BEFORE THE STATE WATER RESOURCES CONTROL BOARD

Petition For Rulemaking to Set Minimum Flows on the Shasta River
Pursuant to the California Constitution, Article 1, Section 3, and Government Code Section 11340.6

Petitioners
California Coastkeeper Alliance, Friends of the Shasta River, Mt. Shasta Bioregional Ecology Center, Water Climate Trust, Shasta Waterkeeper, Save California Salmon, and Environmental Protection Information Center

I. INTRODUCTION

For decades, the environmental conditions in the Shasta River have deteriorated. Over-allocation and overuse of water have caused fish to become stranded, water temperatures to rise, dissolved oxygen levels to fall, and aquatic life to become imperiled.

It is well studied and understood that streamflow depletion caused by both surface and groundwater withdrawals and warm tailwater return flows are the key limiting factors to the success of salmonids in the Shasta River.[1] Surface water diversions and groundwater extractions have transformed the hydrology of the river system, exacerbating the impacts of drought seemingly without concern for the needs of the fish or the people who depend on them.[2]

These combined factors have resulted in devastation. Fall Chinook salmon have been on a declining trend since counts began in 1930, coho numbers have dropped so precipitously that they are on the verge of extirpation within the Shasta watershed, and Spring Chinook salmon have already vanished from the watershed. Decades of scientific inquiry make clear that adequate quality and quantity of flows are needed to prevent remaining fish populations from further decline. Yet this science is not self-executing; effective government intervention is necessary to prevent the extirpation of salmonids in the Shasta. This type of government action is at the core of the Public Trust Doctrine, which requires the government to act as a trustee over public trust resources, and to the extent feasible, step in to protect these resources from over-allocation and over-use. Government intervention is similarly necessary to further the goals of environmental justice and racial equity, where the historic imbalance of powers has prevented tribal groups from preserving their cultural resources. Actions that work to maintain the status quo merely work to preserve this imbalance.

Through its authority to manage water appropriations and groundwater withdrawal, the State Water Board must act to protect the vital public trust resources in the Shasta. While the Board has previously used its emergency authority to protect these fish, such authority is inherently limited, contingent on emergency proclamations and subject to annual expiration. Yet these emergency regulations made clear that government action is both required and effective. In August of 2023 when the Board let its emergency regulations lapse during irrigation season, water withdrawals increased in earnest and dropped river levels to less than half the minimum needed to support the bare survival of salmonids.

The State Water Board must protect the Shasta through the creation of permanent regulations setting minimum instream flows capable of recovering these keystone species. The needs of the salmonids must guide the State Water Board and any regulation must ensure adequate flows and temperatures to protect these fish. Limiting action until there is perfect data on the hydrology of the Shasta River system is a poor policy, especially when there is absolute certainty that half measures will result in irreversible harm to the Shasta's aquatic ecosystem.

II. PARTIES

California Coastkeeper Alliance (CCKA) represents a network of California Waterkeeper organizations dedicated to fishable, swimmable, and drinkable waters for all Californians. CCKA has long advocated

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[1] Paradigm Environmental, DRAFT SHASTA RIVER WATERSHED CHARACTERIZATION AND MODEL STUDY PLAN, Prepared for the State Water Resources Control Board (Sept. 2018), at 23, https://www.waterboards.ca.gov/waterrights/water_issues/programs/instream_flows/cwap_enhancing/docs/shasta_river/shasta_draft_model_plan.pdf.
[2] Dani Anguiana, Ranchers' rebellion: the Californians breaking water rules in a punishing drought, THE GUARDIAN (Sept. 22, 2022), https://www.theguardian.com/us-news/2022/sep/22/california-ranchers-water-rights-diversions-fish.

for fishable waters throughout the state, a goal that requires instream flow protection. Accordingly, CCKA has a strong interest in the development of permanent instream flow regulations at the State Water Board.

Friends of the Shasta River formed to advocate for equity and balance in beneficial water uses in the Shasta River. Friends of the Shasta River is a group of concerned local citizens who live, work, and recreate in the Shasta River basin. It includes riparian property owners and others who have worked in various capacities on Shasta River issues for decades. Friends of the Shasta River has deep ties to the watershed and an important interest in the development of instream flow regulations.

Water Climate Trust advances water policies that prioritize ecosystems, climate resilience, and river-dependent communities. Water Climate Trust has long been an advocate for environmental flow requirements to prevent species extinction, prevent waste and unreasonable use of water, and protect the public trust.

Shasta Waterkeeper works to restore instream flows in the Mt. Shasta region of Northern California and was founded to preserve and protect these watersheds. The goal of Shasta Waterkeeper is to restore instream flows for people that depend on them for food, jobs, health, recreation, and cultural survival.

Mount Shasta Bioregional Ecology Center was formed in 1988 to protect, preserve, and restore the area surrounding Mount Shasta. Through public education, science-based public policy, advocacy, and legal challenges the Center has formed effective community grass roots groups, tribal coalitions, as well as brilliant legal teams who have all joined the cause of large landscape conservation.

The Environmental Protection Information Center (EPIC) advocates for the science-based protection and restoration of Northwest California's forests, rivers, and wildlife with an integrated approach combining public education, citizen advocacy, and strategic litigation. We recognize that issues of social justice, human rights, and environmental justice are inextricably linked to our core mission to protect and restore Northwest California's ecosystems and environment.

Save California Salmon (SCS) is dedicated to policy change and community advocacy for Northern California's salmon and fish dependent people. We support the fisheries and water protection work of the local communities, and advocate for effective policy change for clean water, restored fisheries and vibrant communities. Save California Salmon's main office is on the mid-Klamath River. We work with Tribal communities and the general public in engaging with public comments related to water pollution, fisheries, racial justice and beneficial use issues. Our board, staff and community are salmon people that rely on the Klamath River fishery for their physical and mental health, and culture. We are uniquely impacted by Shasta River flow issues.

III. PETITION FOR RULEMAKING

The right of the people to petition the Government for redress of grievances is foundational to governance in the United States and the State of California. This right exists in the First Amendment to the U.S. Constitution and article I, section 3 of the California constitution which guarantees that the "people have the right to . . . petition government for redress of grievances."[3]

Government Code § 11340.6 provides the procedure a person must follow in California to petition an administrative agency to adopt a regulation. That procedure states that a petition must state the following factors clearly and concisely:

[3] U.S. Const. amend. I; Cal. Const. art. I, § 3.

(a) The substance or nature of the regulation, amendment, or repeal requested.

(b) The reason for the request.

(c) Reference to the authority of the state agency to take the action requested.[4]

The substance or nature of the regulation requested by this Petition is a permanent regulation setting an instream flow standard for the Shasta River which states that it is the policy of the regulation to recover salmonid communities, require that minimum flow and temperature requirements be met throughout the watershed necessary to achieve that policy goal, include appropriate reporting requirements and procedures to modify the regulations in the face of new scientific information, and includes necessary enforcement provisions.

The reason for the request is discussed throughout this Petition. To summarize, the State Water Board's historical inaction in balancing interests in the Shasta River has resulted in degradation of both the quantity and quality of flows in the Shasta River. As a result, public trust resources such as environmentally, culturally, and economically important salmonids have been, and will continue to be, significantly harmed.

Finally, Section V this Petition both references and discusses the legal authority of the State Water Resources Control Board to take this necessary action, alongside the numerous policy principles which urge the Board to act in accordance with this Petition.

IV. FACTUAL BACKGROUND

A. <u>The Shasta River</u>

1. <u>Geographic Setting and Water Use History</u>

The Shasta River winds for 58-miles from its headwaters northward toward the Klamath River, draining an approximately 794 square mile watershed in Siskiyou County.[5] The land and water connected to those 58-river miles is one of the most unique, complex, and important river systems in California.[6]

While the streamflow includes a combination of winter precipitation and snowmelt, the heart of the Shasta River are its springs and spring-fed tributaries. These springs define the hydrology of the Shasta, feeding the river with high elevation rainfall and snowmelt that percolates underground through a region characterized by porous lava tubes and deeply buried rubble zones. The river's spring-fed cold water and historically complex habitat have made it an ideal haven for the salmonids that are biologically conditioned to return year after year to this river.[7] Historically, the Shasta River has been the most productive spawning habitat for salmonids in the Klamath.

The waters of the Shasta River ran unimpaired until the first diversion was made during Shasta Valley's mining history, with the first water rights dating back to the 1850s. With that mining boom came the extensive modification of the Shasta River's natural hydrology. For example, the ninety-mile Yreka Ditch

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[4] Cal. Gov't Code § 11340.6.

[5] Paradigm Environmental, *supra* note 1, at 3.

[6] *Id.*; Jeffres et al., BASELINE ASSESSMENT OF PHYSICAL AND BIOLOGICAL CONDITIONS WITHIN WATERWAYS ON BIG SPRING RANCH, SISKIYOU COUNTY, CALIFORNIA, Prepared for the California State Water Resources Control Board (2009), available at https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=578b85d439353053d3045eca806c6023188d25ce.

[7] Nichols et. al., WATER TEMPERATURE PATTERNS BELOW LARGE GROUNDWATER SPRINGS: MANAGEMENT IMPLICATIONS FOR COHO SALMON IN THE SHASTA RIVER, CALIFORNIA, 30 River Research and Applications, 442, 443, https://watershed.ucdavis.edu/sites/g/files/dgvnsk8531/files/products/2021-11/rra2655.pdf.

created during that boom, "diverted from practically every tributary entering the Shasta River Streams from the west."[8]

After the mining boom, agriculture soon became king. By 1925 a Department of Water Resources (DWR) report on water use for the valley found that there were "over forty thousand acres of irrigated land in the valley."[9] In that same report, DWR noted that at the mouth of the Shasta, during "July, August, and the early part of September the greater part of the flow passing the station is return water from irrigation above."[10]

To further help irrigate the farms that continued to sprout up throughout the Valley, Dwinnell Dam segmented the Shasta River in 1928, the same year California enacted its prohibition on the waste and unreasonable use of water. The dam separated the river into the upper watershed above and the lower watershed below and had drastic impacts on the river's ecology.[11]

With the completion of Dwinnell Dam, approximately "22 percent of the salmon and steelhead spawning and rearing habitat of the Shasta River was lost."[12] Spring-run chinook were extirpated from the Shasta River shortly after their spawning habitat was cut-off. Not only was this a physical barrier to salmonid habitat, but it also fundamentally changed the river's hydrology and how flows influenced the geomorphology of the lower watershed. By reducing the "frequency of large flood flows along with the elimination of sediment transport processes downstream of Dwinnell Dam," there has been a reduction of habitat diversity throughout the lower mainstem, including the transportation of gravel and cobblestones imperative to salmonid redds.[13]

By 2014 the Shasta Valley accommodated approximately 51,810 irrigated acres with over 165,500-acre feet of water used per year for agriculture.[14] As the need for water increased, diverters moved to ground water to supplement their surface water diversions and the number of wells in the Shasta Valley steadily increased over time, with approximately 2,500 wells drawing water by 2001.[15] Because groundwater and surface water are so interconnected, groundwater withdrawals continue to drain and impair the Shasta River.

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[8] Gordon Zinder, SHASTA RIVER ADJUDICATION PROCEEDINGS REPORT ON WATER SUPPLY AND USE OF WATER FROM SHASTA RIVER AND TRIBUTARIES, SISKIYOU COUNTY, CALIFORNIA, Department of Public Works Division of Water Rights, Shasta River Report on Water Supply and Use, 1925, at 1, 12.

[9] *Id*. [sic]

[10] *Id.* at 22.

[11] Thomas Cannon, REMOVAL OF DWINNELL DAM AND ALTERNATIVES: DRAFT CONCEPTS REPORT, Prepared for the Karuk Tribe (Dec. 2011), at 6, https://www.karuk.us/images/docs/press/2012/SHASTA_BYPASS_REPORT_Cannon.pdf.

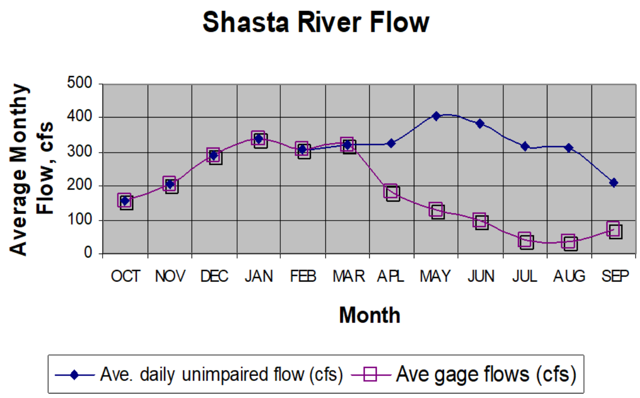
[12] *Id.*

[13] Nichols, A.L. 2008. Geological Mediation of Hydrologic Process, Channel Morphology, and Resultant Planform Response to Closure of Dwinnell Dam, Shasta River, California. University of California, Davis, CA https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=21a2b977457dbda75165a6c4178c0322116e23c

[14] Paradigm Environmental, *supra* note 1, at 26. North Coast Regional Water Quality Control Board, Staff Report for the Action Plan for the Shasta River Watershed Dissolved Oxygen and Temperature Total Maximum Daily Loads, (Jun. 28, 2006), at 1-24, https://www.waterboards.ca.gov/water_issues/programs/tmdl/records/region_1/2010/ref3721.pdf. [hereinafter NCRWQCB Staff Report].

[15] Chart Prepared for Bill Bennett of DWR by Noel Eaves of DWR from well log reports to DWR and is available upon request.

As compared to unimpaired flow data, today, the timing, quantity, and quality of flows in both the mainstem River and tributary spring flows are almost entirely shaped and influenced by the irrigation season.[16]



2. <u>Flows and Temperatures in the Shasta</u>

There are several sets of flow records for the Shasta dating as far back as the early 1910s. However, there are no historic flow records prior to water development in the Shasta River, meaning that there are no flow records of the river's unimpaired annual hydrograph.[17] As far back as there is data, there have been water withdrawals.

Two existing USGS gauges in the Shasta River have the longest and ongoing sources of flow data, nearly continually collecting information for almost 100 years. One USGS gauge is near the mouth of the river where the Shasta meets the Klamath – the Yreka gauge[18] – and the other is downstream of the Little Shasta River, but upstream of the Yreka Creek tributary – the Montague Gauge.[19] Flow data from the Yreka gauge goes back as far as water year 1933 while flow data from the Montague gauge extends back to October 1911.

The below table is every water year on the Yreka gauge between 1934-2022 for the months of June through September. These months and this gauge were selected because this time-period is during the irrigation season and this gauge is where the Waterboard set its emergency flow standards.

Red boxes are years where monthly mean flows were below the emergency minimums created in the 2022 emergency flow regulations (September is split with 50 minimum in the early half and 75 in the latter. Yellow means less than 75). Nearly every year flows during June, July, August, and September have been inadequate to support salmonids in the Shasta, falling well below what CDFW has determined is required for base survival. Even during the term of the emergency regulations, USGS data indicates that the mean flow levels were just shy of the goals. Based on this USGS data since 1933, for 72% of years

[16] Presentation by Bill Bennett, *Hydrologic Characteristics of the Scott and Shasta Watersheds*, California Department of Water Resources.
[17] McBain & Trush, Shasta River Instream Flow Methods and Implementation Framework, Prepared for California Trout and California Department of Fish and Game, (Mar. 27, 2009), at 29, https://ifrmp.net/wp-content/uploads/2017/01/McBain-et-al_2016_0164_Shasta-River-Instream-Flow-Methods.pdf.
[18] USGS, Shasta R NR Yreka CA – 11517500 Stream Gauge, https://waterdata.usgs.gov/monitoring-location/11517500/#parameterCode=00065&period=P7D.
[19] USGS, Shasta R NR Montague CA – 1151700, https://waterdata.usgs.gov/monitoring-location/11517000/#parameterCode=00065&period=P7D.

there have been insufficient survival flows in July and in 76% of years, there have been insufficient survival flows in August. Consistent diversions have forced aquatic life in the Shasta to endure extreme drought conditions regardless of the water year.

Monthly mean in ft3/s				
	Jun	Jul	Aug	Sep
E-reg	50	50	50	50-75
1934	35.9	18.3	13.8	41.5
1935	19.9	13	14.4	42.3
1936	48.8	15.3	14.1	39.5
1937	71.7	16.1	13.6	42.4
1938	143.8	115.6	96.2	104
1939	18.4	17.1	8.35	62.8
1940	73.6	58	59.8	111.4
1941	208.4	115.3	110.6	136.3
1945	102.8	30.9	31.6	66.7
1946	80.3	48.4	43.7	76.7
1947	77.1	22.5	29.2	55.7
1948	154.6	37.4	60.4	112.6
1949	66.4	20.1	26.7	88.6
1950	61.3	18.3	20.2	74.4
1951	32.6	16.2	22.2	61.3
1952	146.8	59.3	50.5	79.4
1953	283.6	46.3	48.6	82.6
1954	132.1	23.6	44.5	81.8
1955	17.9	12.7	11.3	49.8
1956	150.7	71.4	61.6	112.3
1957	59.1	20.8	35.6	102.5
1958	296.4	117.3	73.1	120.5
1959	55.7	20.4	32.5	84.9
1960	35.5	10.1	16.1	32.6
1961	96.4	17.2	34.6	105.2
1962	53.8	22.8	31.4	62.9
1963	131.8	78.4	49.8	103.7
1964	126.8	31.4	19.7	54.4
1965	98.7	66.4	81.7	91.5
1966	63.2	15	13.9	62.2
1967	162.2	38.4	28.6	72.3
1968	49.7	12.1	37.8	57.4
1969	126.7	72.5	34	80.7
1970	83.2	35.7	23.1	59.1
1971	201.8	66.6	34.5	84.8
1972	79	27.3	32.5	80.9
1973	28.1	19.9	16	55.4
1974	128	76.5	58.2	71.7
1975	159.8	82.5	54.2	75.2
1976	49.3	21.8	110.4	72.7
1977	44.3	19.1	17.3	30.9
1978	100.5	77.6	70.8	182.3
1979	31.5	21.7	30.8	70.6
1980	121.8	36.5	29.2	62.3
1981	35.7	13.7	9.51	26.7
1982	135.8	136.5	47.3	96.1
1983	294.4	105.3	91.4	116.7
1984	97	44.6	36.5	87.5
1985	69.6	18.3	24.9	115.2
1986	74.4	40.6	35.6	102.6
1987	44.7	35.4	23	57.1
1988	89.9	23.1	27.9	35.9
1989	66.9	27.2	36.7	103.7
1990	74.6	28	22.5	41.3
1991	44.8	34.7	22	31.2
1992	27.3	25.7	12.8	34.6
1993	166.1	40.2	45.9	55.1
1994	29.6	16.9	14.1	30
1995	162.1	146.6	54.8	62.9
1996	90.2	74.1	35	78
1997	85.1	66.9	46.4	86.4
1998	563.7	136.3	77.5	100.7
1999	139	57.8	57.4	79.2
2000	96.9	60.5	27.9	64.7
2001	25.7	23.6	19.4	47
2002	44.3	24.2	23.9	31.8
2003	88.9	62.2	68	82.1
2004	62.4	37.8	43.5	69
2005	94.1	34.1	35.6	63.3
2006	152.4	86.8	81.2	96.7
2007	60	40.5	27.2	48.8
2008	75.2	20.6	25.5	32.6
2009	70.7	18.6	18.5	23
2010	75.2	22.1	25.8	61.5
2011	193	87.4	56.9	79.4
2012	48.5	25.4	29.7	52.3
2013	25.2	17.1	27.2	34.7
2014	21.8	13.2	15.8	44.9
2015	42.1	28.8	27.8	39.6
2016	72.1	32.4	35	57.3
2017	131.1	45.4	63.3	88.4
2018	56.8	24.3	38.5	41.1
2019	102.8	41.7	41.4	73.6
2020	34.6	14.5	16.7	22.6
2021	17.7	15.9	18.9	47.4
2022	51	48.3	41.3	64.3

Contrast this to estimates of unimpaired flows in the Shasta. A study in 2007 by Deas and Null at the request of the North Coast Regional Water Quality Control Board was conducted to "provide a reasonable estimate of unimpaired flows and temperatures for a representative year in the Shasta Basin."[20] That study shows that unimpaired flows in the Shasta at the Yreka gauge would be around three to four times the minimum flow levels dictated by the emergency regulations. This Petition contains several other studies of unimpaired flows in the Shasta River Watershed in Section IV.B.3 below, many yielding even higher estimates.

Deas and Null, Estimates of Average Unimpaired Flows for a Representative Year in the Shasta Basin			
June	July	Aug	Sept
212 cfs	158 cfs	147 cfs	143 cfs

Further, while the Yreka gauge identifies the flow levels near the confluence of the Shasta with the Klamath, flows from the Big Springs Complex well upstream of that gauge are an essential component of understanding the River's hydrograph, as these flows compose approximately 95% of the baseflows for the lower Shasta during irrigation season.[21] However, as groundwater pumping during irrigation season increases, these important flows from the Big Springs Complex and other springs decrease.

Groundwater studies have found that the flows from the Big Springs Creek in 1922 and 1923, before major groundwater withdrawal became the norm, were "generally stable" throughout the year, even increasing over summer months, and the creek did "not exhibit a typical seasonal reduction through the summer period."[22] Scientific inquiry has consistently reached the conclusion that, absent groundwater pumping, spring flows from the Big Springs Complex are generally stable.[23] However, during irrigation season, Big Springs Creek declines by 35%, and that reduction is "derived almost entirely from water diversions from Big Springs Lake and apparent reduced spring flow contributions associated with seasonal groundwater pumping local to and upgradient (east and south) of the Big Springs complex."[24]

During irrigation season, streamflow from Big Springs Creek, part of the Big Springs Complex, drops to about 54 cfs, while the historically (pre-diversion), the Creek delivered about 100-125 cfs to the Shasta River.[25]

Not only are the flows from Big Springs Complex and Big Springs Creek imperative to understanding water quantity in the Shasta, but they are also major contributors of cold water. The North Coast Regional Water Quality Control Board has found that the most important cold water spring inflow into the Shasta River comes from "Big Springs Lake, Alcove Spring, and

[20] Deas and Null, TECHNICAL MEMORANDUM: YEAR 2000 UNIMPAIRED SHASTA RIVER MODEL SIMULATION FOR FLOW AND WATER TEMPERATURE, prepared for the North Coast Regional Water Quality Control Board (2007).
[21] *Id.*
[22] Deas, TECHNICAL MEMORANDUM ON THE BIG SPRINGS CREEK AND SPRING COMPLEX: ESTIMATES OF SHASTA RIVER CONTRIBUTIONS, Prepared for the North Coast Regional Water Quality Control Board (Feb. 2006), https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/shasta_river/060707/23appendixgtechnicalmemorandum-bigspringscreekandspringcomplexflow.pdf
[23] Jeffres et al., BASELINE ASSESSMENT OF PHYSICAL AND BIOLOGICAL CONDITIONS WITHIN WATERWAYS ON BIG SPRING RANCH, SISKIYOU COUNTY, CALIFORNIA, Prepared for the California State Water Resources Control Board (2009), available at https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=578b85d439353053d3045eca806c6023188d25ce.
[24] *Id.* at 5.
[25] *Id.;* Deas Technical Memorandum, *supra* note 22, at 1.

Little Springs, which all flow into Big Springs Creek."[26] Additional studies have noted that the temperature regime of the Shasta River is largely controlled by both the temperatures of Big Spring Creek, and the velocity of the water.[27] This spring flow is of critical importance to managing the Shasta River's temperature impairment and providing adequate cold water for salmonids.

In addition, while the Little Shasta River historically had year-round spring-fed baseflows, somewhere between 20 and 30 cfs with snowmelt driven floods up to 300 cfs and even the rare 800 cfs, it now routinely runs dry.[28] And, during the irrigation season, the bottomlands reach of the Little Shasta River has unsuitably high summer water temperatures or is dewatered all together.

As a note, the instream flow study for the Little Shasta River found that rivers with "substantial groundwater contributions. . . may require additional analysis to correctly account for large groundwater inputs or discrete spring sources."[29] For example, the historic USGS gauge in the Little Shasta River was above the Table Rock Springs Complex and did not capture the spring flow contributions from these sources. Accordingly, the Board would be reasonable to add additional estimates of spring flow contribution to baseflow levels, as was conducted in that 2022 study.[30]

Even more**,** there are several studies that connect flows to geomorphic processes in the Shasta River. This was documented in the 2018 Paradigm Environmental study, commissioned by the State Water Board, specifically to "better understand water supply, water demand, and instream flow" in the Shasta River.[31] There, the study characterized the current Shasta River as having "a muted hydrologic response dominated by stable year-round baseflows controlled by groundwater inputs," lacking the dynamic fluvial processes that historically shaped the River system.[32] Further studies on this issue include a 2008 thesis on the geologic and hydrologic process of the lower Shasta River that resulted due to the closure of Dwinnell Dam.[33]

Both at the mouth of the Shasta River and at important tributaries, data and scientific analysis demonstrate that flows and temperatures are heavily impaired during irrigation season by surface diversions and groundwater pumping to support agriculture.

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[26] North Coast Regional Water Quality Control Board, Letter Regarding the Petition for Rulemaking to Set Minimum Flows on the Scott River (Jul. 19, 2023).

[27] Nichols et. al., WATER TEMPERATURE PATTERNS BELOW LARGE GROUNDWATER SPRINGS: MANAGEMENT IMPLICATIONS FOR COHO SALMON IN THE SHASTA RIVER, CALIFORNIA, 30 River Research and Applications, 442, 449. https://watershed.ucdavis.edu/sites/g/files/dgvnsk8531/files/products/2021-11/rra2655.pdf.

[28] Yreka Fisheries, California Department of Fish and Wildlife, LITTLE SHASTA RIVER – A COMPENDIUM OF AVAILABLE INFORMATION (Sept. 7, 2016), at 46, https://ifrmp.net/wp-content/uploads/2017/01/Yreka-Fisheries_2016_0157_Little-Shasta-Report.pdf.

[29] Yarnell et al., APPLYING THE CALIFORNIA ENVIRONMENTAL FLOWS FRAMEWORK TO THE LITTLE SHASTA RIVER, (Sept. 2022), at 11.

[30] "To account for spring-fed groundwater contributions not reflected in the models, we added this discrete spring flow volume of 10 cfs to the predicted dry season and wet season baseflow magnitudes and the fall pulse flow" *Id.*

[31] Paradigm Environmental, *supra* note 1, at 1.

[32] *Id.* at 15.

[33] Nichols, A.L. 2008. Geological Mediation of Hydrologic Process, Channel Morphology, and Resultant Planform Response to Closure of Dwinnell Dam, Shasta River, California. University of California, Davis, CA https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=21a2b977457dbda75165a6c4178c0322116e23cb

3. Flow and Temperature Impacts Salmonids

The Shasta River has historically been one of the most productive salmon tributaries to the Klamath. However, for almost two centuries, water in the Shasta Valley has been taken from the river for mining and agriculture and today, ongoing agricultural water diversions from the Shasta River "reduces stream flows and increases temperatures, making many areas of formerly suitable habitat no longer suitable for salmon spawning or rearing."[34]

These fish are not only ecologically vital as keystone species, as they transport nutrients from the ocean inland and vice versa, they are the cultural center of many tribes that call the Klamath River watershed home. [35] In conjunction with their cultural importance, salmon composes a major component of the diet of tribal members and the loss of salmon led to a decline in fish consumption and health, including an increase in diabetes, heart disease, and hypertension.[36] To sum through a quote by Joe James, Yurok Tribal Chairman, "If the salmon don't survive, we don't either."[37] Additionally, these salmon are important to coastal communities ranging from Monterey to the Columbia River where fishing industries have been repeatedly forced to curtail their livelihoods to protect these weakened populations; curtailments that agricultural interests in Shasta Valley have only recently begun to share through the Water Board's 2021 and 2022 emergency regulations.

Yet fish continue to decline, and if nothing changes, these salmonids will be extirpated from these river systems. In 2023, Klamath Basin salmon populations have become so weak that the Yurok Tribe chose to forgo serving salmon at their annual salmon festival and California has canceled the salmon fishing season due to alarmingly low population levels.[38]

Based on the life-cycle of different salmonids, there are four important timing and location considerations for setting flow and temperature requirements: (1) migration - when the salmon return to the Shasta and where they migrate to within the watershed, (2) spawning - when and where eggs are laid, fertilized, and hatched, (3) rearing and growth - when and where the fry emerge from redds and grow in the Shasta and its tributaries, and (4) outmigration - when the juvenile leave the Shasta. During each of these life stages there must be adequate flows to ensure the fish can traverse the Shasta River, survive the hot summer temperatures, and thrive in complex habitat.

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[34] California Department of Fish and Wildlife, Upper Klamath – Trinity Rivers Fall – Run Chinook Salmon_Fall Run_Chinook_ at 8, available for download at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=104380. [Hereinafter UKTR Fall-Run Chinook].
[35] Brook Thompson, The familial bond between the Klamath River and the Yurok People, HIGH COUNTRY NEWS (Aug. 24, 2021), https://www.hcn.org/issues/53.9/indigenous-affairs-klamath-basin-the-familial-bond-between-the-klamath-river-and-the-yurok-people
[36] Shilling et al., CALIFORNIA TRIBES FISH-USE: FINAL REPORT, Prepared for the State Water Resources Control Board and the U.S. Environmental Protection Agency (Jul. 2014), at 5. https://www.waterboards.ca.gov/water_issues/programs/mercury/docs/tribes_%20fish_use.pdf
[37] Susan Sawyer, People of Salmon, U.S. FISH AND WILDLIFE SERVICE (May 24, 2023), https://www.fws.gov/story/2023-05/people-salmon.
[38] Nick Watt, The Salmon Festival in Klamath, California, is not serving salmon this year, with the hope of restoring a food central to area tribes, CNN (Aug. 20, 2023), https://www.cnn.com/2023/08/20/us/california-salmon-klamath-river-yurok/index.html; Juliana Kim, California salmon fishing slated to shut down this year due to low stock, NPR (Apr. 7, 2023), https://www.npr.org/2023/04/07/1168595658/california-salmon-fishing-shutdown-low-stock.

a. Fall Run Chinook

Chinook salmon, also known as king salmon, are the largest of the pacific salmon.[39] Their range extends the length of the West Coast, and the Shasta is home to the evolutionary significant unit (ESU) of Chinook called the upper Klamath-Trinity Rivers (UKTR) fall-run Chinook; an ESU that represents an important component of the evolutionary legacy of the species.[40] For the UKTR fall-run Chinook, the "Shasta and Scott rivers historically supported large numbers of spawning Chinook salmon and they remain among the most important spawning areas, when sufficient flows are present."[41] This is because the "Shasta River was historically the most reliable spawning tributary in the Klamath River system in terms of water temperatures."[42]

Accordingly, adequate flows and temperatures are required in the Shasta River for each major step in these fish's fresh-water life-cycle.

i. Migration

Generally, the fall-run Chinook enter the Shasta River between early-September, tapering off by November, with the last fish coming in as late as mid-December, though historically this migration occurred up to four weeks earlier and the fall-run Chinook were known as the summer run. [43] This delayed migration timing is likely a response to warming stream conditions, as migration and spawning both occur under decreasing temperature regimes as summer wanes.[44]

Once the Chinook enter the Shasta River, these salmon require both adequate flows to navigate through the river and its tributaries and suitable cold-water and complex habitat to begin spawning. Temperatures must remain below 19-23.9°C, as heightened temperatures act as thermal blockages to migration.[45] In addition, sufficient flow is needed to supply dissolved oxygen in adequate quantity to meet the metabolic needs of the salmon.

ii. Spawning

After reaching the Shasta, spawning occurs relatively quickly. Accordingly, most of the spawning takes place during October and November with spawning tapering off in December.[46] In the Shasta River below Dwinnell Dam, there are two primary areas where the fall-run Chinook

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[39] USGS, How many species of salmon are there and how large can they get? (last visited Sept. 7, 2023), https://www.usgs.gov/faqs/how-many-species-salmon-are-there-and-how-large-can-they-get.
[40] NOAA Fisheries, Glossary, (last visited Sept. 2023), https://www.fisheries.noaa.gov/laws-and-policies/glossary-endangered-species-act.
[41] UKTR Fall-Run Chinook, *supra* note 34, at 5.
[42] *Id.*
[43] *Id.* at 1.
[44] Center for Biological Diversity, Petition to List Upper Klamath Chinook Salmon (*Oncorhynchus tshawytscha)* as a Threatened or Endangered Species, (Jan. 27, 2011), at 14. https://www.biologicaldiversity.org/publications/petitions/listing/pdfs/Klamath_Chinook_Petition.pdf.; Hardy et al., Application of a Salmonid Life Cycle Model For Evaluation of Alternative Flow Regimes, (2012) at 4, https://ifrmp.net/wp-content/uploads/2017/01/Hardy_et_al_2012_0206_Application-of-a-Salmonid-Life-Cycle.pdf ; UKTR Fall-Run Chinook, *supra* note 34, at 1.
[45] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 1.
[46] UKTR Fall-Run Chinook, *supra* note 34, at 1.

spawn: the lower watershed canyon and the Shasta-Big Springs Complex of the upper watershed basin.[47]

For these salmon, "the keys to successful spawning are adequate water flow and cold temperatures."[48] Though Chinook also require a substrate composed of large cobbles, or loosely embedded gravel, generally with sufficient subsurface infiltration of water to provide enough oxygen to the developing embryos.[49]

Temperatures in the Shasta are imperative to successful spawning and CDFW has found that optimal spawning temperatures for Chinook salmon are as less than 13°C.[50] Additionally, the North Coast Water Regional Water Quality Control Board found that, for successful Chinook spawning and incubation, "the average daily temperatures remain below 11-12.8°C at the initiation of incubation, and that the seasonal average should not exceed 8-9°C in order to provide full protection from fertilization through initial fry development. The highest single day maximum temperature should not exceed 17.5-20°C to protect eggs and embryos from acute lethal conditions."[51] With optimal conditions, these embryos will hatch after 40-60 days.[52]

iii. Rearing

After eggs hatch and fry emerge, most juvenile Chinook salmon leave the Shasta River during the spring and early summer. However, approximately "4% of juvenile Chinook salmon remained in the Shasta River throughout the summer months" before out-migrating to the Klamath.[53] These multiple life histories are essential for overcoming varying mortality factors.

Studies into the life-cycle of juvenile Chinook have found that those Chinook that reared in the upper basin resided significantly longer and had much higher growth than those in the lower basin. This is likely because low flows caused water temperatures in the lower Shasta Canyon to reach near or above the thermal tolerance of these juvenile fish, likely forcing "the majority of juveniles rearing in the lower basin to out-migrate by late spring" while juveniles rearing in the upper basin "did not experience the same degree of decreased stream flow and resulting increase in temperature."[54] This is concerning, as gravel augmentation efforts in the lower Shasta River focused primarily on the lower basin, and a large proportion of the total number of juvenile Chinook that rear in the lower Shasta are significantly smaller than is typical for ocean-type Chinook salmon.[55] In addition, while the salmon rearing in the upper basin may not experience the same degree of increased temperature while they rear, they will need to traverse those hot waters when it comes time to out-migrate.

Between the time the eggs hatch and the juvenile fish leave the Shasta, studies indicate that the Chinook optimum rearing temperatures are between 10.0-15.6ºC, with anything above that

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[47] Roddam, Residency, Growth, and Outmigration Size of Juvenile Chinook Salmon (*Oncorhynchus Tshawytshaw),* Across Rearing Locations in the Shasta River, California, Masters Thesis at Humboldt State University (Jul. 2014), at ii, https://scholarworks.calstate.edu/downloads/w6634578z
[48] UKTR Fall-Run Chinook, *supra* note 34, at 4.
[49] *Id.*
[50] *Id.* at 3.
[51] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 7.
[52] UKTR Fall-Run Chinook, *supra* note 34, at 4.
[53] Jeffres and Adams, Novel Life History Tactic Observed in Fall-Run Chinook Salmon, Ecology Vol. 100, NO. 9 (Sept 2019), at 1, https://www.jstor.org/stable/26785447
[54] Roddam, *supra* note 47, at 67.
[55] *Id.*

threshold significantly increasing the risk of mortality from warm-water diseases.[56] "While there is research suggesting that some Chinook stocks exhibit adequate rearing capabilities above 15.6°C, USEPA (2001) conclude that anything over this threshold significantly increases the risk of mortality from warm-water diseases."[57] Research has additionally shown that optimal temperatures for rearing and growth "is generally between 10.0ºC and 15.5ºC."[58]

iv. Out-Migration

After rearing, Chinook salmon require adequate flows and temperatures to leave the Shasta and enter the main-stem Klamath. Water temperatures above 15°C stimulate juvenile emigration, although temperatures above 15.6°C can increase risk of disease.[59] The fish out-migrate usually between March and July under the current and flow temperature-regime.[60]

Studies on UKTR life-cycle needs have found that adequate flows are needed for outmigration. One study hypothesized that a rapid decease in stream flow in April prevented Chinook from out-migrating in 2013.[61] Similarly, a 2014 McBain and Trush study found that instream flow regulations must prioritize adequate flows in late spring to avoid mortality from water temperatures as any remaining smolts out-migrate.[62] Further, as diversion pumps are turned on, there can be severe localized impacts that prevent the juvenile fish from leaving the river system. For these reasons, slow warm outflows are a serious threat to the next generation of Chinook.

b. Southern Oregon/Northern California Coho

The Shasta River is also home to the Southern Oregon/Northern California (SONCC) ESU of coho salmon. These salmon are listed as threatened under both the Federal Endangered Species Act and the California Endangered Species Act.[63]According to CDFW's 2004 recovery strategy for coho, some of the "most adversely affected populations in the State are in the Shasta River."[64] The National Oceanic and Atmospheric Administration (NOAA) Fisheries has summed the issue succinctly by stating that the "Shasta River population is at high risk of extinction."[65]

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[56] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 13.
[57] *Id.*
[58] Stenhouse et. al, Water Temperature Thresholds for Coho Salmon in a Spring-Fed River, Siskiyou County, California, California Fish and Game (Dec. 2012) at 8, https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/marblemountain/exhibits/nat_marine_fs_exhibits/nmfs_43.pdf.
[59] UKTR Fall-Run Chinook, *supra* note 34, at 4.
[60] CDFW, Scott and Shasta River Juvenile Salmonid Outmigration Monitoring (Apr. 29, 2022), https://www.svrcd.org/files/b6209c328/2022+RST+Update+Apr29.pdf.
[61] Roddam, *supra* note 47, at 69.
[62] McBain & Trush, SHASTA RIVER CANYON INSTREAM FLOW NEEDS ASSESSMENT (FINAL REPORT), Prepared for the Ocean Protection Council and California Department of Fish and Game (Mar 7, 2014), at 90. [hereinafter Shasta River Canyon Report].
[63] 50 C.F.R. § 223.102 (2021).; California Department of Fish and Game, RECOVERY STRATEGY FOR CALIFORNIA COHO SALMON, (Feb. 2004), https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=99401&inline [hereinafter CDFG Recovery Strategy].
[64] California Fish and Game Commission, RECOVERY STRATEGY FOR CALIFORNIA COHO SALMON PROGRESS REPORT 2004 – 2012, (2015), available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=165447. [hereinafter CDFG Progress Report].
[65] NOAA Fisheries, FINAL RECOVERY PLAN FOR THE SOUTHERN OREGON/NORTHERN CALIFORNIA COAST EVOLUTIONARILY SIGNIFICANT UNIT OF COHO SALMON (*ONCORHYNCHUS KISUTCH*), (2014), at 37-8. Available at https://www.fisheries.noaa.gov/resource/document/final-recovery-plan-southern-oregon-northern-california-coast-evolutionarily [hereinafter NOAA Recovery Plan].

Because both the federal and state government have recognized that intervention is necessary to prevent the extinction of this ESU, multiple plans have been developed with the goal of recovering the SONCC coho ESU "to the point where the species is viable and . . . is naturally self-sustaining, with a low risk of extinction"[66] and to the point "when naturally producing coho salmon are adequately abundant and occupy a sufficient range and distribution to ensure against extinction due to environmental fluctuations, stochastic events, and human land and water-use impacts."[67] Specifically, NOAA's recovery plan requires 4,700 spawners in the Shasta before the ESU is considered recovered, with a depensation threshold of 144 returning adults.[68] Less than the depensation threshold and the biomass and genetic pool becomes so depleted that population growth becomes negative. Even above that threshold, smaller populations are more susceptible to harm by singular devastating events, such as wildfires, disease, or extreme drought years.[69]

In both these plans, NOAA and CDFW make clear that adequate flows and temperature are pivotal to the recovery of this species. In the federal recovery plan, NOAA states that "[i]nstream flow criteria should be established"[70] and, in the state recovery plan, CDFW makes clear that the "development of more natural streamflow regimes that minimize the adverse effects of flow regulation is consequently an important aspect of coho salmon recovery."[71]

i. Migration

About 95-99% of all coho salmon return to their natal streams to spawn, returning with each generation to an increasingly degraded Shasta River.[72] These fish migrate upstream and reach the Shasta River generally between October 15-December 15.[73] During this time, research into coho life-needs have shown that these salmon require a minimum level of flows to safely traverse the waterway and temperatures should not exceed 16.5°C as the maximum weekly maximum temperature with ideal temperatures for migrating coho salmon being 11.4°C.[74]

ii. Spawning

Spawning occurs in November and December, though it can occur as late as January if stream flows are low or access is limited due to drought.[75] Depending on water temperatures, eggs will incubate in redds for 1.5 to 4 months before hatching into alevins, the larval life stage of the fish.[76] These alevins progress into fry and emerge from the gravel, usually between March and May and subsequently transition to juvenile stages by about mid-June.[77]
According to the NOAA recovery plan:

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[66] *Id.* at 4-1.
[67] CDFG Progress Report, *supra* note 64, at 12.
[68] NOAA recovery plan, *supra* note 65 at D-27 and 2-35.
[69] *Id.* at 2-17.
[70] *Id.* at 6-2.
[71] CDFG Progress Report, *supra* note 64, at 28.
[72] NOAA Recovery Plan, *supra* note 65, at 1-18.
[73] Chesney et. al., Shasta River Juvenile Coho Habitat & Migration Study, Prepared for the U.S. Bureau of Reclamation (2009), https://ifrmp.net/wp-content/uploads/2017/01/Chesney-et-al_2009_0155_Shasta-River-Juvenile-Coho-Habitat.pdf
[74] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 5.
[75] NOAA Recovery Plan, *supra* note 65 at 1-11.
[76] *Id.* at 1-11.
[77] *Id.* at 1-12.

> "the current distribution of coho salmon spawners is concentrated in the mainstem Shasta River from river mile 32 to about river mile 36, Big Springs Creek, lower Parks Creek, and in the Shasta River Canyon (river mile 0 to 7). Juvenile rearing is also occurring in these same areas, and occasionally in lower Yreka Creek (Garwood 2012) and the upper Little Shasta River (Whelan, J., pers. comm. 2006)."[78]

And, CDFW data from spawning ground surveys of coho salmon have documented coho redds in the Shasta Canyon reaches and the Big Springs Complex.[79] During spawning, the maximum weekly average temperatures "should not exceed 10°C and the daily maximum temperature should not exceed 13°C to be protective of coho."[80] Further, the preferred temperatures for fry emergence is between 4.5-13.3ºC.[81]

iii. Rearing

After the fry emerge from their gravel redds in the spring and early summer, juvenile coho feed and rear within streams of their natal watershed for usually a year (i.e. throughout the entire summer and irrigation season) before migrating to the ocean.[82] However, water temperatures at many locations throughout the Shasta River can reach detrimental, or even lethal levels as early as May.[83] In its 2016 five-year review of SONCC coho salmon, NOAA found that while "every life stage of coho salmon requires adequate stream flow, summer rearing juveniles are most vulnerable because stream flows within the ESU naturally reach annual lows during the late summer or early fall."[84] These naturally low annual flows coincide with irrigation season, artificially exacerbating the impacts of low flows and high temperatures.

During the summer, juvenile coho require a minimum level of water to safely move out of lethally warm areas of the Shasta River. Temperatures above 16.8ºC as a mean weekly average temperature or above 18.1ºC as a maximum weekly maximum temperature will preclude the presence of juvenile coho in a stream.[85] Accordingly, over the summer months juvenile coho seek out refuge from high water temperatures to rear.[86]

According to the NOAA Recovery Plan, juvenile coho have been observed rearing in the Shasta River Canyon, lower Yreka Creek, in the upper Little Shasta River, throughout the Big Springs

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[78] NOAA Recovery Plan, *supra* note 65 at 37-6.
[79] California Department of Fish and Game, Shasta River Chinook and Coho Salmon Observations in 2011-2012 Siskiyou County, CA (Nov. 2012), at 10, available for download at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=77844.
[80] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 9.
[81] *Id.*
[82] NOAA Fisheries, Coho Salmon (Protected), (last visited Sept. 8, 2023), https://www.fisheries.noaa.gov/species/coho-salmon-protected#.
[83] Adams, Survival and Movement of Juvenile Coho Salmon (*Oncorhynchus Kisutch*) In the Shasta River, California, Masters Thesis for Cal Poly Humboldt (Dec. 2013) at 43., https://scholarworks.calstate.edu/downloads/z603r066p; Chesney et. al, *supra* note 73, at 71.
[84] NOAA, 2016 5-YEAR REVIEW: SUMMARY & EVALUATION OF SOUTHERN OREGON/NORTHERN CALIFORNIA COAST COHO SALMON, (2016), at 26, https://www.dfw.state.or.us/agency/commission/binders/19/06_Jun/Beaver%20Petition%20Bibliography/NMFS_2016b.pdf.
[85] The Effects of Temperature on Steelhead Trout, Coho Salmon, and Chinook Salmon Biology and Function by Life Stage: Implications for Klamath Basin, within NCRWQCB Staff Report, *supra* note 14, at 15.
[86] NOAA Fisheries, Coho Salmon (Protected), (last visited Sept. 8, 2023), https://www.fisheries.noaa.gov/species/coho-salmon-protected#.

Complex, in lower Parks Creek, and even further upstream.[87] All locations with cold water spring flow. Studies documenting juvenile rearing in the Shasta have shown that individual fish that were hatched in the lower mainstem were likely to move into Big Springs Creek and the upper mainstem in search of cold water, though these movements are subject to instream barriers such as low flows and dams.[88]

At key times over the course of the year while these juvenile fish rear, they will move around in search of tolerable habitat and temperatures. From when they emerge until fall, juvenile salmon will move to find cool water but once they do they are likely to stay in those locations for summer rearing.[89] In late fall and winter when the protective plant growth dies off and the fish are exposed to predation or washing out by high winter flows, the juveniles will move again.[90] One study found that this type of winter movement occurs out of Big Springs Creek in the fall to the mainstem Shasta above the Parks Creek confluence.[91] During the winter, studies have also shown that there is a high winter survival estimate in the upper mainstem Shasta for these juvenile fish, which is likely attributable to "the favorable thermal conditions and stable base flows of the Shasta River during that time." [92]

iv. Out-Migration

After spending a year rearing in the Shasta River, the coho salmon out-migration usually begins in the Spring between April and May and continues into June.[93] Studies have noted that there is "a positive relationship between flow volume and travel time and survival of juvenile coho salmon in the mainstem Klamath River,"[94] and a similar relationship likely exists in the Shasta.

Unfortunately, the beginning of out-migration coincides with the start of irrigation season. [95] As the timing of outmigration overlaps with irrigation and associated high-water temperatures in the Shasta River, the lower flows cause longer migration times and force juvenile fish to endure detrimentally high temperatures as they out-migrate from the Shasta River. In addition, just as with the Chinook, as pumps are turned on, there can be severe localized impacts that prevent the juvenile fish from leaving the river system.

B. <u>The Scientific Data Necessary to Set Flows is Available</u>

The goal of permanent instream flow regulations must be the long-term survival and recovery of the Shasta River's salmonids, in accordance with the federal and state Endangered Species acts. Existing scientific studies, data, and information are more than sufficient to identify the flows necessary to support all phases of the salmonid life-cycle needs in the Shasta River.

This Petition has compiled existing research into the Shasta River to catalog and categorize: (1) existing instream flow studies and desktop methodologies, (2) the water quantity and quality needs of relevant salmonids, and (3) data on both current and baseline flows. This data provides a

[87] NOAA Recovery Plan, *supra* note 65, at 37-5.
[88] Adams, *supra* note 83, at 45.
[89] Chesney et al., *supra* note 73, at 7.
[90] NOAA Recovery Plan, *supra* note 65, at 1-14.
[91] Adams, *supra* note 83, at 47.
[92] *Id.*
[93] NOAA Recovery Plan, *supra* note 65, at 1-15.
[94] *Id.*
[95] Adams, *supra* note 83, at 48.

foundation to set legally defensible minimum flow levels capable of protecting and recovering salmonids in the Shasta River.

1. Existing Instream Flow Studies and Desktop Methodologies

There are existing instream flow studies that identify necessary habitat, fish passage, and temperature requirements for key aquatic species in the Shasta River watershed and determine those flows necessary to create and maintain those factors. Because the Shasta River is so vital to salmonids and these flow recommendations are imperative to salmonid recovery, the Ocean Protection Council (OPC) funded two McBain and Trush, Inc. reports explicitly so the Water Board would "implement the recommendations to regulate the timing and flow of water." [96] As the OPC recognized in 2008, waiting to act while the California Department of Fish and Wildlife (CDFW) completed its legally required flows recommendation for the Shasta River would only result in harm. [97] Further, the California Environmental Flows Framework was developed to provide a consistent and defensible method to setting ecological flows throughout the State, and that process was used to develop a flow recommendation for the Little Shasta River because of the tributary's position as a vital role in the recovery of the Shasta River watershed.

These available studies were developed to provide the Water Board the tools to set regulations to protect salmonids in key areas of the Shasta River, yet previous iterations of emergency regulations only applied part of one study to one area, creating weak protections for a single section of the watershed. The Board must use these studies as a foundation and augment them with additional data recommended in this Petition to set flows that protect the fresh-water life-cycle needs of Shasta River salmonids throughout the watershed.

a. McBain and Trush: Shasta River Canyon

First, the OPC funded a report to establish interim flow criteria which recommends interim flow numbers for "each salmonid life history stage and desired ecological condition" within the Shasta River Canyon from its confluence with Yreka Creek downstream to the Klamath River. While these flow numbers are beneficial in the Shasta River Canyon, relying on these numbers for the entire river-system is improper as they ***are not sufficient to protect the entire watershed***. These recommendations were designed to be met at the Yreka gauge and, in part, the Water Board based their emergency flow recommendations off this research.[98]

The recommendations from this study are in the table below:[99]

[96] California Ocean Protection Council, Staff Recommendation In-Stream Flow Assessments, (Nov. 2008), at 3 -4. https://opc.ca.gov/webmaster/ftp/project_pages/salmon_and_steelhead/0811COPC_Instreamflow.pdf
[97] California PRC sec. 10000.; California Department of Fish and Wildlife, Scott and Shasta River Studies (Siskiyou County), (last visited Sept. 7, 2023), https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/Scott-Shasta-Study.
[98] State Water Resources Control Board, Proposed Emergency Regulation and Informative Digest: Establishment of Minimum Instream Flow Requirements, Curtailment Authority, and Information Order Authority in the Klamath Watershed (Aug. 12, 2021), at 43, https://www.waterboards.ca.gov/drought/scott_shasta_rivers/docs/digest_081221.pdf
[99] McBain & Trush, SHASTA RIVER CANYON INSTREAM FLOW NEEDS ASSESSMENT (FINAL REPORT), Prepared for the Ocean Protection Council and California Department of Fish and Game (Mar 7, 2014), at 90. [hereinafter Shasta River Canyon Report].

Table 22. Summary of IFN recommendations at USGS gage #11-5117500 by salmonid life stage.

Salmonid Life Sage	Streamflow Period	IFNs (cfs)	Dry Year IFNs (cfs)	Section Reference
Early Adult Chinook Salmon Migration	September 15: September 30:	≥ 70 ≥ 125	≥ 50 ≥ 125	8.1
Adult Salmon Spawning	October 1: October 15: October 31 to December 31:	≥ 125 ≥ 170 ≥ 195	≥ 125 ≥ 125 ≥ 150	8.2
Fry and Juvenile Salmonid Winter Rearing	January 1 to March 31:	≥ 170	≥ 135	8.3
Juvenile Salmonid Growth and Smolt Outmigration, Snowmelt Streamflows	April 1 to May 15: May 16 to June 15: June 16 to June 30:	≥ 200 ≥ 165 ≥ 125	≥ 170 ≥ 150 ≥ 70	8.4
Juvenile Salmonid Rearing Summer Baseflows	July 1 to September 14:	≥ 70	≥ 50	8.5

Importantly, this study notes that dry year summer flows are not protective during summer rearing, one of the most impactful times for salmonids, because the report's "dry year flow recommendations will likely not support suitable water temperatures for summer rearing juvenile salmonids in the Shasta Canyon."[100] Because both flows and temperatures are imperative for recovery of salmonids, the Board must augment these flow recommendations with water temperature data to set flows capable of supporting these salmonids in the Shasta Canyon.

To accomplish that goal, we recommend using the North Coast Regional Water Quality Control Board's Temperature Total Maximum Daily Load (TMDL), which outlines how to achieve temperature quality goals. Specifically, the TMDL identifies that there should be a 50% increase in flow downstream of the Big Springs Creek Complex.[101] This is because these higher flows preserve the important cold-water flow from Big Springs Creek by reducing travel time to the Shasta River Canyon and reducing the impact of hot tailwater return flows.[102]

While there have been recent criticisms about the benefits of even the 50 cfs emergency summer flows in the Shasta Canyon recommended by this report, as compared to a 30 cfs target recommended by the Podlech Memo,[103] the North Coast Regional Water Quality Control Board has thoroughly analyzed this recommendation and found "there is no water quality benefit to lowering the summertime minimum flow targets to 30 cfs." [104] In fact, the Regional Board concluded that reducing flows below the recommended 50 cfs "may be detrimental to target species utilizing cold water refugia in the Shasta River canyon by increasing instream temperature and potentially shrinking existing cold water refugia."[105]

Therefore, the Water Board has sufficient data to set flow and temperature standards to be met at the Yreka gauge to support the freshwater life-cycle needs of salmonids in the Shasta Canyon.

[100] *Id.* at 104.
[101] NCRWQCB Staff Report, *supra* note 14, at 6-12.
[102] *Id*.
[103] Memo from Elias Scott to Alydda Mangelsdorf, North Coast Regional Water Quality Control Board regarding Analysis of Mike Podlech's Memo Dated June 13, 2022, Regarding CDFW Instream Flow Recommendations for the 2022 Readoption of Drought Emergency Recommendations.
[104] *Id.* at 14.
[105] *Id.*

b. McBain and Trush: Big Springs Complex

Second, there is a report which recommends interim flow numbers "to maintain native fish in good ecological condition," in the Big Springs Complex of the Shasta River.[106] Flows from this study focused on the needs of individual fish, rather than the flow and temperature requirements for population or communities. Still, they provide insight into the absolute baseline survival conditions needed for fish in this area of the watershed, and the Board can easily increase protections by requiring more flows and suitable temperatures from the Big Springs Complex while the fish rear over the summer.

The report did not recommend a gauge where flows could be measured and enforced. However, there is now a gauge downstream of the Big Springs Creek Complex, called the Shasta R at Grenada Pump Plant gauge (SPU), that could be used for information and enforcement purposes.[107]

The report looked at a variety of sites, and recommendations for flows in the most useful sections and a map of their locations from this study are in the table and figure below:

Big Springs Complex Interim Instream Flow Needs *February 28, 2013*

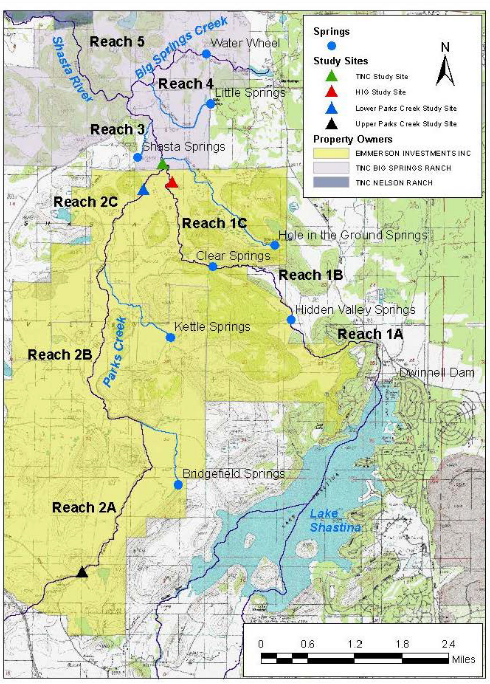

Figure 2. Reaches, sub-reaches, and study sites in the Big Springs Complex

Table 31. Recommended interim minimum IFNs for priority reaches in the Big Springs Complex.

Salmonid Life Sage	**REACH 3** **TNC Study Site IFN** **Q_{MIN} (cfs)**	**REACH 2A** **UPC Study Site IFN** **Q_{MIN} (cfs)**	**REACH 2C** **LPC Study Site IFN** **Q_{MIN} (cfs)**	**REACH 1C** **HIG Study Site IFN** **Q_{MIN} (cfs)**
September 7 to September 30: Early Adult Chinook Salmon Migration	20	11 to 15	11 to 15	10
October 1 to December 31: Chinook and coho Salmon Spawning Habitat and Adult Chinook Migration	20 to 22	11 to 15	11 to 15	10 to 13
January 1 to March 31: Winter Juvenile Salmonid Rearing Habitat	20	10	12	7 to 10
April 1 to June 15: Spring Pulse and Smolt Outmigration	40	20 to 25	20 to 25	20 to 25
June 16 to September 6*: Summer Juvenile Salmonid Rearing Habitat	13	2	7	6

The Big Springs Complex is an extraordinarily important source of both flows and cold temperatures into the Shasta River. Any instream flow regulation with the goal of protecting salmonids in the Shasta must take into consideration flows from this region. Not only will this lead to better conditions for the fish in this crucial stretch of the river, one of the sole remaining

[106] McBain & Trush, SHASTA RIVER BIG SPRINGS COMPLEX INTERIM INSTREAM FLOW NEEDS ASSESSMENT, Prepared for the Ocean Protection Council and California Department of Fish and Wildlife, (Feb. 2013) at 4. [hereinafter Big Springs Complex Report].

[107] California Department of Water Resources: Data Exchange Center, Shasta R NR Grenada, https://cdec.water.ca.gov/webgis/?appid=cdecstation&sta=SPU. For best user experience, open using Microsoft Edge

areas for coho salmon spawning and rearing, it has the additional benefit of being essential to improving water quality downstream of the Big Springs Complex.

Therefore, at a minimum, the Water Board must establish an emergency flow standard to be met in this section of the watershed to ensure there are the adequate cold-water flows that are required by salmonids.

c. Yarnell: Applying the California Environmental Flows Framework to the Little Shasta River

Third, there is a report for the Little Shasta River tributary to the mainstem of the Shasta which applied California's environmental flow framework to identify instream flow recommendations for this tributary to the Shasta. [108] The flows recommended in this report were meant to achieve the ecological management goals for specific reaches, including improving passage and migratory conditions for adult steelhead, Chinook, and coho salmon during fall and early winter passage, and for stretches of the River important to rearing and preserving and maintain year-round, high quality cold water habitat for native fishes.[109] These flows were based on data supplied by the now inactive United States Geological Survey (USGS) gauge on the Little Shasta River but could be used to guide appropriate flows at the recently installed Little Shasta River below Big Springs Road (LSS) CDEC gauge[110] as well as the USGS Montague gauge on the main Shasta River which is currently active downstream of the confluence of the Little Shasta River with the mainstem.

The Little Shasta River historically provided high quality habitat and maintained cold, spring-fed instream flows all year long. However, agricultural diversions have resulted in instream flows that are inadequate for salmonids to migrate upstream, despite the ideal gradient, gravel bed morphology, deep pools, woody debris, undercut banks, and dense cover suitable for salmon rearing.[111] Because this tributary has extraordinary potential to provide prime salmon rearing habitat, and instream flow data is readily available, the Board must set an instream flow and temperature requirement in this region to promote the survival, growth, and recovery of salmonids.

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[108] Yarnell et al., APPLYING THE CALIFORNIA ENVIRONMENTAL FLOWS FRAMEWORK TO THE LITTLE SHASTA RIVER, (Sept. 2022).
[109] *Id.* at 9.
[110] California Data Exchange Center, LSS gauge, https://cdec.water.ca.gov/webgis/?appid=cdecstation&sta=LSS
[111] Yreka Fisheries, California Department of Fish and Wildlife, LITTLE SHASTA RIVER – A COMPENDIUM OF AVAILABLE INFORMATION (Sept. 7, 2016), at 9, https://ifrmp.net/wp-content/uploads/2017/01/Yreka-Fisheries_2016_0157_Little-Shasta-Report.pdf.

Table 7. Final Ecological flow criteria for the Little Shasta River (LOI 3). Values reflect medians and 10th – 90th percentiles in parentheses of functional flow criteria for all water year types, as well as dry, moderate, and wet year types.

Flow Component	Flow Metric	All years Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Dry Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Moderate Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Wet Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)
Fall pulse flow	Fall pulse magnitude (cfs)	38 (17-84)	29 (14-61)	38 (18-85)	48 (22-138)
	Fall pulse timing (WY day)	32 (6-61)	40 (3-61)	32 (7-61)	29 (8-57)
	Fall pulse duration (days	4 (2-8)	4 (2-8)	4 (2-8)	4 (2-8)
Wet-season baseflow	Wet-season baseflow (cfs)	21 (11-38)	18 (10-20)	21 (11-37)	29 (12-51)
	Wet-season median flow (cfs)	33 (5-69)	12 (2-40)	31 (4-68)	53 (23-123)
	Wet-season timing (WY day)	74 (23-149)	69 (15-157)	92 (24-150)	78 (33-141)
	Wet-season duration (days)	121 (59-211)	125 (64-220)	111 (59-209)	117 (57-201)
Peak flows	2-year flood magnitude (cfs)	143 (19-514)	143 (19-514)	143 (19-514)	143 (19-514)
	2-year flood duration (days)	2 (1-5)	2 (1-5)	2 (1-5)	2 (1-5)
	2-year flood frequency (# per season)	1 (1-3)	1 (1-3)	1 (1-3)	1 (1-3)
	5-year flood magnitude (cfs)	165 (115-1,000)	165 (115-1,000)	165 (115-1,000)	165 (115-1,000)
	5-year flood duration (days)	1 (1-3)	1 (1-3)	1 (1-3)	1 (1-3)
	5-year flood frequency (# per season)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)
	10-year flood magnitude (cfs)	373 (162-2,090)	373 (162-2,090)	373 (162-2,090)	373 (162-2,090)
	10-year flood duration (days)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)
	10-year flood frequency (# per season)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-2)
Flow Component	Flow Metric	All years Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Dry Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Moderate Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)	Wet Ecological Flow Criteria at LOI 3 Median (10th – 90th percentile)
Spring recession flows	Spring recession magnitude (cfs)	90 (25-308)	53 (11-213)	88 (24-293)	170 (65-465)
	Spring timing (WY day)	223 (161-251)	217 (152-251)	222 (168-250)	224 (180-250)
	Spring duration (days)	78 (41-127)	87 (39-151)	77 (41-122)	73 (42-121)
	Spring rate of change (percent)	0.056 (0.04-0.08)	0.056 (0.04-0.08)	0.056 (0.04-0.08)	0.056 (0.04-0.08)
Dry-season baseflow	Dry-season baseflow (cfs)	19 (11-30)	17 (11-27)	19 (11-30)	23 (12-42)
	Dry-season high baseflow (cfs)	21 (12-45)	16 (11-37)	21 (12-45)	27 (13-61)
	Dry-season timing (WY day)	299 (264-334)	299 (263-335)	299 (267-333)	300 (265-332)
	Dry-season duration (days)	148 (81-227)	147 (78-228)	149 (81-227)	149 (81-226)

d. Desktop Methodologies

In addition to completed studies with field components, desktop methodologies are a useful tool to evaluate and approximate instream flow requirements throughout a watershed based on known data about historic unimpaired flows and the passage and habitat requirements for salmonids. The State Water Board is no stranger to these desktop methodologies and used one to set state-wide instream flow requirements under the Cannabis Policy.[112] Further, CDFW recommended the use of such desktop studies for the Scott and the Shasta as an interim step while the process to establish permanent flow regulations is completed.[113]

The desktop method used by CDFW in its 2017 interim recommendation for the Scott River relies on four sets of data: (1) an estimate of unimpaired flows, (2) a fish passage equation prepared in support of the North Coast Instream Flow Policy, (3) spawning and rearing requirements of coho and Chinook, as detailed by regression equations, and (4) estimates of unimpaired basin wide hydrology to ensure that the flows mimic natural hydrology. Importantly, these methods identify the amount of flows, not necessarily the quality of those flows. Therefore, if the Water Board only uses these desktop methodologies, they must account for qualitative temperature flows from the spring systems in the Shasta.

First, as noted below, there are several estimates of unimpaired flows for the Shasta River the Board may use in these equations.

Second, the fish passage equation requires use of mean annual flow based on unimpaired flow estimates, minimum fish passage depth criterion in feet based on the North Coast Instream Flow Policy, and the drainage area of the watershed in square miles.[114] Each of these factors is known.

Third, CDFW pulled the spawning and rearing regression equations directly from the 2000 Hatfield and Bruce study. [115] These spawning and rearing equations were developed based on the needs of Chinook, coho, and steelhead from 127 physical habitat simulation studies conducted across North America and rely on a combination of mean annual discharge with longitude of where the flow requirements need to be met to identify appropriate flows.

Finally, the Tessmann adaption of the Tennant method simply compares the mean monthly flow to the mean annual flow and makes the required adjustments to mimic basin wide hydrology. [116] Once again, the only variable here is the estimate of unimpaired flows for the Shasta, of which there are several available studies that provide this relevant information.

While these desktop methodologies are readily available and could generate recommended necessary flows throughout the mainstem and its tributaries, modeled flows alone are insufficient to recover salmonids, as temperature "is one of the most important factors affecting the success of

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[112] State Water Resources Control Board, CANNABIS CULTIVATION POLICY STAFF REPORT (Feb. 5, 2019), at 53, https://www.waterboards.ca.gov/water_issues/programs/cannabis/docs/policy/cannabis_staff_report_clean_version.pdf.
[113] California Department of Fish and Wildlife, Interim Instream Flow Criteria for the Protection of Fishery Resources in the Scott River Watershed, Siskiyou County, (Feb. 6, 2017), at 20, available for download at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=143476 [hereinafter Interim Scott Flow Report]; CDFW Letter to the State Water Board Regarding the Petition to set Minimum Flows on the Scott River, (Jul. 20, 2023), at 3-4.
[114] Interim Scott Flow Report, *supra* note 113, at 20.
[115] Hatfield and Bruce, Predicting Salmonid Habitat-Flow Relationships for Streams from Western North America, North American Journal of Fisheries Management 20:1005-1015 (2000), at 1012.
[116] Tessmann, Environmental Assessment Technical Appendix E: Reconnaissance Elements of the Western Dakotas Region of South Dakota Study (1979), at 8.

salmonids and other aquatic life."[117] This is especially true in the Shasta River where the "degree of water extraction and tailwater return-flow in the summer can render flow volume and water temperature independent."[118] Accordingly, any instream flow requirement in the Shasta River with the goal of recovering fish communities must take into consideration temperatures as an independent variable from flows, something which these desktop methodologies are not designed to do.

Therefore, the Board must supplement any flows recommended by the use of a desktop methodology with data from the North Coast Regional Water Quality Control Board Temperature TMDL on methods to decrease temperatures in the Shasta River. There, the Regional Board recommends, "an increase of approximately 45 cfs and a total flow of approximately 112 cfs at the mouth of Big Springs Creek" as modeling has shown that this specific flow increase on its own "has the potential to decrease maximum stream temperatures by up to 2°C, including up to 1.8°C in the Shasta River canyon."[119] In this unique spring-fed system, where the required flows originate, not just their volume, is critical to recovery of the Shasta River ecosystem.

2. <u>Studies That Identify Flows and Temperatures Needed to Support Life-Cycle Functions, Habitat, and Migration Needs of Salmonids in the Shasta</u>

The purpose of instream flow requirements is to protect aquatic life. Therefore, any flow regulation must be guided by the needs of the fish and would be inherently ineffective if it ignored either the flows or temperatures salmonids need to survive. To supplement the available instream flow reports and desktop methodologies, there are a host of scientific studies that describe the flow and temperature needs of salmonids in the Shasta. This Petition summarizes the life-cycles and needs of coho and Chinook salmon in the Shasta River in Section IV.B. In addition to that summary, below is a non-exhaustive list of those studies which have observed, modeled, or compiled information on the behaviors and flow and temperature needs of these important salmonids.

Government Reports:

1. National Marine Fisheries Service, Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (*Oncorhychus kisutch*), 2014.
    - o The recovery plan describes the life needs of and threats to the SONCC coho and is designed to identify and prioritize actions to conserve and recover these species.
2. National Marine Fisheries Service, 2016 5-Year Review: Summary & Evaluation of Southern Oregon/Northern California Coast Coho Salmon, 2016.
    - o The Endangered Species Act Requires periodic review of listed species. This study reviewed all new available data on coho since originally listed in 1997.
3. CDFW Recovery Strategy for California Coho Salmon Progress Report 2004 – 2012, 2012.

[117] NCRWQCB Staff Report, *supra* note 14, at 2-5.
[118] McBain & Trush, Shasta River Instream Flow Methods and Implementation Framework, Prepared for California Trout and California Department of Fish and Game, (Mar. 27, 2009), at 3, https://ifrmp.net/wp-content/uploads/2017/01/McBain-et-al_2016_0164_Shasta-River-Instream-Flow-Methods.pdf.
[119] Letter from Valerie Quinto, Executive Officer of the North Coast Regional Water Quality Control Board, to the State Water Board Regarding the Petition for Rulemaking to Set Minimum Flows on the Scott River (Jul. 1, 2023), at 5.

- This report details the biology, trends, and threats to coho salmon and actions that should be taken to recover this threatened species.

4. Chesney et al., Annual Report: Shasta and Scott River Juvenile Salmonid Outmigrant Study, 2001-2002 Project 2a1, Prepared for California Department of Fish and Game, Jan. 2003.
   - This report summarizes the third consecutive year of trapping for juvenile steelhead, coho, and Chinook salmon on the Shasta and Scott Rivers.
5. Cohn and Chesney, Report: Shasta River Juvenile Salmonid Outmigrant Study, 2017.
   - This 17-year record spans the final collapse of all three coho salmon cohorts in the Shasta River and most importantly documents the very wide variability in the number of smolts produced per returning adult parent annually.
6. Stenhouse and Bean, Water Temperature Thresholds for Coho Salmon in a Spring-Fed River, Siskiyou County, California, Prepared for California Department of Fish and Game, Dec. 2012.
   - This study identified general water temperature thresholds for coho salmon and reexamined existing literature to identify Shasta River-specific water temperature thresholds for coho.
7. Chesney et al., Shasta River Juvenile Coho Habitat and Migration Study, Prepared for the Bureau of Reclamation, 2009
   - This study utilized field observations to study juveniles produced from Brood Year 20007 until emigration in 2009 and discusses the location and thermal characteristics of over-summering rearing habitat in the Big Springs complex and probability of survival of juvenile coho rearing and emigrating in the Shasta River.
8. CDFW, A Biological Needs Assessment for Anadromous Fish in the Shasta River, Siskiyou County, California, 1997
   - This study catalogued the life history of Chinook, coho, and steelhead in the Shasta River along with their habitat needs and habitat deficiencies and threats.
9. Jeffres et al. 2010. Longitudinal Baseline Assessment of Salmonid Habitat Characteristics of the Shasta River, March through September 2008, Prepared for the United States Bureau of Reclamation.
   - The goal of this study was to provide baseline information necessary to guide and evaluate restoration work to improve salmonid populations in the Shasta River.
10. North Coast Regional Water Quality Control Board, Staff Report for the Action Plan for the Shasta River Watershed Temperature and Total Dissolved Oxygen TMDLs, 2006.
    - This Report catalogues the Shasta River's hydrology and the needs of the salmonids that rely on the Shasta for habitat. In addition, the TMDL ran several models to identify how flow increases could increase water quality necessary to protect salmonids.

Academic Reports:

1. Null, Deas, and Lund, Flow and Water Temperature Simulation for Habitat Restoration in the Shasta River, California, 2009
   a. This study uses flow and temperature simulation and modeling to evaluate potential restoration alternatives in the Shasta and suggests that restoring and protecting cool spring-fed sources provides the most benefit for native salmon species.

2. Null and Lund, Fish Habitat Optimization to Prioritize River Restoration Decision, 2011.
    a. This is a case study in the Shasta River which applies modeling based on measured conditions in the Shasta River to determine the benefits to habitat restoration of flows and temperature by comparing different restoration actions and their costs. This study provides insight into the levels of flows and temperature enhancements that would aid fish survival in the Shasta and how to achieve those goals.
3. Christopher C. Adams; Survival and Movement Of Juvenile Coho Salmon (Oncorhynchus Kisutch) In The Shasta River, California
    a. This study catalogs the movement of juvenile coho salmon that were tagged from approximately three months after emergence to age-1 smolt outmigration. The findings of this study help to identify when and where the coho move throughout the river and their apparent rates of survival in different parts of the system.

3. Studies on Current and Unimpaired Baseline Flows of the Shasta River

Finally, important to setting instream flow requirements is an understanding of both current and unimpaired baseline flows. These unimpaired baseline flows are often used as a reference point, setting an upper limit for what types of flows are possible in the region and will provide an environmental baseline to mimic. In addition, unimpaired flows can be used to identify the flows needed to maintain geomorphologic requirements for salmonids, like adequate gravel beds for spawning. While flows are essential for temperature and passage, they also move and shape the environment, creating the habitat needed for salmonid life-cycle and recovery.

This Petition provides a summary of flows in the Shasta in IV.A.2. In addition to that summary, below is a non-exhaustive list of those studies and tools which have modeled and measured current and historic flows in the Shasta River and its tributaries:

1. Office Memo, State of California, Klamath River Basin Natural Flow, Feb 24, 1997.
    a. A 1997 DWR report estimated unimpaired flows at the Yreka gauge by measuring actual flow and adjusting for a variety of factors, including loss of water by evaporation in lake Shastina and total consumptive impairment in the Shasta valley. This report estimates total unimpaired flows for water years 1945 - 1994.
2. Deas and Null, Technical Memorandum: Year 2000 Unimpaired Shasta River Model Simulation for Flow and Water Temperature,
    a. At the request of the North Coast Regional Water Quality Control Board, a 2007 study by Deas and Null attempted to estimate unimpaired flows and temperature in the Shasta and its tributaries. It included analysis of inflow from Dwinnell Dam, Parks Creek, Big Springs, Creek, the Little Shasta River, and Yreka Creek.
3. Smitherum, H. 1926. Engineer's Report on Water Supply Available for Appropriation from Shasta River and Parks Creek Applications Numbers 3544-3555. Report to the Chief of the Division of Water Rights, State Water Resources Control Board, Sacramento, CA.
    a. This study estimated unimpaired flows above and below Parks Creek.
4. McBain & Trush, Shasta River Instream Flow Methods and Implementation Framework, Mar. 2009.
    a. This study used flow data from the Montague gauge to estimate unimpaired flows in the Shasta River.

5. California Department of Fish and Wildlife, Little Shasta River – A compendium of Available Information, Sept. 7, 2016
    a. This study gathered the historic information available on the Little Shasta River to determine how the watershed once functioned, including estimates of unimpaired flows from important spring systems.

These flow studies provide baseline information on flows and how those flows shaped the Shasta River's hydrology.

V. LEGAL FRAMEWORK

A. <u>State Water Board's Constitutional and Statutory Authority to Issue a Flow Regulation</u>

Article X section 2 of the California Constitution declares that "the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare."[120] This Constitutional provision makes clear that just because a use of water is beneficial does not necessarily make that use reasonable.[121] Instead, reasonableness is largely defined by the circumstances and what "may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need."[122]

Circumstances define reasonableness and the Water Board has clear authority to pass regulations that identify collectively unreasonable uses or methods of diversion of water and the authority to enforce those regulations.[123]

First, California courts have made clear that the Board has the authority to pass regulations that define unreasonable use or methods of diversion of water. In *California Trout v. St. Water Resources Ctrl. Bd.*, 207 Cal.App.3d 585, 625 (Cal. Ct. App. 1989), the court found that, while a determination of reasonableness can be an ad hoc inquiry, the Legislature has the power to "to enact statutes which determine the reasonable uses of water."[124] Further, the Legislature has properly delegated authority to the Water Board through Water Code section 174 to "exercise the adjudicatory and regulatory functions of the state,"[125] granting the Board "any powers . . . that may be necessary or convenient for the exercise of its duties authorized by law."[126] As the regulatory functions of the state include the ability to determine reasonable uses of water, the Board has the clear authority to make such determinations.

Not only is there clear legal authority to make such determinations, but the law also mandates the Board to act by stating that it "shall take all appropriate proceedings or actions . . . to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state."[127] To accomplish this statutory goal, the Legislature has provided the Board

[120] Cal. Const. art. 10, § 2.
[121] *Joslin v. Marin Municipal Water Dist.*, 55 Cal. Rptr. 737, 739 (Cal. Ct. App. 1966).
[122] *Light v. State Water Resources Control Bd.*, No. A138440, 11 (Cal. Ct. App. Jun. 16, 2014).
[123] *Id.*
[124] *California Trout v. St. Water Resources Ctrl. Bd.*, 207 Cal.App.3d 585, 625 (Cal. Ct. App. 1989).
[125] Cal. Wat Code § 174.
[126] Cal. Wat Code § 186, subd. (a).
[127] Cal. Wat Code § 275.

the authority to make "such reasonable rules and regulations as it may from time to time deem advisable in carrying out its powers and duties under this code."[128]

Second, the Board may enforce these regulations against all water users. While the recent court of appeal decision in *California Water Curtailment Cases* found that the Board lacked the authority to pursue enforcement actions under Water Code section 1052 for violations of priority-based curtailments by pre-1914 water rights holders, that case dealt only with authority under section 1052, not the Board's waste and unreasonable use or public trust authority.[129] Further, the Court in *Light* explicitly found that "the Board cannot require riparian users and pre-1914 appropriators to obtain a permit before making reasonable beneficial use of water does not mean the Board cannot prevent them from making unreasonable use. Any other rule would effectively read Article X, Section 2 out of the Constitution."[130]

Even more, Governor' Newsom's trailer bill regarding drought and flood streamlining shows general political support for increasing the Water Board's power to enforce regulations without relying on emergency powers, as it amended Water Code § 1831 to give the Board the authority to issue a cease-and-desist order for violating any of its regulations, not just regulations adopted pursuant to the Board's emergency authority.[131]

In addition to the Board's clear authority over surface waters, the Board has authority over groundwater that is interconnected to surface waters because these "waters, together with the surface stream supplied by them, should be considered a common supply."[132] The Board acknowledges as much on its website, stating that "the state does have the authority to take action to stop wasteful or unreasonable uses of groundwater or to stop groundwater diversions that harm state resources, such as fisheries."[133]

Together, this legal structure demonstrates that the Board has the clear authority to enact and enforce regulations limiting both surface and groundwater water withdrawals to prevent waste and unreasonable use.[134]

The Board has already made clear that it finds that diversions of water that result in severe harm to salmonids are unreasonable. Through title 23 sec. 862 of the California code of regulations, the board found that, collectively, diversions of water that caused fish stranding and mortality were an "unreasonable method of diversion and use and a violation of Water Code section 100."[135]

Further, the stated the goals of the now expired 2021-2023 Emergency Regulations and the recently adopted 2024 Emergency Regulations were to "prevent the diversion of water that would unreasonably interfere with" emergency minimum flows needed to protect Chinook, coho, and steelhead.[136]

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[128] Cal. Wat Code § 1058.
[129] Nylen et. al., Managing Water Scarcity: A Framework for Fair and Effective Water Right Curtailment in California, Berkeley Law (Apr. 2023) at 48, https://www.law.berkeley.edu/wp-content/uploads/2023/04/Managing-Water-Scarcity-Report-April2023.pdf.
[130] *Light*, *supra* note 121, at 20.
[131] Drought and Flood Streamlining Trailer Bill Language, available at https://esd.dof.ca.gov/trailer-bill/public/trailerBill/pdf/910; *See also* Cal. Wat Code § 1831(d)(4).
[132] *Hudson v. Dailey*, 156 Cal. 617, 627-28 (Cal. 1909)
[133] SWRCB, Water Rights: Frequently Asked Questions, (last visited Dec. 14, 2023), https://www.waterboards.ca.gov/waterrights/board_info/faqs.html
[134] *Light*, *supra* note 121, at 17.
[135] Cal. Code Regs. tit. 23 § 862.
[136] Cal. Code Regs. tit. 23, § 875.4 (repealed),

Accordingly, the Board has already made a water code section 1058 determination that it is "advisable in carrying out its power and duties" to prevent diversion of water which impair salmonids. Even if every individual divertor and diversion is reasonable, when the collective diversion harms these fisheries, the Board has found it appropriate to intervene to prevent such harm.

B. <u>The State Water Board's Duty to Act</u>

In addition to having the authority to act, the Board has a duty to act to protect the Public Trust and to further the goals of its Racial Equity Action Plan.

1. <u>Duty to Consider and Protect the Public Trust</u>

The Water Board has an obligation to balance California's water rights system with protection of the public trust.[137] Embracing one over the other will either breach "trust appropriations essential to the economic development of this state or deny any duty to protect or even consider the values promoted by the public trust."[138]

Yet in the Shasta River watershed, the Board has singularly embraced the appropriation system to the detriment of public trust resources, excluding the most recent emergency circumstances where the Board was given a direct command from the Governor to "ensure critical instream flows for species protection in the Klamath River."[139] This imbalanced approach to water resources in the Shasta has ignored the clear mandate and affirmative duty "to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible."[140] The State Water Board's abdication of this duty has allowed trust resources, like fall-run Chinook and coho salmon to dwindle and populations of fish that are biologically connected to the Shasta River are on the verge of extirpation.

The Water Board understood and explained its public trust obligations in Water Board Decision 1631 where it noted that a "lack of consideration to protection of public trust uses at the time that the City of Los Angeles acquired its appropriative water rights in the Mono Basin requires that this Board or the courts take a new and objective look at the water resources of the Mono Basin."[141] That same way that a lack of consideration for the public trust in Mono Basin led to avoidable ecologic harm and a need to reexamine the status quo, a lack of consideration of the public trust here has led to ecologic harm in the Shasta River. Therefore, the same obligation to "take a new and objective look" at the water resources of the Shasta River Watershed applies.

This duty applies not only to navigable waterways, but also tributaries and groundwater extractions that affect public trust uses of navigable waterways. As noted by the court in the

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https://www.waterboards.ca.gov/drought/scott_shasta_rivers/docs/2022/klamath-reg-oal-approval-2022.pdf; SWRCB, Preliminary Draft Emergency Regulation for the Scott River & Shasta River Watersheds, (Nov. 7, 2023), https://www.waterboards.ca.gov/drought/scott_shasta_rivers/docs/2023/scott-shasta-preliminary-draft-emergency-regulation-20231107.pdf.

[137] *National Audubon Society v. Superior Court*, 33 Cal.3d 419, 447 (Cal. 1983).

[138] *Id.* at 445.

[139] Governor Gavin Newsom, Proclamation of A State of Emergency Regarding Drought, (May 2021), available at https://www.gov.ca.gov/wp-content/uploads/2021/05/5.10.2021-Drought-Proclamation.pdf.

[140] *National Audubon Society, supra* note 137, at 446.

[141] SWRCB, Mono Lake Basin Water Right Decision 1631, (Sept. 28, 1994), at 31 available at https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1631.pdf.

Environmental Law Foundation v. State Water Resources Control Board, "the analysis begins and ends with whether the challenged activity harms a navigable waterway and thereby violates the public trust." [142] Here, the Shasta is a navigable waterway and surface and groundwater diversions have harmed the public trust resources of that waterway.

Accordingly, the Public Trust Doctrine compels the Board to reexamine how the use of water resources of the Shasta Valley, including both surface and groundwater extraction, have detrimentally affected the public trust. Further, the Board must protect those trust resources where feasible.

2. Racial Equity Resolution and Action Plan

In recent years, the Water Board has made strides toward changing its historic practices of ignoring and upholding racial inequity and environmental injustice. And, in 2021, it passed Resolution No. 2021-0050 to make racial equity and environmental justice a priority.[143] In that resolution, the Board recognized that California Native American Tribes continue to face barriers to accessing their cultural resources, including the redistribution of water reducing or eliminating access to traditional foods like salmon.[144] And, the resolution goes on to state that "low or non-existent instream flows, and associated water quality problems, impair or prevent water-related cultural, spiritual, and subsistence practices."[145]

To respond to these harms, the Water Board committed itself to making racial equity and environmental justice central to its work and directed its staff to develop and implement a Racial Equity Action to carry out the goals of the Resolution.

That Action Plan was developed in 2023 in collaboration with communities impacted by racial injustice. From that collaboration, one of the goals identified as an important method to combat historic racial injustice was for the Board to consider impacts to BIPOC communities, tribal beneficial uses and cultural resources when developing instream flow requirements.[146]

The Board has formally recognized the harms of low instream flows and poor water quality on California Native American Tribes and has created a plan of action to address those harms. Faced with a Petition to set instream flow requirements in the Shasta to protect culturally important resources, the Board must take this opportunity to achieve the goals it set out in the Racial Equity Action Plan and follow through on its commitments in the Racial Equity Resolution.

C. Policy Incentives for the State Water Board to Act

In addition to the Board's legal authority and duty to take action to protect salmonids in the Shasta River, there are several policy benefits of establishing permanent instream flow regulations in the Shasta River rather than relying solely on emergency authority. The Board should be proactive and reap the benefits of the notice and comment procedures put in place to ensure proper public engagement in the development of needed flow protections for the Shasta River.

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[142] *Envtl. Law Found. v. State Water Res. Control Bd.*, 26 Cal.App.5th 844, 859-60 (Cal. Ct. App. 2018).
[143] SWRCB, Resolution No. 2021-0050, Condemning Racism, Xenophobia, Bigotry, and Racial Injustce and Strengthening Commitment to Racial Equity, Diversity, Inclusion, Access, and Anti-Racism, (2021), https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2021/rs2021-0050.pdf
[144] *Id.* at 3.
[145] *Id.*
[146] SWRCB, RACIAL EQUITY ACTION PLAN (2023), at 16, https://www.waterboards.ca.gov/racial_equity/docs/racial-equity-action-plan-final-en.pdf.

1. The 2021 and 2022 Emergency Regulation Curtailments Were Effective

As this Petition has made clear, minimum flows and temperatures are essential to the protection of salmonids in the Shasta River. Increasing the quantity and quality of flows in the Shasta, therefore, is a necessary component of what is needed to protect these fish.

In August 2021 the Water Board set "emergency regulations to establish minimum drought instream flows" necessary to "protect salmon, steelhead, and other native fishes." [147] While relatively crude and focused only on a single location within the watershed, these regulations improved flows and benefited fish. Flows during the previous two years in June and July were below 20 cfs while after the regulation took effect, flows rose to a mean of nearly 50 cfs. The month the regulations came into effect, flows rose in the Shasta from 18.9 cfs to 47.4 cfs. The regulations did exactly as designed, and increased streamflow at the Yreka gauge to levels necessary to ensure survival flows for salmonids.

The table shows the minimum emergency flow levels at the Yreka gauge, with months in red representing time periods where curtailments proved necessary to meet these flow levels. While curtailments were not necessary year-round, without Board action, flows would have been insufficient to support salmonid survival during key times in the salmonids' life-cycles.

Aug 17, 2021 Emergency Minimum Flows at the Yreka Gauge in cfs											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec*
135	135	135	70	50	50	50	50	50	125	150	150/135

In August 2022, the Water Board re-adopted the flow regulations. While there was some modification to the minimum flow requirements, including a lower recommendation for winter flows, CDFW noted that there were explicit benefits from the emergency regulation (beyond just the benefits to the salmon), including an increased in awareness of the importance of flows for fish, and adaptive approach to refine minimum flows when new science became available, and the benefits of the information gathering required by the order.

Like the previous year's emergency regulations, these regulations also resulted in curtailments and an increase in flows at the Yreka gauge. Although curtailments under these regulations were similarly not required year-round, Board intervention was required to ensure that a minimal amount of water flowed in the Shasta, creating better conditions for salmonids.

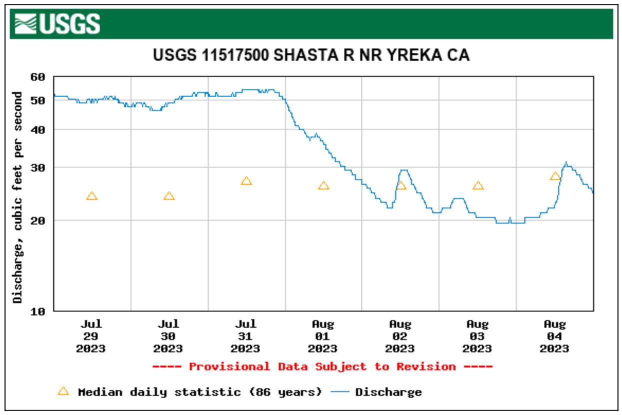
Emergency Minimum Flows at the Yreka Gauge in cfs – Aug. 2, 2022-Aug. 2, 2023													
Jan	Feb	Mar 1-24	Mar 25-31	Apr	May	Jun	Jul	Aug	Sept 1-15	Sept 16-30	Oct	Nov	Dec
125	125	125	105	70	50	50	50	50	50	75	105	125	125

However, after the emergency regulations expired on August 2nd, 2023, flows halved. The graph below shows flows dropped from greater than 50 cfs on July 31st to less than 20 cfs on August

[147] Proclamation of A State of Emergency Regarding Drought, *supra* note 138.

3rd. In addition, the graph shows that the level the flows dropped to is the historic median of the modified Shasta River absent protective regulation.[148]

The Emergency Regulations effectively increased flows in the Shasta and the extreme drop in flow levels upon their expiration clearly demonstrate that similar Board intervention is necessary to ensure a minimal level of protections for salmonids.



2. Regulating Minimum Instream Flows Only in Emergencies is Reactive and Decreases Opportunity for Stakeholder Engagement

Rather than reissuing emergency regulations year after year, the Board should take the time to properly engage stakeholders and set permanent regulations under its Waste and Unreasonable Use Authority. For the past two years, the State Water Board has been forced to promulgate emergency regulations to "protect the threatened SONCC coho salmon, the culturally and commercially significant fall-run Chinook salmon, and the culturally significant steelhead . . ."[149] Without the Board's intervention, the lack of flows threatened these important species with extinction. The Board's emergency authority has proven necessary to protect the fisheries in the Shasta River Watershed, yet that authority is designed to be a tool of last resort, inappropriate for proactive long-term management.

There are several benefits that come with promulgating non-emergency regulations under the Board's Waste and Unreasonable Use authority, including: (1) no emergency triggers, (2) deliberative public engagement, and (3) certainty for stakeholders.

First, under Water Code section 1058.5, the Board is only granted emergency regulatory authority when the Governor issues an emergency proclamation based on drought conditions or there is a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years.[150] However, issuing or maintaining an emergency drought proclamation is a potentially unpopular political decision. In 2023, as an example, interests in the Shasta River watershed mounted political pressure against the State Water Board and the Governor to rescind the drought proclamation, despite the continued need due to the ongoing and long-term effects of

[148] NWIS, Chart Demonstrating Stream Flow at the Yreka USGS Gauge in August 2023, available at https://nwis.waterdata.usgs.gov/nwis/uv/?ts_id=16562&format=img_stats&site_no=11517500&begin_date=20230729&end_date=20230804
[149] State Water Res. Control Bd., Notice of Proposed Emergency Rulemaking, at 2 (June 20, 2022), https://www.waterboards.ca.gov/drought/scott_shasta_rivers/docs/2022/notice-ssd-rulemaking-06202022.pdf.
[150] Cal. Water Code § 1058.5(a)(2).

drought.[151] Had the Governor acquiesced to this political pressure, the authority to issue necessary emergency instream flows interposed by the State Water Board would vanish.

In the alternative, only allowing instream flow regulations after the third consecutively dry year ignores the reality of California's weather whiplash. Rather than relying on emergency triggers to promulgate necessary regulations, the Board should use its authority now to better manage the Shasta River, avoiding the need to wait on the sidelines until the last possible moment.

Second, normal notice and comment rulemaking allows for better stakeholder engagement and a more thought out, deliberative process. Emergency regulations, by contrast, are meant to be expedient. Under Government Code section 11346.1, an agency is only required to provide notice of an emergency regulation to interested parties five days before submittal to the Office of Administrative Law (OAL) and, under section 11349.6, the OAL is required to allow five calendar days for interested parties to submit comments.[152] Under this emergency authority, regulations can be noticed and finalized within two weeks. In fact, there were only eighteen days between the 2021 Notice of Proposed Emergency Rulemaking to set minimum instream flows for the Scott and the publication of the approved emergency regulation by the OAL.[153] Contrast this to the public participation procedures outlined in Government Code section 11346.4, which requires at least forty-five days' notice, public comment, and the opportunity to be heard.[154]

Above and beyond the requirements of the California Administrative Procedure Act, the Board has the discretion to allow for additional time to fully engage stakeholders and ensure that its decision-making is sound. In an emergency, the Board must act fast and lacks the ability to thoroughly deliberate and engage all stakeholders.

During the latter half of 2023 after the Emergency Regulations expired, the Board took the time to engage with stakeholders on both the Scott and Shasta Rivers to create more effective curtailment regulations. That engagement took place over the course only a few months, yet the Board was able to educate itself on the relevant issues, facilitate conversations between stakeholders, and encourage collaboration toward an effective regulatory scheme. That notice and comment process for a permanent regulation will take years, not months, and the benefits of that prolonged public process cannot be understated.

Finally, permanent regulations create certainty within the regulatory landscape. Unlike emergency regulations which automatically expire after a single year,[155] permanent regulations last until they are changed using the same involved notice and comment period discussed above. This certainty allows all parties to understand how and when the Water Board will act and to plan accordingly. In addition, permanent regulations free the Water Board of the administrative burden of having to readopt emergency regulations each year after they expire.

[151] Brad Hooker, *Ranchers Feel Unfairly Tied to Drought Emergency Order*, Agri-Pulse (Apr. 5, 2023), https://www.agri-pulse.com/articles/19198-ranchers-feel-unfairly-tied-into-drought-emergency-order.
[152] Cal. Gov't Code §§ 11346.1(a)(2) and 11349.6(b).
[153] State Water Res. Control Bd., Notice of Proposed Emergency Rulemaking, at 1 (Aug. 12, 2021), https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/scott_shasta_rivers/docs/rulemaking_notice_081221.pdf; OAL, Notice of Approval of Emergency Regulatory Action, at 1 (Aug. 30, 2021), at 1, https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/scott_shasta_rivers/docs/klamath_reg_oal_approval.pdf.
[154] Cal. Gov't Code § 11346.4.
[155] Cal. Water Code § 1058.5(c).

Due to the numerous policy benefits of notice and comment rulemaking and the inadequacies of emergency regulations for long-term management, the Water Board should begin rulemaking on permanent instream flow regulations in the Shasta River immediately.

3. Permanent Instream Flow Standards Should Contain Adequate Safeguards to Ensure Recovery of Aquatic Ecosystems Beyond Just the Emergency Need for Survival

It is imperative that the Water Board not conflate the purpose of an emergency regulation with that of a permanent regulation. The purpose of an emergency regulation is to quickly prevent catastrophe, while a permanent regulation is meant to further the Water Board's obligation to comprehensively manage the State's water resources and "provide for the orderly and efficient administration of the water resources of the state."[156] This includes fulfilling the Board's mission statement to "preserve, enhance and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses . . ."[157] Accordingly, when setting a permanent instream flow requirement, the Water Board should aim to preserve and enhance fishery resources, and not merely settle for survival.

This distinction was recognized by CDFW in its June 2021 letter to Eileen Sobeck, where the Department noted that the emergency flow recommendations "are not intended to set the stage for long-term management considerations, nor should they be construed to provide adequate protections for salmonids over extended periods of time." Instead, the flow recommendations' sole purpose was "to enable salmonids in these rivers to survive this dire situation."[158] The fact that these flow levels were insufficient for anything other than immediate, short-term survival made them only appropriate for emergency regulations. The notice for the emergency flow regulations even noted as much, stating that "emergency regulation is necessary to provide for *bare minimum fisheries flows* in Scott and Shasta watersheds" (emphasis added).[159]

Contrast this short-term, bare minimum approach to the goals of the 2017 interim flows report created by CDFW which was developed to "identify instream flow needs for the long-term protection, maintenance and proper stewardship of fish and wildlife resources."[160] The goal of these studies, as noted by Public Resources Code section 10001, is "to assure the continued viability of stream-related fish and wildlife resources," not just prevent their extinction.[161]

For these reasons, the goal of these regulations should not be to develop a permanent version of the emergency regulations. Not only will this prove insufficient, but it also conflates the purpose of the Board's emergency authority with its non-emergency authority. Rather, the Board should aim to develop a long-term approach toward managing the water resources in the Shasta River.

[156] Cal. Water Code § 174(a).
[157] State Water Res. Control Bd., *About the Water Board*, https://www.waterboards.ca.gov/about_us/ (Mar. 6, 2023).
[158] CDFW, Letter to Eileen Sobeck regarding Minimum Flow Recommendations for the Shasta and Scott Rivers to Inform the 2021 Drought Emergency Regulations, at 1. https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/scott_shasta_rivers/docs/swb_2021_shasta_scott_drought_emergency_final.pdf
[159] SWRCB, Notice of Proposed Emergency Rulemaking (June 20, 2022), at 3, https://www.waterboards.ca.gov/drought/scott_shasta_rivers/docs/2022/notice-ssd-rulemaking-06202022.pdf.
[160] Interim Scott Flow Report, *supra* note 112, at 4.
[161] Cal. Pub. Res. Code § 10001.

VI. REQUEST FOR ACTION

We request the Board to begin the process of establishing permanent instream flow regulations for the Shasta Watershed and to formally adopt a resolution committing itself to this course of action. In addition, any such regulation should contain the following elements:

1. A declaration that the policy goal of the regulation is to recover communities of coho, Chinook, and steelhead trout throughout the Shasta River and its tributaries.

Setting a policy goal within the regulation will ensure that the Board has a lodestar to evaluate the effectiveness of its actions. That goal must be to create flows and water quality conditions sufficient for the recovery of salmonids in the Shasta. Such a goal is already established in law for SONCC Coho salmon by the federal and California Endangered Species Acts, and the Board can use the periodic reviews from NMFS and CDFW to help evaluate its progress towards its stated goal and the adequacy of the flow regime adopted by the Board.

2. An adaptive management approach which requires the Board to periodically reexamine whether flows are recovered to its stated goal, and if not, to adjust instream flow requirement accordingly.

The Shasta River has been studied for decades, but its complex spring system and groundwater surface water interactions are not yet fully understood, and it will take many more years and many more taxpayer dollars before scientists have satisfactorily modeled everything. If no action is taken while those studies are conducted, fish populations will continue to decline. The Board should act now while giving itself the ability to reexamine and refine its actions.

Therefore, any instream flow regulations in the Shasta should include an obligation for the Board to periodically reexamine and update the regulations as new science and data emerges and in response to trends in fish population numbers. The Board is well versed in such practices, as it periodically reviews and updates the state's General NPDES Permit. Those permits require periodic updating as new data and technologies are developed, so should this regulation.

3. Reporting requirements to better understand surface and groundwater use in the Shasta River Watershed.

While there is more than sufficient data to set legally defensible instream flow regulations today, for the Board to effectively refine its regulations, better and more complete data is needed. As such, data supporting water use in the Shasta River Watershed, including the number of surface water and groundwater diversions, the respective amounts of water diverted and pumped by each such diversion, and the timing of those diversions, are key to refining an instream flow regulation.

4. Measures of flow and temperature to be met at various gauges at key locations and times in the Shasta River including the Shasta Canyon, in the Little Shasta River, and at the Big Springs Complex.

The science clearly demonstrates that both flows and cold temperatures are necessary for salmonid populations to survive. But due to the stark differences in hot-tail water returns and cold spring flow, flow and temperature are not necessarily connected in the Shasta.

Therefore, the Board should tailor the regulations to ensure that temperatures are met at key locations throughout the Shasta River. This requires consideration of, at a minimum, adequate flows through the Shasta River Canyon, cold-water spring-flow from the Big Springs Complex, which provides a majority of the base flow quantity and cold temperatures quality for the Shasta during irrigation season, and ample flows within the Little Shasta River to open prime rearing and spawning habitat. This all should be coupled with compliance with the TMDL identified timeline for tailwater elimination.

VII. CONCLUSION

For too long, the State Water Board has failed in its duty to balance the Public Trust resources of the Shasta River against the appropriative water system. That imbalance has led to the erosion of one of the most important salmonid rearing habitats in the State, harming the Public Trust resources, tribal cultural resources, and tribal and coastal communities and livelihoods. While re-adopting the original emergency regulations is a step in the right direction, the Board has failed to take proactive measures to avoid this devastation and cannot resign itself now to only acting to maintain the already degraded status quo.

The purpose of instream flow regulation is to protect fish. Therefore, the guiding principle behind permanent regulations must be to set the flows that salmonids need to survive, recover, and thrive. This goal must be at the heart of instream flow regulations if the Board truly plans to protect Public Trust Resources and accomplish the goals of its Racial Equity Action Plan. There is ample data to support this goal, and the Board has everything it needs to act effectively.

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