

Salinas River Operations

Habitat Conservation Plan

salinasrivermanagementprogram.org



Habitat Conservation Plan Reservoir Release Protocols and Modeling Effort

Bernadette Clueit – ICF



Purpose of HCP Modeling

Develop new reservoir operations protocol to meet agency mission and obligations while minimizing effects to species covered under the HCP.

MCWRA Guiding Principles

- Stop seawater intrusion
- Improve long-term hydrologic balance between groundwater recharge and withdrawal
- Provide a sufficient water supply to meet existing needs and to serve as the foundation to meet future water needs

Agency Obligations

- Flood control and prevention
- Provide recharge of Salinas Valley water supply aquifers through Salinas River percolation
- Enhance steelhead migration opportunities
- Comply with existing water rights
- SRDF operation

Current Actions

2005 Flow Prescriptions

- Adult steelhead upstream migration
 - 5 more days of 260 cfs at Chualar when the Salinas River mouth is open to the ocean
- Smolt outmigration
 - Reservoir storage, and
 - Block-flows
- Kelt downstream migration
 - After smolt block-flow criteria 45 cfs for 10 days or until the Salinas River mouth has closed to the ocean

Interim Operations Plan

Purpose – supplement the existing Flow Prescription and acquire information to support HCP development

- Attempt to mimic natural hydrograph during storm events that have the potential to produce connected flow, but may not provide adequate steelhead passage
- Interim operations are triggered when specific conditions are met:
 - Less than 16 passage days have occurred
 - Inflow at reservoirs exceeds minimum releases
 - Flow from Arroyo Seco is >173 cfs
 - Salinas Lagoon is open to the ocean

Components of the HCP Reoperation Protocols

- Flood control and prevention
- Groundwater recharge
- Comply with existing water rights
- Minimize effects to covered species through targeted reservoir releases

Minimize Effects to Species

Steelhead

- Adult upstream passage
 - Establish upstream passage criteria based on CRA results.
- Smolt and kelt downstream passage
 - Establish downstream passage criteria based on CRA results.
- Provide suitable rearing and spawning habitat in Nacimiento and San Antonio Rivers
 - Establish minimum flows to support rearing and spawning lifestages.
- Provide access to habitat located in the Arroyo Seco
 - Develop targeted releases to promote access to and from Arroyo Seco basin during adult and smolt migration periods.

Other Covered Species

Questions and Comments?



HCP Comparison Point Scenarios: Hydrological Modeling Results

Matt Baillie – West Yost





Groundwater-Surface Water Modeling Update

August 7th, 2024

Outline

- Background
- Modeling Process To Date
- HCP Comparison Point Scenarios
- Upcoming Work

Background

Background

- Salinas River Operations HCP is investigating the occurrence of conditions in the Salinas River and its tributaries conducive to the **migration** of threatened SCCC steelhead trout between the **Pacific Ocean** and **spawning grounds**
- HCP Comparison Point Scenarios simulate the system under **all, some, or none** of the **current operational approach** MCWRA uses for the Nacimiento and San Antonio Reservoirs
- These scenarios can be **compared** to each other to show the effect of the current operational approach on the system, and will be used to determine the effect of operational changes included in the Reoperation Scenarios (to be developed)

Background

- Relies on the Salinas Valley Operational Model (SVOM or Operational Model), currently under development by the USGS
- MODFLOW-OWHM model of the groundwater-surface water system in the alluvial basin, with Nacimiento and San Antonio Reservoirs integrated using the Surface Water Operations Process (SWO)
- Built from Salinas Valley Integrated Hydrologic Model (SVIHM or Historical Model)
- All results are considered provisional until final (published) model version is used

Background

USGS Disclaimer:

SVOM Model: Unofficial Collaborator Development Version of Preliminary Model. Access to this repository and use of its data is limited to those who are collaborating on the model development. Once the model is published and recieved [sic] full USGS approval it will be archived and released to the public. This preliminary data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided specifically to collaborate with agencies who are contributing to the model development and meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.

Background

Water Year Types

- **Water year type** is determined based on the average annual (water year) streamflow at the Arroyo Seco near Soledad gauge using exceedance probability:
 - Wet: Exceedance probability 0% to 25% (wettest 25% of years)
 - Wet-Normal: Exceedance probability 25% to 41.7%
 - Normal: Exceedance probability 41.7% to 58.3%
 - Dry-Normal: Exceedance probability 58.3% to 75%
 - Dry: Exceedance probability 75% to 100% (driest 25% of years)

Background

Water Year Types

- **Operational water year type** is determined on 3/15 each year and re-calculated on 4/1 each year, based on correlation between average annual streamflow and 3/15 or 4/1 streamflow at Arroyo Seco near Soledad gauge:
 - Wet: Exceedance probability 0% to 25% (wettest 25% of years)
 - Normal: Exceedance probability 25% to 75%
 - Dry: Exceedance probability 75% to 100% (driest 25% of years)
- Operational decisions (e.g., smolt block flow) are made based on operational water year type

Modeling Process To Date

Modeling Process to Date

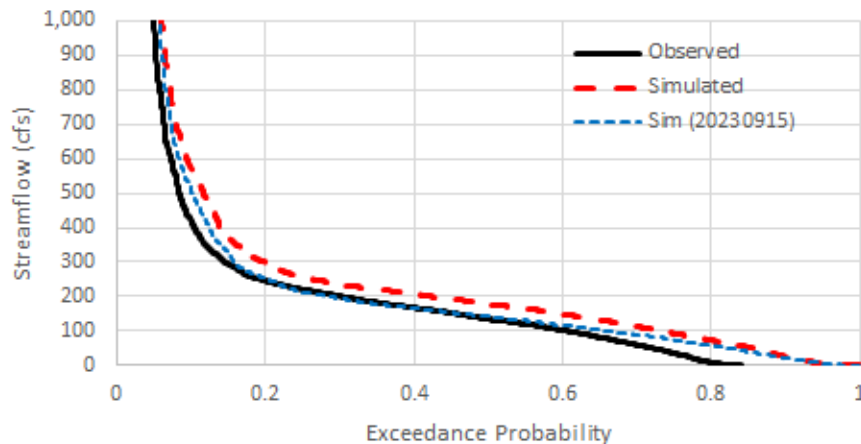
- USGS provided preliminary versions of SVIHM and SVOM in Summer/Fall 2023
- HCP Comparison Point Scenarios developed in Fall 2023
- Recognized that SVIHM over-predicted lower streamflows in Salinas River in Fall/Winter 2023
- Developed Bias Correction process in Winter/Spring 2024
- Ran “Final” HCP Comparison Point Scenarios in Spring 2024
- USGS released updated preliminary versions of SVIHM and SVOM in May 2024
- Draft documentation of HCP Comparison Point Scenarios released in July 2024

Modeling Process to Date

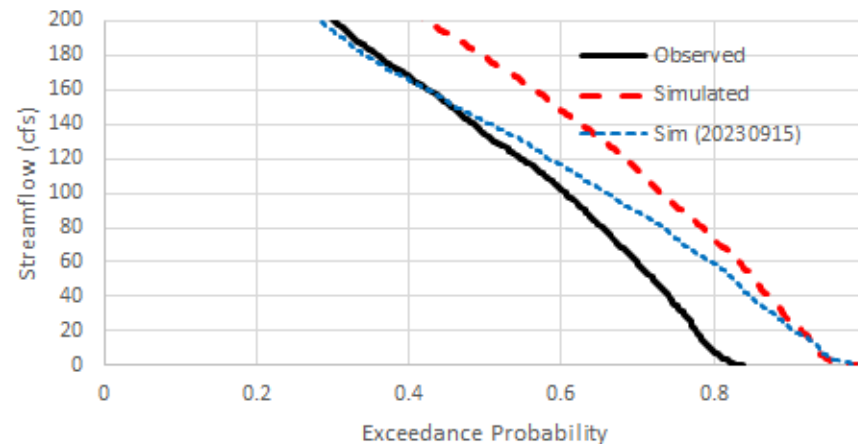
Analysis of May 2024 Model Update

- At Soledad, the updated model has a slightly better r^2 and regression slope slightly closer to 1
- Exceedance probabilities were closer to the observed data for the previous model version

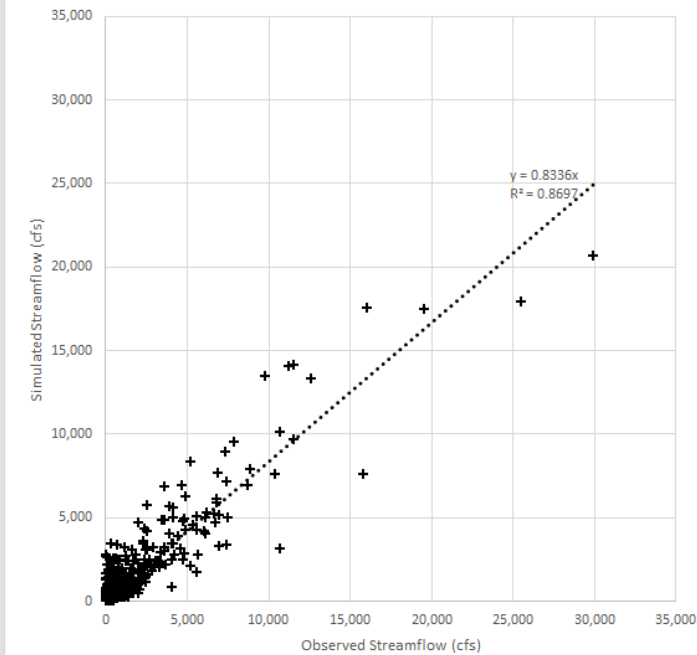
Salinas River at Soledad



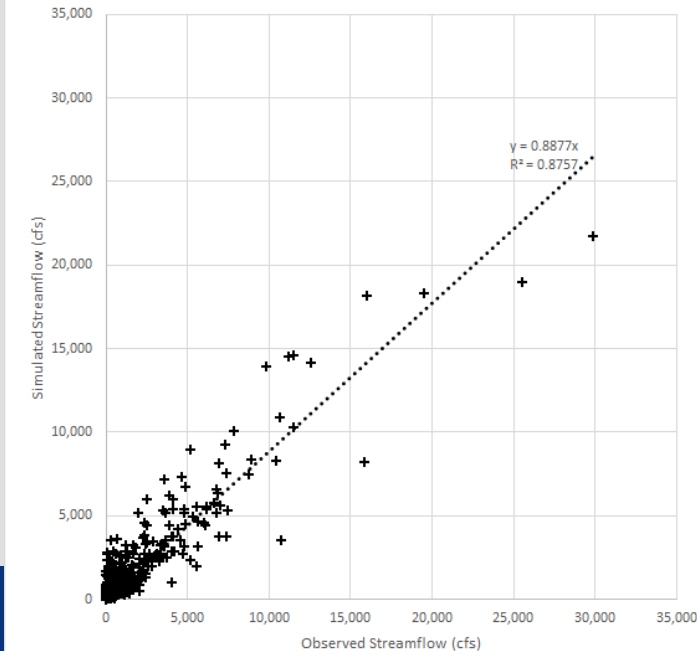
Salinas River at Soledad



Historical Scenario w/ 15 Sep 2023 SVIHM



Historical Scenario w/ 16 May 2024 SVIHM

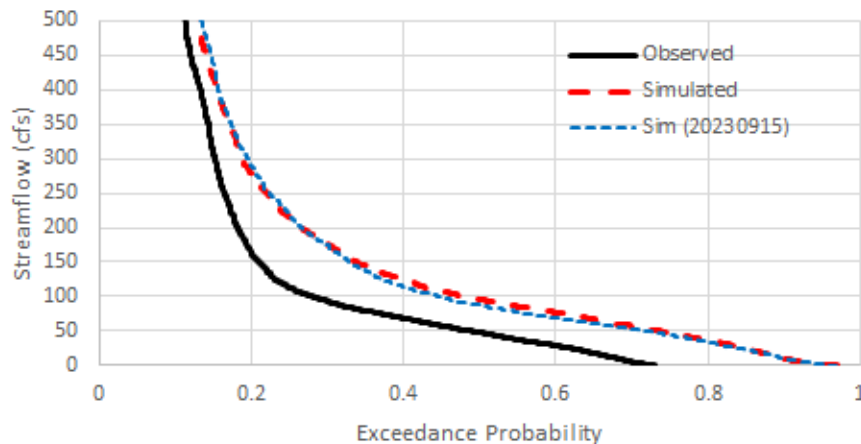


Modeling Process to Date

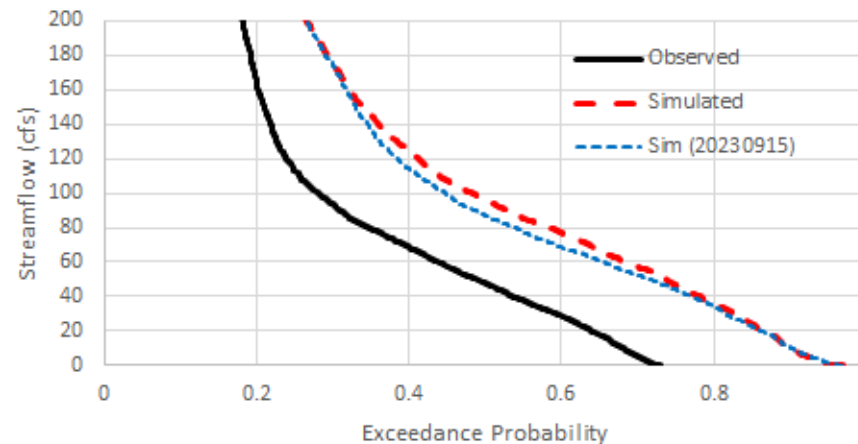
Analysis of May 2024 Model Update

- At Chualar, the updated model has a slightly better r^2 and regression slope slightly closer to 1
- Almost no difference in exceedance probabilities between the previous and latest model versions

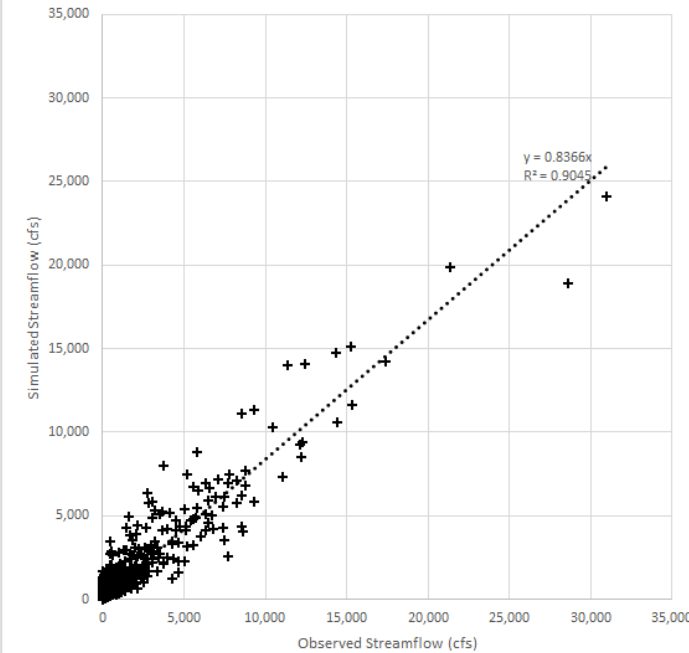
Salinas River at Chualar



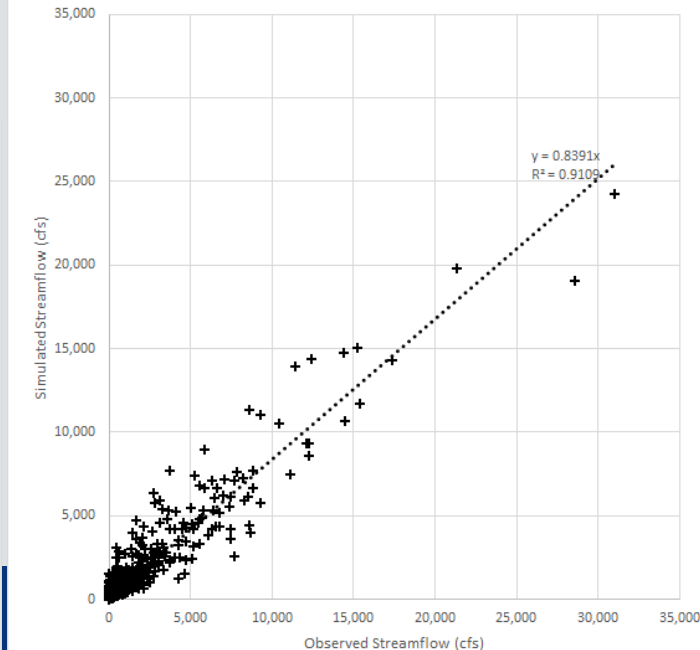
Salinas River at Chualar



Historical Scenario w/ 15 Sep 2023 SVIHM



Historical Scenario w/ 16 May 2024 SVIHM

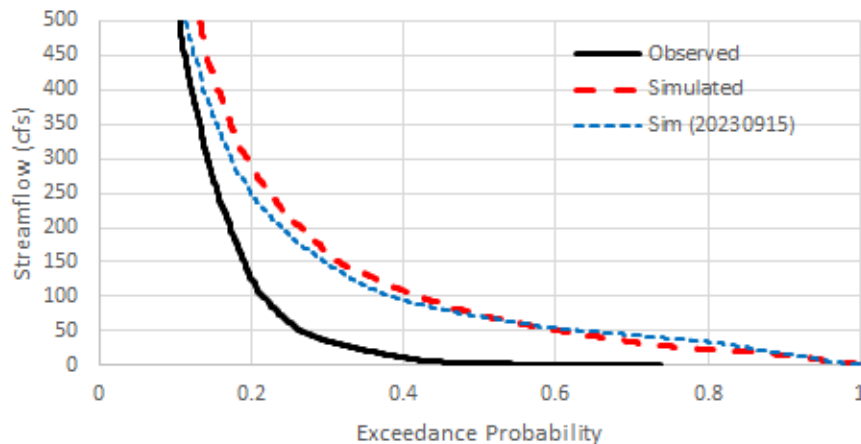


Modeling Process to Date

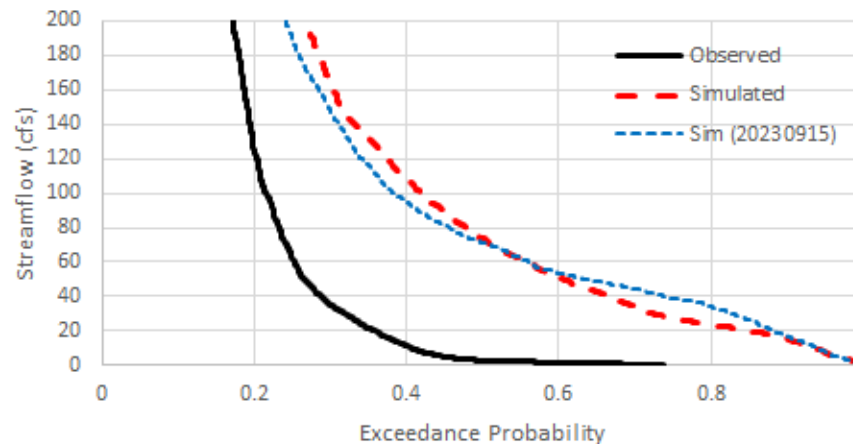
Analysis of May 2024 Model Update

- At Spreckels, The updated model has a slightly worse r^2 and regression slope slightly closer to 1
- Exceedance probabilities were slightly closer to observed over most of range < 500 cfs, except between ~ 20 and 55 cfs

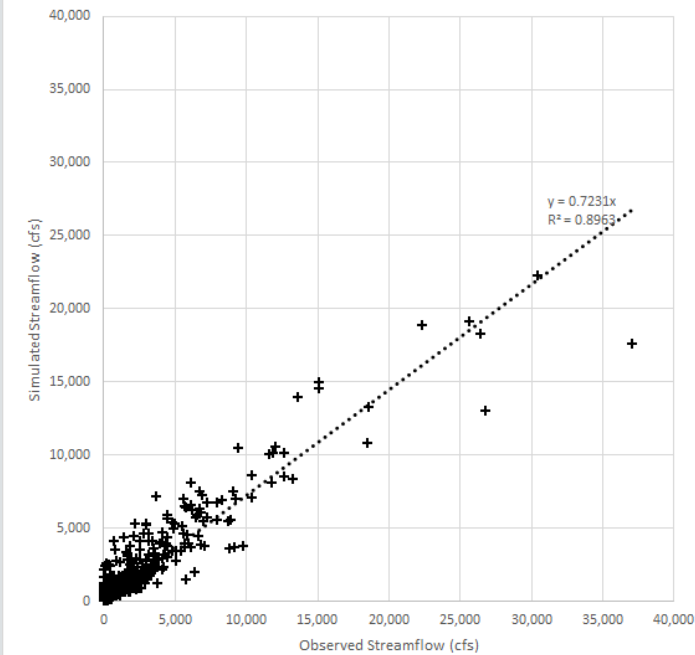
Salinas River at Spreckels



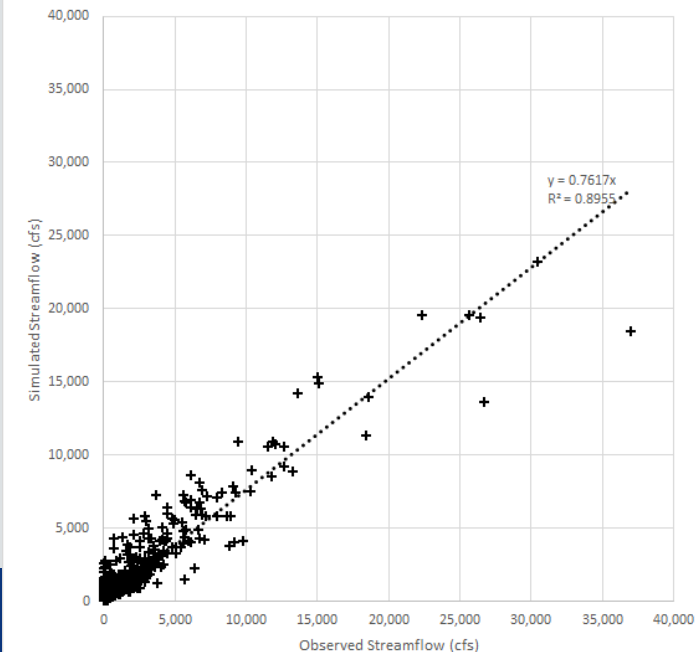
Salinas River at Spreckels



Historical Scenario w/ 15 Sep 2023 SVIHM



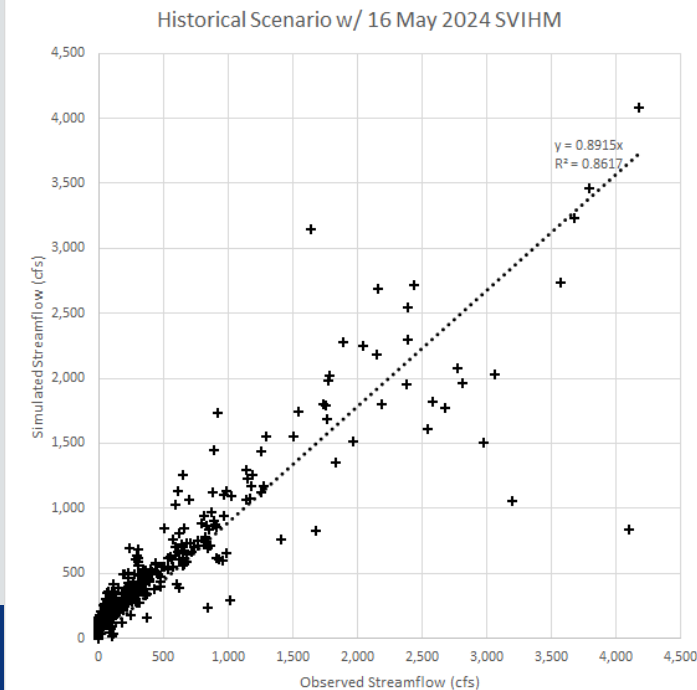
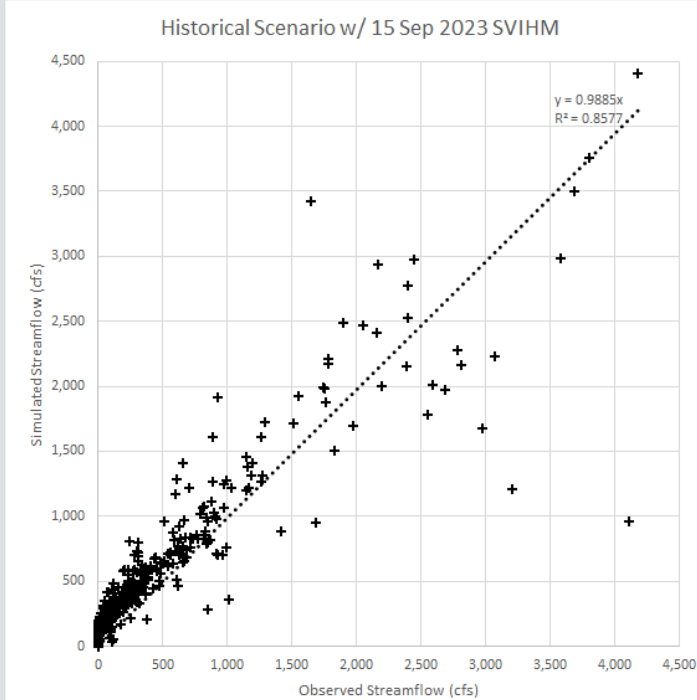
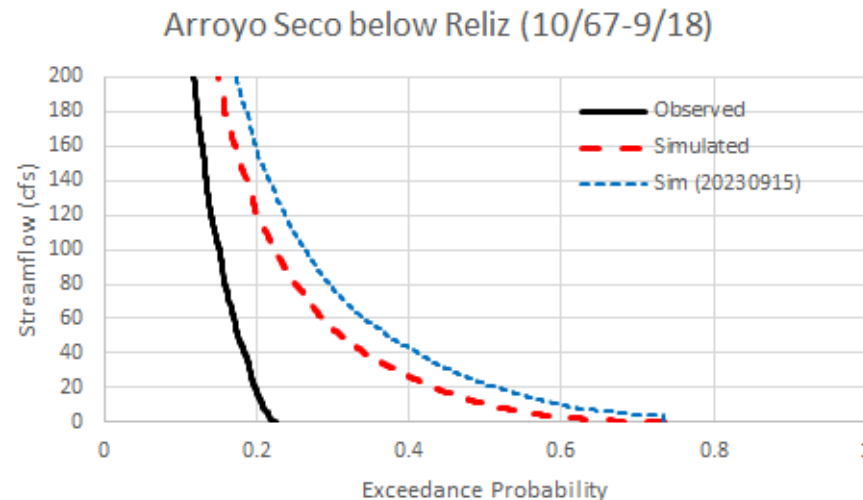
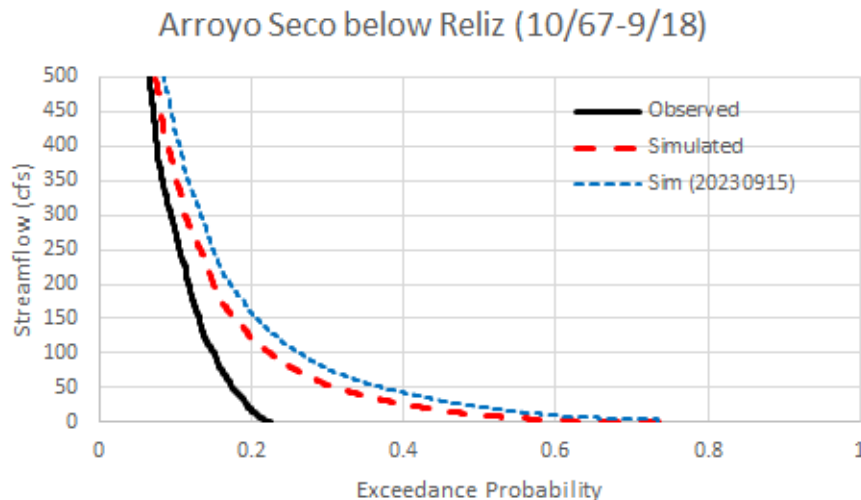
Historical Scenario w/ 16 May 2024 SVIHM



Modeling Process to Date

Analysis of May 2024 Model Update

- At Arroyo Seco below Reliz Creek, the updated model has a slightly better r^2 but a lower regression slope
- The updated model exceedance probability curve is somewhat closer to the observed



Modeling Process to Date

Analysis of May 2024 Model Update

- HCP Comparison Point Scenarios had already been run prior to May 2024 Update
- May 2024 Update does not seem to produce substantially better simulation of observed streamflows
- Therefore, decided to move forward with existing HCP Comparison Point Scenario runs using September 2023 model version

Modeling Process to Date

Model Modifications

- Minimum Conservation Release (to prevent diversion of natural flows)
- Update to Kelt and Juvenile Release Rules
- Smolt and Kelt Counter Incrementation
- Timestep Streamflow Inputs
- Bias Correction
- Customized Outputs

HCP Comparison Point Scenarios

HCP Comparison Point Scenarios

Three Comparison Point Scenarios:

- Current Operations Scenario
 - Matches, as closely as possible, the operational approach currently employed by MCWRA for the reservoirs and related projects and programs
- No Flow Prescription Scenario
 - Identical to Current Operations Scenario, with rules of Flow Prescription removed
- No Operations Scenario
 - Identical to Current Operations Scenario with all reservoir operations removed
 - Reservoirs release as much water as possible at all times, subject to physical limitations

HCP Comparison Point Scenarios

Scenario Design

	Current Operations Scenario	No Flow Prescription Scenario	No Operations Scenario
Flood Rule Curves	Current Curves	No Changes	Removed
Release Capacity	Current Capacities	No Changes	No Changes
Release Balancing	Prioritize Nacimiento	No Changes	No Prioritization
Operational Pools	Current Pools	No Changes	No Pools
Fish Passage Requirements	Current Approach	Removed	Removed
SRDF Operations	Current Approach	2 cfs Bypass Flow Removed	Removed
Fish and Wildlife Habitat Releases	Nacimiento: 60 cfs San Antonio: 10 cfs	Nacimiento: 25 cfs San Antonio: 10 cfs	Removed
SLO Allotment	Current Table	No Changes	Removed
Water Rights	Current Rights	No Changes	Removed

HCP Comparison Point Scenarios

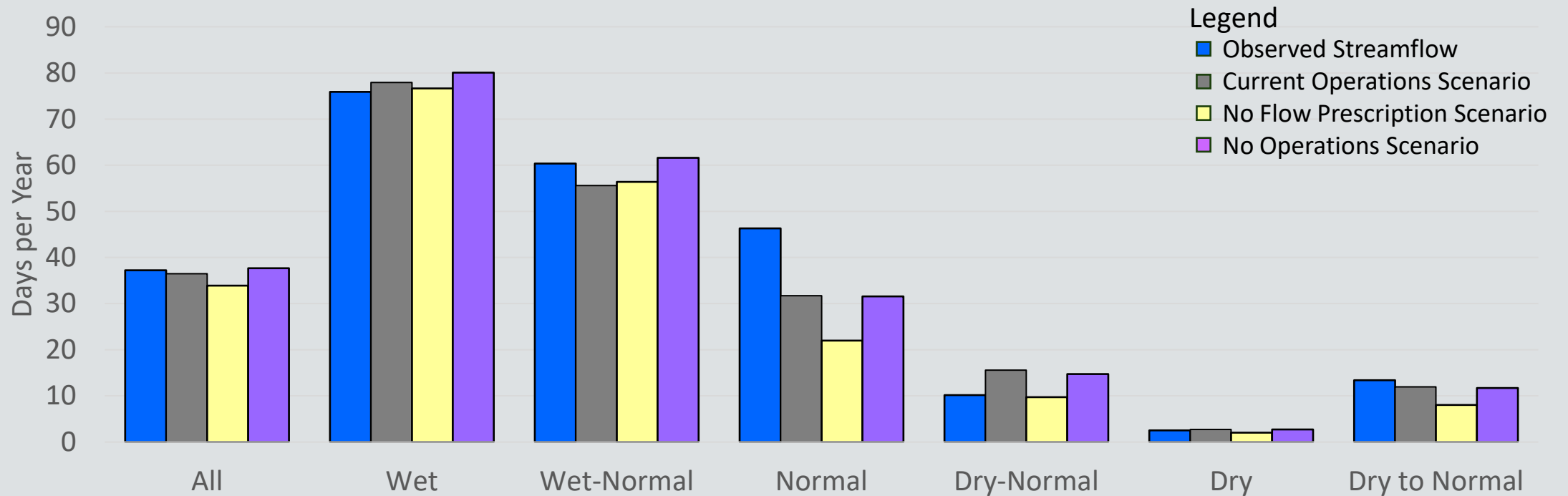
Scenario Intercomparison

- Current Operations Scenario – No Operations Scenario = Effect of Current Operational Approach
- Current Operations Scenario – No Flow Prescription Scenario = Effect of Flow Prescription Rules
- No Flow Prescription Scenario – No Operations Scenario = Effect of Current Operational Approach Without Flow Prescription Rules

HCP Comparison Point Scenarios

Adult Passage Days

- Days per year, 1/1 to 3/31, with at least 260 cfs in Salinas River at Chualar, and Salinas River Lagoon open to ocean



HCP Comparison Point Scenarios

Adult Passage Days

- Days per year, 1/1 to 3/31, with at least 260 cfs in Salinas River at Chualar, and Salinas River Lagoon open to ocean

Water Year Type	Observed (Timestep-Averaged)	Current Operations Scenario	No Flow Prescription Scenario	No Operations Scenario
All	37	37	34	38
Wet	76	77	77	80
Wet-Normal	60	56	56	62
Normal	46	33	22	32
Dry-Normal	10	16	10	15
Dry	3	3	2	3
Dry to Normal	13	12	8	12

HCP Comparison Point Scenarios

Smolt Block Flow Triggers

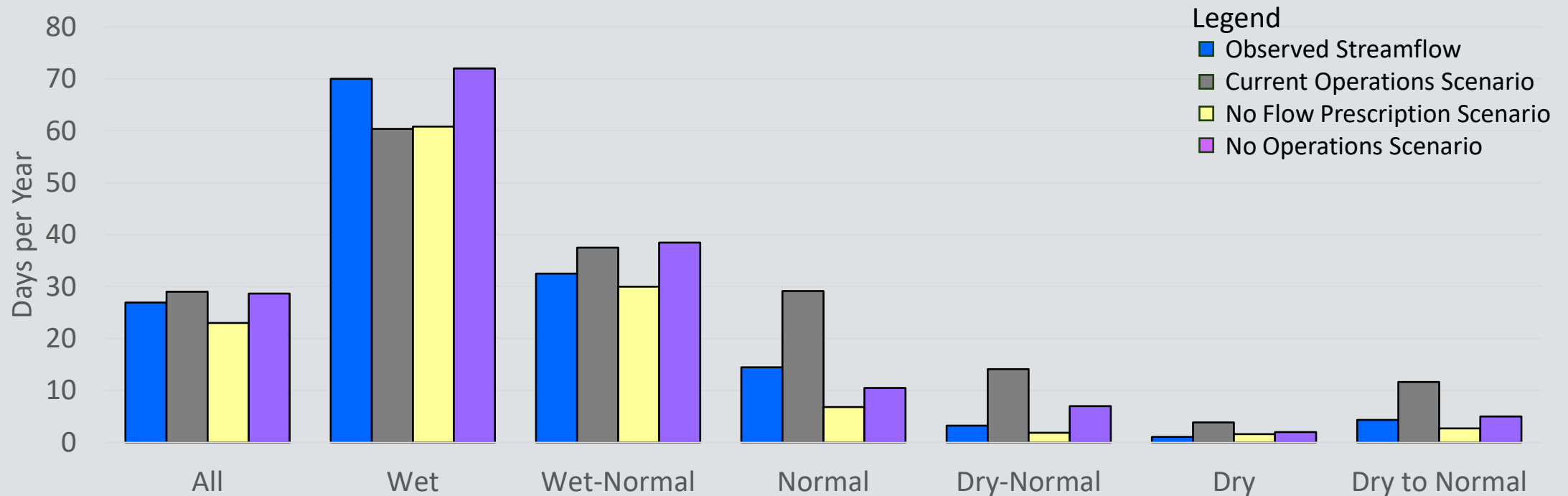
- Percentage of normal years with $\geq 150,000$ af total reservoir storage on 3/15 and natural flow triggers met (≥ 125 cfs at Sapaque OR ≥ 70 cfs at Reliz)

Water Year Type	Observed (Timestep-Averaged)	Current Operations Scenario	No Flow Prescription Scenario	No Operations Scenario
Total Number of Normal Years	20	25	25	25
Normal Years with Smolt Block Flow Triggers Met	15	19	18	0
Percentage of Normal Years with Triggers Met	75%	76%	72%	0%

HCP Comparison Point Scenarios

Outmigration Passage Days

- Days per year, 3/15 to 6/30, with at least 150 cfs in Salinas River at Spreckels, and Salinas River Lagoon open to the ocean



HCP Comparison Point Scenarios

Outmigration Passage Days

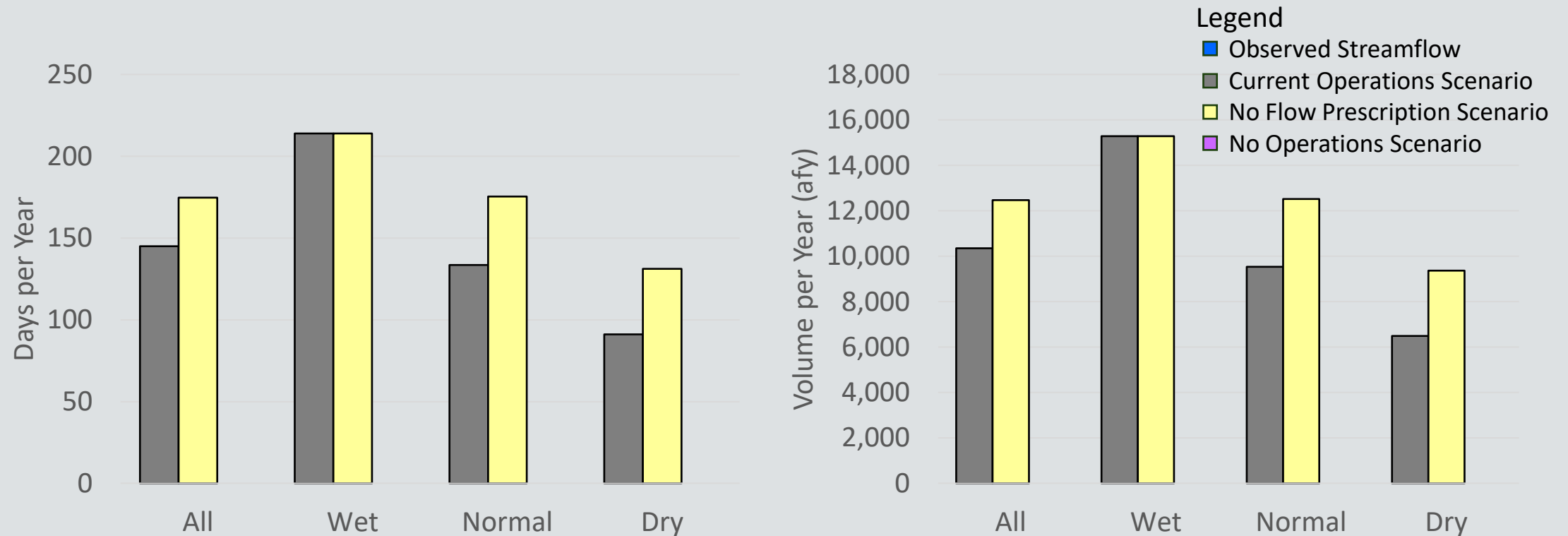
- Days per year, 3/15 to 6/30, with at least 150 cfs in Salinas River at Spreckels, and Salinas River Lagoon open to the ocean

Water Year Type	Observed (Timestep-Averaged)	Current Operations Scenario	No Flow Prescription Scenario	No Operations Scenario
All	27	29	23	29
Wet	70	60	61	72
Wet-Normal	33	38	30	39
Normal	15	29	7	11
Dry-Normal	3	14	2	7
Dry	1	4	2	2
Dry to Normal	4	12	3	5

HCP Comparison Point Scenarios

SRDF Operations

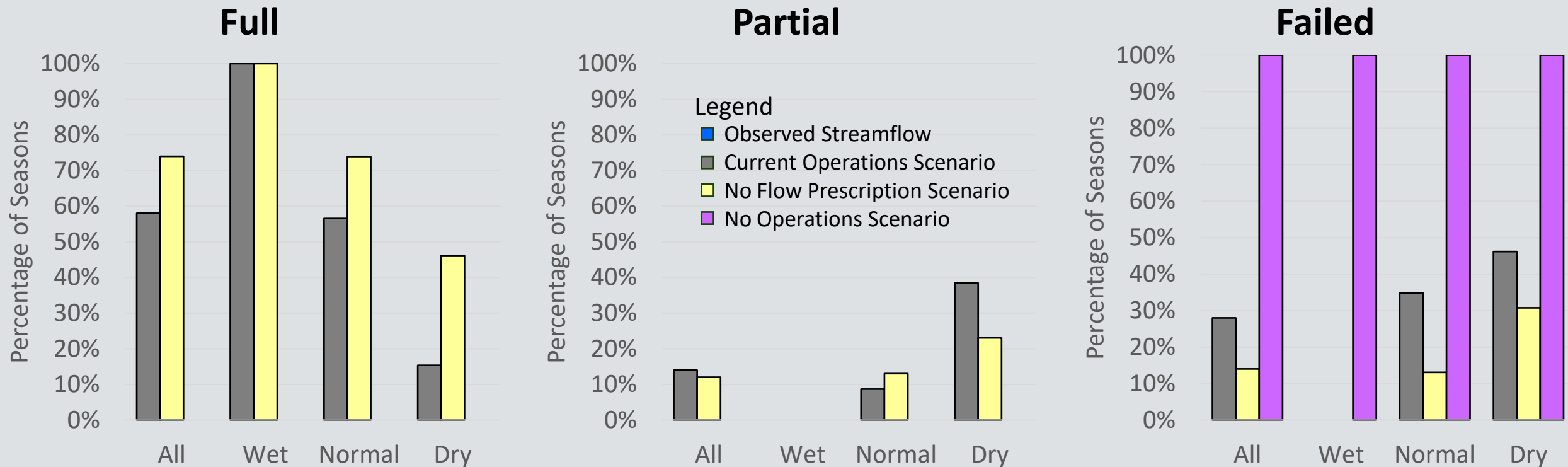
- Days and volume of diversion, 4/1 to 10/31



HCP Comparison Point Scenarios

SRDF Operations

- Full season = 214 days, Partial season = 1 to 213 days, Failed season = 0 days



HCP Comparison Point Scenarios

SRDF Operations

- Days and volume of diversion, 4/1 to 10/31
- Full season = 214 days, Partial season = 1 to 213 days, Failed season = 0 days

Water Year Type		Observed (Timestep-Averaged)	Current Operations Scenario	No Flow Prescription Scenario	No Operations Scenario
All	Div. Days	--	145	175	0
	Div. Volume	--	10,400	12,500	0
	Full Part Fail	64% 9% 27%	58% 14% 28%	74% 12% 14%	0% 0% 100%
Wet	Div. Days	--	214	214	0
	Div. Volume	--	15,300	15,300	0
	Full Part Fail	100% 0% 0%	100% 0% 0%	100% 0% 0%	0% 0% 100%
Normal	Div. Days	--	134	175	0
	Div. Volume	--	9,600	12,500	0
	Full Part Fail	50% 25% 25%	57% 9% 35%	74% 13% 13%	0% 0% 100%
Dry	Div. Days	--	91	131	0
	Div. Volume	--	6,500	9,400	0
	Full Part Fail	50% 0% 50%	15% 38% 46%	46% 23% 31%	0% 0% 100%

Upcoming Work

Upcoming Work

Reoperation Scenarios

- Effect of reoperation of the reservoirs

Modified Pumping Scenarios

- Effect of pumping on conditions in the system

THANK YOU

WESTYOST.COM

HCP Comparison Point Scenarios: Habitat Modeling Results

Forrest Carpenter – ICF
Bernadette Clueit – ICF



→ Salinas River Operations HCP → Technical Advisory Committee Meeting

08/07/2024

Bernadette Clueit, ICF
Forrest Carpenter, ICF





Steelhead Habitat Modeling in the Nacimiento and San Antonio Rivers

- Methods for Evaluating Effects to Rearing and Spawning Lifestages in the Lower Nacimiento and San Antonio Rivers
- Preliminary Results for Rearing and Spawning Life stages



→ Agenda



Methods

1. Establish **channel transects** in reaches in Nacimiento and San Antonio Rivers and measure channel elevation, water depth, substrate, channel width, and velocity measurements along transects at high and low flows.
2. Develop Hydraulic Model (**HEC-RAS**) using instream transect data and Lidar.
3. Compile **SVOM Streamflow** estimates for all transect locations for each operational scenario (1968 – 2018).
4. Apply daily streamflow estimates to **HEC-RAS** to estimate **channel depth, velocity, and wetted area** for each operational scenario at each field measured transect.

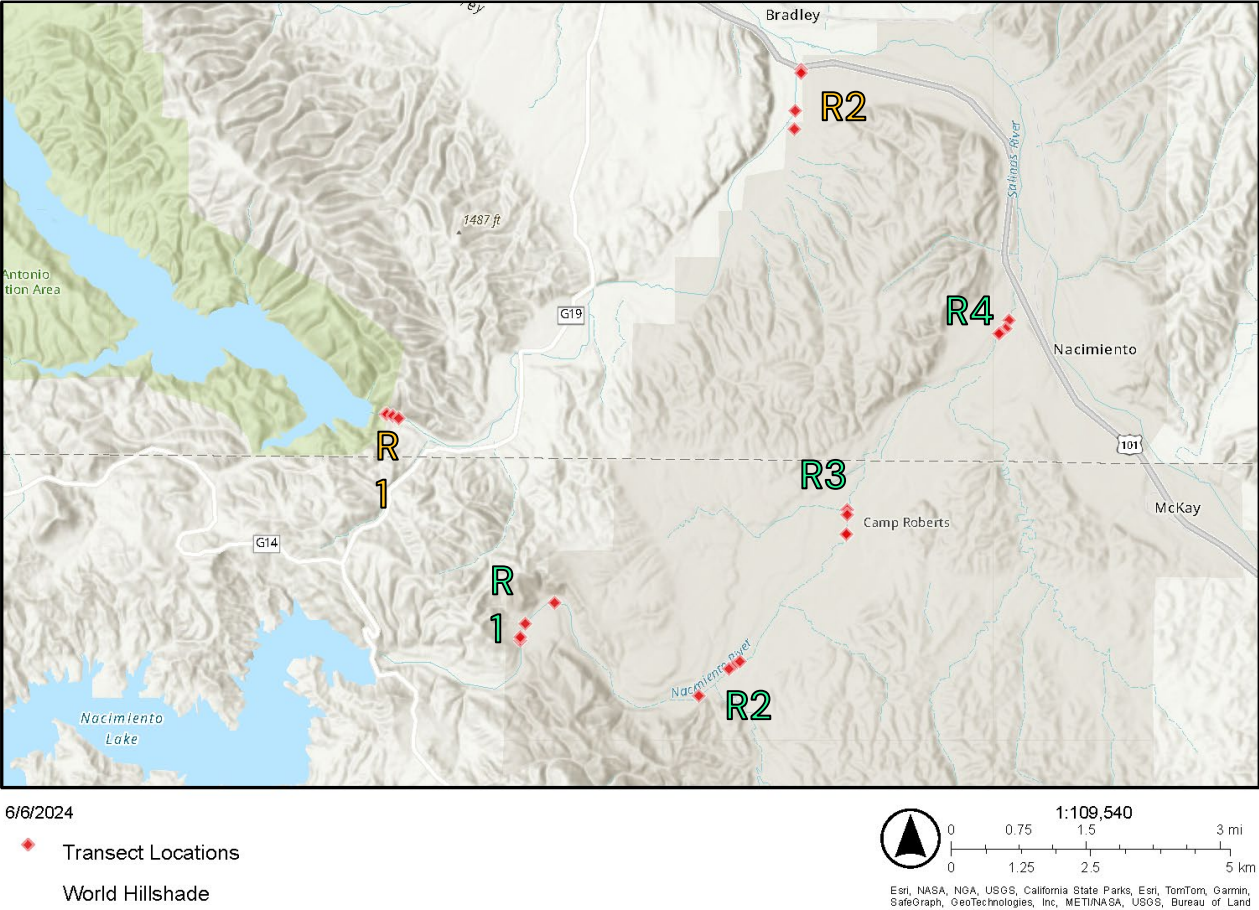
→ Methods

Nacimienta: 16 Transects in 4 Reaches

San Antonio: 8 Transects in 2 Reaches

Nacimienta River		
Reach	Transect ID	Interpolated Flow at Time of Survey (cfs)
Reach 1	R1 R4	60.9
	R1 G4	73.7
	R1 P5	73.7
	R1 F2	75.9
Reach 2	R2 P3	58.8
	R2 G1	73.7
	R2 R3	73.7
	R2 F1	60.9
Reach 3	R3 F1	58.8
	R3 G2	58.8
	R3 R4	58.8
	R3 P3	58.8
Reach 4	R4 F1	60.9
	R4 G1	60.9
	R4 R1	58.8
	R4 P1	58.8

San Antonio		
Reach	Name	Flow
Reach 1	R1 F2	14.7
	R1 G2	12.7
	R1 R6	11
	R1 P2	11.2
Reach 2	R2 F3	9
	R2 G1	6.2
	R2 P1	8.9
	R2 R1	8.9

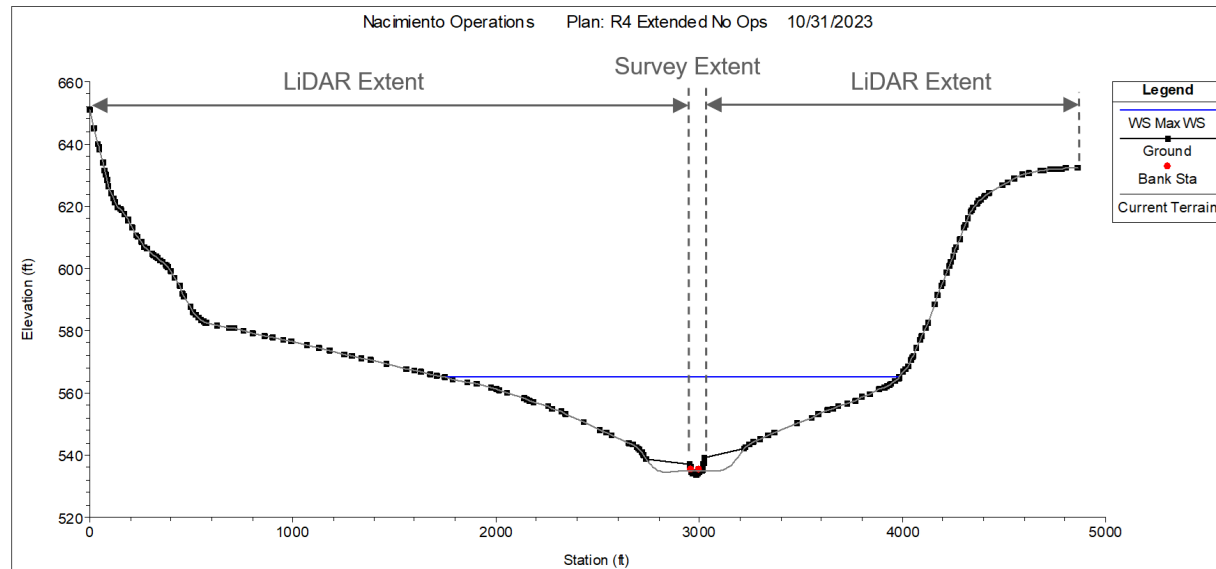


→ Surveyed Channel Transects

- 1. Establish **channel transects** in reaches in Nacimiento and San Antonio Rivers and measure channel elevation, water depth, substrate, channel width, and velocity measurements along transects at high and low flows.
- 2. Develop Hydraulic Model (**HEC-RAS**) using instream transect data and Lidar.
- 3. Compile **SVOM Streamflow** estimates for all transect locations for each operational scenario (1968 – 2018).
- 4. Apply daily streamflow estimates to **HEC-RAS** to estimate **channel depth, velocity, and wetted area** for each operational scenario at each field measured transect.

→ Methods

- Develop and Calibrate a 1-Dimensional HEC-RAS model using a combination of in-stream transect measurements and Lidar

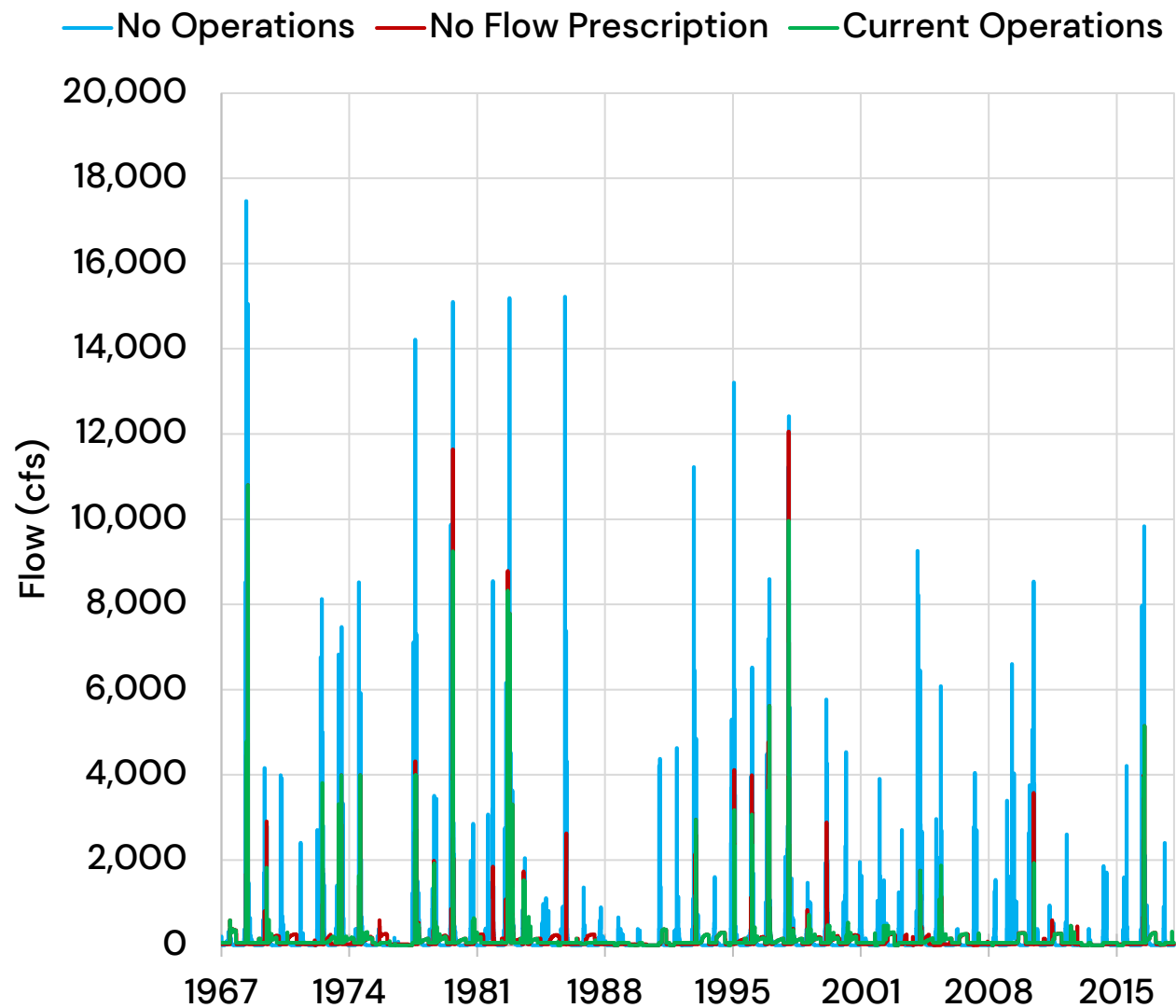


→ Calibrate HEC-RAS Model

River	Reach	Habitat	Name	Slope for Normal Depth Boundary Condition	Invert Elevation (feet)	Manning's Roughness Coefficient		
						Left Bank	Channel	Right Bank
Nacimient River	Reach 1	Run	R1 R4	0.006	592.79	0.1	0.06	0.07
		Glide	R1 G4		593.24	0.1	0.06	0.08
		Pool	R1 P5		591.87	-	0.045	-
		Riffle	R1 F2		590.05	0.085	0.045	0.085
	Reach 2	Pool	R2 P3	0.01	572.13	0.1	0.06	0.1
		Glide	R2 G1		571.56	0.085	0.04	0.08
		Run	R2 R3		570.63	0.06	0.04	0.09
		Riffle	R2 F1		570.78	0.05	0.04	0.1
	Reach 3	Riffle	R3 F1	0.0001	560.45	0.1	0.04	0.1
		Glide	R3 G2		559.69	0.1	0.06	0.1
		Run	R3 R4		558.86	0.095	0.04	0.095
		Pool	R3 P3		556.82	0.1	0.08	0.1
	Reach 4	Riffle	R4 F1	0.00006	535.26	0.057	0.06	0.085
		Glide	R4 G1		533.73	0.065	0.06	0.1
		Run	R4 R1		533.71	0.09	0.04	0.09
		Pool	R4 P1		532.06	0.1	0.1	0.095
San Antonio River	Reach 1	Riffle	R1 F2	0.000035	589.36	0.057	0.04	0.055
		Glide	R1 G2		589.18	0.075	0.05	0.055
		Pun	R1 R6		588.64	0.08	0.05	0.06
		Pool	R1 P1		587.97	0.097	0.07	0.097
	Reach 2	Riffle	R2 F3	0.00003	501.25	0.07	0.045	0.095
		Glide	R2 G1		499.85	0.045	0.04	0.045
		Pool	R2 P1		498.40	0.095	0.06	0.06
		Run	R2 R1		498.50	0.09	0.035	0.06

1. Establish **channel transects** in reaches in Nacimiento and San Antonio Rivers and measure channel elevation, water depth, substrate, channel width, and velocity measurements along transects at high and low flows.
2. Develop Hydraulic Model (**HEC-RAS**) using instream transect data and Lidar.
- 3. Compile **SVOM Streamflow** estimates for all transect locations for each operational scenario (1968 – 2018).
- 4. Apply daily streamflow estimates to **HEC-RAS** to estimate **channel depth, velocity, and wetted area** for each operational scenario at each field measured transect.

→ Methods

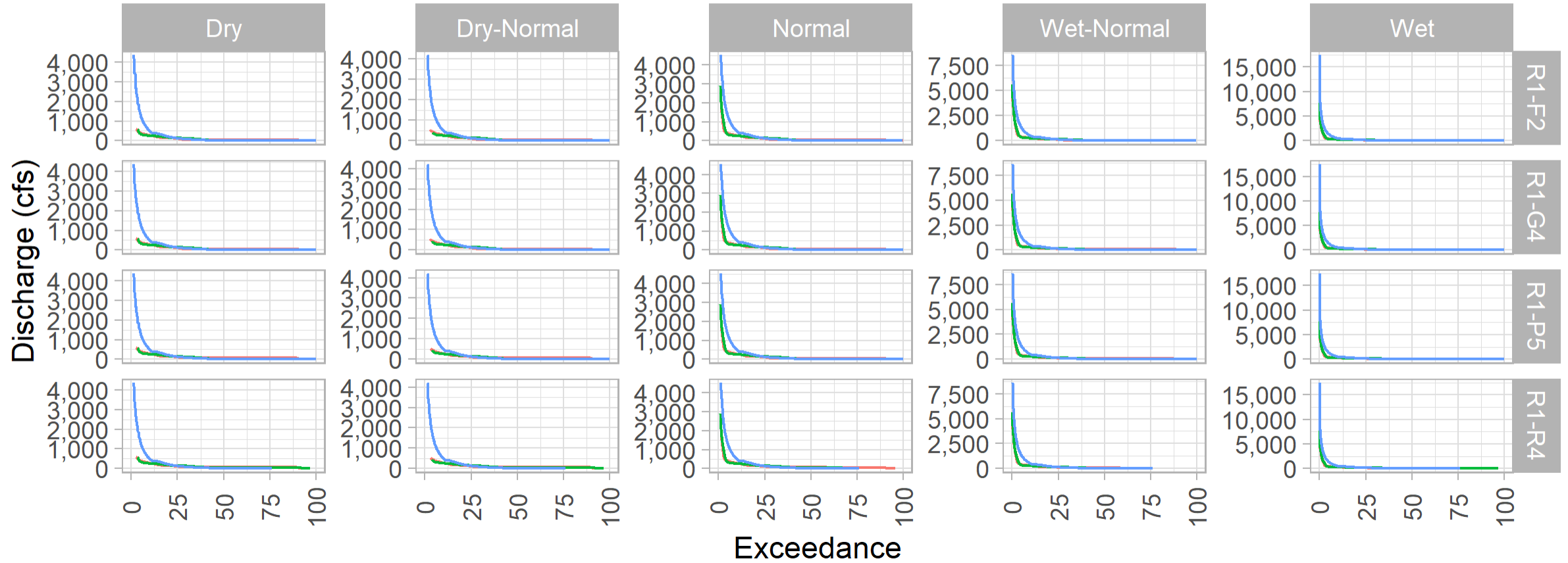


➔ Summary of SVOM Results

River	Reach	Flow Scenario	Flow (cfs)		
			Minimum	Median	Maximum
Nacimiento River	Reach 1	Current Operations	0	60	10,799
		No Flow Prescription	0	25	10,799
		No Operations	0	18	17,466
	Reach 2	Current Operations	0	60	10,799
		No Flow Prescription	0	25	10,799
		No Operations	0	40	17,466
	Reach 3	Current Operations	0	60	10,799
		No Flow Prescription	0	25	10,799
		No Operations	0	18	17,466
	Reach 4	Current Operations	0	65	10,774
		No Flow Prescription	0	36	10,774
		No Operations	0	9	17,524
San Antonio River	Reach 1	Current Operations	0	10	3,158
		No Flow Prescription	0	68	4,453
		No Operations	0	1	1,558
	Reach 2	Current Operations		49	3,276
		No Flow Prescription	0	88	4,659
		No Operations	0	11	1,771

R1

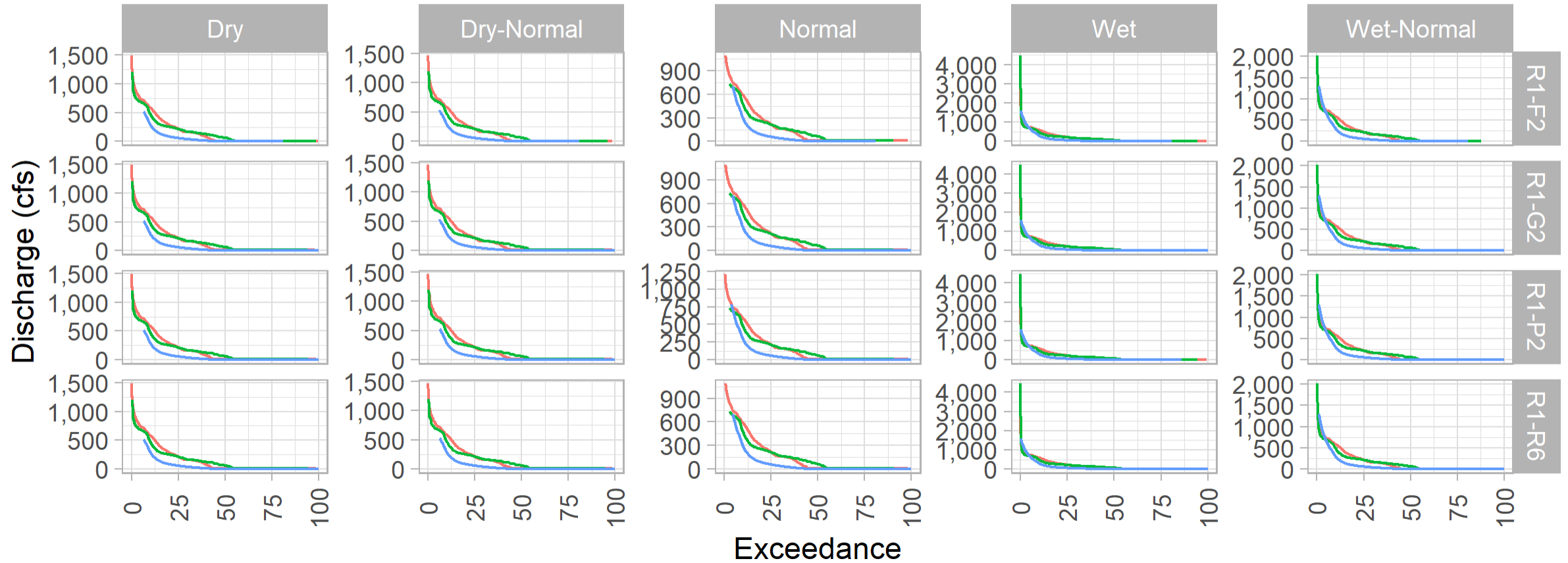
— Current Operations — No Flow Prescriptions — No Operations



→ Nacimiento River – Example: Reach 1

R1

— Current Operations — No Flow Prescriptions — No Operations



→ San Antonio River – Example: Reach 1

→ 5. Relate estimates of depth and velocity to HSC

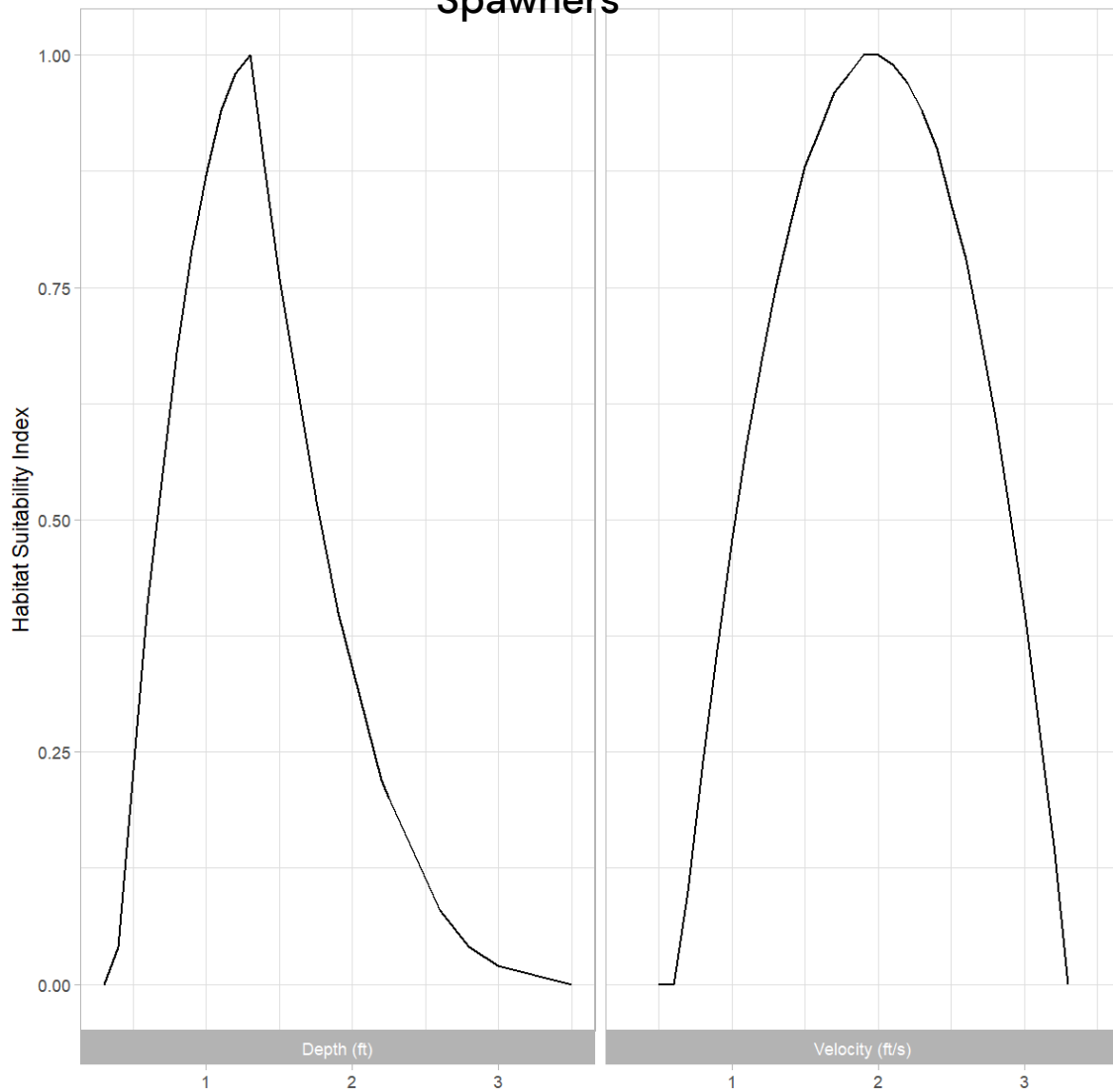
- Rearing – utilize all transects
- Spawning – subset transects based on locations of spawning areas documented during habitat surveys

Study River	Life stages Evaluated	Source
Trinity River	Juvenile, Fry	Hampton (1997)
Klamath River	Juvenile, Fry	Hardy and Addley (2001)
Big Sur	Juvenile, Fry, Spawning	Holmes et al. (2014)
Multiple	Juvenile, Fry	Bovee (1978)
Hollow Tree	Juvenile, Fry	Gephart et al. (2020)

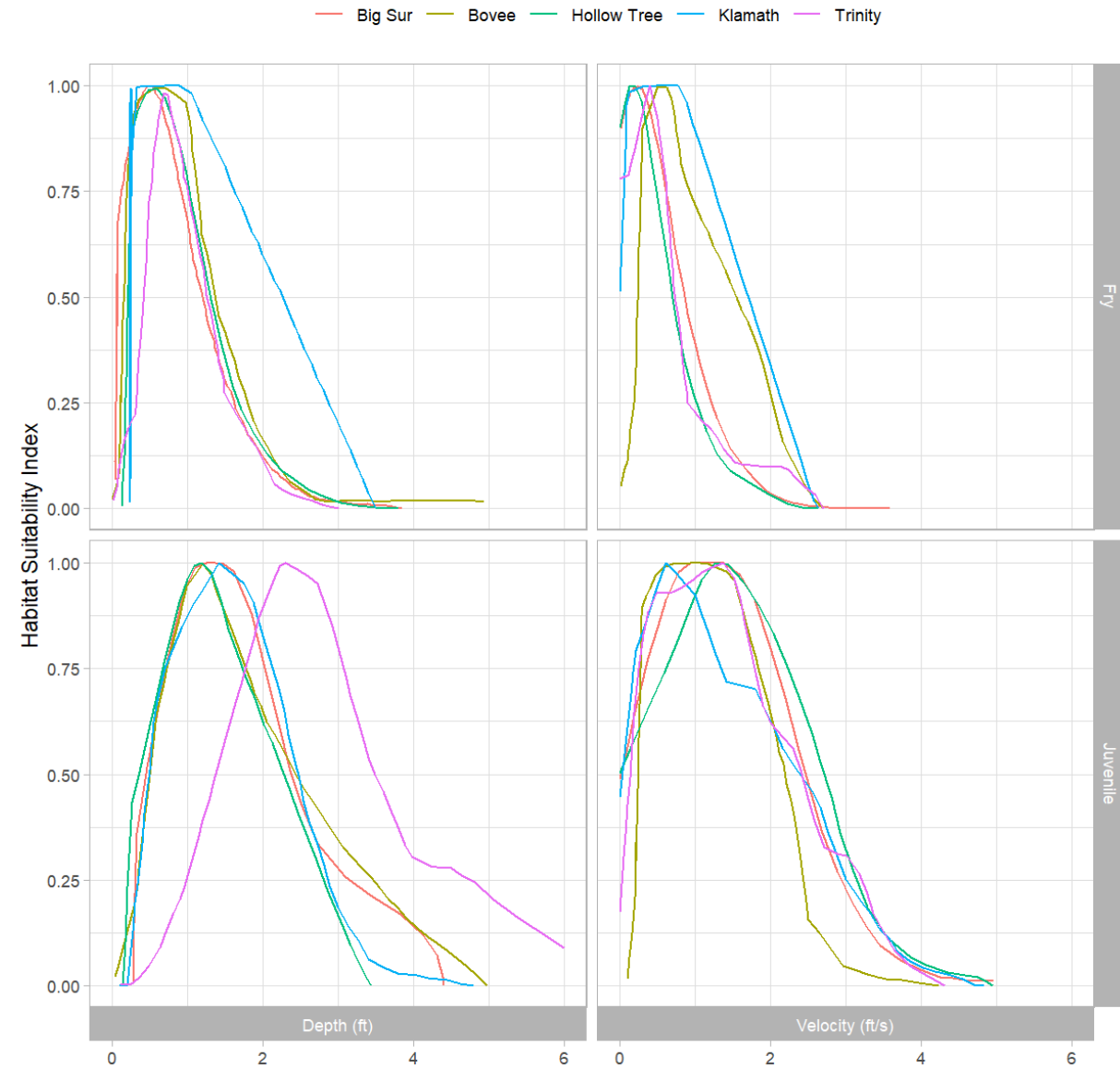
→ Methods



Spawners

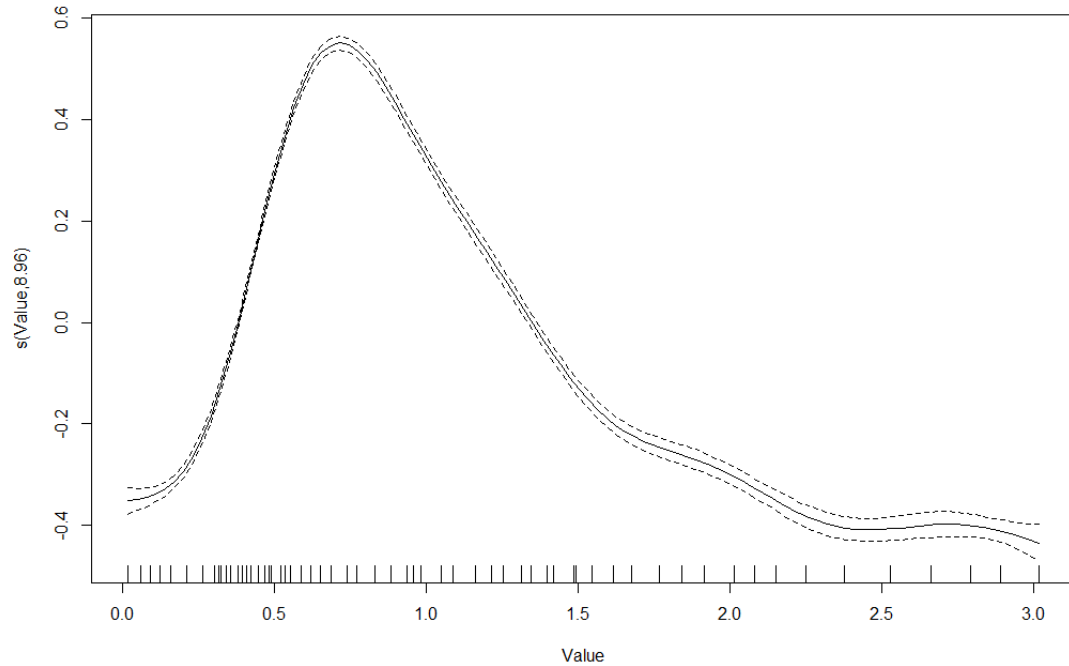


Fry and Juveniles

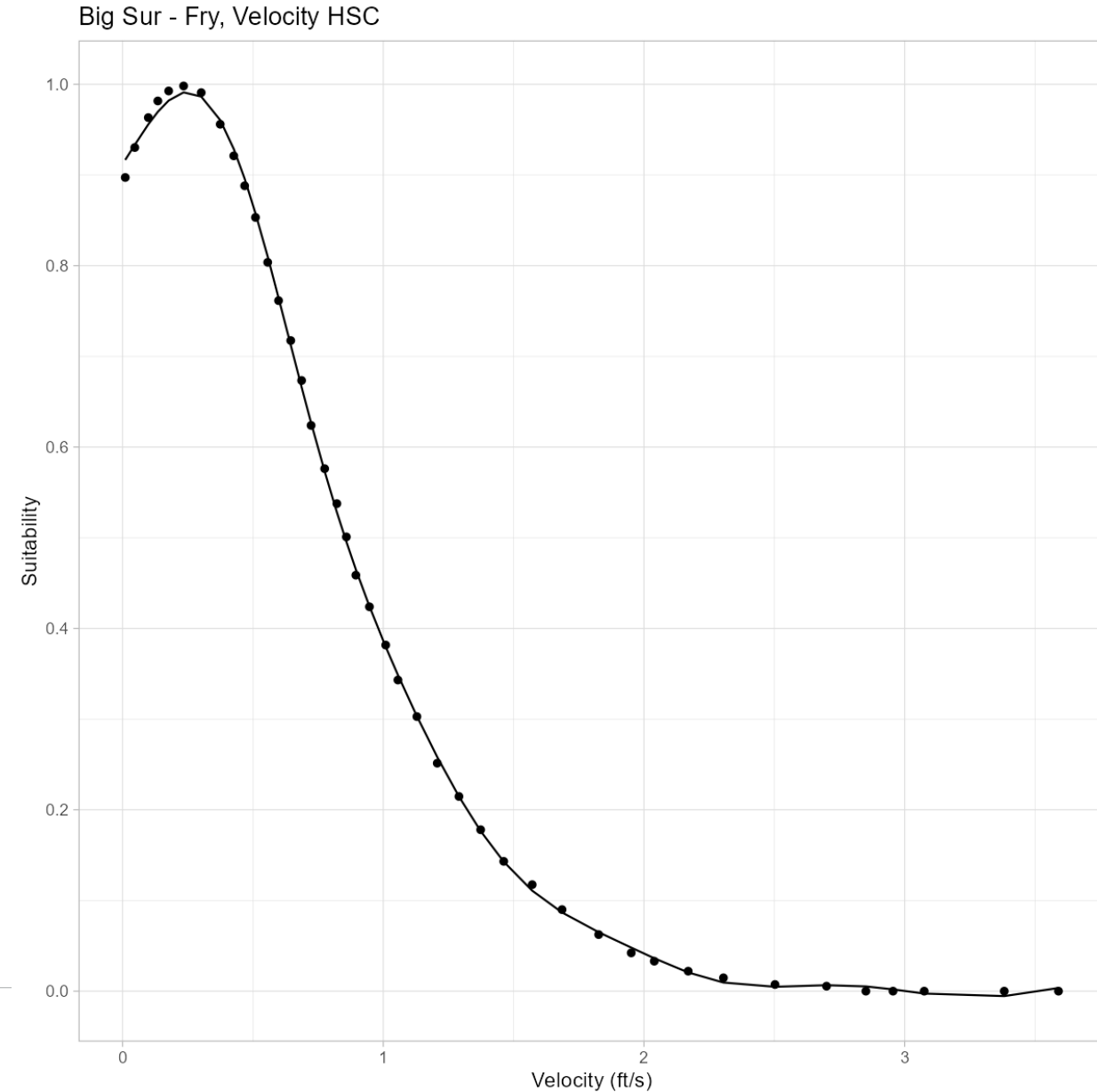


→ Habitat Suitability Criteria (HSC)

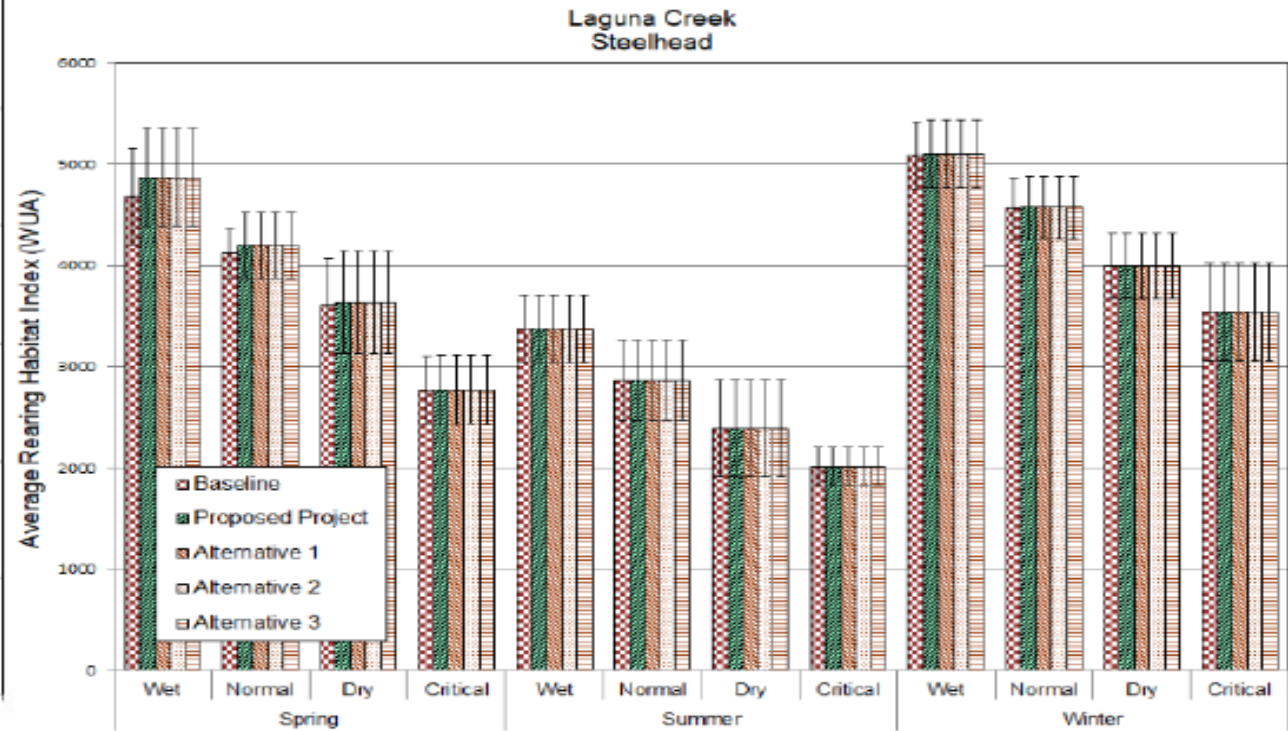
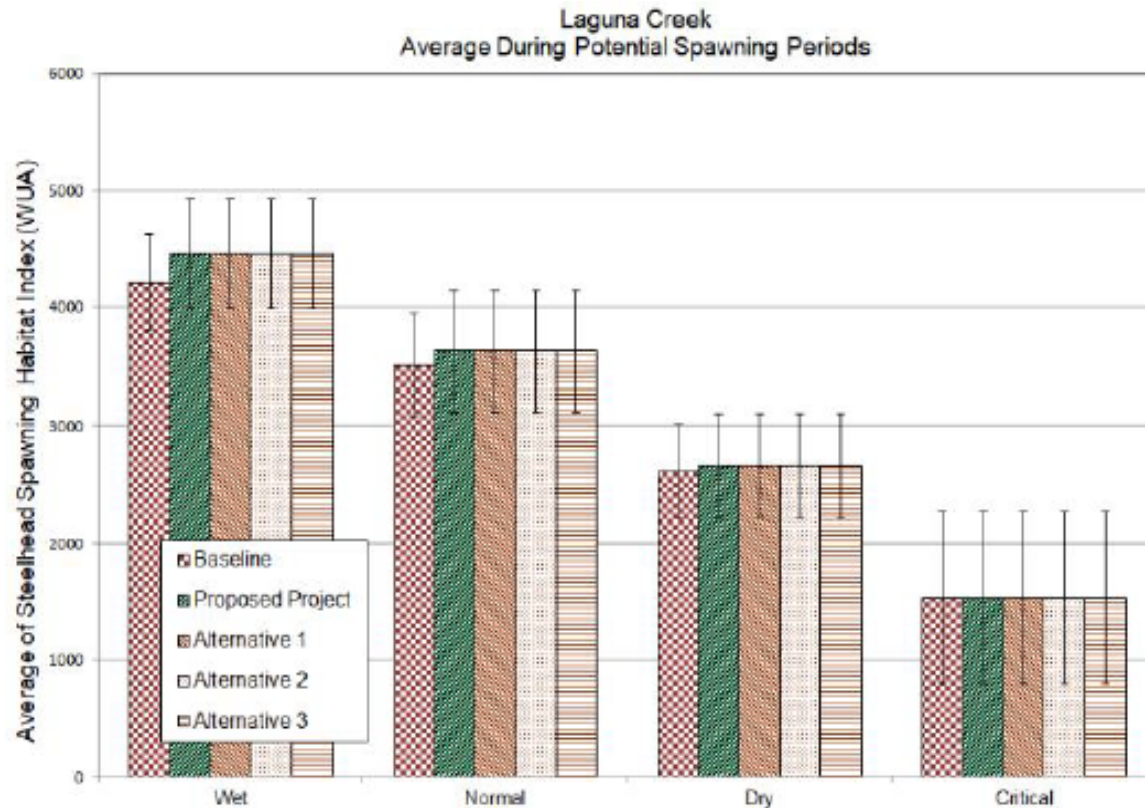
- Use generalized additive models were fit to each HSC curve and used to quantitatively relate HEC-RAS results to the indices derived from the literature.



➔ Habitat Suitability Criteria (HSC)



6. Habitat suitability is then applied to the total area surveyed in each reach to arrive at an estimate of weighted useable area.



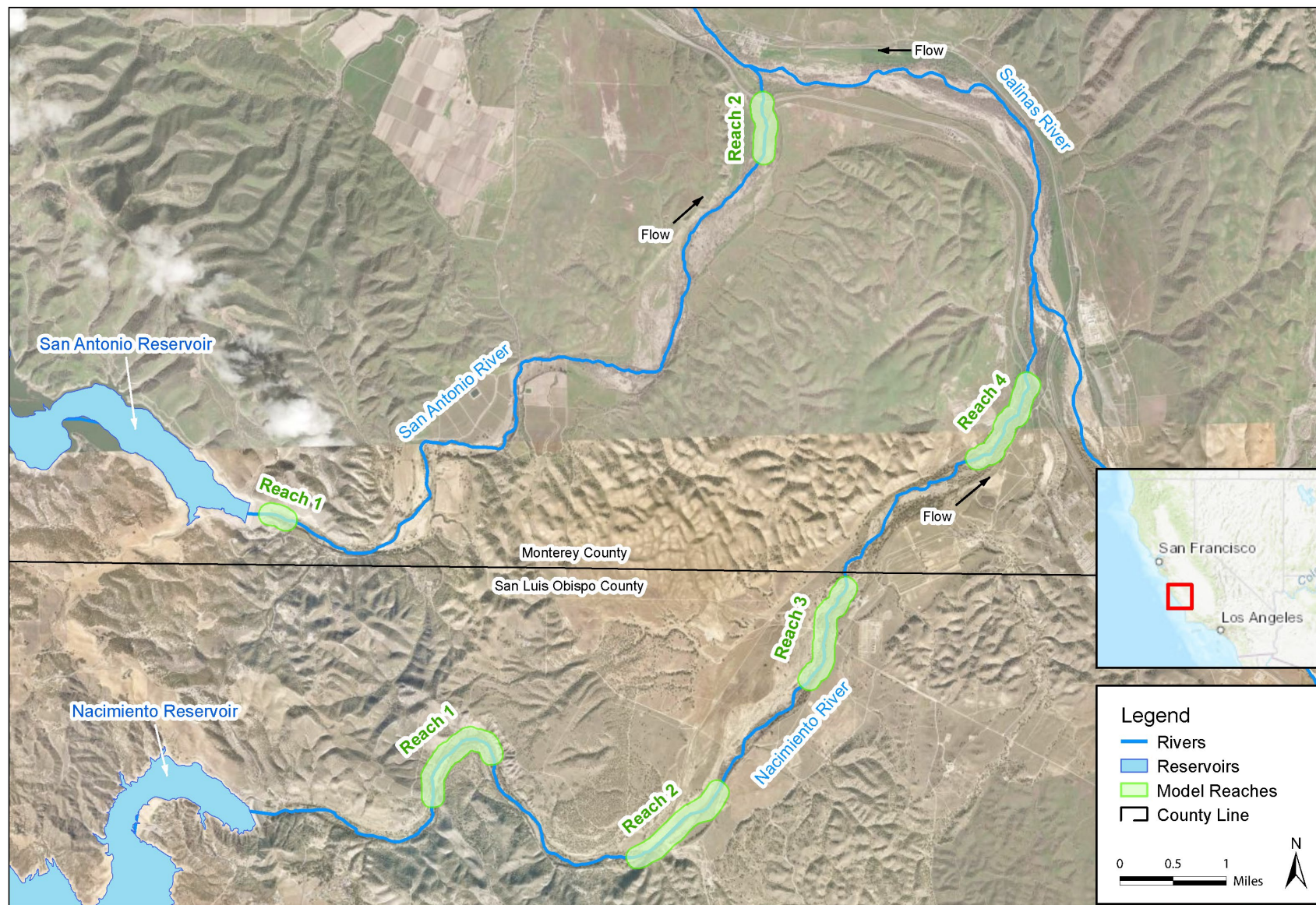
➔ Steelhead Effects Methods – Rearing and Spawning Impacts

Preliminary Results:
Juvenile and Fry Lifestages

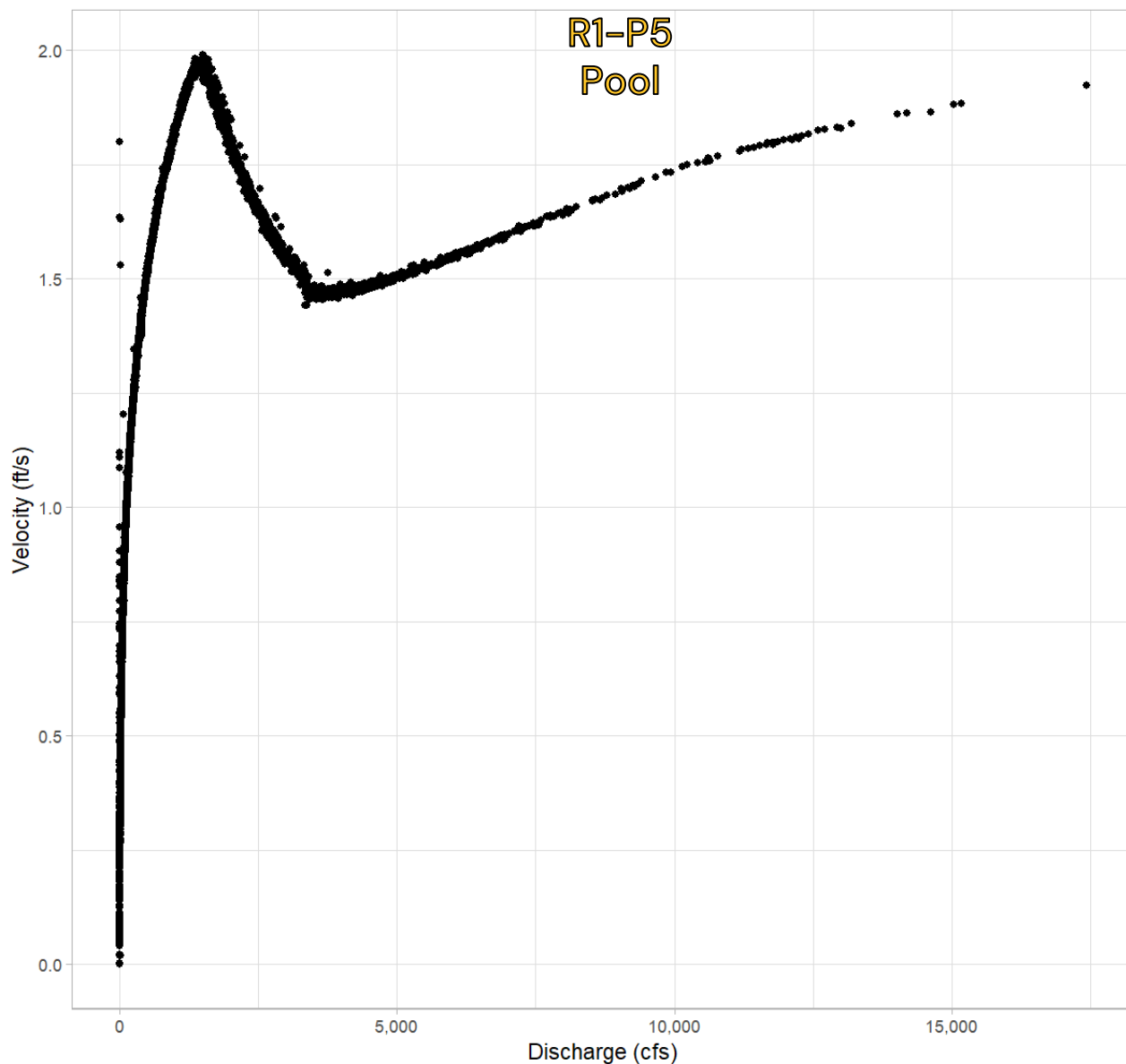




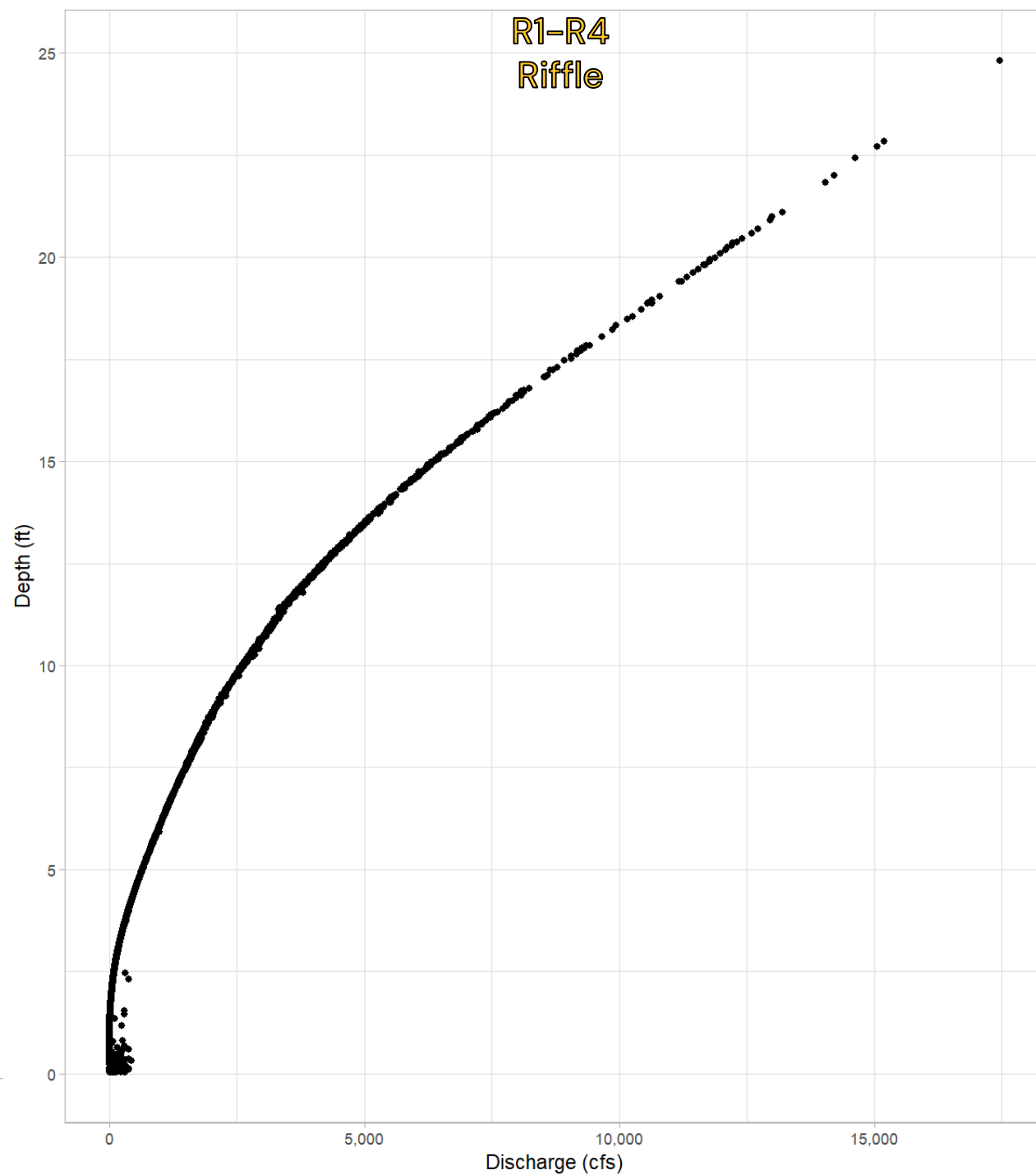
→ Lower Nacimiento River



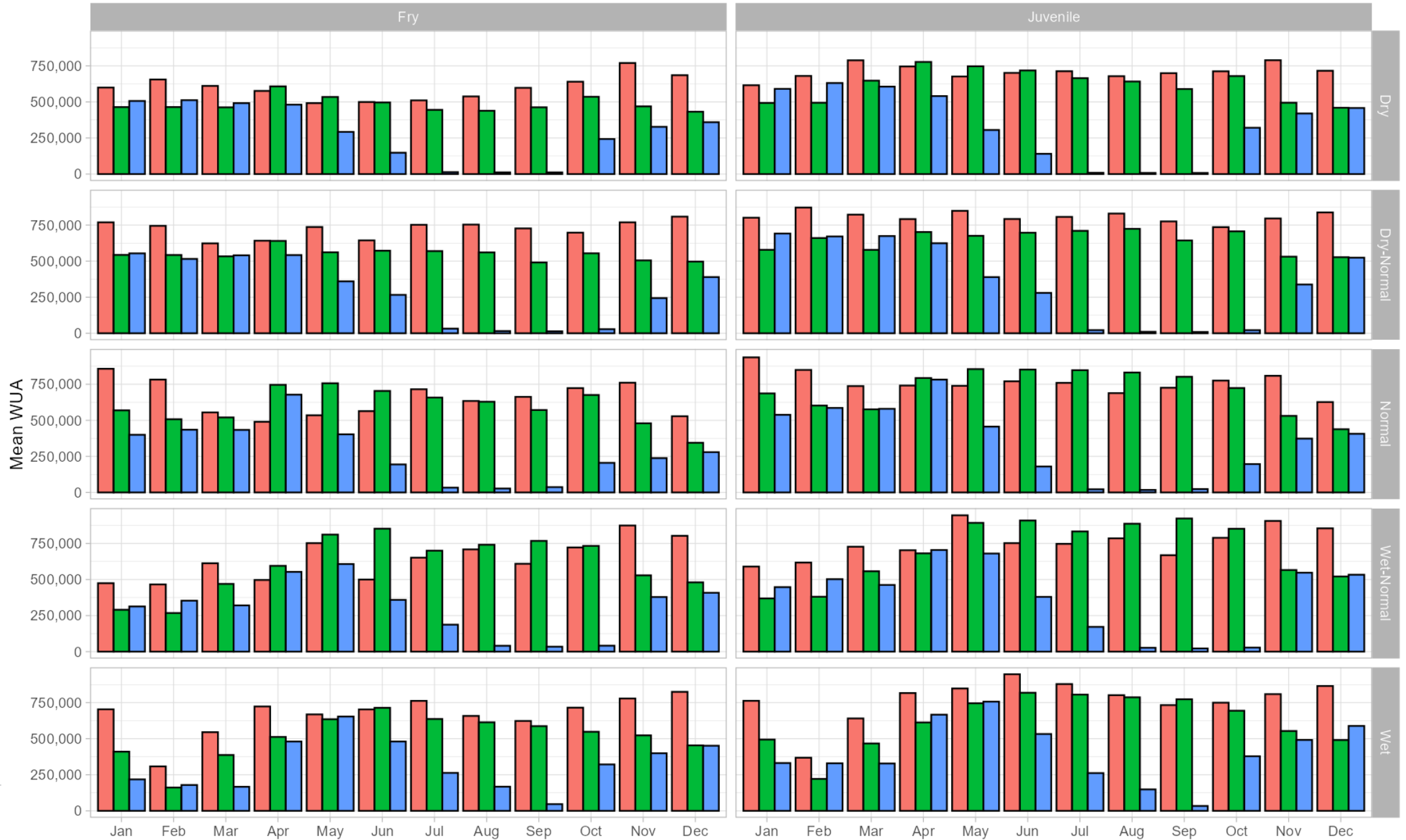
→ Lower Nacimientto River



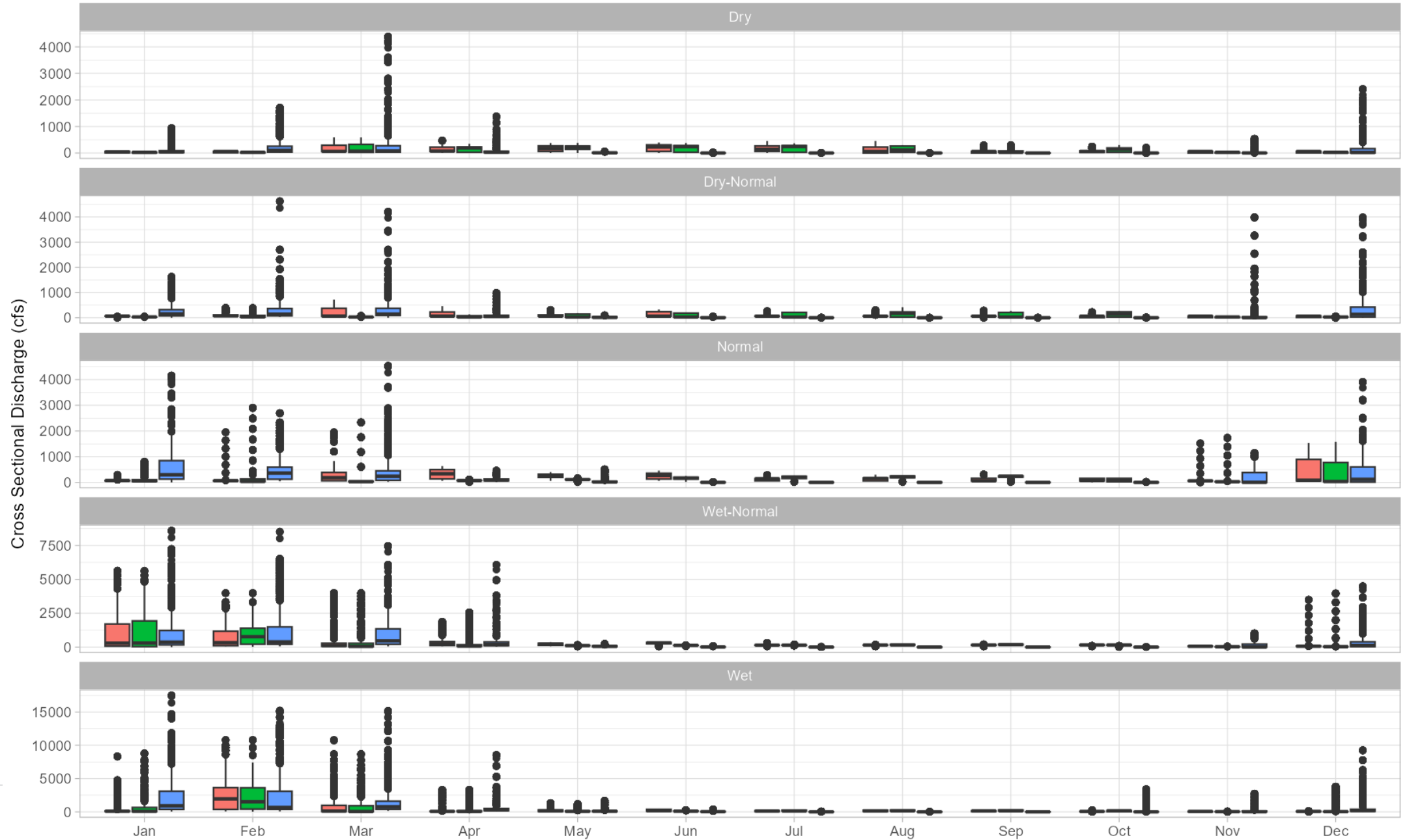
→ Lower Nacimientto River



■ Current Operations
 ■ No Flow Prescriptions
 ■ No Operations

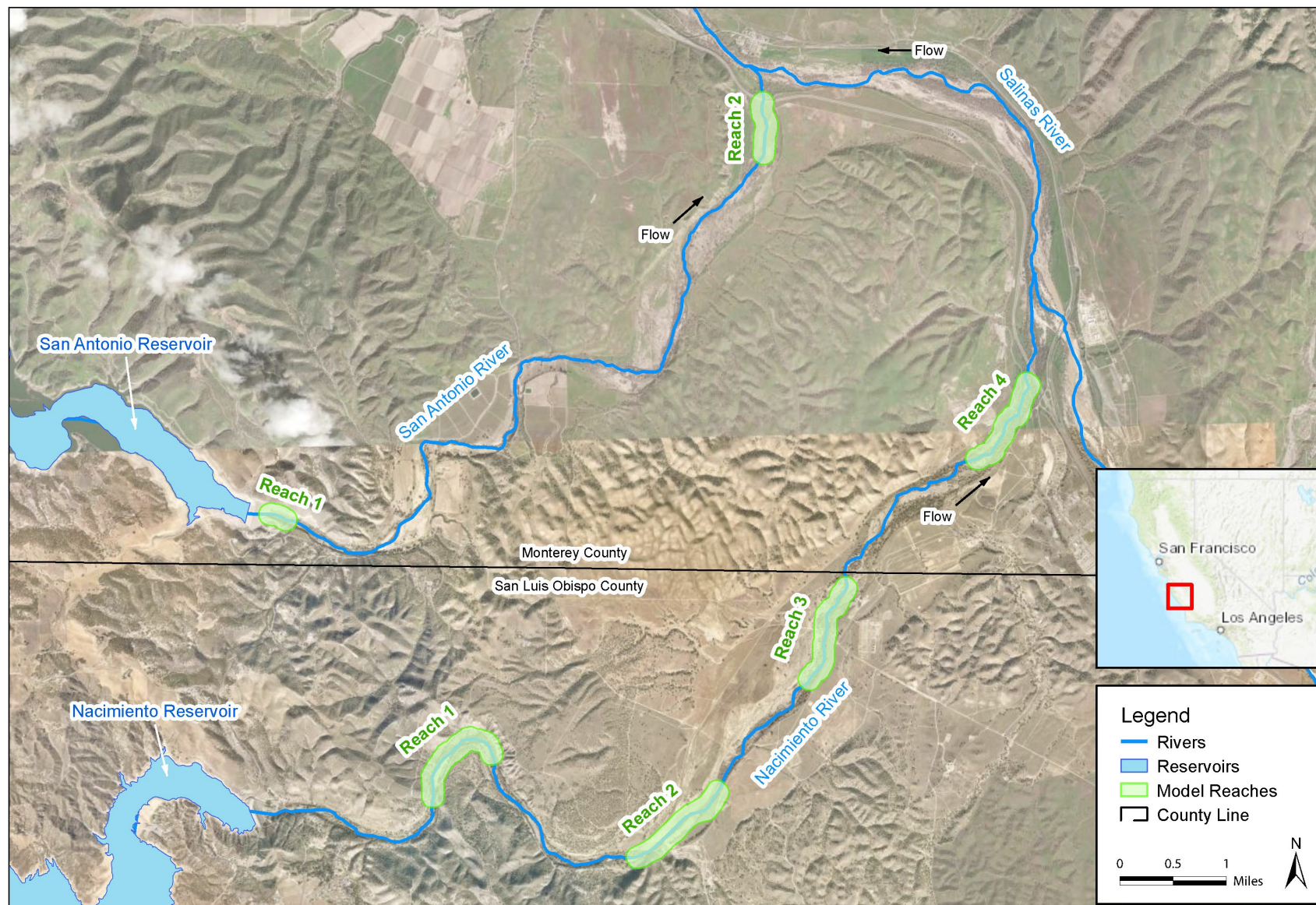


Current Operations No Flow Prescriptions No Operations



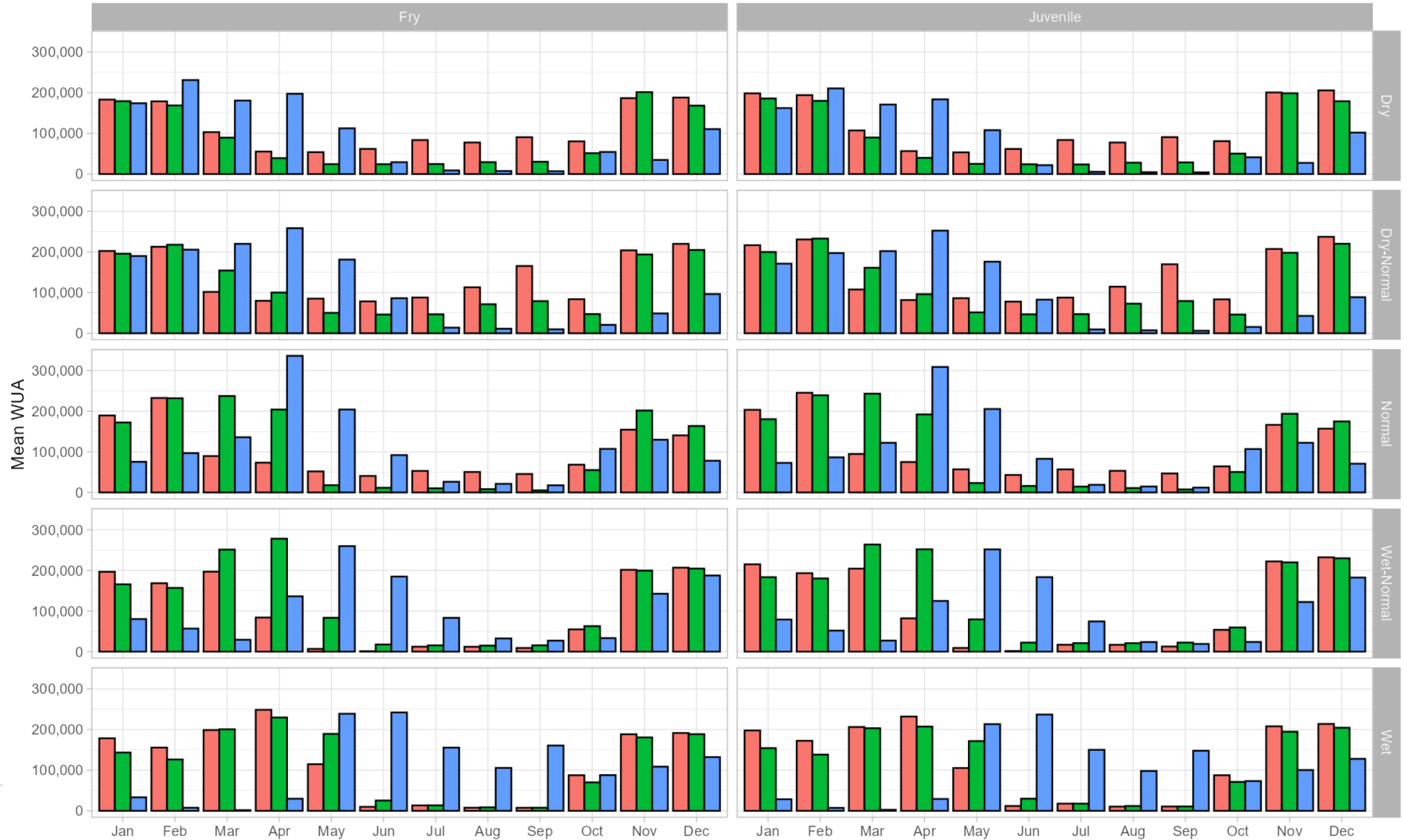


→ Lower San Antonio River

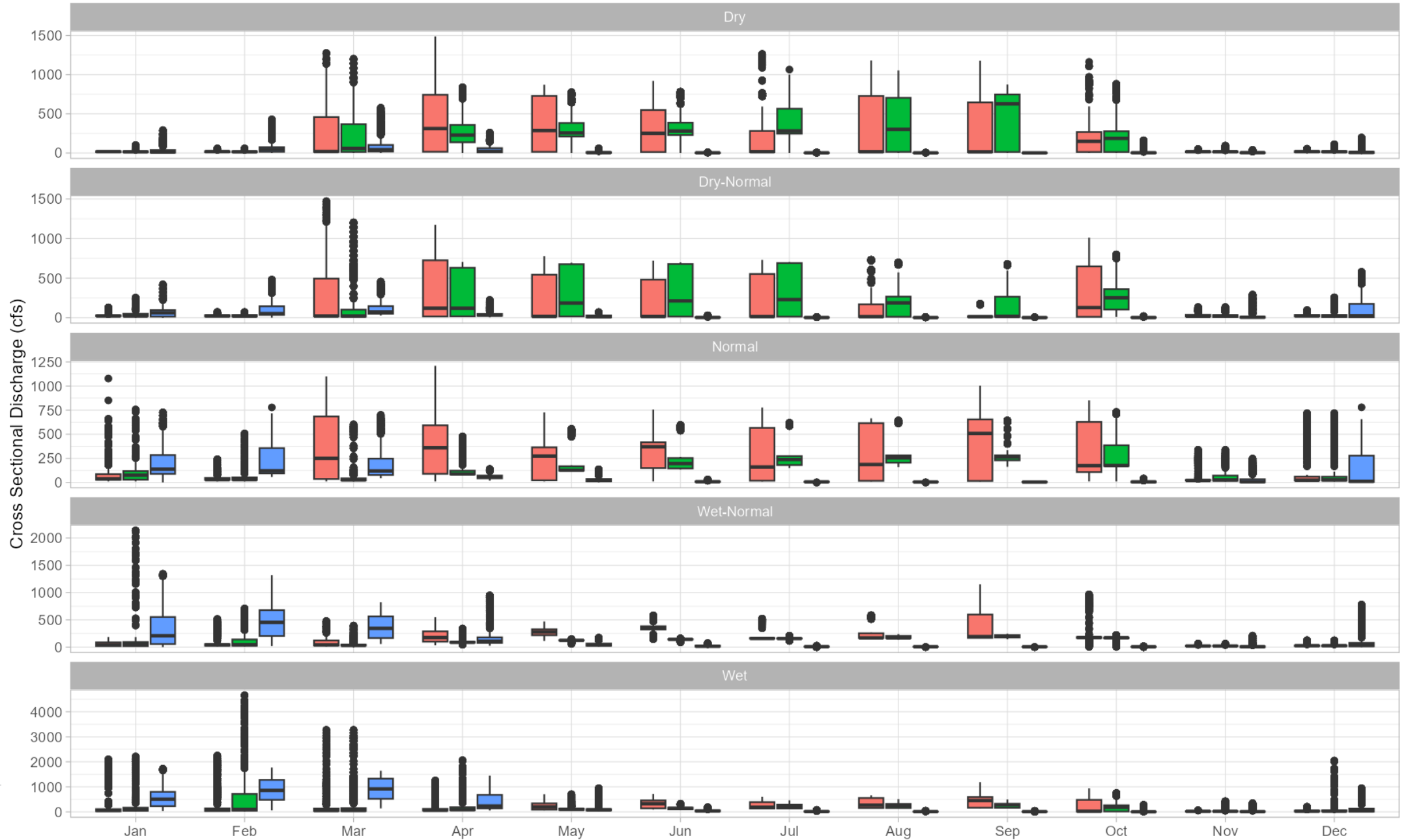


→ Lower San Antonio River

Current Operations No Flow Prescriptions No Operations



Current Operations No Flow Prescriptions No Operations



- In general, more suitable habitat is available for rearing juveniles and fry under the **Current Operations** scenario compared to the other comparison point scenarios.
- During dry, dry-normal, and normal water years mean WUA for Fry and Juveniles is lowest during the summer months (**July** to **September**) across all scenarios, lowest under the **No Operations** scenario.
- Nacimiento Fry: During wet-normal and wet water years, mean WUA is slightly higher in the spring and summer under **Current Operation** and **No Flow Prescription** scenarios. Under **No Operations** mean WUA peaks in the spring and declines in the summer.
- In general, mean WUA is similar between **Current Operation** and **No Flow Prescription** scenarios between November and March.
- Nacimiento and San Antonio Juveniles: During dry, dry-normal, and normal water years during the summer (**July** to **September**) Mean WUA is highest under the **Current Operations** scenario.
- San Antonio Juveniles: During wet and wet-normal water years during the summer (**July** to **September**) Mean WUA is higher under the **No Operations** scenario.

→ Initial Findings

Preliminary Results:
Spawning Lifestage



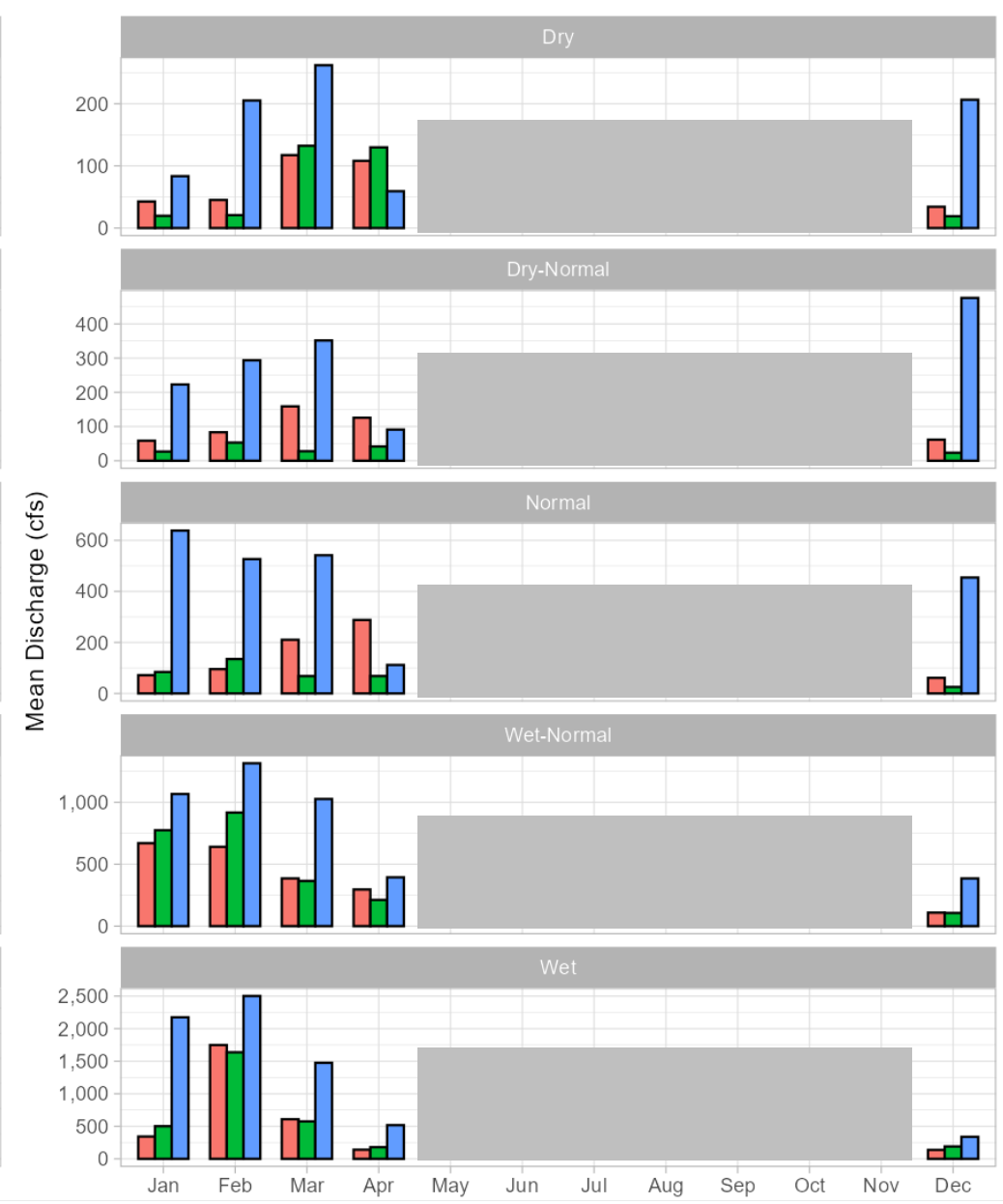
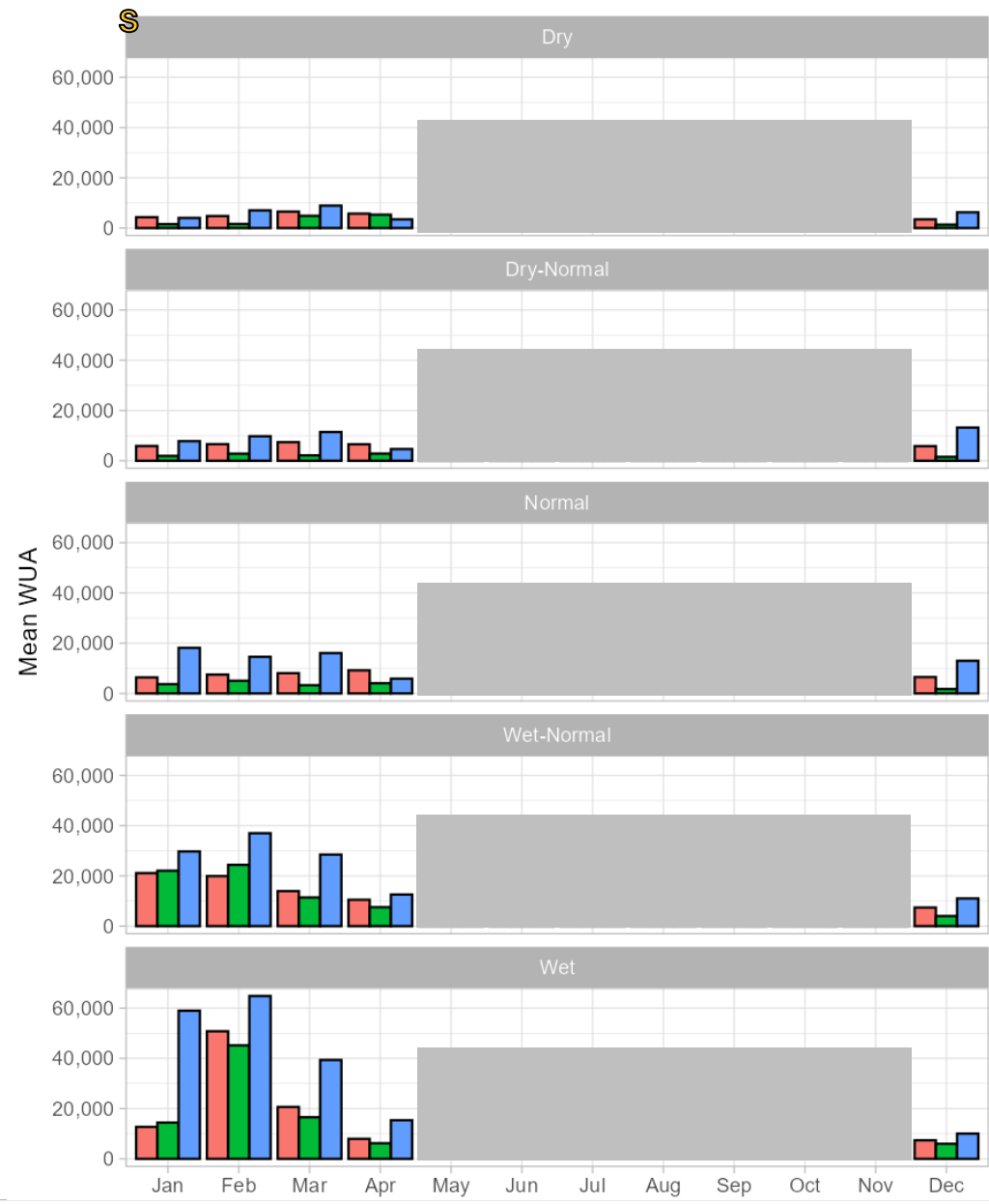
wildearthguardians.org

→ Spawning Habitat



Spawner

Current Operations No Flow Prescriptions No Operations



Steelhead Spawning period:
Dec – March

- No documented spawning habitat in the San Antonio River in the reaches surveyed.
- Mean weighted useable area is higher under the **No Operations** scenario during all year types.
- Mean WUA is typically higher under the **Current Operations** compared to the **No Flow Prescriptions** scenario during all year types.



Photo Credit: Protecting Central Valley Steelhead - Earthjustice

→ Initial Findings



Next Steps

- Develop additional scenarios to be considered under the HCP and calculate weighted useable area (WUA) to compare to baseline scenario.
- Evaluate minimum flows needed to maximize WUA during key juvenile and fry rearing periods and compare to minimum flows managed previously (60 cfs – Nacimiento, 25 cfs – San Antonio).
- Evaluate water quality conditions including water temperature and suspended sediments.

→ Next Steps





Herpetofauna Habitat Assessment

Three additional covered species have suitable habitat in San Antonio and Nacimiento Rivers below the dams

- Foothill yellow-legged frog (*Rana boylii*)
- California red-legged frog (*Rana draytonii*)
- Southwestern pond turtle (*Actinemys pallida*)



→ Other Covered Species

Aquatic Habitat Requirements

- Egg laying and tadpole rearing:
 - Cobble/gravel bars
 - Shallow water and tailouts adjacent to riffles
 - Stable flows after high flows as water temperatures increase
 - Direct sunlight
- Impact Assessment Method
 - Evaluating existing habitat and flow regime models for applicability

→ Foothill Yellow-legged Frog



Aquatic Habitat Requirements

- Egg laying and tadpole rearing:
 - Emergent vegetation
 - Deeper ($>0.7\text{m}$), still backwaters and pools
 - Fish-free
 - Late summer drydown
- Impact Assessment Method
 - Qualitative

→ California Red-legged Frog



Bryant Baker

Aquatic Habitat Requirements

- Foraging, breeding, migration, overwintering:
 - Aquatic and terrestrial habitats connected (<500 m)
 - Underwater shelter sites
 - Standing or slow-moving water
 - Muddy substrate
- Rearing:
 - Shallow water
 - Dense submerged vegetation and logs
- Impact Assessment Method
 - Qualitative

→ Southwestern Pond Turtle



Shellie Puffer/USGS

Reservoir Reoperation Scenarios

Jason Demers – MCWRA



Modification of Block Flows

- Need to simplify process
- Make sure block flows are feasible when triggers are met
- Implement as part of all reoperation scenarios, not modeled separately
- MCWRA studying historical data to evaluate feasibility

Incorporate Elements of Interim Operations Plan

- Expanded time window for releases supportive of Upstream Migration
- Utilization of bypass flows

3 proposed Scenarios

1. Modified Passage Flow Targets
2. Modified Passage Flow Targets plus Winter Releases from Storage
3. Modified Passage Flow Targets plus Winter Bypass Flows

Scenario 1: Modified Passage Flow Targets

- Critical Riffle Analysis results identified target flow of 80 cfs at Chualar as sufficient for adult upstream passage
- Upstream Passage time window expanded: December 1-April 1.
- Propose to use 80 cfs target for all life stages, upstream and downstream migration
- One model run with new target, time window and modified block flow

Scenario 2: Scenario 1 plus Winter Releases from Storage

- Release water in Nov & Dec before natural events to pre-wet channel
 - Prescribed volume?
 - target area?
- Potential benefits from channel wetting release
 - Potential for increased opportunities for fish passage during early storms
 - Potentially more groundwater recharge in winter

Scenario 2: Scenario 1 plus Winter Releases from Storage

Issues to consider

- May lead to fewer complete conservation seasons
- Impacts to Salinas Lagoon operations
- Water Rights implications?

Scenario 3: Scenario 1 plus Winter Bypass Flows

- Bypass some winter inflow during early season storm events
- November-December early season is focus
- Mimic natural conditions
- Timing of winter recharge closer to natural occurrence
- Channel wetting flows without impacting water rights storage

Project Information:

salinasrivermanagementprogram.org

Project Team Contact:

SalinasRiverHCP@icf.com

