Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

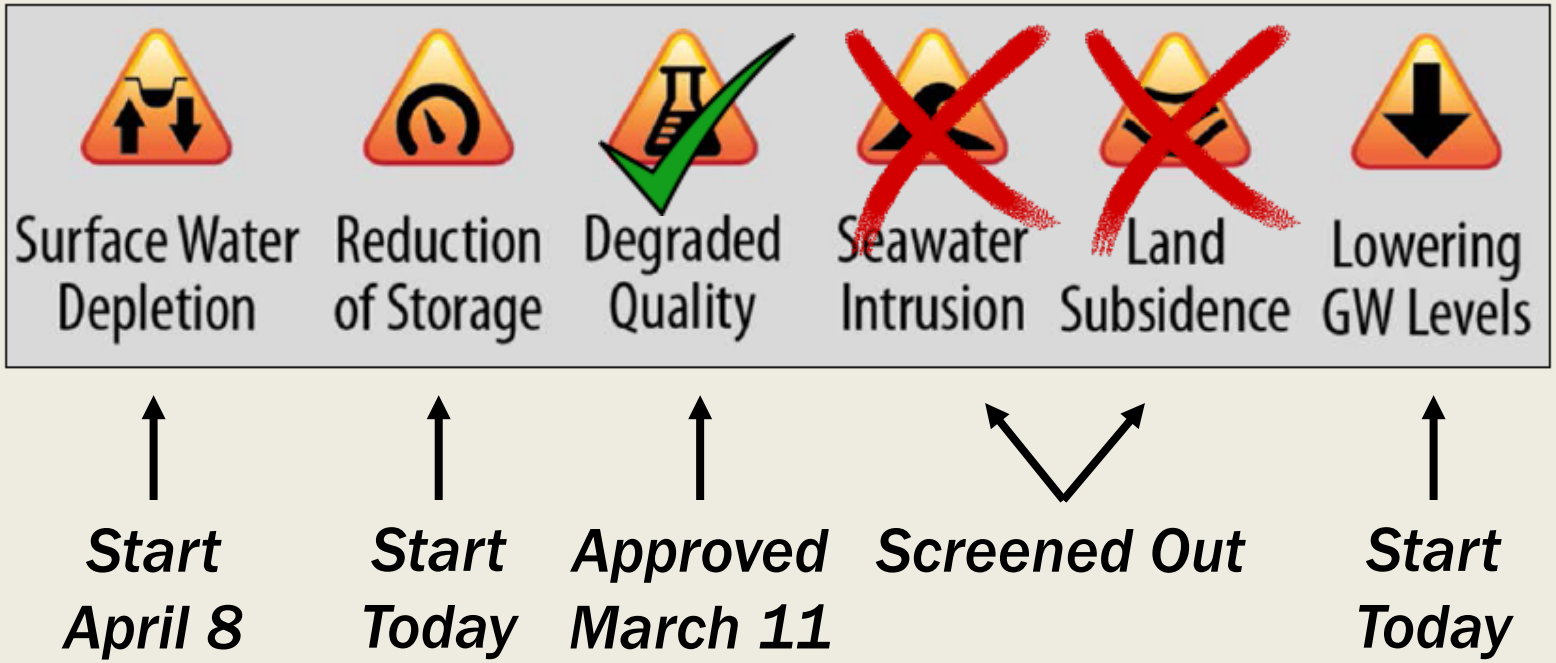
UVRGA BOARD MEETING
MARCH 25, 2021

ITEM 7A
MODEL RESULTS
&
SMC IMPLICATIONS

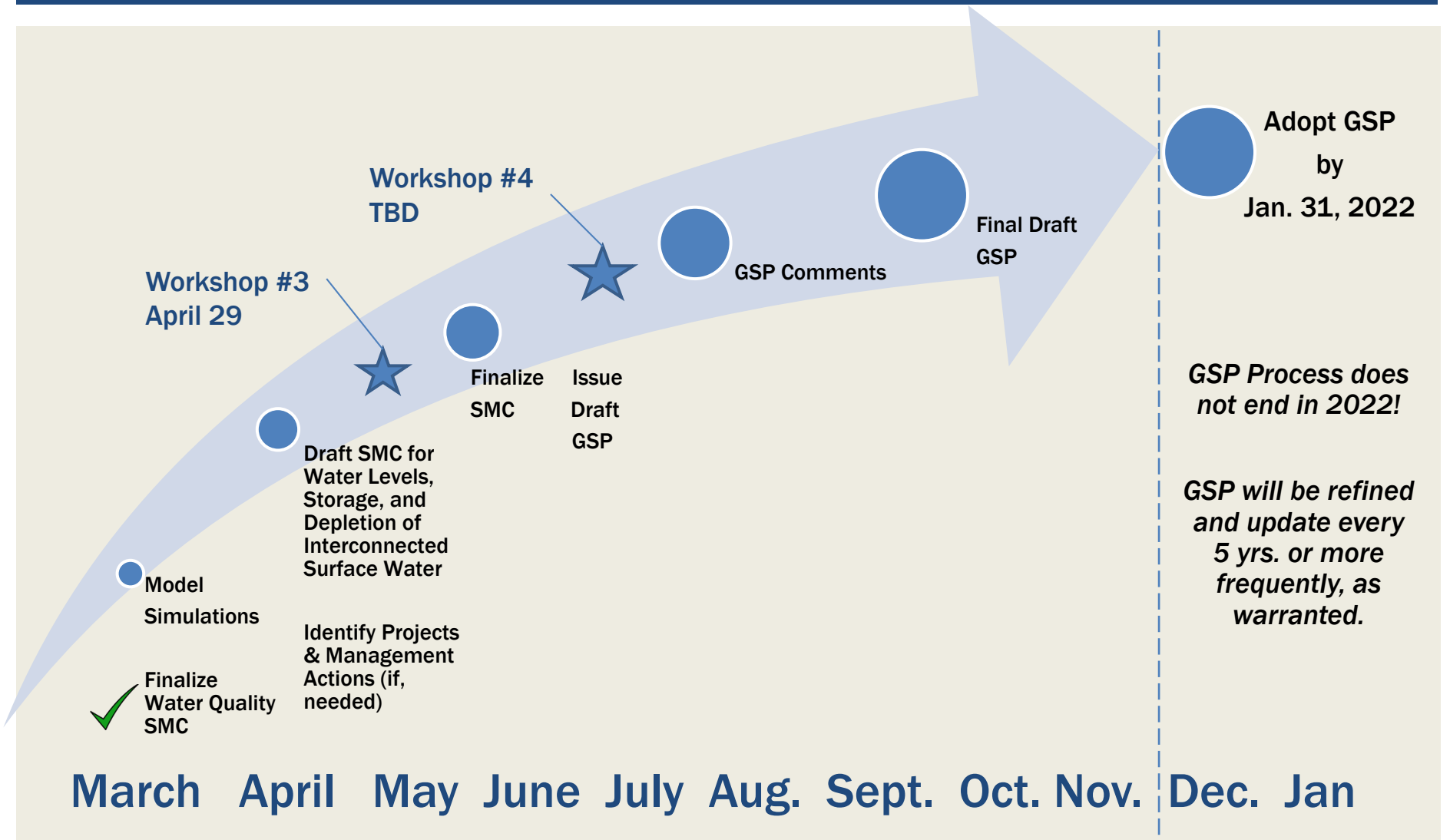
GOALS FOR TODAY

1. SMC Status Review
2. Review Water Budget Results
3. Review Projected Groundwater Levels and Streamflows
4. Initial Review of Chronic Groundwater Level Decline & Groundwater Storage Sustainability Indicators

SMC DEVELOPMENT STATUS



SCHEDULE


Workshop #4
TBD
Workshop #3
April 29
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

NEXT STEPS FOR SMC

- Today
  - Discuss results of future simulations
  - Begin Chronic GW Level Decline & GW Storage SMC
- April 8 Regular Board Meeting
  - Discuss additional model results
  - Begin Depletion of Interconnected Surface Water SMC
- April 22 Special Board Meeting
  - Continue SMC discussions
  - Agree Workshop #3 content for SMC
- April 29 Workshop #3
  - Obtain feedback on remaining SCM
- May 6 or 20 Board Meetings – finalize SMC for draft GSP

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

MODEL RESULTS

SGMA PROJECTED WATER BUDGET REQUIREMENTS

- SGMA requires 50-yr future projections of groundwater conditions, including water budget for the basin
- Must use >= 50 yrs. of *historical* hydrology
- Must use most recent conditions for baseline estimate of future water demands
- Must evaluate potential effects on water demand due to:
  - Land Use Change
  - Population Change
  - Climate Change

FUTURE CONDITIONS KEY ASSUMPTIONS

- Discussed with Board on 12/10/2020
- Hydrology
  - 1970 – 2019 is proxy for future conditions
    - Several wet-dry cycles
    - Precipitation average similar to long-term average
    - Includes 1985 Wheeler and 2017 Thomas Fires

FUTURE CONDITIONS KEY ASSUMPTIONS

- Groundwater Pumping:
  - Domestic:
    - Assumed 2 AF/yr per well and 184 AF/yr all wells
  - Mutual Water Companies:
    - Assumed same as historical pumping: 31 AF/yr
  - Agricultural: 1,079 AF/yr (average)
    - Ad Hoc committee and Exec. Dir. estimated pumping based on available data and outreach to pumpers
    - Baseline pumping adjusted annually by precipitation/ET
    - Pumping distributed throughout given year based on ET

Note :

Pumping amounts used in model simulations are for planning purposes only.
The pumping amounts are not water rights or allocations.

FUTURE CONDITIONS KEY ASSUMPTIONS

- Groundwater Pumping (con't):
  - Water Districts – per District feedback on Dec. 10, 2020
    - Two pumping rates: dry years and normal-wet years:

District	Dry Year (AF/yr)	Wet-Normal Year (AF/yr)
CMWD	45	188
MOWD	487	924
VRWD	863	950

    - Pumping distributed throughout given year based on available data

Note :
Pumping amounts used in model simulations are for planning purposes only.
The pumping amounts are not water rights or allocations.

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FUTURE CONDITIONS KEY ASSUMPTIONS

- Groundwater Pumping (con't):
  - Updated per additional discussions with City:
  - City of Ventura: per 2020 CWRR:
    - Wet/Normal Year 4,200 AF/yr
    - One-Two consecutive dry years 1,573 AF/yr
    - Third+ consecutive dry years 1,298 AF/yr
    - Distribute throughout year based on available data and

Wet & normal years:

January	Febuary	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Sum
3.84%	6.63%	9.17%	9.47%	10.21%	9.91%	9.77%	9.85%	9.25%	9.03%	7.45%	5.43%	100.00%

Dry years:

January	Febuary	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Sum
0%	16.67%	16.67%	16.67%	16.67%	16.67%	16.67%	0%	0%	0%	0%	0%	100.00%

Note :

Pumping amounts used in model simulations are for planning purposes only.

The pumping amounts are not water rights or allocations.

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SGMA REQUIRED ANALYSIS

- Land Use Impact
  - Significant land use change not expected due to SOAR voter initiatives approved through 2050.
- Population Change
  - Same as above.
- Climate Change
  - Evaluated climate change using DWR change factors for 2030 and 2070 climate change conditions

MODEL SCENARIOS

- Historical: 2005-2019 (calibration model)
- Baseline: This simulation employs the future assumptions described above.
- 2030 Climate Change: Baseline inputs modified using DWR 2030 "climate change factors"
- 2070 Climate Change: Baseline inputs modified using DWR 2070 "climate change factors"

Simulations Required for Water Budget ↑

Add'l Simulations To Support SMCs ↓

- Baseline No Pumping: Baseline w/o GW pumping

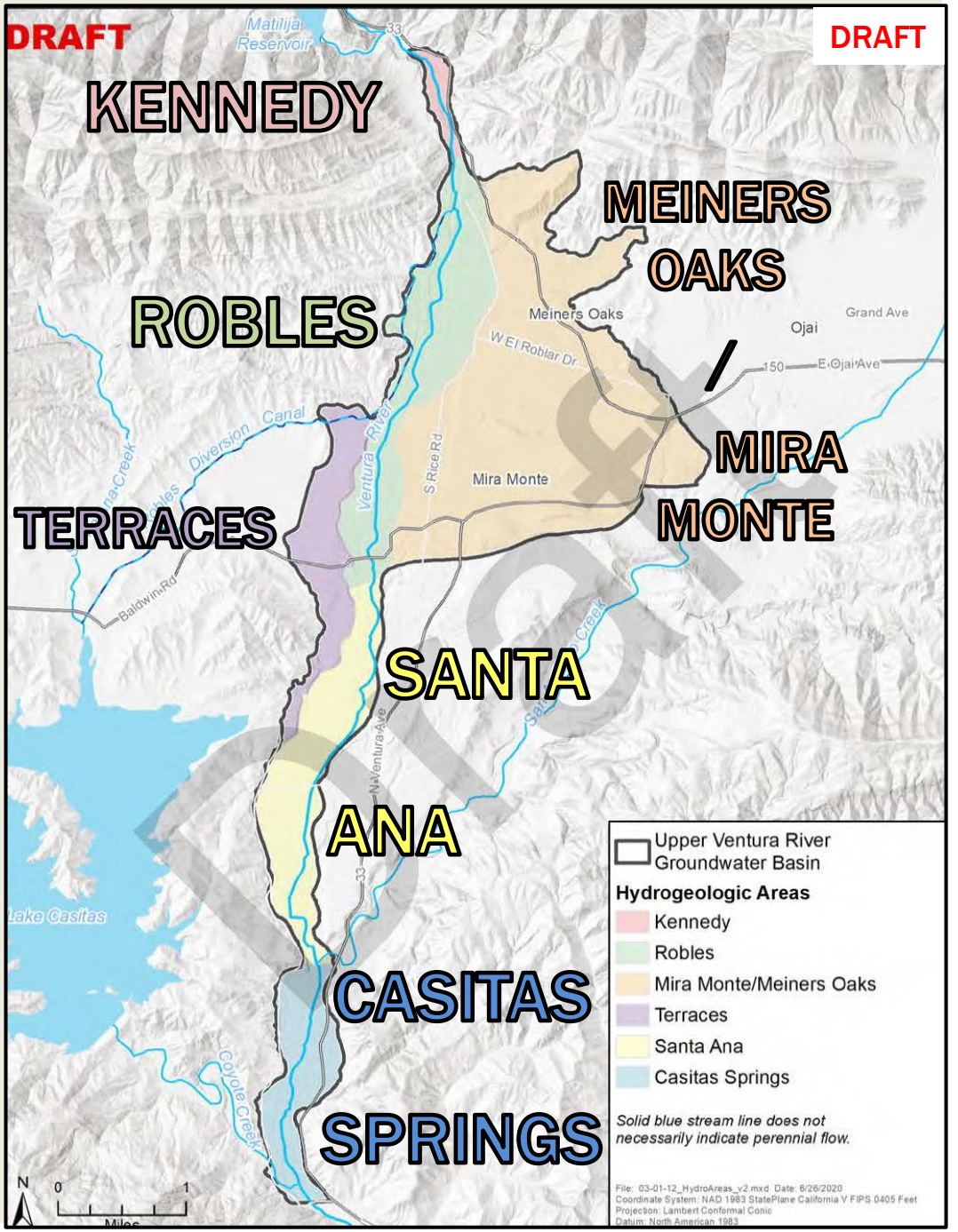
MODEL RESULTS

- Today
  - Climate Change Effects:
    - Water Budget
    - Groundwater Levels
    - Stream flow
  - Pumping Effects on Groundwater Levels

- April 8
  - Additional results relevant to SMCs

HYDROGEOLOGIC AREAS

- 6 areas with distinct hydrogeologic conditions
- Used to simplify discussion in meetings and GSP



Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

WATER BUDGET
&
CLIMATE CHANGE EFFECTS

CLIMATE CHANGE EFFECTS ON WATER BUDGETS

- Evaluation Method:
  - Compare baseline simulation with simulations incorporating 2030 and 2070 climate change factors

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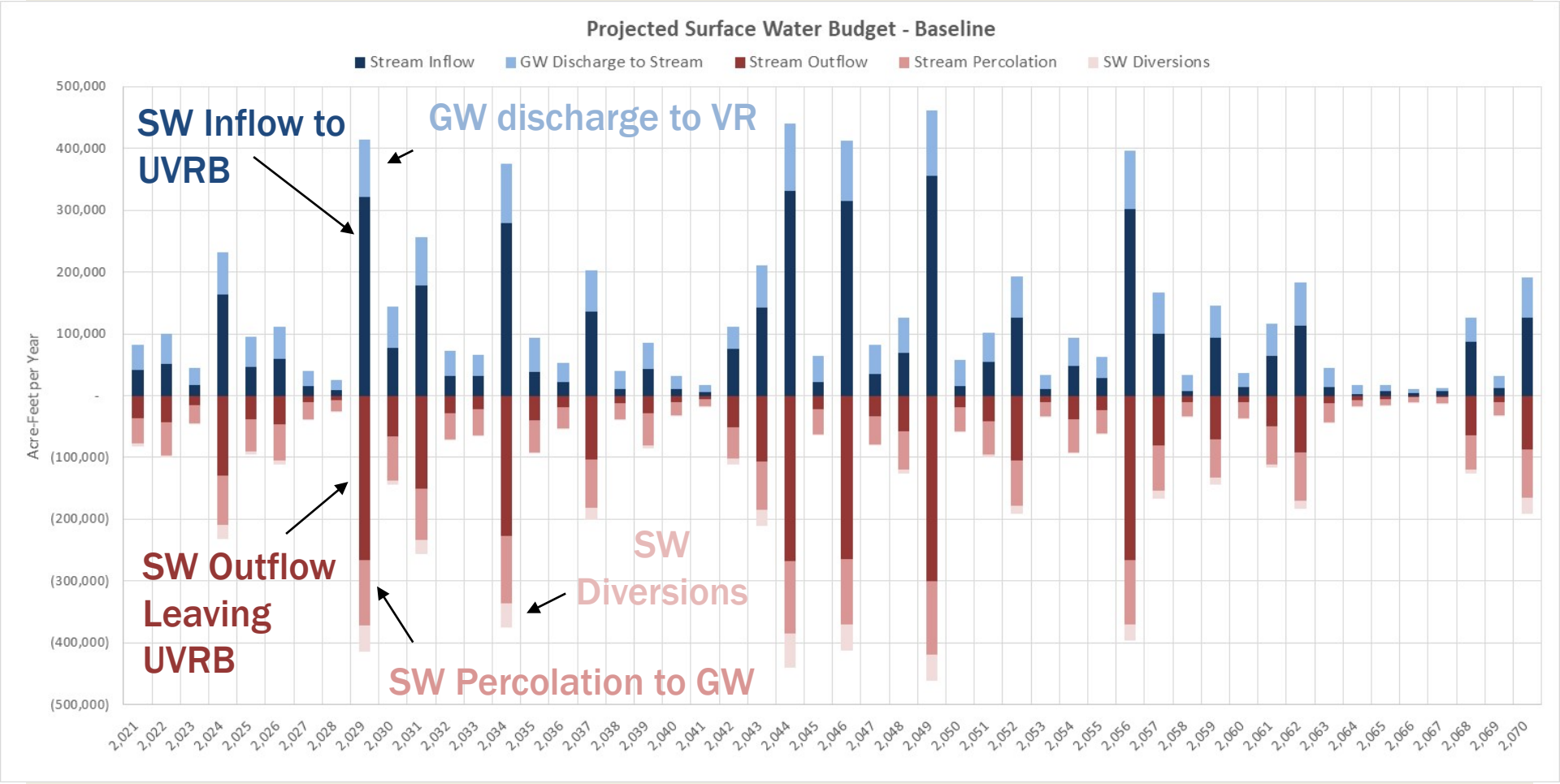
SURFACE WATER BUDGET BASELINE (NO CLIMATE CHANGE)



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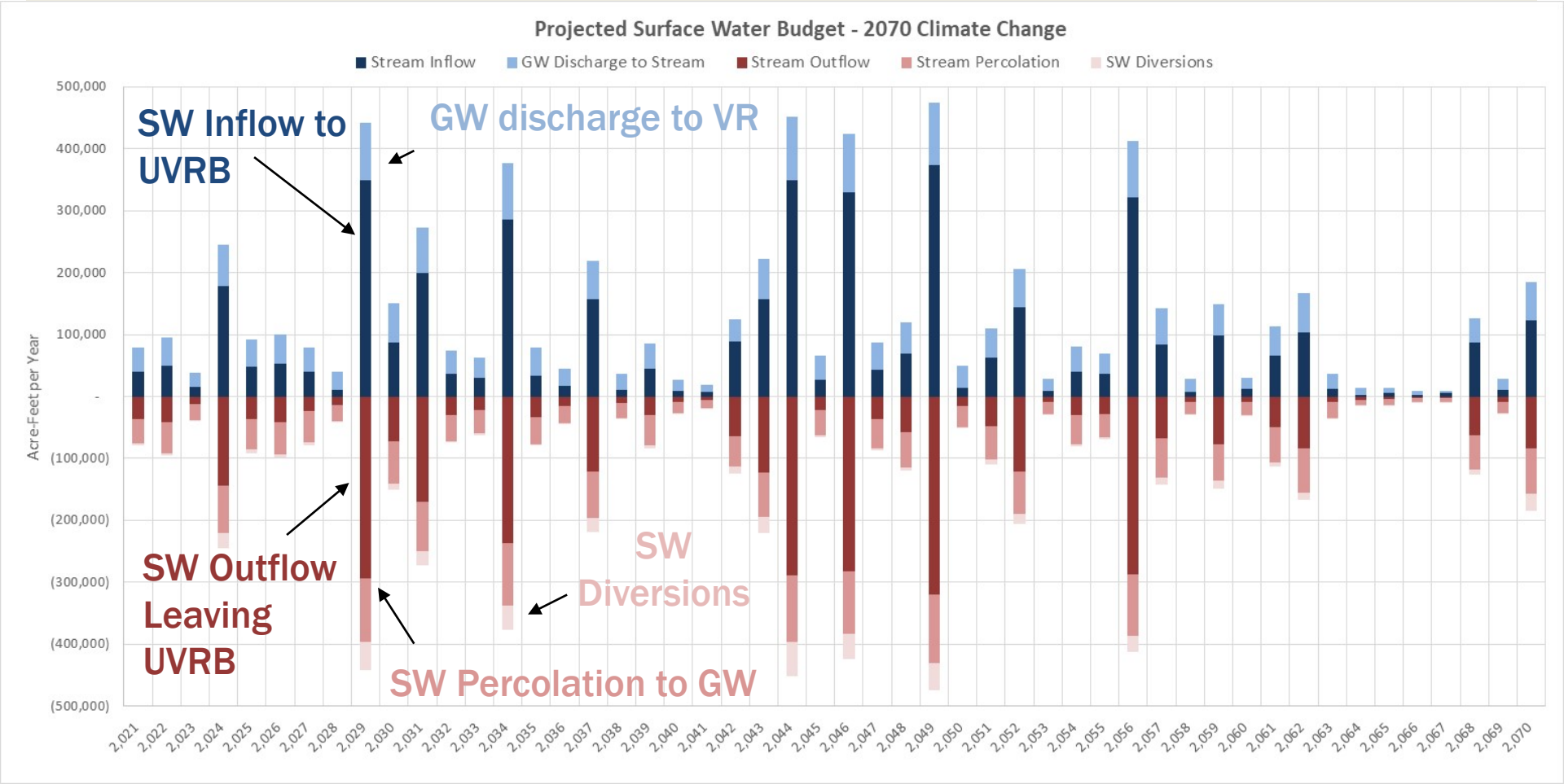
SURFACE WATER BUDGET WITH 2070 CLIMATE CHANGE



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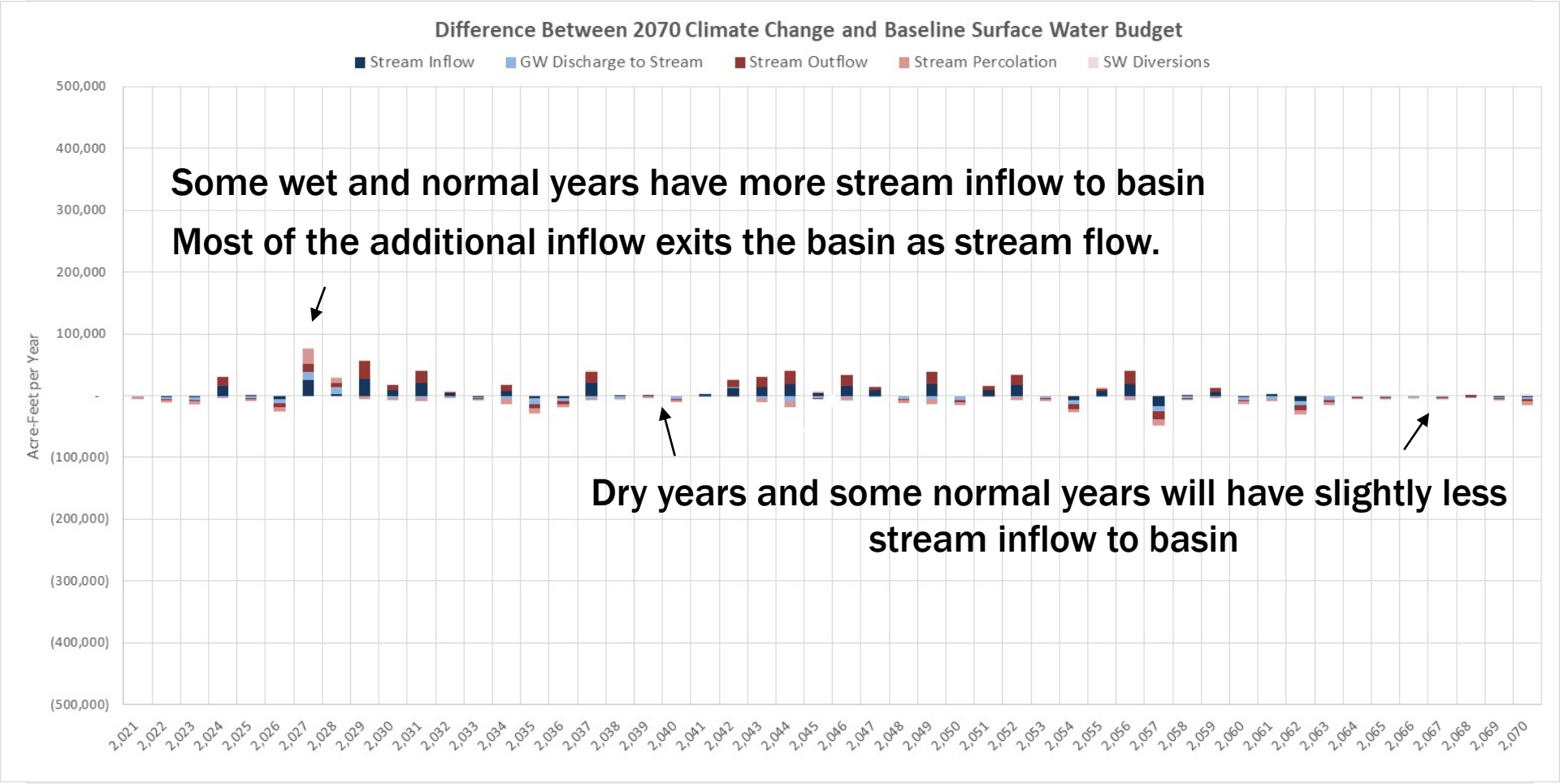
SURFACE WATER BUDGET DIFFERENCE 2070 CC - BASELINE



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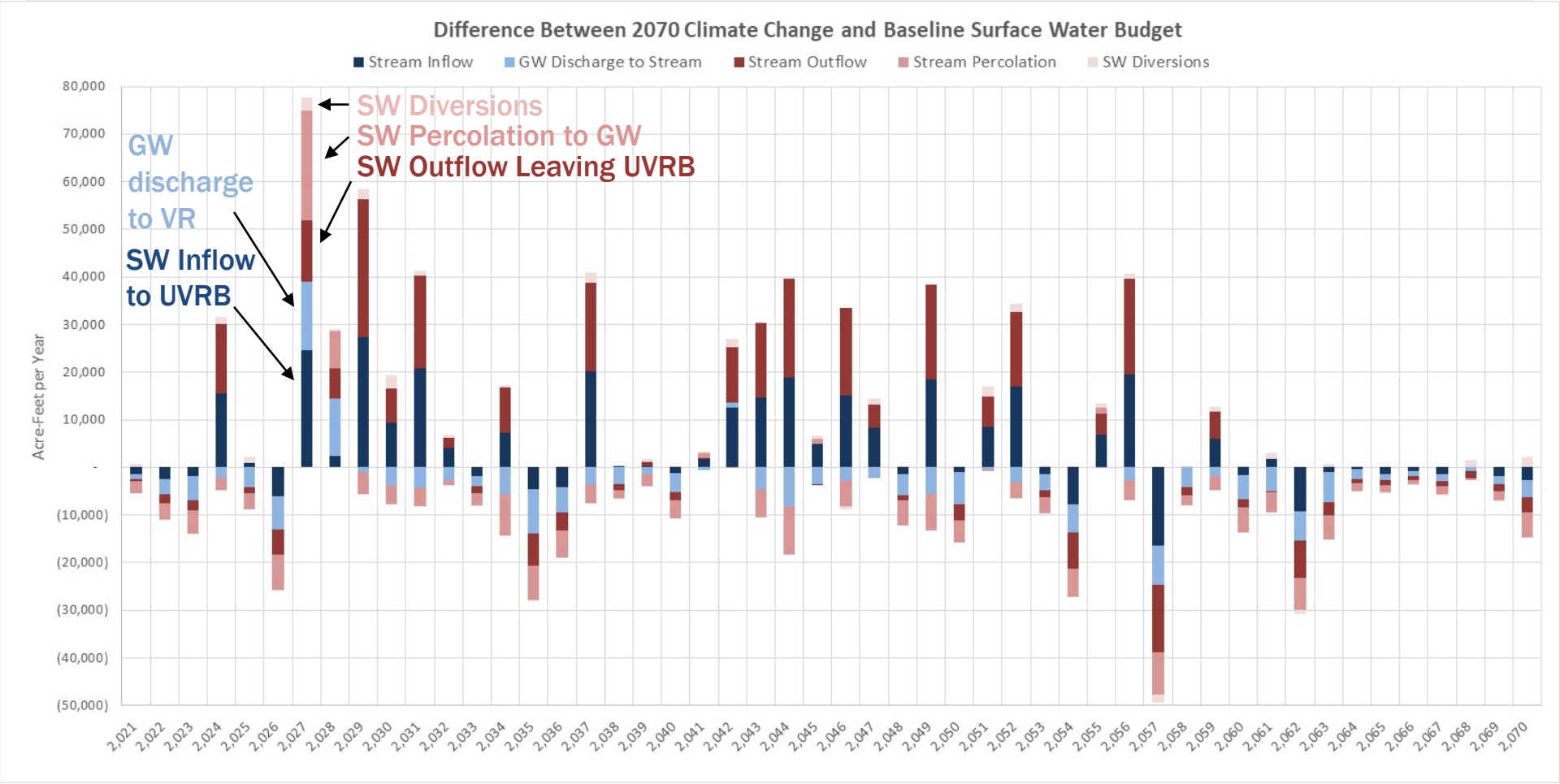
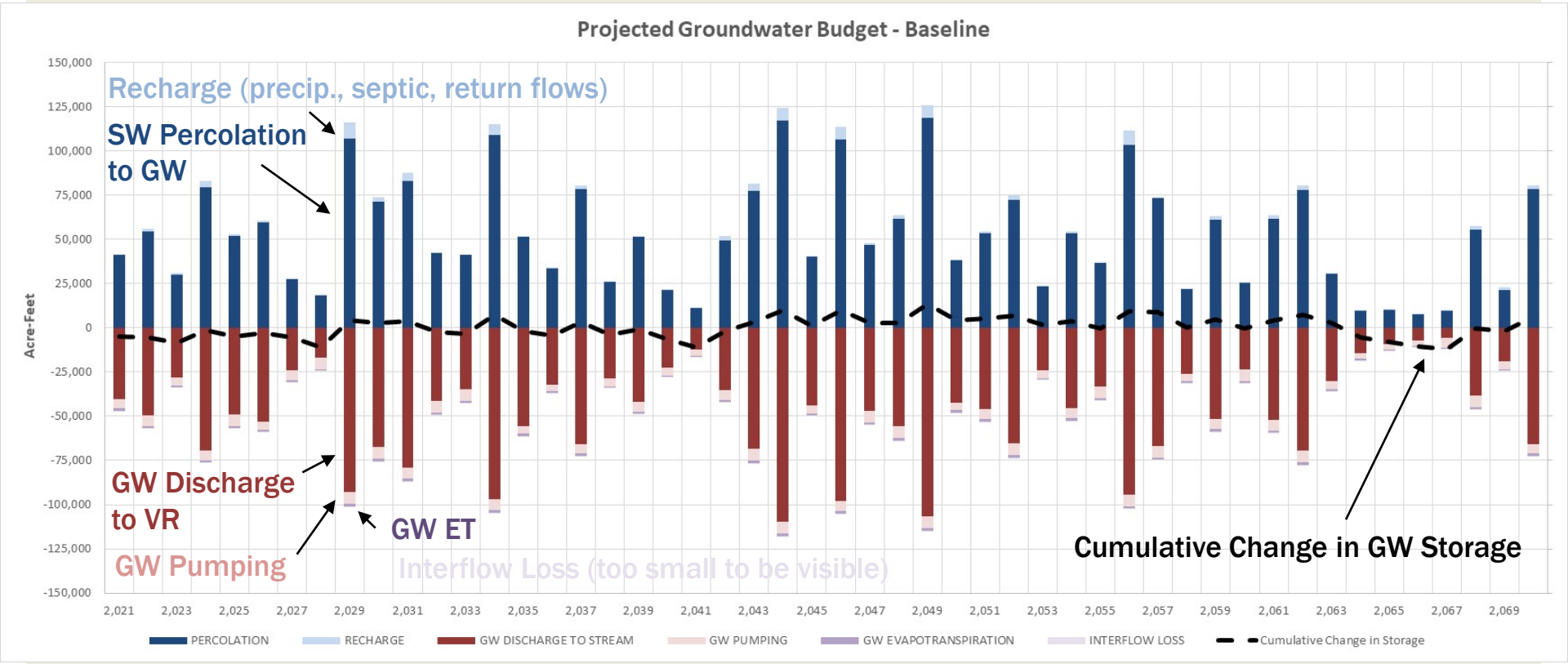
SURFACE WATER BUDGET DIFFERENCE 2070 CC - BASELINE

Y-AXIS 7.7X LARGER SCALE THAN PRIOR SLIDE



GROUNDWATER BUDGET BASELINE (NO CLIMATE CHANGE)



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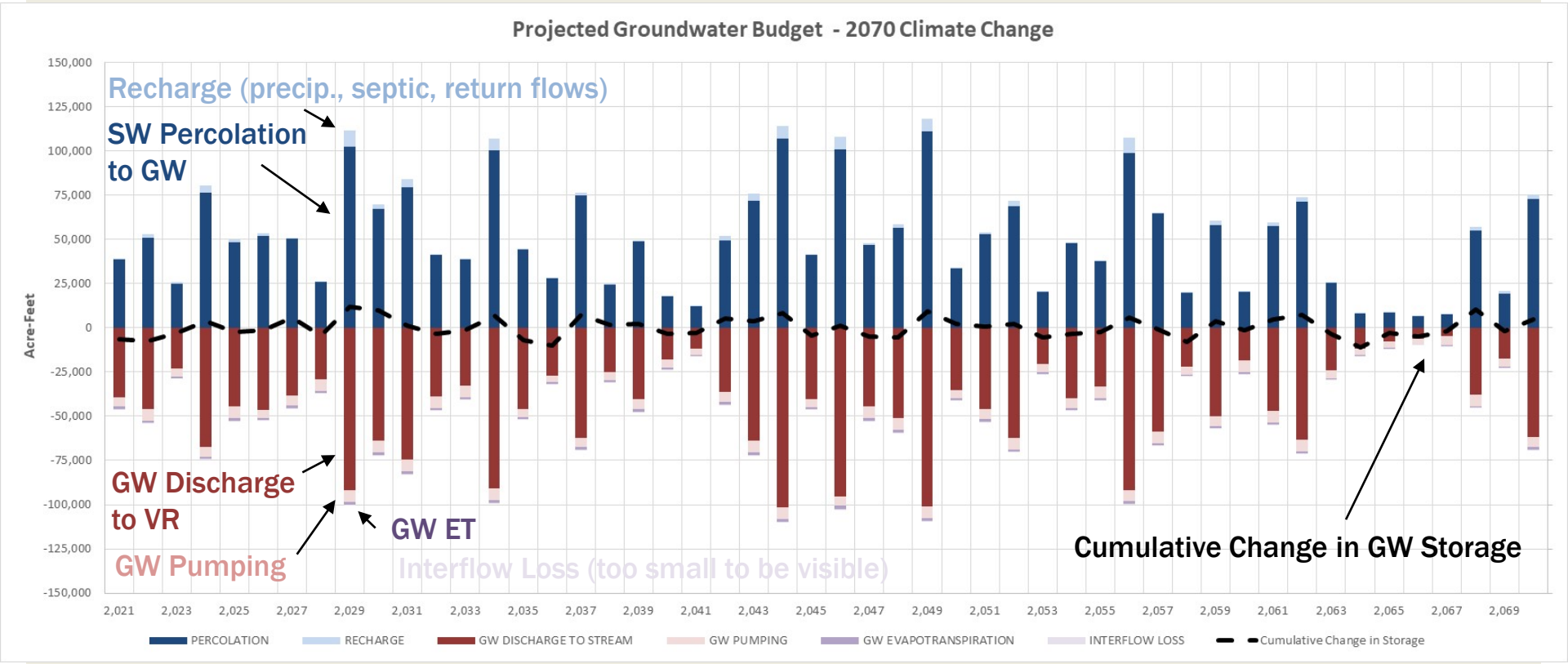
GROUNDWATER BUDGET WITH 2070 CLIMATE CHANGE



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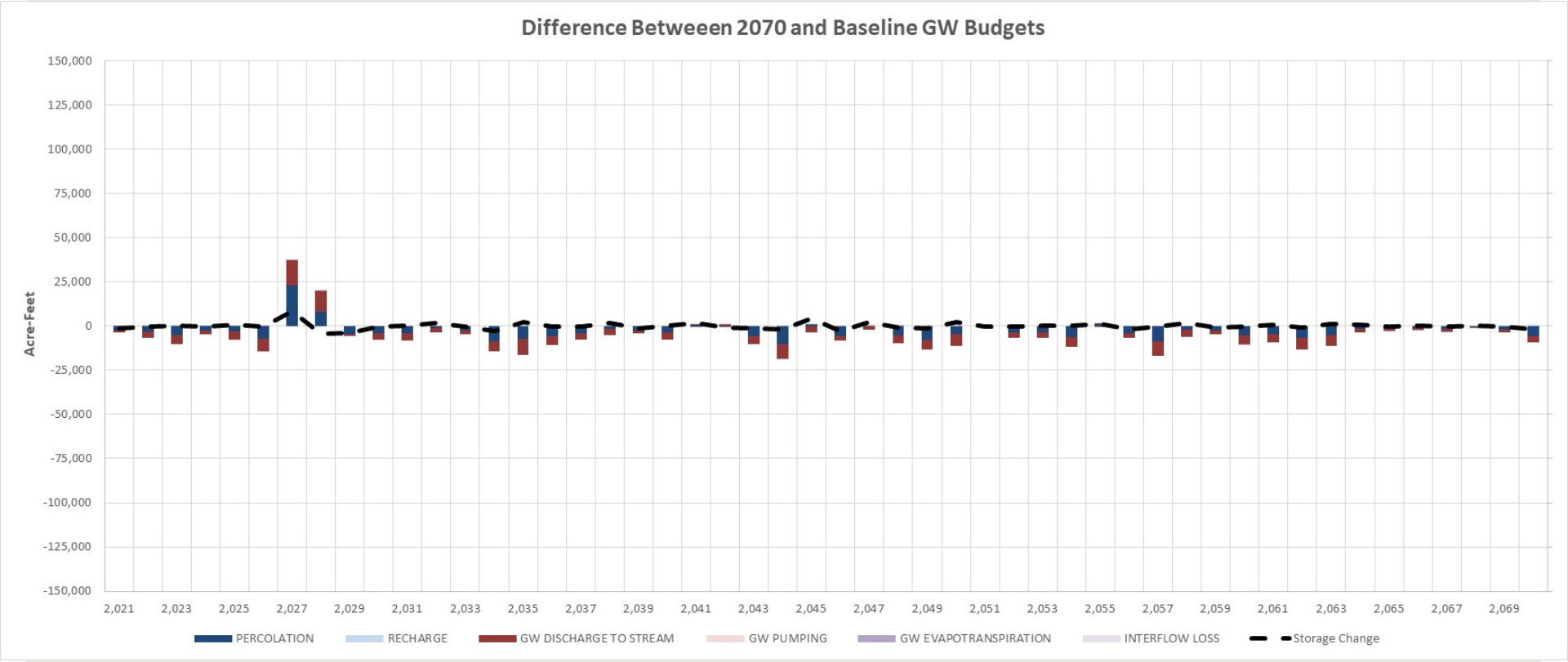
GROUNDWATER BUDGET DIFFERENCE 2070 CC - BASELINE



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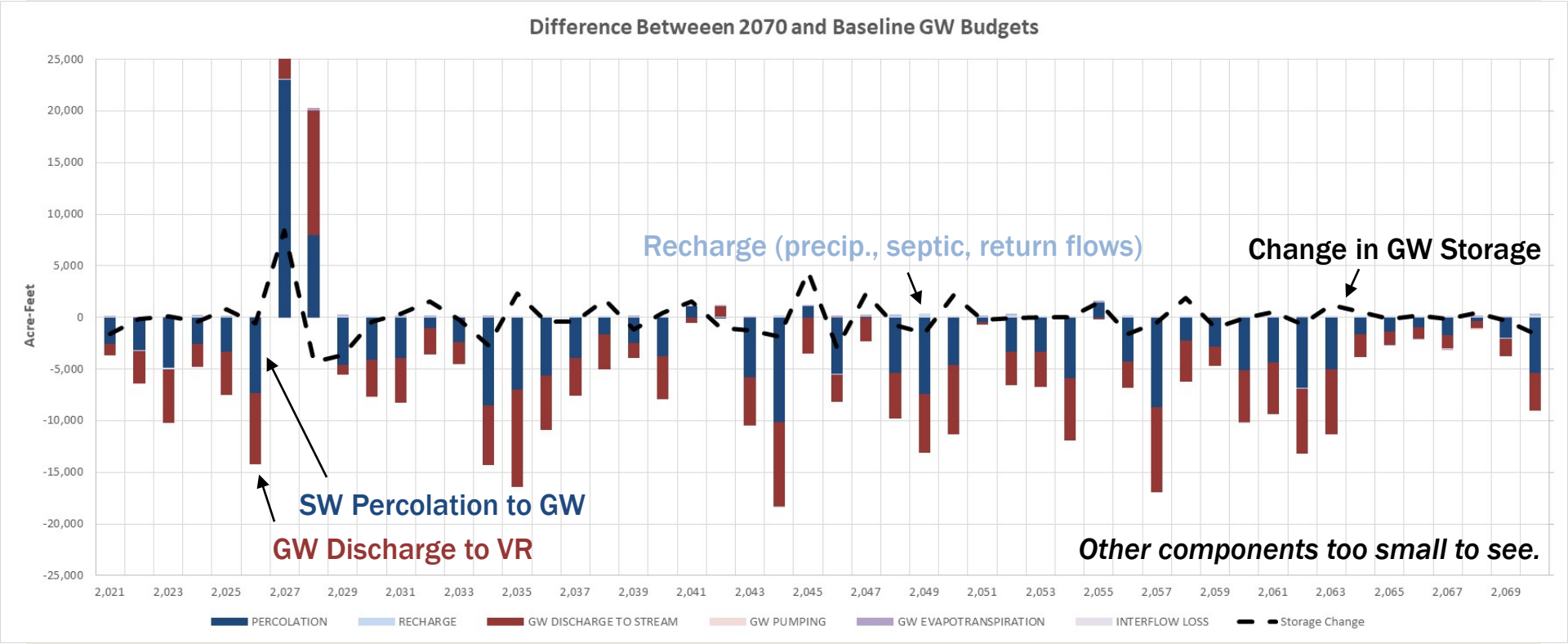
GROUNDWATER BUDGET DIFFERENCE 2070 CC - BASELINE

Y-AXIS 6X LARGER SCALE THAN PRIOR SLIDE



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WATER BUDGET SUMMARY

- Basin water budget is dominated by streamflow percolation into the Basin and groundwater discharge to Ventura River
  - All GW budget terms are dwarfed by streamflow
  - GW pumping averages only ~10% of the GW Budget
    - As low as 4% in wet years
    - Up to 31% in dry years
- Storage – no long-term decline in GW storage
- Evapotranspiration
  - Small (1,064 AFY on average), but important because it occurs in perennial reaches that have GDE

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SUMMARY OF CLIMATE CHANGE EFFECTS ON WATER BUDGET

- Some wet and normal years have more stream inflow to basin, but most of increased inflow simply flows out the Basin during storms.
- Some normal year and most dry years will have less inflow resulting in less percolation and less surface water outflow
- Groundwater storage will have larger swings
  - Basin GW levels will be lower in dry seasons, but Basin will still re-fill in normal to wet years

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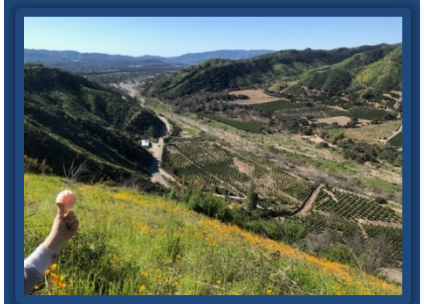
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

GW LEVELS
&
CLIMATE CHANGE EFFECTS



CLIMATE CHANGE EFFECTS ON GW LEVELS

- Evaluation Method:
  - Compare baseline simulation with simulations incorporating 2030 and 2070 climate change factors

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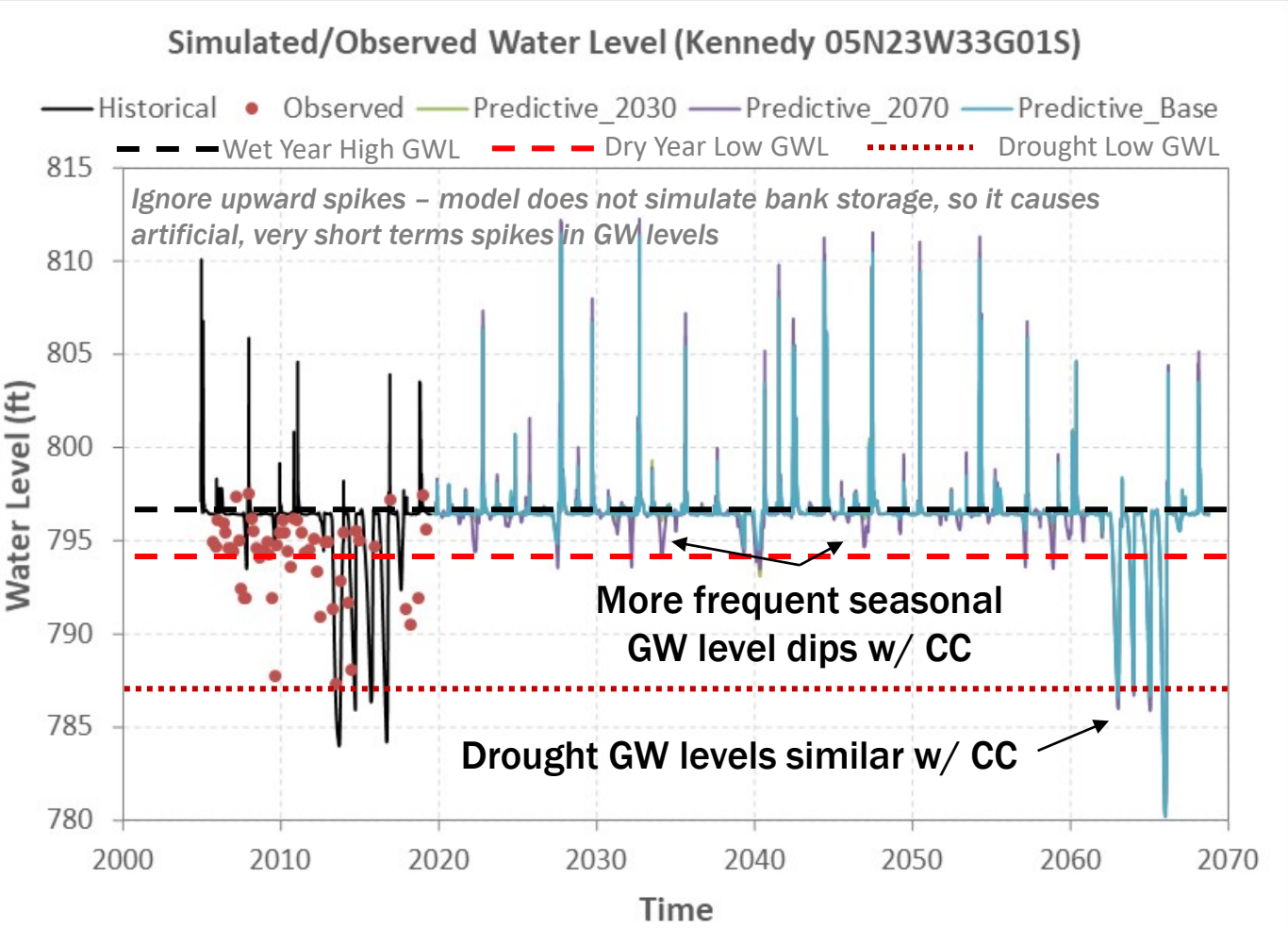
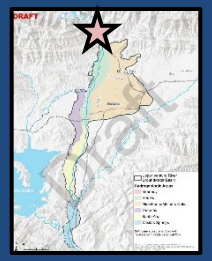


GROUNDWATER LEVELS KENNEDY AREA



- Future conditions similar to past
- Minimal climate change impact:
- More frequent GW level dips on order of several feet
- Negligible change during droughts

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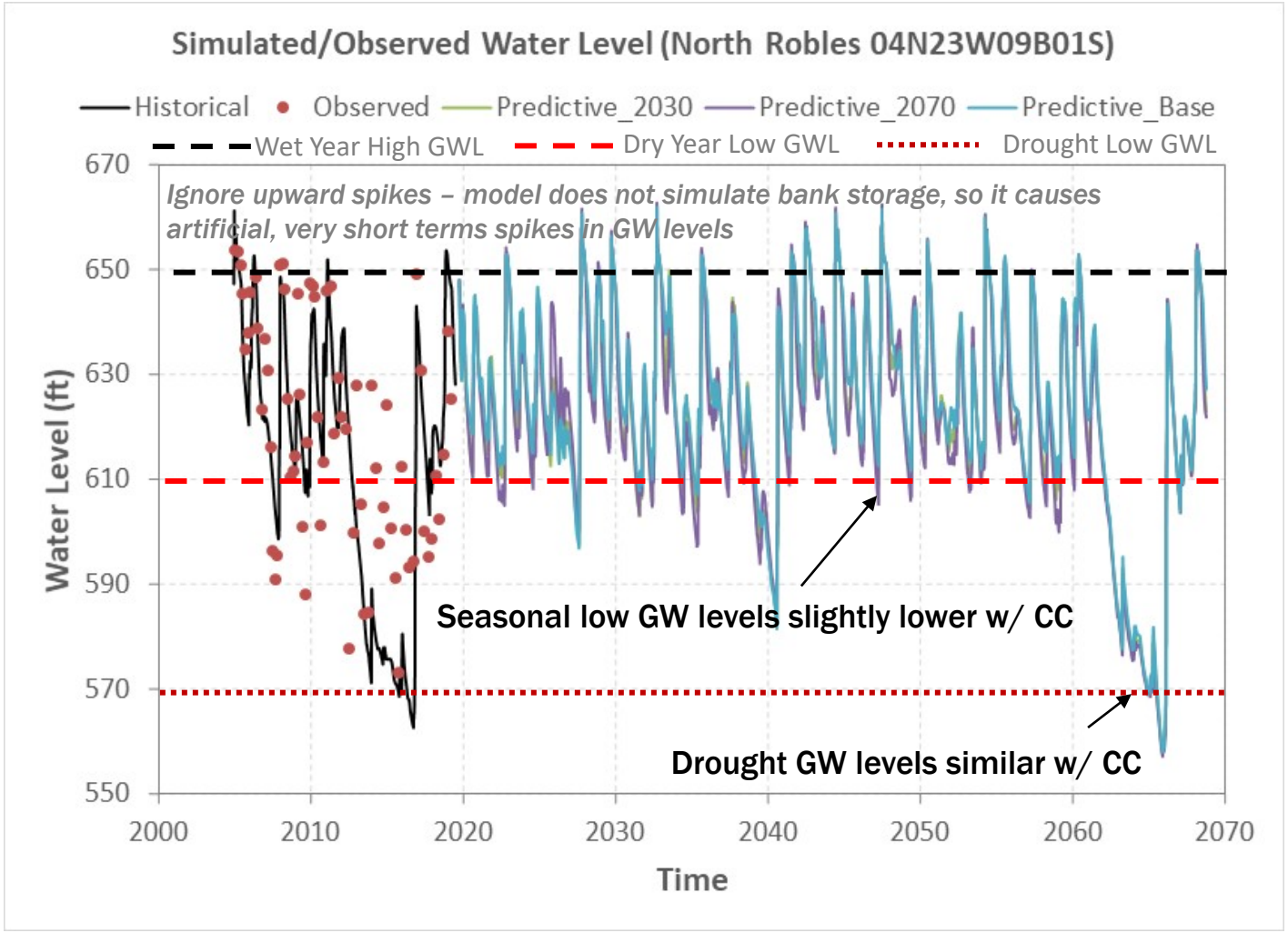
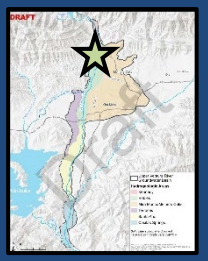


GROUNDWATER LEVELS NORTHERN ROBLES AREA



- Future conditions similar to past
- Minimal climate change impact:
- Dry season lows up to ~5 feet lower
- Negligible change during droughts

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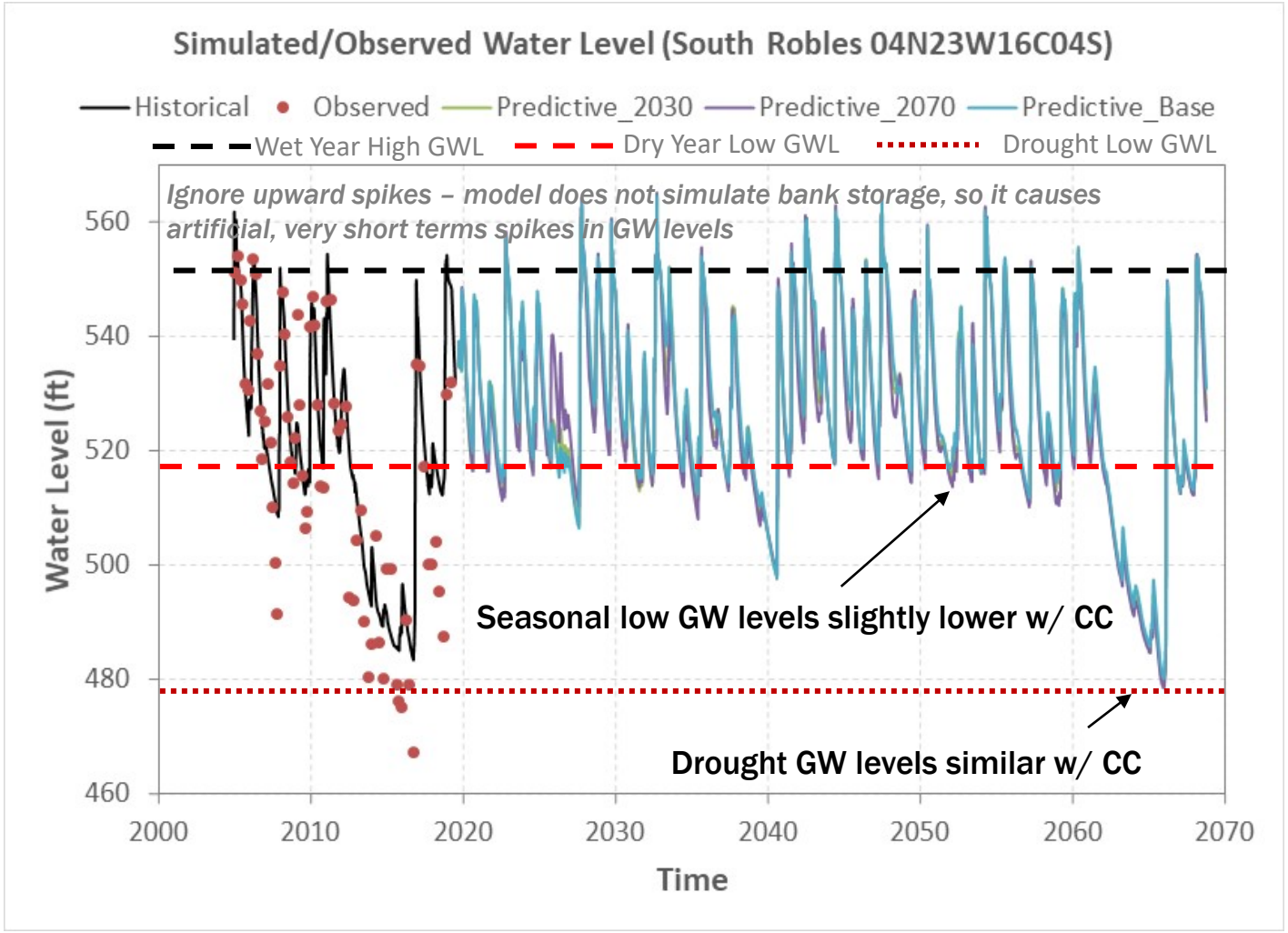
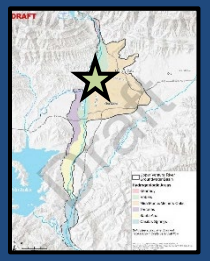


GROUNDWATER LEVELS SOURTHERN ROBLES AREA



- Future conditions similar to past
- Minimal climate change impact:
- Dry season lows up to ~2-3 feet lower
- Negligible change during droughts

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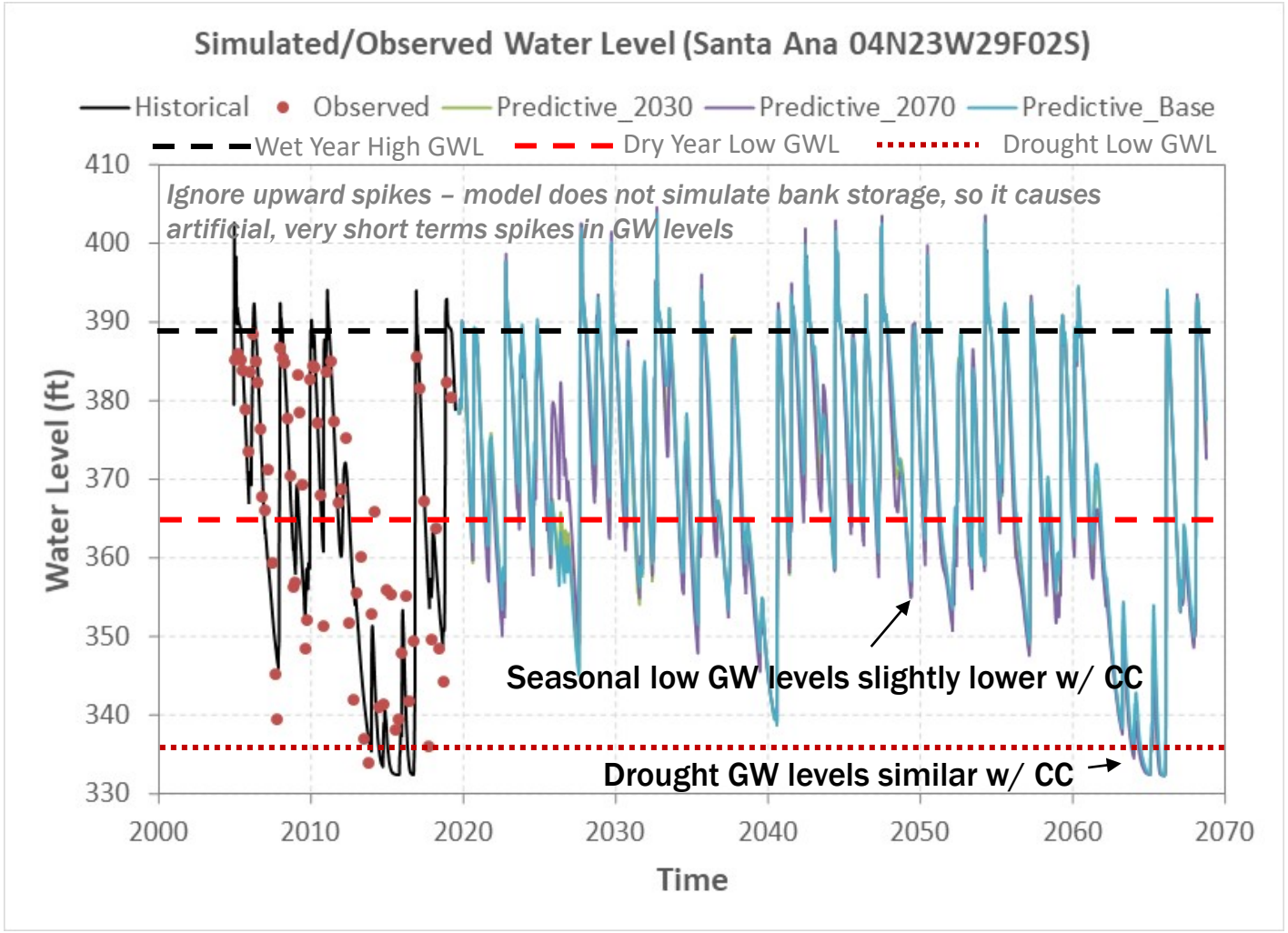

GROUNDWATER LEVELS SANTA ANA AREA

- Future conditions similar to past
- Minimal climate change impact:
- Dry season lows up to ~2-8 feet lower
- Negligible change during droughts

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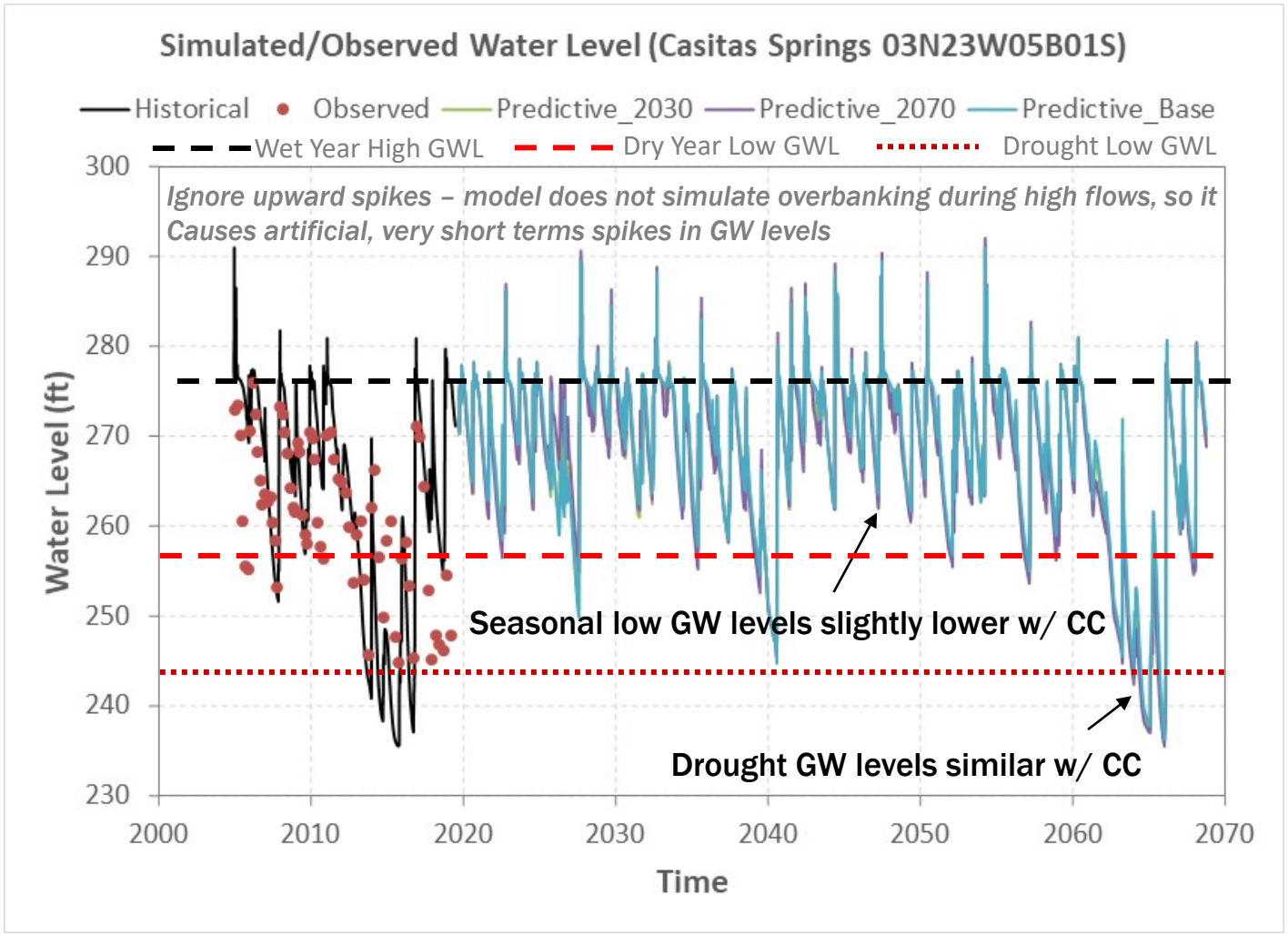
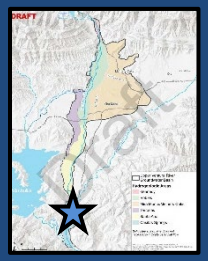


GROUNDWATER LEVELS NORTHERN CASITAS SPRINGS AREA



- Future conditions similar to past
- Minimal climate change impact:
- Dry season lows up to ~1-3 feet lower
- Negligible change during droughts

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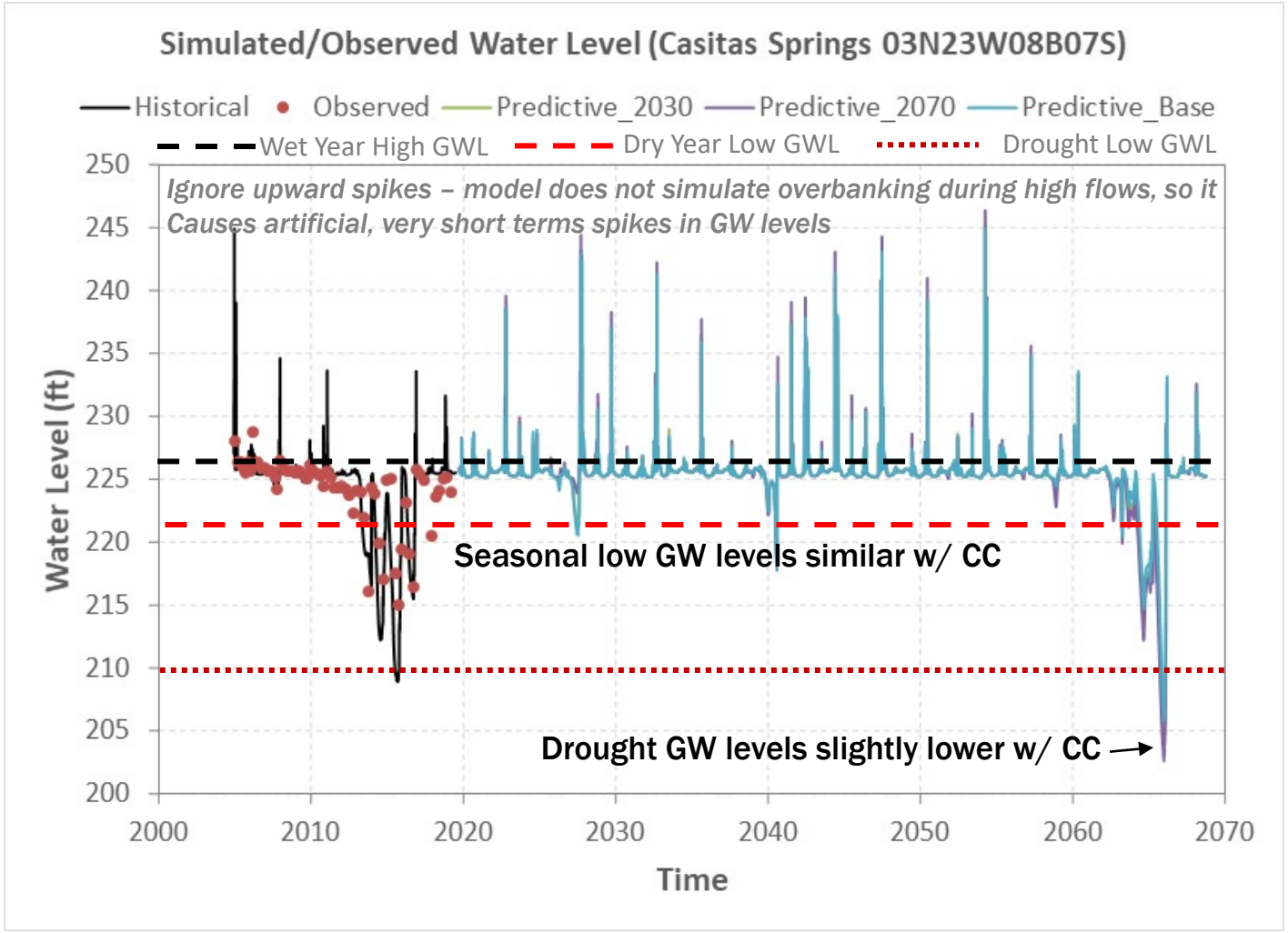
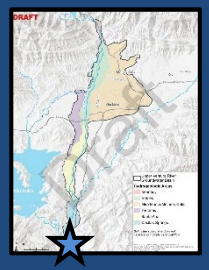


GROUNDWATER LEVELS SOUTHERN CASITAS SPRINGS AREA (FOSTER PARK)



- Future conditions similar to past
- Minimal climate change impact
- GW levels during drought several feet lower

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SUMMARY OF CLIMATE CHANGE EFFECTS ON GW LEVELS

- Climate change effects on GW levels are minimal
  - Basin will continue to drain and refill as it has historically
  - Wet season GW levels are the same
  - Dry season GW levels may be slightly lower
    - Kennedy Area: more frequent dips in GW levels in on the order of several feet
    - Robles and Santa Ana Areas: Seasonal low GW levels may be several feet lower
  - Drought GW levels only impacted in Foster Park (maybe several feet lower)

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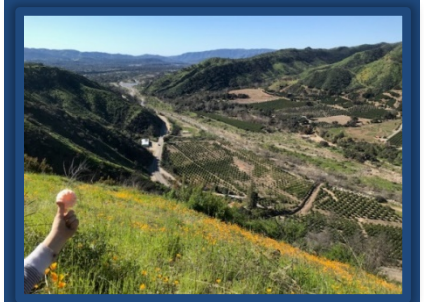
Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

STREAM FLOW
&
CLIMATE CHANGE
EFFECTS



CLIMATE CHANGE EFFECTS ON STREAM FLOW

- Evaluation Method:
  - Compare baseline simulation with simulations incorporating 2030 and 2070 climate change factors

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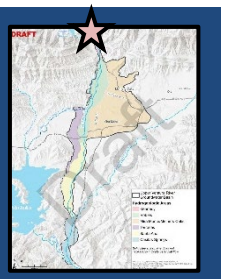
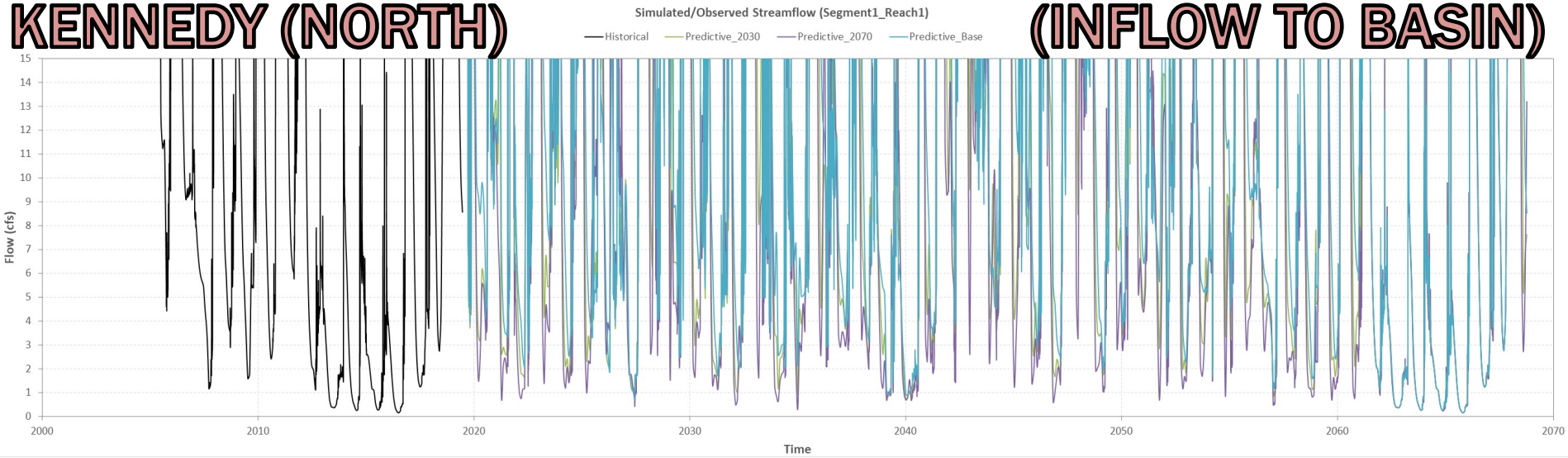
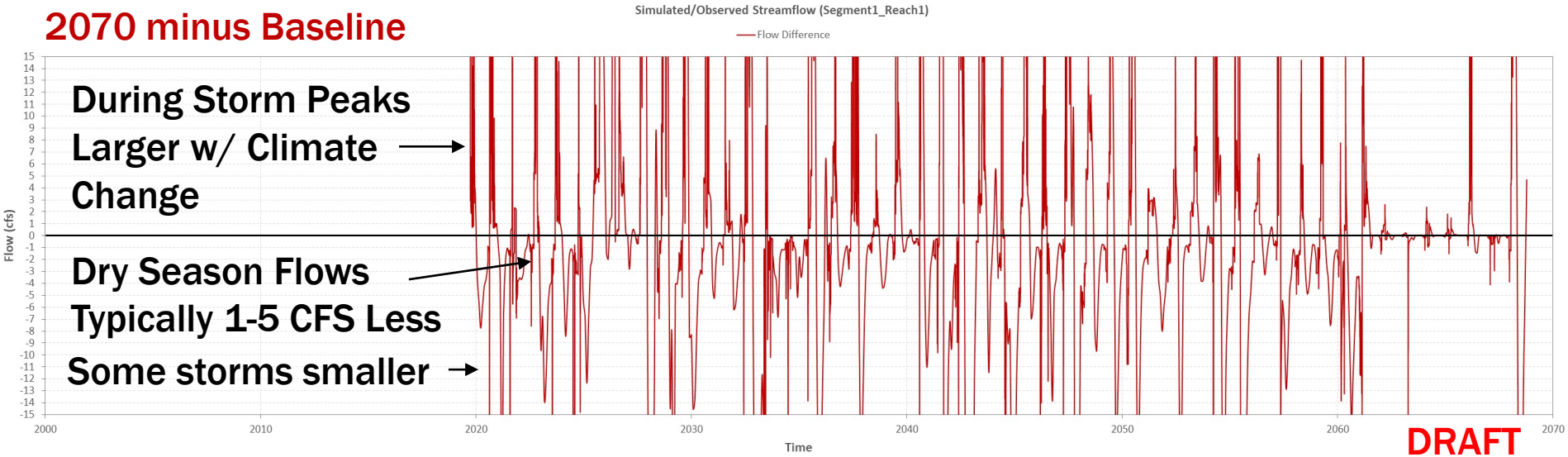
CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW



KENNEDY (NORTH) (INFLOW TO BASIN)



2070 minus Baseline



During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically 1-5 CFS Less

Some storms smaller →

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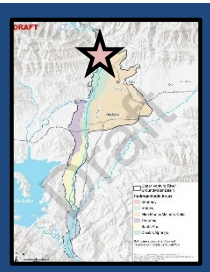
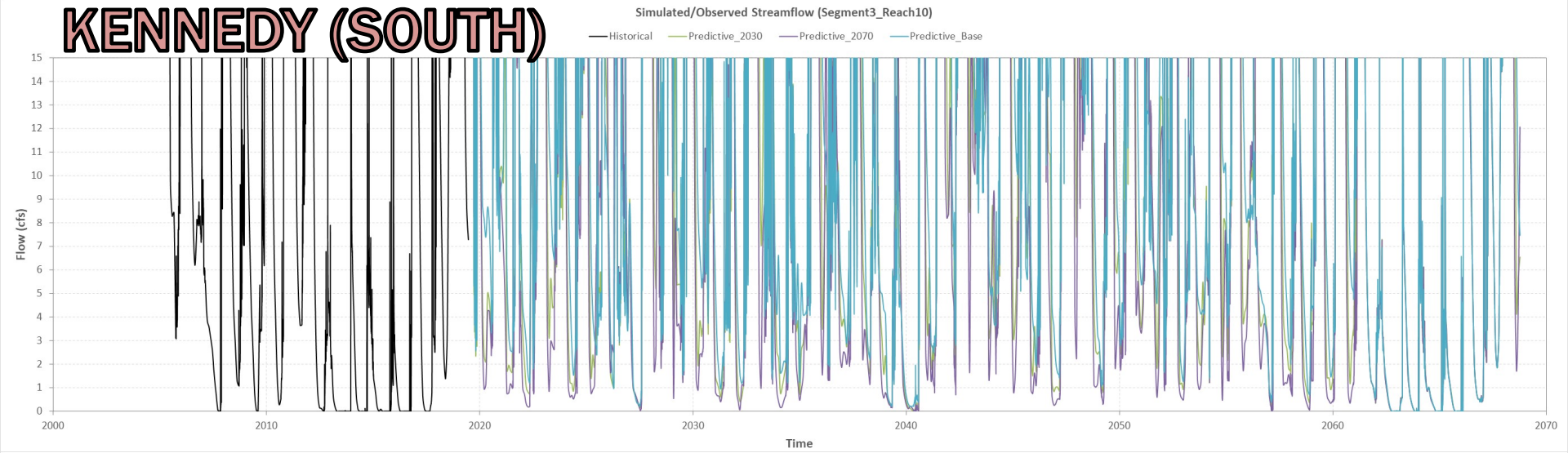
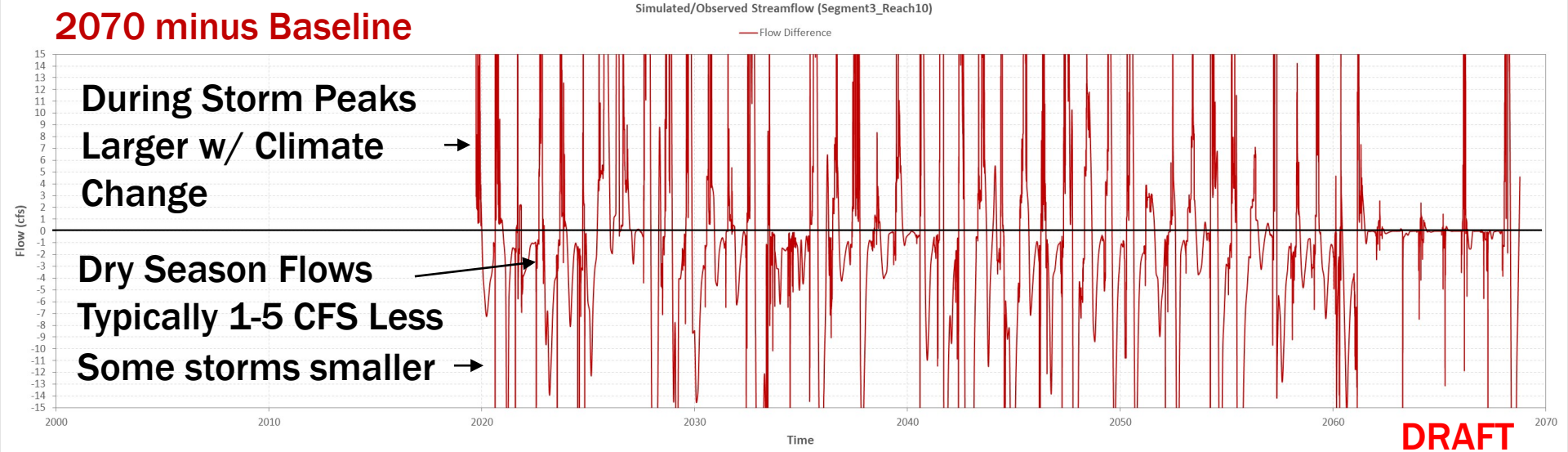
CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW



KENNEDY (SOUTH)



2070 minus Baseline



During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically 1-5 CFS Less

Some storms smaller →

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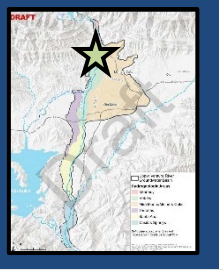
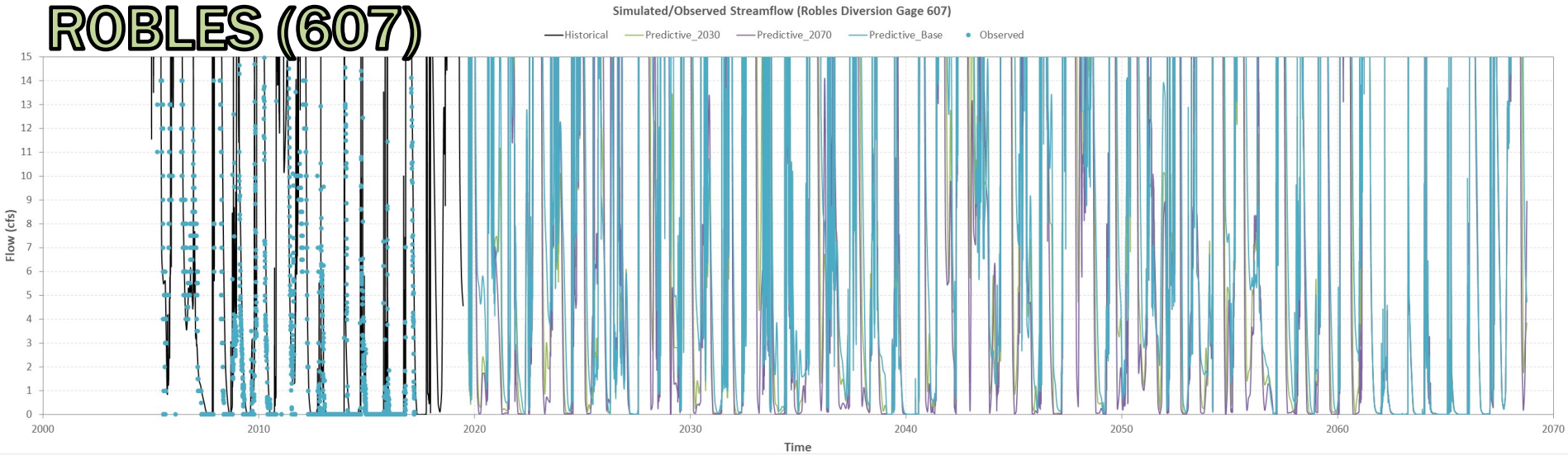
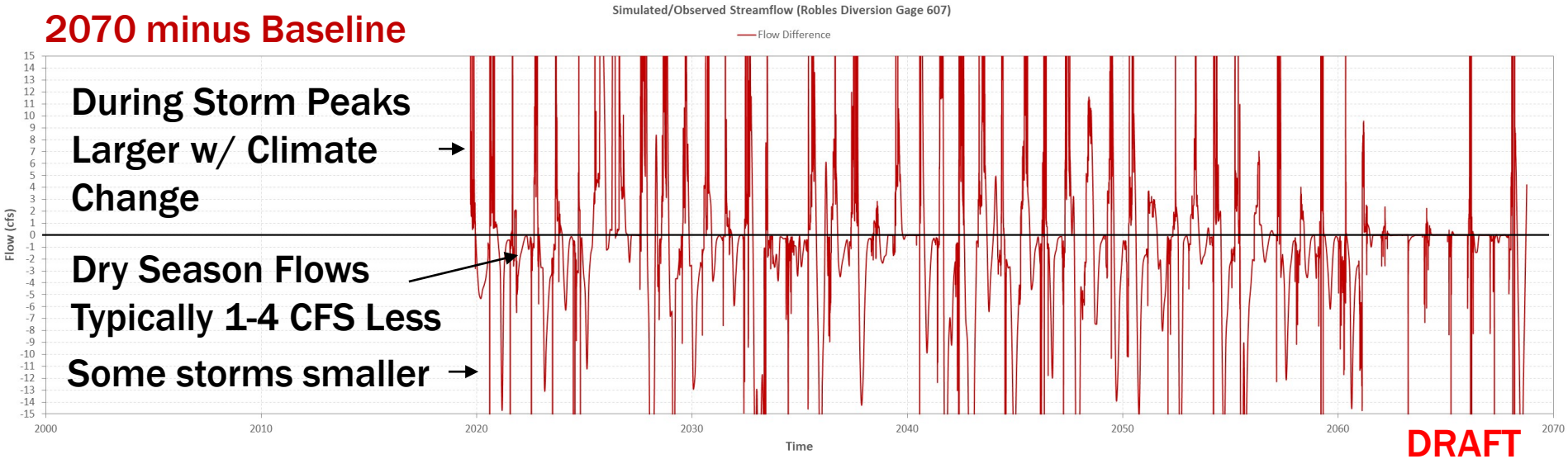
CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW



ROBLES (607)



2070 minus Baseline



During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically 1-4 CFS Less

Some storms smaller →

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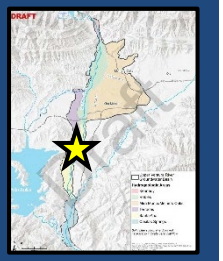
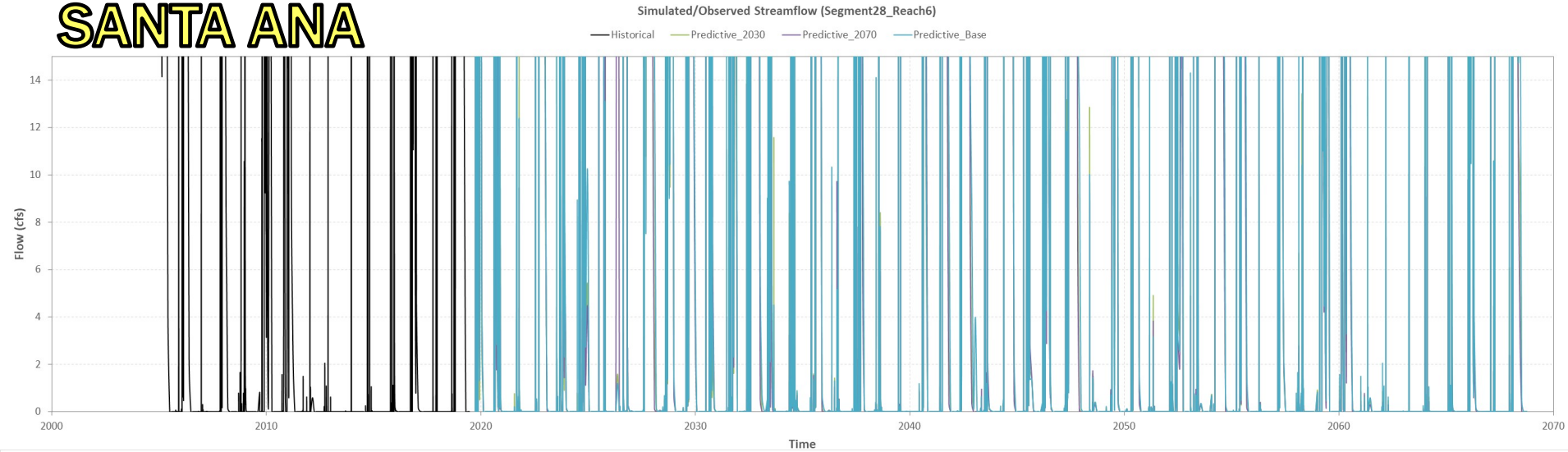
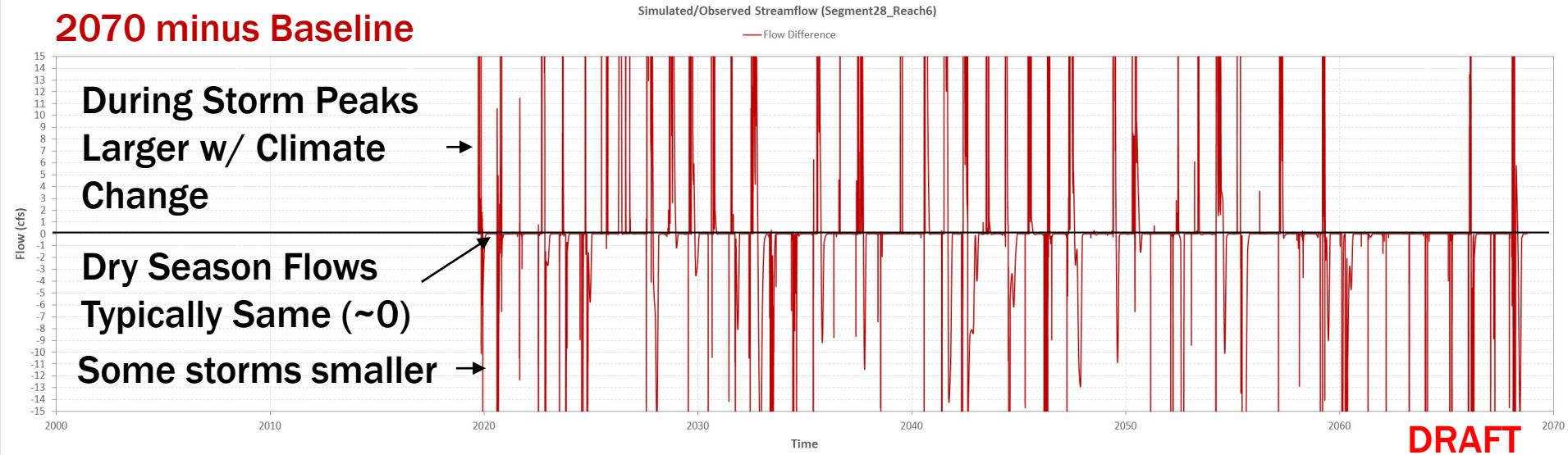
CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW



SANTA ANA



2070 minus Baseline



During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically Same (~0) ↘

Some storms smaller →

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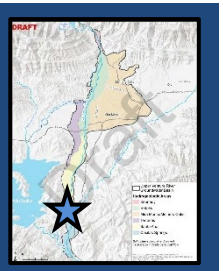
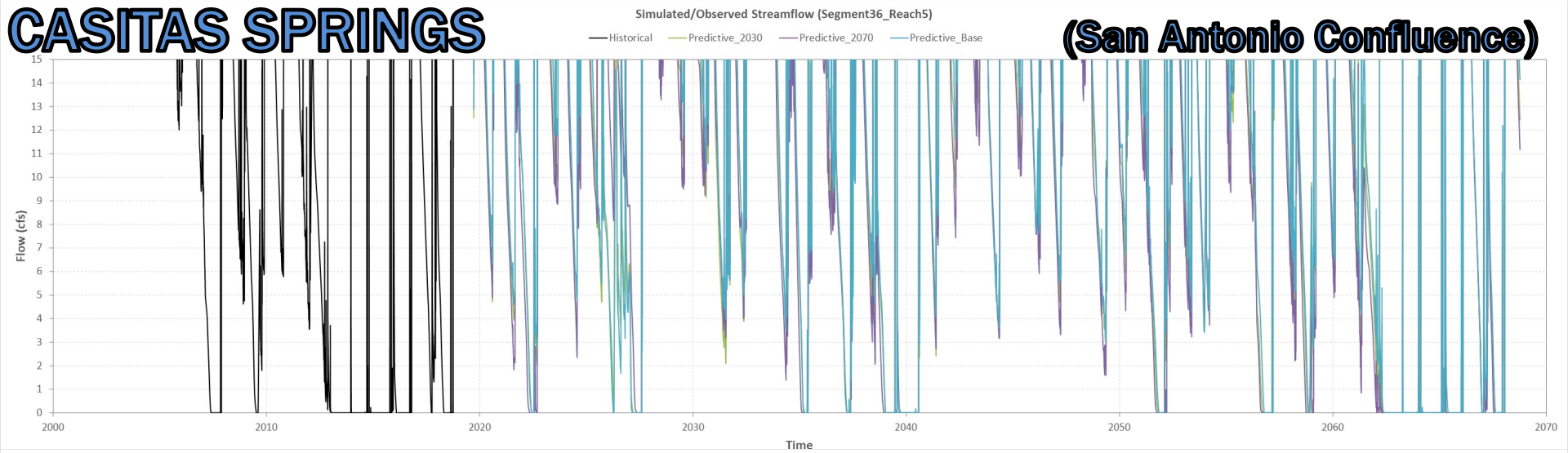
CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW

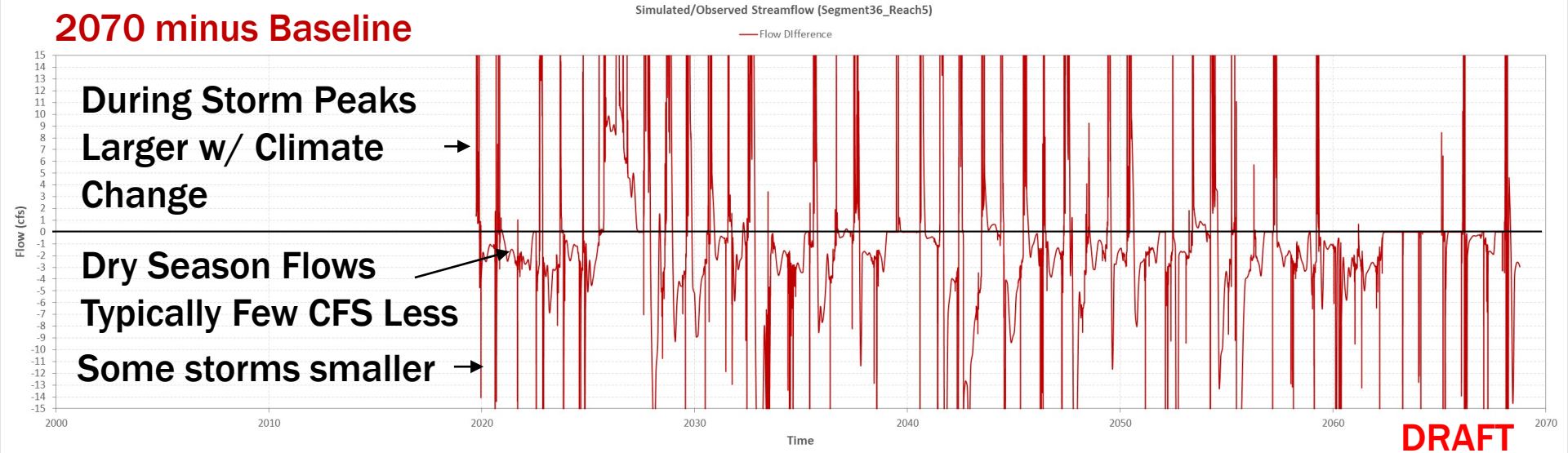


CASITAS SPRINGS

(San Antonio Confluence)



2070 minus Baseline



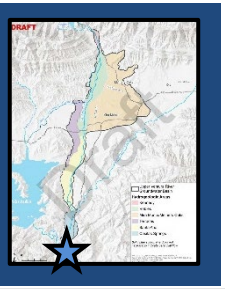
During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically Few CFS Less

Some storms smaller →

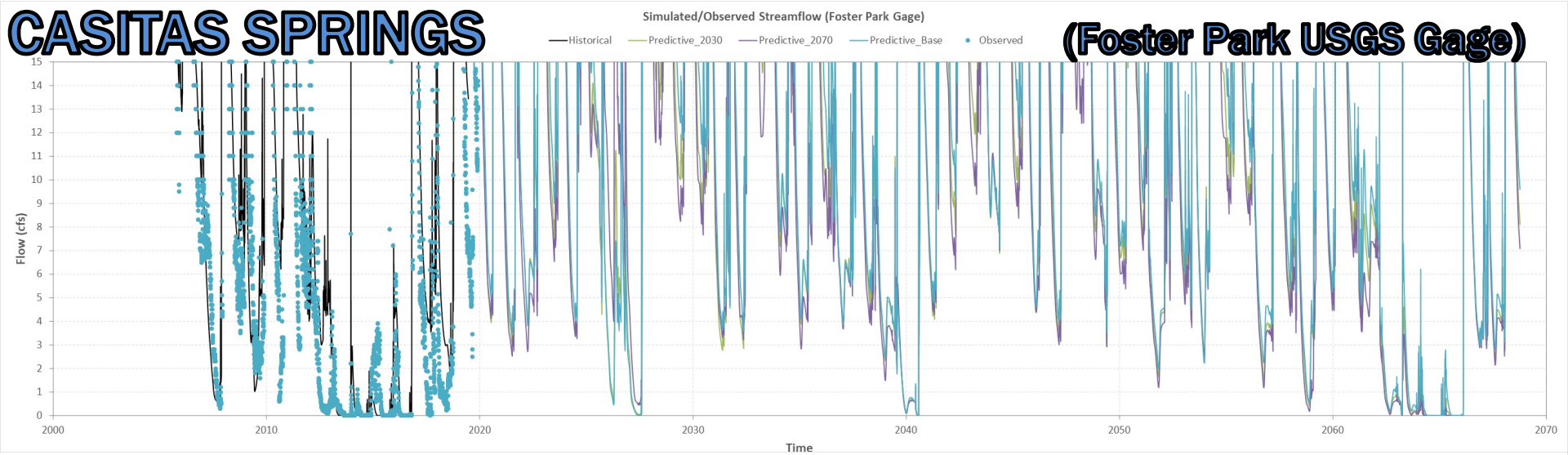
DRAFT

CLIMATE CHANGE EFFECT ON SURFACE WATER FLOW

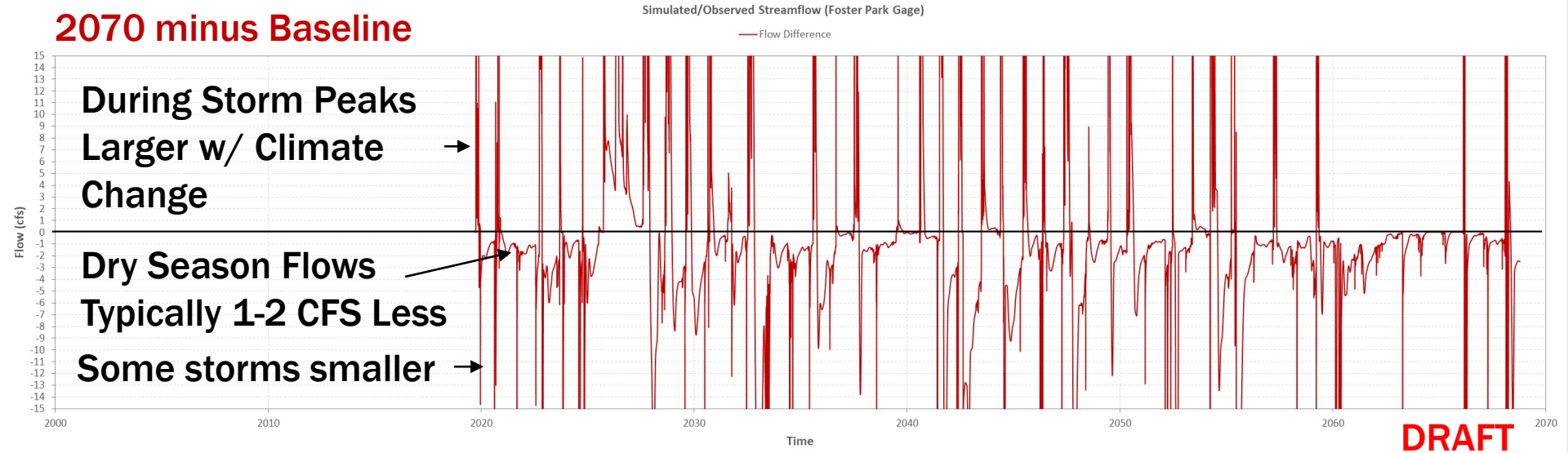


CASITAS SPRINGS

(Foster Park USGS Gage)



2070 minus Baseline



During Storm Peaks Larger w/ Climate Change →

Dry Season Flows Typically 1-2 CFS Less

Some storms smaller →

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SUMMARY OF CLIMATE CHANGE EFFECTS ON STREAM FLOW

- Many storm flows larger – increased inflow to the basin
- Some storm flows lower
- Dry season baseflow slightly lower (up to several CFS)

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Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

PUMPING EFFECTS ON GW LEVELS

PUMPING EFFECTS ON GW LEVELS

- Evaluation Method:
  - Compare baseline simulation with no pumping simulations

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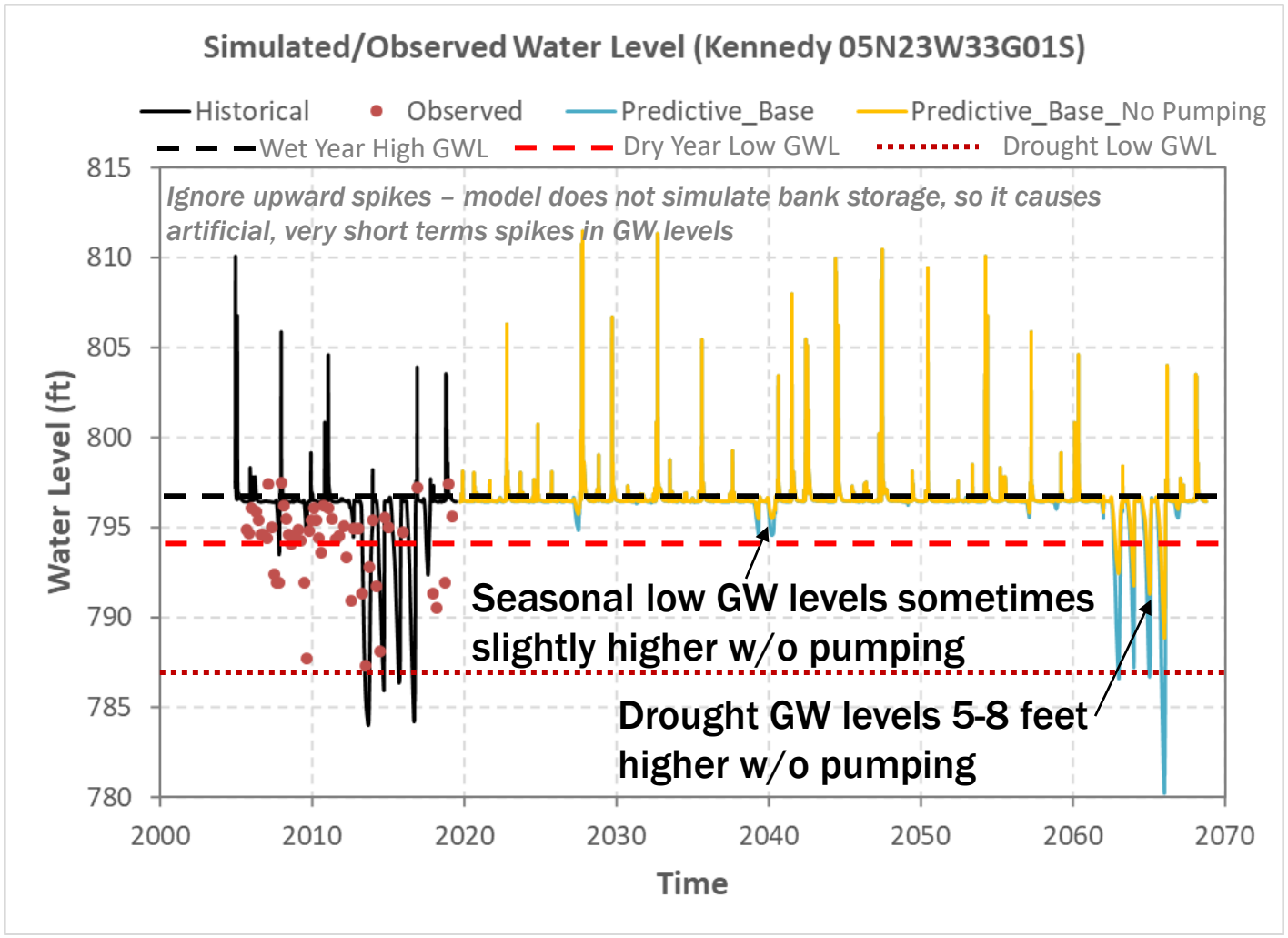
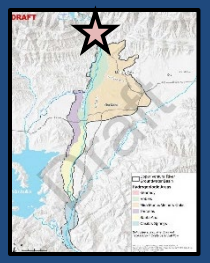


GROUNDWATER LEVELS KENNEDY AREA



- Pumping has minimal impact on GW levels
- Difference limited to dry years and droughts, ~1-8 feet difference

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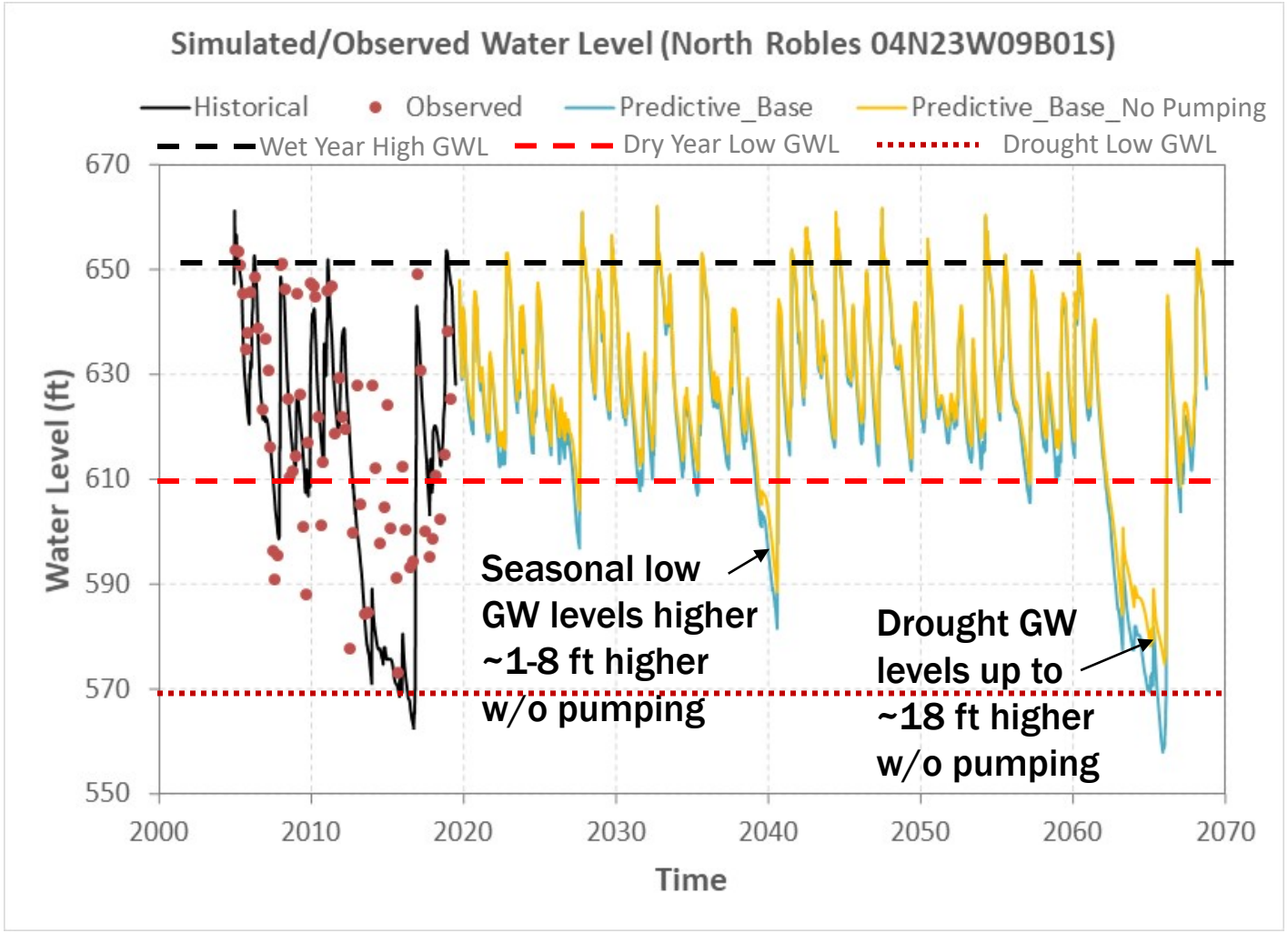
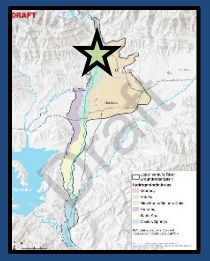


GROUNDWATER LEVELS NORTHERN ROBLES AREA



- Pumping has minimal impact on GW levels
- Dry season lows ~4 feet lower
- Drought lows up to ~10-15 feet lower

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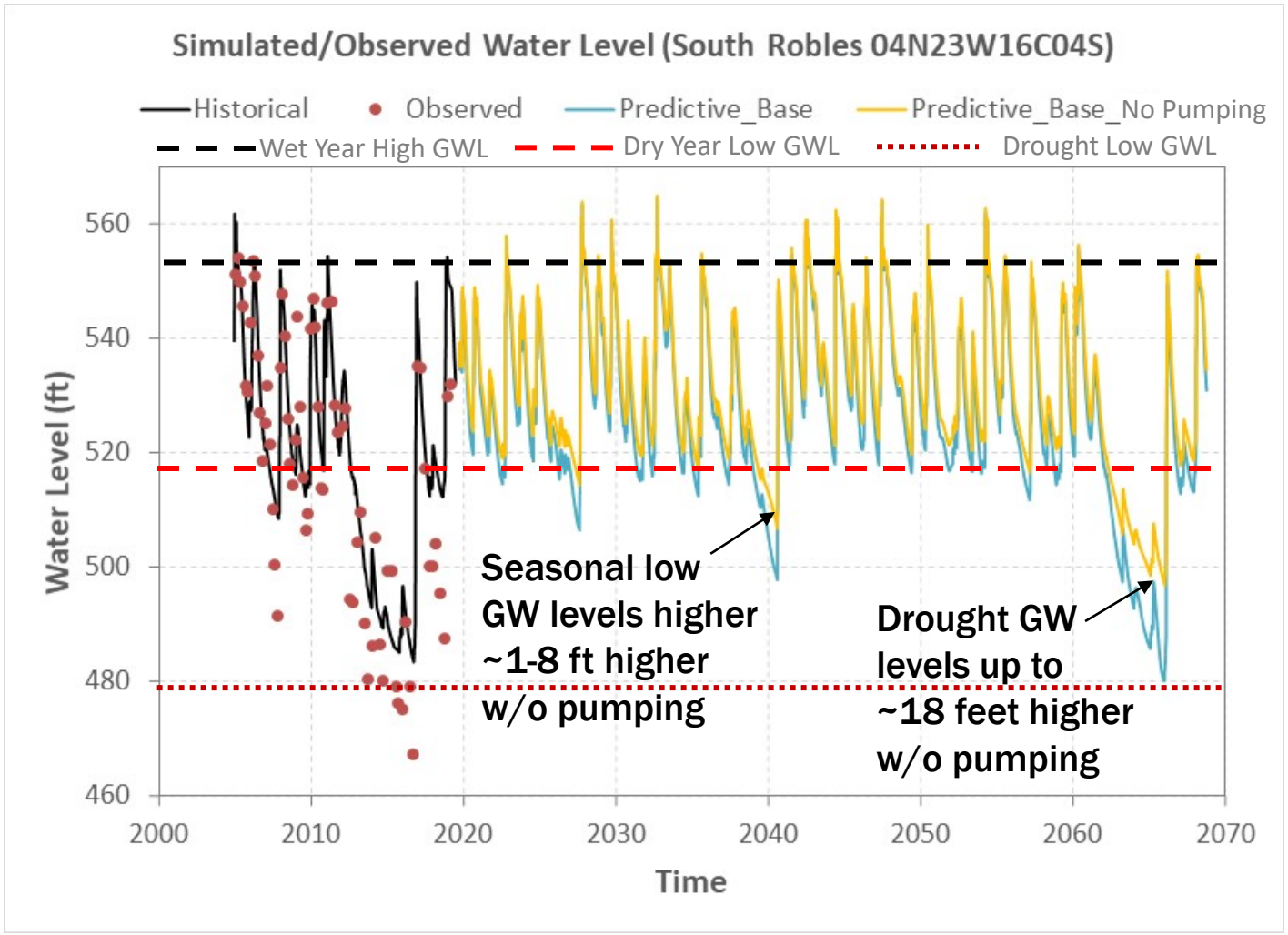
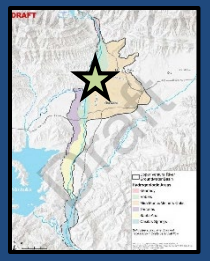


GROUNDWATER LEVELS SOURTHERN ROBLES AREA



- Pumping has minimal impact on GW levels
- Dry season lows ~5 feet lower
- Drought lows up to ~18 feet lower

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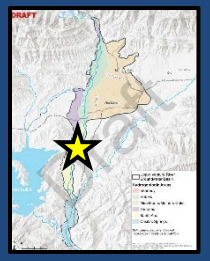
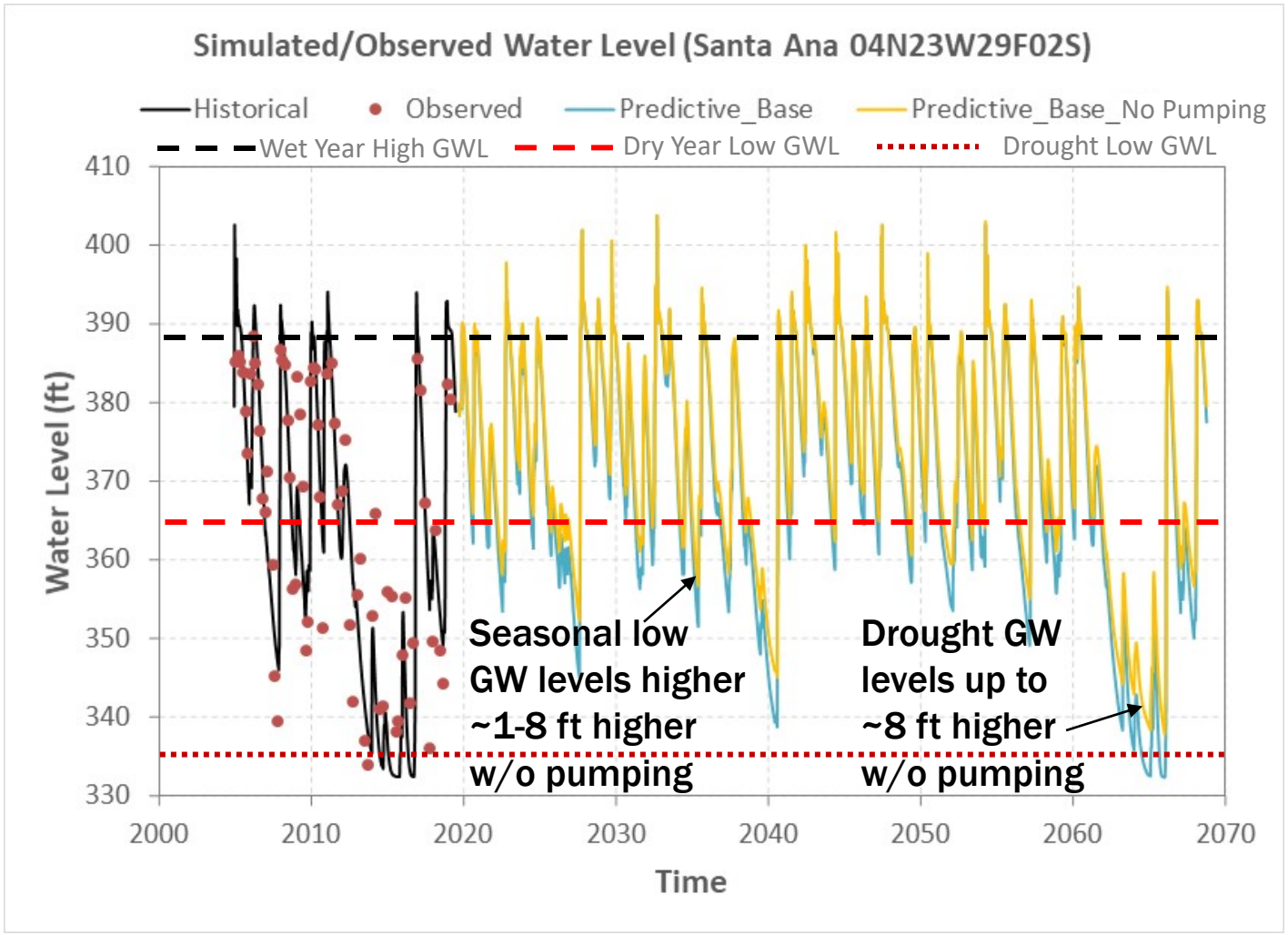
GROUNDWATER LEVELS SANTA ANA AREA



- Pumping has minimal impact on GW levels
- Dry season lows ~4 feet lower
- Drought lows up to ~6 feet lower



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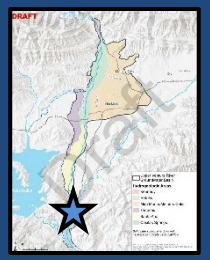
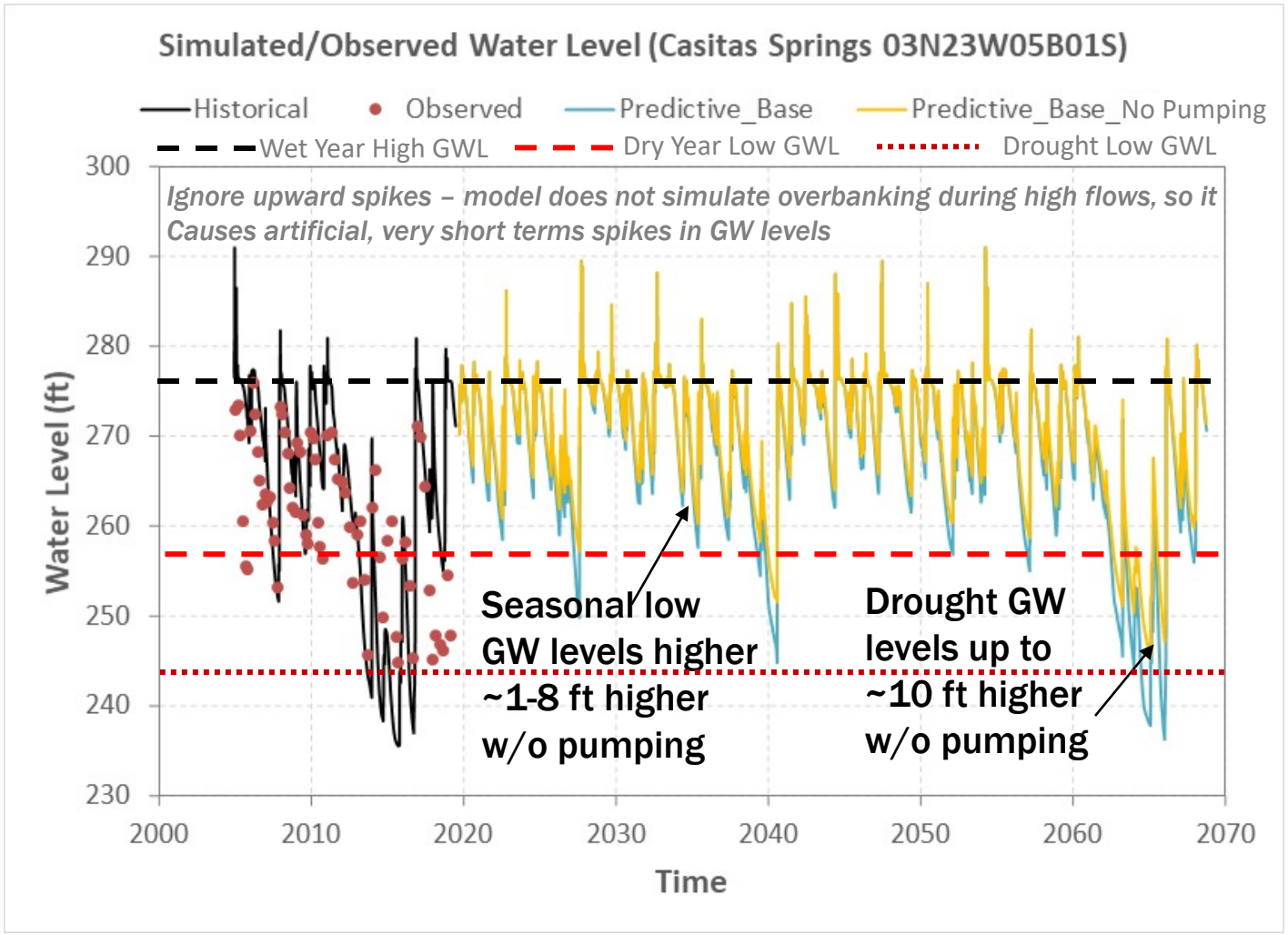
GROUNDWATER LEVELS NORTHERN CASITAS SPRINGS AREA



- Pumping has minimal impact on GW levels
- Dry season lows ~2 feet lower
- Drought lows up to ~10 feet lower



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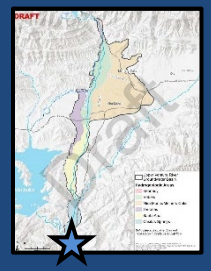
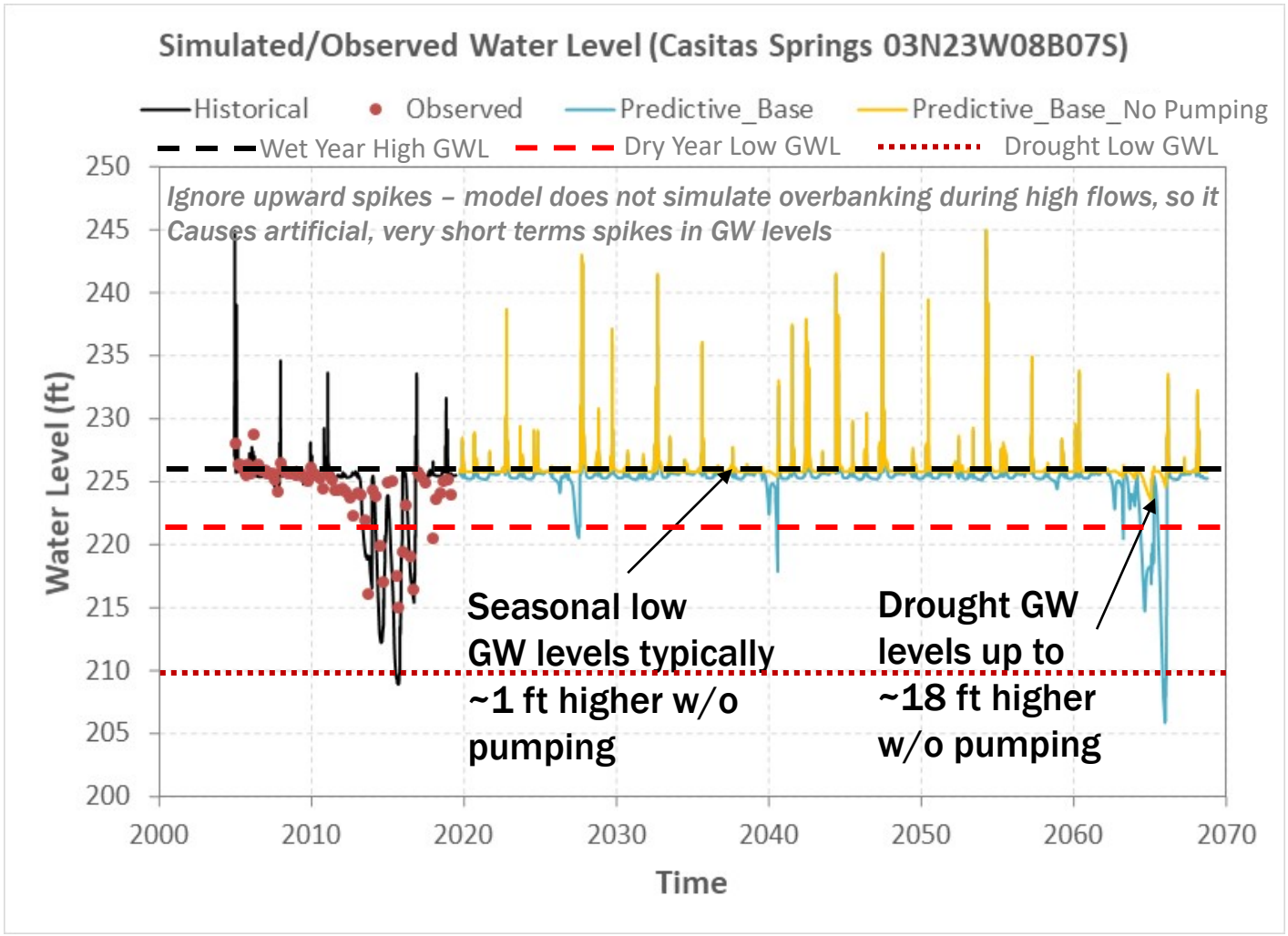
GROUNDWATER LEVELS SOUTHERN CASITAS SPRINGS AREA (FOSTER PARK)



- Pumping has minimal impact on GW levels
- Dry season lows ~1 foot lower
- Drought lows up to ~20 feet lower



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SUMMARY OF PUMPING EFFECTS ON GW LEVELS

- Basin GW levels are dominated by streamflow patterns
- Pumping is a secondary signal in the GW levels
- Wet season GW levels are the same
- Dry season GW levels
  - Kennedy Area typically the same
  - Robles and Santa Ana Areas ~1-8 ft higher
  - Foster Park typically ~1 ft higher
- Drought GW levels differences
  - Up to ~18 feet higher without pumping
  - Largest pumping effects in areas with GDEs

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

SUSTAINABLE MANAGEMENT CRITERIA IMPLICATIONS

CHRONIC LOWERING OF GROUNDWATER LEVELS

- 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 GROUNDWATER LEVELS

- Basin fills and drains in sync with rainfall patterns
- No chronic lowering of groundwater levels is indicated in the historical record of projections of future groundwater conditions.
- Over pumping occurs temporarily during drought when inflows are almost entirely eliminated
- Basin has very limited storage to buffer pumping drawdown during drought, resulting in GW level declines, esp. in Kennedy & FP Areas which have GDEs
- However, GW levels recover fully & quickly post-drought and temporary GW level declines during drought alone are not an indicator or chronic lowering.

CHRONIC LOWERING OF GROUNDWATER LEVELS

- Based on the foregoing, one possible conclusion is that Chronic Lowering of GW Levels is not applicable to the Basin.
- However, review of DWR's OBGMA alternative review findings indicates that GSAs must evaluate whether URs 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 GROUNDWATER LEVELS

- Staff Conclusion:
  - UVRGA will need to develop SMC to address any undesirable results caused by pumping-induced groundwater level declines during droughts.

- More information at next meeting
  - Impacts to GDEs at low water levels. Significant and unreasonable?
  - Potential minimum thresholds and measurable objectives.

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

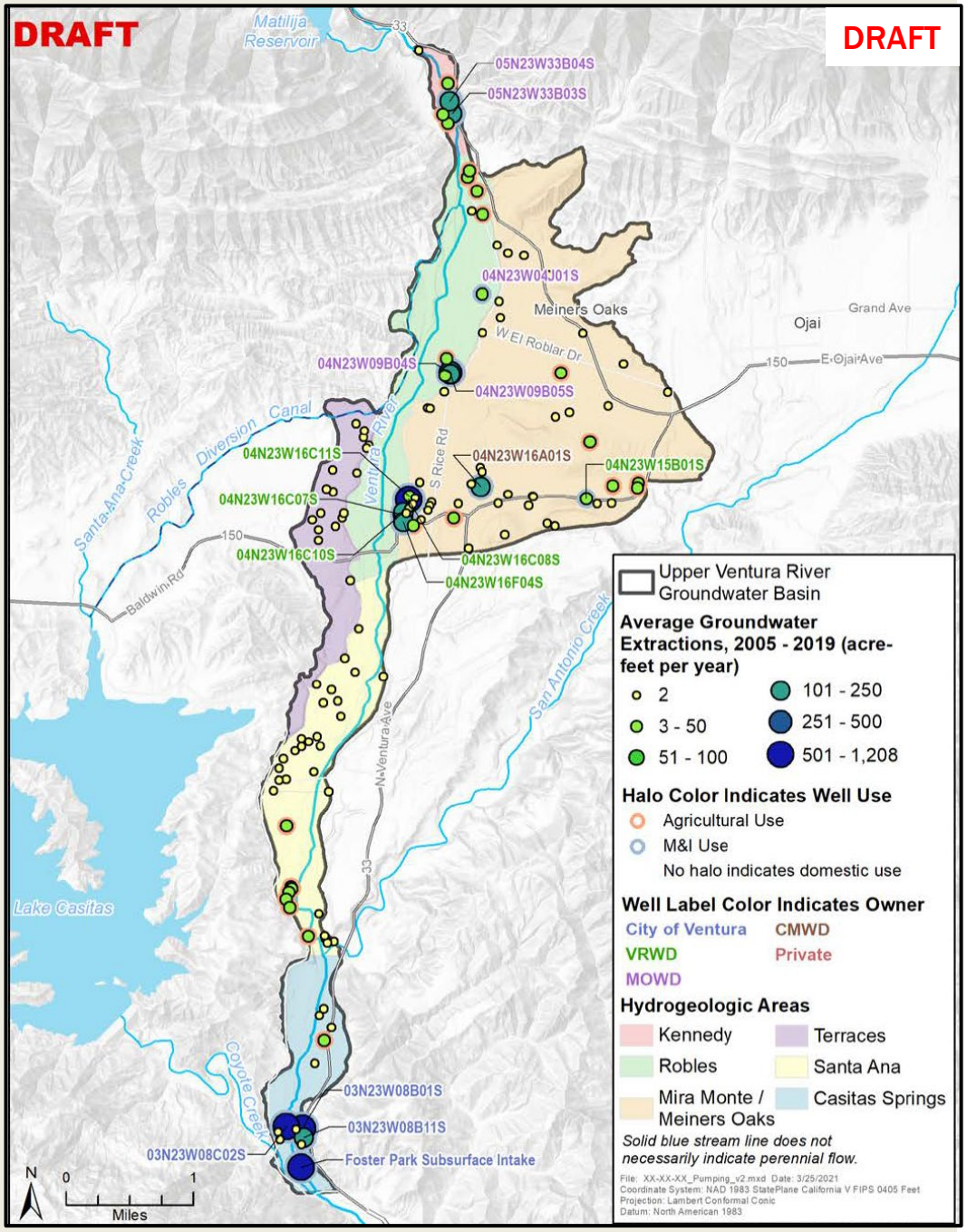
QUESTIONS?

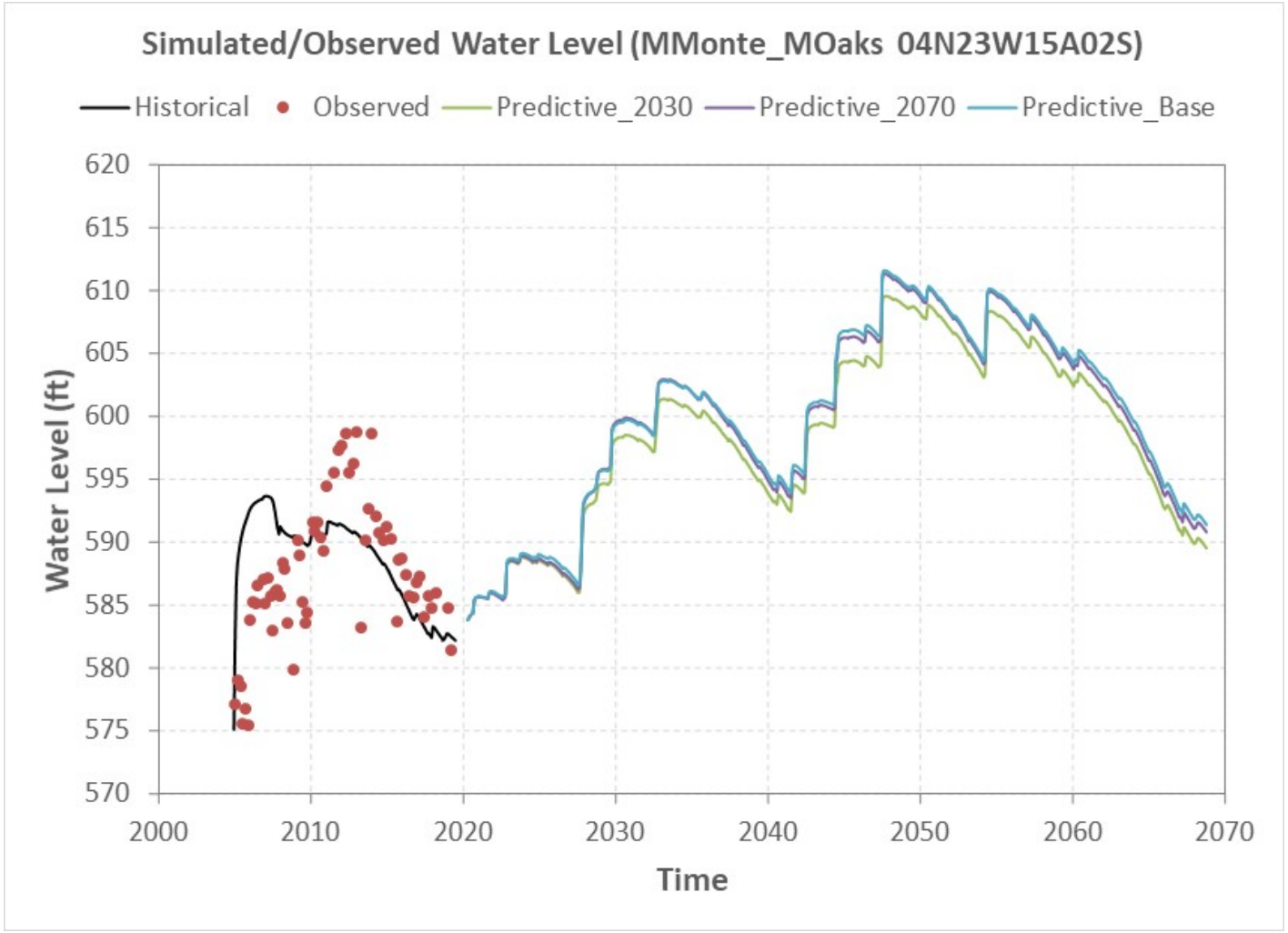
Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

EXTRA SLIDES

GROUNDWATER PUMPING IN UVRB

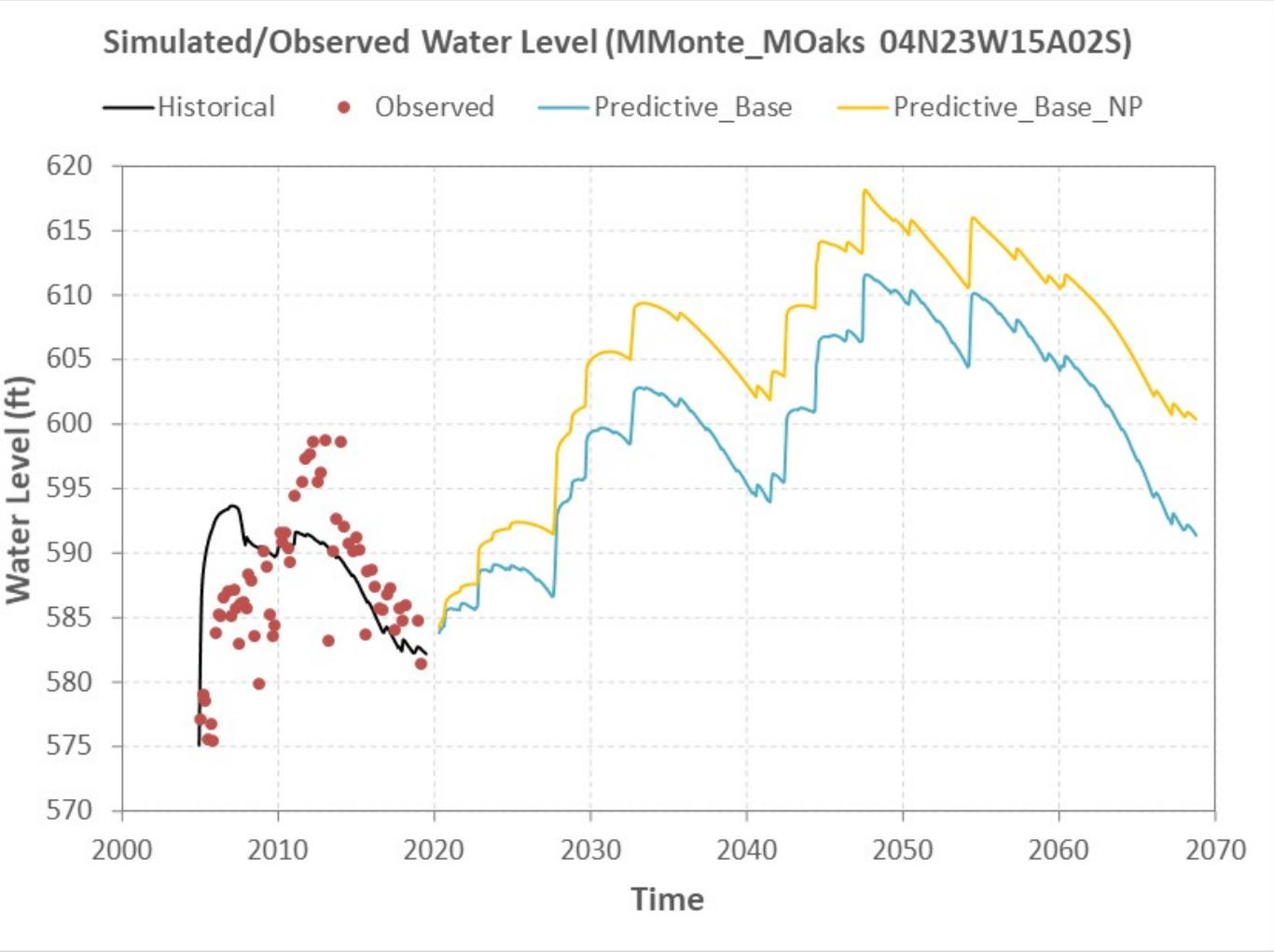
- Four areas of concentrated pumping
- Diffuse pumping elsewhere





GROUNDWATER LEVELS MMMO AREA

- Area has limited data
- Model results not well constrained
- Impact of climate change is minimal (only a few feet)



GROUNDWATER LEVELS MMMO AREA

- No Pumping predicted to raise GW levels by ~5 feet