ASSESSING THE REASONABLENESS OF THE SCOTT RIVER WINTER FLOW MINIMUM OF 362 CFS

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A winter flow minimum of 362 cubic feet per second (cfs) is now being promoted by the California Department of Fish and Wildlife (CDFW) for the Scott River during the current 2022-2023 drought. This required flow is greater than the monthly 200 cfs minimum for winter months already designated in the State Water Board's emergency regulation for the Scott River, "Establishment of Minimum Instream Flow Requirements", readopted in June 2022 (SWRCB 2022). CDFW did not explain its purported reason for this increase in flow expectation for any winter diversion for stock water or recharge purposes, other than reference to the CDFW's 2017 report, "Interim Instream Flow Criteria for the Protection of Fishery Resources in the Scott River Watershed, Siskiyou County". In fact, in this report, CDFW misapplied instream flow models and failed to compare any of the readily available Scott River flow data with the actual fish data collected by its own personnel. Reviewing real-world data reveals that adequate monthly minimal flows for Coho and steelhead adults in winter could range from 55 to 180 cfs based on fish passage data for the mainstem Scott River at CDFW's fish counting facility at river mile 18.

As a result of CDFW's higher flow requirement, the approved SWRCB permit for significant recharge by the Scott Valley Irrigation District (SVID) has not been able to proceed this season, despite State policy "to maximize recharge opportunities" (Calif. Natural Resources Agency et al. 2022; SWRCB 2023). Even more importantly, this flow minimum will prevent almost any winter recharge effort in Scott Valley from going forward in most water years for any significant length of time due to Scott River's natural fluctuations. To help improve interconnected surface flow during summer and fall, winter groundwater recharge was shown to be an effective tool in UC Davis's Scott Valley Integrated Hydrologic Model and became a high priority management action item in the Scott Valley Groundwater Sustainability Plan (GSP), adopted by Siskiyou County under the State's Sustainable Groundwater Management Act (SGMA) (Siskiyou County GSA 2021). Blocking recharge efforts can also block streamflow recovery in the Scott.

This paper analyzes the assumptions of this new flow expectation and examines the suitability and reasonableness of its regulatory application. The fixation on a hypothetical single flow minimum without validation from real-world Scott River fishery resource experience merits better justification than what has been offered to date. The word "interim" itself implies that the findings in the 2017 CDFW report were not necessarily meant as a final determination of a regulatory standard. To date, there has been neither peer review on the report nor opportunity for public discussion on its findings. Yet, this "interim" report, which is based on simulations rather than real-world data, is now being used as a regulatory tool.

For the purpose of this assessment, "winter months" are here defined as December through March. These months are essentially a period of unimpaired flows with no irrigation and only minimal livestock water diversions (Siskiyou County Superior Court 1980.)

Assumptions in CDFW's 2017 Interim Instream Flow Criteria Report

The report's stated purpose is to describe "*the methods and results of an analysis using historical flow data and regional regression relationships to develop interim instream flow criteria suitable for anadromous fish in the Scott River watershed*." Specific focus was on the Scott River as "*one of the most important Coho Salmon spawning and rearing tributaries in the Klamath River watershed.*"

Three different regression equations were used to model the theoretical salmonid-habitat flow relationships, each developed without the use of Scott River fish and habitat data for validation. When

conflicting results were found between two of the models, CDFW selected "the highest semi-monthly flow" to produce its recommended flow regime for the Scott River (Report's Table 10). Other assumptions are identified below. All flows are to be measured at the Scott River USGS Gage 11519500 below Fort Jones, located at River Mile 21.5.

Comparison of Flow Models Used

The Interim Flow Criteria report calculates various flows for different life stages or months for the three applied methods: Q_{fp} (R2 Resources, 2008); Hatfield & Bruce (2000); and Tessman Adaptation of Tennant (Tessman 1980). The Q_{fp} formula components are Mean Annual Flow or Discharge (MAF or MAD), Minimum Passage Depth (by species and life stage), and Drainage Area. In contrast, the other two methods are hydrologic simulations based on MAF/MAD, Mean Monthly Flow (MMF), and longitude and/or latitude coordinates. Comparison of the three models for adult flows for migration and spawning is shown in Table 1, with the CDFW Interim Flow Criteria shown in the bottom row.

Table 1. Model results for Flows (cfs) for Winter Months for Adult Fish Life Stages

Method	Chin. Migr.	Chin. Spawn.	Coho Migr.	Coho Spawn.	Steelhead Migr.	Steelhead Spawning	Dec	Jan	Feb	March
Q-fish passage	103		61		61					
Hatfield - Bruce**		351		217		362*				
Tessman/Tennant							337*	446	500	354*
CDFW Interim							337	362	362	354

*Flow is same number used in CDFW's Interim Flow Criteria (Table 13); ** "Optimum" flow

For winter flows, the adult life stage is most important. Based on CDFW's video weir results at river mile 18, Chinook spawning ends by November (Knechtle 2022). While Coho spawning is known to extend into January and steelhead spawning occurs from October into April, these two species primarily spawn in the cooler tributaries with more suitable habitat conditions. CDFW's mainstem Scott River gage "threshold" does not reflect flow conditions in the known spawning tributaries for Coho and steelhead, such as Shackleford or French Creeks.

Fish passage for Chinook might understandably be a higher flow as this species is usually bigger than Coho or steelhead trout, which seems reflected in the Q_{fp} results (103 vs. 61 cfs). However, the Hatfield-Bruce results shown in Table 1 surprisingly give steelhead a higher flow than Chinook or Coho for spawning habitat. If steelhead spawning habitat is truly the winter mainstem flow concern of CDFW, then that assumption has not been clearly stated by the Department. Although little data is being collected, experience shows adult steelhead often migrate upstream and into the Scott's tributaries for spawning access during spring snowmelt runoff flows.

Suitability of Flow Models

Q_{fp} - Fish Passage (R2 Resources, 2008)

This method was developed and later adopted as part of the State Water Board's North Coast Instream Flow Policy to evaluate new water rights permit applications. This model uses a single regression equation: $Q_{fp} = 19.3 * Q_m * D_{min}^{2.1} * DA^{-0.72}$. where Q_{fp} = the minimum fish passage flow (cfs), Q_m = mean annual flow (cfs), D_{min} = minimum passage depth criterion (feet), and DA = drainage area (mi^2).

While some coastal California stream data were used for validation, the watersheds evaluated were all less than 100 mi^2 in comparison to the Scott River watershed size of 613 mi^2 (above the USGS gage). Compared to the Hatfield-Bruce method, it looks for "minimum" rather than "optimum" flows. Its main

limitation in suitability for the Scott River is its assumption of "minimum passage depth" for adults: 10.8" for Chinook and 8.4" for Coho and Steelhead. These depths seem unreasonably high for adult fish that range in height from 3" (steelhead) to 6" (Chinook) and which are often seen successfully migrating upstream through riffles with half of their backs out of the water. Despite this apparent over-estimation for the depth assumption, the Q_{fp} method provided the lowest flow result for Coho and steelhead trout adult migration among the three methods (Table 1). However, its result of 61 cfs was not selected by CDFW as one of the recommended interim flows of the 2017 report's Table 13, despite this method being the basis for the SWB's North Coast Instream Flow Policy.

Hatfield-Bruce Model

This model is the apparent source of CDFW's call for 362 cfs during January through March in the current SVID permit (SWRCB 2023). As the authors state in their 1980 article, "*Our results are presented as a planning tool to: (1) allow managers and project proponents to conduct a preliminary assessment of proposed water-use development projects, (2) optimize research efforts for instream flow studies and experiments, and (3) set experimental boundaries for adaptive management of stream flow.*" However, in the case of the 2022-23 drought in Scott Valley, CDFW is not using this model for planning, research, or adaptive management experiments – but as a regulatory tool.

The data employed in the Hatfield-Bruce model come solely from Instream Flow Incremental Methodology (IFIM) reports done for water project planning in western streams. While some of the geography may be similar, the equations were based on a compilation of theoretical habitat suitability criteria applied in various streams but not necessarily based on field measurements of actual fish passage flows. In sum, each resulting regression equation represents the "line of best fit" for data among multiple estimates using similar criteria rather than real-world validations. The resulting high R^2 value (in this case 0.681), which should indicate that the model outputs provide a reasonable estimate of real world values, is instead practically a foregone conclusion because it is based on similar IFIM assumptions found in those planning reports. Real world data from the Scott River would be better.

Another limitation of the Hatfield-Bruce method is its choice of using Mean Annual Discharge (MAD) instead of <u>median</u> annual discharge, mainly because the MAD data were considered by the authors to be much more numerous for streams selected for the model. Median flows are not biased by the extreme ranges that can occur from extreme flood or drought flows and are more reflective of natural flow conditions that fish experience. In dammed streams, the regulated flows also tend to be closer to the mean as the extreme flow events are usually brought under artificial control and moderated.

As the Instream Flow Council (2002) cautioned, <u>the IFIM method "is not intended for prescribing instream flow standards"</u>, yet here it is being used for that purpose. The regression equations reflect hypothetical relationships between habitat and flow, selecting the "flow that maximizes an index of habitat suitability" referred to as the "optimum flow for that species and life stage." Therefore, this Hatfield-Bruce model does not suggest minimum flow criteria - as CDFW's report implies (p. 25) – but rather optimum flow. Is an optimum flow reasonable during a multi-year extreme drought?

While the Hatfield-Bruce model was plainly meant to be used as a planning and research tool, the very opposite seems to be happening in the case of the Scott River: CDFW is using its results as a regulatory standard, while less fishery resources data are being gathered than usual. The SWB's Emergency Regulation's Instream Flow Minimums for2021-23 should have spurred new field work to evaluate their effectiveness. However, CDFW has not been, and is not currently, performing any new field work to evaluate adult fish passage or spawning access beyond the Department's existing monitoring efforts.

In fact, the annual Coho spawner survey, which is routinely carried out by the Siskiyou RCD with funding from CDFW, has inexplicably not yet been funded for 2022-23 by the Department, despite an early grant submittal and millions of dollars being dedicated by the State to address the drought emergency. Such surveys help confirm the upper most Coho migration and spawning sites within the watershed, which can then be compared with access flows. Most major tributaries have continuous flow gages operated by Calif. Dept. of Water Resources (CDWR 2023a,b). Access to these cooler tributaries is far more relevant to Coho success than the Interim Report's simulated mainstem flow recommendations.

Further exacerbating the dearth of data, CDFW's fish counting facility at RM 18 this season operated only until Dec. 26, 2022, when it was removed due to the threat of high flows. While this practice is not uncommon, the annual Coho count this season will be underestimated, as the run was just beginning to respond to the rain-induced pulse flow.

Tessman Adaptation of Tennant Model

CDFW has used this model to call for 354 cfs for the month of March in a recent request for winter livestock water diversion from Kidder Creek. Essentially this method uses the Mean Monthly Flow (MMF) for low flow months (in the Scott River's case July-Oct), 40% of MMF for high flow months (Jan-June), and 40% of Mean Annual Flow (MAF) for those in-between months (Nov-Dec). Note that CDFW has defined the years for calculating MMF and MAF to be for the "less-developed period of water year 1942 through water year 1971" instead of for the full 81-year period of record. It appears that the Department assumes that this earlier 30-year period had less water use before groundwater sources were expanded for irrigation. However, flood irrigation from surface water was the predominant method then and applied more water per acre than later sprinkler methods, as noted in the Scott Valley GSP (Siskiyou County GSA 2021). Mean flows from this earlier time period also are biased in that they reflect the two largest floods of record in 1955 and 1964 but not one of the most extreme dry water years, experienced in 1976-77.

While the original Tennant method used 30% MMF as "excellent" criteria for all winter months, this version assumes that 40% MMF is needed for a proposed flow prescription. As with the Hatfield-Bruce Model, another weakness of this model and its Tennant predecessor is they do not directly apply fish metrics, unlike the Q_{fp} method for minimum passage depth. Tessman is from South Dakota and, as the Instream Flow Council (2002) noted, "Tessman's modification has been used throughout the northern great plains and Canadian prairie provinces where it better reflects the flashy nature of prairie streams." The relevance of its application to the snowmelt-influenced Scott River in a Mediterranean climate has not been explained by CDFW.

Reasonableness of Flow Models

- Scott River is an undammed, unregulated stream system and essentially free-flowing half of the year, though in an "impaired" hydrologic condition during the irrigation season from April to October when surface and groundwater diversions primarily occur. It does not require minimum flows for geomorphological processes which mainly occur during winter and spring high flow events (and can be absent from dam releases without relevant flow criteria) (Instream Flow Council 2002). The instream flow models used by CDFW are not designed to prescribe flows in an unregulated, undammed stream with naturally fluctuating flows that can vary in the extreme.
- These three flow models are each designed to help quantify a range of instream flow needs below a water storage project, which does not apply to the Scott River with only two diversion dams on the mainstem and no reservoir storage.

- In an extreme 3-year drought period as 2020-2023 has proven to be, choosing an "optimum" flow instead of the purported "minimum" flow does not seem reasonable. The Hatfield & Bruce model is for planning and research purposes, but is instead being used by CDFW for regulatory use without any local validation. This expansion of intent is not reasonable and not defensible.
- Selecting the 362 cfs flow target, designed for steelhead spawning, does not seem reasonable, when CDFW's emphasis has been on Chinook and Coho passage, and steelhead spawn primarily in the spring run-off period and in the tributaries. Steelhead spawners are also smaller than the other two species, so should not require as much flow for passage or spawning.

Comparison with Real World Scott River Data – see Attachment A also

A more realistic approach is to look at existing data in the Scott River instead of just applying theoretical models (see Attachment A – Flows & Fish). Fortunately, the Scott River has some very good salmon data, thanks to CDFW. So it is surprising when the data are not fully applied for an analysis of flow conditions compared to adult migration, spawning, and outmigration success. The annual Scott River Salmon Studies reports (Knechtle et al. 2007-2022) usually do compare flows and adult Chinook and Coho migration timing, though the fish counting facility (RM 18) is sometimes removed due to high flows before Coho spawning season is complete, as noted above. Only a minimum count of steelhead trout is feasible as "a large fraction of the adult steelhead migration occurs outside the operational window" of the facility, with few if any steelhead usually recovered during the spawning ground survey efforts for Chinook and Coho (Knechtle et al. 2021).

Based on these annual CDFW Salmon reports, the run timing of both Coho and steelhead appears to be influenced by increased flows, often in the form of pulses brought on by rainfall events. As these two species are the ones of most concern for migration during winter flows, the minimum flows for Chinook spawning migration in October are not as relevant. Coho spawner (and limited steelhead) migration into the valley past the CDFW fish counting facility at RM 18 has been tracked since 2007.

As an example of adult fish passage during a drought year, a flow range of only **45-60 cfs** during the 2013 Chinook run and Coho run was sufficient to get spawners of both species access to all of the 52 miles below the (highly disturbed) tailings reach in Scott Valley (Siskiyou RCD 2014). While the Scott River had sufficient flow for all 2,752 Coho adults to access the mainstem, they could not access their natal streams with all of the tributaries except French Creek disconnected in that very dry and cold fall. But the Interim Flow Criteria targeting the USGS gage will not address that tributary migration access problem.

Looking at *real* Coho Spawner counts and comparing them to *real* Monthly Flow Means offers a *real world* look at what flow minimums might be for the Scott River. Table 2 lists the returns for 6 years of Coho returns in selected drought years (Knechtle et al. 2009-2021). The only real disaster for too little flow was in 2013, as noted above. But it wasn't too little water in the mainstem: 2,752 adults made it far up the valley with less than 55 cfs mean flow, almost all by the end of December. Compare this actual Coho migration access flow to those calculated in the three models of Table 1: only the Q_{fp} at 61 cfs is in the ballpark while the other models predicted 217 cfs or 337 cfs.

Table 2. Scott River Coho Spawning Returns, Flows & Run Timing in Selected Drought Years

YEAR	Coho Spawners	Nov. Flow Mean	Dec. Flow Mean	Run Timing
2009	81	48 cfs	73.6 cfs	11/20 to 1/1
2012	201*	139.5 cfs	1,014 cfs	10/26 to 11/29
2013	2,752	50.5 cfs	54.2 cfs	10/21 to 2/6

2015	212*	7.75 cfs	308.4 cfs	12/4 to 12/9
2020	1,766	12.7 cfs	52.6 cfs	11/16 to 1/4
2021	852	180 cfs	118.6 cfs	10/24 to 1/2

*incomplete count due to early removal of counting weir

If CDFW is determined to use Mean Monthly Flow for its criteria, then applying actual observations of adequate fish passage flows to its criteria would be very reasonable. Although some of these monthly means may reflect higher pulse flows that could have attracted upstream migration, pulse flows cannot be managed in an undammed stream system. Based on the data in Table 2, adequate minimal mainstem passage flows for Coho and steelhead adults could range from 55 to 180 cfs. This *real flow* analysis differs significantly from the Interim Flow Criteria requirement of 362 cfs for Jan-Feb (or 354 cfs in March).

From personal observations for the Scott River Water Trust from 2001 to 2014, the severely disturbed 4-mile tailings reach in the upper Scott River (RM 52 to 56) appears to need between 100 and 200 cfs showing at the USGS gage (RM 21) to connect – and allow passage to/from good Coho and steelhead habitat in Sugar Creek, South Fork and East Fork. Data collection and analysis about flow (and sub-surface water) focusing on just this chronic fish passage problem area would be helpful. Theoretical flow models will not work here.

Conclusions & Recommendations

- The Hatfield & Bruce model, which was used by CDFW for the basis of its 362 cfs winter flow requirement, is intended to be used only for planning and research purposes. Instead, it is being used by CDFW for regulatory use without any local validation. This expansion of intent is not reasonable and not defensible.
- CDFW has not applied its own fish data to analyze flows needed for adult passage for Coho and steelhead during winter months.
- Adequate monthly minimal flows for Coho (and steelhead) adults could range from 55 to 180 cfs based on CDFW fish passage data for the mainstem Scott River at its fish counting facility (RM 18). A Scott River real flow analysis differs significantly from the Interim Flow Criteria requirement of 362 cfs for Jan-Feb (or 354 cfs in March). Credibility is challenged, or as CDFW Director Bonham recently remarked in another context: **"Facts are not in evidence."** Why CDFW ignores its own fish passage data is not explained nor is this lack of analysis reasonable.
- Authors Hatfield & Bruce recommend that the "use of equations and prediction intervals may allow managers to decide on the value and range of flows for a management experiment". CDFW should promote validation of any instream flow criteria through an experimental design rather than just impose unreasonable flow minimums – and then not observe how Coho and steelhead are reacting to various flows. With no systematic Coho and steelhead spawner surveys ongoing in the winters of 2021-23 in the Scott River stream system, no conclusion can be reached about the CDFW criteria's purported effectiveness to protect the fishery resource.
- If steelhead spawning habitat is truly the winter mainstem flow concern of CDFW, as implied by their selection of the 362 cfs winter flow criteria, then that assumption has not been clearly stated by the Department nor has any evidence been shown that their migration or spawning access has been affected by previous winter low flow conditions.
- Recharge efforts, an important priority under the 2022 California Water Supply Strategy, are being seriously hampered by CDFW's winter flow requirements when set as unreasonably high as they have recently been for the Scott River. As shown from actual salmon spawner data for the Scott

River, sufficient flows are available in almost all winter months to sustain both diversions and the fishery at a much lower flow than the currently required 362 cfs.

- Two fundamental questions should be considered when attempting to institute instream minimum flows: When it comes to determining flow levels that are adequately "protective" of fishery resources, is real-world data and past experience a better guide than a theoretical model? And perhaps more importantly, can theoretical "protective" flows reasonably be expected to be obtainable during drought periods in an unregulated stream system?
- In making its flow recommendations under the auspices of the SWB's emergency regulation, CDFW should immediately re-evaluate its current recommendations and instead apply the real-world flow minimums indicated by the above analysis. The Department can use its own excellent fish data for the Scott River as sufficient proof for adequate winter flow passage.

References

California Dept. of Fish and Wildlife (CDFW). 2017. Interim Instream Flow Criteria for the Protection of Fishery Resources in the Scott River Watershed, Siskiyou County. Sacramento. 29 p.

California Dept. of Water Resources (CDWR). 2023a. California Data Exchange Center (CDEC). Real-time River Stages: Scott River. https://cdec.water.ca.gov/reportapp/javareports?name=RealStages

CDWR. 2023b. Water Data Library Station Map. https://wdl.water.ca.gov/waterdatalibrary/Map.aspx

California Natural Resources Agency et al. 2022. CALIFORNIA'S WATER SUPPLY STRATEGY: Adapting to a Hotter, Drier Future. August 2022. Sacramento. p. 6

Hatfield, T. and J. Bruce. 2000. Predicting salmonid habitat-flow relationship for streams from western North America. *No. Amer. J. Fish Mgt*. 20(4):1005-1015.

Instream Flow Council. 2002. Instream Flows for Riverine Resource Stewardship. 410 p.

Knechtle, M. et al. 2007-2022. Scott River Salmon Studies. CDFG / CDFW, Yreka CA.

Maurer, S. 2002. Scott River Watershed Adult Coho Salmon Spawning Survey: December 2001 - January 2002. Prepared for the Klamath National Forest, Fort Jones, CA.

R2 Resources. 2008. Approach for Assessing Effects of Policy Element Alternatives on Upstream Passage and Spawning Habitat Availability - Appendix G. Administrative Draft. Prepared for State Water Board's North Coast Instream Flow Policy: Scientific Basis and Development of Alternatives Protecting Anadromous Salmonids. March 14, 2008.

Siskiyou County Groundwater Sustainability Agency (GSA). 2021. Scott Valley Groundwater Sustainability Plan. Adopted by the County Flood Control and Water Conservation District. Yreka, CA.

Siskiyou County Superior Court. 1980. Scott River Stream System Adjudication. Prepared by State Water Resources Control Board. Decree No. 30662. Yreka.

Siskiyou Resource Conservation District (RCD). 2002-2021. Scott River adult coho spawning ground surveys. (various authors). Etna, CA.

State Water Resources Control Board (SWRCB). 2022. Establishment of Minimum Instream Flow Requirements, Curtailment Authority, and Information Order Authority for Klamath River Watershed. Resolution No. 2022-0025. July 29, 2022. Sacramento.

SWRCB. 2023. Temporary Permit 21439 (Application T033339) to Appropriate Water from Scott River in Siskiyou County. Issued Jan. 18. 2023. Division of Water Rights. Sacramento.

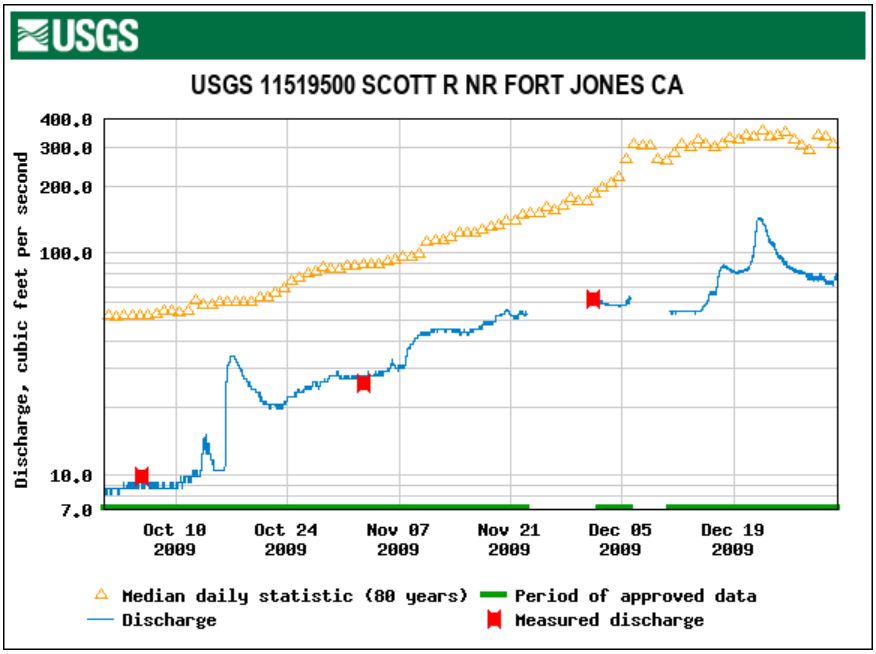
Tennant, D.L. 1975. Instream Flow Regimens for Fish, Wildlife, Recreation and Related Environmental Resources. US Fish & Wildlife Service, Billings MT. 30 p.

Tessman, S.A. 1980. Environmental assessment, technical appendix E in: Environmental use sector reconnaissance elements of the western Dakotas region of South Dakota study. South Dakota State University, Water Resources Research Institute. Brookings, SD.

U.S. Geological Survey. 2009-2022. Scott River Gage near Fort Jones, #11519500. Mean Monthly Discharge. https://waterdata.usgs.gov/monitoring-location/11519500/#parameterCode=00060&period=P7D

Attachment A -- Scott River Droughts: Fall Flows & Fish Returns in Selected Years

Fall 2009 (WY 2010)

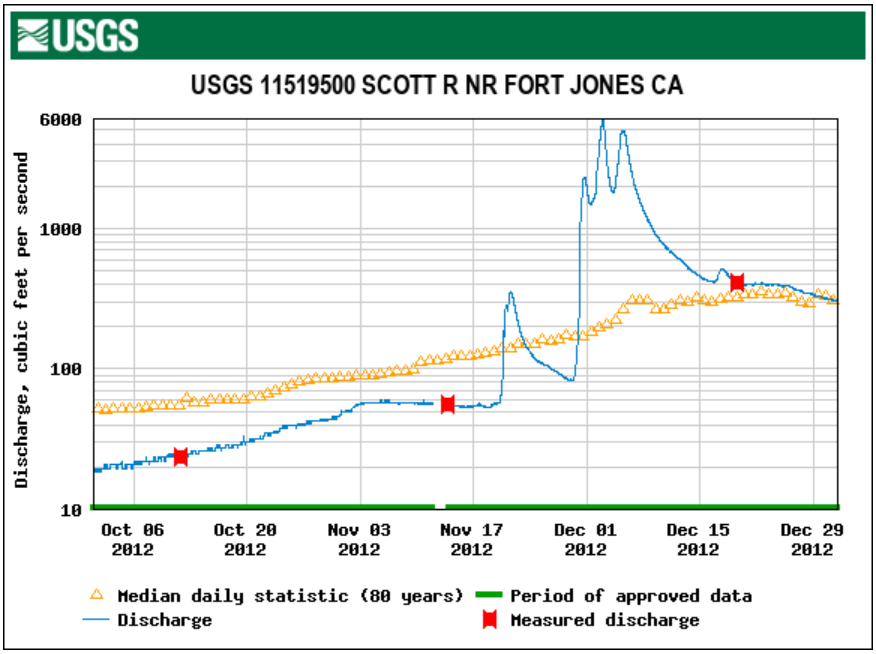


2009 Chinook Spawners = 2,211 (54% above weir) (10/14 to 12/22)

2009 Coho Spawners = 81 (11/20 to 1/1)

Oct. mean flow = 17.6 cfs Nov. mean flow = 48 cfs Dec. mean flow = 73.6 cfs

Fall 2012 (WY 2013)

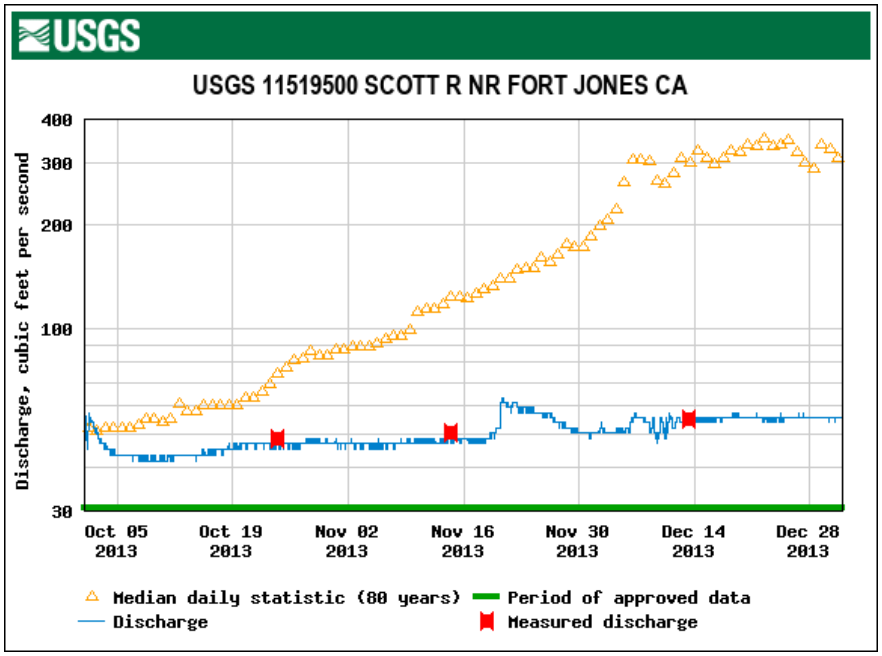


2012 Chinook Spawners = 9,352 (87% above weir) (10/5-11/26)

2012 Coho Spawners = 201* (10/27 to 11/29, when removed)

Oct. mean flow =29.9 cfs Nov. mean flow = 139.5 cfs Dec. mean flow =1,014 cfs

Fall 2013 (WY 2014)

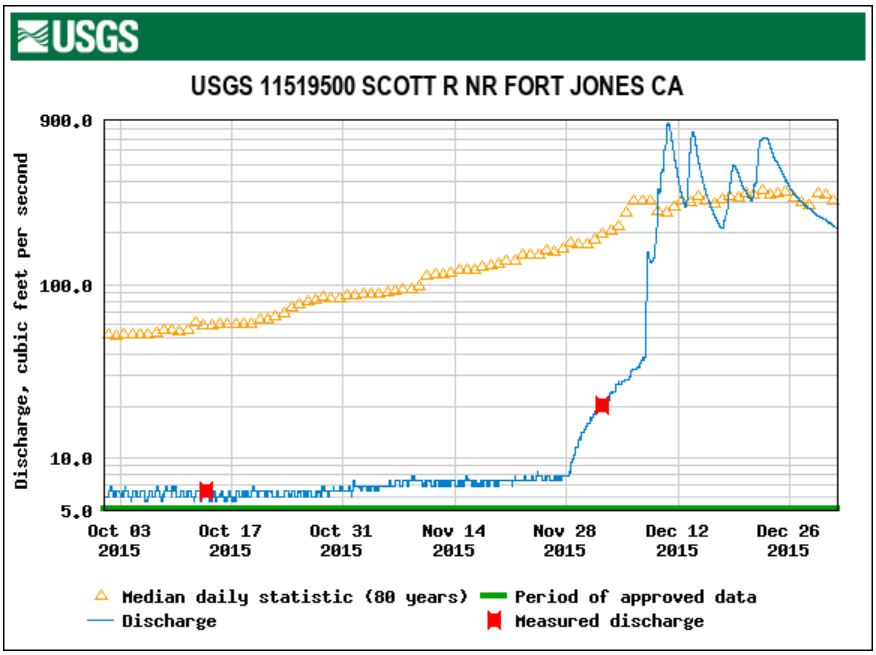


2013 Chinook Spawners = 4,624 (73% above weir) (10/1 to 12/3)

2013 Coho Spawners = 2,752 (10/21 to 2/6) (no tributary access)

Oct. mean flow = 45.3 cfs Nov. mean flow = 50.5 cfs Dec. mean flow = 54.2 cfs

Fall 2015 (WY 2016)

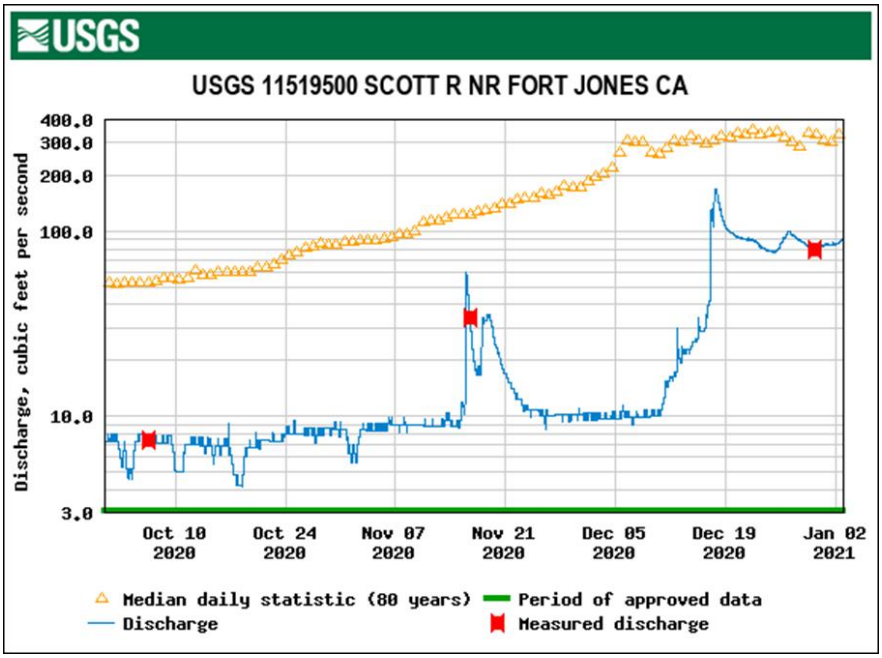


2015 Chinook Spawners = 2,113 (18% above weir) (10/6-12/9 when weir removed)

2015 Coho Spawners = 212* (12/4-12/9 when weir removed)

Oct. mean flow = 6.27 cfs Nov. mean flow = 7.75 cfs Dec. mean flow = 308.4 cfs

Fall 2020 (WY 2021)

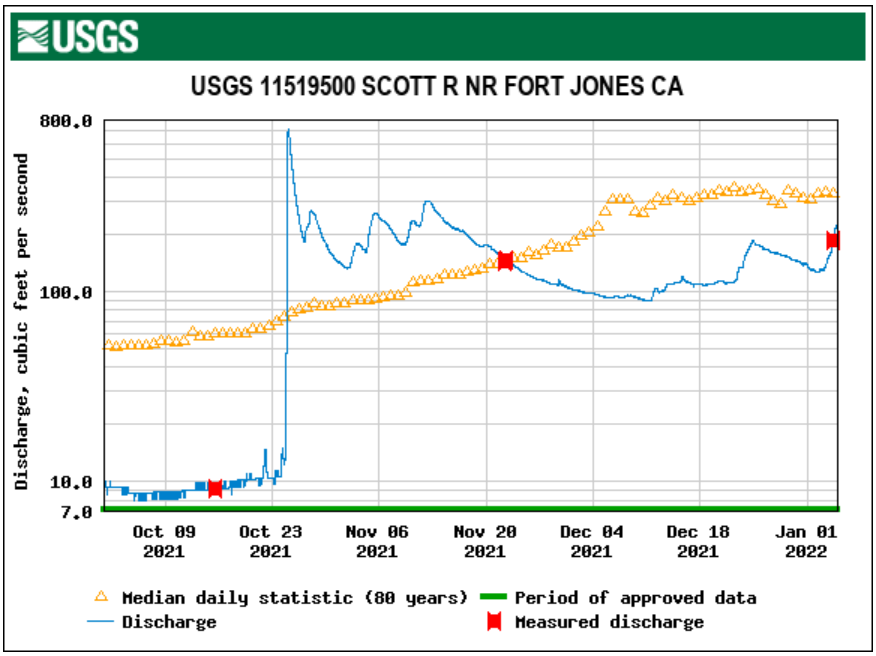


2020 Chinook Spawners = 855 (31% above weir) (9/29-12/16)

2020 Coho Spawners = 1,766 (9 below weir) (11/16 to 1/4)

Oct. mean flow = 7.1 cfs Nov. mean flow = 12.7 cfs Dec. mean flow = 52.6 cfs

Fall 2021 (WY 2022)



2021 Chinook Spawners = 1,961 (__% above weir) (10/21 to 11/6)

2021 Coho Spawners = 852 (10/24 to 1/2)

Oct. mean flow = 64.6 cfs Nov. mean flow = 180.8 cfs Dec. mean flow = 118.6 cfs

Key Scott River Locations by River Mile

RM 18 – CDFW's Scott River Fish Counting Facility (video weir)

RM 21.5 - USGS Gage

RM 24.7 – Shackleford Creek mouth (key coho spawning trib)

RM 25.4 to RM 29.5 - Reach 9 "disconnect" reach near Oro Fino

RM 46.7 - Young's Dam Fish Ladder

RM 48.2 – French Creek mouth (key coho spawning trib)

RM 52.3 to 56.4 - Tailings "disconnect" Reach

RM 57.1 – Confluence of East & South Forks

References:

Knechtle, M. et al. 2008-2022. Annual Scott River Salmon Studies-Final Reports. Klamath River Project. CDFW, Yreka.

US Geological Survey (USGS). 2009-2022. Scott River Gage near Fort Jones, #11519500. Mean Monthly Discharge.