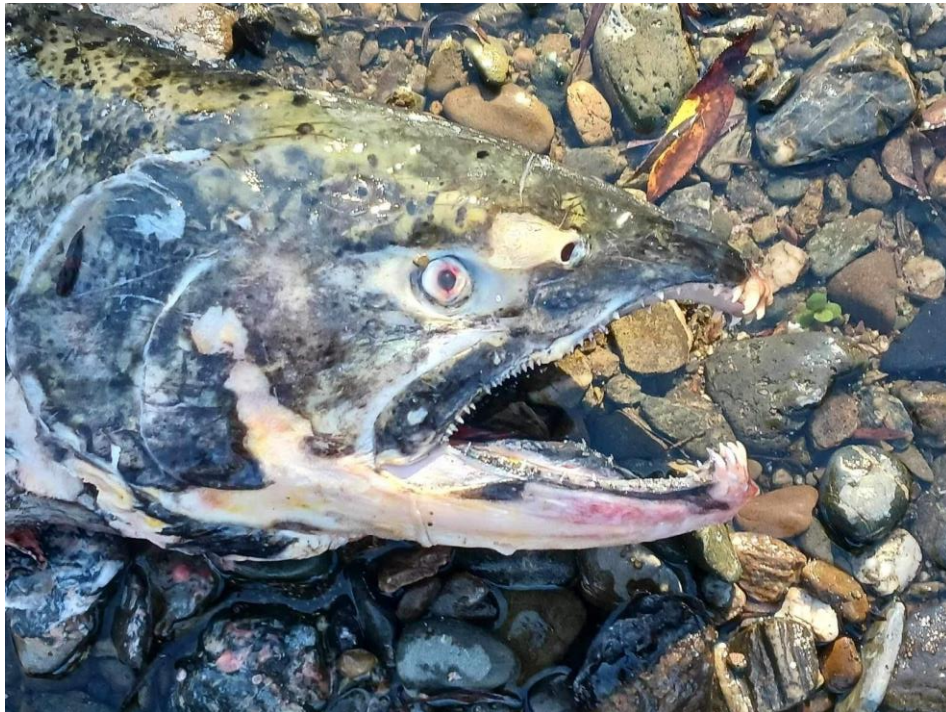


Scott River Fall Chinook Spawning Ground Surveys 2023 Season



Work Completed by the Siskiyou Resource Conservation District for the United States Fish and Wildlife Service

(Grant Agreement #F19AP00242 and F20AP10581)

**Report Prepared by Evan Senf and Christina Jankowski for the SRCD
March 2024**

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Introduction

The Scott River is an important spawning tributary for natural fall-run chinook salmon in the Klamath Basin. Since 1992, escapement estimates have been compiled for the Scott River through cooperative spawning ground surveys organized by the California Department of Fish and Wildlife (CDFW) and the United States Fish and Wildlife Service (USFW). The objective of these surveys is to collect information on run parameters including the timing, duration, age composition, hatchery contribution, and redd distribution. The monitoring of this independent chinook salmon population provides valuable trend data, including escapement estimates - *escapement*: a term referring to the number of fish that escape the watershed and return to freshwater to spawn - used by the Pacific Fisheries Management Council for the allocation of Klamath Basin fall run fish for commercial and recreational take (fisheries).



SRCD field technician (Christina Jankowski) surveying Scott River for chinook spawners. October 2023.

Fall 2023 Flow Conditions

California's Water Year 2023 (October 1, 2022, through September 30, 2023) was marked by exceptional climatic events. A succession of intense winter storms, including a rare tropical system, shattered numerous records and brought an end to a three-year drought. With temperatures generally below the long-term average - less extreme than the record-setting Water Year 2022 - the season was characterized by sporadic but substantial precipitation. Notably, significant rainfall in late December and early January resulted in dramatic increases in stream flows.

The Sierra-Cascades snowpack peaked earlier than the traditional April 1 maximum accumulation date, underscoring the shifting patterns in an era marked by climate change. By April 2023, snowpack measurements from the Klamath National Forest reported levels at 178% of the historical average depth and 163% of the historical average Snow Water Equivalent (SWE) - a critical measure of water content. Such conditions resulted in the Scott River and its tributaries maintaining connectivity throughout the entire survey period, providing an anomalous yet vital habitat for spawning chinook salmon.

The attached USGS hydrograph (4.) of the Scott River near Fort Jones, CA (*below*), visually underscores the substantial flow fluctuations throughout the fall of 2023. The data points highlighted in the graph directly correlate with the pivotal periods of increased precipitation, offering a quantitative backing to the anecdotal evidence of an atypically wet year.

Chart 1: USGS Hydrograph (October 1, 2023 – December 15, 2023).

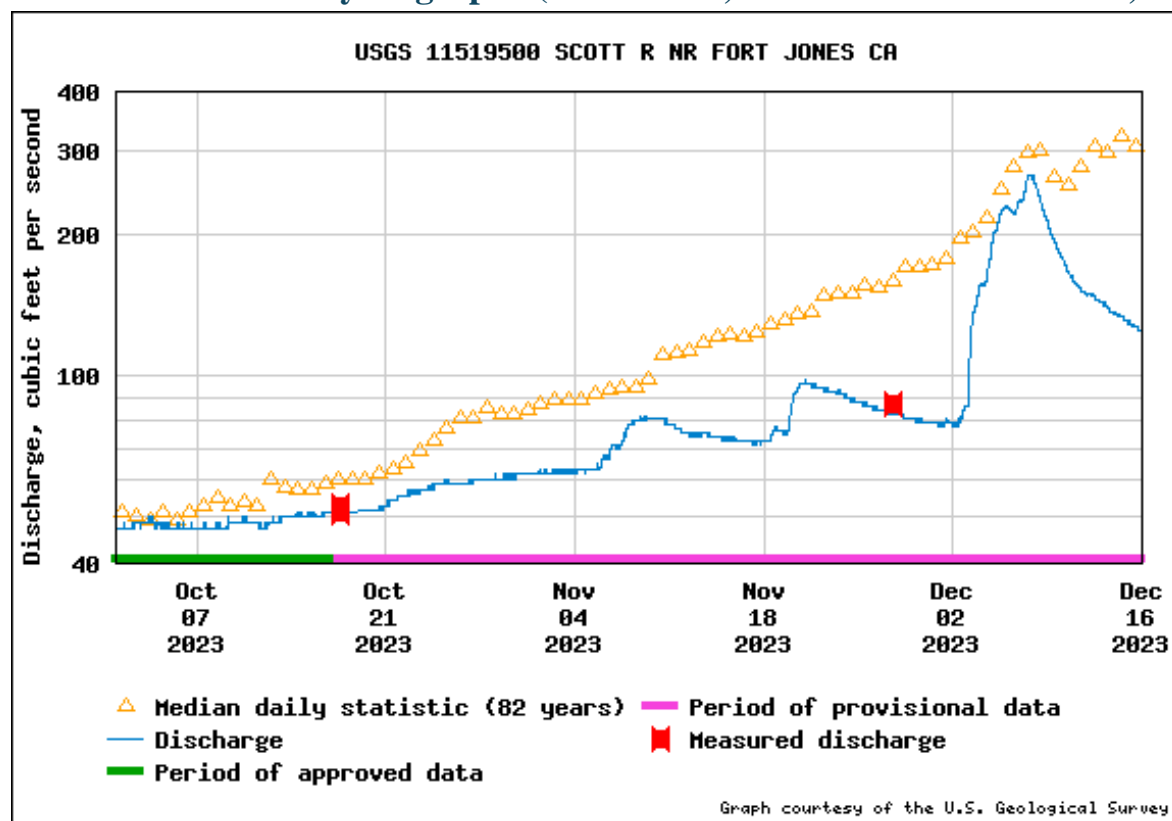
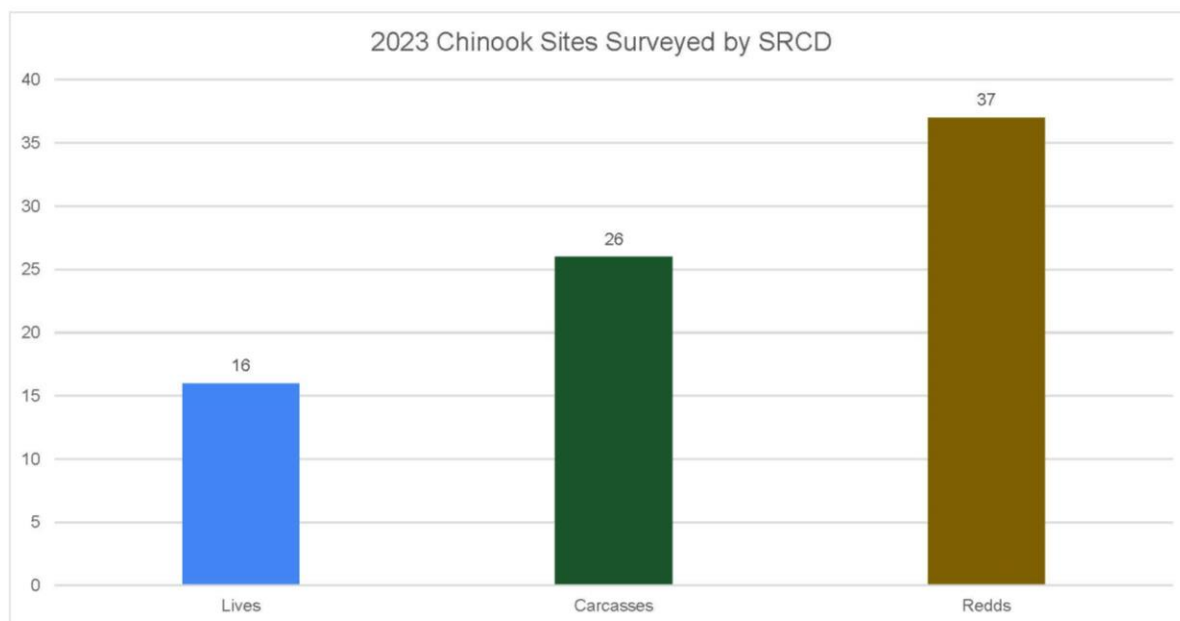


Chart 2: 2023 Chinook Sites Surveyed by SRCD

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Surveys

The 2023 Scott River chinook salmon spawning ground surveys, a cornerstone in the assessment of chinook populations within the Klamath River Basin, commenced with comprehensive in-person training (1.). On October 2, 2023, SRCD, in collaboration with CDFW, hosted the Annual Scott River Spawning Ground Survey Training at Indian Scotty Campground. SRCD staff including Evan Senf, Christina Jankowski, Tully Doyle, Lindsay Cummings, and Jamuna Maloney, attended this year's training as well as participated in previous sessions, contributed to the continuity of the project's rich historical data lineage.

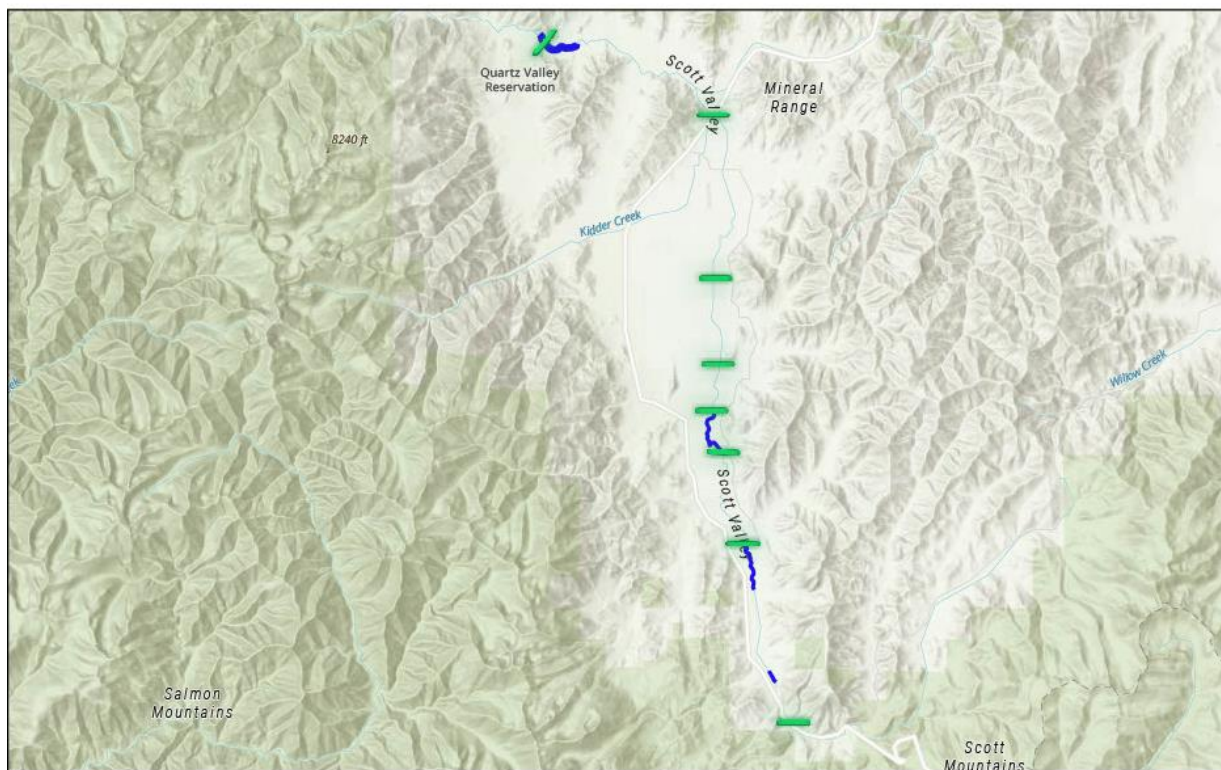
The Siskiyou RCD follows the protocol employed since 1992 to assess Chinook populations in the Klamath River Basin. This protocol has been used in the Scott River watershed for adult coho spawning ground surveys since they were initiated in 2001 (5. Maurer, 2002). Stream reaches were surveyed by hiking the stream channel during the chinook spawning season (mid-October through November). Surveyors worked in teams of two (sometimes accompanied by the project coordinator), traversing the stream in neoprene waders and felt soled boots, walking in a downstream direction. The number of live fish, redds and carcasses observed were counted by species, recorded on data sheets and mapped for each stream surveyed. Redd dimensions and substrate composition information was collected from redds only if it did not disturb spawning fish. Flagging was hung adjacent to all new redds on each survey to prevent double counting. GPS points were collected at redd sites, carcass sites, and sites of unusual fish observation (i.e. beyond previously documented extent of rearing). Tissue, scale, and otolith samples were taken from each recovered chinook carcass for age and DNA analysis. All carcasses sampled were chopped in half with a machete to signify that they were handled and were promptly returned to the stream.

The team embarked on the annual surveys under fair-to-good conditions that favored spawning observations. Water levels remained conducive throughout the fall, ensuring complete reach connectivity for the survey period.

The SRCD team initiated the spawning ground surveys on October 6, 2023, covering Index Reaches 8, 9, 13 and 15 on a weekly basis, or as conditions allowed (*Map 1, below*). This monitoring culminated on November 21, 2023, concluding that chinook spawning had tapered off. The 2023 season saw SRCD surveyors documenting occurrences across the surveyed sites (except in the tailings), as the accompanying chart illustrates with the tallies of live sightings, carcasses, and redds (*Chart 2, above*). Jim Morris, as a subcontractor for the SRCD, led a crew of high school students on parts of Reach 12.

Map 1: Scott River Valley Reach Breaks (9-16; highlighted in green), SRCD Surveys (highlighted in blue).

Reach Breaks, Surveyed Reaches: SRCD 2023



5/13/2024

1:332,712
0 2 4 8 mi
0 3.25 6.5 13 km
Esri, NASA, NGA, USGS, California State Parks, Esri, TomTom, Garmin, SafeGraph, FAO, MET/NASA, USGS, Bureau of Land Management, EPA

Table 1: Scott River Mainstem Index Reaches

| Index Reach | Reach Description | Upstream River Mile | Downstream River Mile | Total Length (miles) | Length Surveyed (miles) |
|--------------------|---------------------------------|----------------------------|------------------------------|-----------------------------|--------------------------------|
| 8 | Below Meamber bridge | 24.4 | 21 | 3.4 | 0.2 |
| 9 | Meamber Bridge to Hwy 3 | 28.6 | 24.4 | 4.2 | 1.1 |
| 10 | Hwy 3 to Eller Lane | 35.6 | 28.6 | 7 | 0 |
| 11 | Eller Lane to Etna Creek | 41.1 | 35.6 | 5.5 | 0 |
| 12 | Etna Creek to Horn Lane bridge | 44.7 | 41.1 | 3.6 | 0 |
| 13 | Horn Lane bridge to Young's Dam | 46.5 | 44.7 | 1.8 | 1.8 |
| 14 | Young's Dam to Fay Lane bridge | 48.6 | 46.5 | 2.1 | 0 |
| 15 | Fay Lane to Callahan | 52.2 | 48.6 | 3.6 | 1.2 |
| 16 | Above Callahan | 59.1 | 52.2 | 6.9 | 0.3 |
| | | | | 38.1 | 4.6 |



SRCD field crew surveying for chinook in Scott River. Project coordinator (pictured left) Evan Senf walks the river with field technician Christina Jankowski. October 2023.

Lives

Throughout the fall migration period, the SRCD monitored chinook salmon within the Scott River watershed. The CDFW-operated Scott River Fish Counting Facility (SRFCF), situated at river mile 18.2, serves as a crucial data collection point, marking the juncture between the canyon's end and the expansive valley. From September 26 to November 21, 2023, the video weir at the SRFCF recorded 1,663 chinook salmon ascending the river. In addition to this, an observation below the SRFCF tallied 1,400 chinooks (1. Morgan Knechtle, Pers. Comm. 2023).

The SRCD's field crews, through their dedicated surveys in the valley, contributed to these insights by observing 16 live chinooks. These observations are particularly noteworthy against the backdrop of below-average water flow reported for the year by USGS (2. 2023, preliminary data) (*Chart 1*). Despite this, the summer of 2023 was marked by connected reaches throughout the valley, bolstered by two significant rainfall events late in October and early November, which produced robust flows.

The gage data from the USGS station at river mile 21, showing streamflow ranging from 45 to 285 CFS (*Chart 1*) during the migration period, alleviated concerns over potential fish passage impediments in

historically problematic areas like Oro Fino and Young's Dam. Checks by the field crews confirmed that the potentially shallow riffles through the channels at Young's Dam did not pose significant barriers to passage. This was evidenced by chinook sightings above Young's dam on Reach 15, as early as November 7, 2023.

Encouragingly, from October 5 to November 18, 2023, pairs of chinook salmon were consistently encountered by SRCD crews in the valley's main stem reaches (*Table 3*). This consistent presence of salmon pairs across the surveyed reaches indicates a successful migration and highlights the river's health and functionality during the critical spawning season.

(Below left): 2023 chinook and coho spawning survey training at Indian Scotty campground hosted by CDFW and SRCD. SRCD Project coordinator Lindsay Cummings discusses identifying salmon species. (Below right): SRCD field technicians observing and recording a chinook redd (Tully Doyle & Jamuna Maloney). October 2023.



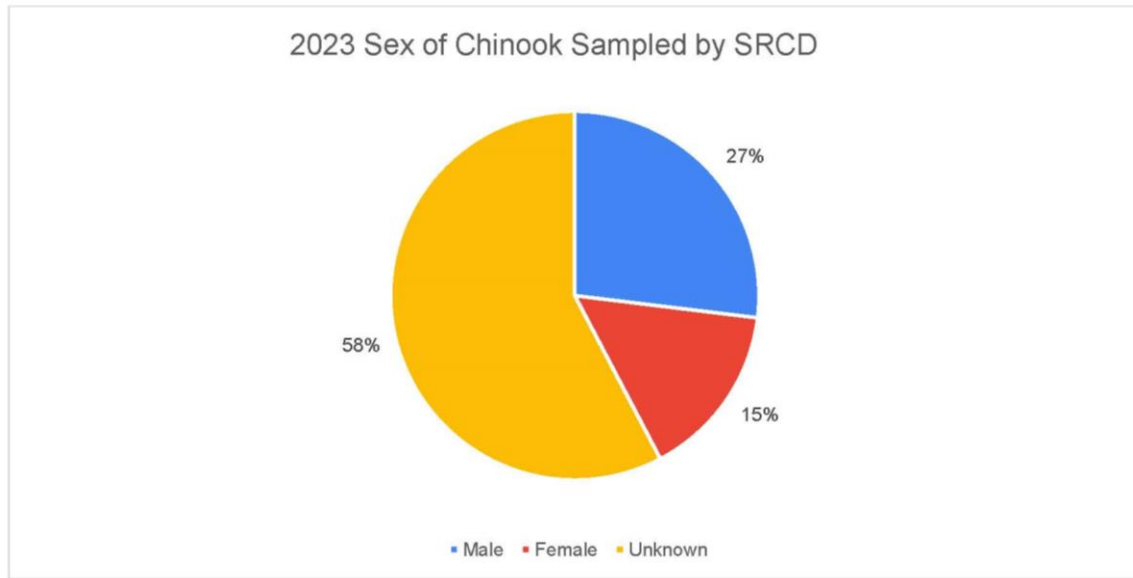
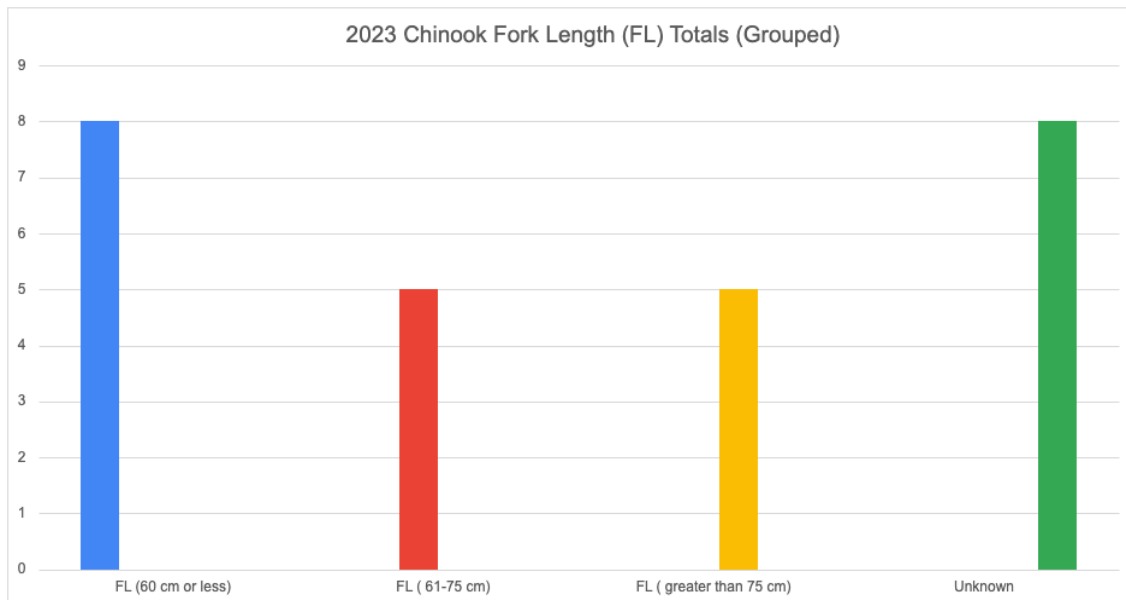
Biological Samples

Field crews diligently conducted biological sampling throughout the survey period, observing and examining 26 chinook salmon carcasses (*Charts 2, 3*). On average, chinook salmon in the survey were measured with a fork length of 63.83 centimeters (about 2.09 feet or 25 inches), providing a quantitative glimpse into the population's physical stature. The largest chinook was sampled on October 31st, measuring 93 centimeters in length (about 3.05 feet or 36.6 inches).

It's important to note that due to the varying stages of decomposition, not all carcasses could be reliably sexed or measured. Those specimens were categorized as 'Unknown' to maintain the integrity of the data. The distribution of sampled chinook by sex (*Chart 3*) shows a total of 7 males, 4 females, and 15 unidentified due to decomposition.

Fork lengths were grouped into three categories to illustrate the range in sizes: 60 cm (about 1.97 ft) or less (group 1), 61-75 cm (group 2), and greater than 75 cm (group 3) (*Chart 4*). This grouping approach reveals the size distribution within the sampled population, with an average fork length of 63.83 cm (about 2.09 ft).

This biological sampling effort is crucial for documenting the status of the chinook population and for tracking changes over time. Such data are instrumental in assessing the population's overall health and viability, which can be influenced by many environmental factors and is essential for shaping effective conservation and management strategies.

Chart 3: 2023 Sex of Chinook Sampled by SRCD**Chart 4: 2023 Chinook Fork Length (FL) Totals (Grouped)**

Redds

The favorable stream conditions of Fall 2023 afforded surveyors the opportunity to meticulously trace the development of chinook salmon redds. In many instances, crews could identify the pair of fish responsible for constructing a redd and monitor the site's evolution across consecutive weeks. Each identified redd was carefully inventoried, flagged, and its habitat characteristics - such as type, dimensions, and superimposition - were documented, alongside observations of nearby fish. Where permissions were granted, GPS coordinates were taken for each redd, bolstering the spatial precision of our data collection.



During the survey period, 4.6 miles of the Scott River mainstem were covered, focusing on the Index Reaches 8-9, 13, 15, and 16. One spot survey was conducted along the top section of the historic mining tailings (reach 16) however, no observations were made. The spawning observed along the mainstem was concentrated where encountered, with spawning sites distributed across much of the surveyed length. Reach 13 (below Young's Dam) demonstrated particularly high relative spawning densities, recording an impressive 30 redds per mile.

While the absence of surveys in certain tributaries like Shackleford Creek, Etna Creek, Kidder Creek, Sugar Creek, and South Fork was noted - due to the funding-directed focus on areas of historically high

spawning - the overall effort resulted in a total of 37 documented redds. This work is encapsulated in *Table 2* and visualized in *Map 2*, providing a clear, quantifiable measure of spawning activity within the valley reaches. *Table 3* collates the data collected, presenting the relationship between the dates of the surveys, the reaches covered, and the counts of carcasses, live fish, and redds.

The survey teams' efforts have enriched our understanding of chinook salmon spawning in the Scott River and laid the groundwork for shaping future survey strategies. These findings, reflective of the spawning grounds' vitality, will serve as a cornerstone for assessing the health and trajectory of the chinook salmon population in the watershed.

Table 2: Redds Recorded on the Scott River Mainstem

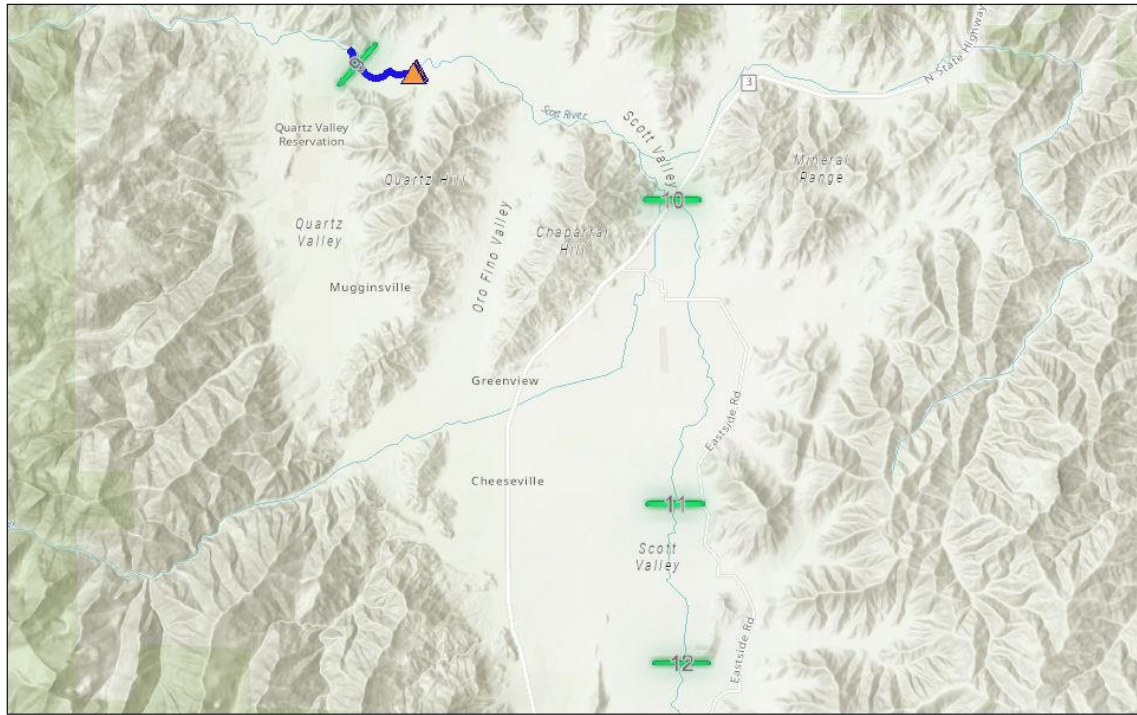
| Valley Reach | Total Number of Redds Identified |
|--------------|----------------------------------|
| 8 | 0 |
| 9 | 3 |
| 10 | N/A |
| 11 | N/A |
| 12 | N/A |
| 13 | 32 |
| 14 | N/A |
| 15 | 2 |
| 16 | N/A |
| Total | 37 |

Table 3: 2023 Siskiyou RCD Chinook Spawning Ground Surveys

| Dates | Reach | Carcasses | Lives | Redds |
|----------------------------------|-------|--------------------------------------|-----------------------------------|-------------------------------|
| 10/14, 10/31, 11/7, 11/17 | 8 | 0 | 0 | 0 |
| 10/14, 10/31, 11/7, 11/17 | 9 | 5 | 13 | 3 |
| 10/27, 11/3, 11/10, 11/14, 11/21 | 13 | 22 | 3 | 32 |
| 11/7, 11/10, 11/14 | 15 | 0 | 0 | 2 |
| | | Carcasses sampled: 26 | Lives Observed: 16 | Redds Measured: 37 |

Map 2: Redds Map – Lower Scott Valley Reaches.

Reach Breaks, Surveyed Reaches, Redds Surveyed - Lower Valley Reaches (9-12): SRCD 2023

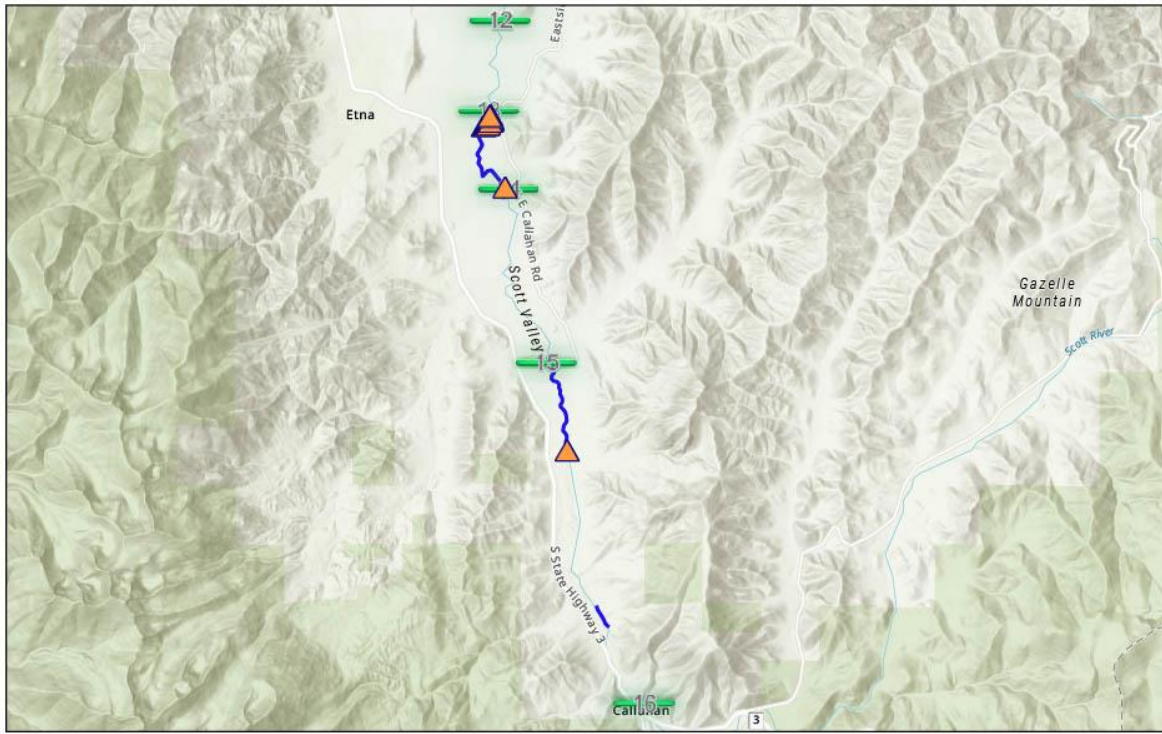


5/13/2024

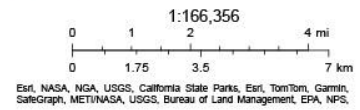
1:166,356
0 1 2 4 mi
0 1.75 3.5 7 km
Esri, NASA, NGA, USGS, California State Parks, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS.

Map 3: Redds Map - Upper Scott Valley Reaches

Reach Breaks, Surveyed Reaches, Redds Surveyed - Upper Valley Reaches (12-16): SRCD 2023



5/13/2024



Conclusions

The Scott River's chinook salmon escapement has demonstrated significant variability since 1978, with a historical peak in 1995 and a stark low in 2004. The 2023 escapement, estimated at 1,663 fish, underscores a continuation of this trend of decline, notably falling below the average of 4,583 fish over the monitored years (*Chart 3*). Such figures are indicative of a broader pattern of decline in the population, suggesting urgent conservation and management considerations are necessary.

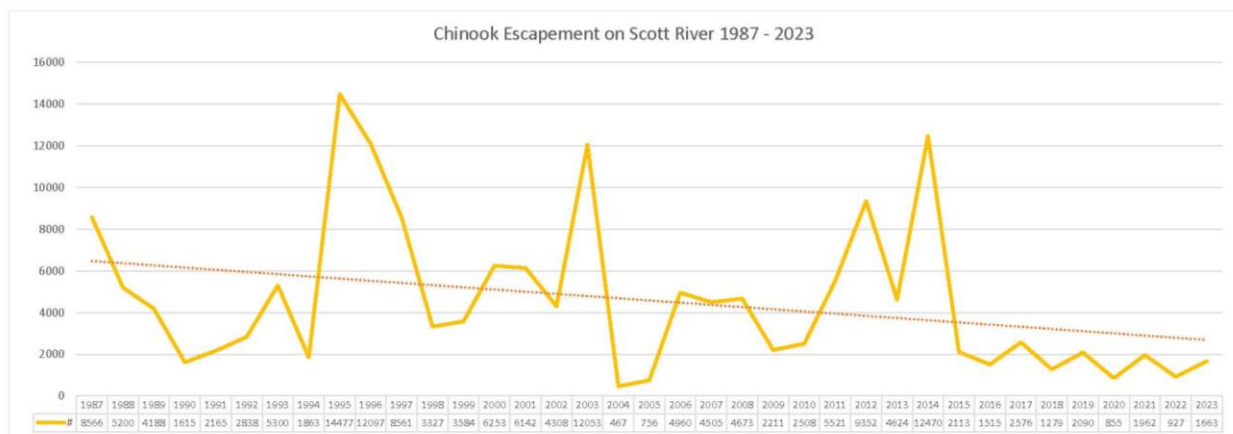
The year 2023's fall season brought substantial early precipitation followed by a notably dry period. With the count at the weir revealing numbers less than half of the historical average, 2023 has been categorized as a substantially below-average year for chinook returns.

Spatial distribution and habitat usage for spawning observed in 2023 align with known behaviors for the region, with the majority occurring on the mainstem of the Scott River. Reach 13, located below Young's Dam, exhibited the highest concentration of redds, aligning with expected spawning patterns.

The broader trends in the Scott River Watershed, however, provoke concern. When analyzing escapement from 1987 to 2023, the data indicates a drastic reduction from the historical average of 65% in recent years, with the Scott River's decline outpacing that of the Klamath Basin's 43% reduction over a similar period. This accelerated decline within the Scott River suggests the need for immediate attention to the factors contributing to these downward trends, emphasizing the urgency for targeted conservation strategies.

Considering these findings, it is imperative to consider adaptive management strategies that address the complex dynamics influencing chinook populations. Continued monitoring, paired with comprehensive data analysis and collaborative management efforts, is critical to reversing the trend of decline and ensuring the resilience of chinook salmon within the Scott River ecosystem.

Chart 5: Chinook Escapement on Scott River 1987 – 2023



References Cited

1. California Department of Fish and Wildlife (CDFW) et al. 2021. Klamath Basin Cooperative Spawning Ground Survey Training Manual.
2. Knechtle, M. Pers. Comm., 2023.
3. Knechtle, M. and Guidice, D. 2022. 2020 Scott River Salmon Studies. Final Report, Klamath River Project. CDFW Yreka Fisheries Office. Yreka, CA.
4. U.S. Geological Survey (USGS). 2023. Discharge records for Scott River Gage 11519500 near Fort Jones. (data was identified as provisional at time of retrieval)
https://nwis.waterdata.usgs.gov/usa/nwis/uv/?cb_00060=on&cb_00065=on&format=gif_default&site_no=11519500&legacy=1&period=&begin_date=2023-10-01&end_date=2023-12-15
5. Maurer, S. 2002. Scott River Watershed Adult Coho Salmon Spawning Survey: December 2003 - January 2002. Prepared for the Klamath National Forest, Fort Jones, CA.

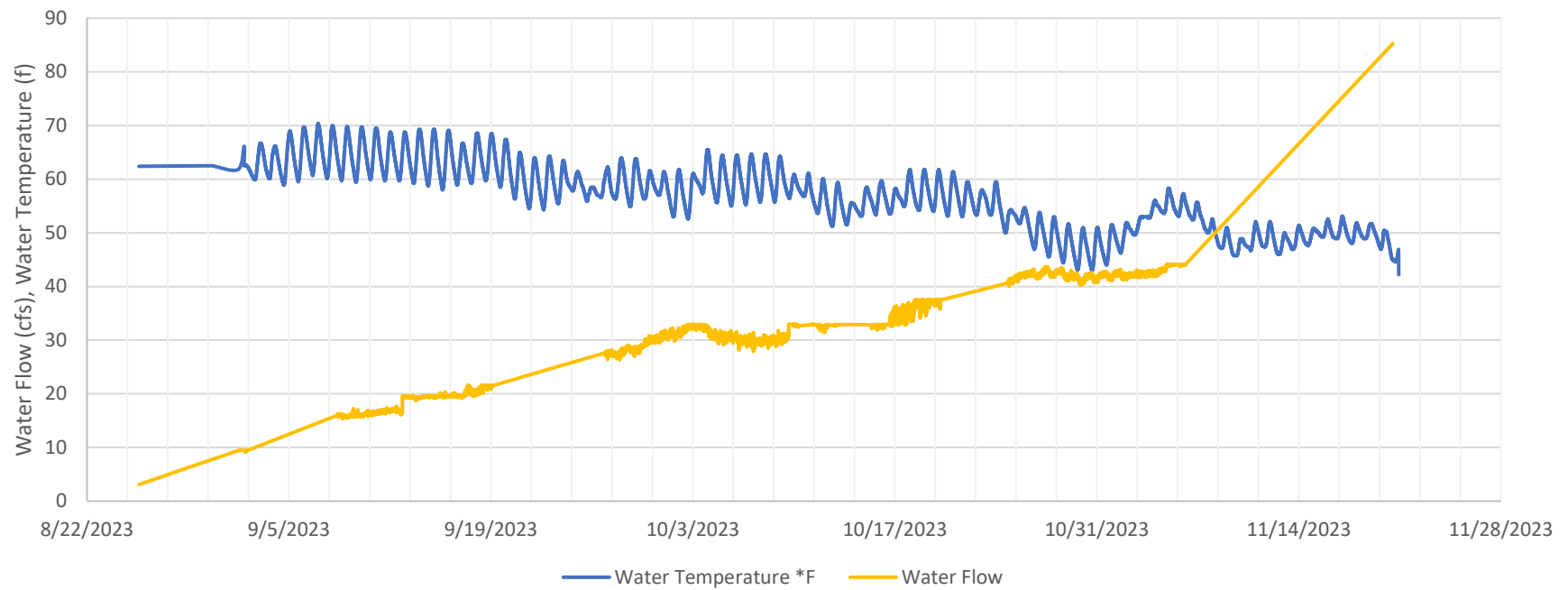
Appendices:

Budget:

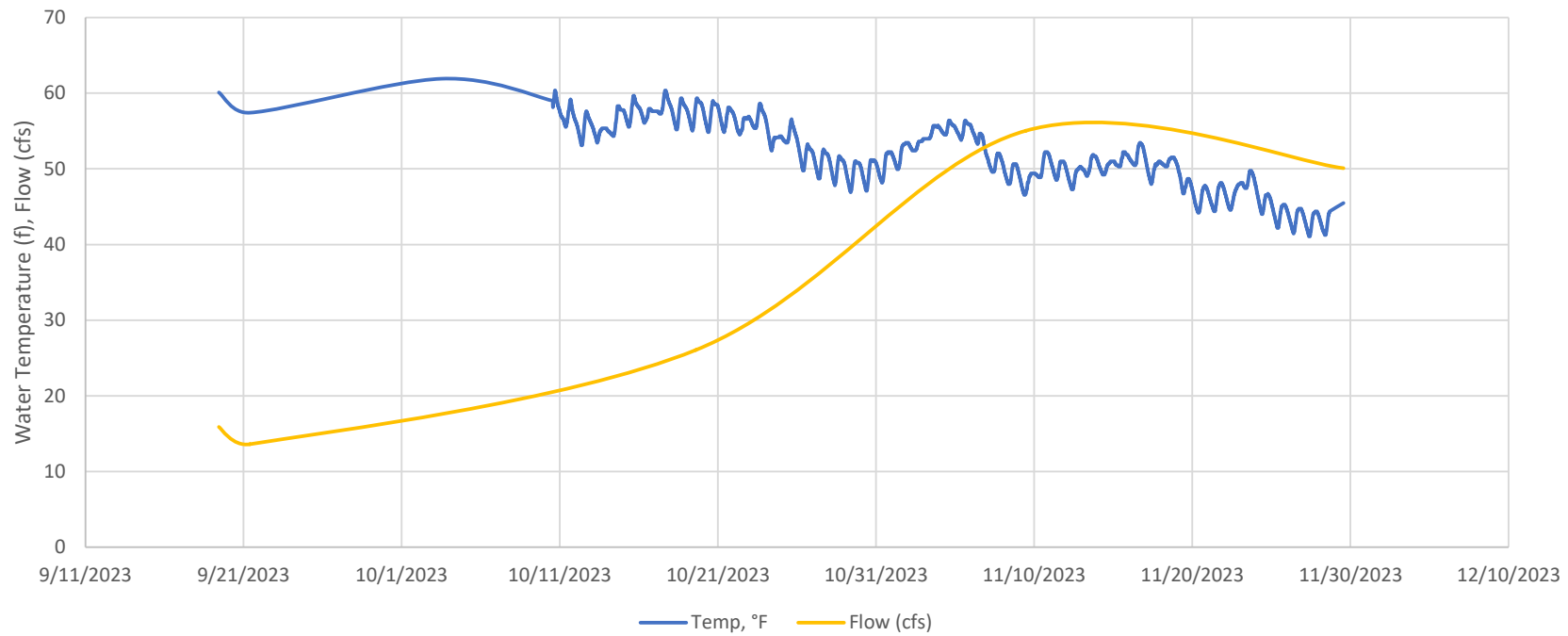
| | Rate | Units | Total Requested | Matching Contributions | Project Budget |
|--|---------|-------|--------------------|------------------------|--------------------|
| Personnel Expenses (wages and benefits) | | | | | |
| District Bookkeeper | \$48.39 | 15 | \$725.85 | \$- | \$725.85 |
| Project Coordinator | \$48.39 | 30 | \$1,451.70 | \$- | \$1,451.70 |
| Field Crew | \$40.32 | 200 | \$8,064.00 | \$- | \$8,064.00 |
| Subtotal Personnel | | | \$10,241.55 | \$- | \$10,241.55 |
| Contractual | | | | | |
| J. Morris Crew Leader | \$40.00 | 45 | \$1,800.00 | | \$1,800.00 |
| Subtotal Contractual | | | \$1,800.00 | | \$1,800.00 |
| Travel | | | | | |
| Mileage | \$0.655 | 1000 | \$655.00 | \$- | \$655.00 |
| Subtotal Travel | | | \$655.00 | \$- | \$655.00 |
| Supplies | | | \$670.00 | | |
| Subtotal Supplies | | ae | \$670.00 | \$2,570.00 | \$3,240.00 |
| Other Expenses | | | | | |
| Subtotal Other Expenses | | | \$186.20 | \$- | \$186.20 |
| Other Contributions | | | | | |
| Local NGO's (cash match) | \$75.00 | 10 | \$- | \$750.00 | \$750.00 |
| CDFW Biologist (in-kind) | \$51.00 | 10 | \$- | \$510.00 | \$510.00 |
| Landowner Volunteer (in-kind) | \$35.00 | 10 | \$- | \$350.00 | \$350.00 |
| Subtotal Other Contributions | | | \$- | \$1,610.00 | \$1,610.00 |
| Direct Expenses Subtotal | | | \$13,552.75 | \$4,180.00 | \$17,732.75 |
| Indirect Expenses (21.05%) | | | \$2,852.85 | | \$2,852.85 |
| TOTAL Request | | | \$16,405.60 | \$4,180.00 | \$20,585.60 |
| | | | 79.7% | 20.3% | 100% |

[illegible]

(Reach 8): Meamber Site Water Flow and Temperature WY2023



(Reach 13) Horn Site Water Flow and Temperature WY2023



(Reach 15) Fay Site Water Flow and Temperature WY2023

