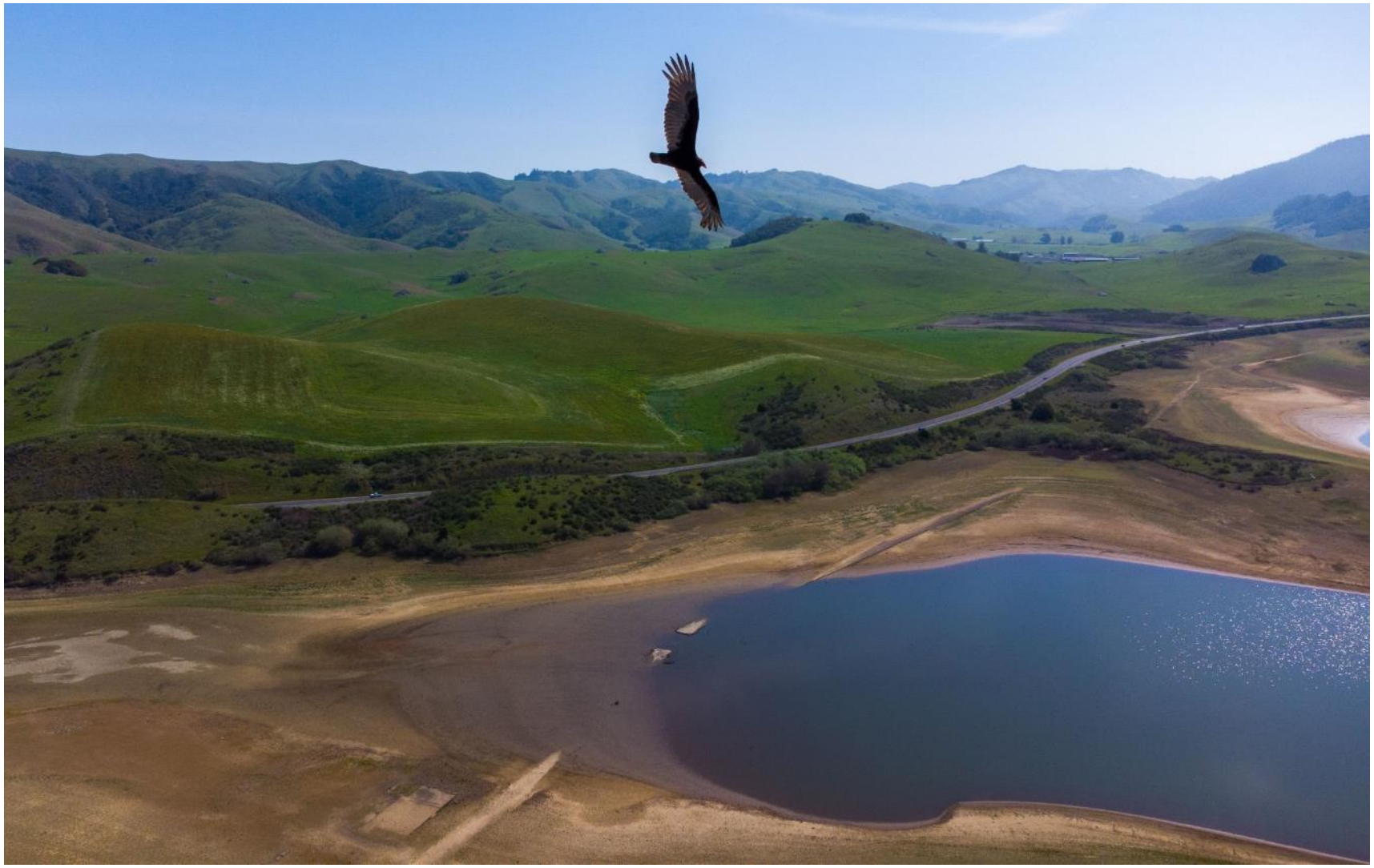
MARIN WATER

Operations Committee

August 30, 2021

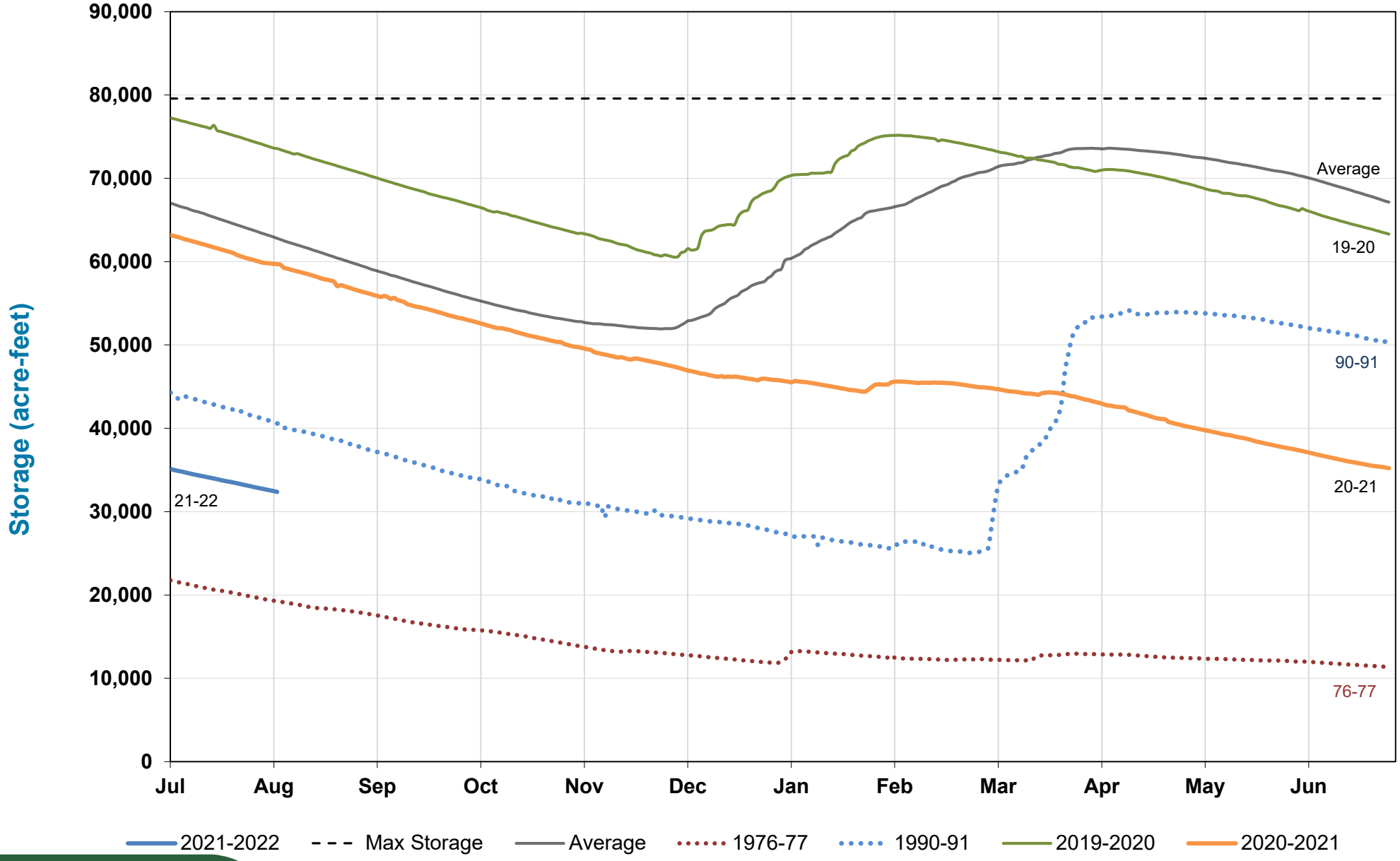


Meeting Purpose

- Review of Water Supply
- Lagunitas Creek & Order 95-17 Review
- Results of Flow Release Study
- Draft Monitoring Plan
- Outreach & Proposed TUCP Recommendation

Review of Water Supply

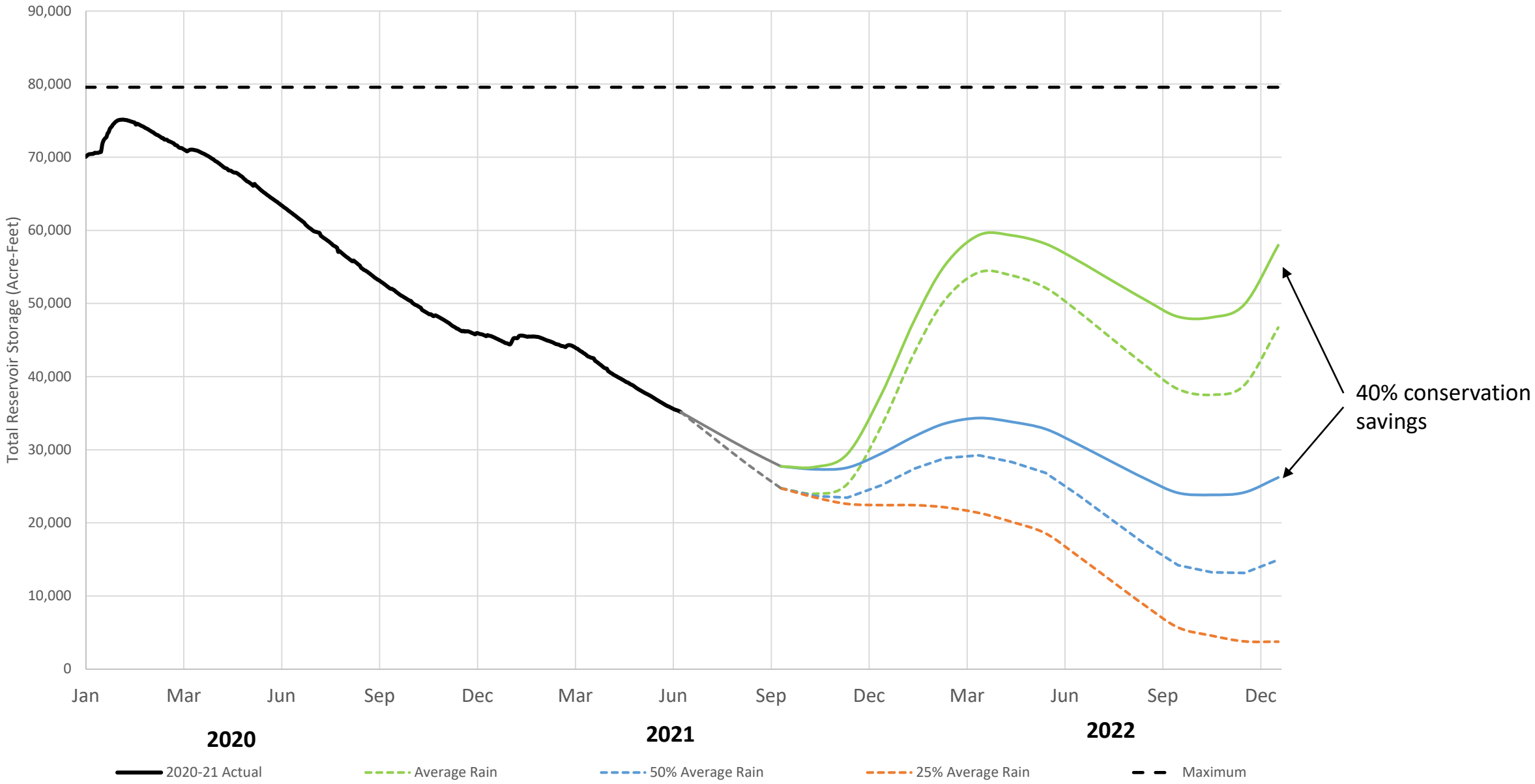
Total Reservoir Storage



Storage includes:

- Phoenix Lake
- Lake Lagunitas
- Bon Tempe Lake
- Alpine Lake
- Kent Lake
- Nicasio Lake
- Soulajule

Projected Reservoir Storage



Lagunitas Creek & Order 95-17 Review

Lagunitas Creek Watershed

Coho Salmon (CCC)

Endangered - State and Federal

Steelhead (CCC)

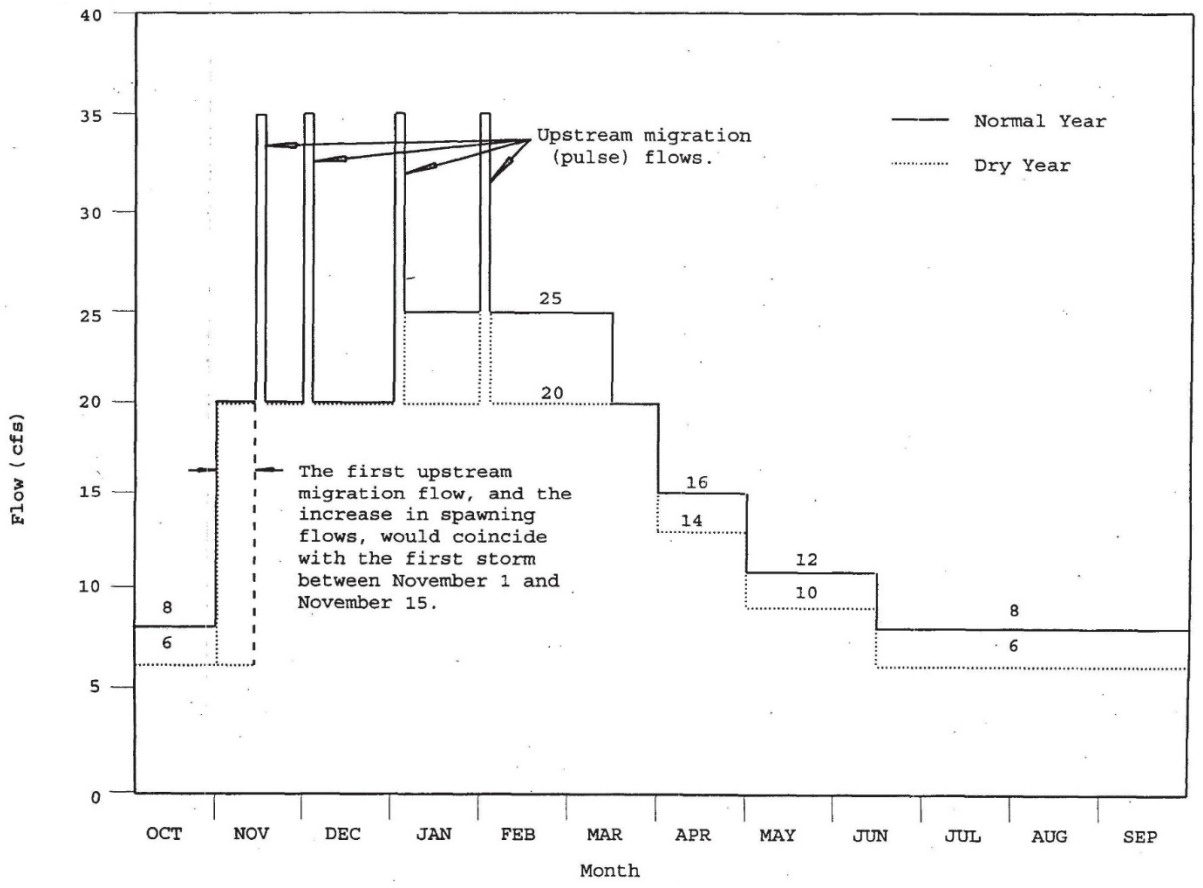
Threatened - Federal

California Freshwater Shrimp

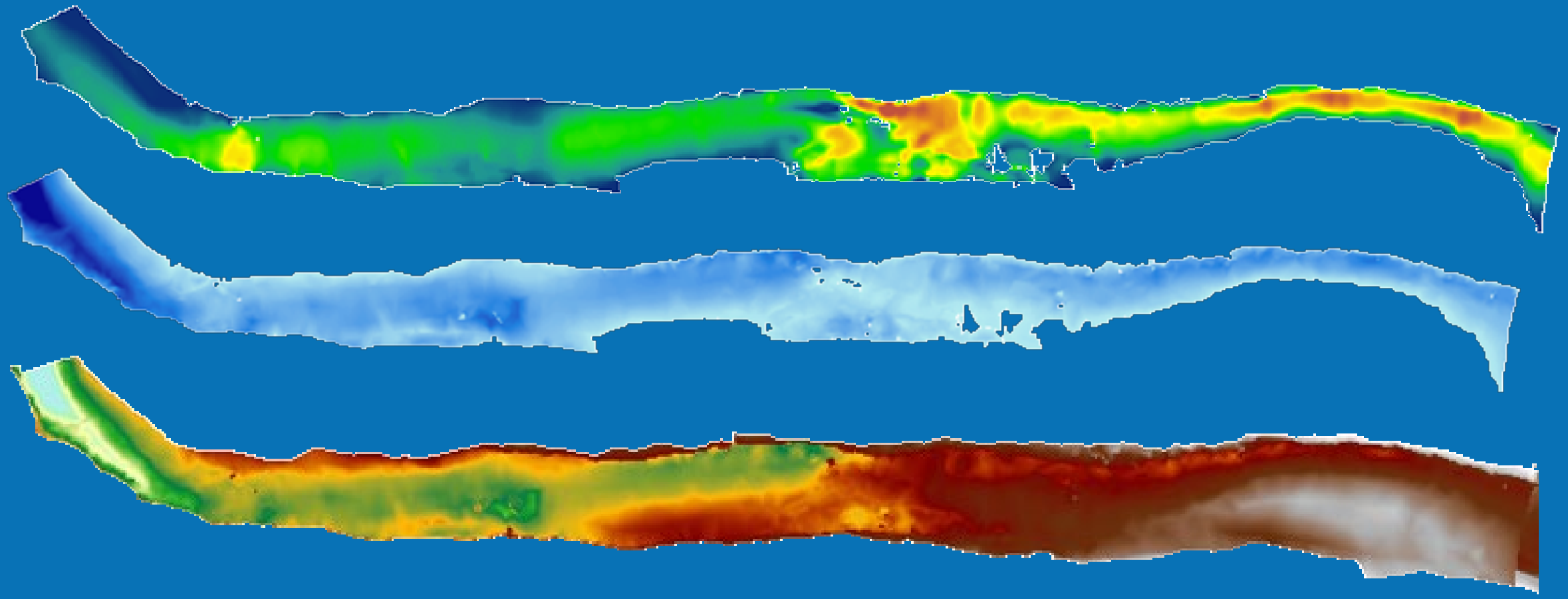
Endangered – State and Federal

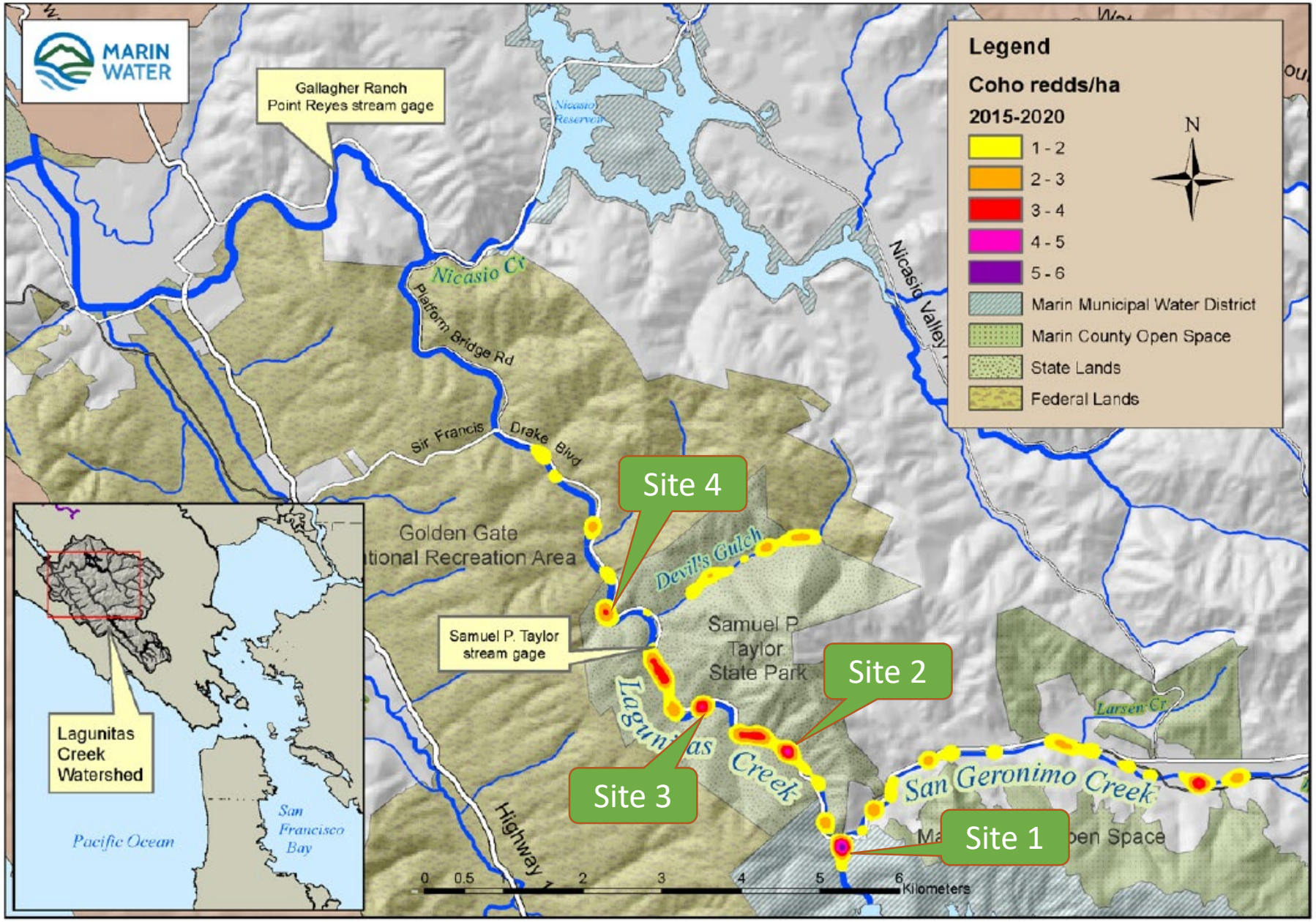
Order 95-17 – Instream Flow Requirements

- Combination of rain, runoff, and MMWD Kent Lake releases
- Measured from USGS gage at Samuel P. Taylor State Park, 3 miles downstream of Kent Lake
- Dry year determination
  - April 1 – If previous 6 months rain less than 28 inches, dry year until Dec 31
  - Jan 1 – If previous 15 months rain less than 48 inches, dry year until March 31



Instream Flow Study Findings





Coho Salmon Spawning Locations in the Lagunitas Creek Watershed

Study Approach

- Identify four reaches that represent around 25% of coho spawning habitat in mainstem Lagunitas Creek
- Build Habitat Suitability Models and run for coho and steelhead spawning, fry rearing
- Temperature data collated to look at effects of lower flow from Kent Lake

Proposed Delay in Winter Baseflow

Proposed flow delay scenario

- Delay winter baseflow trigger window from Nov 1-15th to Dec 1-15th
- Temporary scenario being proposed
  - Between Nov 15th – Dec 1st Adaptive Management
    - If >25 cfs flow measured @ SP Taylor USGS gauge then increase baseflow to 10 cfs and monitor for coho spawning for 1 week following flow event
    - If no coho spawning observed within 1 week, return to summer baseflow, if spawning observed within 1 week, increase proposed winter baseflow
  - From Dec 1 – 15th Baseflow increases to winter value coincident with >25 cfs flow due to dry year classification @ SP Taylor USGS gauge or by Dec 15th if no such flow has occurred

Eliminate Nov migration pulse, Dec migration pulse will coincide with winter baseflow increase

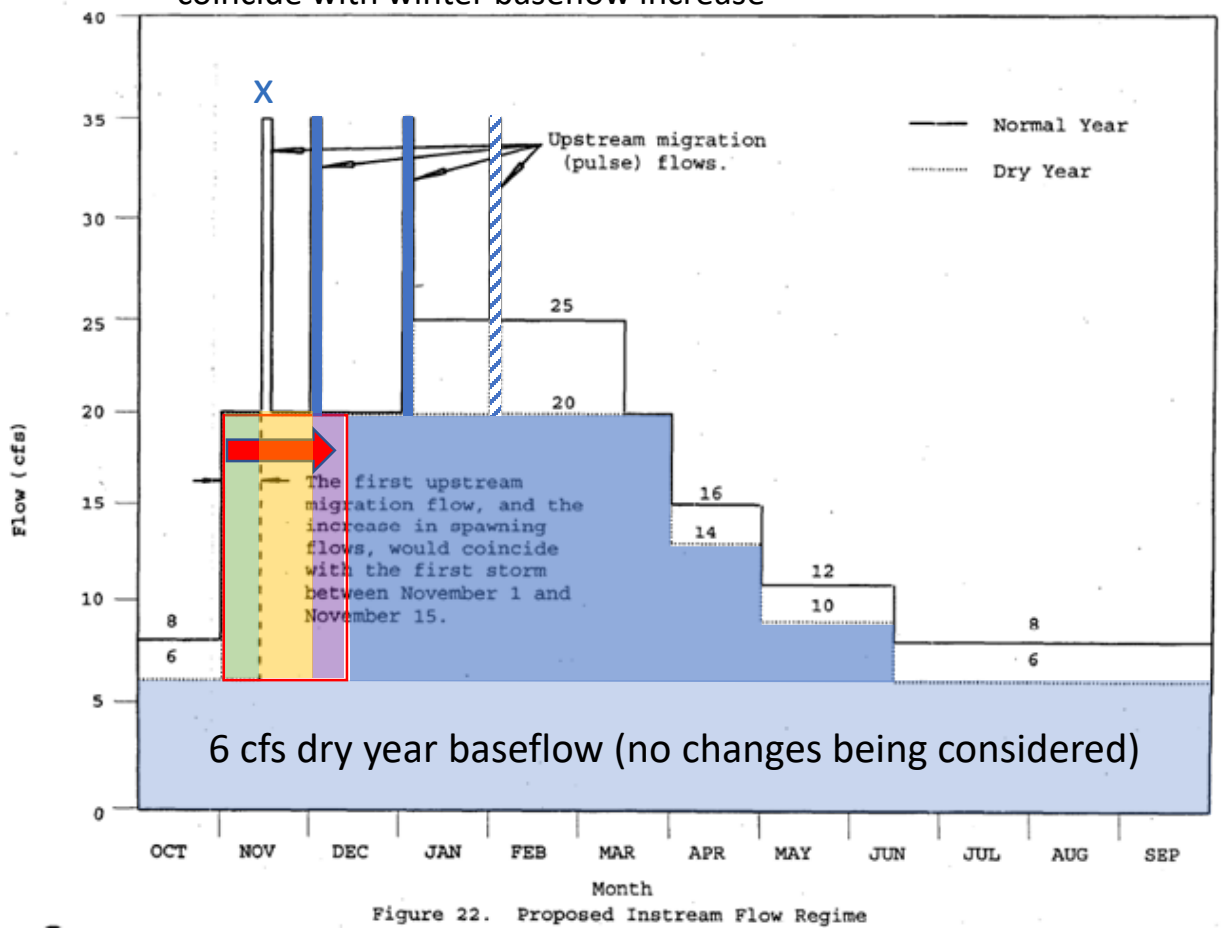
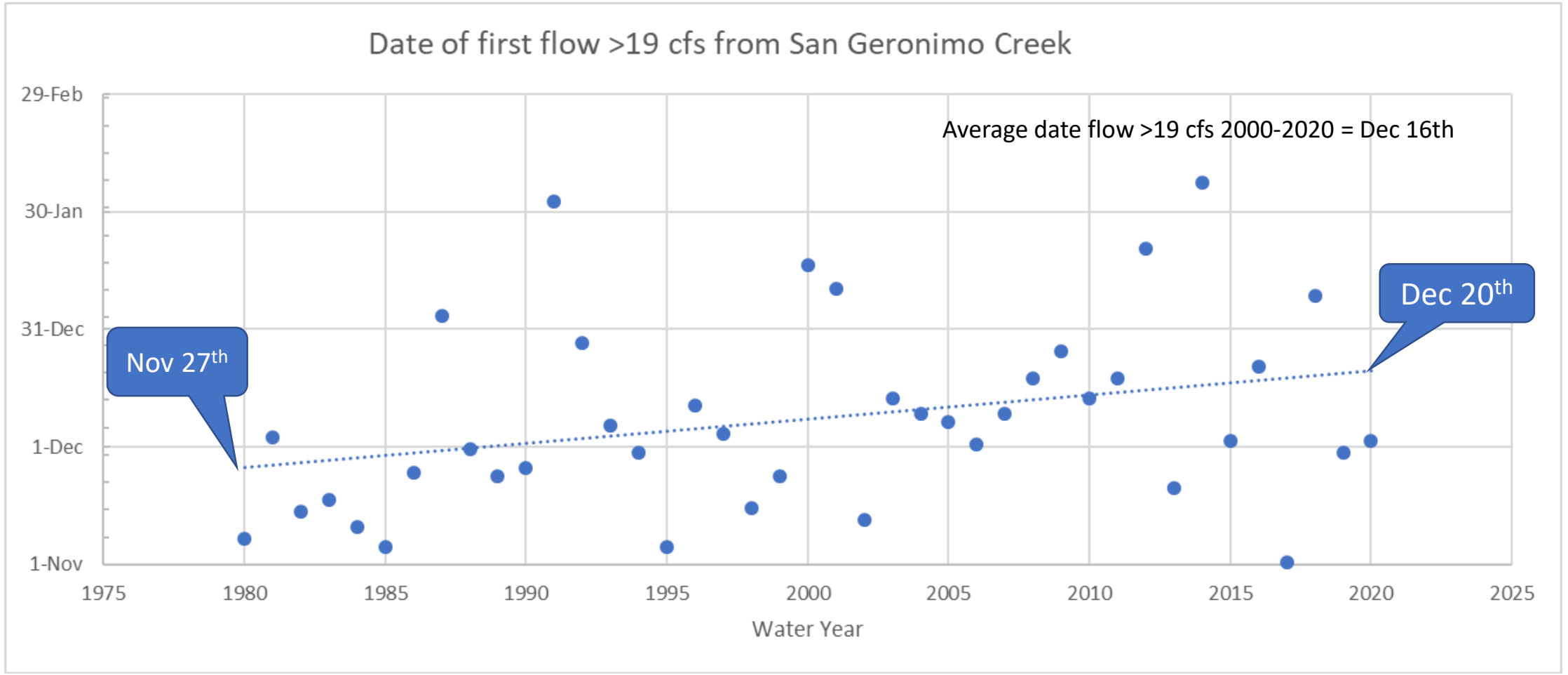


Figure 22. Proposed Instream Flow Regime

Basis for delay 1: Winter flows likely to trigger migration are occurring later than when the flow schedule was setup

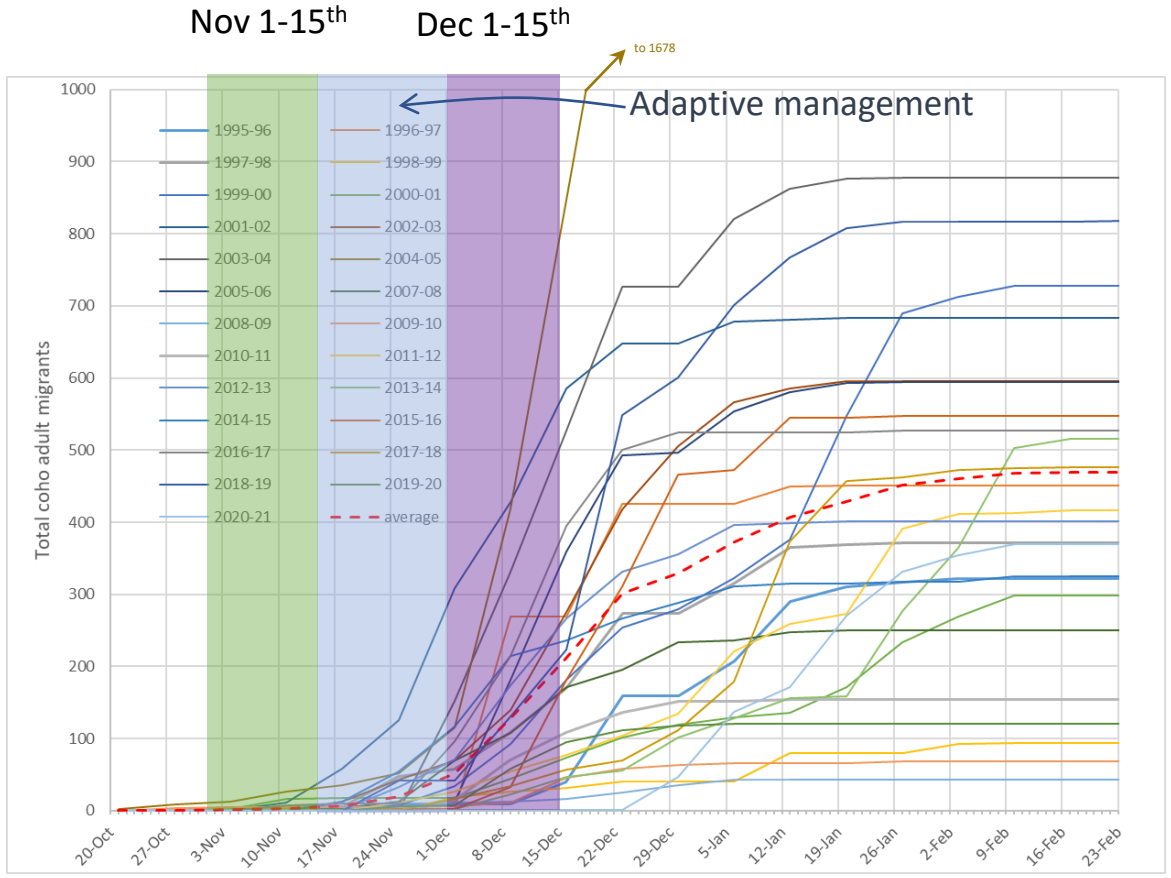


Basis for 19 cfs: 6 cfs summer baseflow from Kent + 19 cfs from San Geronimo = 25cfs, lowest flow identified as likely to trigger migration

Basis for delay 2: Timing of coho migration and spawning is also later than the existing Nov 1-15 window

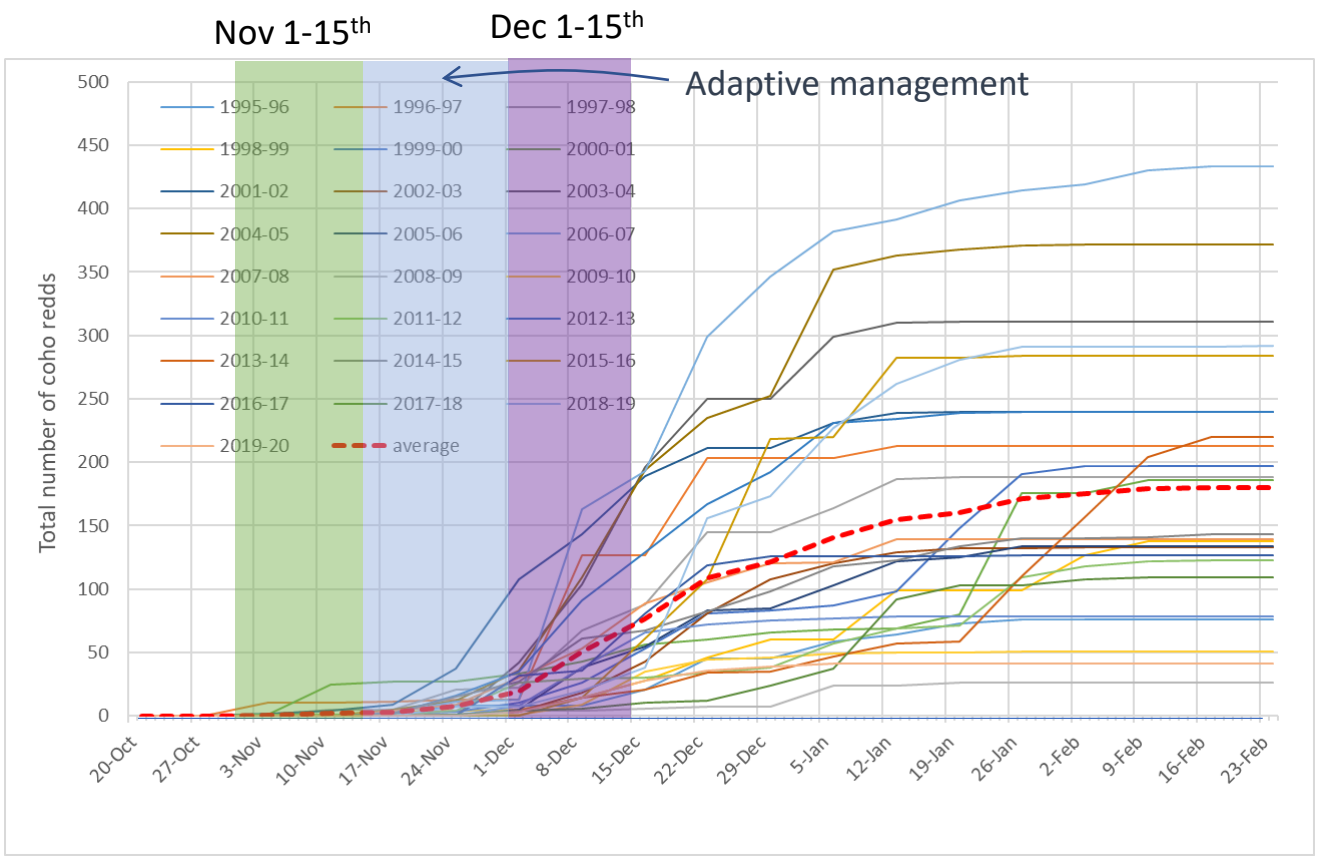
Cumulative Coho migration

Existing and proposed trigger windows



Cumulative Coho spawning

Existing and proposed trigger windows



Habitat Suitability Modeling Results

Potential flow reduction scenarios to evaluate

- Run flows at 20 cfs (baseline), 15 cfs and 10 cfs
- Output velocity, depth and wetted area
- Estimate area of usable habitat for coho and steelhead at a range of lifestages
- Coho spawning is considered to be most likely limiting factor by resource agencies

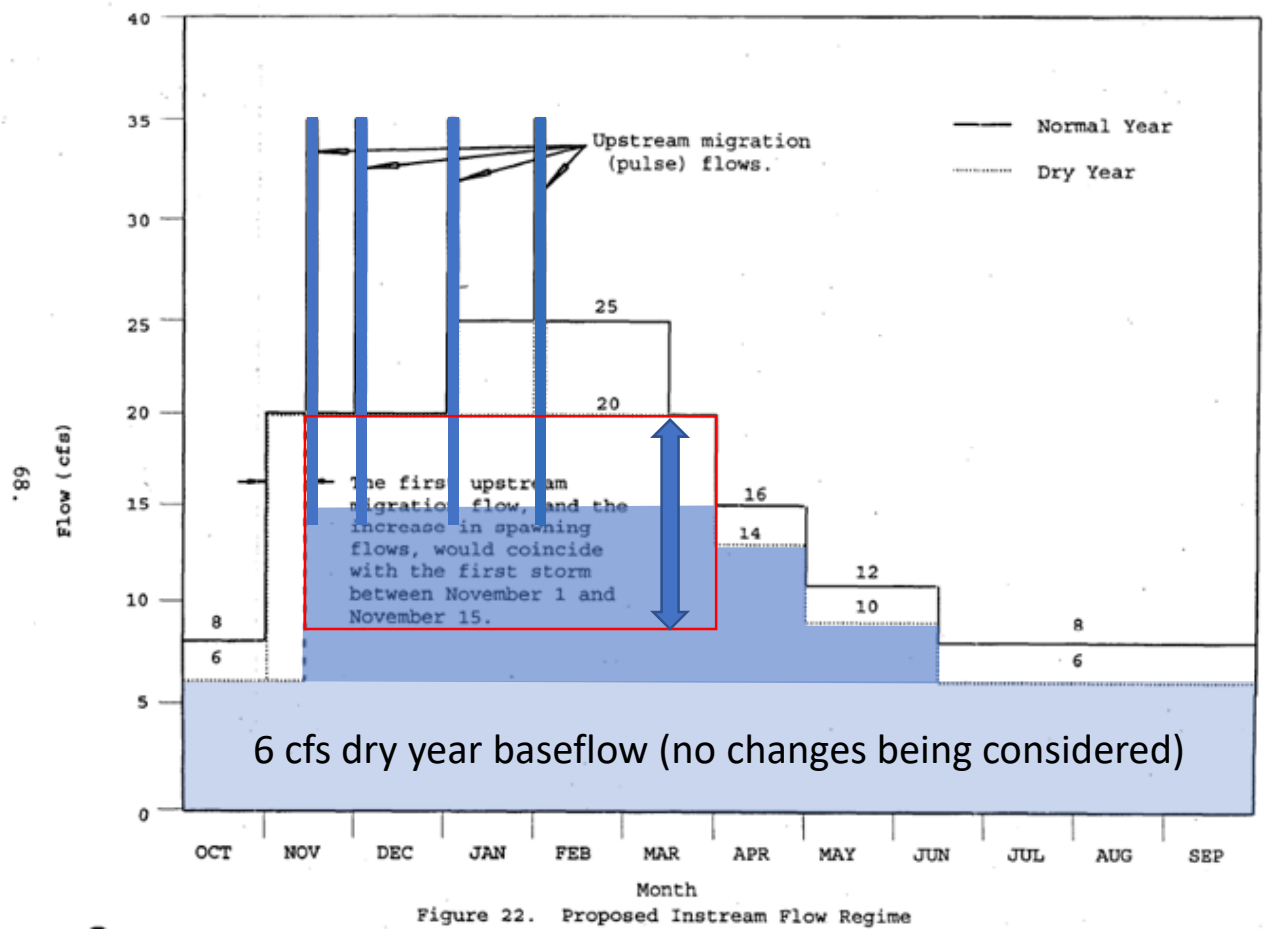
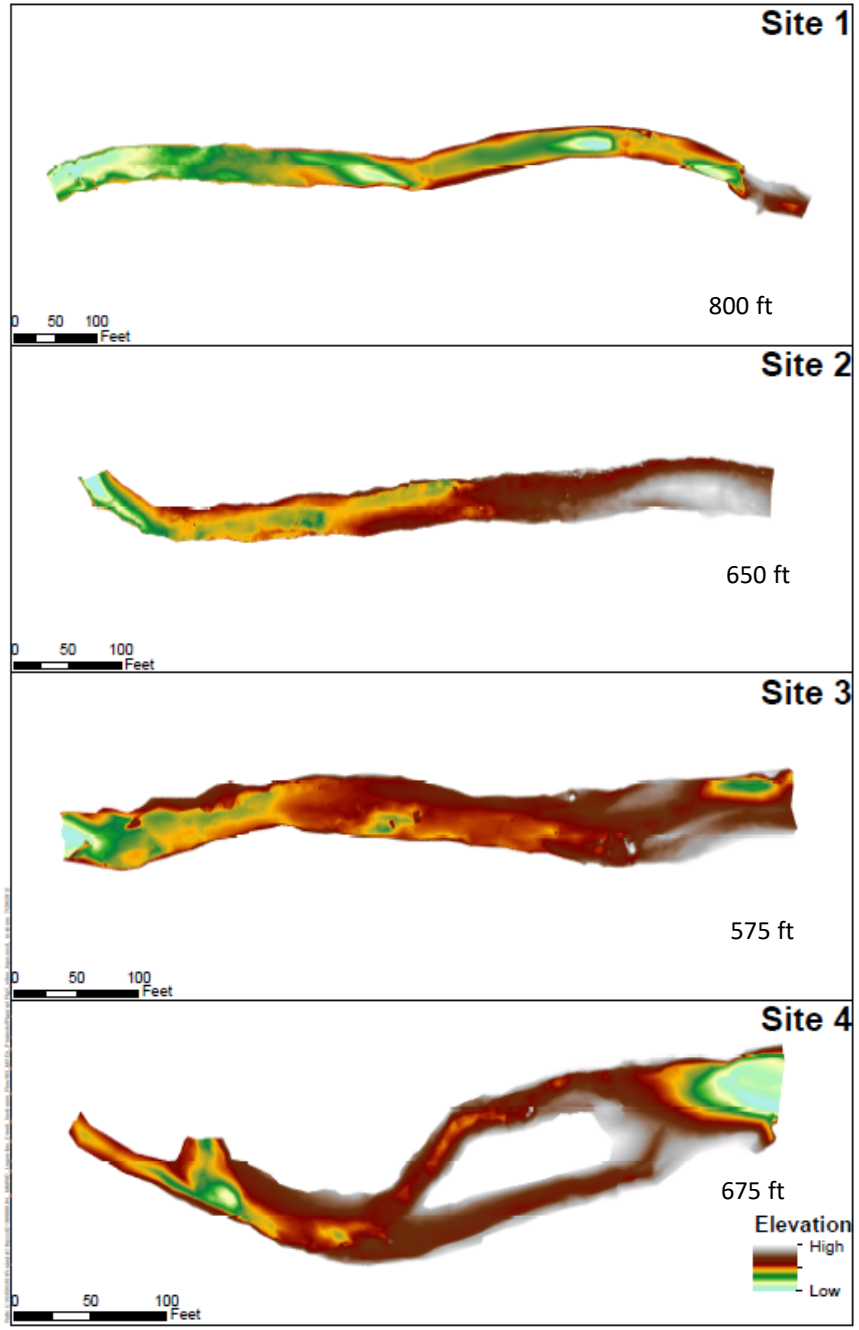


Figure 22. Proposed Instream Flow Regime

Site 1-4 bathymetry

Site 1

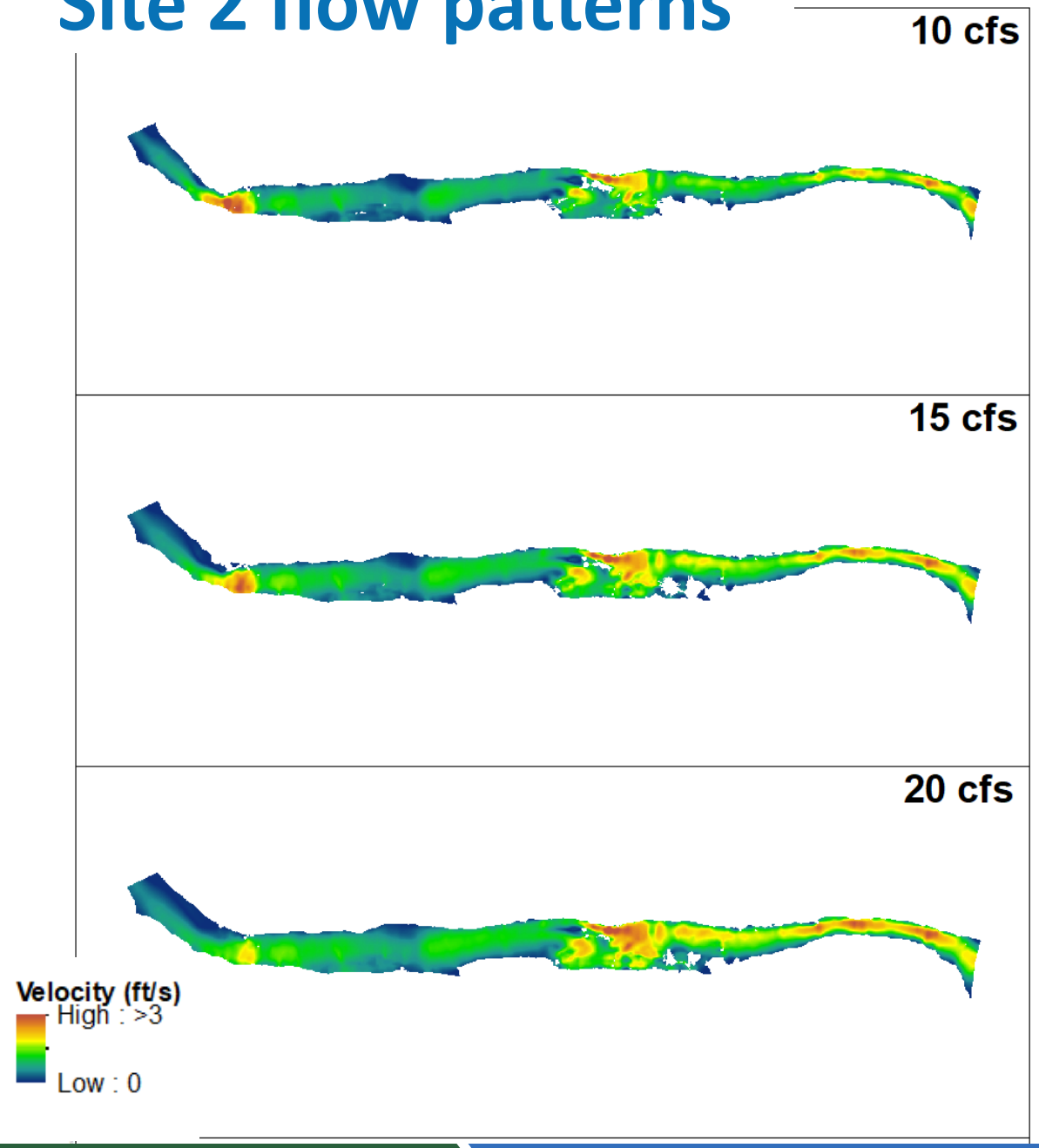
Site 2

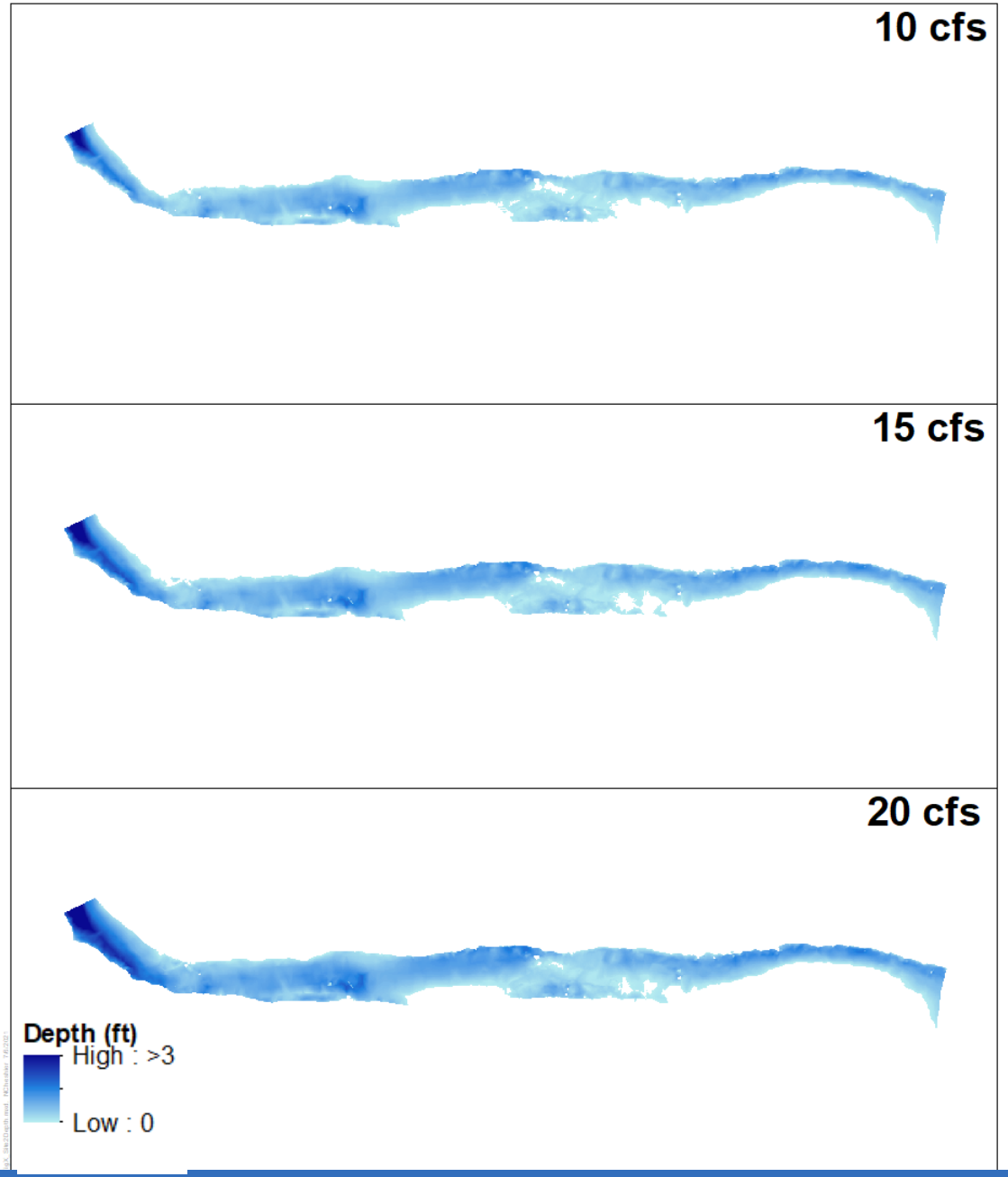


Site 3

Site 4

Site 2 flow patterns

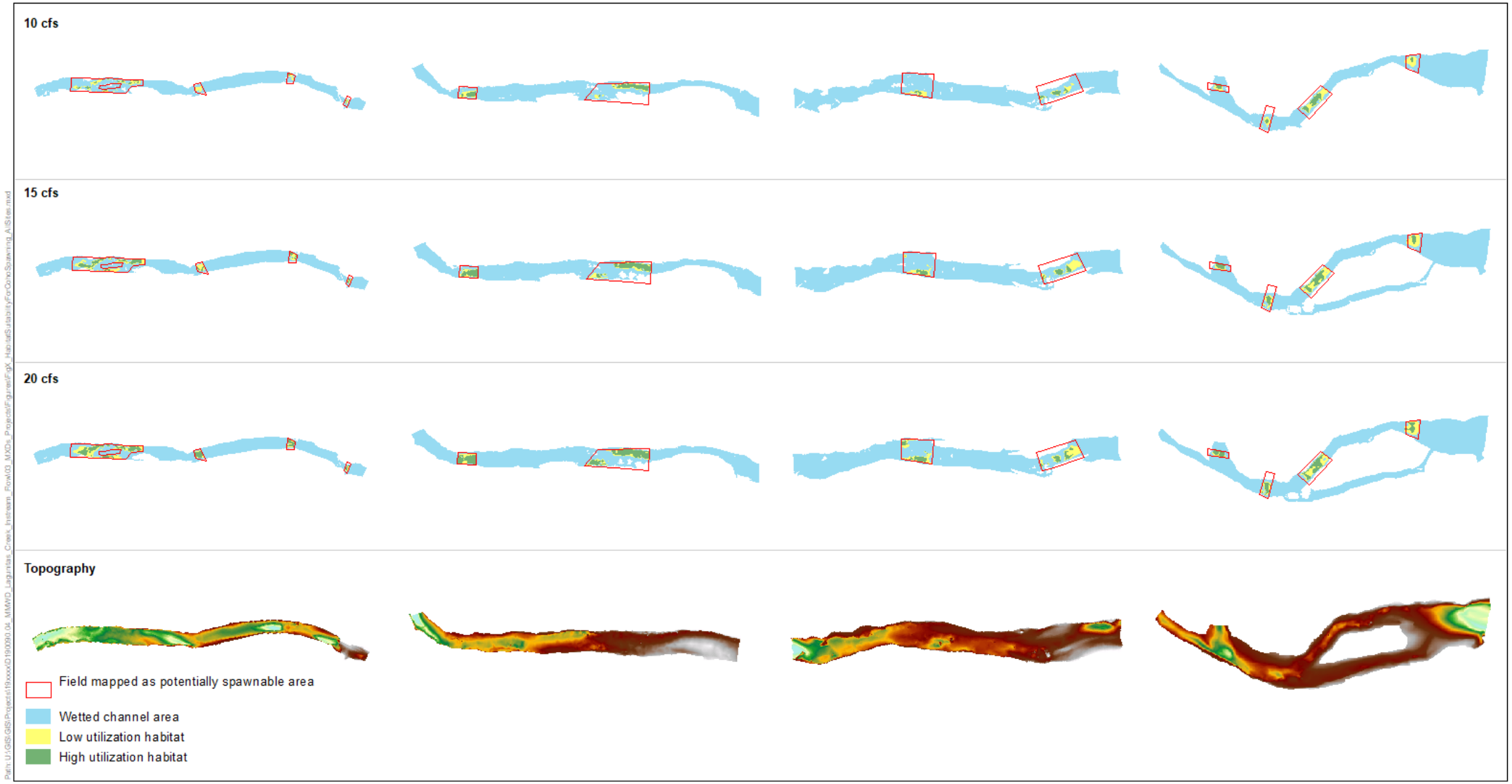




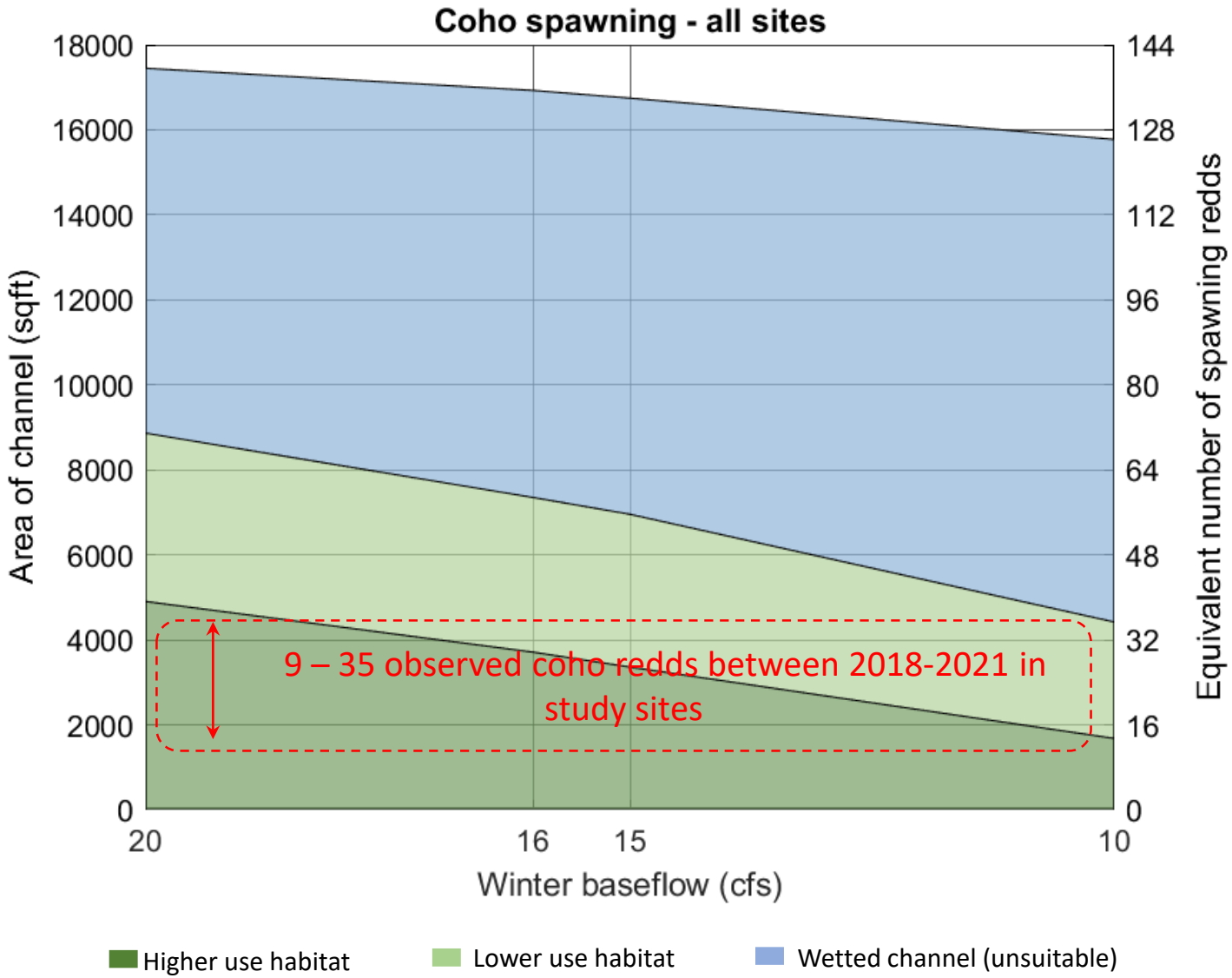
Habitat Suitability Results

Coho spawning suitability

(26% last year's spawning surveyed)



Coho spawning suitability

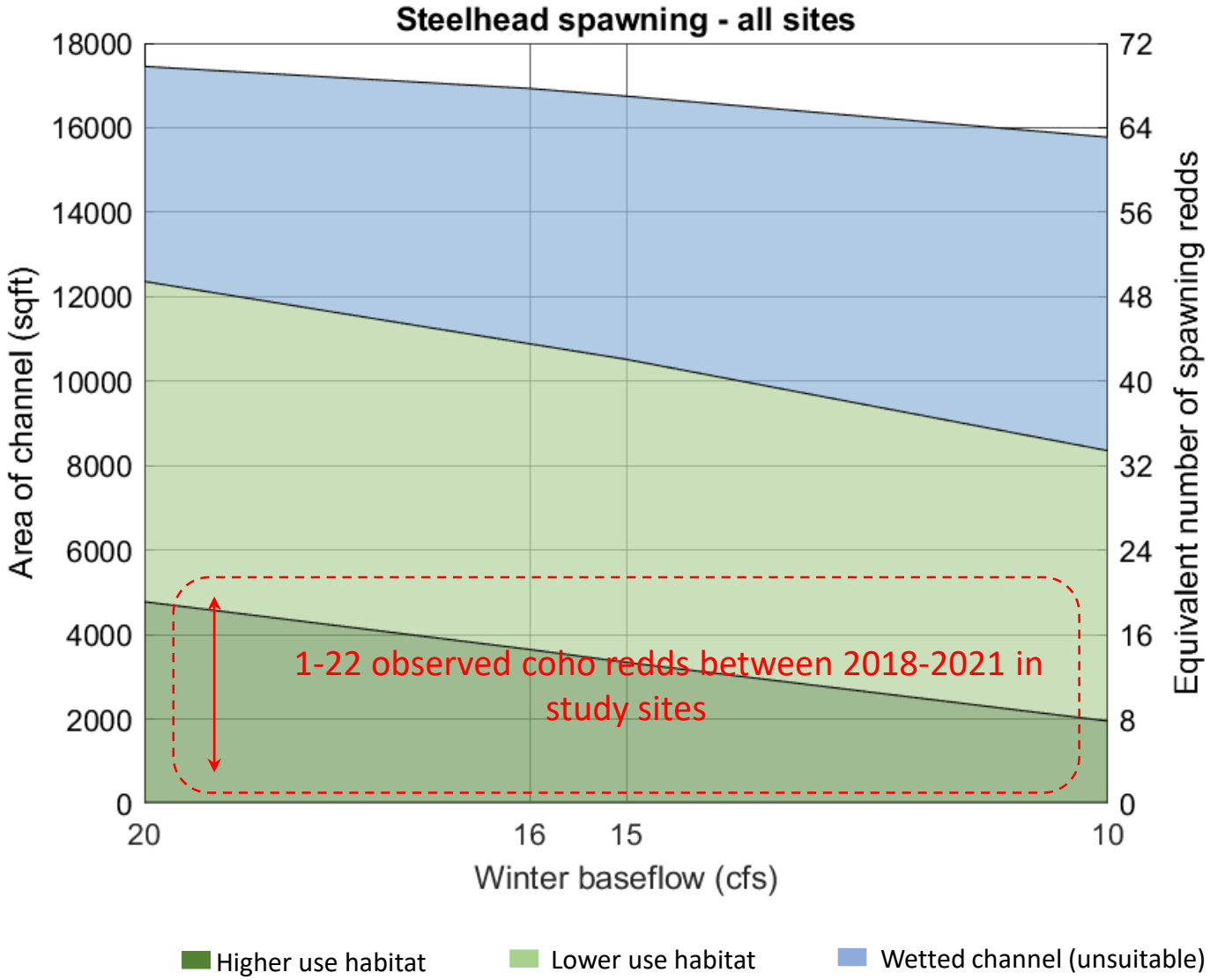


	Approximate Equivalent Redds in Study Sites[1]			
	20 cfs	**16 cfs**	15 cfs	10 cfs
Higher utilized habitat	39	**30**	27	13
Lower utilized habitat	32	**29**	29	22
Total	71	**59**	56	35

1. Redd equivalent areas assume 125 sq ft/redd for coho

	Observed coho redds in study sites				
Water Year	Site 1	Site 2	Site 3	Site 4	**Total in study sites**
2018	8	4	2	1	**15**
2019	4	9	4	2	**19**
2020	2	2	5	0	**9**
2021	14	11	6	4	**35**

Steelhead spawning suitability



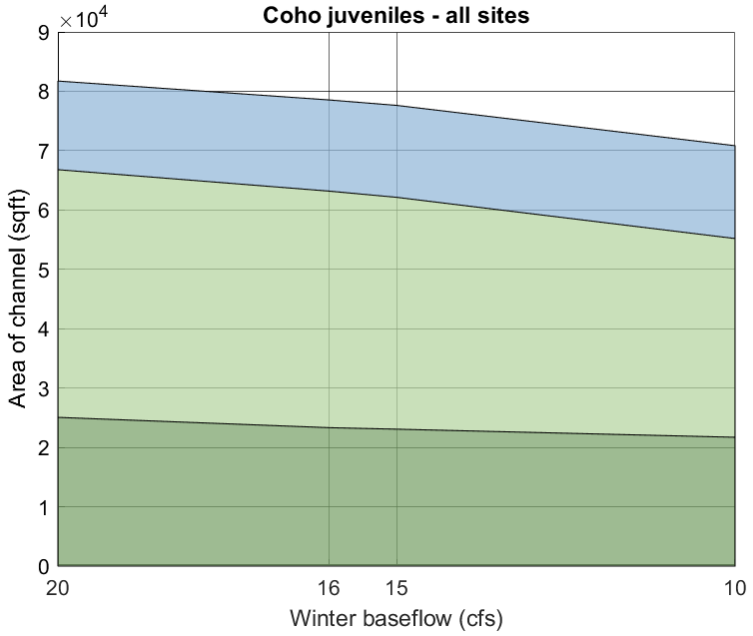
	Approximate Equivalent Redds in Study Sites[2]			
	20 cfs	16 cfs	15 cfs	10 cfs
Higher utilized habitat	19	15	13	8
Lower utilized habitat	30	29	29	26
Total	49	44	42	33

2. Redd equivalent areas assume 250 sq ft/redd for steelhead

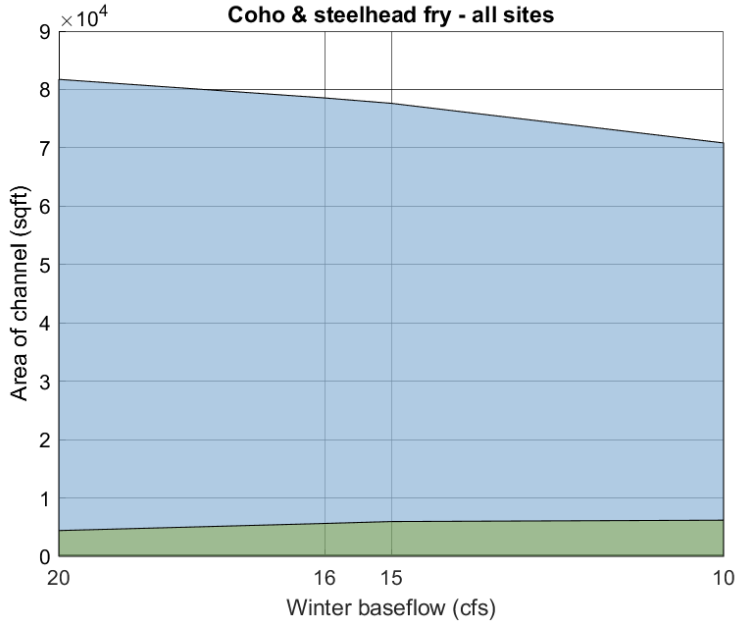
	Observed steelhead redds in study sites				
Water Year	Site 1	Site 2	Site 3	Site 4	Total in study sites
2018	0	4	4	2	10
2019	1	0	0	0	1
2020	3	5	10	4	22
2021	1	3	5	2	11

Other Evaluated Life Stages

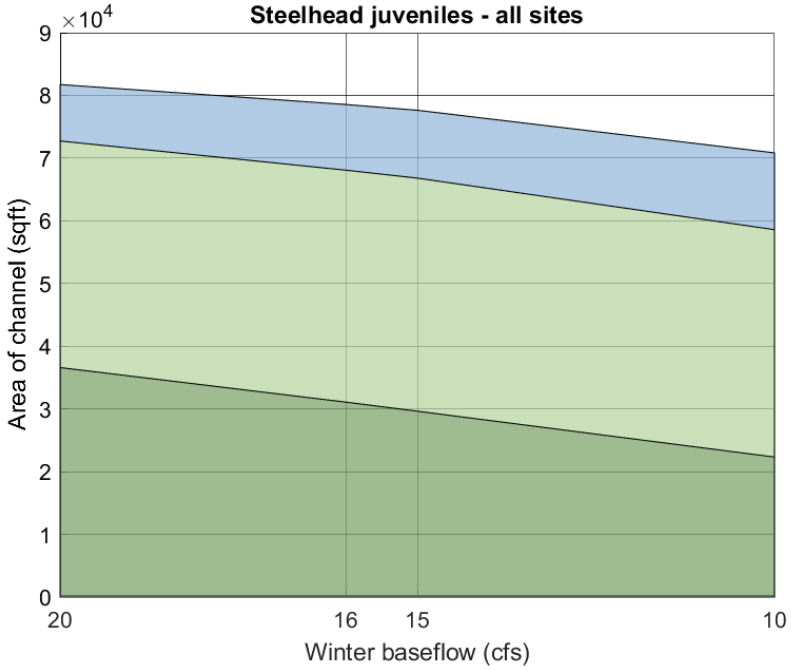
Coho juvenile rearing (1+ year)



Coho and Steelhead spawning fry



Steelhead juvenile rearing (1+ year)



Salmonid Habitat Suitability Summary

- Varying and complicated trends in relationship between flow and area/quality of habitat across reaches and life stages: no obvious universal cut-off point for all sites, species and lifestages, but several trends suggest that 16 cfs is reasonable.
- Dewatering is not a high risk: less than 4% of the channel is dewatered at 16 cfs (compared with 20 cfs). Main impact is conversion of higher utilized spawning habitat to lower utilized habitat, or unsuitable habitat.
- Suitable coho spawning area declines with reducing flows; 17% reduction in total suitable redd area @ 16 cfs. Higher utilized habitat declines by 24%.
- Suitable steelhead spawning area declines with reduced flows, but less sensitive than coho spawning suitability: 12% reduction in total suitable redd area @ 16 cfs. Higher utilized habitat declines by 24%.
- Area of suitable coho and steelhead fry rearing increases by 28% as flows decrease to 16 cfs.
- Area of suitable 1+ juvenile coho rearing habitat less sensitive to reduced flows: 5% reduction @ 16 cfs.
- Area of suitable 1+ juvenile steelhead rearing habitat decreases in quality and slightly in area at lower flows: 15% reduction @ 16 cfs.

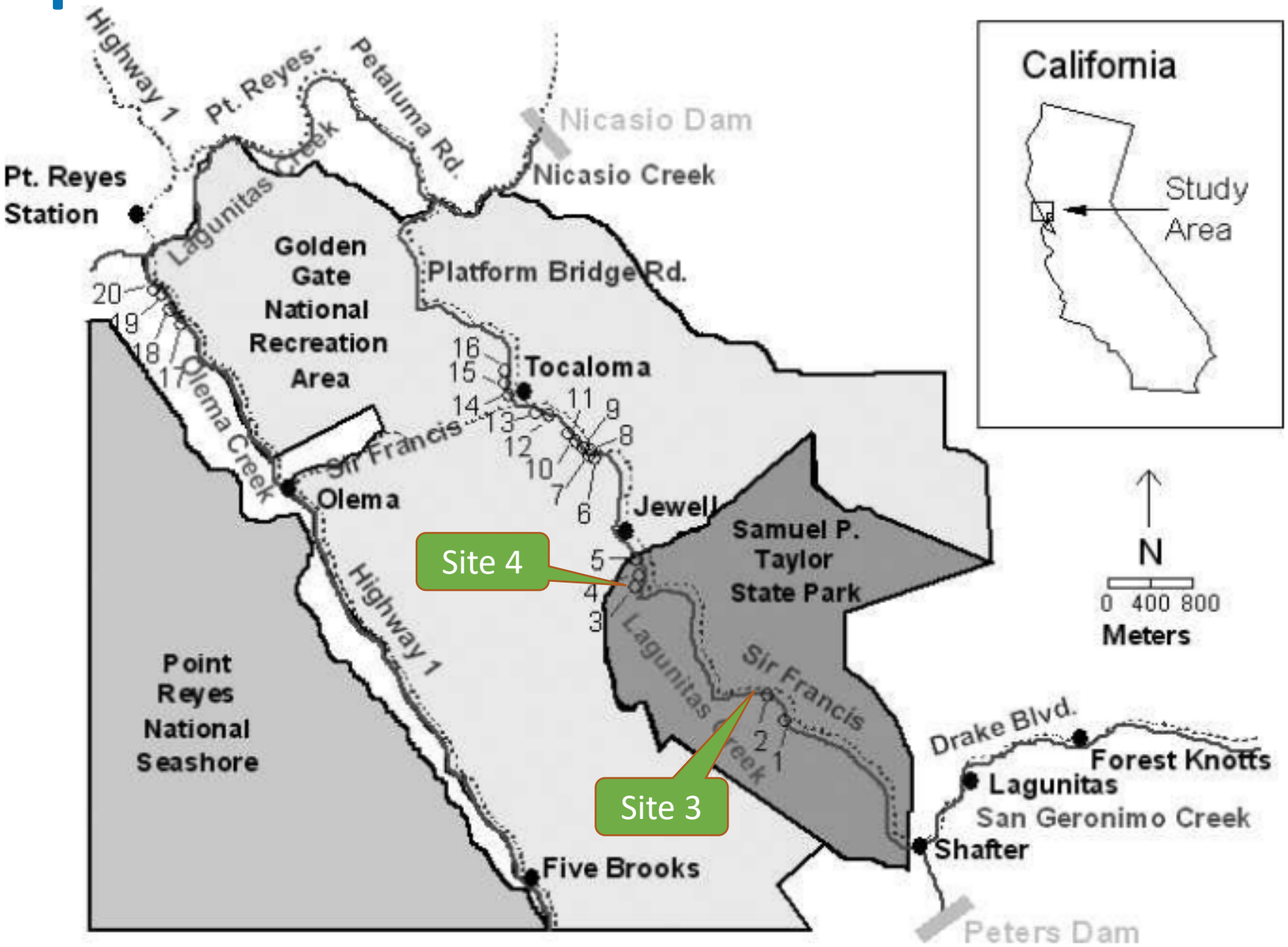
Freshwater shrimp

Found in slow glides and pools with undercut banks and sandy substrate, mostly downstream of Big Bend but with some habitat near sites 3 and 4.

Preferences
Velocity < 0.005 ft/sec
Depth 12-18 inches

Reduction in typical pool depths from 20-15 cfs flow
Site 3 0.07 ft for 3.2 ft pools
Site 4 0.11 ft for 3.5 ft pools

Martin, B.A., Saiki, M.K. and Fong, D. (2009). Habitat Requirements of the Endangered California Freshwater Shrimp (Syncaris Pacifica) in Lagunitas and Olema Creeks, Marin County, California, USA. Journal of Crustacean Biology, Volume 29, Issue 4, 1 Pages 595–604



Lagunitas Creek TUCP Monitoring & Adaptive Management

Monitoring Type	Methods	Location	Sites	Period	Frequency
Habitat Conditions & Hydrologic Connectivity	**Walking survey** **Photo monitoring** **Cross-section width and depth**	Upper Lagunitas Creek	Four flow study reaches, two cross-sections per reach	Nov 1 – April 30	Bi-weekly
Habitat Conditions & Hydrologic Connectivity	**Walking survey** **Photo monitoring** **Riffle length, critical depth, thalweg depth**	Lower Lagunitas Creek	Four riffles between Tocaloma and Gallagher (exact locations to be determined based on recon surveys in August/September)	Nov 1 – Mar 1	Bi-weekly
Water Quality	Water temperature	Upper Lagunitas Creek	**Peter's Dam,** Samuel P. Taylor State Park, **San Geronimo Creek**	Continuous	1-hour interval
Water Quality	**Water temperature, dissolved oxygen (DO), conductivity (specific conductance), turbidity**	Lower Lagunitas Creek	Gallagher Ranch	Continuous	1-hour interval
Fisheries	Spawner survey **(+ additional water depth data collected at 10% of redds)**	Upper Lagunitas (including tributaries)	Peter's Dam - Irving Br. Irving Br. - Swimming Hole Swimming Hole - Tocaloma Devil's Gulch San Geronimo Cr.	Nov 1 - Mar 15	Weekly (as conditions allow)
Fisheries	Spawner survey **(+ additional water depth data collected at 10% of redds)**	Lower Lagunitas Creek	Tocaloma - Nicasio Cr. **Nicasio Cr. - Gallagher Ranch**	Nov 1 - Mar 15	**Bi-weekly (as conditions allow)**

***New monitoring activities associated with TUCP management**

Adaptive Management

- Monitoring during TUCP period to inform adaptive actions
- Multi step process to inform adaptive management
  - Step 1-Increase biological and hydrological monitoring
  - Step 2-Consult model & agencies to inform adjustments to flow releases
  - Step 3-Adapt operations & continue with increased level of monitoring
- Establish weekly reporting to agencies and monthly reporting to Lag Tac Subcommittee regarding monitoring findings and operational responses, or more frequently if conditions warrant

Outreach & TUCP Application

Stakeholder Engagement

- Watershed Committee- 6/17/21
- Lag TAC Meeting-6/11/21
- Lag TAC Subcommittee Meeting-5/13/21, 6/8/21, 7/28/21, & 8/11/21
- Resource Agencies Meetings-4/15/21, 5/17/21, 7/30/21, & 8/12/21
- Individual Resource Agency Meetings
  - CDFW-6/9/21, 8/13/21, 8/19/21
  - NMFS-6/9/21, 8/19/21
  - RWQCB-6/8/21, 8/20/21
- State Water Board-5/12/21 & 8/24/21

Initial Stakeholder Comment Integration

Stakeholder/Date	Comment	Response
April 15th Agencies	Concern about limited area of habitat surveyed	Expanded length of reaches, stakeholder participated in location selection
April 15 Agencies	Build in monitoring program to see how flow reduction would be affected	Adaptive management and monitoring program a component of TUCP
May 13th TAC Sub	Include Leo T. Cronin as site	This is Site #1
May 13th TAC Sub	Include temperature monitoring	Additional temp data being collected
May 17th Agencies	Reach out to Rick Rogers re food production	Met with Rick Rogers on 6/9/21
June 8th TAC Sub	Rainy season occurring later than in 1990s	Flow schedule includes delay to winter flows
June 8th TAC Sub	Provide additional monitoring in Lower Lag Creek	Incorporated into monitoring plan
July 30th Agencies	Need adaptive management for delay, not just hard date	Provided adaptive management from 11/15-11/30 and weather driven trigger from 12/1-12/15
July 30th Agencies	Include redd monitoring	Incorporated into monitoring plan
Aug 11th TAC Sub	Include temperature trigger in threshold	Incorporated into monitoring plan
August 12th Agencies	Concerns regarding 14 cfs winter baseflow	Increase flow schedule baseflow to 16 cfs
Aug 13th CDFW	More frequent reporting	Increased from bi-weekly to weekly

Stakeholder & Resources Review of TUCP Approach

- **August 13th**-Final Draft of TUCP Monitoring Plan and Flow Release Schedule sent to resource agencies & Lag TAC Subcommittee for review.
- **August 17th**-Initial comment letters received
- **August 18th**-Revised TUCP Monitoring Plan & Flow Schedule and sent it to resource agencies for subsequent review.
- **August 19th & 20th**-Final agency meetings to review modifications and to receive final comments.
- **August 24th**-Marin Water Fisheries technical review with agencies
- **August 24th**-State Water Board Meeting to review flow study and discuss TUCP process with Marin Water.

Conservation & Water Supply Savings

Community Water Conservation Savings

- 25,880 AF annual demand
  - 3-year average 2018-2020
- Assumes 15% - 25% annual conservation
- Projected savings 3,900 - 6,500 AF

TUCP Proposal Savings

- Average annual releases 11,000 AF
- Adaptive management delay to winter baseflow
- Reduction of dry year winter baseflow
- Projected savings 1,800 – 2,500 AF

Combined Savings
5,700-9,000 AF

Proposed TUCP application

(To be filed by 9/10)

- Eliminate first upstream migration flow
- Adaptive Management Nov 15th – Dec 1st
- From Dec 1 – 15th Baseflow increases to winter value coincident with >25 cfs flow due to dry year classification @ SP Taylor USGS gauge or by Dec 15th if no such flow has occurred
- Reduce winter baseflow to 16 cfs
- Resume dry year flow schedule on April 1st
- Potential modifications to increase flow throughout TUCP period based on monitoring & adaptive management

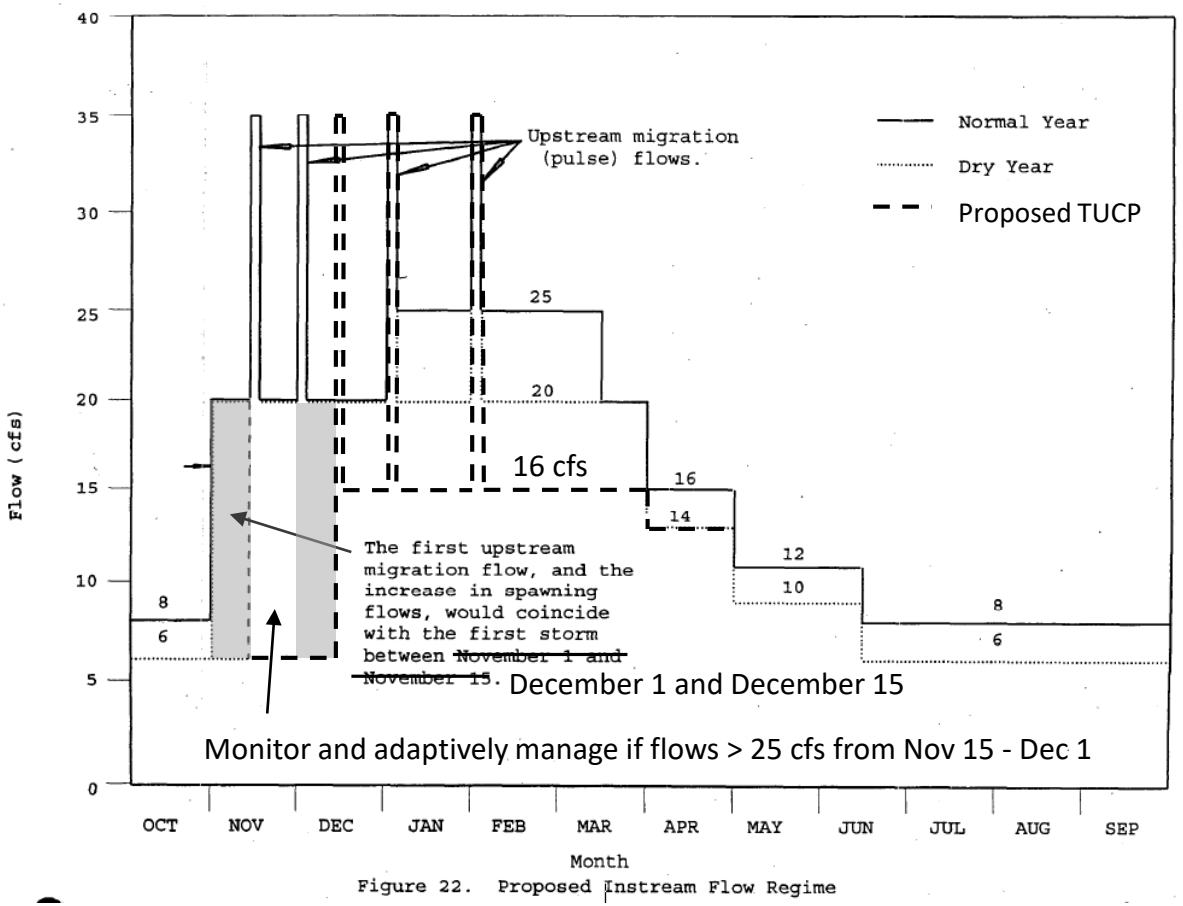


Figure 22. Proposed Instream Flow Regime

Thank You