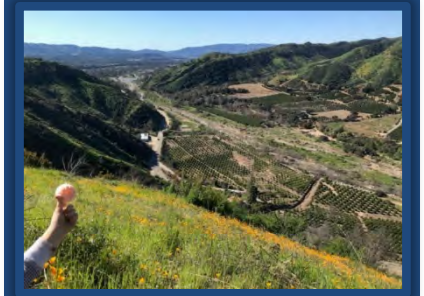
Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

UVRGA BOARD MEETING
APRIL 22, 2021

ITEM 7A
SUSTAINABLE MANGEMENT CRITERIA



GOALS FOR TODAY

1. Sustainable Management Criteria (SMC) Status
2. Interconnected Surface Water (ISW) Depletion & Groundwater Dependent Ecosystem (GDE) Overview
3. Aquatic GDE Identification & Characterization
4. ISW Depletion Model Results
5. ISW Depletion Effects on Aquatic GDEs
6. Discuss ISW SMC

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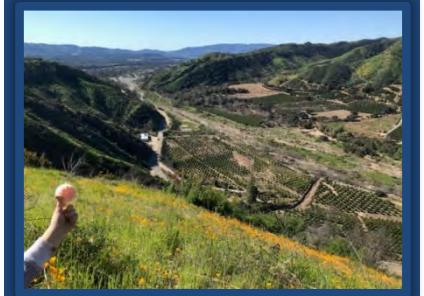
SMC DEVELOPMENT STATUS



SMC DEVELOPMENT STATUS

Discuss Today

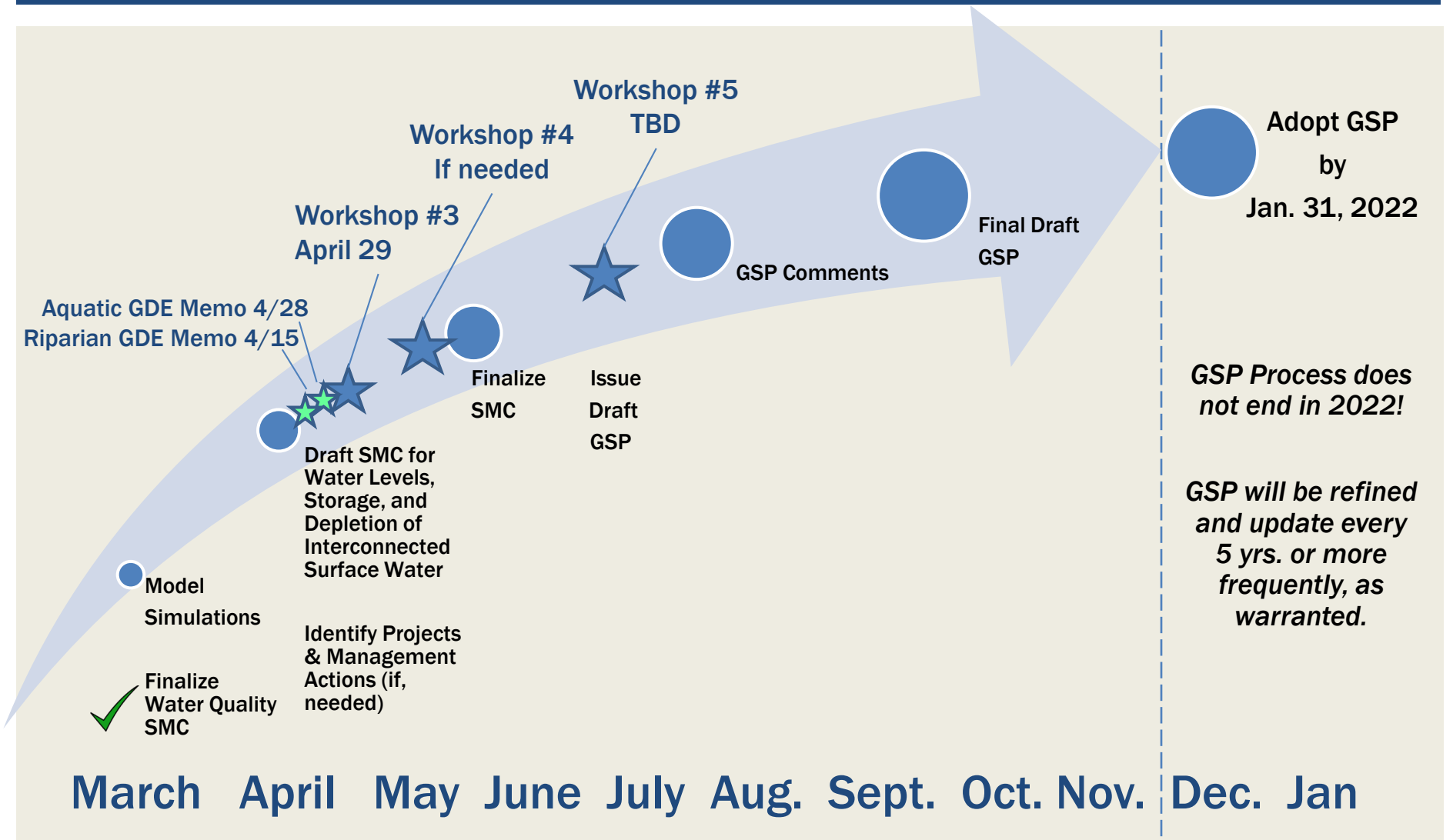
Pending Workshop Feedback

Approved March 11

Screened Out

Pending Workshop Feedback

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

Upper Ventura River
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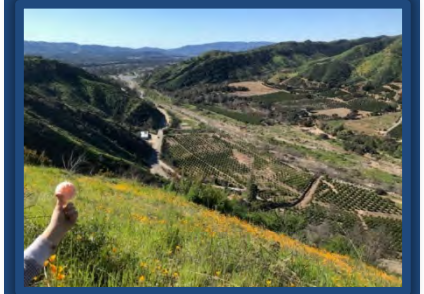
ISW DEPLETION & GDE OVERVIEW

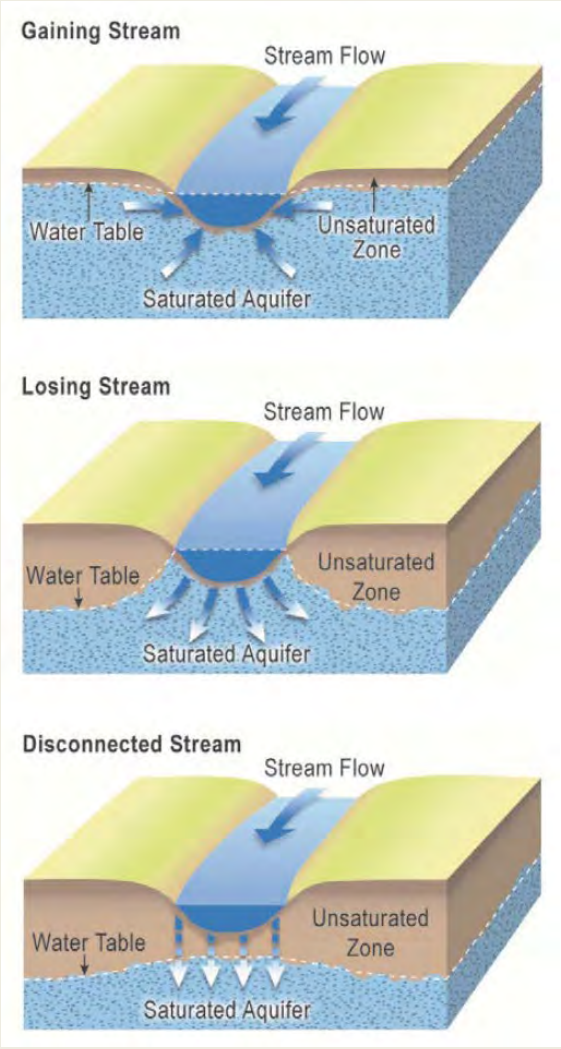


WHAT IS ISW?

Interconnected Surface Water ISW:

"Surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted."

(GSP Emerg. Regs § 351)

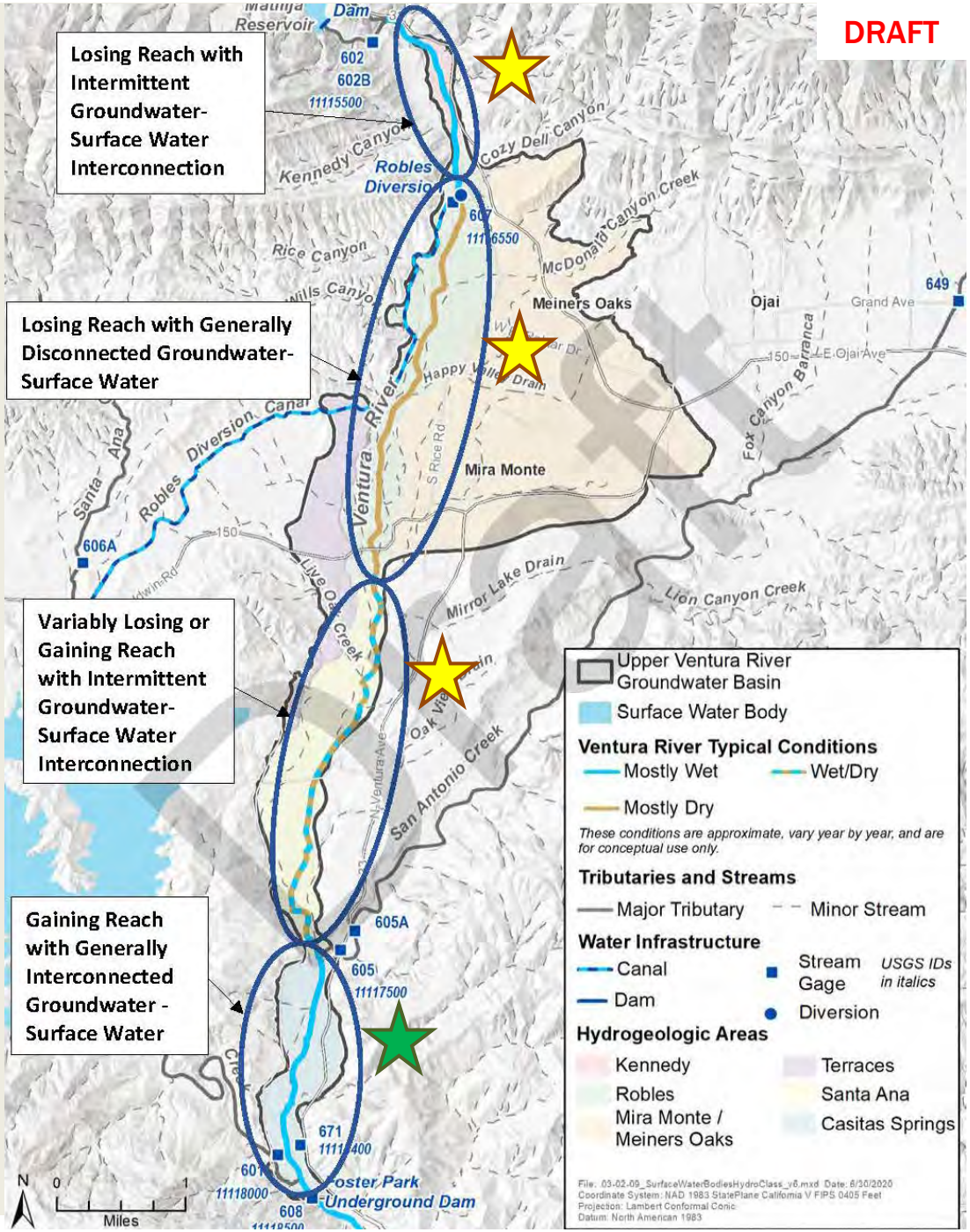


GROUNDWATER SURFACE WATER INTERACTION

- 4 areas along Ventura River with different types of GW-SW interaction

★ Consistently interconnected

★ Interconnection is transient and spatially variable



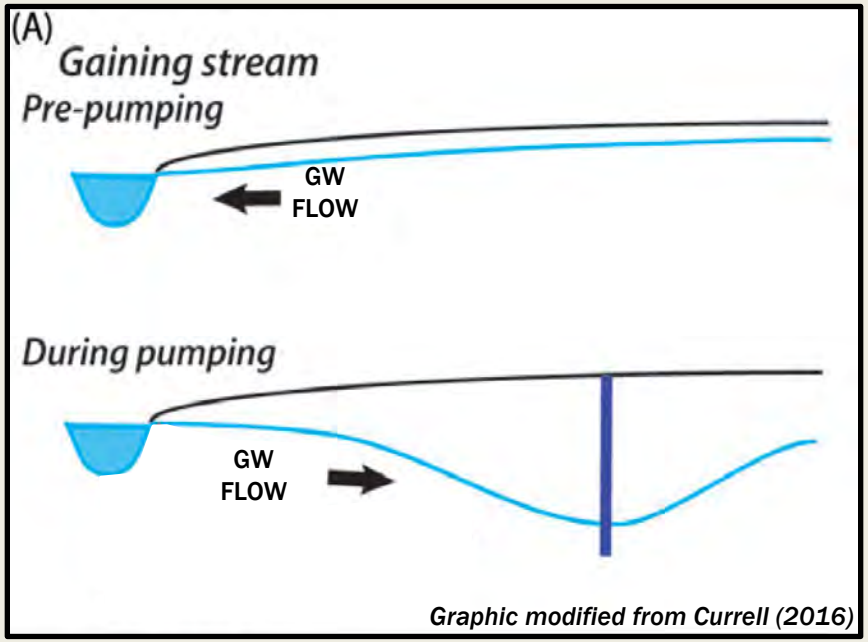
ISW DEPLETION MECHANISMS

1. Direct Depletion: Wells very close to the river capture flow directly from the river
2. Indirect Depletion: Wells further removed from the river:
   a. Lower the water table causing more streamflow percolation, decreasing streamflow in downstream areas
   b. Capture groundwater flow that would otherwise have discharged to the surface water system in the future.

GSP must address both types of depletion

DIRECT DEPLETION

- Well proximal to surface water body creates a water table "cone of depression" that induces flow from surface water body toward the wells
- Predominantly occurs at Foster Park



Graphic modified from Currell (2016)

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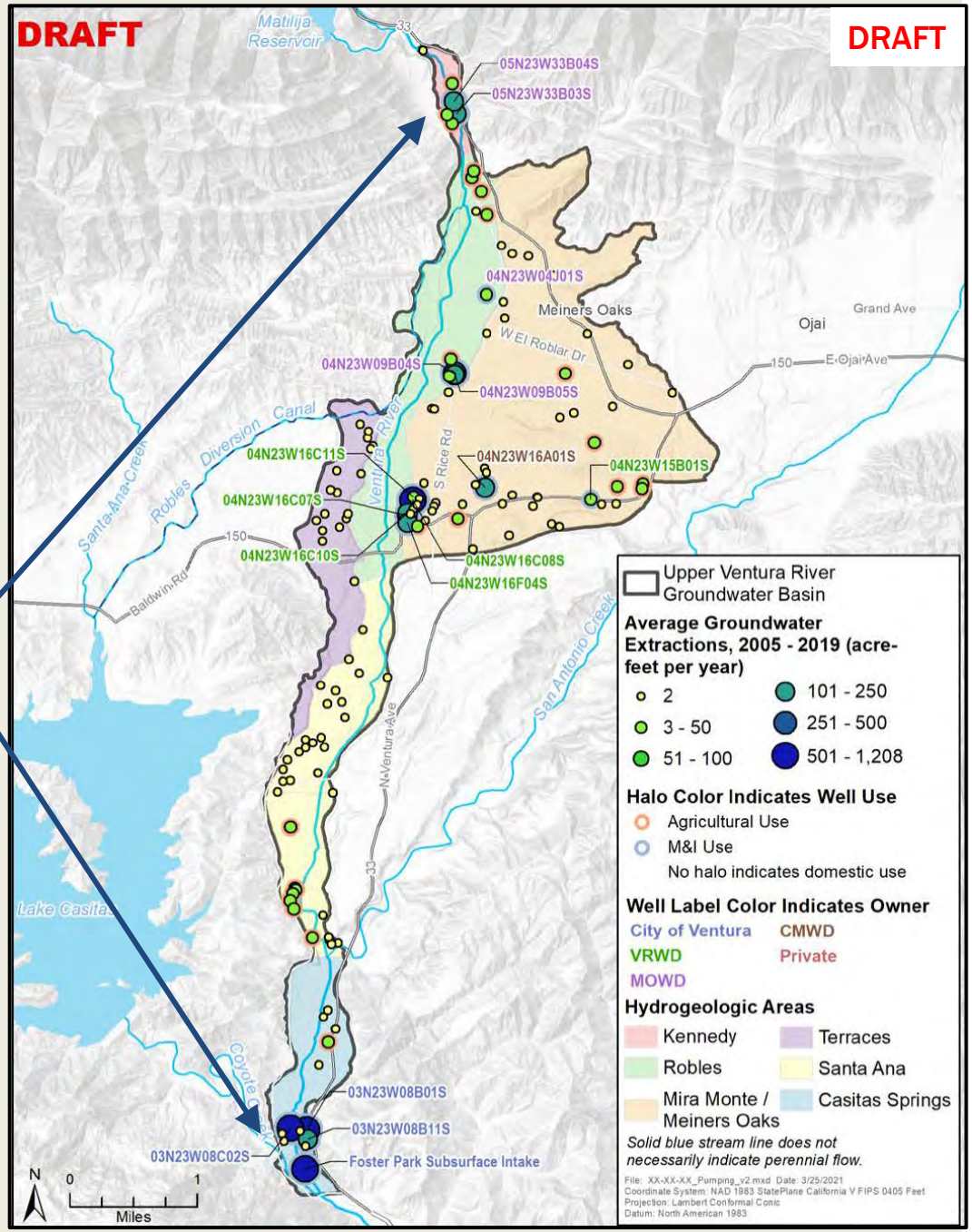
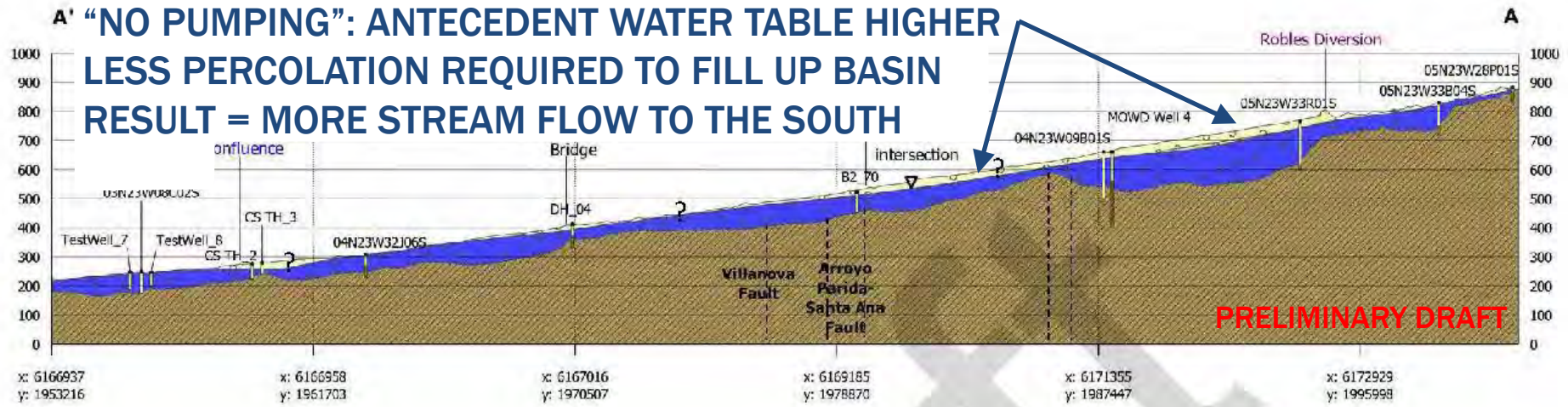
POTENTIAL AREAS OF DIRECT DEPLETION

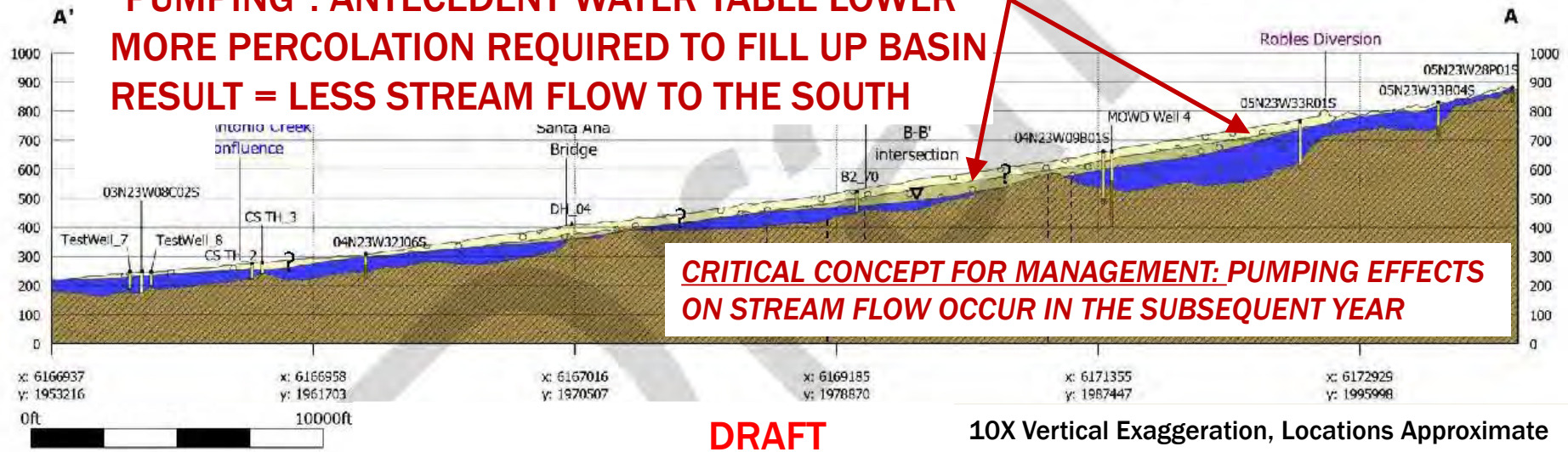
- Interconnected with Pumping Proximal to Ventura River
- Elsewhere pumping is either not proximate to Ventura River or the river is not interconnected



INDIRECT DEPLETION (A)

Note: Graphics intended to illustrate concept only. Not intended to represent actual pumping effect on water table.

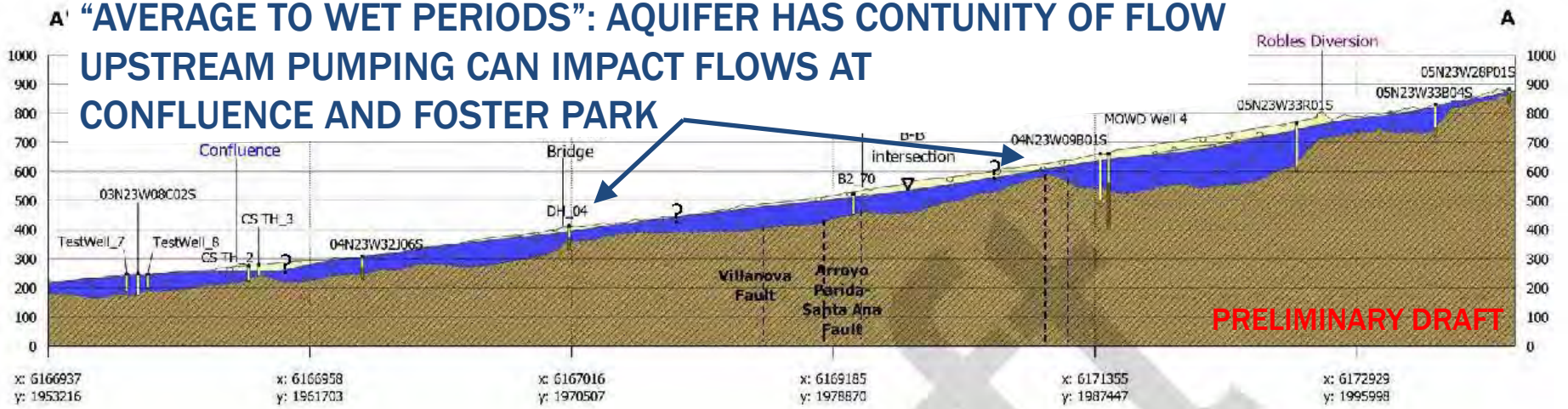




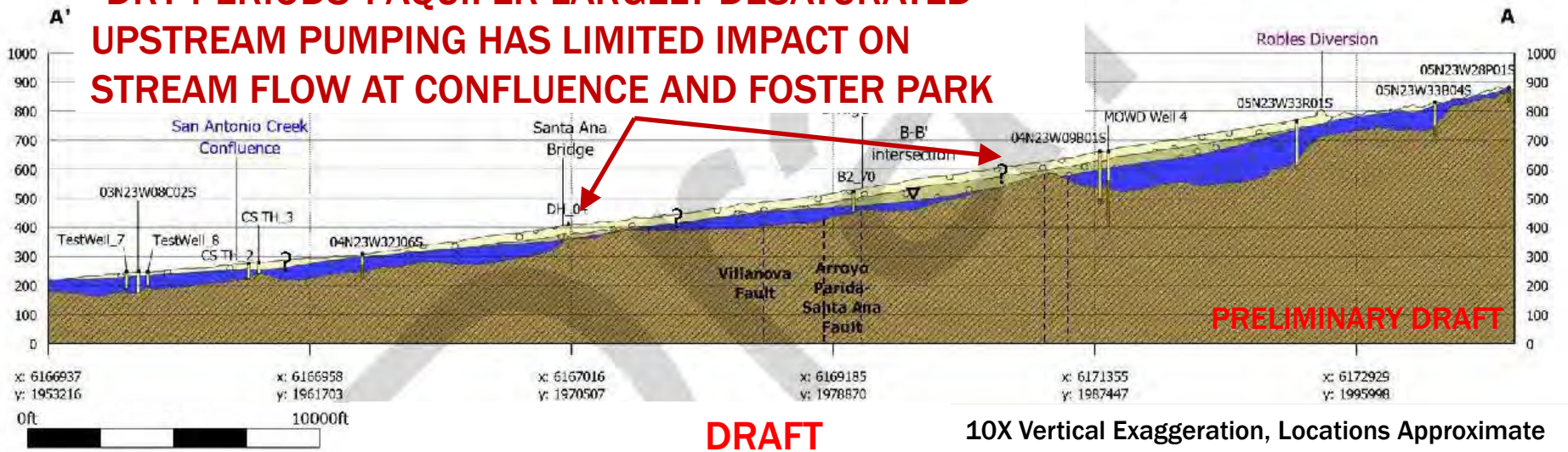
INDIRECT DEPLETION (B)

Note: Graphics intended to illustrate concept only.

"AVERAGE TO WET PERIODS": AQUIFER HAS CONTUNITY OF FLOW
UPSTREAM PUMPING CAN IMPACT FLOWS AT CONFLUENCE AND FOSTER PARK



"DRY PERIODS": AQUIFER LARGELY DESATURATED
UPSTREAM PUMPING HAS LIMITED IMPACT ON STREAM FLOW AT CONFLUENCE AND FOSTER PARK



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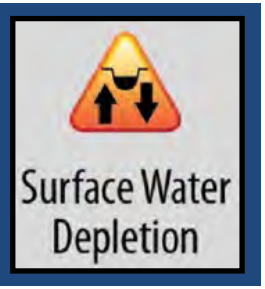
10X Vertical Exaggeration, Locations Approximate

ISW DEPLETION SMC



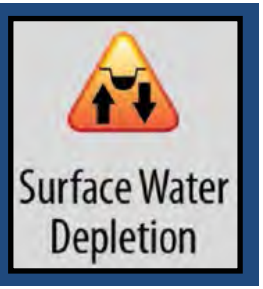
- Undesirable Result (Water Code §10721): Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

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

  The rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.

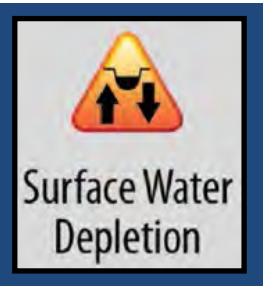
  - Must identify the location, quantity, and timing of depletions.

ISW BENEFICIAL USES



RWQCB Basin Plan Beneficial Uses	GSP Classification
Municipal Supply	
Industrial Supply	→ *Diversions*
Agricultural Supply	
Groundwater Recharge	→ *N/A*
Freshwater Replenishment	→ *N/A in UVRB*
Warm Freshwater Habitat	
Cold Freshwater Habitat	
Wildlife Habitat (terrestrial)	→ *GDE*
Migration of Aquatic Organisms	
Spawning, Reproduction, and/or Early Dev.	
Wetland Habitat	
Recreation	→ *Recreation*

ISW BENEFICIAL USES



Diversions

Recreation

Aquatic GDEs

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*

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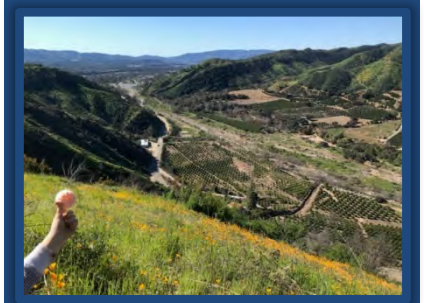
AQUATIC GDE IDENTIFICATION & CHARACTERIZATION

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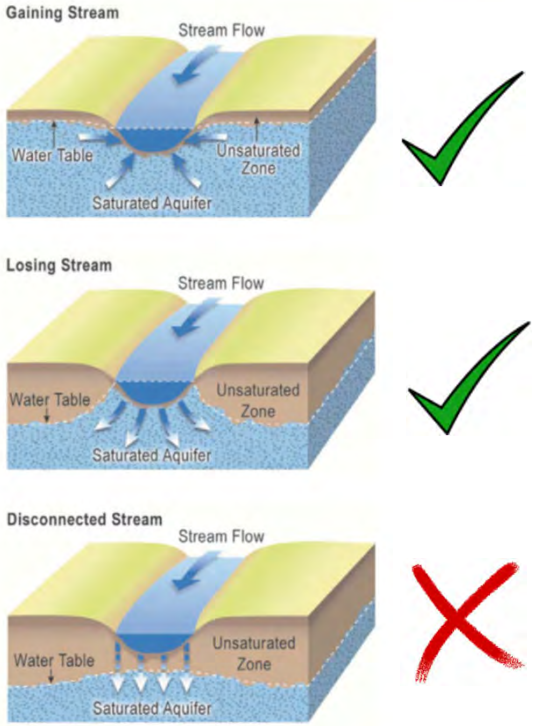
Upper Ventura River Groundwater Agency
Aquatic Groundwater Dependent Ecosystem Assessment

Aquatic GDE Introduction

- Aquatic GDEs: important instream habitat areas with *interconnected surface water*

Ventura River near Meiners Oaks, UVRGA



Aquatic GDE Introduction

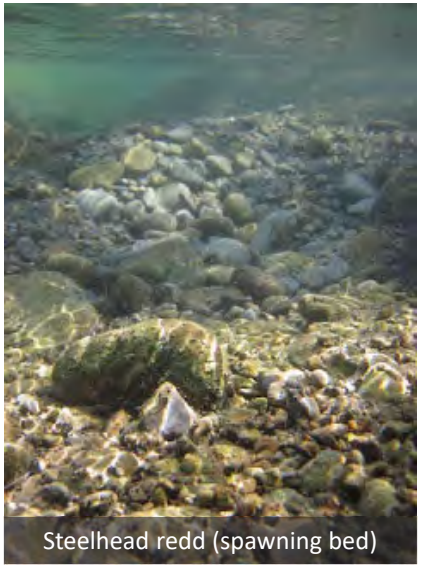
Upper Ventura River GROUNDWATER AGENCY SUSTAINABLE MANAGEMENT

Aquatic GDEs are used in a variety of ways by fish and aquatic wildlife species.

- Passage (critical riffles)
- Refuge (shade/structure)
- Rearing
- Spawning/breeding
- Dispersal/migration

California red-legged frog egg mass

Courtesy of Steve Howard



Steelhead redd (spawning bed)

Matilija Creek, Courtesy of Paul Jenkin

Aquatic GDE Introduction

Upper Ventura River GROUNDWATER AGENCY SUSTAINABLE MANAGEMENT

Many factors within the watershed can influence Aquatic GDEs.

Natural Climatic Factors	Anthropogenic Factors	Hydrogeologic Factors
Storm pulses	Groundwater Pumping	Losing/Gaining Reaches
Drought	Surface Water Diversion	Depth to Groundwater

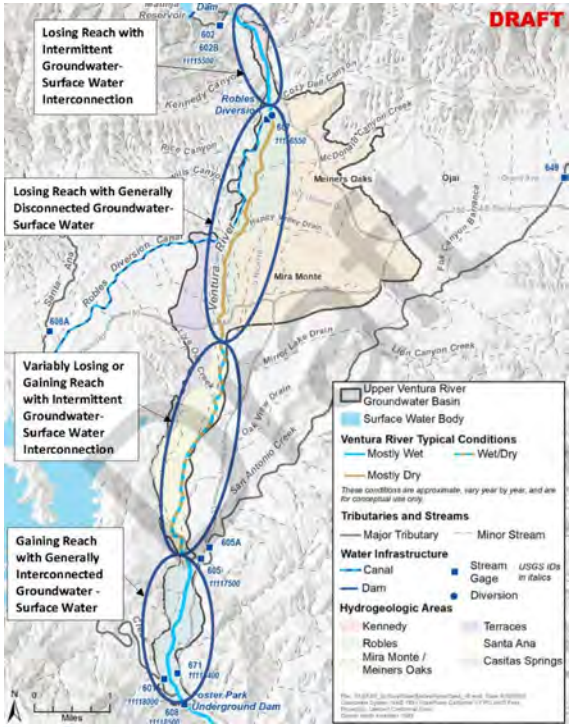
Aquatic GDE Assessment Overview

- Identify Aquatic GDEs
  - Determine important aquatic habitat areas within the UVRGB
  - Evaluate groundwater dependency of these areas
- Characterize Aquatic GDEs
  - Habitat characteristics and ecological value
  - Critical habitat
  - Special status species
- Determine potential effects on Aquatic GDEs
  - Assess hydrologic data (rates of depletion of ***interconnected surface water)***

Aquatic GDE Identification Methods

Potential Aquatic GDEs	All reaches of the Ventura River within the UVRGB
Evaluate Groundwater Dependency	Hydrogeologic data Site-specific knowledge of surface water-groundwater interactions
Identify Important Aquatic Habitat	Literature review Knowledge of local experts

Aquatic GDE Identification Methods

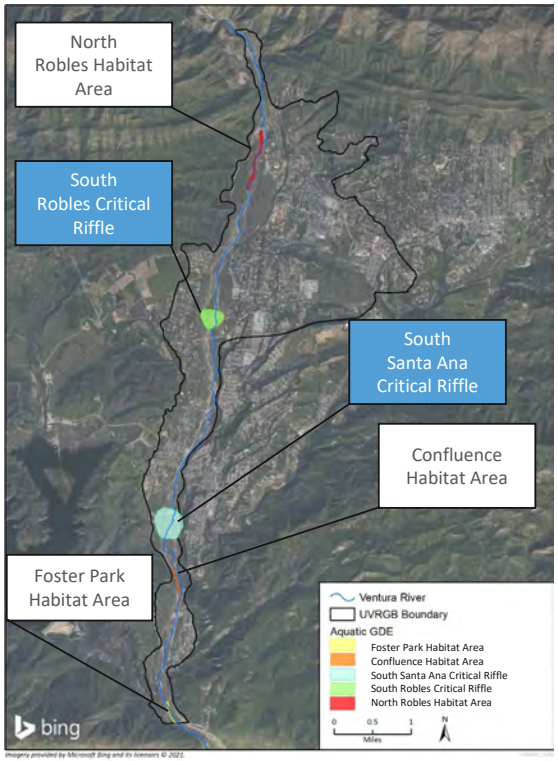


All reaches of the Ventura River within the UVRGB were considered.

Reaches were evaluated based on Aquatic GDE uses.

Aquatic GDE Identification: Passage and Habitat

- Critical Riffles:
  - South Robles
  - South Santa Ana
- Habitat areas:
  - North Robles
  - Confluence
  - Foster Park



Critical Riffle Photographs

South Robles Critical Riffle
(facing north)

South Santa Ana Critical Riffle
(facing north)

Photos by S. Howard, April 13, 2021

Habitat Area Photographs (Robles Habitat Area)

Northern portion of North Robles Habitat Area (looking south)

Southern portion of North Robles Habitat Area (looking south)

Photos by S. Howard, April 13, 2021

Habitat Area Photographs: Confluence Habitat Area

Confluence Habitat Area (looking north)

Confluence Habitat Area (looking north)

Photos by S. Howard, April 19, 2021

Habitat Area Photographs: Foster Park Habitat Area

Foster Park Habitat Area (looking north)

Foster Park Habitat Area (looking north)

Photos by S. Howard January 22,2020 and April 19, 2020

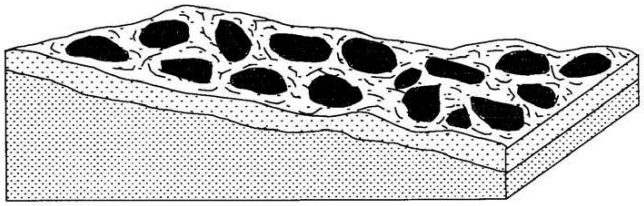
Aquatic GDE Characterization

Composition and ecological value of Aquatic GDEs

Upper Ventura River GROUNDWATER AGENCY SUSTAINABLE MANAGEMENT

Aquatic GDE Characterization of Critical Riffles

- Limiting passage for migration of Steelhead



Riffle Habitat Diagram

Critical Riffle Assessment (CDFW 2017)

Aquatic GDE Characterization of Habitat Areas

Upper Ventura River GROUNDWATER AGENCY SUSTAINABLE MANAGEMENT

Special Status Species


Pacific Lamprey


Southern California DPS Steelhead


California Red-legged frog tadpole


Southwestern Pond Turtle


Two-striped Gartersnake

Photos by S. Howard

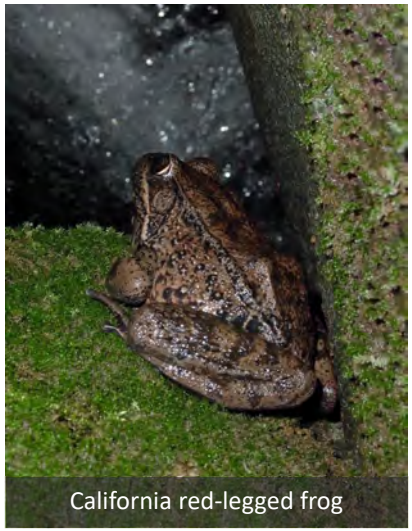
Aquatic GDE Characterization

All five Aquatic GDES have **High Ecological Value.**

- Important Habitat for Special Status Species
- Federally Designated Critical Habitat
  - California red-legged frog
  - Southern California DPS Steelhead

Steelhead

Courtesy of Steve Howard



California red-legged frog

Courtesy of Steve Howard

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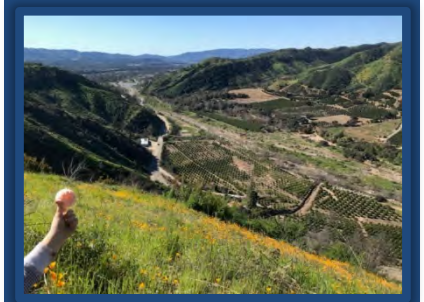
ISW DEPLETION MODEL RESULTS FOR AQUATIC GDE AREAS



ISW DEPLETION EVALUATION

- Evaluation Method: Compare baseline 50-yr future project simulation with and without pumping
- Evaluation Areas:
  - Two key reaches for passage ("critical riffles")
  - Three habitat areas

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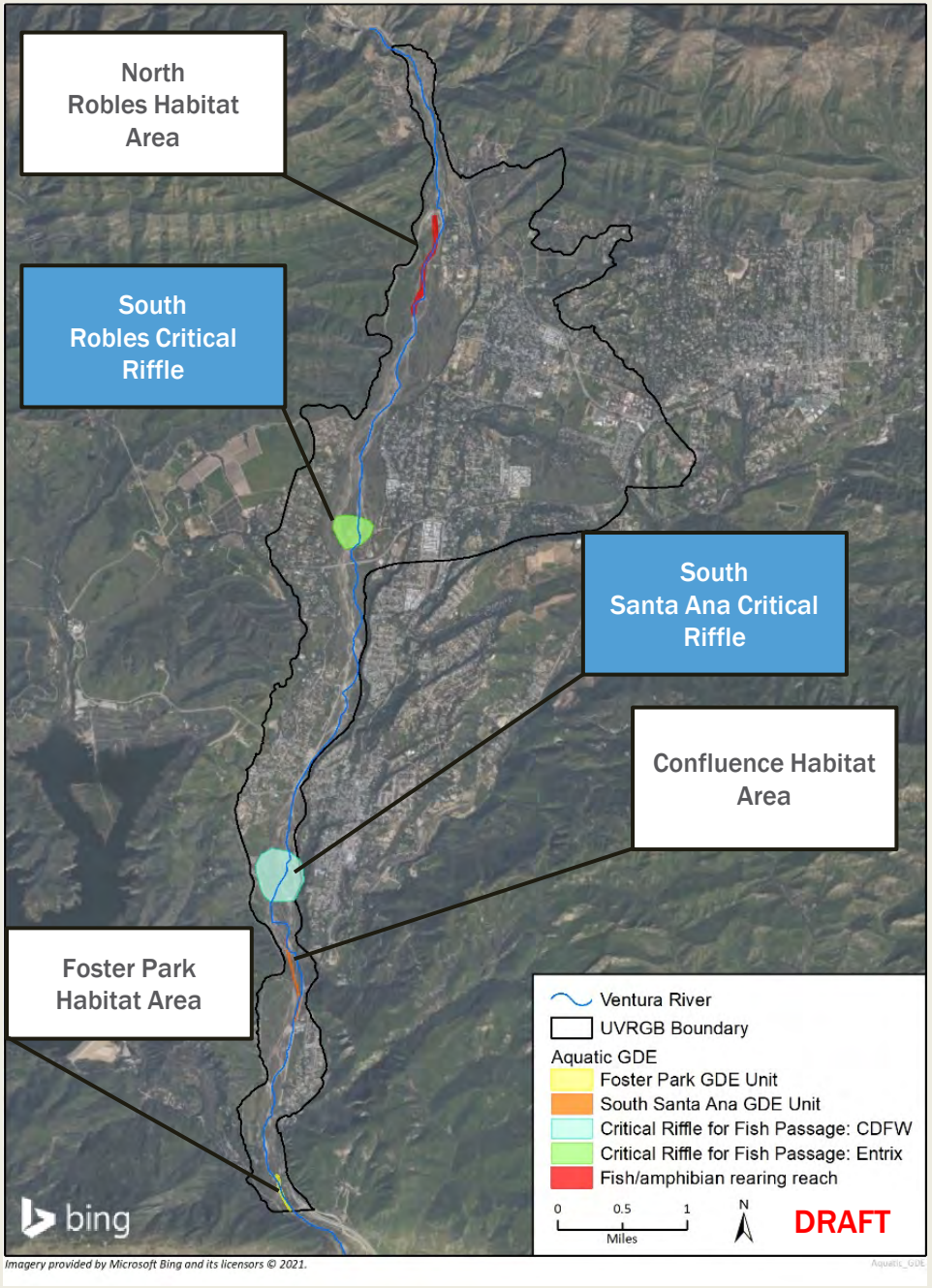
IMPORTANT AQUATIC GDE AREAS

- Critical Riffles
  - South Robles
  - Santa Ana
- Habitat Areas
  - North Robles
  - Confluence
  - Foster Park



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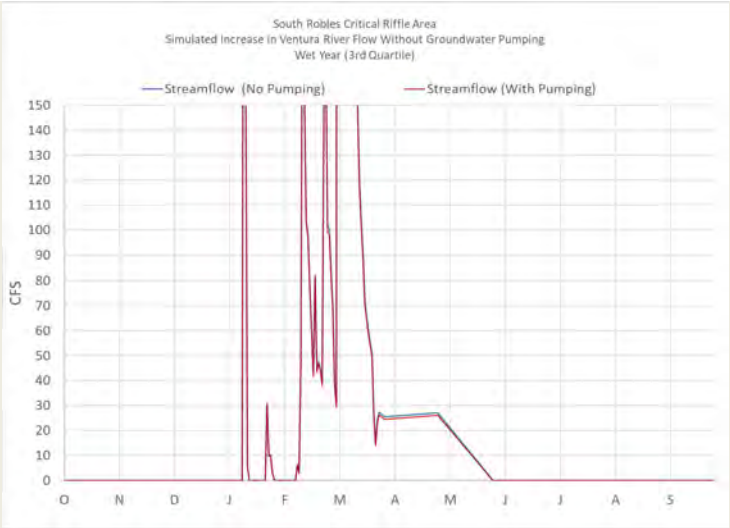
STREAMFLOW DEPLETION
SOUTH ROBLES CRITICAL RIFFLE

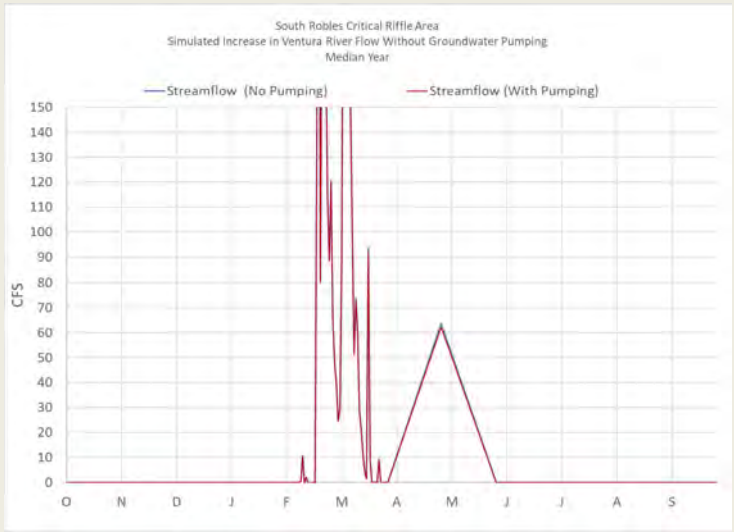
Streamflow Depletion Example Water Years

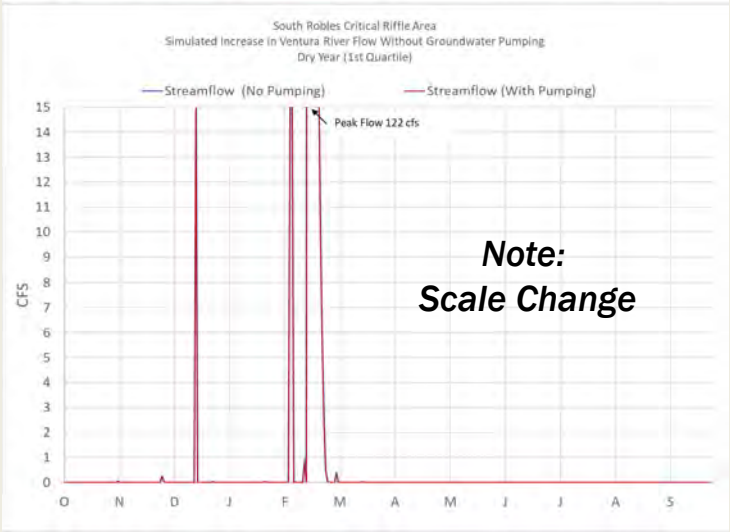
Wet

Median

Dry



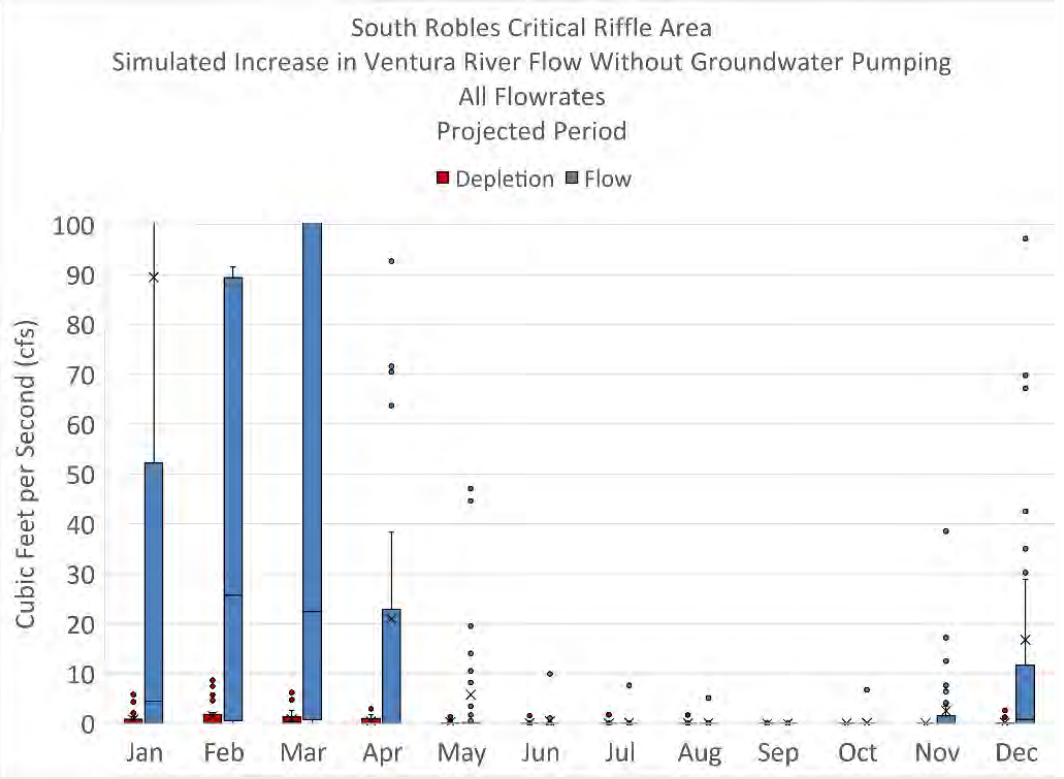




Note: Scale Change

Note: Model is Daily Nov - March & Monthly April - Oct

STREAMFLOW DEPLETION
SOUTH ROBLES CRITICAL RIFFLE



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median Flow	4.4	26	22	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	0.6
Median Depletion	<0.1	0.2	0.4	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	<0.1

All values are cubic feet per second (cfs)

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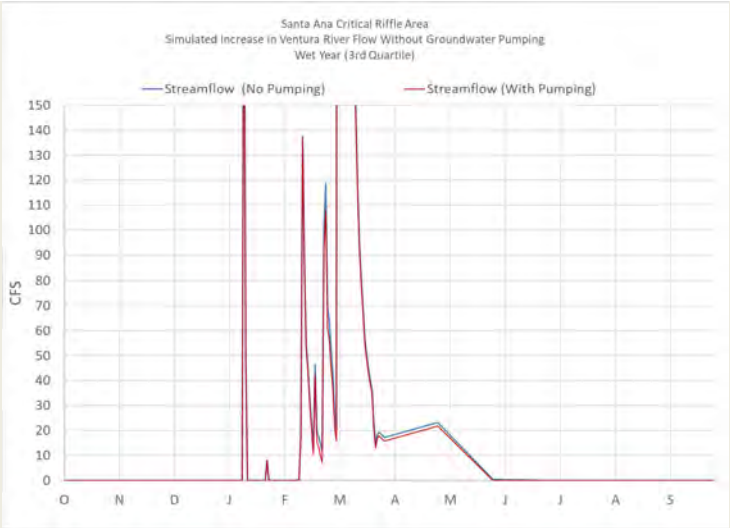
STREAMFLOW DEPLETION
SANTA ANA CRITICAL RIFFLE

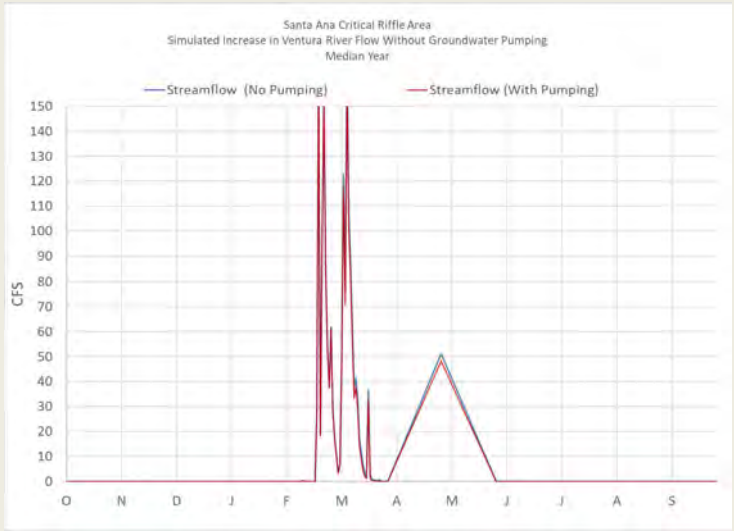
Streamflow Depletion Example Water Years

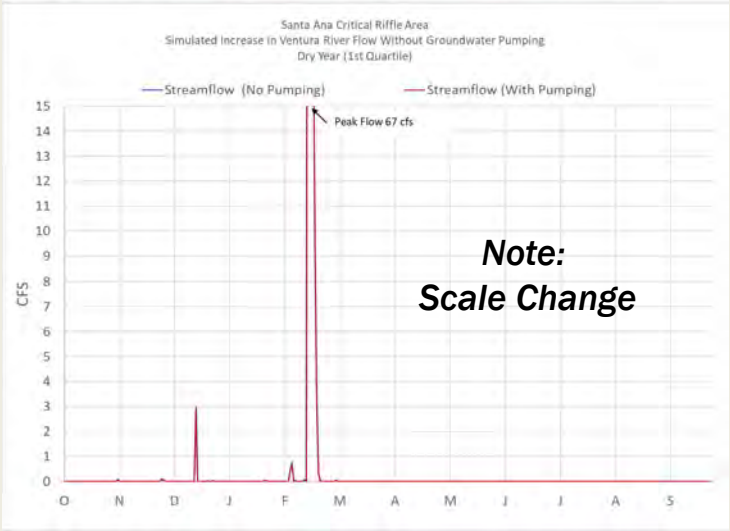
Wet

Median

Dry







Note:
Scale Change

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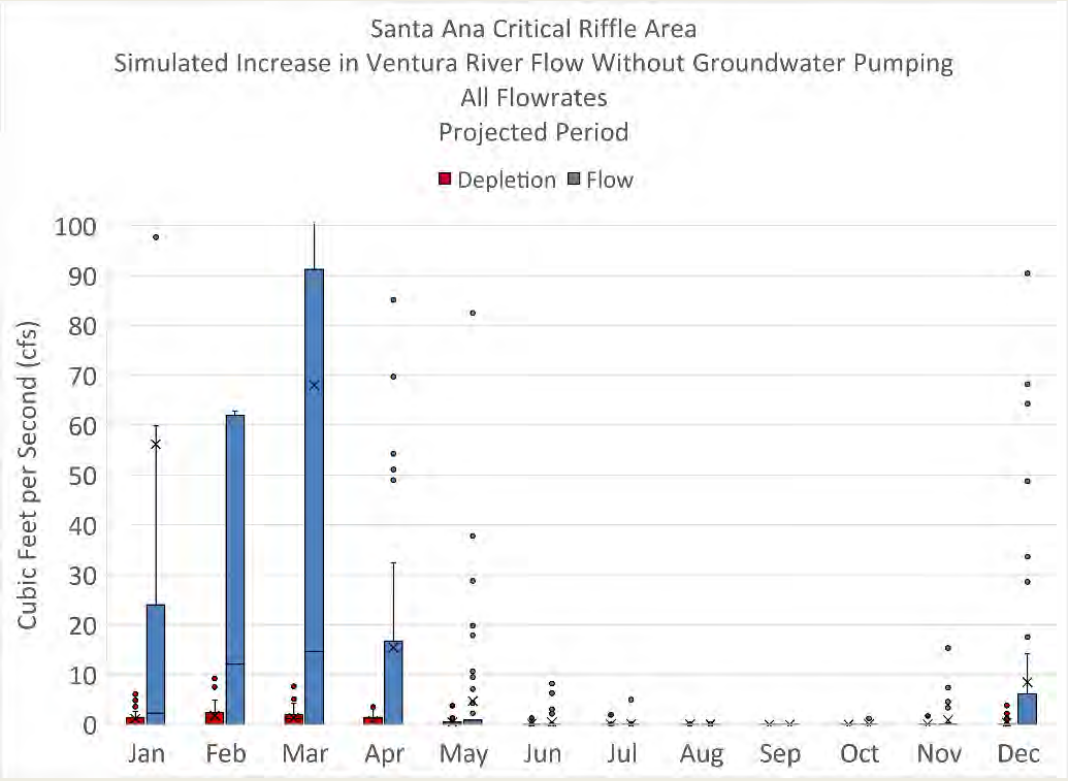
STREAMFLOW DEPLETION
SANTA ANA CRITICAL RIFFLE



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median Flow	2.3	12	14	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	0.1
Median Depletion	<0.1	<0.1	1.2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	<0.1

All values are cubic feet per second (cfs)

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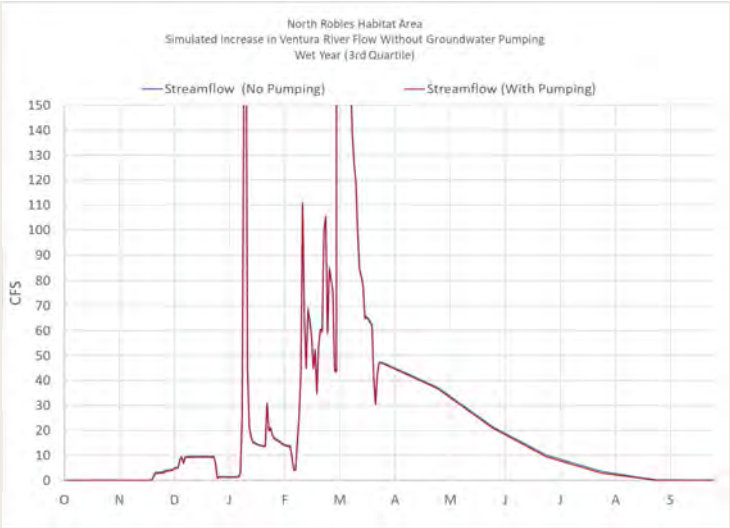
STREAMFLOW DEPLETION NORTH ROBLES HABITAT AREA

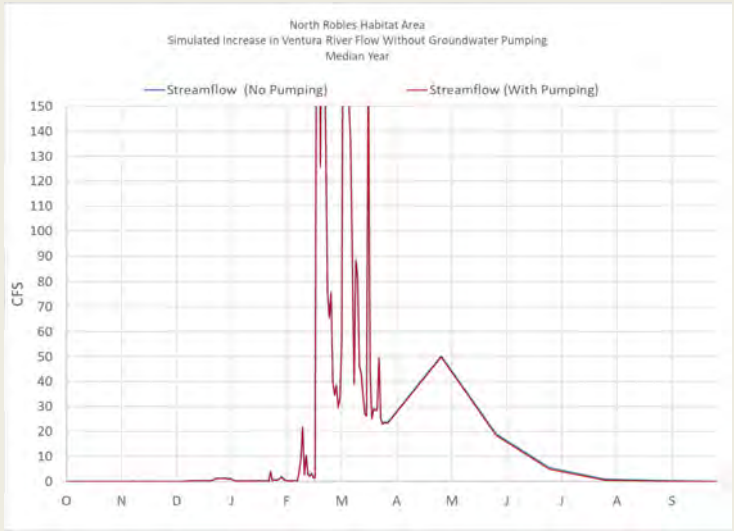
Streamflow Depletion Example Water Years

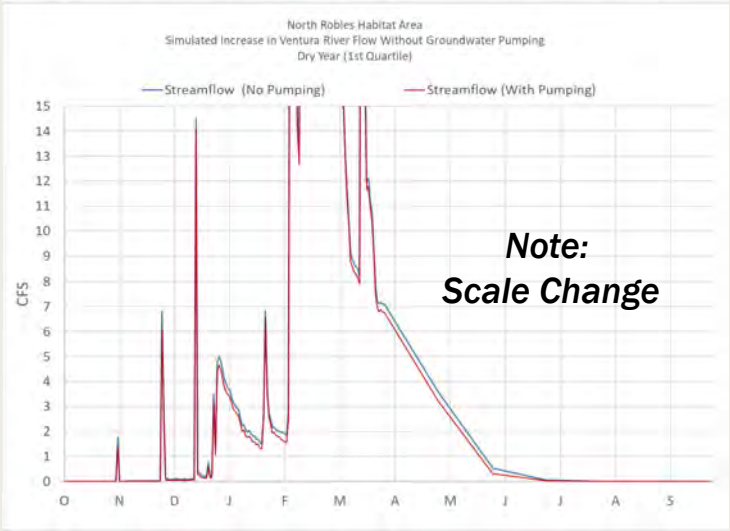
Wet →

Median

Dry →







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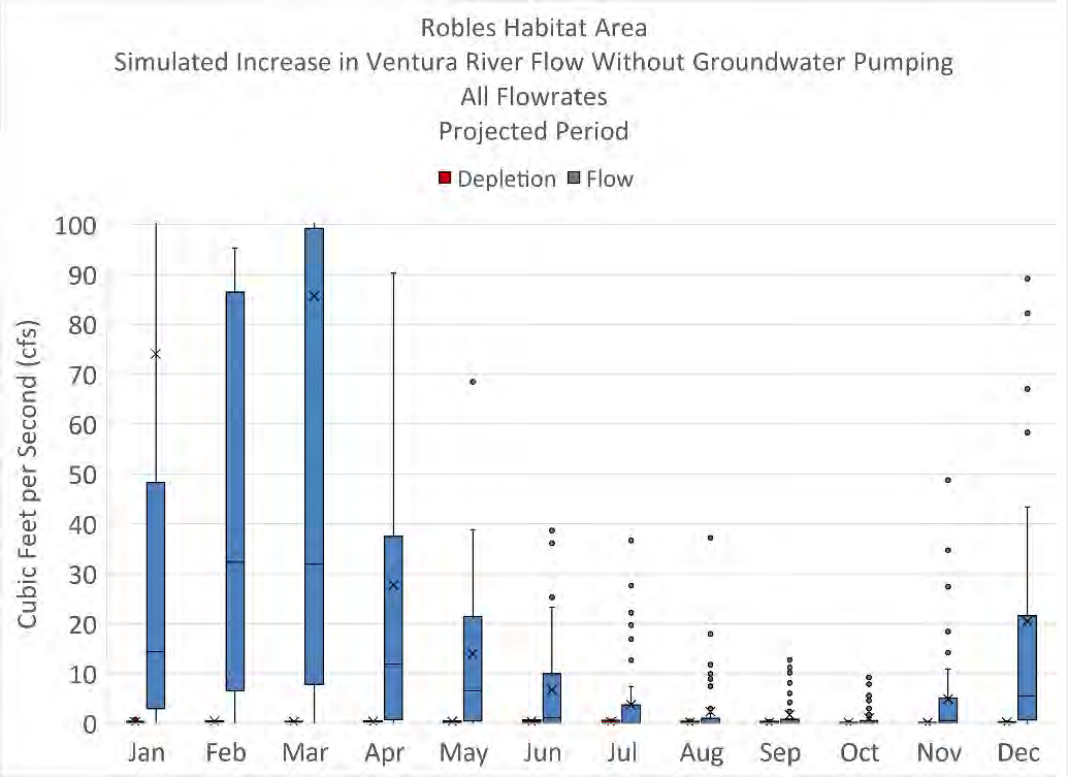
STREAMFLOW DEPLETION
NORTH ROBLES HABITAT AREA



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median Flow	14	32	32	12	6.3	0.9	DRY	DRY	DRY	DRY	0.5	5.2
Median Depletion	0.3	0.4	0.4	0.5	0.5	0.5	DRY	DRY	DRY	DRY	0.1	0.2

All values are cubic feet per second (cfs)

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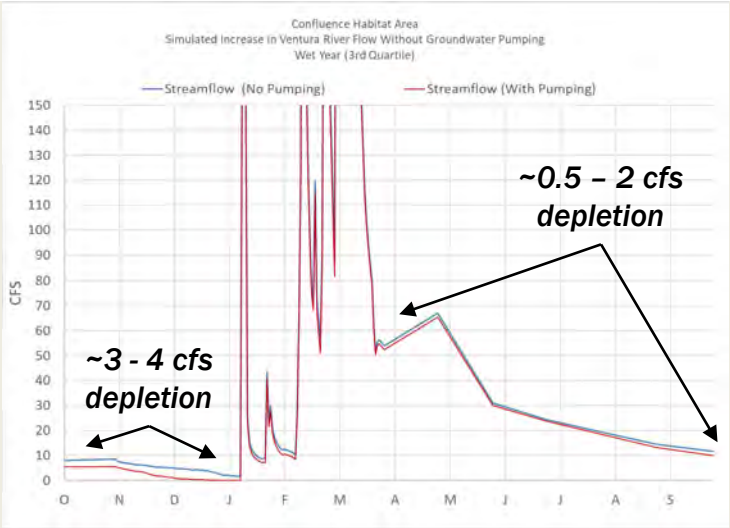
STREAMFLOW DEPLETION CONFLUENCE HABITAT AREA

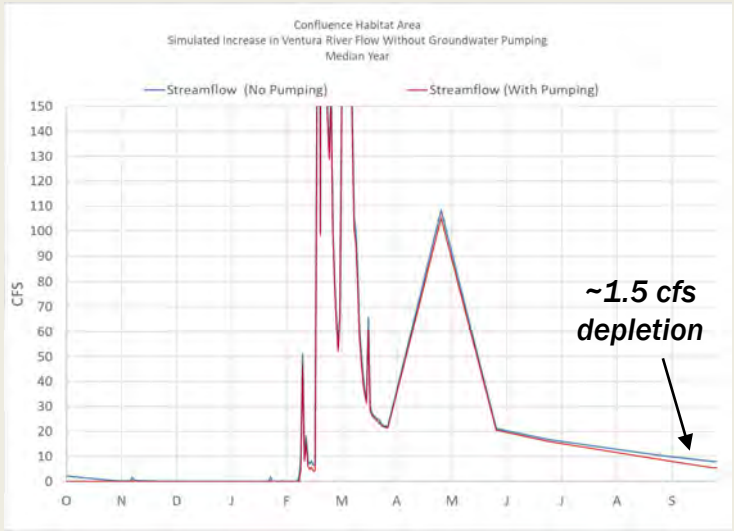
Streamflow Depletion Example Water Years

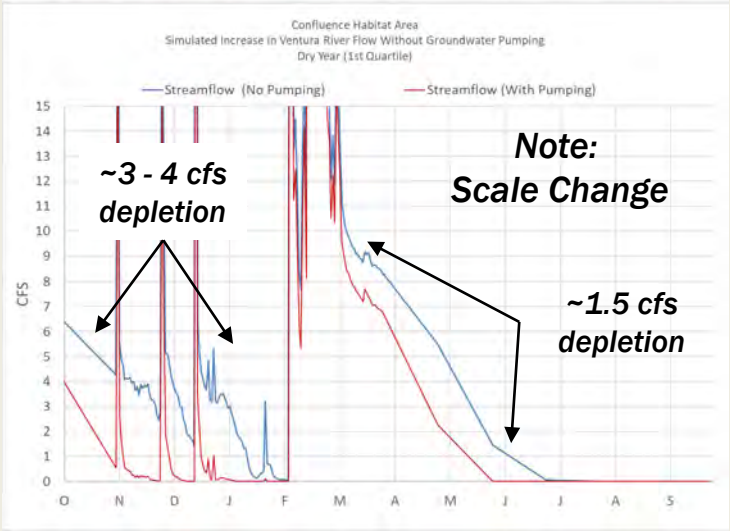
Wet

Median

Dry

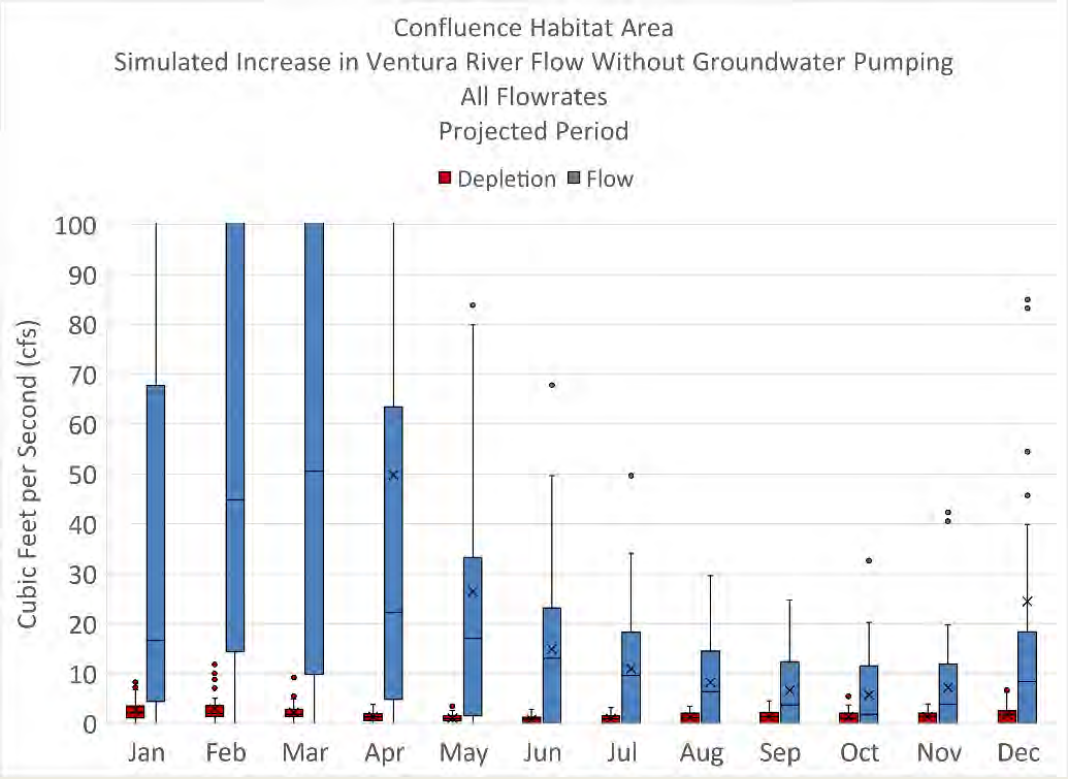






Note: Model is Daily Nov - March & Monthly April - Oct

STREAMFLOW DEPLETION CONFLUENCE HABITAT AREA



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median Flow	16	44	50	22	17	13	8.8	5.4	2.1	1.0	2.0	7.5
Median Depletion	2.2	2.0	1.9	1.3	0.9	0.8	0.9	1.2	1.4	1.1	1.5	1.8

All values are cubic feet per second (cfs)

DRAFT

DRAFT

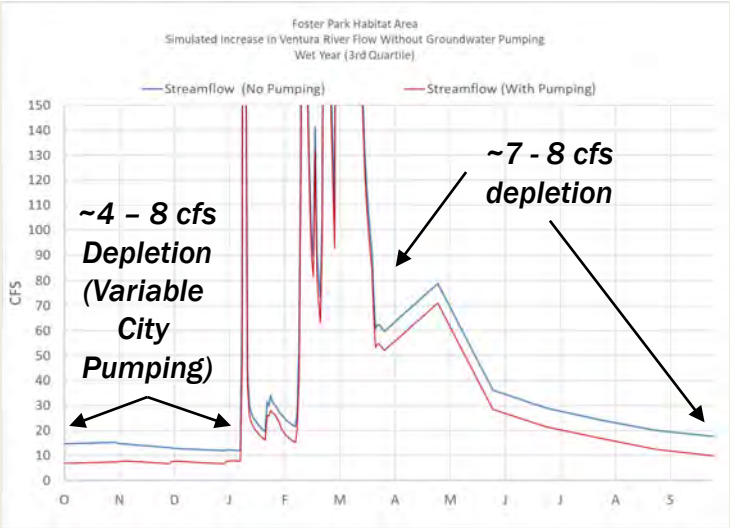
STREAMFLOW DEPLETION FOSTER PARK HABITAT AREA

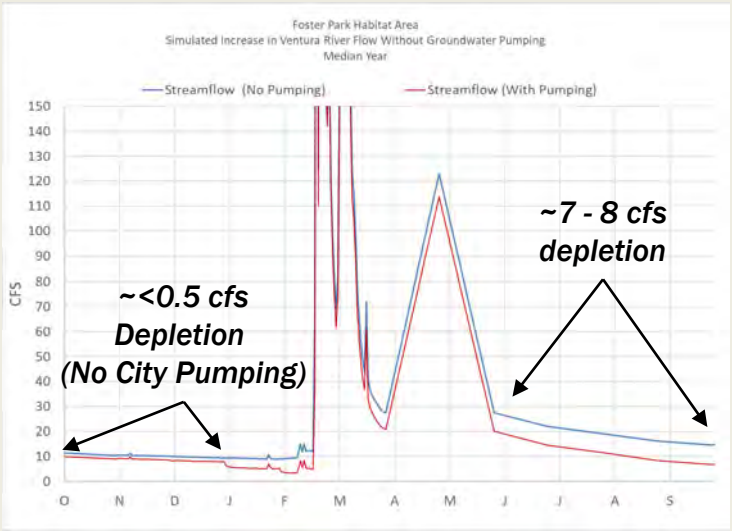
Streamflow Depletion Example Water Years

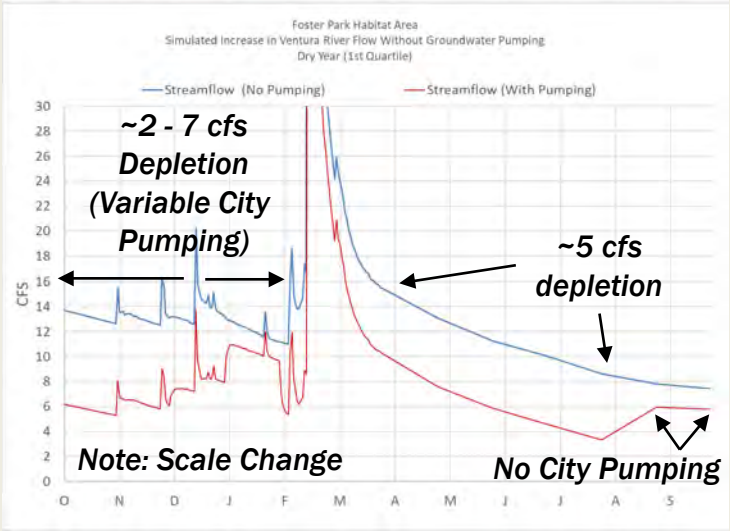
Wet

Median

Dry

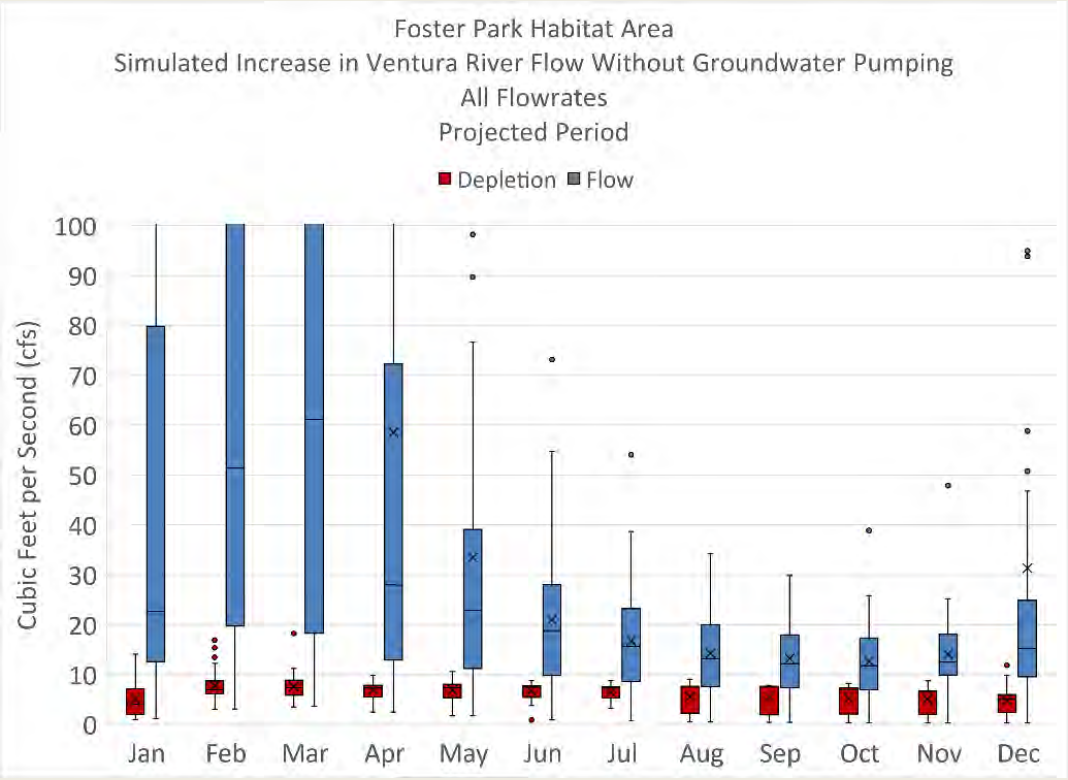






Note: Model is Daily Nov - March & Monthly April - Oct

STREAMFLOW DEPLETION
FOSTER PARK HABITAT AREA



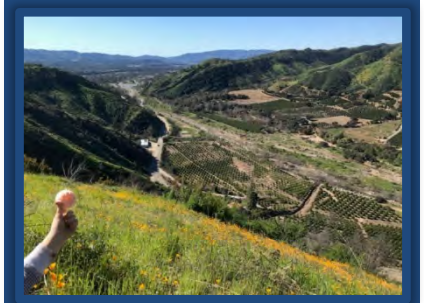
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median Flow	23	51	61	28	23	19	16	14	13	13	13	15
Median Depletion	4.0	7.0	7.4	7.3	7.4	7.5	7.3	7.5	7.5	7.1	6.6	5.1

All values are cubic feet per second (cfs)

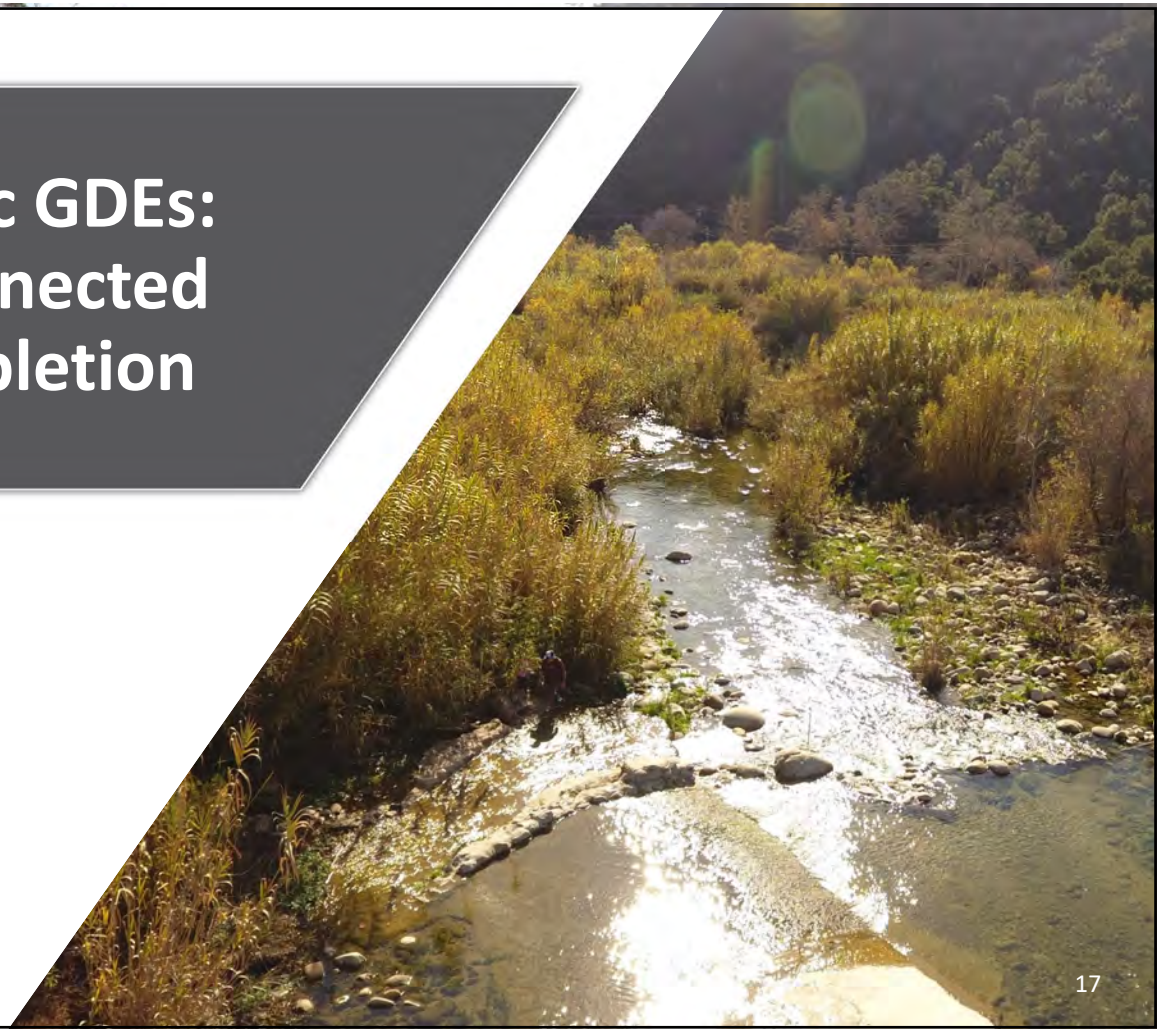
DRAFT

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

ISW DEPLETION EFFECTS ON AQUATIC GDES



Impacts to Aquatic GDEs: Effects of Interconnected Surface Water Depletion



Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

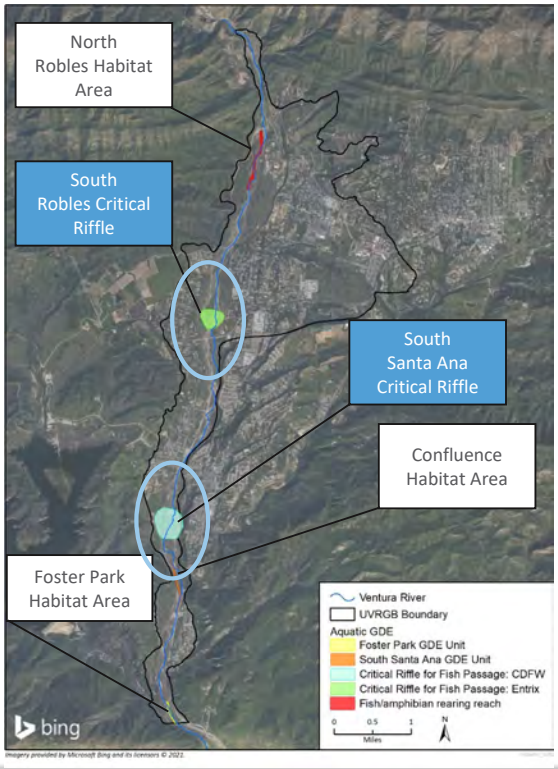
Effects of ISW Depletion on Aquatic GDEs

- Streamflow was modeled for each Aquatic GDE for wet, median, and dry years.
  - Streamflow without pumping
  - Streamflow with pumping

- Depletion = difference between modeled streamflow

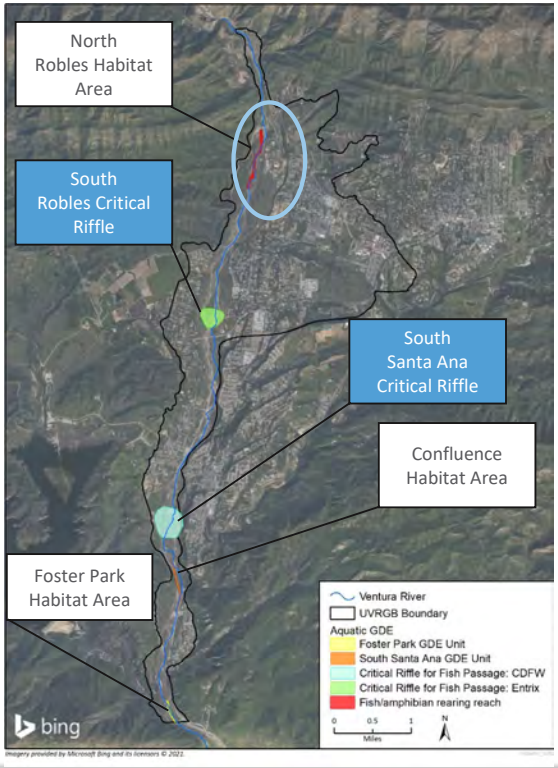
Effects on Aquatic GDEs: Critical Riffles

- South Robles & South Santa Ana Critical Riffle
  - Limited effect
  - Migration occurs during and following peak flows



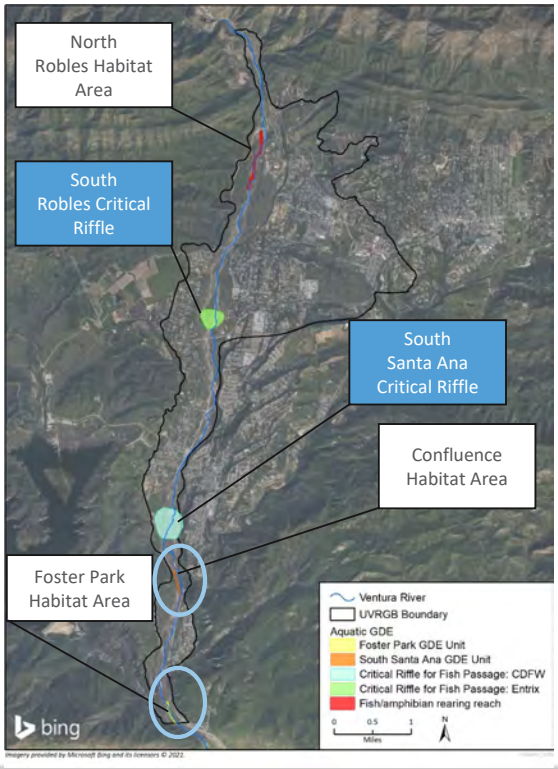
Effects on Aquatic GDEs: North Robles Habitat Area

- North Robles Habitat Area
  - Limited effect
  - Minimal impact from pumping



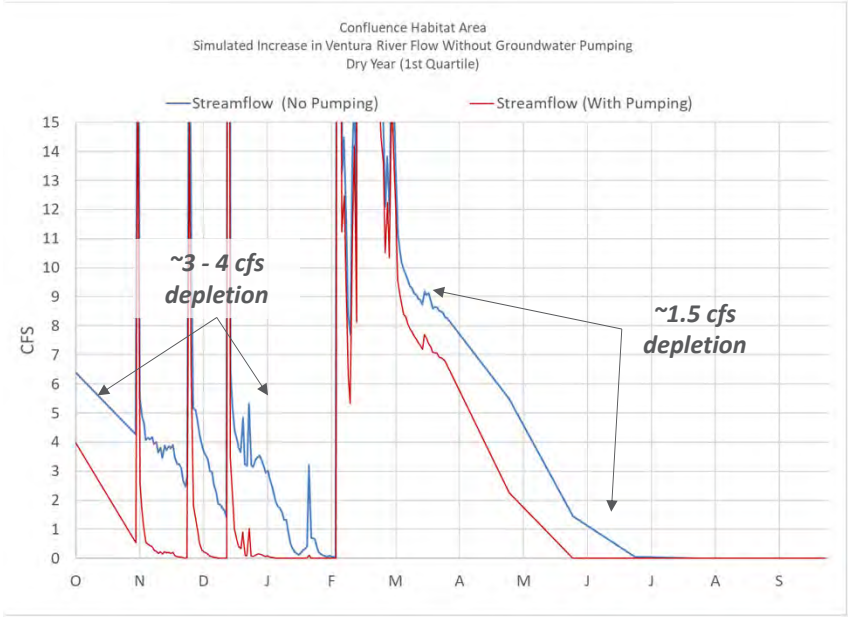
Effects on Aquatic GDEs: Confluence and Foster Park

- Confluence Habitat Area
- Foster Park Habitat Area



Effects on Aquatic GDEs: Confluence Habitat Area

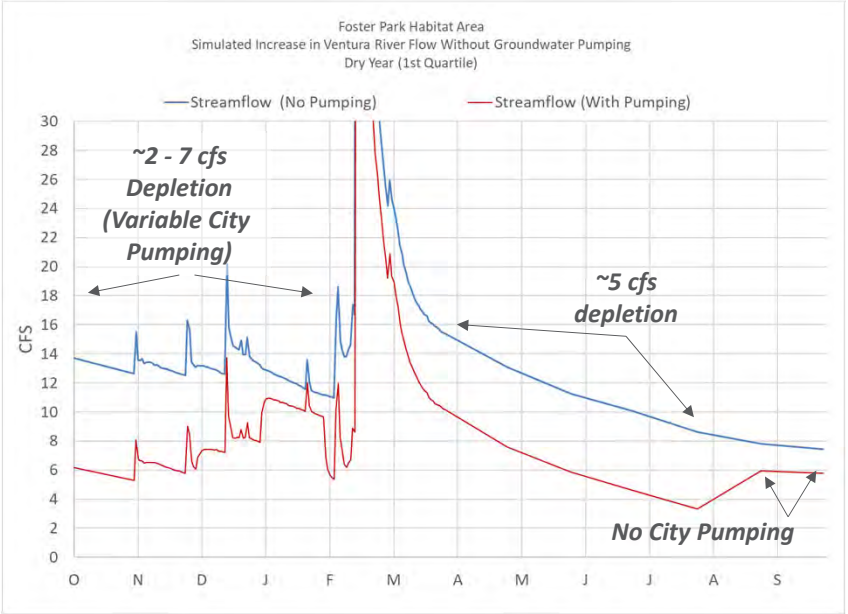
- Confluence Habitat Area
  - Effects from pumping are potentially significant during dry periods.
  - Effects to Aquatic GDEs are a data gap.
  - Future monitoring recommended to address data gap and determine if significant and unreasonable effects are occurring to the Aquatic GDEs.



Note: Model is Daily Nov - March & Monthly April - Oct

Effects of ISW Depletion on Aquatic GDEs

- Foster Park Habitat Area
  - Pumping can cause significant and unreasonable effects during dry periods.
  - City of Ventura has studied effects on Aquatic GDEs and believed to be best available information for this area.
  - City's minimum pumping thresholds are appropriate for MT
  - City monitoring, UVRGA to review results and incorporate into 5-year GSP revision



Monitoring and Management Considerations

- Monitor:
  - Surface flow, depletion rates, and groundwater levels
    - Locations: Foster Park and Confluence Aquatic Habitat Area GDEs
  - Aerial imagery of surface flow extents
    - Locations: Foster Park and Confluence Aquatic Habitat Area GDEs
  - Impacts on aquatic species during low flow conditions
    - Location: Confluence Aquatic Habitat Area GDE
- Track studies and monitoring by others in the UVRGB

Questions?

Upper Ventura River
GROUNDWATER AGENCY
SUSTAINABLE MANAGEMENT

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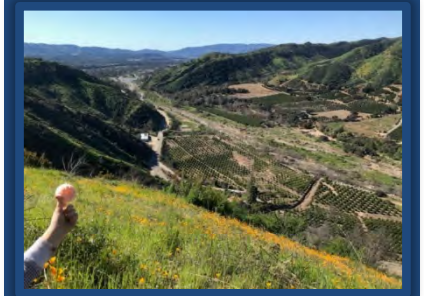
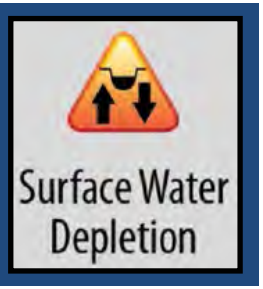
PROPOSED SCM DEPLETION OF INTERCONNECTED SURFACE WATER



ISW DEPLETION



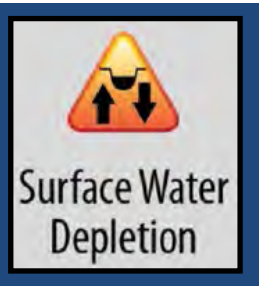
- Undesirable Result (Water Code §10721): Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

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

  The rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.

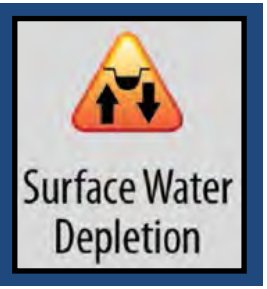
  - Must identify the location, quantity, and timing of depletions.

ISW DEPLETION



- GSA must address pumping–related impacts (depletion) that occurs during dry years and droughts
- It is critical to differentiate between depletion (caused by GW pumping) and natural low flow conditions. GSA is not required to address the latter.

ISW BENEFICIAL USES

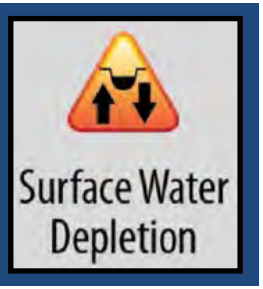


Diversions

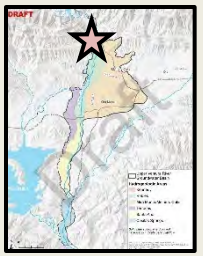
Recreation

Aquatic GDEs

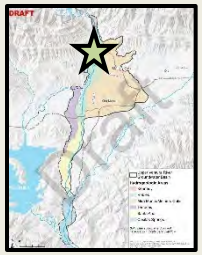
ISW DEPLETION EFFECTS ON DIVERSIONS



- Surface water diversions:
  - Rancho Matilija MWC (Kennedy Area)



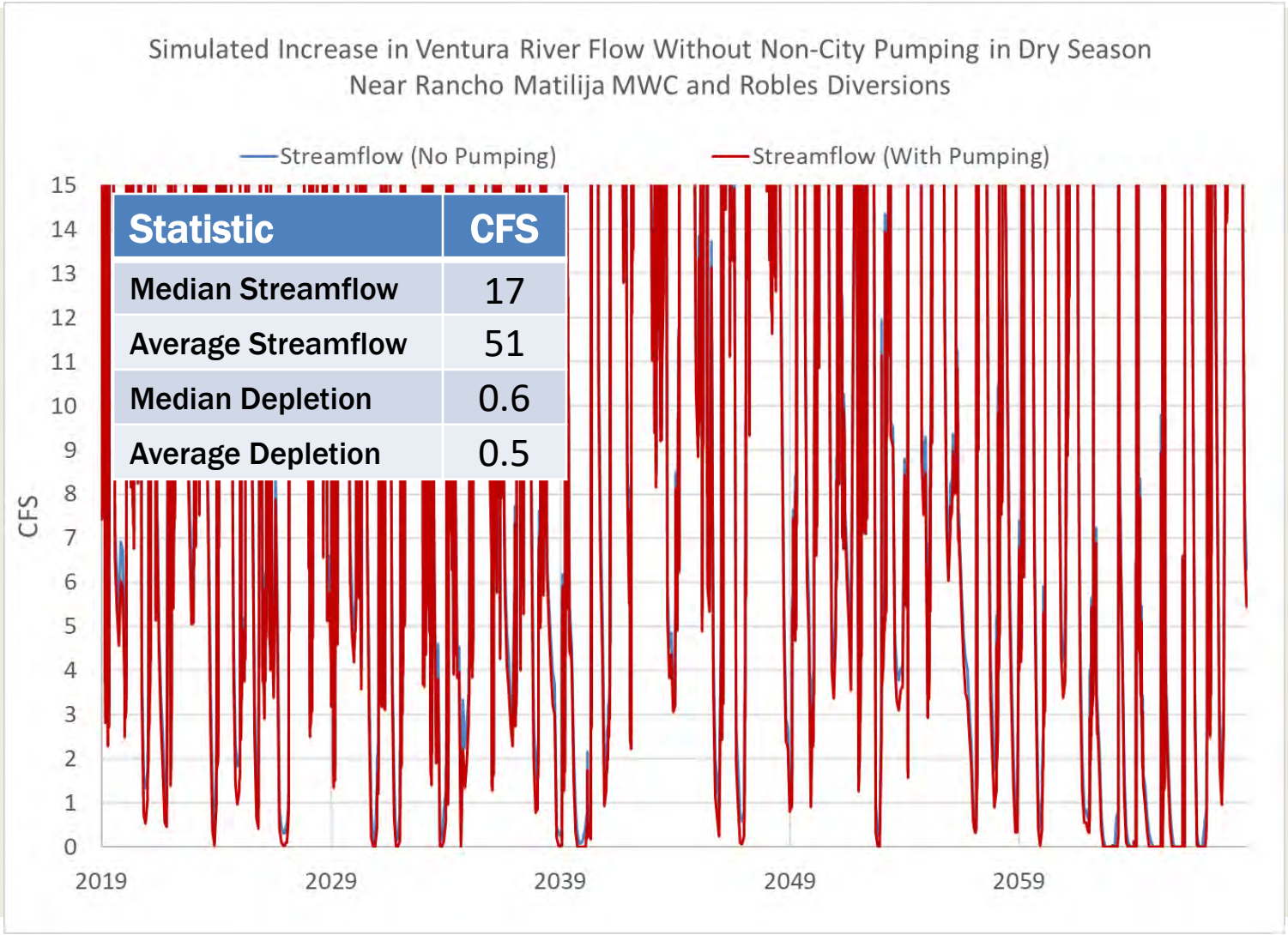
  - Robles Diversion (Robles Area)



  - Downstream of Basin:
    - Two small abandoned diversions

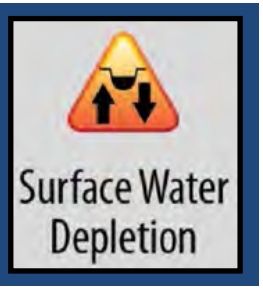
ISW DEPLETION EFFECTS ON DIVERSIONS

Surface Water Depletion



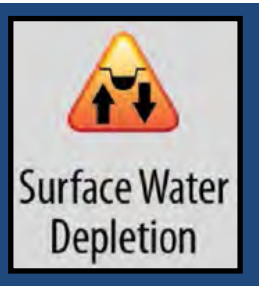
Statistic	CFS
Median Streamflow	17
Average Streamflow	51
Median Depletion	0.6
Average Depletion	0.5

ISW DEPLETION EFFECTS ON RECREATION



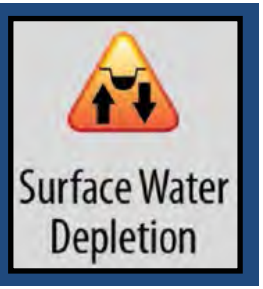
- Prominent Recreation Areas Coincide with Habitat Areas:
  - Robles "Pool" – Robles Habitat Area
  - Confluence / Steelhead Preserve – Confluence Habitat Area
  - Foster Park – Foster Park Habitat Area
- Assume no significant and unreasonable effects on recreation if GDEs are addressed?

ISW DEPLETION SMC AREAS SCREENED OUT



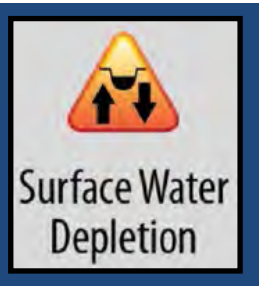
- Passage Areas and Robles Habitat Area:
  - No significant and unreasonable effects
  - No further consideration for SMC development

CONFLUENCE HABITAT AREA PROPOSED ISW SMC



- Unclear whether depletion causes significant and unreasonable effects
  - Data Gap: impact on fish during low flow conditions
- Study to determine effects on fish at low flow conditions
- Add MT/MO for Confluence Habitat Area during 1st or 2nd GSP update if significant and unreasonable effects determined to be likely

FOSTER PARK HABITAT AREA PROPOSED ISW SMC



- SGMA significant and unreasonable effects when depletion causes streamflow to decline below 2cfs at USGS gage (Hopkins, 2013)
- Minimum Threshold (MT) and Measurable Objectives (MO) based on not depleting below 2cfs
- City to voluntarily implement Foster Park protocols and monitor
- Additional monitoring and modeling to better quantify depletion by upstream pumping
- Update MT/MO during 1st or 2nd GSP update based on monitoring results

Hopkins, 2013 available at: https://uvrgroundwater.org/library/

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QUESTIONS?