Coho Salmon and Steelhead Monitoring Report

Summer 2022

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Contents

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1. Background

In 2004, the Russian River Coho Salmon Captive Broodstock Program (Broodstock Program) began releasing juvenile coho salmon (*Oncorhynchus kisutch*) into tributaries of the Russian River with the goal of re-establishing populations that were on the brink of extirpation from the watershed. The US Army Corps of Engineers (USACE) is the principal federal agency responsible for operating the Broodstock Program at the Don Clausen Fish Hatchery at Warm Springs Dam in Geyserville, CA, and contracts with California Sea Grant at University of California (CSG) to conduct monitoring related to this program. At the onset of the first releases of fish in 2004, CSG worked with local, state, and federal biologists to design and implement a coho salmon monitoring program to track the survival and abundance of hatchery-released fish. Since then, CSG has been closely monitoring smolt abundance, adult returns, survival, and spatial distribution of coho salmon populations in four intensive monitoring watersheds: Willow, Dutch Bill, Green Valley, and Mill creeks. Data collected from this effort are provided to the Broodstock Program for use in evaluating the success of hatchery releases and informing future releases.

Over the last decade, CSG has developed many partnerships in salmon and steelhead (*O. mykiss*) recovery, and our program has expanded to include identification of limiting factors to survival, evaluation of habitat enhancement and streamflow improvement projects, and participation in a statewide salmon and steelhead monitoring program. In 2010, we began documenting relationships between streamflow and juvenile coho salmon survival as part of the Russian River Coho Water Resources Partnership (Coho Partnership), an effort to improve streamflow and water supply reliability to water users in flow-impaired Russian River tributaries. In 2013, we partnered with Sonoma Water (SW) and California Department of Fish and Wildlife (CDFW) to begin implementation of the California Coastal Monitoring Program (CMP), a statewide effort to document status and trends of anadromous salmonid populations using standardized methods and a centralized statewide database. In 2022, we also began providing support to CDFW's Drought Monitoring Program. These projects have led to the expansion of our program, which now includes over 50 Russian River tributaries.

The intention of our monitoring and research is to provide science-based information to all stakeholders involved in salmon and steelhead recovery. Our work would not be possible without the support of our partners, including public resource agencies and non-profit organizations, along with hundreds of private landowners who have granted us access to the streams that flow through their properties.

In this seasonal monitoring report, we provide results from our summer Broodstock Program and Drought Monitoring Program snorkel surveys, including relative abundance and spatial distribution of juvenile salmonids in Russian River tributaries. Additional information and previous reports can be found on our website.

2. Juvenile Presence and Distribution

2.1. Goals and objectives

Summer snorkel surveys were conducted in Russian River tributaries to document the relative abundance and spatial distribution of juvenile coho salmon and steelhead during the summer of 2022. These data were used to determine whether successful spawning occurred the previous winter and to track spatiotemporal trends in relative abundance and occupancy.

2.2. Methods

2.2.1. Sampling reaches

For Broodstock Program monitoring, we surveyed juvenile salmonid reaches of Willow, Dutch Bill, Green Valley, and Mill creeks (Figure 1). For CDFW's Drought Monitoring Program, a spatially-balanced random sample of reaches from the Russian River sample frame (a sample frame of stream reaches identified by the Russian River CMP Technical Advisory Committee[1] as having coho salmon, steelhead, and/or Chinook salmon habitat) was selected using a generalized random tessellation stratified (GRTS) approach as outlined in Fish Bulletin 180 (Adams et al. 2011). The reaches selected using the GRTS draw were used to estimate basinwide juvenile coho salmon occupancy. Additional reaches were surveyed to contribute to long-term datasets or inform specific studies, but results from those reaches were not included in the occupancy estimates. For example, Yellowjacket Creek and the upper extent of Redwood Creek (CMP reach RED3) were surveyed to monitor coho salmon adjacent to a remote site incubator (RSI) study conducted in partnership with National Marine Fisheries Service, CDFW, and USACE.

[1] A body of fisheries experts, including members of the Statewide CMP Technical Team, tasked with providing guidance and technical advice related to CMP implementation in the Russian River.

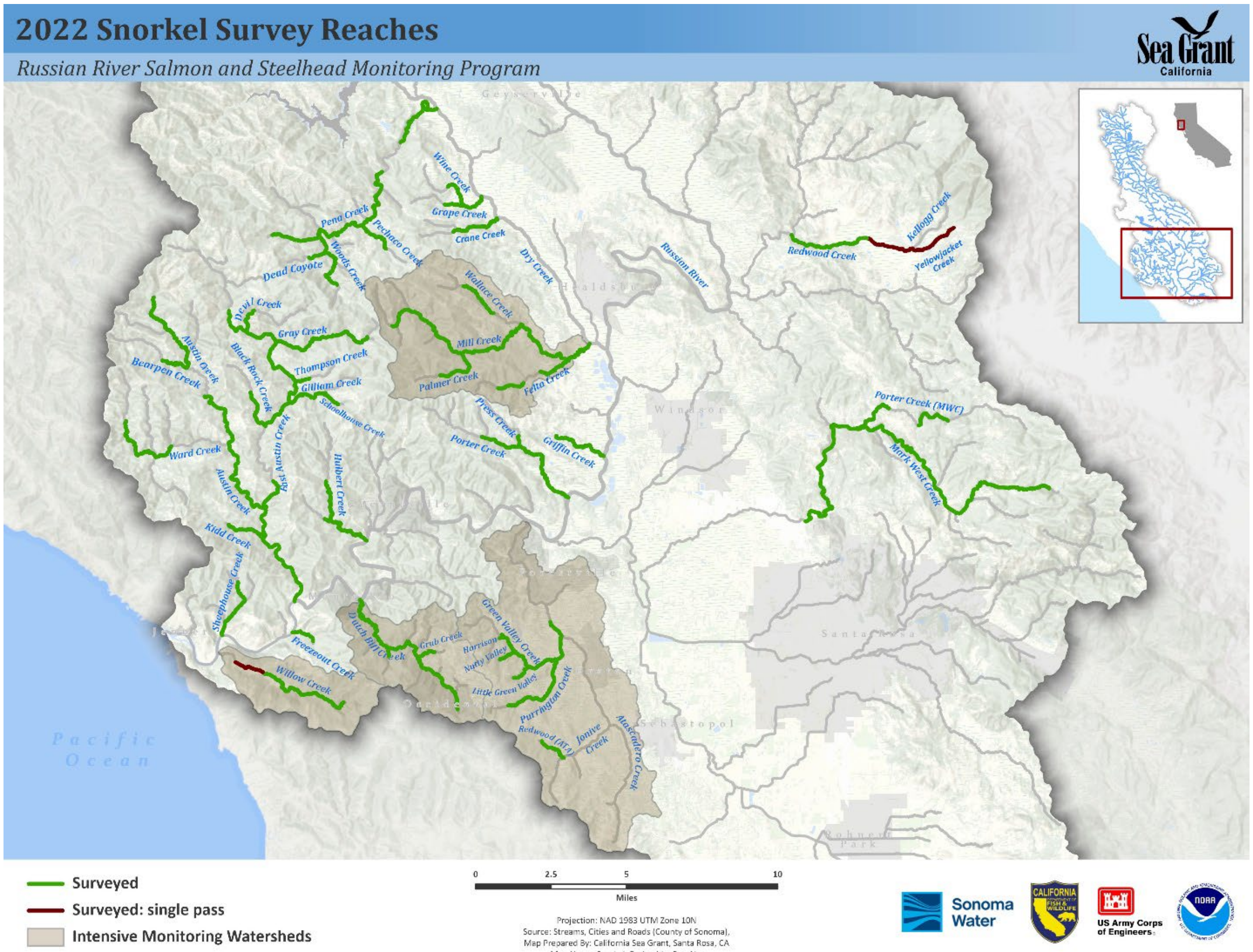

Figure 1. Reaches surveyed during 2022 summer juvenile snorkel surveys, with the four Broodstock Program intensive monitoring watersheds of Mill, Green Valley, Dutch Bill, and Willow creeks highlighted. Reaches in dark red were sampled with a single pass.

2.2.2. Field methods

Sampling was based on modifications of protocols in Garwood and Ricker (2014). On each snorkel survey, salmonids were counted in every other pool within the reach, with the first pool (one or two) determined randomly. Pools were defined as habitat units with a depth of greater than one foot in an area at least as long as the maximum wetted width and a surface area of greater than three square meters. A GPS point was collected at the downstream end of each pool snorkeled. For reaches that were included in the occupancy estimate, a second snorkeling pass was completed the following day in which every other pool that was snorkeled during the first pass was snorkeled a second time in order to determine snorkel efficiency.

During each survey, snorkeler(s) moved from the downstream end of each pool (pool tail crest) to the upstream end, surveying as much of the pool as water depth allowed. Dive lights were used to inspect shaded and covered areas. In larger pools requiring two snorkelers, two lanes were agreed upon and each snorkeler moved upstream through the lane at the same rate. Final counts for the pool were the sum of both lane counts. All observed salmonids were identified to species (coho salmon, Chinook salmon, steelhead) and age class (young-of-year (yoy) or parr (≥ age-1)), based on size and morphological characteristics. Presence of non-salmonid species was documented at the reach scale. Trimble TDC600 tablets were used for data entry and, upon returning from the field, data files were downloaded, error checked, and transferred into a SQL database. Spatial data were downloaded, error checked, and stored in an ArcGIS geodatabase for map production.

2.2.3. Metrics

2.2.3.1. Relative abundance

First-pass counts were used to document the minimum number of coho salmon and steelhead yoy and parr observed in each reach. Because only half of the pools were snorkeled, minimum counts were doubled for an expanded minimum count. Expanded minimum counts did not incorporate variation among pools or detection efficiency; therefore, they should only be considered approximate estimates of abundance for relative comparisons.

2.2.3.2. Spatial distribution

Multiscale occupancy models were used to estimate the probability of juvenile coho salmon occupancy at the sample reach scale (ψ) and conditional occupancy at the sample pool scale (θ), given presence in the reach (Garwood and Larson 2014; Nichols et al. 2008). Detection probability (*p*) at the pool scale was accounted for using the repeated dive pass data in the occupancy models. The proportion of area occupied (PAO) was then estimated by multiplying the reach- and pool-scale occupancy parameters (ψ*θ).

2.3. Results

Between May 16 and August 24, 2022, CSG and SW biologists snorkeled 75 reaches representing 214 km (133 mi) of stream length and 42 tributaries. All juvenile coho salmon rearing reaches of Willow, Dutch Bill, Green Valley, and Mill creeks were surveyed for Broodstock Program monitoring, and 69 reaches within the Russian River sample frame that were considered to contain juvenile coho salmon habitat (66% of coho salmon reaches) were included in the basinwide occupancy estimate. Although the reach in Yellowjacket Creek fell within the drawn GRTS reaches, we excluded counts from this creek because hatchery fry were released from the RSI prior to snorkel surveys, and we had no way of visually distinguishing them from natural-origin fish. Six other reaches were not included in the occupancy estimate because either 1) they did not contain coho salmon habitat, 2) they were not part of the GRTS draw for 2022, or 3) only a single pass was completed.

We observed 26,565 coho salmon yoy, with an expanded minimum count of 51,548 (Table 1), and we observed 4,990 steelhead yoy, with an expanded minimum count of 9,971 (Table 2). All coho salmon yoy were presumed to be of natural-origin, except in Yellowjacket and Redwood creeks because of hatchery-origin fish released from a RSI in Yellowjacket Creek. Natural-origin coho salmon yoy were observed in 58 of the 75 juvenile coho salmon *reaches* surveyed and in 33 of the 42 juvenile coho salmon *streams* snorkeled (77% and 79%, respectively) (Table 1, Figure 2). Steelhead yoy were observed in 66 of the 76 steelhead reaches and 31 of the 42 steelhead streams surveyed (87% and 74%, respectively) (Table 2). Natural-origin coho salmon counts were highest in Green Valley Creek, with the second highest counts in Willow and Dutch Bill creeks (Table 1). Higher numbers of coho salmon were also observed in Kidd Creek (Austin Creek watershed), Woods Creek (Pena Creek watershed) and Purrington Creek (Green Valley Creek watershed) (Table 1).

Based on results of the multiscale occupancy model, we estimate that the probability of coho salmon yoy occupying a given reach within the basinwide Russian River coho salmon stratum (ψ) in 2022 was 0.73 (0.61 - 0.82, 95% CI), and the conditional probability of coho salmon yoy occupying a pool within a reach, given that the reach was occupied (θ), was 0.62 (0.59 – 0.65, 95% CI). The proportion of the coho salmon stratum occupied (PAO) was 0.45. This was the highest PAO observed over the last eight years (Table 3).

Juvenile coho salmon were observed in all four Broodstock Program intensive monitoring watersheds and spatial distribution varied among streams (Table 1, Figure 3 - Figure 6). High densities of coho salmon yoy were observed throughout the reaches surveyed in Willow Creek and in the mainstem of Green Valley Creek (Figure 3, Figure 5). In Dutch Bill Creek, coho salmon yoy were observed throughout the stream and were highest in the upper half (Figure 4). In the Mill Creek watershed, coho salmon densities were generally lower and patchier than in the other streams, with the highest densities in the lower reaches of Mill and Felta creeks, throughout Palmer Creek, and in upper Mill Creek (Figure 6).

Table 1. Number of coho salmon yoy and parr observed in Russian River tributaries and expanded minimum counts, summer 2022.

Tributary	Pools snorkeled (n)	Stream length snorkeled (km)	Yoy	Expanded Yoy[1]	Parr	Expanded Parr[1]
Austin Creek [2]	147	22.0	515	1,030	3	6
Bearpen Creek	13	1.9	182	364	0	0
Black Rock Creek	20	2.5	247	494	1	2
Crane Creek (Dry)	8	3.2	4	8	0	0
Dead Coyote Creek	11	1.1	204	408	0	0
Devil Creek	13	1.5	117	234	0	0
Dutch Bill Creek	108	9.7	3,521	7,042	28	56
East Austin Creek	118	13.1	61	122	0	0
Felta Creek [3]	61	3.7	306	612	3	6
Freezeout Creek	20	1.5	3	6	1	2
Gilliam Creek	24	2.6	107	214	0	0
Grape Creek	25	2.6	0	0	2	4
Gray Creek	130	6.3	780	1,560	0	0
Green Valley Creek	92	7.0	5,697	11,394	50	100
Griffin Creek	10	3.6	0	0	0	0
Grub Creek	6	1.1	0	0	0	0
Harrison Creek	2	0.2	0	0	0	0
Hulbert Creek	34	6.1	154	308	0	0
Kidd Creek	35	2.5	1,359	2,718	3	6
Little Green Valley Creek	10	1.2	6	12	4	8
Mark West Creek	230	25.0	1,156	2,312	1	2
Mill Creek	137	16.6	258	516	7	14
Nutty Valley Creek [4]	2	1.2	47	94	1	2
Palmer Creek	44	2.9	97	194	4	8
Pechaco Creek	21	2.3	3	6	0	0
Pena Creek	110	15.1	645	1,290	2	4
Perenne Creek	12	0.5	111	222	1	2
Porter Creek	77	7.4	1,050	2,100	11	22
Porter Creek (MWC)	30	5.1	59	118	0	0
Press Creek	7	0.6	0	0	0	0
Purrington Creek	81	4.8	2,194	4,388	1	2
Redwood Creek [5]	38	7.5	160	169	1	2
Redwood Creek (Atascadero)	24	1.9	0	0	12	24
Schoolhouse Creek	3	1.1	1	2	0	0
Sheephouse Creek	61	3.7	384	768	50	100
Thompson Creek	13	0.9	12	24	0	0
Wallace Creek	25	2.5	0	0	0	0
Ward Creek	63	5.0	0	0	0	0
Willow Creek [6]	140	7.7	3,621	6,632	38	76
Wine Creek	1	1.8	1	2	0	0
Woods Creek	71	4.1	2,682	5,364	3	6
Yellowjacket Creek [7]	145	2.8	821	821	0	0
Total	**2,222**	**213.9**	**26,565**	**51,548**	**227**	**454**

[1] *Expanded count is the observed count multiplied by a factor of 2.*

[2] *CDFW relocated up to 767 coho salmon yoy from other creeks into Austin Creek prior to snorkel surveys, so fish origin is unknown.*

[3] *CDFW captured and relocated 103 juvenile coho salmon yoy prior to snorkel surveys.*

[4] *CDFW captured and relocated 379 juvenile coho salmon yoy prior to snorkel surveys.*

[5] *There is a high probability that the coho salmon observed originated from the RSI release on Yellowjacket Creek. In the upper reach (RED3), every pool was snorkeled so counts from that reach (151) were not expanded.*

[6] *In lower Willow Creek (WIL2), every visible pool was snorkeled so counts from that reach (610) were not expanded.*

[7] *Snorkel counts include coho salmon yoy released from RSI. Every pool was snorkeled so counts were not expanded.*

Table 2. Number of steelhead yoy and parr observed in Russian River tributaries and expanded counts, summer 2022.

Tributary	Pools snorkeled (n)	Stream length snorkeled (km)	Yoy	Expanded Yoy[1]	Parr	Expanded Parr[1]
Austin Creek	147	22.0	564	1,128	141	282
Bearpen Creek	13	1.9	0	0	3	6
Black Rock Creek	20	2.5	7	14	7	14
Crane Creek (Dry)	8	3.2	3	6	2	4
Dead Coyote Creek	11	1.1	0	0	4	8
Devil Creek	13	1.5	119	238	11	22
Dutch Bill Creek	108	9.7	248	496	34	68
East Austin Creek	118	13.1	611	1,222	315	630
Felta Creek	61	3.7	21	42	9	18
Freezeout Creek	20	1.5	3	6	20	40
Gilliam Creek	24	2.6	84	168	13	26
Grape Creek	25	2.6	0	0	3	6
Gray Creek	130	6.3	333	666	74	148
Green Valley Creek	92	7.0	499	998	16	32
Griffin Creek	10	3.6	0	0	0	0
Grub Creek	6	1.1	0	0	0	0
Harrison Creek	2	0.2	5	10	0	0
Hulbert Creek	34	6.1	3	6	11	22
Kidd Creek	35	2.5	37	74	29	58
Little Green Valley Creek	10	1.2	0	0	0	0
Mark West Creek	230	25.0	277	554	202	404
Mill Creek	137	16.6	415	830	84	168
Nutty Valley Creek	2	1.2	0	0	0	0
Palmer Creek	44	2.9	136	272	20	40
Pechaco Creek	21	2.3	35	70	25	50
Pena Creek	110	15.1	680	1,360	89	178
Perenne Creek	12	0.5	2	4	1	2
Porter Creek	77	7.4	272	544	79	158
Porter Creek (MWC)	30	5.1	27	54	19	38
Press Creek	7	0.6	0	0	0	0
Purrington Creek	81	4.8	269	538	56	112
Redwood Creek [2]	38	4.8	99	198	127	254
Redwood Creek (Atascadero)	24	1.9	6	12	14	28
Schoolhouse Creek	3	1.1	0	0	2	4
Sheephouse Creek	61	3.7	22	44	27	54
Thompson Creek	13	0.9	40	80	8	16
Wallace Creek	25	2.5	0	0	1	2
Ward Creek	63	5.0	29	58	27	54
Willow Creek [3]	140	7.7	21	42	3	6
Wine Creek	1	1.8	0	0	1	2
Woods Creek	71	4.1	114	228	34	68
Yellowjacket Creek [4]	145	2.8	9	9	27	27
Total	**2,222**	**211.2**	**4,990**	**9,971**	**1,538**	**3,049**

[1] *Expanded count is the observed count multiplied by a factor of 2.*

[2] *No steelhead were observed in upper Redwood Creek (CMP reach RED3) where every pool was snorkeled.*

[3] *No steelhead were observed in lower Willow Creek (CMP reach WIL2) where every visible pool was snorkeled.*

[4] *Every pool was snorkeled so counts were not expanded.*

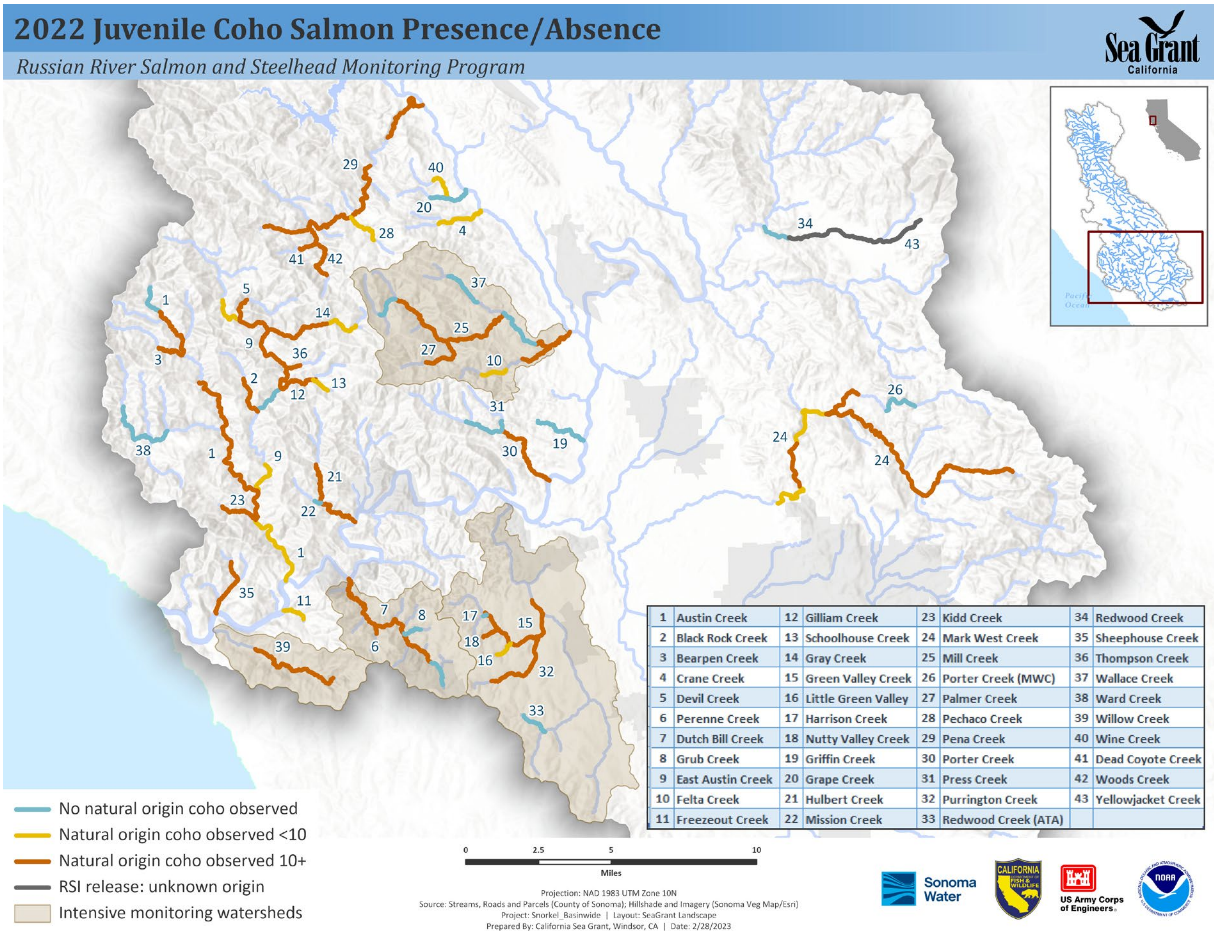

Figure 2. Natural-origin coho salmon presence by reach in surveyed Russian River tributaries, summer 2022.

Table 3. Percent of area occupied by coho salmon yoy within juvenile coho salmon reaches of the Russian River sample frame, 2015-2022.

Year	Reaches Sampled	Stream length surveyed (km)	PAO
2015	58	167	0.37
2016	72	206	0.33
2017	73	214	0.20
2018	69	205	0.25
2019	70	211	0.15
2020	51	139	0.37
2021	63	178	0.16
2022	69	199	0.45

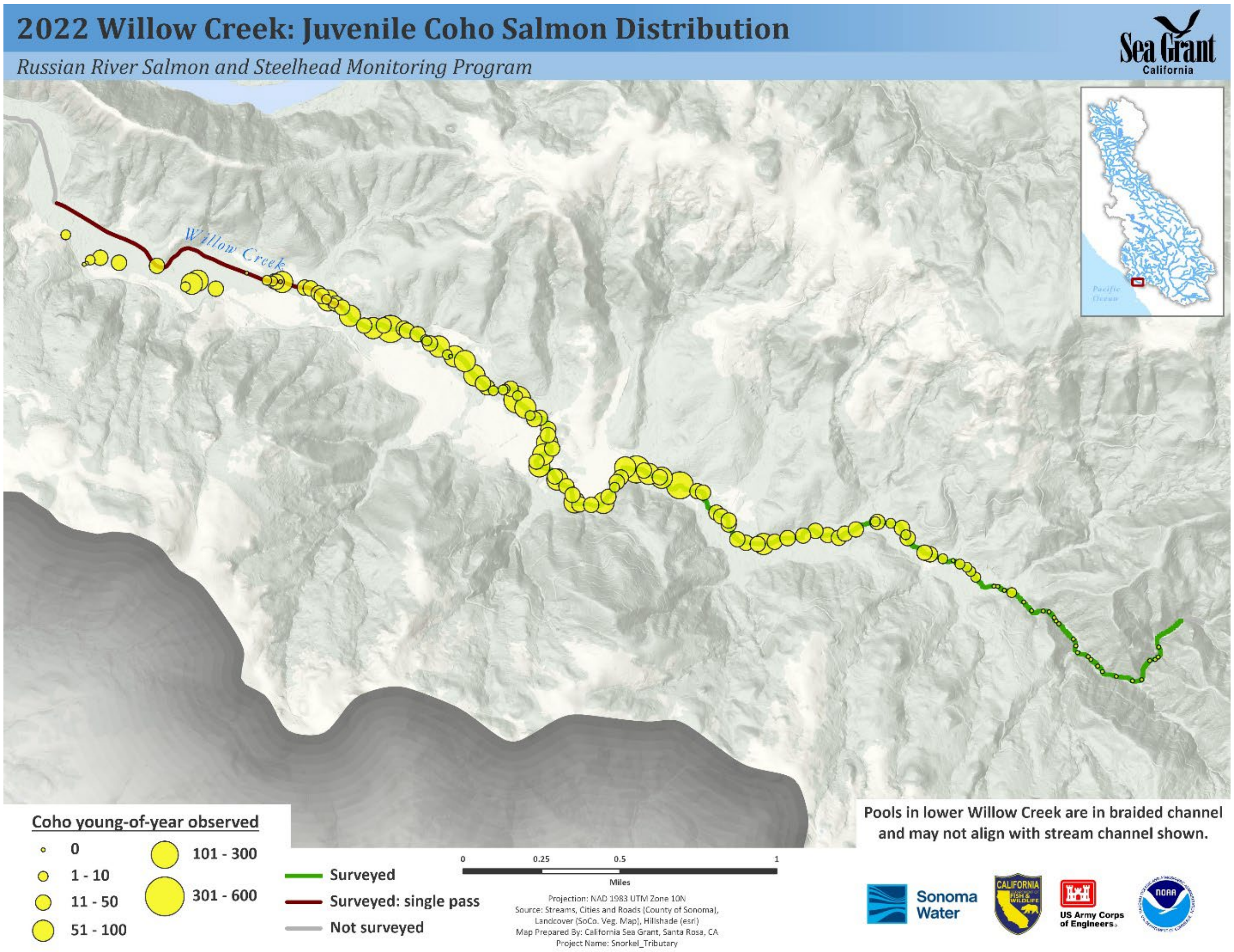

Figure 3. Density and distribution of juvenile coho salmon yoy observed in Willow Creek, 2022. Note that the smallest circle indicates no coho salmon observations in the associated pool. A single pass survey was conducted in lower Willow Creek (CMP reach WIL2).

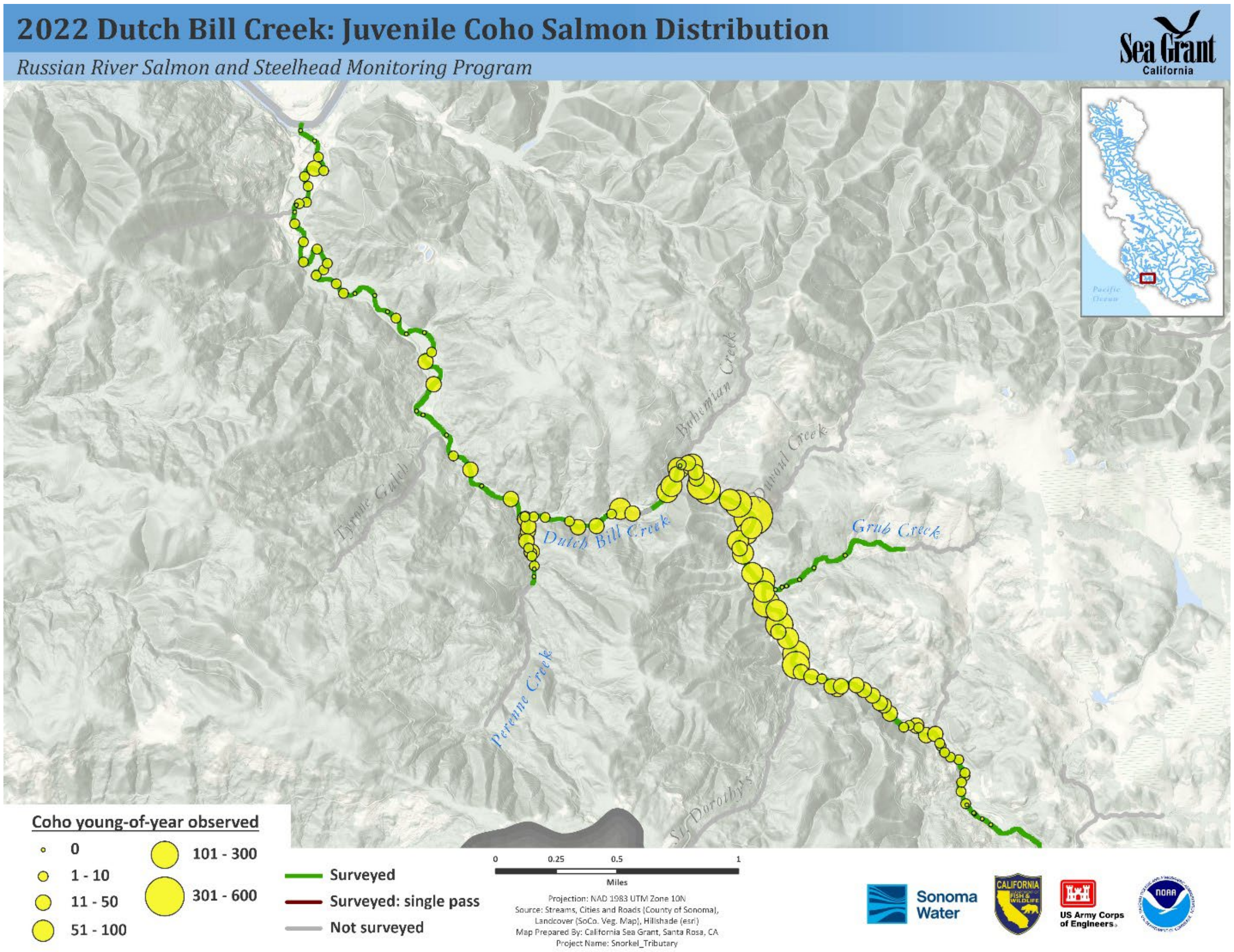

Figure 4. Density and distribution of juvenile coho salmon yoy observed in Dutch Bill Creek, 2022. Note that the smallest circle indicates no coho salmon observations in the associated pool.

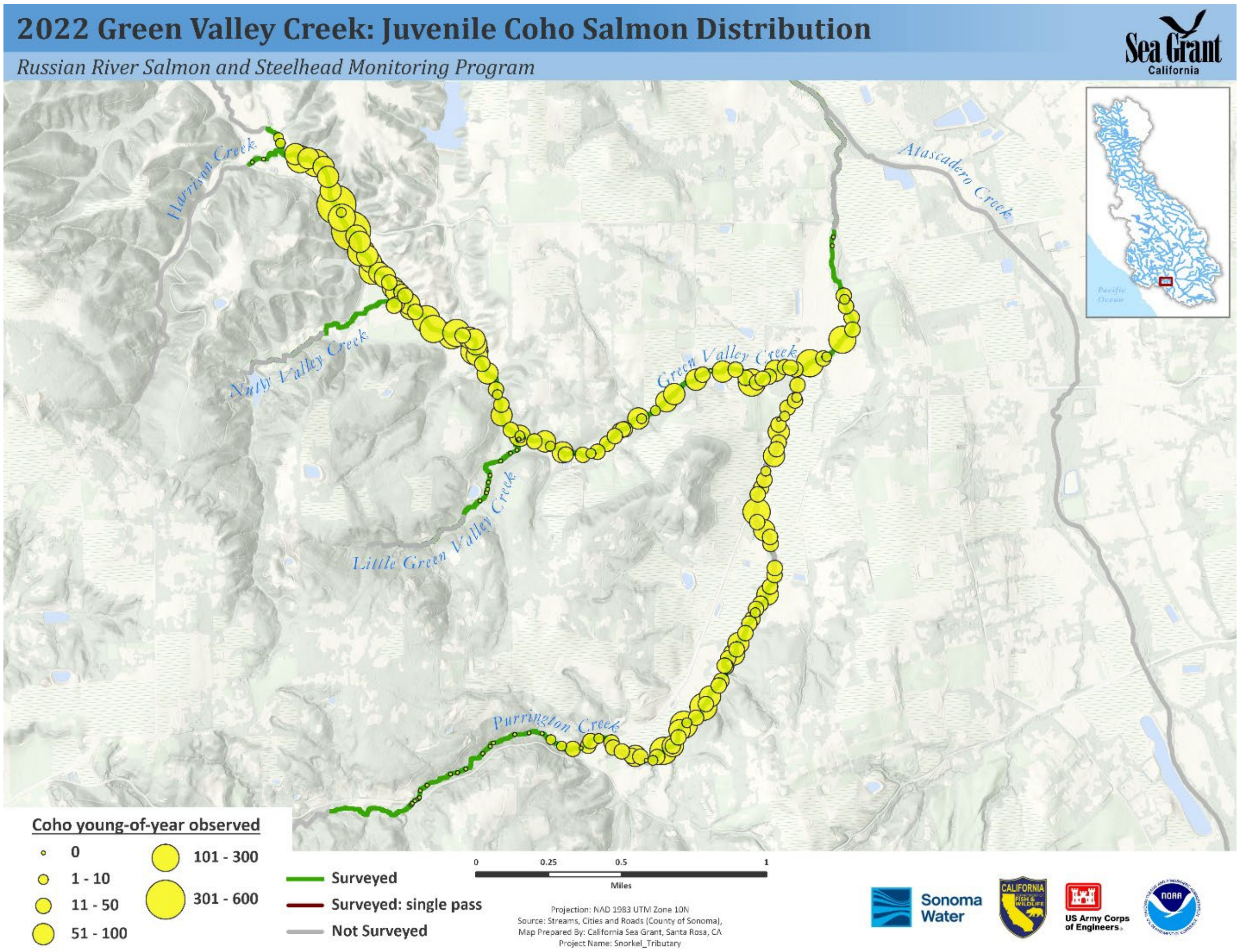

Figure 5. Density and distribution of juvenile coho salmon yoy observed in Green Valley Creek, 2022. Note that the smallest circle indicates no coho salmon observations in the associated pool.

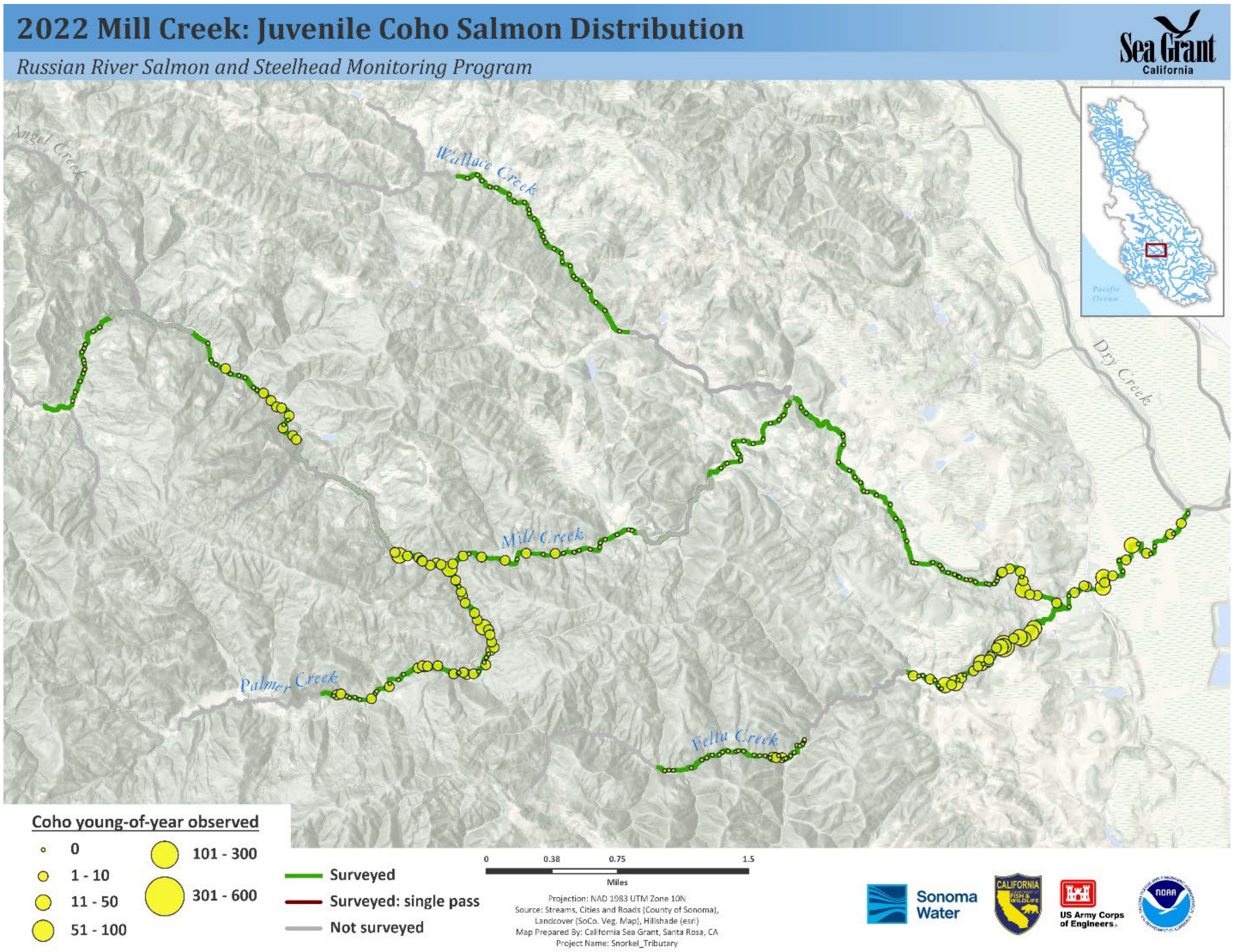

Figure 6. Density and distribution of juvenile coho salmon yoy observed in Mill Creek, 2022. Note that the smallest circle indicates no coho salmon observations in the associated pool.

3. Discussion and recommendations

With an expanded count of over 50,000 coho salmon yoy (Table 1), relative abundance of coho salmon was higher during the summer of 2022 than in any of the previous eight years of basinwide snorkel surveys. Similarly, spatial occupancy of juvenile coho salmon was also higher than in all previous years of sampling (Table 3). We think that almost all of the fish were of natural-origin, with the exception of coho salmon observed in Yellowjacket and Redwood creeks, where prior to snorkeling, unfed fry were released in Yellowjacket Creek as part of a study to test a RSI release method. Because Yellowjacket Creek flows into Redwood Creek (Figure 2), it is likely that coho salmon observed in Redwood Creek originated from the release of RSI fish in Yellowjacket Creek.

In contrast to coho salmon, the relative abundance of steelhead yoy was lower during the summer of 2022 than the previous eight years of basinwide surveys and represented the second year in a row of extremely low counts. The high coho salmon yoy counts and low steelhead yoy counts reflect the trends in redd counts for each species observed during the winter of 2021-2022 (California Sea Grant 2022c); redd counts were higher than average for coho salmon and lower than average for steelhead. The low number of steelhead redds in 2021-2022 was likely a combination of low numbers of returning adults and limited access to tributaries during the spawning window due to low streamflow. The opposite appeared true for coho salmon; a relatively high number of coho salmon adults returned during the winter of 2021-2022, the timing of winter storms allowed access to tributaries during the coho salmon spawning window, and flows were not so high as to scour redds.

A period of drought and early flow recession occurred in late-January through early-April of 2022 (Figure 7), during the early life stages of the 2022 cohort of salmonid yoy. The low precipitation during this period resulted in winter stream disconnections and drying or partial-drying of redds during the winter of 2021-2022 (California Sea Grant 2022c). In mid-April, a pulse of rain reconnected many of the streams, allowing passage for smolts and likely preventing what would have been extremely severe juvenile mortality during summer 2022. This highlights the importance of rainfall timing; even a small amount of rain in late spring can have a strong influence on late spring and summer flow conditions and the fate of multiple life stages of fish.

Due to rapidly drying conditions during the spring of 2022, CDFW conducted fish rescues on streams where coho salmon had a high risk of becoming stranded in drying pools. Rescues occurred between early April and late August, and fish were either relocated to other streams within the Russian River that had a higher probability of remaining wet, or they were transported to Don Clausen Fish

Hatchery to contribute to the broodstock population. When possible, we conducted snorkeling surveys prior to CDFW's relocation efforts, but this was not possible for all streams. Prior to snorkeling surveys, a total of 379 coho salmon yoy were removed from Nutty Valley Creek (a tributary of Green Valley Creek) and 103 coho salmon yoy were removed from Felta Creek, and these fish were not reflected in our snorkel counts (Table 1). An uncertain number of the fish captured from these two streams, as well as from Kidd Creek, were relocated to Austin Creek prior to our snorkeling surveys in Austin Creek; therefore, we have no way of knowing whether the coho salmon observed in Austin Creek originated from Austin Creek or represent relocated fish from the other tributaries. It is also possible that steelhead were relocated and may have influenced the snorkel counts in Nutty Valley, Felta, and Austin creeks. We recommend continued and increased coordination between the CDFW fish rescue team and the CSG/SW snorkeling team to inform relocations and document when and where fish are being removed and relocated.

Despite the April rain, spring and summer flow recession still resulted in stream drying in many Russian River tributaries; however, drying was not as severe as the previous summer's conditions (California Sea Grant 2022b). In support of the CDFW Drought Monitoring Program, CSG performed wetted habitat surveys in the late summer and early fall on the same reaches that were snorkeled during the summer months to document sections of stream as wet, intermittent, or dry based on surface flow. We performed a spatial join of fish distribution data from early summer snorkel surveys overlaid with late summer wetted habitat conditions to estimate the impacts of stream drying on the fish observed during snorkel surveys (Figure 8-Figure 11). Many of the fish observed early in the summer experienced intermittent habitat later in the season, and a lesser proportion were in reaches that became entirely dry.

Although early summer occupancy captures the extent of successful spawning, in years with widespread stream drying it does not fully capture how much of the basin is being used for juvenile rearing, since reaches that go dry are not providing habitat throughout the summer. In order to understand the impact, occupancy was calculated for two periods in 2022; an early-season period (May to August) when snorkel surveys were conducted and a late-season period (August to September), which incorporated data on stream drying. The first period is considered 'standard PAO' as this is the time period occupancy has been reported in previous seasons. For late-season occupancy, the spatial overlay of early-season snorkel pools with late-season wetted habitat conditions was used. Snorkel pools in stretches of stream that were dry late in the season were treated as not occupied, while those that were either wet or intermittent late in the season were treated as occupied. Preliminary analysis for 'end-of-season PAO' showed a moderate reduction in occupancy from 0.45 in the early-season period down to 0.37, an 18% reduction in PAO. Compared to 2021, when occupancy dropped from 0.16 to 0.09 (44%), juvenile distribution was less impacted. This comparison highlights the importance of evaluating end-of-season conditions to gain a more complete assessment of juvenile occupancy in the watershed. This 'end-of-season' occupancy metric also provides a glimpse of what might be expected for future life stages. Even in a moderately dry year like 2022, the occupancy estimate was influenced by the timing of the surveys. This observation suggests that flow-related juvenile bottlenecks in the Russian River basin are not limited to only the driest of years.

During the spring of 2022, we observed an uncharacteristically high number of coho salmon yoy (2,965) in our downstream migrant trap located at the downstream end of the spawning habitat in Willow Creek near Third Bridge (California Sea Grant 2022a). To determine whether any of the outmigrants remained in the lower reaches of Willow Creek, we conducted a snorkel survey on May 26 and observed 610 coho salmon yoy (Figure 2, Table 1). The lower reaches of Willow Creek are characterized by extremely low gradient, shallow, braided stream channel that weaves through a floodplain with dense alder and willow (Figure 12). Pool length ranged from approximately 1-200 meters, and visibility was generally low. Fish were primarily observed at the heads of the pools where surface flow entered each pool unit. On October 13, we returned to the reach to conduct a wetted habitat survey and found the channel either dry or inhabitable for fish. This reach offers high potential for summer and winter rearing habitat for juvenile salmonids, but low spring flows can limit juvenile passage and desiccation in summer can strand fish. We highly recommend pursuing habitat and streamflow enhancement work that could increase the suitability of this habitat for juvenile salmonids. If opportunities exist for projects that would raise the water table, those would be particularly beneficial.

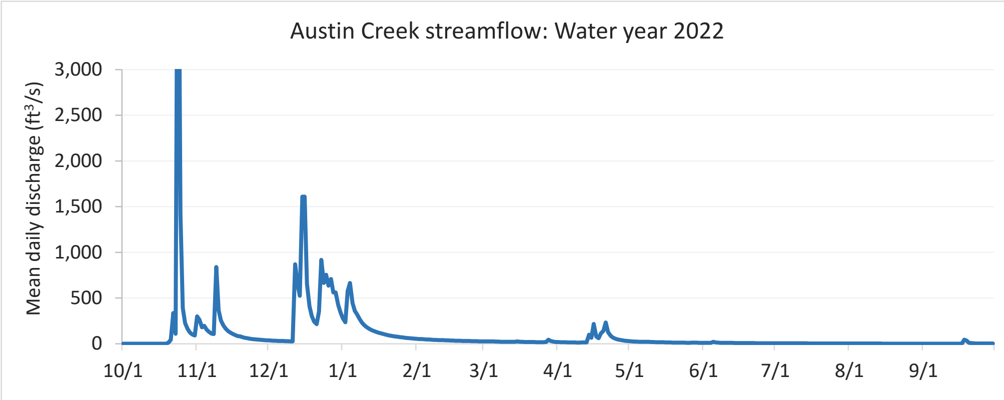

Figure 7. Mean daily discharge on Austin Creek, USGS gage [11467200](11467200).

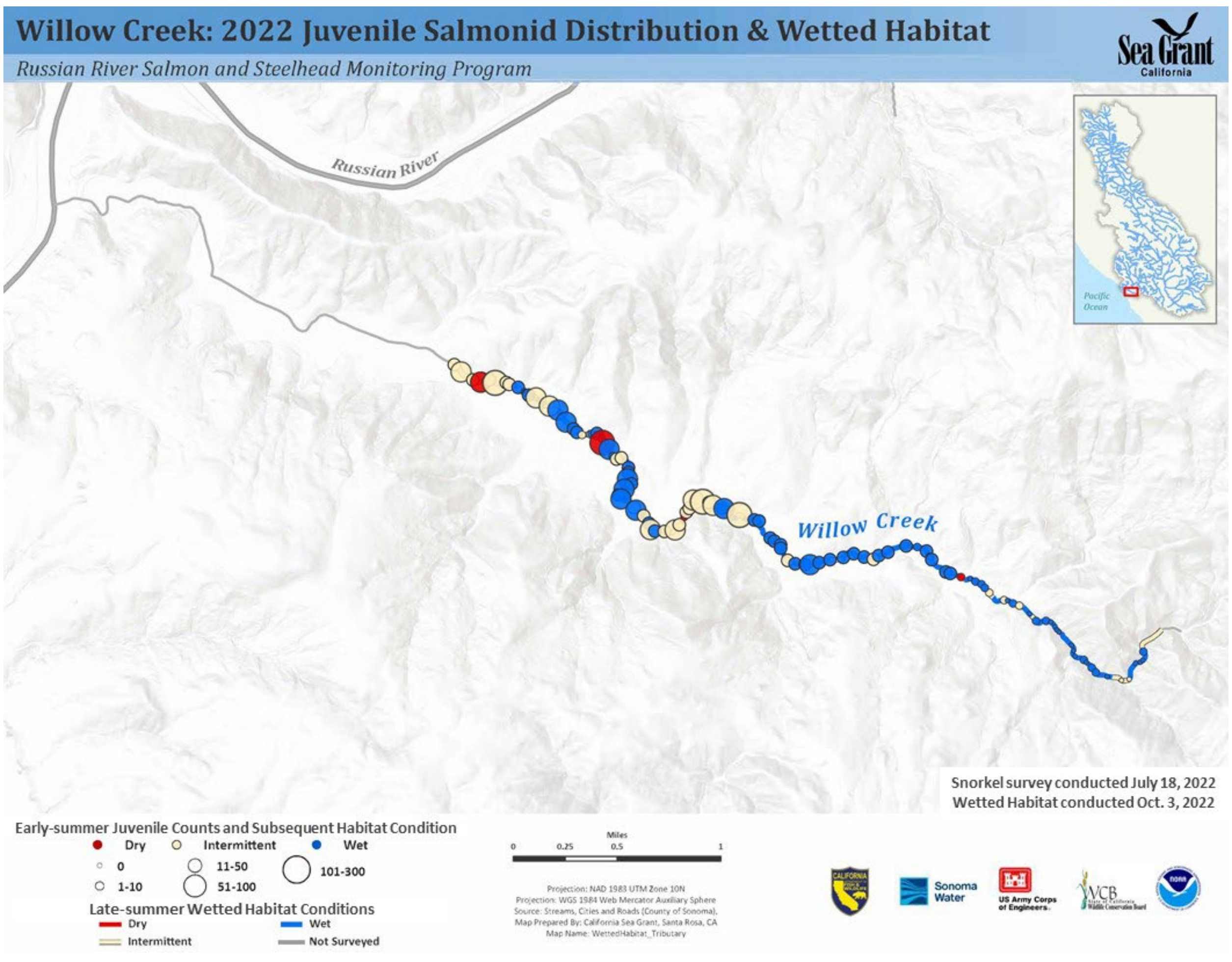

Figure 8. Willow Creek juvenile salmonid density and distribution from summer 2022 overlaid with fall 2022 wetted habitat conditions.

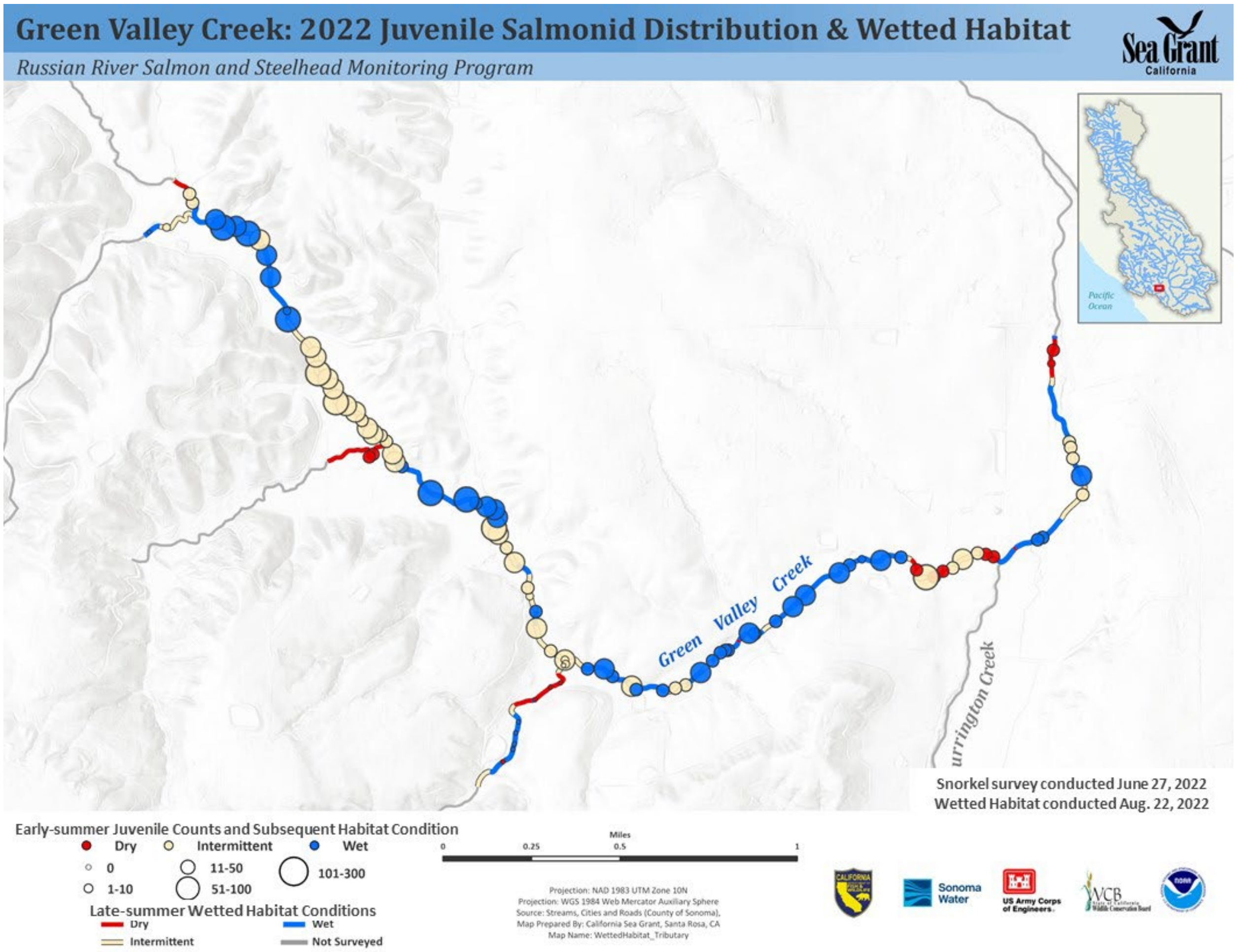

Figure 9. Green Valley Creek juvenile salmonid density and distribution from summer 2022 overlaid with fall 2022 wetted habitat conditions.

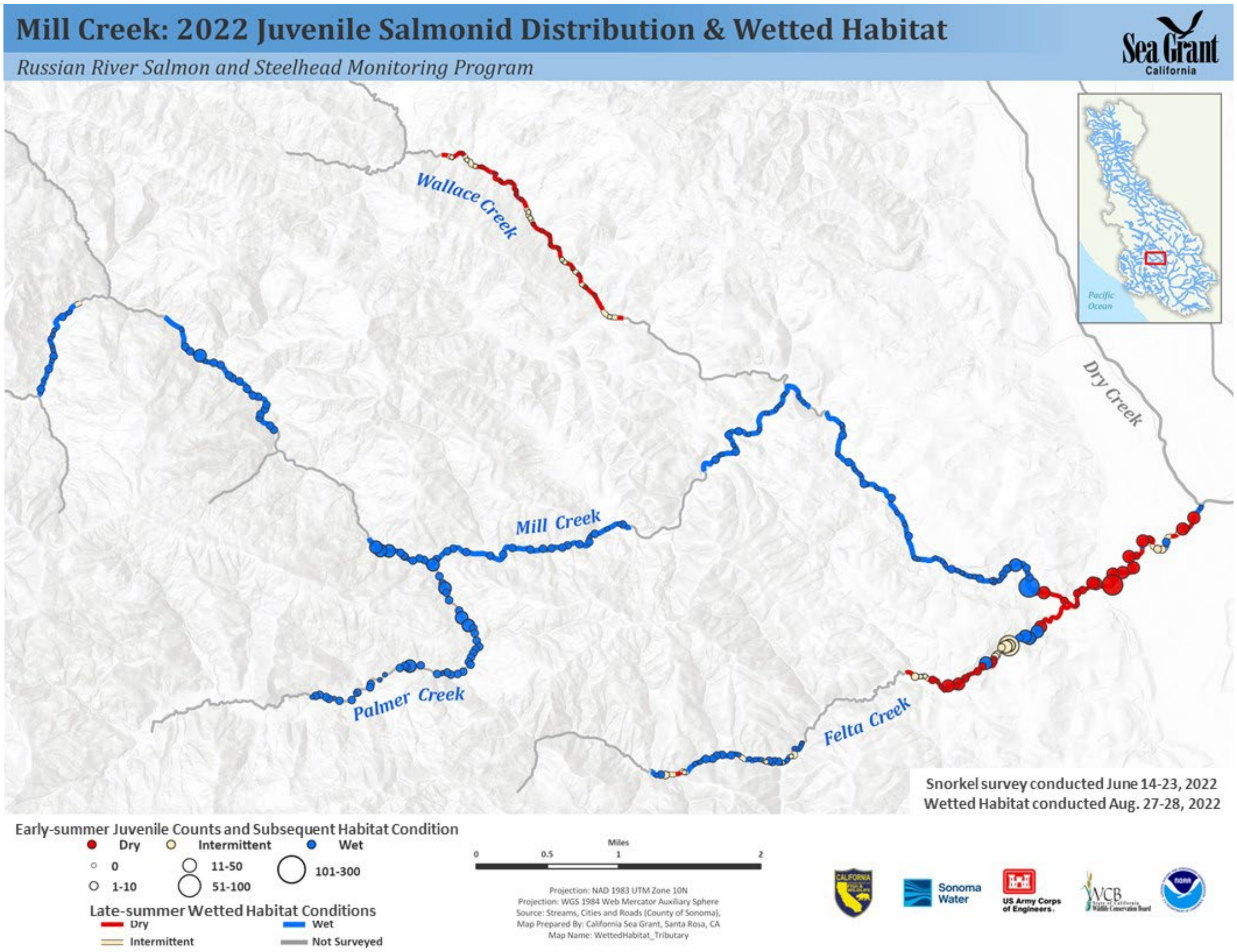

Figure 10. Mill Creek juvenile salmonid density and distribution from summer 2022 overlaid with fall 2022 wetted habitat conditions.

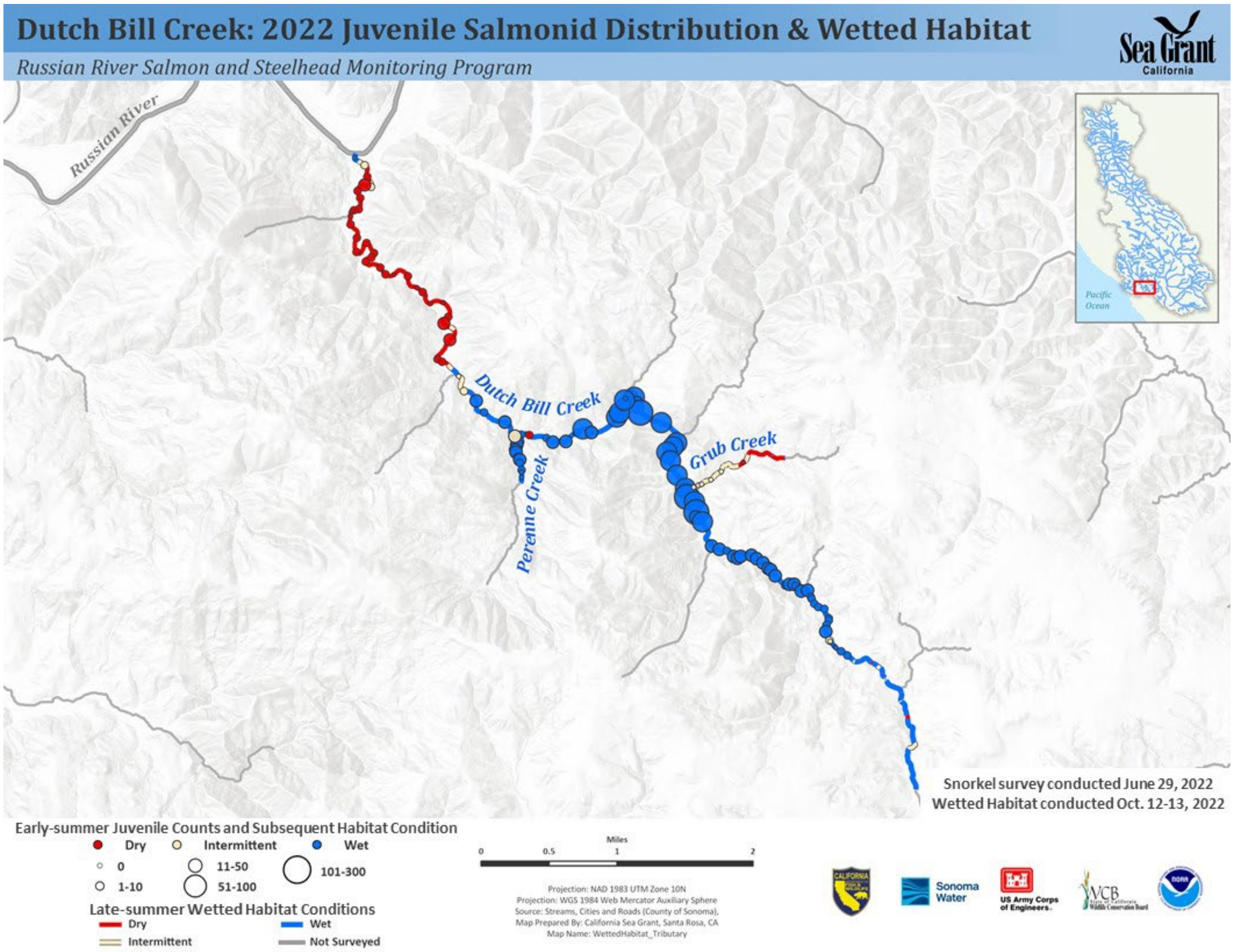

Figure 11. Dutch Bill Creek juvenile salmonid density and distribution from summer 2022 overlaid with fall 2022 wetted habitat conditions.

Figure 12. Snorkel survey in lower Willow Creek.

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