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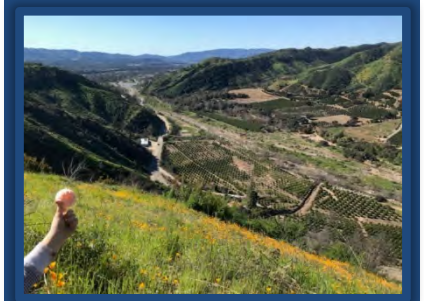
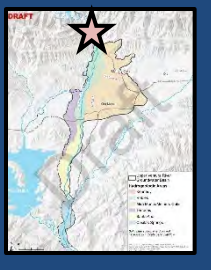
EXAMPLE SMC

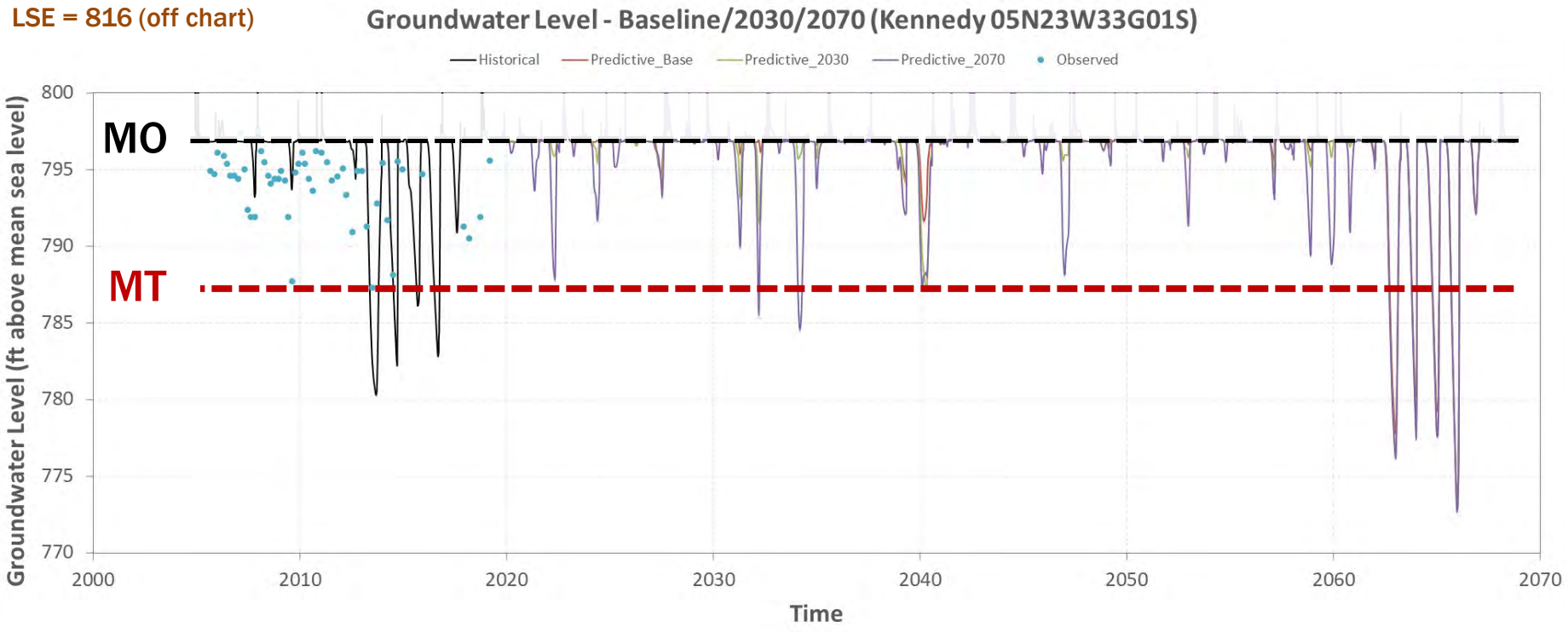
The following charts show the proposed MO and MT superimposed on historical groundwater level data and projected future groundwater levels with current climate change conditions (baseline), 2030 climate change conditions, and 2070 climate change conditions.



EXAMPLE SMC: KENNEDY AREA WELL



LSE = 816 (off chart)



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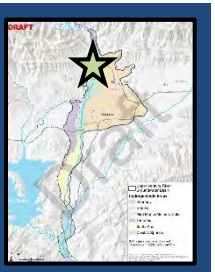
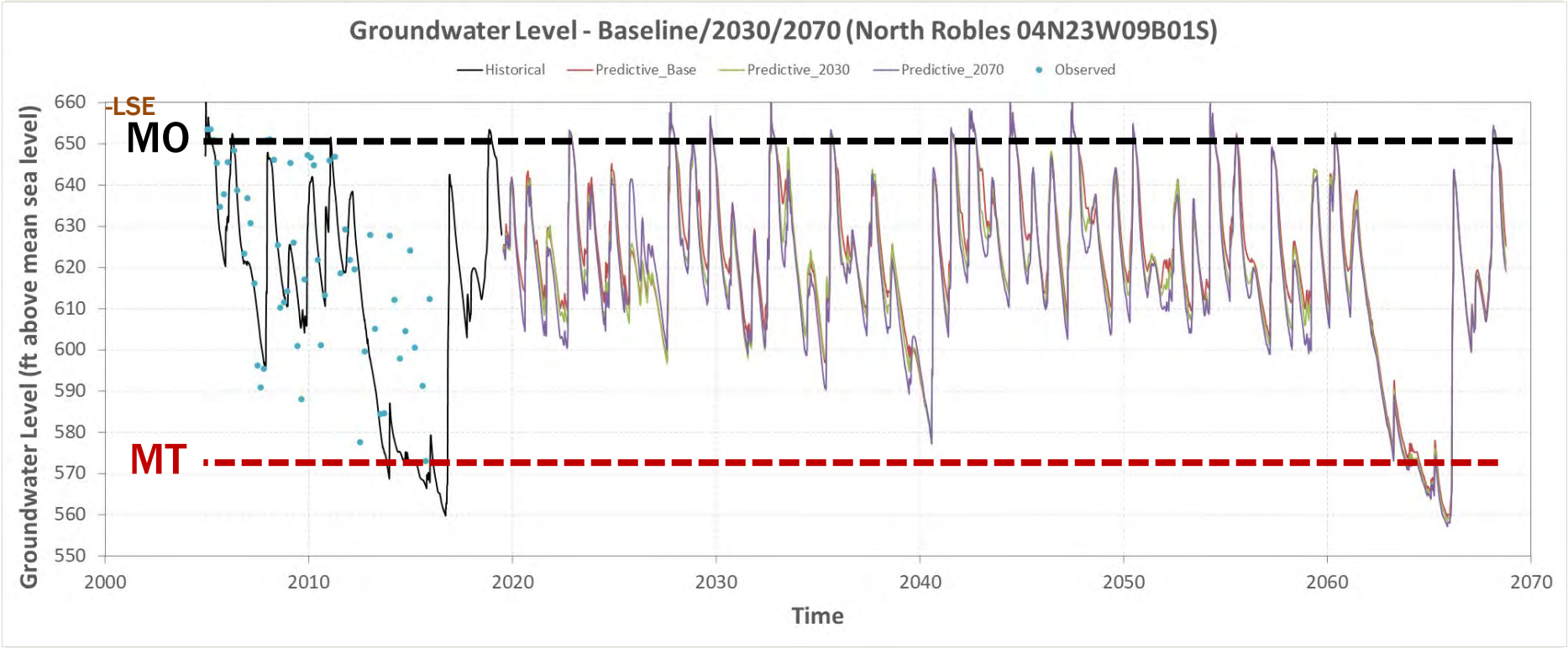
EXAMPLE SMC: NORTHERN ROBLES AREA WELL





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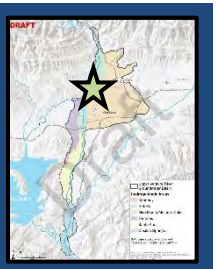
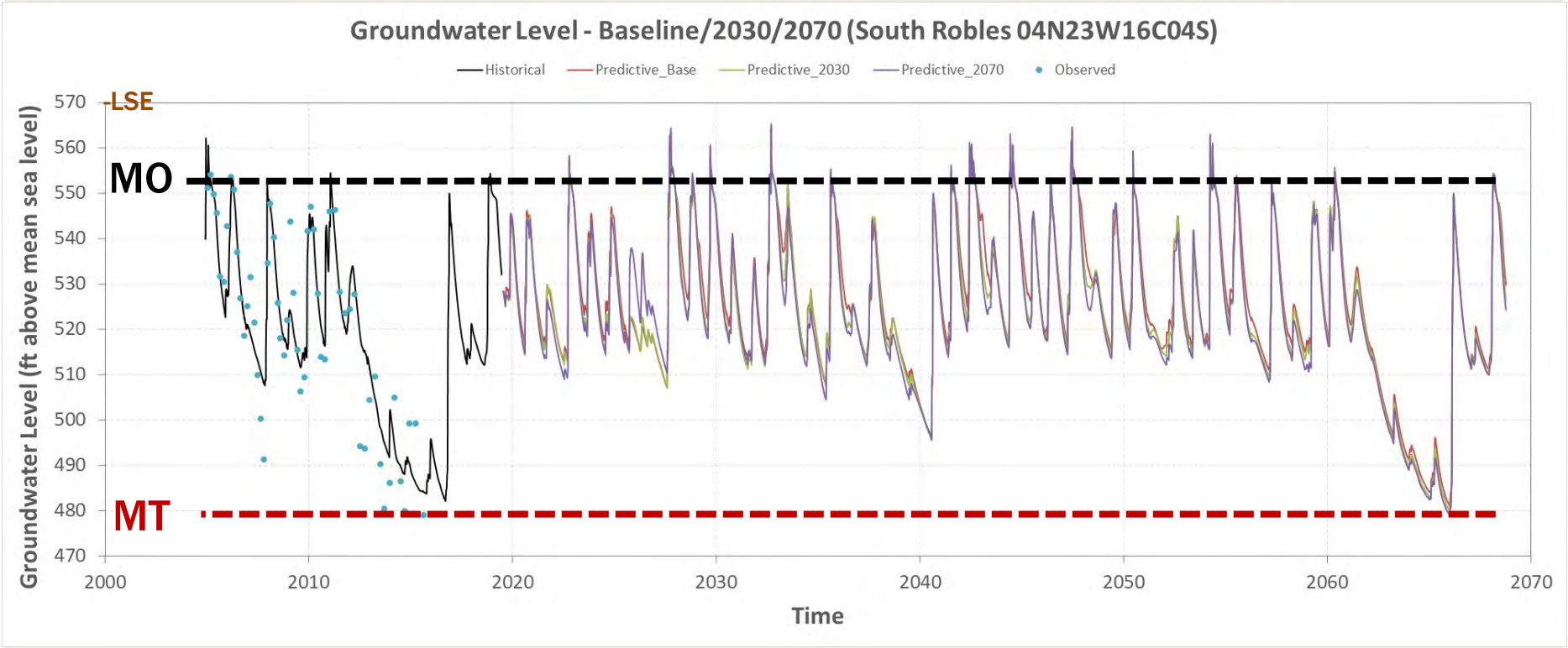
EXAMPLE SMC: SOUTHERN ROBLES AREA WELL





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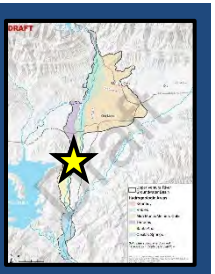
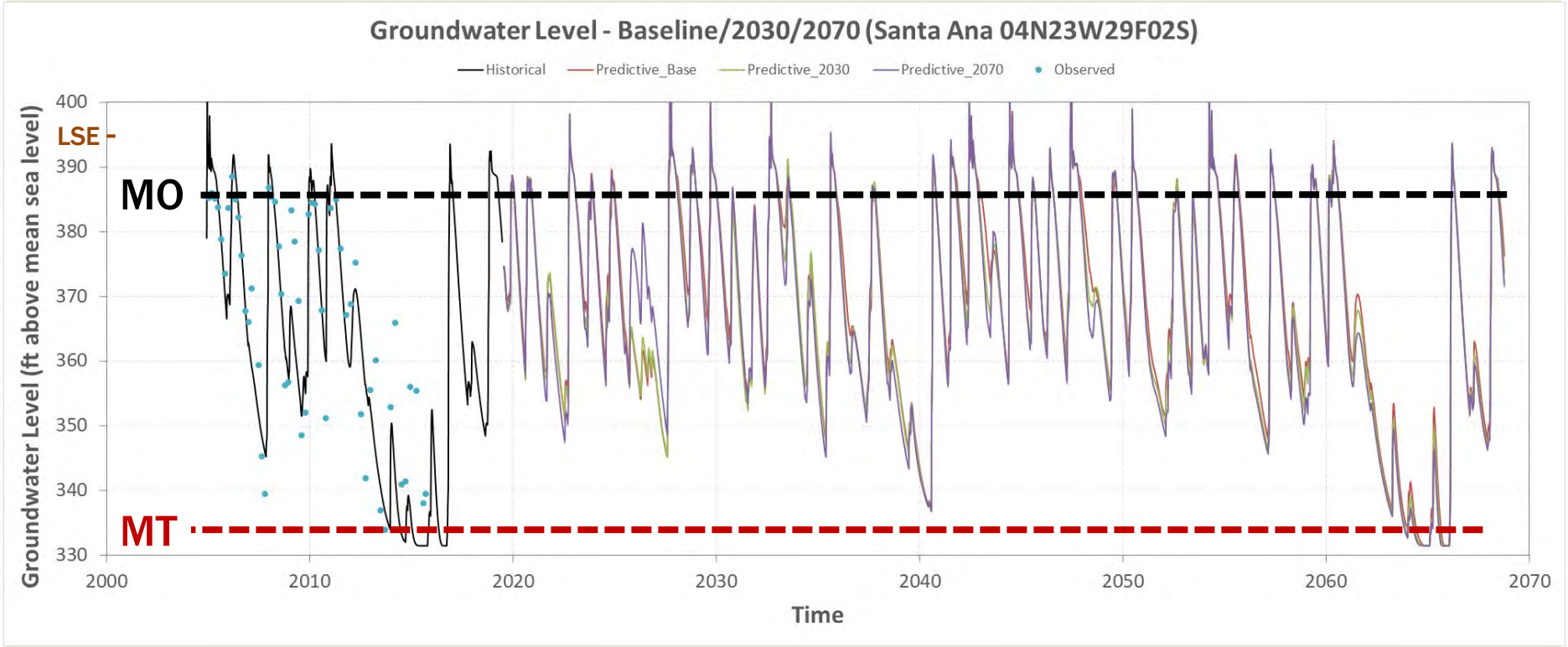
EXAMPLE SMC: SANTA ANA AREA WELL





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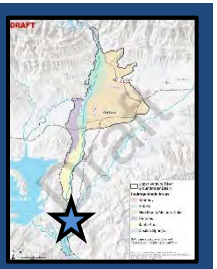
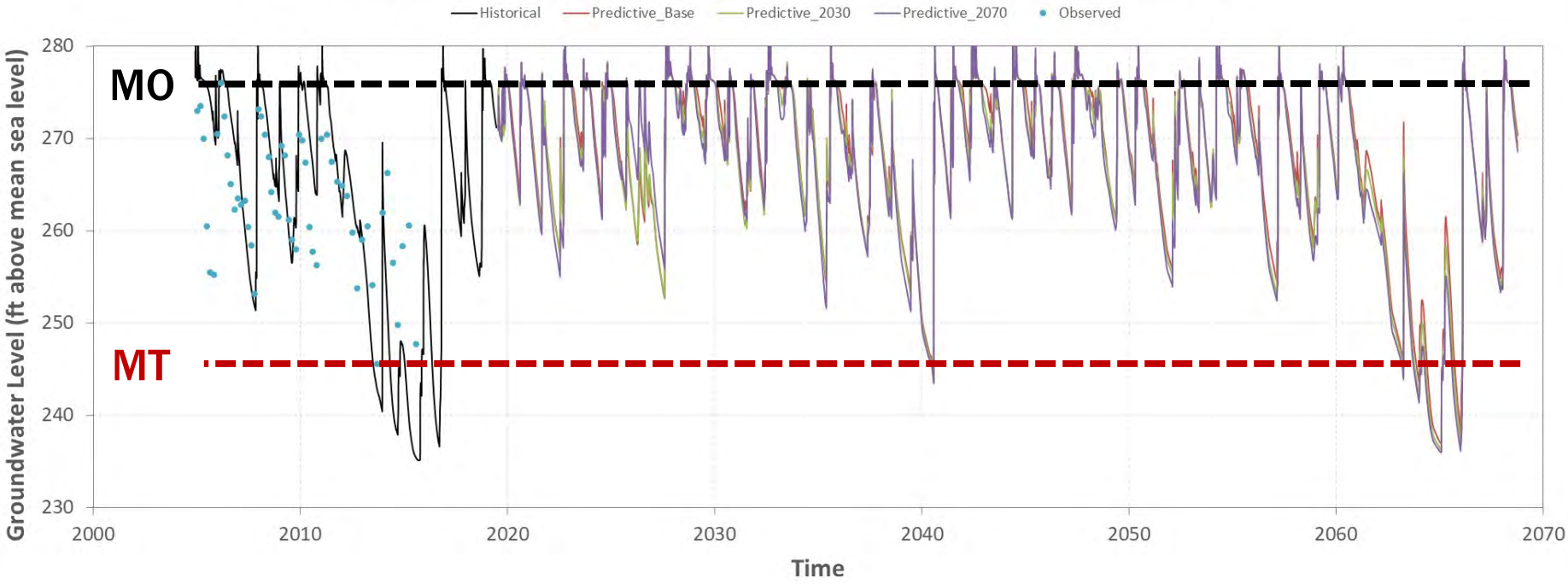
EXAMPLE SMC:
NORTH CASITAS SP. AREA WELL



-LSE



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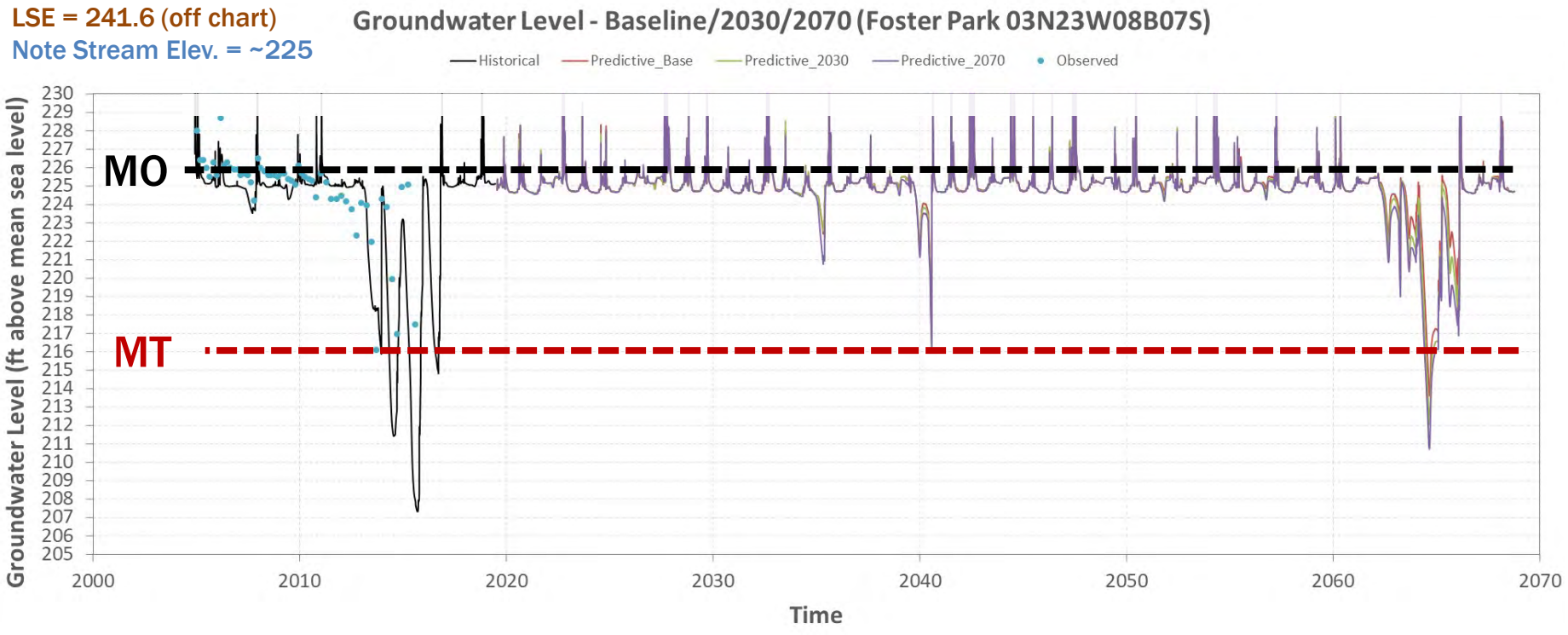
EXAMPLE SMC: FOSTER PARK WELL

LSE = 241.6 (off chart)

Note Stream Elev. = ~225



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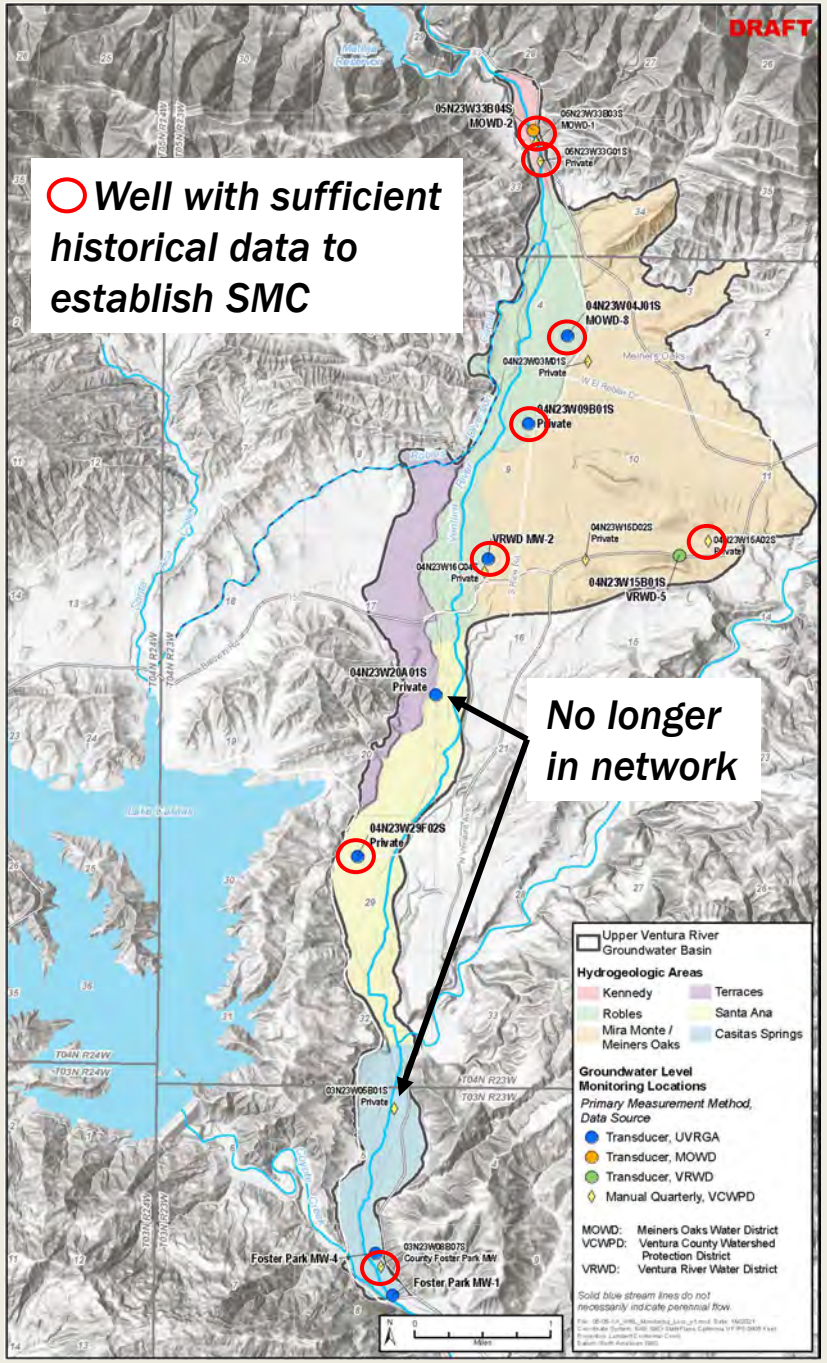
CHRONIC LOWERING OF GW LEVELS UNDESIRABLE RESULTS

- Undesirable results is defined quantitatively as "*The combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*"

GROUNDWATER LEVEL MONITORING LOCATIONS

- *15 wells*
- *8 wells have sufficient historical data to establish SMC*
- *Gaps in monitoring network to be addressed during GSP implementation*



CHRONIC LOWERING OF GW LEVELS UNDESIRABLE RESULTS

- Undesirable Results Options:
  1. UR = GW levels below MT in all 8 wells
  2. UR = GW levels below MT in the 7 wells outside of the Mira Monte Area
  3. UR = GW levels below MT in Foster Park well and a majority of the remaining wells (4 / 7)

Option 2 or 3 is recommended because GW levels in the Mira Monte Area are not representative of GW conditions along the river.

CHRONIC LOWERING OF GW LEVELS SMC IMPLEMENTATION

- MOs are expected to be met without GSP projects or management actions
- MTs may be exceeded, but infrequently
  - Not required to meet MTs until 2042
- Recommend further analysis and planning after GSP adoption:
  - Additional monitoring and modeling
  - Domestic well survey
  - Revisit SMC in 1st 5-year GSP update
  - Add contingency plan to address potential URs?

REDUCTION OF GROUNDWATER STORAGE

- Minimum Threshold (GSP Emerg. Regs §354.28):

  The total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results.

- Directly correlated with groundwater levels

- Will develop based on SMC for Chronic Decline of Groundwater Levels

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

QUESTIONS?

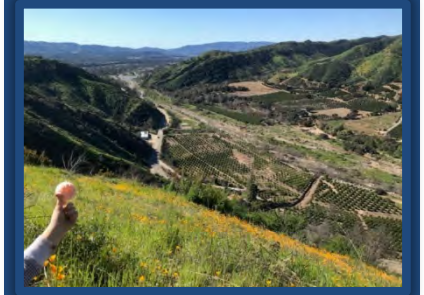
CASITAS Municipal Water District

We Serve Water

MEINERS OAKS WATER DISTRICT
VENTURA COUNTY SINCE 1949

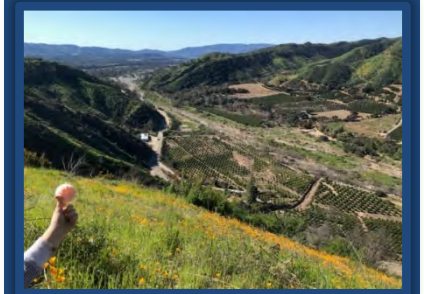
COUNTY OF VENTURA CALIFORNIA

VENTURA WATER



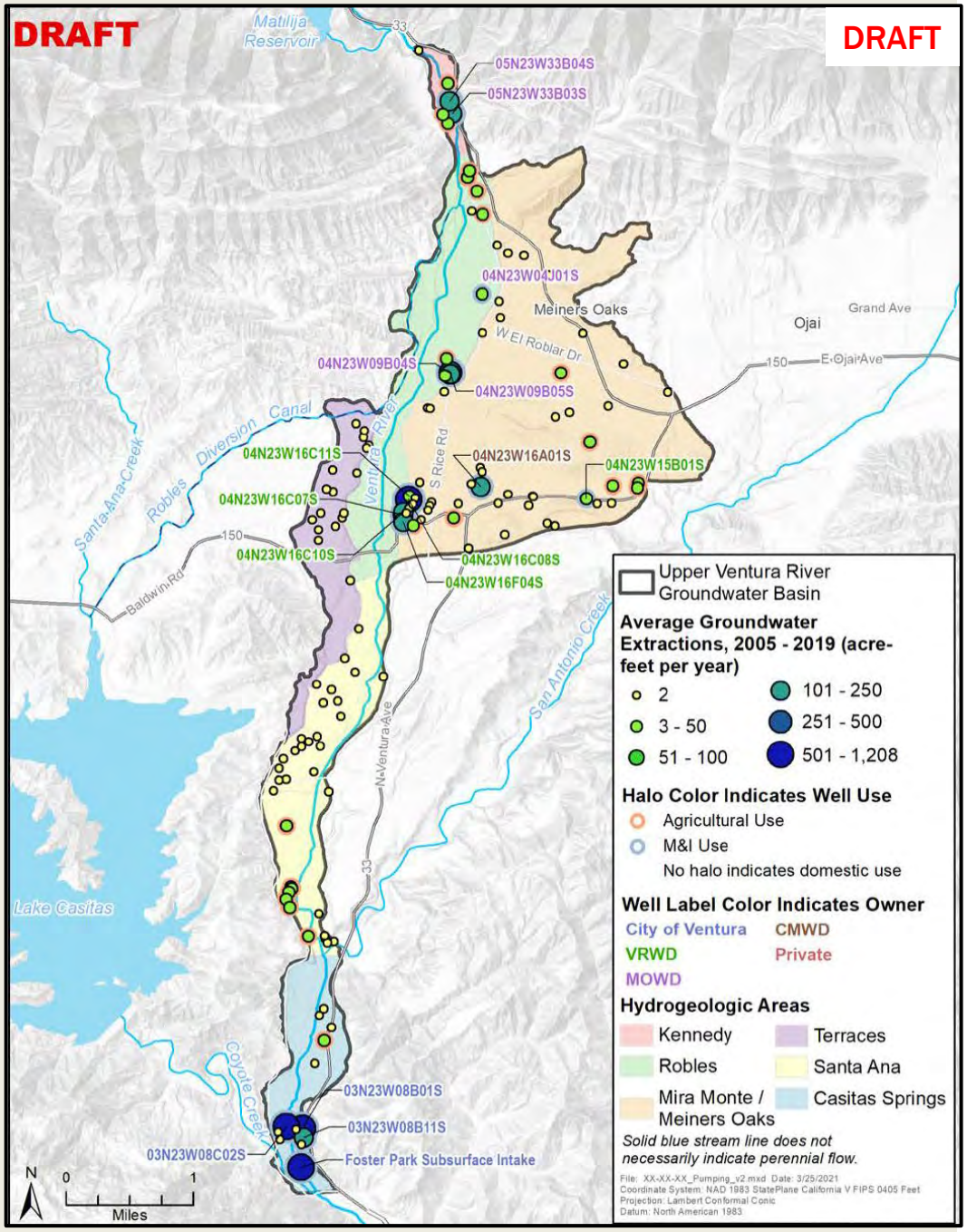
Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

EXTRA SLIDES

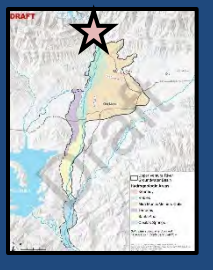


GROUNDWATER PUMPING IN UVRB

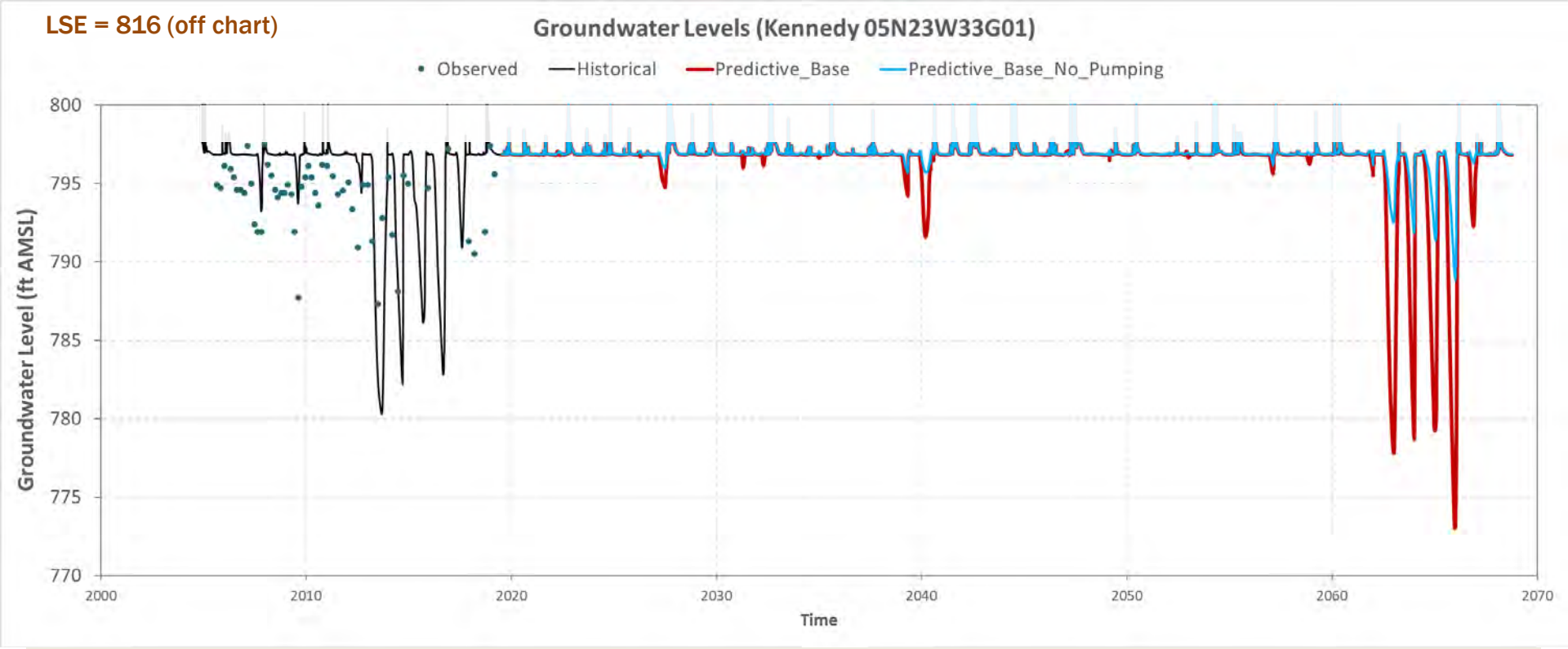
- Four areas of concentrated pumping
- Diffuse pumping elsewhere



PUMPING EFFECTS: KENNEDY AREA WELL



LSE = 816 (off chart)



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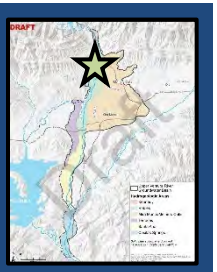
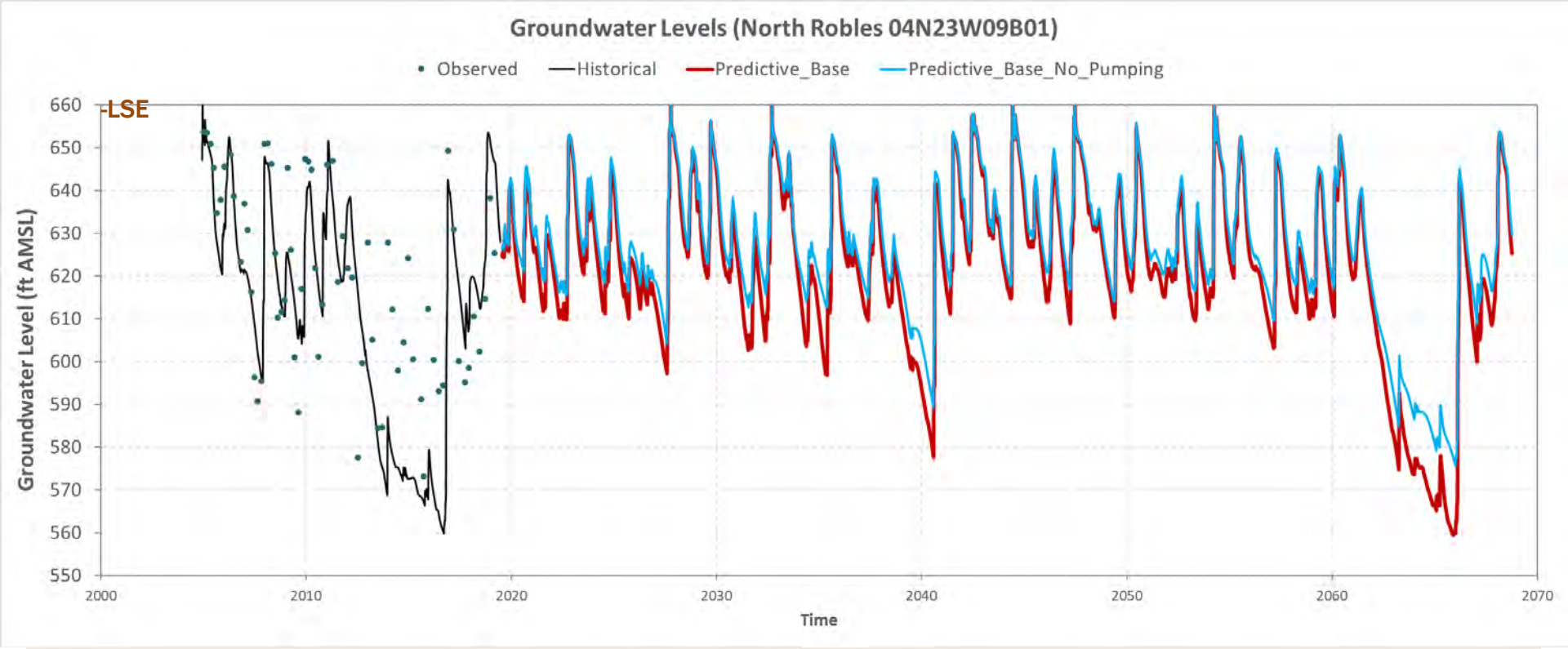
PUMPING EFFECTS: NORTHERN ROBLES AREA WELL





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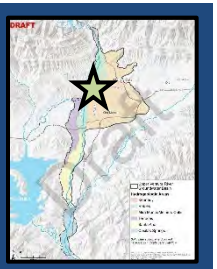
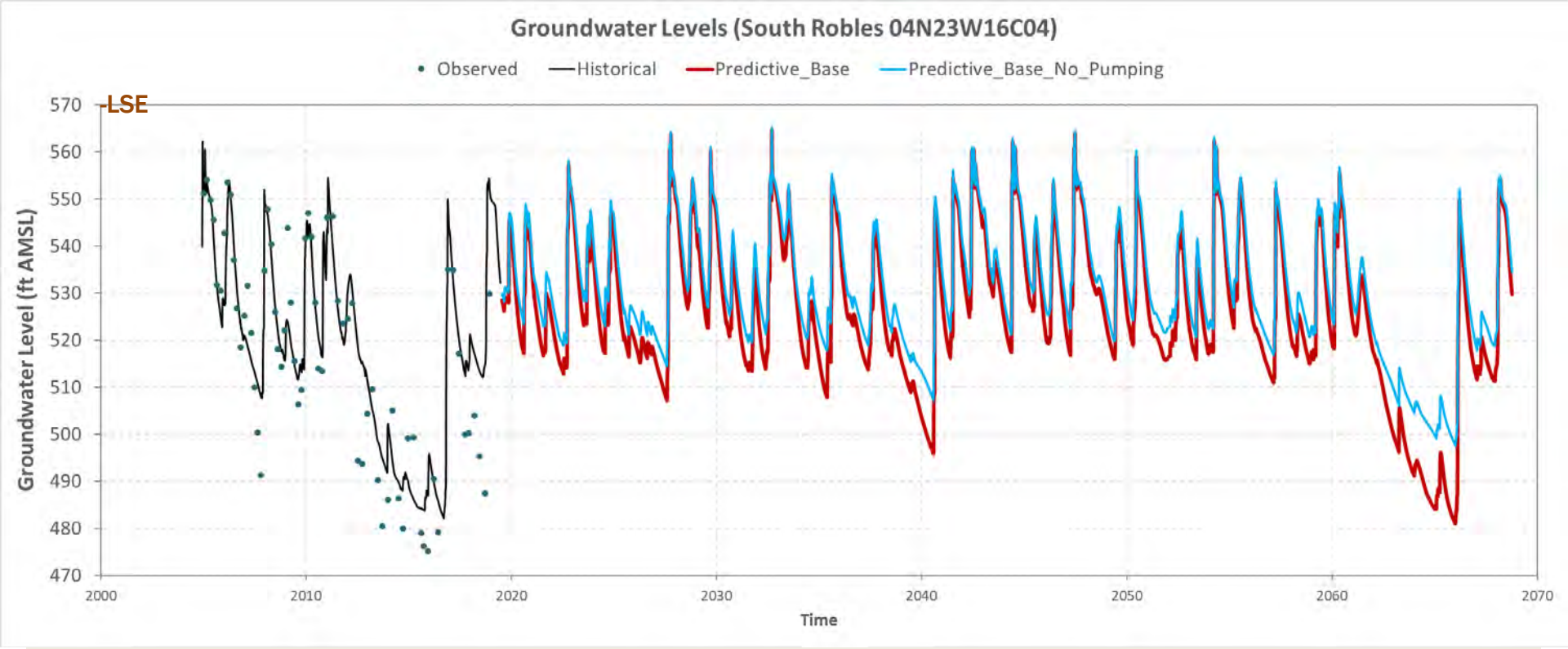
PUMPING EFFECTS: SOUTHERN ROBLES AREA WELL





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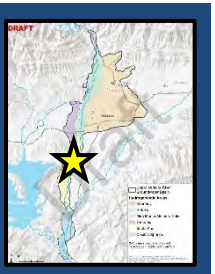
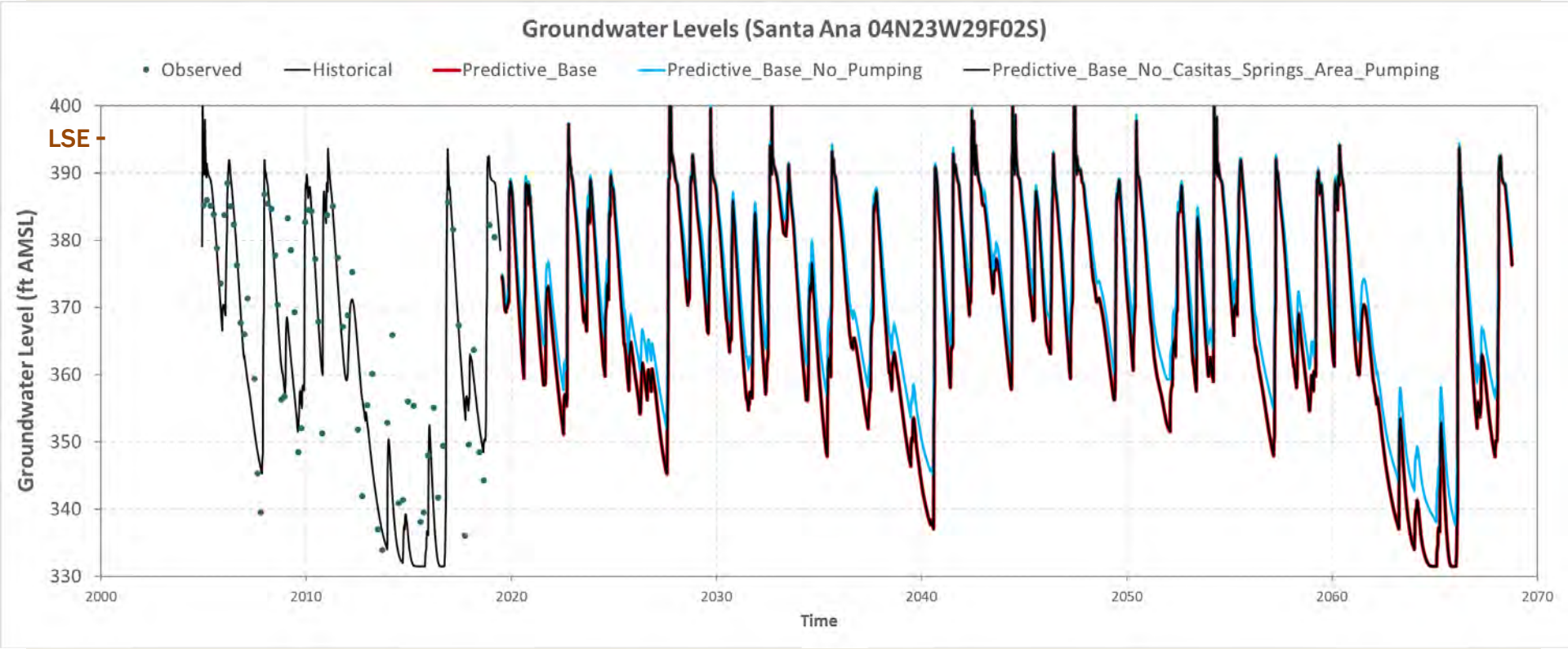
PUMPING EFFECTS : SANTA ANA AREA WELL





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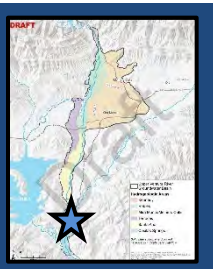
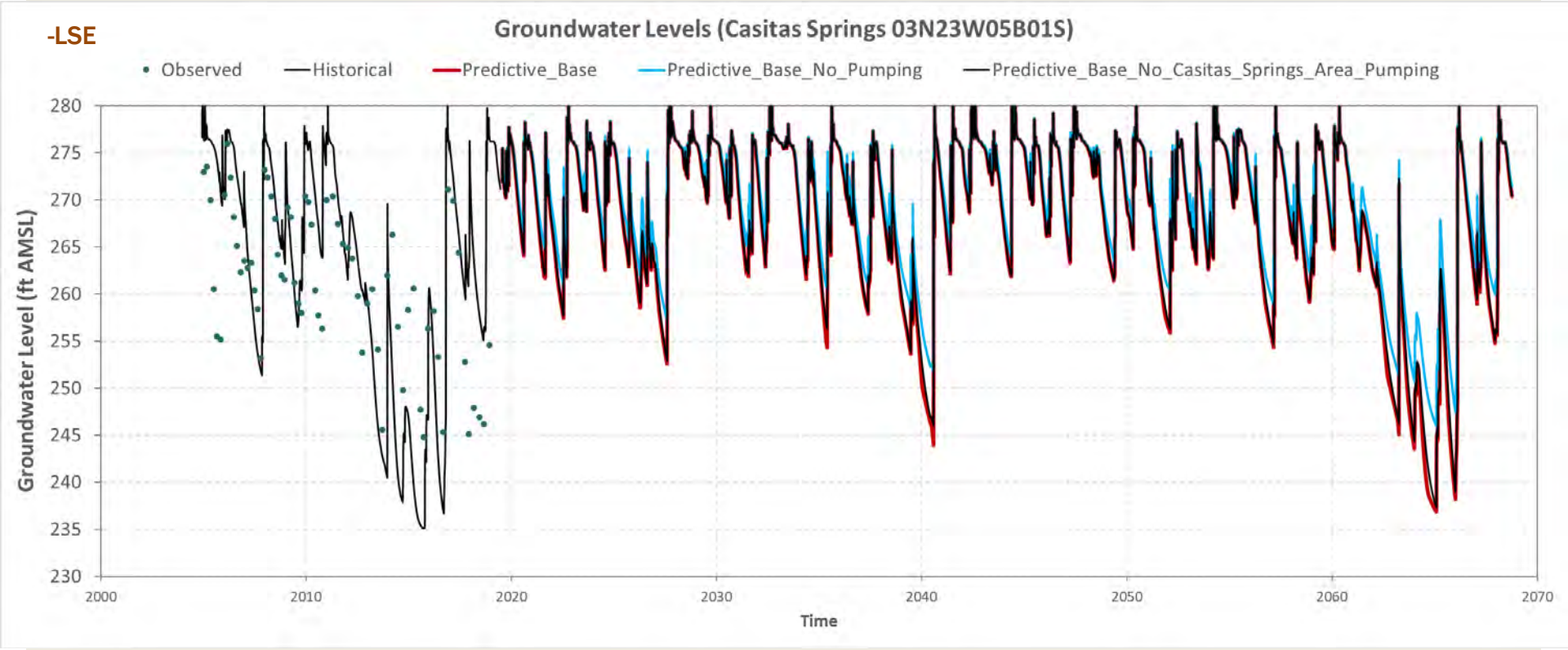
PUMPING EFFECTS : NORTH CASITAS SP. AREA WELL



-LSE



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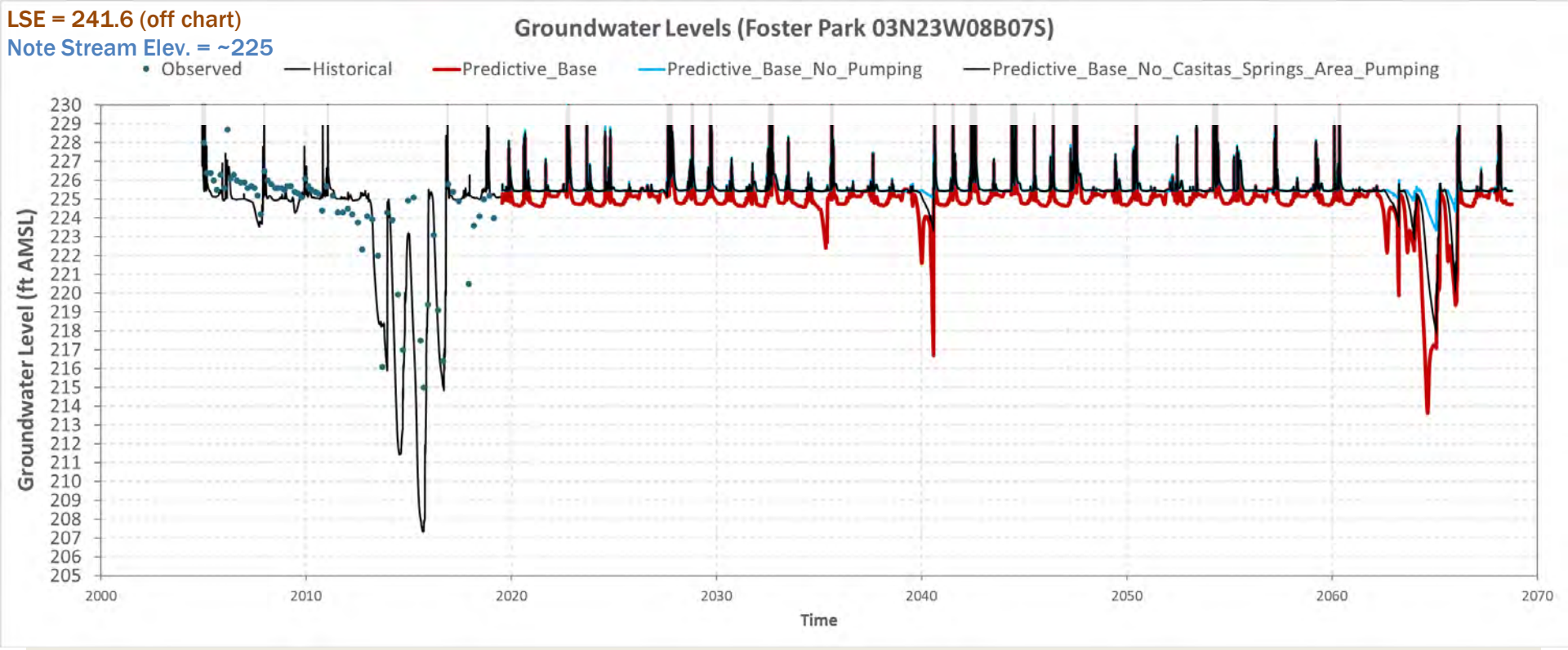
PUMPING EFFECTS: SOUTH CASITAS SP. (FP) WELL

LSE = 241.6 (off chart)

Note Stream Elev. = ~225



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