STATE WATER RESOURCES CONTROL BOARD

In the Matter of:)

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Workshop)

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WORKSHOP REGARDING EMERGENCY REGULATION EFFORTS IN THE SCOTT RIVER AND SHASTA RIVER WATERSHEDS

COASTAL HEARING ROOM - SECOND FLOOR

JOE SERNA JR. - CalEPA BUILDING

1001 I STREET

SACRAMENTO, CA

HYBRID VIA IN-PERSON AND ZOOM

FRIDAY, OCTOBER 6, 2023

9:00 A.M.

Reported by:
Elise Hicks

APPEARANCES

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Jeff Abrams, NOAA, National Marine Fisheries Service

Michael Harris, California Department of Fish and Wildlife

Nathanial Kane, on behalf of Karuk Tribe

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Michael Belchik, Yurok Tribe

APPEARANCES

PRESENTERS (cont.)

Sarah Schaefer, Quartz Valley Indian Tribe

Sari Sommarstrom

Gary Black, Shasta Producers

Elias Scott, North Coast Regional Water Quality Control Board

Thomas Harter, UC Davis

Bronwen Stanford, The Nature Conservancy

Chris Voigt, formerly with Siskiyou RCD

Eli Asarian, Riverbend Science

Theodora Johnson, Scott Valley Agricultural Water Alliance

PUBLIC COMMENT

Brandon Fawaz

Laura Foglia

Ryan Walker

Cody Phillips, California Coastkeeper

David Webb, Friend of Shasta River

Angelina Cook, California Sportfishing Protection Alliance

Kasil Willie, Save California Salmon

Nick Joslin, Mount Shasta Bioregional Ecology Center

Konrad Risher, Water Climate Trust

APPEARANCES

PUBLIC COMMENT (cont.)

Regina Chichizzola, Save California Salmon

Glen Spain, PCFAA/IFR

Amber Jamieson, Environmental Protection Information Center

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P R O C E E D I N G S

9:05 a.m.

FRIDAY, OCTOBER 6, 2023

MR. EKDAHL: All right, let's go ahead and get started, if we can get everyone to take their seats. And we'll kick off the webinar/in-person meeting.

So the main thing I'm going to do, the room is a little bit of an interesting setup. We have a couple of panels. We didn't want to sit up on the dais and kind of look down at everyone. But as a result now, we look behind this bench. So I'm going to stand up while I initially talk, and I'll run through a little bit of introductions and kick things off, give a little bit of a layout, and just talk through the mechanics of how we're going to work through the day.

First off, my name is Erik Ekdahl. I'm the Deputy Director for the Division of Water Rights.

An immense thank you for those who are participating today, those both in the room, as well as on our Zoom platform. I believe we have a number of attendees virtually as well. It is a long drive from the Scott and Shasta Watersheds down and from other watersheds in the Klamath. So any amount of participation is immensely appreciated, and we look forward to hearing the comments and the input from those that are with us today.

A couple of other introductions. I'm joined by a number of Board staff. I may not introduce everybody, but I want to run through those that are kind of sitting up here.

We have Zack Zwhalen, who's a Senior Engineer -- Environmental Scientist, I should know that, in the Division of Water Rights, overseeing the Water Action Plan Unit in the Division of Water Rights. We have Erin Ragazzi, an Assistant Deputy Director, who oversees mainstream flows, cannabis, admin, and FERC, and a bunch of really, really hard things. We have Marianna Aue, who's an attorney with our Office of Chief Counsel. And we have Philip Dutton, who is a section manager and engineer for our Supply Demand Assessment Unit and the Water Action Plan. So we have a number of staff.

We also have staff from both the Water Action Plan and Supply Demand Units here assisting us today, both in the room and virtually. And if you all want to raise your hands and at least wave, if you see these folks and you have a question, don't hesitate to reach out.

We also have a number of other Water Rights staff in the room. We have Julie Rizzardo, another Assistant Deputy Director, and Roberto Cervantes, the Section Chief for our Enforcement Unit.

On top of that, we also have some Board members.

And we have Board Member Laurel Firestone.

Do you want to raise your hand and say hi?

We may be joined by other Board members throughout the day, and we may also be joined by some Board members virtually, but they won't be providing comments. This isn't a decision-making venue. And so we're trying to adhere to the Open Meetings Act requirements, and so this won't be kind of an open dialogue or a forum where we're vetting or evaluating a decision point.

Let's see. We also have Eric Oppenheimer, Chief Deputy Director for the entire Water Board. And he has a lot of other very difficult roles and responsibilities, as well as receives water rights, administrative services, and some other work, Cigna, too.

Let's see, some logistic.

Let's go to the next slide.

So what is the workshop purpose? We want to solicit questions and get some information about potential emergency regulations for flows in the Scott and Shasta Rivers.

The speakers, we have a number of panels today, and we'll go through those logistics in a moment. We have speakers invited by the State Water Board to answer specific questions related to state of the fisheries, emergency regulation flows, and groundwater Local

Cooperative Solutions. This is to exchange information. The Board members won't be asking questions, but staff will be. And so those sitting up here will be maybe asking some follow-up questions to the panelists. The idea is to exchange information and to get to the point of some very specific questions. We don't expect full resolution or answers on any of them by any means, but we want to have the data presented and then know what questions we might need to ask later on.

This is also not going to be kind of an open Q&A from the public, but there is opportunity for public comment. We're going to go through the panels, and if there is time at the end following the Q&A from Board staff, after each panel section, we will turn it --- open it to open public comments where people are able to kind of come up and make observations or comments about what they've just heard.

There will also be a longer block of time at the end of the day, which is what everyone wants to wait around for, four o'clock on a Friday afternoon, after a long, long week for open public comment. But we will stay until all of the public comments are heard, and we are going to, at the same time then, manage the clock aggressively.

What does that mean? That means for both the panelists and public comments, we're going to keep to a

pretty strict time limit. The panelists have been informed of, you know, their timeframes and their time windows, and

I'm going to be the clock keeper, and I will reserve the right to cut people off if we need to. I don't think we're going to need to but, you know, we want to make sure that everyone gets an opportunity to speak.

And just being respectful of all the other panelists who are keeping on time and commenters who are keeping on time, we're going to try and keep people moving pretty briskly. With that, we will have clocks. We'll also kind of interrupt people to give them a heads up you have X minutes left. I might not cut you off right at your exact time, but pretty close to it.

So just a request. If you're a panelist and you have a lot of slides that have been shown before, maps and figures, locations, you know, maybe move through those more quickly, and we'll see how quickly we can move through things to preserve those comment times where we can.

We will take a break for lunch, as well, and move forward.

We do also have translation services in Hmong for the public comment session. So we'll put that information into the chat. And we'll also look for the kind of information in Hmong, I think, that we'll also be able to put in the chat. So we'll put that up on the slides, too,

in a little bit. This is kind of a late breaking development, but we are working to make that information accessible, and we should have it momentarily if not already. And a huge thanks to Robert and Marina and OPP for working really quickly to get that done.

Let's see what else? Next slide.

This is a public workshop. We're here to listen.

A couple of ground rules. Listen actively with an open mind, stay on point and on time, and mute your microphone when you're not speaking. Otherwise, we will get some pretty gnarly echoes throughout this room and onto the Zoom platform.

Next slide, please.

Logistics. We do have to go through some of the fire safety and just other general information. If we do hear a fire alarm, we are required to vacate this room, go downstairs, and I believe we have to go out into Cesar Chavez Park until the all-clear is sounded.

Restrooms. If you go out these doors and this direction towards the giant glass sculpture, if you kind of head around the corner, there are restroom facilities there.

How to provide comments. Virtually, if you're listening in on the Zoom platform, you can fill out virtual speaker cards linked to the workshop notice, or if you're

in person, there's a QR code at the back of the room and a form to fill out.

So if people do have comments and you aren't able, if you're in the room and you aren't able to figure it out, please, again, contact one of these folks that raised their hands earlier and they will definitely help you out. And in the Zoom platform, if you can't figure it out, please send a -- I think we can send a chat and one of the staff -- or an email, email, actually, would be even better and we'll get back to you pretty quickly.

And let's see, if you do have questions for the panelists as you're listening in, we encourage you to submit those questions to the email, scottshastadrought@waterBoards.ca.gov. You don't need to capitalize it, it is capitalization agnostic, but the comments will go to Board staff and we'll compile them.

We may not get to every question, but we'll try to thread those in as best we can. At the end of the meeting, we will compile all of the questions that we get. We may combine some of them and post them without attribution. So we'll just have a list of questions that were brought up at the meeting and we will be able to use these going forward if we have future workshops or events and other discussions.

And lastly, the meeting is being transcribed. So

at the end, we will be able to transcribe it and post it online, I think, as a recording.

Next slide, please.

Today's schedule. We emailed questions out to parties on September 29th. There are questions -- or copies of that, I think, out front and in the back of the room if people don't have those immediately accessible. We're looking into four main sections, State of the Fisheries is our first panel, Emergency Flows is the second panel, Groundwater Local Cooperative Solutions is the third, and a discussion on Data is the fourth.

Each section and topic will include presentations from invited speakers, responding to specific questions that were proposed by Board staff. There will be opportunity for additional questions from staff and then, if there's time again, opportunity for comments with that section at the end, specifically reserved for additional comments at the end of the day.

Next slide.

And so with that, I would like to kick off our first panel. What we're asking folks to do is if you're on this panel, please come up to the seats here. It will be a little bit close quarters where you'll have to look us directly in the eyes as you make your presentation, but sit up here, turn the mics on and we'll get things started.

I think our first set of panelists, we have representatives from the California Department of Fish and Wildlife and National Marine Fisheries Service. We have Councilman Troy Hockaday from the Karuk Tribe, we have Michael Belchik from the -- representing the Yurok Tribe, and Sarah Schaefer representing the Quartz Valley Indian Tribe as well.

And with that, let's get things started. And we do have -- I believe some of these participants are virtual. So if you are in person, you might be the -- and let's go to the next slide.

So these are the questions that were posed to the panelists. The first question, please describe the state of the fisheries in the Scott River and Shasta River watersheds with a focus on coho, Chinook and steelhead. The second question is: What would healthy fish numbers be for these watersheds? And third, how important are Scott River and Shasta River watersheds for coho, Chinook and steelhead populations to the Klamath Basin populations as a whole?

And so with that, let's go to the next slide, and we'll turn it over to Michael Harris from the California Department of Fish and Wildlife, who is here in person.

MR. HARRIS: Was NOAA going to go first or I go first?

UNIDENTIFIED FEMALE: Next slide.

MR. ABRAMS: Next slide, please.

MR. EKDAHL: Next slide, please.

MR. ABRAMS: Okay. Great.

MR. EKDAHL: So I'll turn this over then to Jeff Abrams, fisheries biologist for the Klamath Branch. And if you're online, you should be able to unmute.

MR. ABRAMS: Hi. Is my audio okay?

MR. EKDAHL: Yes, we can hear you.

MR. ABRAMS: Great. Good morning. My name is Jeff Abrams, and I'm a fisheries biologist with NOAA Fisheries Klamath branch. I'm located in Arcata. NOAA Fisheries is responsible for the stewardship of the nation's marine resources and their habitat, which includes freshwater species that spend time in the ocean, such as salmonids.

Next slide, please.

Within my branch, one major responsibility is implementation of the Federal Endangered Species Act, or ESA. Under the ESA, Congress requires us to examine populations to determine if they fit the definition for listing as either threatened or endangered. The listable unit for coho and Chinook salmon is the Evolutionarily Significant Unit, or ESU, and the listable unit for steelhead is the Distinct Population Segment, or DPS. Coho

in the Scott and Shasta are part of the Southern Oregon/Northern California Coastal, or SONC, ESU, which is the dark blue polygon on this map of West Coast coho ESUs. Chinook in the Scotton Shasta are part of the Upper Klamath Trinity River, or UKTR ESU, and steelhead are part of the Klamath Mountain Province DPS. I'm going to discuss all three species, beginning with coho.

Next slide, please.

SONC coho salmon are comprised of coho populations from the Elk River in Oregon to the Mattole River in California. SONC coho salmon were first listed as threatened in 1997 and reaffirmed in 2005 and 2014.

To make this determination, NMFS evaluates the extinction risk for the ESU, which is done in part by evaluating four viable salmon and population parameters, abundance, productivity, which is population growth rate, spatial structure, which includes connectivity, and diversity, which includes life history and genetics. These four parameters are useful because they are measurable and are key indicators of species viability and function as reasonable predictors of extinction risk.

These four parameters are also central to our consultation process when evaluating the effects of proposed actions on listed species.

Next slide, please.

In 2014, we completed a final Recovery Plan for SONC coho salmon. The goal of this plan is to recover the SONC coho salmon to the point where the species can be removed from the list. A recovered SONC coho salmon ESU will be naturally self-sustaining, and the factors that cause it to be listed will be sufficiently reduced to allow it to persist over time.

The SONC coho ESU is made up of 40 populations and seven diversity strata, and extinction risk is determined for each population individually and for the ESU as a whole. This map shows the independent SONC coho salmon populations, including the Scott and Shasta, all of which are either at high or moderate risk of extinction.

Next slide.

In order to understand the key threats and stressors identified in the Recovery Plan, it is necessary to understand the needs of the species. Salmon are complex in that they use different habitats according to different life stages. All life stages are equally important for fish to complete their life cycle.

Coho salmon spend over a year in fresh water, which means that they require both over-summer and over-winter rearing habitat. A recovered population requires sufficient abundance, productivity, spatial structure, and diversity, which requires a patchwork of suitable habitat

seasonally.

The availability of suitable habitat is also dependent on access. It is critical that salmon have a functioning migratory corridor to access the different habitat types throughout their life cycle. This is true for all salmon, not just coho.

Next slide.

Which brings us to the role of the Scott and Shasta in the Recovery Plan. Again, there are seven diversity strata in the ESU. The interior climate diversity stratum is outlined here in blue. The Scott and Shasta populations are two of the five populations within the interior climate diversity stratum. Although the Recovery Plan describes how all four VSB parameters, abundance, productivity, spatial structure, and diversity need to be addressed.

To achieve recovery, the Recovery Plan does identify recovery criteria in terms of abundance of spawners. For the Shasta River, that number is 4,700. Mike's going to talk more about abundance estimates later, and I don't want to steal his thunder, but I will highlight that 53 or less adult coho salmon have been observed returning to the Shasta River each year since 2014.

For the Scott River, the recovery criteria targets 6,500 spawners, and annual returns are well below

that, placing the Scott River population at moderate risk of extinction.

Next slide.

Again, the 2014 Recovery Plan identifies key threats for each population for the ESU. For the Shasta and Scott Rivers, the key limiting factors for recovery are poor hydrologic function, which includes seasonal pass concerns and unsuitable habitat conditions due to water quality. Since the 2014 Recovery Plan was published, the hydrologic function has continued to degrade, particularly in the Scott, where periods of disconnection has increased over time, creating significant fish passage barriers.

Next slide.

The 2014 Recovery Plan also identifies a depensation threshold for each population. Depensatory effects are problems with successful reproduction that occur when the overall abundance is too low, such as spawners being too scarce to find each other. The depensation threshold is identified as the number of spawners needed to avoid depensatory effects. An independent population with spawner numbers below the depensation threshold is at a high risk of extinction.

Depensation threshold for the Shasta River is 144 spawners, but again, 53 adult coho or less have been recorded returning to the Shasta River each year since

2014.

Next slide.

In addition to coho salmon, we have stewardship responsibilities for Chinook and steelhead. I mentioned earlier that Chinook salmon in the Scott and Shasta Rivers are part of the UKTR ESU. This ESU is comprised of all spring-run and fall-run populations upstream of the confluence of the Klamath and Trinity Rivers. We completed a status review for the ESU in 1998 to determine that the ESU did not warrant listing. We received a petition to list UKTR Chinook salmon in 2011, the focus on the Springhorn component of the ESU, but we determined that the Springhorn component did not constitute an ESU and therefore was not listable unit.

However, in 2017, we received another petition to either list the Springhorn component of the ESU or list the entire ESU. The result of that petition is still pending, so the ESU does not warrant ESA protection. However, we do have to consider the status of the UKTR Chinook when we complete consultations because UKTR Chinook are a known food source for southern resident killer whales, which are ESA listed as threatened -- as, sorry, endangered.

Next slide.

In addition, we have responsibilities under the Magnuson-Stevens Act, or MSA. The MSA established new

requirements to identify and protect essential fish habitat, or EFH. EFH for Coho salmon and Chinook salmon in the Klamath Basin includes the Scott and Shasta Rivers where Chinook salmon EFH consists of four major components, spawning and incubation, juvenile rearing, juvenile migration corridors, and adult migration corridors and holding habitat.

On top of our ESA and MSA responsibilities, NOAA has tribal trust responsibilities. The relationship between the United States government and federally recognized tribes is one of government to government. Tribal tribes are co-managers of the salmon and steelhead fisheries in partnership with the state federal government. Chinook fisheries throughout California and parts of Oregon, including the ocean fisheries, and the Klamath tribal fisheries, were closed in 2023 due in part to insufficient abundance of Klamath Fall Chinook.

The Scott River population of Chinook salmon represents about 9 percent of the total Klamath Basin escapement on average, with some years representing as high as 21 percent of the total Klamath escapement. However, in four of the last eight years, Chinook were excluded from preferred spawning habitat in the Scott Valley due to low flow barriers. Over the last eight years, the population has only averaged about 1,600 adults. This sharp decline

represents a trajectory toward extirpation of Chinook in the Scott.

Next slide.

And finally, steelhead. KMP steelhead consists of both winter and summer run from the Elk River in Oregon to the Klamath River. ESA status is currently not listed. However, while the steelhead in the DPS are not listed, we still have tribal trust responsibilities to maintain their populations.

In addition, summer run steelhead in nearby populations have been the focus of recent petitions similar to the focus of petitions on the Springhorn component of the UKTR Chinook salmon ESU.

Next slide.

Further, of the six steelhead DPSs recognized in California, only KMP steelhead are not currently listed with populations tending to be at greater risk of extinction as you move south. The KMP steelhead is the southernmost DPS of steelhead along the west coast that isn't listed. The goal of the ESA is to recover species to a point that they no longer need to be listed. So the goal of basin managers should be to maintain populations such that they don't need to be listed in the first place.

Next slide.

So in conclusion, the primary stressors to salmon

and steelhead in the Scott and Shasta Rivers are altered hydrology and poor water quality. Low flow barriers in the Scott River degrade the migratory corridor and limit spatial distribution and diversity of life history strategies. The Shasta River coho population, which is predominantly impacted by poor water quality, is at a high risk of extinction in the near future.

Therefore, NMFS recommends flows return to a more natural hydrograph that aligns with life history requirements and supports our VSP parameters for healthy coho, Chinook, and steelhead populations. The minimum flow-setting process will result in improved water quality and address passage issues in the Scott and Shasta Rivers.

So NMFS is supportive of the petition asking the State Water Board to develop minimum in-stream flows. We are working collaboratively with CDFW to identify opportunities that will encourage water conservation and augmentation projects by private landowners. Although some short-term voluntary actions can provide minimal benefits to in-stream flows, for example, water leasing programs, long-term rules for basin-wide curtailments of groundwater pumping, and surface diversion are necessary to provide minimum flows for salmon and rearing, migration, and spawning.

That is all I had. I think the next slide is

Mike's.

MR. HARRIS: All right. Next slide, please.

Hi, I'm Michael Harris, Environmental Program Manager for the Klamath Watershed Program from the California Department of Fish and Wildlife.

I'm starting today with the Chinook salmon population estimates for the period of record on the Scott River. As you may be aware, the projected number of Chinook salmon adults expected to return to the Klamath Basin in 2023 is the third lowest on record. This has contributed to recent decisions by state and federal and tribal fisheries managers to close the California Ocean and River fisheries in 2023. This is the second time in three years for the Klamath Basin.

Average fall and Chinook salmon returns from 2015 to 2020 for the Klamath Basin population is 43 percent below the historical average. For the same time period on the Scott River, we are seeing a 65 percent reduction from the historical average.

As noted in previous presentations, Chinook salmon are declining in the Scott River faster than the Klamath Basin as a whole. You can see that there are below average returns in seven straight years and 15 of the last 20. This is not a good trend. And I think that everybody here in the room today agrees that this is something that

we need to work on.

Next slide, please.

Chinook salmon are migrating to spawning beds in the Scott River during the month of September and reductions in Scott River flows for the month of September have been occurring since 1978. I'll cover more of that in my regs presentation. This drop in flows during migration is concerning because passage into the Scott Valley for spawning is critical for the protection of reds, salmon egg nests during high flows. The Scott River flow velocities are much higher in the canyon than in the valley, which can lead to red scour during high flow events resulting in lower survival if fish cannot get out of the canyon, adults.

I've included the graph on the left that demonstrates the difficulty Chinook are experiencing accessing the valley over the past 14 years. There's a very clear trend between flows and Valley access over the period of record, 2008 to date. The map on the right depicts the video weir located at mile 18. It's the big black dot up there. This is the point used for this analysis since this location is close to the valley, which opens upstream of mile 21.

The blue line on the graph is the average flow at the Fort Jones gauge from October 16th to October 31st for

each year. The red bars are the percentage of Chinook salmon they were able to access the Scott Valley. You can see, last year we had 93 percent of fall run Chinook salmon spawn below the video weir on the Scott River due to insignificant flows to provide passage.

We had notable flow increases on westside tributaries, but the main stem flows were still very low. We presume this to be because surface water flow was fully curtailed, which is the dominant irrigation method on the tributaries, while the main stem is dominated by groundwater pumping, which was curtailed at 30 percent. This was followed by a considerable amount of snow accumulation this winter, so spring runoff rates were quite high.

CDFW rotary screw trapping crews trapped an unusually high amount of Chinook sac fry this spring indicating that red scour had occurred, presumably from the Scott River Canyon. Sac fry salmon do not leave the red until their sacs have been absorbed. These are delicate immature fish that need protection. They have not formed their mouths to eat yet. And subjecting reds to high canyon flows is forcing sac fry out to high river velocity and flow conditions that they are not biologically prepared for.

Another point we would like to make here is that,

also, a portion of the population may be passing the video weir at low flows. It's really the bulk of the population that needs to pass to ensure the coho has the best chance at producing out migrating schools.

Next slide, please.

This slide illustrates the coho salmon minimum escapement estimates on the Scott River since 2007. We are unable to operate the video weir doing high flows, we typically have to pull the weir for safety reasons around the end of December, so we refer to these estimates as the minimum escapement numbers.

Previous spawning ground surveys have indicated, though, that the majority of the in-migrating adult coho population has passed the video weir before the end of December. We refer to each annual run as a cohort or brood year because they have a very high, a very consistent life history of over-summering one year in freshwater before going to the ocean. They then come back to spawn in Scott River at year three.

We color coded the cohorts to show you the last five generations of each cohort. The cohorts displayed in blue and red bars have been steadily increasing. Credit should be given to all those in and around the community that have made recovery of the species a commitment to restoration and efficiency actions.

The cohorts displayed in black demonstrates that the Scott River has the capacity to support even larger numbers of adult spawning. The reason we remain concerned is evident in what you see in the black cohort. You can see we lost approximately 90 percent of that cohort during the droughts of 2014 and 2015.

That cohort is now making a comeback, but you can see that without supportive flows, we can set all the hard work back by several generations. For this reason, coho salmon in the Scott remain a moderate extinction risk and deserve to be treated as such.

Next slide, please.

The Shasta River adult salmon population has been about 2,000 fish below the 45-year average in the last two of the three drought years. Run sizes have ranged from a high of 29,544 in 2012 to 533 in 1990. The Shasta has been documented as highly productive salmon stream. In 1935, the Fish County facility operated near the mouth, documented a run of over 75,000 fish.

With the exception of the 1980s, the Shasta River follows the trend of the Klamath Basin indicating similar survival rates. Historically, these fish contributed 12 percent of the Klamath Basin fall run Chinook population. In the past five years, that percentage has increased to 21 percent, stressing the importance of protecting this

population.

Rails (phonetic), in 1951, described the impacts to Chinook salmon in the Shasta River in a detailed report. Rails reported 81,844 adult Chinook returning to the Shasta in 1931. He noted, quote,

> "This may be the greatest number of Chinook that has ever been known to enter a minor California stream. It should also be noted that the Shasta River Chinook population has the longest uninterrupted series of salmon counts of any stream in California."

These statements only echo the importance of the Chinook salmon population on the Shasta. It has been recognized that the system has an incomparable production capacity for a stream this size in the entire state.

Next slide, please.

This slide illustrates the coho Salmon minimum escapement estimates on the Shasta River since 1978. We are unable, once again, to operate the video weir during high flows. So, once again, it is pulled at the end of December and, once again, these are minimum escapement numbers. Previous spawning ground surveys -- excuse me. And also, 1983 to 2001 can't be compared since the video weir was pulled on November 12th.

On the Shasta River, the adult population of coho Salmon is a very low number with an average of 43 to 50

individuals returning since 2014. The number of coho spawners needed in the Shasta Valley to avoid depensation, a condition where very low population numbers increase the risk of extinction through multiple factors, is 531 fish, which you can see in that orange bar there in the graphic. As you can see, the average of 43 fish is well below this threshold. This is of serious concern to the department, the agricultural community, community members, basin fisheries managers, as well as the tribal and commercial fishery communities.

Next slide, please.

The Scott and Shasta Rivers also serve as a valuable habitat for steelhead. CDFW-operated video weirs have enabled annual counts of adult steelhead returning to the Scott and Shasta Rivers to spawn and have been annually counting them since 2007 and 2005 respectively. Those become too high, once again, to operate the weir, so these are minimum numbers of returns and not based on population estimates.

Steelhead adults migrating through the Scott River Fish County Facility from 2007 to '21 are depicted in orange. Steelhead from the Shasta River are depicted in blue. These numbers are very low compared to historic population estimates. For instance, the 1965 California Fish and Wildlife Plan estimated the Scott River steelhead

annual adult spawner escapement to be 5,000 fish. Schneider reported that in 1933, 8,400 steelhead passed through the counting facility in the Shasta Canyon.

Habitat degradation has been recognized as its primary driver in the declines of California steelhead populations. Since the 1965 steelhead estimate, the number of groundwater wells has quadrupled and the impact of surface flows is evident in the hydrograph. Construction of Dwinnell Reservoir in 1983 has also blocked 19 miles -- 18 miles of spawning and rearing habitat in the Shasta.

Next slide, please.

In summary, Scott River populations are a fraction of what they were a hundred years ago. While coho salmon numbers are showing improvement in some brood years, the population numbers are still very low. Chinook salmon populations are getting lower. Access to the valley for spawning is becoming more and more of an issue as we continue to experience declines in the snowpack and water demands remain static. The system has become fragmented due to a lack of surface flow connectivity, leaving isolated habitats during base flows.

Fish populations in the Shasta River are in a similar situation. Although Chinook salmon appear to be doing better, coho salmon extinction risk remains high. Access to Valley habitat for spawning is of concern. And

attempts over the year to purchase water have occurred in an effort to bolster those flows. Summertime base flow habitat conditions for fish are also fragmented in the Shasta due to water quality barriers such as temperature and dissolved oxygen.

Many of these aquatic conditions have been presented themselves for a number of decades and the fish population estimates indicate these are not favorable conditions to restoring the species.

Thank you.

MR. EKDAHL: Thank you both. We're going to hold any questions until the end of all of the panelists.

And so with that, let's move on to the next slide.

It looks like Councilmember Hockaday is not on the Zoom platform and hasn't been in contact with us yet, so we're going to move on to Mike Belchik.

And let's go to the next slide.

And the question posed here is, what is the state of the Klamath-specific fisheries and how has that status affected your tribe? Please provide any information on recent trends, life history, or other items you think are relevant.

And the next slide.

All right, and let's turn it over to Mr. Belchik,

who I believe is on the Zoom platform.

MR. BELCHIK: Good morning. Can you hear me?

MR. EKDAHL: We can, yes.

MR. BELCHIK: Okay. Great. Hello. My name is Michael Belchik and I'm sorry I can't be there in person, but this is the next best thing these days; right? So I'm going to be talking today about the status of the Klamath fishery, the Yurok Tribe and its fishery and what's been happening.

Next slide, please.

The Yurok Tribe, for whom I've worked for, for over 25 years, has authorized me to present this today. And I want to give you a picture of what's been happening here.

So you see various stages of fishing in the background here. The Yurok Tribe is the largest tribe in California with over 6,400 tribal members and has been fishing and living in the lower Klamath since time immemorial. Tribal cultural leaders would say the beginning of time. I think it's at least 5,000-plus years. And in this time the tribe fishes for and manages the fishery for multiple different species, as you see here.

Next slide, please.

The Yurok Tribe are stewards of the river and this has been since time immemorial. And that means that

they care-take the river not only on the reservation and where they live and manage their fishery, but have a responsibility to restore the fish and fisheries and habitat throughout the Klamath basin.

And you can see now in modern times how that has played out with the Yurok Tribe undertaking multiple large restoration efforts and building partnerships and extending, our interests go wherever the fish go. And so that means the Shasta and Scott are local watersheds and they are important to the Yurok Tribe. And the tribe is engaged in multiple large scale efforts all the way from dam removal, projects in the Trinity, like Oregon Gulch, building partnerships on the Scott River with Farmer's Ditch and other things.

And so I want to talk now and move towards the fishery and what's been happening on there. But first we need to talk about fishing rights.

Next slide.

The Yurok people have been fishing the river since time immemorial, but in the 1930s the State of California outlawed fishing in the Yurok reservation for tribal members. And for many decades, from the 30s all the way through the 70s, in order to fish and fulfill their inherent right, the tribe was subject to arrest, forfeiture, property seizures and so on. And in the 1970s,

some tribal members took the case all the way to court. Raymond Mattz was offered $1.00 to settle the court case and have it -- have the charges dismissed and he refused to, and it went all the way to the Supreme Court, and eventually the Yurok Tribe won recognition of its fishing rights, only to have the federal government turn around and ban Yurok Tribe fishing.

And what you see in the bottom here is federal marshals showing up in riot gear to stop the Yurok Tribe from exercising its sovereign right to fish, and that was called the Fish Wars in the 1970s and 1980s.

So if you fast forward to modern times, what you've seen is the tribe build its own fishing department. The tribe manages its own fishery. The tribe manages for conservation purposes, is an active participant in the PFMC, which is the Pacific Fisheries Management Council, the KFMC, which is the Klamath Fisheries Management Council, which is associated with the PFMC, and actively sets its own harvest rules and regulations, regulates its commercial fishery.

And I think the point here is that the tribe fought for decades. It didn't come easy. This fishing right was attempted to be taken from them and the tribe exercised and now manages its own fishery.

But what is the point of a fishery if there's no

fish?

Next slide.

I want to present a longer timeline than what we've seen in the previous presentations. So when we look back at cultural practices and where the tribe came from, we see a far larger decline than even what we've seen in the last decade, which are concerning.

So when you look at the bigger picture here, we are at somewhere around two percent to five percent, and that's a generous estimate of what used to happen. And, you know, if you look at like, say, Schneider 1931 talks about and tribal traditional environmental knowledge talks about the spring run Chinook really being the dominant run, and that continues to be the prize run. But even the fall run Chinook right now, we are down to just a very fraction of the historic run here.

This has impacted the tribe in profound ways. This prevents people from practicing cultural practices, it impacts ceremonies, and it definitely impacts quality of life and living because the tribe, especially before contact, was very wealthy, and all of that wealth has been transferred to other interests who have developed their extractive industries, starting with gold mining and continuing into present days.

Next slide, please.

And I apologize, I tried to update this to the last couple of years as this stops in 2021, but the trend, they actually continue lower. And so what you see here is this is since 1978 when reliable counts started, and the red line there is the minimum number of spawners. And what is -- although I will acknowledge that that line used to be 34,000, so before around -- before the early 2000s, the fishery -- the spawning floor was set lower.

And so what ends up happening every year is that a spawning run is estimated and the harvest is limited in order to try to make that. And what you see is consistently underestimated salmon runs. The tribe regulates its own fishery and then manages for conservation. It's a core principle that overharvest not be allowed, and the tribe has adhered to that for a long time.

I want to switch to a couple of specific stocks here. I want to talk about springers for a second.

Next slide.

So when we look at certain runs of fish, in particular the wild springers, we see a crash towards extinction. The South Fork Trinity River, for example, is functionally extinct. Salmon River, it's on its way. In the Scott River, there were springers until the 1970s. And the salmon -- the Shasta River had springers up until the

1950s, a lot of springers. And so we see a blinking out of tributary by tributary in the Klamath watershed, including the Trinity, until right now we are at high risk of extinction. Things are getting very dire right now.

Next slide.

And so now spring salmon are protected under the State Endangered Species Act and a petition to be listed under the federal.

Next slide.

And the Yurok are suffering through this. The Yurok has not had a viable commercial fishery since 2015. So when the quota is set with conservation values in mind, the Yurok Tribe, then if the quota is large enough, will set a commercial fishery. This enables people to buy books and school supplies for their kids. It enables people to make car payments. This is really important. The unemployment rate on the Yurok reservation is over 70 percent.

The loss of the commercial fishery and the income that this projects is (indiscernible) in comparison to the cultural, but it is extremely significant. This is impacting the tribe and in ways that just can't be really described.

And you would think that this is as bad as it gets but -- next slide -- this year the escapement was

projected to be so low that the Yurok Council, after a lot of a vigorous internal debate, decided to cancel the entire fishery, and that includes the subsistence fishery. This is the first time since time immemorial that nobody was fishing on the river.

And I'm not a tribal member, so I can't ever fully understand exactly this, but I do know this, I have friends on the lower river, I know tribal members, and people are grieving. They're absolutely grieving right now. And this is about the eighth year in a row right now, since 2015, there's not been a commercial fishery. In 2017, there was a subsistence of commercial fishery, the tribe ended up canceling it.

And so when I say the season was canceled, that means for everything. That means there was no take a fish for ceremonies. They cut that out. There was no fish taken for the Elders Distribution Program. So your tribal elders didn't even get any fish this year. Nobody got any fish. And that is despite the fact that the PFMC allows a de minimis fishery. So the tribe could have taken about 2,400 fish this year, but elected to stop its fishery.

Next slide.

So a simplified look at what's happening to the fishery and why is we have high juvenile disease rates. And so what to do about that? This is one of the reasons

the tribes have advocated and pushed for, for years, along with our partners, the removal of dams, which is predicted to significantly reduce disease risk.

We have poor habitat due to agricultural diversions in the main stem rivers and tributaries, it says, such as the Scott and Shasta. But let's be fair, the Trinity River main stem diversion is also impacting fish. And this last winter, the Bureau of Reclamation lowered flows and dewatered coho reds on the main stem Klamath River because of over allocation to ag in the previous summer.

And then we have poor ocean conditions, and I might add climate change as a looming threat. So you know, the ocean conditions are always a factor in this, but we really point towards the freshwater causes and habitat for this.

And I want to go next slide. I know I'm getting low on time here. I'm watching my time, Erik.

So we do have good news on the horizon here. This is a current picture, this picture is actually a couple of months old, there's been more progress since, of the dam removal activities. I acknowledge the dam removal was controversial in Siskiyou County. The whole dam removal effort is intended as a fish restoration project and is proceeding forth. It is intended to open up new

habitat, but also address geomorphic conditions that have caused high fish disease rates in there in the lower river.

Next slide.

We also have something that other rivers like, say, the Sacramento doesn't have. And this is a picture of genetic groupings of different tributaries for the Shasta River. You see red is Iron Gate Hatchery.

This slide was prepared for me by Keith Parker, who is a tribal biologist downriver. And what it's showing you is that unlike a lot of other rivers across the brass (phonetic), like the Columbia and the Sacramento, that the Klamath River still has relatively intact genetic diversity on here. This is something that we need to preserve and need to treasure. And the Scott and Shasta here, as you can see, you can see the Scott there, left center in green, has its role to play in terms of preserving the genetic diversity.

So it's not just a numbers game. This isn't like, well the Scott is this percent of the harvest and therefore you should only care of this percent. The Scott and the Shasta present unique life histories and have genetics that will preserve the genetic and geographic diversity of the salmon in the Klamath River, and therefore increases the chances of survival if these populations are conserved.

I don't have a slide for it but I should also say, the other good news is that we are working with a number of landowners in the Scott and in the Shasta to implement large scale habitat restoration projects. But we've been really clear here, the formula for restoring fish in the Shasta and the Scott is not just habitat restoration, but it also takes water. You can't have dry, good habitat. Also, pouring water into poor habitat is not going to yield satisfactory results.

We're pursuing a twin strategy of fixing the water issues but also working on habitat restoration and partnerships. We strongly believe that this is the way to move forward for a lot of reasons.

Then I have a closing slide here just to remind us what it's all about. And I thank you and I look forward to questions after the panel, is what you s aid, so --

MR. EKDAHL: Great. Thank you so much.

And, also, thank you for all the panelists so far for staying on time.

We'll next go to Sarah Schaefer from the Quartz Valley Indian Tribe. And the question again is: What is the state of Klamath-specific fisheries and how has that status affected your tribe? Please provide any information on recent trends, life history, or other items you think are relevant.

And let's go to the next slide.

All right, great. Sarah, are you on?

MS. SCHAEFER: I am. Can you hear me?

MR. EKDAHL: We can. Thank you.

MS. SCHAEFER: Okay. Excellent. Well, my name is Sarah Schaefer. I'm the Environmental Director representing the Quartz Valley Indian community here in the Scott Basin.

Next slide, please.

The Klamath River tribes depend upon fish for their physical and cultural survival. When the salmon runs were sustainable, Karuk families would consume 100 to 200 fish per family every year. Currently, an average about one fish per person is consumed annually. In a study on the effects of altered diet on the health of the Karuk people, it was shown that the elimination of traditional foods, including multiple runs of salmon, Pacific lamprey, sturgeon and other aquatic species has had extreme adverse health, social, economic and spiritual effects on the Karuk people.

Next slide, please.

Diabetes rates in 2004 were 21 percent, which is four times higher than the national average. Heart disease rates soared to 39.6 percent, which is three times the national average. Historic fish consumption for the Karuk

people is estimated at 458 pounds of salmon per person per year; 2004 estimates are less than five pounds of salmon per person per year.

Next slide, please.

With the loss of the most important food source, the spring Chinook salmon in the 1970s, and it's not a coincidence that that's when most of the more extractive groundwater wells went in Scott Valley. The Karuk people hold the dubious honor of experiencing one of the most recent and dramatic diet shifts of any native tribe in the United States. The lack of access to traditional foods due to such thing as a dramatic decline in eel and salmon populations that once supplied over one half of the Karuk diet has occurred within the lifetime of most adults alive today.

The loss of the spring Chinook run is directly linked to the appearance of epidemic rates of diabetes in Karuk families. Poverty and hunger rates are amongst the highest in the nation. In 2016, the Yurok Tribe actually declared a state of emergency due to high suicide rates in tribal youths. It can't be denied that these effects are directly related to food source.

Next slide, please.

Water trends show decreases in groundwater and the subsequent difficulty that salmonids and other aquatic

species have to move through and within critical habitats that they need for spawning and rearing.

The dewatering of critical tributaries is shown by the example of Shackleford Creek, which you can see here. It's a vital nursery for coho and it's dewatered every single year, killing thousands of juvenile salmonids, along with other species such as frogs and salamanders. Shackleford Creek runs directly through the reservation right by the housing on the res, making it especially brutal for tribal members who are forced to witness this diversion of water from the creek into the ditches.

This dewatering also affects tribal water quality and swim holes, which become polluted with E. coli before warming and drying up.

This dewatering happens as a result of surface diversions directly above the reservation. It's entirely legal. It is hard to wrap one's head around how this can be possible. If this were, you know, golden or bald eagles being killed every year, I can't imagine that it would be allowed to happen, and yet every year this is what we're dealing with, with our fish populations.

Next slide, please.

Basket makers have reported a change in the quality of the willows (phonetic) in their basketry materials due to low flows. The low water causes them to

be more brittle.

Additional effects of the surface diversions in Quartz Valley have to do with our drinking water wells. At our Environmental Department, for example, the drinking well becomes filled with E. coli when the ditches are running. There are a few drinking wells on the reservation housing that go dry during low water years.

Next slide, please.

The spread of nutrients from salmon carcasses is an effect that cannot be ignored. It really does take cohorts of salmon to nourish a forest, and our inland forests, as well as the animals moving through them, are all fed by the nutrients that salmonids have sequestered during their maturity in their ocean, not to mention the effects on protected species such as orcas and other ocean predators.

As indigenous people have warned, the system is out of balance. Twenty-five of the 32 salmonid species in California will likely be extricated within this century, according to scientists. Over three-quarters of these are regionally endemic species, so their loss represents global extinction. That's 25 out of 32 species.

Next slide, please.

In 1994, scientists showed a 70 percent coho decline since the 1960s. Less than six percent of the coho

population of the 1940s remains. This is within our lifetimes. We're witnessing this.

The California Endangered Species Act and Federal Endangered Species Act have the pathway to recovery flows set by Congress when they adopted this legislation. We are witnessing the extinction of not only fish, but the disadvantaged communities that have relied on tended to them since time immemorial.

Next slide, please.

I'm not going to spend much time discussing the LCSs, as they will be addressed by scientists later in today's workshop, but I will just state that they were ineffective in the Scott for providing more water for fish during critical habitats and critical time periods. This process needs to be standardized, reviewed, regulated, and monitored.

And this is a picture, by the way, in Scott Valley, where you can see green fields, some flood irrigation, and a dry river.

Next slide, please.

It's really hard to overstate the importance of these species and the impacts to tribal communities. It's heart-wrenching to watch water subside until it's down to a few small rocky pools under Quartz Valley Bridge, a pool surrounded by opportunistic fish-eating birds such as

egrets and herons feasting on juveniles trapped in warm, oxygen-deprived water that's subsiding daily.

This disconnecting of the water annually disrupts the flow of nutrients and animals through the Klamath River and its tributaries. It's essentially a viaduct for lampreys, sturgeons, salmonids, and pacific pond turtles, which I see are now being listed for protection as well, as well as all the macroinvertebrates associated with good water quality that feed all the tropical songbirds.

Another problem documented from warmer waters and low flows are the harmful algal blooms that generate toxic microsystem, which is a health hazard to humans as well as dogs and wildlife. Microsystem poisoning was documented in a small group of deer at Iron Gate Reservoir several years ago. Last year, with the lower flows, there was more toxic algae documented in the Scott River and its tributaries than there has been this year at this same time period. We believe it's because the flows were a little bit higher. This year was more of a normal year.

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The Quartz Valley community wishes no harm on anybody and is not focused on its grim history of the last 150 years in Scott Valley. The Quartz Valley people have developed a strong database of water quality and quantity parameters. We have a strong data collection program, a

science program. Quartz Valley Indian communities sees itself in service to the community, providing salmonid education within Scott Valley Unified School District, hosting annual community events such as the Salmon Festival, the Water Festival, Bike Rodeo, as well as monitoring potential toxins at popular swim areas.

The Quartz Valley community continues to look forward to collaborative opportunities to address restoration opportunities and flow standards. But like Mike said, you know, the restoration is not going to work unless we have the flows to support it. And it's a depressing situation, and it just really can't be overstated.

Next slide, please.

So thank you for the opportunity to present on behalf of Quartz Valley Indian Reservation. I appreciate your time, and I look forward to providing citations or answering any questions that anybody may have.

Thank you.

MR. EKDAHL: Great. Thank you very much.

We have been trying to communicate with Councilmember Hockaday over the last 30 minutes or so, and they have suggested or he has suggested that Nathaniel Kane speak for him in his place.

And so we'll turn it over to Nathaniel Kane. And

thank you for jumping in on short notice. And then on the little green button where it says, "Push," and if it's green, then you're unmuted.

MR. KANE: Good morning, everyone. My name is Nathaniel Kane. I'm here on behalf of the Karuk Tribe, Pacific Coast Federation of Fishermen's Associations Institute for Fisheries Resources and Environmental Law Foundation.

Unfortunately, Councilmember Troy Hockaday was not able to make it this morning. I'm going to step in and deliver just a very brief presentation on impacts to the Karuk Tribe from low flows in the Scott and Shasta.

I want to Karuk Tribe very clear that I'm not a tribal member. I cannot speak from personal experience. What I'm going to talk about today is based on my conversations with tribal members over the years, based on my understanding of the literature, but this is not my personal account.

The Karuk Tribe is one of the largest tribes in California. The tribe is based/headquartered in Happy Camp and has lands along the Klamath River and throughout Humboldt and Siskiyou counties.

The tribe faces severe economic issues, as Sarah presented earlier. Unemployment rate is up to 16 percent and poverty rates up to 40 percent. As a result,

subsistence fishing is an absolutely crucial part of tribal economy. Just to put food on the table in a part of the state that suffers from food deserts, that suffers from high prices, where incomes are low, the ability to go out and fish is an incredibly important way to feed families.

And that is leaving aside the deep, deep cultural and religious importance of salmonids to Karuk people. There are tribal ceremonies that require the presence of freshly caught fish. This includes the spring salmon ceremony, the world renewal ceremony. These are at the heart of tribal religious practice and cultural identity. And, for instance, the spring salmon ceremony has not been able to be properly performed since spring Chinook and the Scott were extirpated in the 70s. This is just a loss that someone like me, speaking as an outsider, cannot fully understand or express, but it is devastating to the tribe.

The question in the materials was about recent trends. I think it's important to understand what recent means in the context of a tribe who has been located in this area since time immemorial, for thousands of years.

These declines started more than 100 years ago. They have accelerated over the course of the lifetimes of current tribal members. I've talked to Troy, I've talked to other tribal members who grew up still able to fish in a more traditional way, and that has declined and in some

cases gone away over the course of their lifetime.

And I think it's really important to understand, you know, to the extent that I can as an outsider, the identity of fishing, of being a member of the tribe, being able to fish with traditional equipment, dip nets at the traditional locations where their ancestors have done that for thousands of years, for generations and generations. And that opportunity is going away.

And, you know, we've presented in documentary evidence before this Board many, many times about poor habitat, poor flow and passage conditions in the Scott and Shasta that really are at the root of this issue. I don't need to reiterate that right now.

I will point out, the Karuk Tribe's Natural Resource Program has done an enormous amount of work to improve habitat, build off-channel habitat, and to fund and perform its own science and its own monitoring on the Klamath and in these basins over the last several decades. And they've contributed an enormous amount to the understanding of coho chinook and other species in the basin.

And all of this is why the Karuk Tribe petitioned for an emergency regulation back in 2021, and then for a permanent regulation this spring. The tribe is absolutely committed to seeing this through. You know, they have

borne so much of the risk and seen so little of the benefit of water management in the Klamath Basin over the last several centuries. And they are committed to seeing this through, looking forward to participating the rest of the day and over the course of this process.

And I'm happy to answer any questions that you might have. But other than that, thank you.

MR. EKDAHL: Okay. Great. Thank you. So this -- yes, please stay as there may be questions and follow-ups.

So we actually far ahead of schedule. And thanks everyone for, you know, keeping on time and moving quickly. We do have a couple of follow-up questions, I think, from the staff level. I'll turn it over to all of us up front here and then encourage those.

If you're in the audience and you have questions, as well, please submit it to the scottshastadrought@waterBoards.ca.gov email and we'll try to incorporate it. We have kind of a running list that we're going through.

And with that, I turn to Marianna and Erin, if you have questions, if not, I'll pick up with a couple.

MS. RAGAZZI: Well, I'll ask a question of Mr. Harris. I think this was covered in your presentation, but just to make sure that it's clear, did the main channel

flow of the Canyon Reach, and specifically in the Shasta River, produce suitable over-summering habitat in July of 2023 when the emergency regulations were in place? And additionally, were there any changes to that when the emergency flows ended on August 1st?

MR. HARRIS: Yeah, thank you for the question, and I actually have this in my emergency regs presentation, so I can go through this for you.

Yeah, so we conducted fish surveys and sampling in the Shasta Canyon during implementation of both the 2022 and 2023 emergency regulations. Our out-migrant fish trapping operations in the canyon, just to (indiscernible) in the Klamath Conference, we were actually still catching salmonids in the canyon on June 30th of this year. Trapping operations were halted due to safety concerns for temperature related on the surface with the rotary screw traps. But we did continue to snorkel through the month of July and observed juvenile Chinooks still residing in the canyon almost to the end of the month.

Subsequent to that, in the ending of the drought flows, we did no longer see any more Chinook salmon in the canyon itself. We saw omicus (phonetic) and salmonids, but the Chinook seem to have gone away. So it sort of does add a lot of additional information to the idea that the canyon's not suitable and it's unknown if a Chinook life

history characteristic of trying to stay in the canyon all year would have continued to be there and the flows been there.

MS. AUE: Mr. Harris, just to reiterate, that was the Shasta Canyon or the Scott?

MR. HARRIS: Shasta Canyon.

MS. AUE: Okay. Thank you.

MR. HARRIS: Yes.

MR. EKDAHL: I have a broader series of questions, and it kind of -- this is going to blur into the e-reg discussion, which I know we have some presentations I think that we'll touch on this, as well, coming up. And so if we need to defer it or if we need to come back to these questions, please, you know, flag it and we'll do so. And I may not ask the question in quite the right way, so I will do my best. I'm not a fisheries biologist.

And one of the questions that we've had, and I think this is for all of the panelists, is, you know, there's lots of ongoing restoration in the Klamath, specifically the four dams that are being removed right now. To the degree to which populations in the Scott Shasta are driven by conditions in the Klamath watershed and Pacific conditions as a whole -- this was an issue that was brought up at the August 15th hearing that, you know, the population numbers that we're seeing in these two sub-

watersheds are really more subject and driven by broader impacts -- will the restoration efforts, the removal of the dams, help drive broader restoration on the Klamath and the degree to which populations on the Scott and Shasta are needed to support that restoration or are more influenced by that restoration, if that makes any sense whatsoever?

I see people scribbling notes, so I know it's a broad question, but kind of some thoughts on that. And we'll probably come back to this similar question in the e-regs portion.

MS. RAGAZZI: And we're looking at the people virtually too. If you have any thoughts on that, feel free to step in.

Oh, can you unmute both of them, Sean (phonetic), with mic and then --

MR. BELCHIK: Thank you. I see Councilman Hockaday has his hand raised.

MR. EKDAHL: So Councilmember, if you can hold for one second, we'll do a formal introduction for you. And I don't know if you want to touch on this question, if you do, please do. If we can get to this question, then we'll come back to you. It looks like you were able to join and thank you for doing so. And we'll kind of go through your presentation maybe after this question.

MR. BELCHIK: So I'll take a shot at answering,

Erik, and it's a good question.

The restoration approach used by the Yurok Tribe is a wholistic approach that's guided by traditional environmental knowledge. That knowledge states that everything is connected. That's a pretty simplified view of everything.

But when we look at restoring the Klamath River Basin, we know that we have to do it all. Focusing only on the Shasta and Scott won't work, nor will not focusing on the Shasta and Scott and only doing other things. So that's why we're taking a large-scale approach. We're working on the Shasta and Scott, we're working on dam removal. We're also doing multiple large-scale projects on the main stem Trinity River. We've done projects in the South Fork Trinity.

And finally, as we're learning, the connection between the Scott and the Shasta and the lower Klamath tributaries as coho winter rearing and interconnected basins that are also important to coho rearing, we're doing large scale restoration on the lower Klamath tributaries, including McGarvey Creek, Toa (phonetic) Creek, and Hunter Creek.

So you're right, those things are all interlinked, and that is reflected in our approach, and along with our partners, the Karuk Tribe, which I'm sure

Councilman Hockaday will talk to you about.

So, yeah, short answer, dam removal will help Shasta and Scott fish. It will lower the disease rate in the river. And part of that was intended to help the Shasta and Scott. But we need work within the watersheds too.

MR. EKDAHL: Great. Thank you.

Any other responses to this question?

MS. SCHAEFER: I see Jeff has his hand up, but I would like to say, in the Scott, a lot of the issues have to do with disconnection within the Scott Basin itself. So dam removal in the Klamath isn't going to help with that so much, but we're happy that that's happening, and that's a major cause of celebration for tribal members, for many tribal members.

I'm also not a tribal member, so -- but, yes, it's disconnection and being able to move within the miles and miles of habitat that are appropriate for spawning and rearing within the Scott that is so critical to us, and that's not really going to be affected by dam removal.

MR. EKDAHL: Okay. Great. Thank you.

Any other responses?

MR. ABRAMS: Hi, this is Jeff Abrams. Can you hear me?

MR. EKDAHL: Jeff, go ahead, please.

MR. ABRAMS: All right, so yeah, we completed a biological opinion on dam removal, and that includes an analysis of all the populations, including the Scott and Shasta, and certainly dam removal is expected to, you know, have benefits for those populations through remediation of some disease impacts and just improvement of the migration corridor overall. But obviously, that's -- you know, it's not going to help if conditions in the Scott and Shasta Basins aren't sufficient to support those populations.

I also wanted to point out that the Oregon Department of Fish and Wildlife and the Klamath tribes have a Reintroduction Plan that sort of has expectations for all the various species. And the only species that they intend to have active reintroduction for is spring run Chinook salmon. All of the other species, they're going to give three generations of various species, but, you know, all of the other salmonid species are expected to volitionally repopulate those areas above the dams. And so the Scott and Shasta populations are major contributors hopefully for, you know, key genetic components and just abundance overall.

So it sort of works both ways that, you know, reintroduction should help the Scott and Shasta but -- or sorry, dam removal should help the Scott and Shasta, but the Scott and Shasta are key pieces to make dam removal a

success.

MR. EKDAHL: Great. Thank you.

Any other responses?

All right, let's go to Councilmember Hockaday, and hopefully you're unmuted. And would you like to give a brief presentation and overview and after which we'll go back to some questions?

MR. HOCKADAY: All right. Thank you. Sorry for being late. I couldn't get on this morning. Can you guys hear me okay?

MR. EKDAHL: We can. Thank you.

MR. HOCKADAY: Thank you for letting me have this time today.

Scott and the Shasta are really, really important for the Karuk Tribe and the Yurok Tribe and the tribal members on the Klamath River. Back in centuries' time, those were populations of salmon and spring salmon that used to run into hundreds of thousands, you know, of fish. Now we're whittled down to what, anywhere from 200 to maybe 300 salmon yearly basis. And historically, those rivers were part of the coho and the fall Chinook runs, because of the cold waters.

And now, as we see today, even this year, we see that parts of the Scott are dry. Parts of the Shasta are only four feet deep in some spots, and some spots it's only

two feet deep and only six feet wide, and the water temperatures are in the 80s. I mean, as you know, that's uncalled for.

Like I said in the beginning, we're not against farming. We're not against, you know, people making a living, because that's the way the United States works. But at the same time, do we need another endangered species listed in the world? If the coho die in Shasta and Scott, you can't just go to another river and replant. I mean, those fish don't belong in that river. The creator put those fish in those streams for certain purposes.

It's just like if you take a steelhead out of the Umpqua River and put it in the Klamath River, you can tell the difference, because the Umpqua steelhead -- oh, sorry, I meant -- didn't mean salmon, steelhead has little black spots, it looks like pepper on their bellies, and you don't see that any other place on the West Coast but the Umpqua River from the steelhead. So that's the same way as if you take a coho and put it in a different spot, it does not belong there.

So I've heard people talking about, well, if the fish go extinct, we can always transplant. No, it's not right. The creator never meant for that fish to be there.

And with the flows, with the question that I heard when I came on, with the flows that need to be

regulated on the Scott and Shasta, it will help after dam removal because the fish are going to take at least a couple of years to start getting up to the reaches. It's going to take about ten years or more for the brood stock to get back to where it naturally belongs. Especially, we have to reunite the spring salmon in the upper basin, that's going to take a while.

I mean, fish do adapt, don't get me wrong, they do adapt, but until we get all the water that belongs in the Klamath Basin back in the Klamath Basin, we're going to -- the Shasta is still going to be a big part, and the Scott's going to be a big part, as long as -- along with all the other creeks. Like we're working on Indian Creek right now, which the Slater Fire destroyed. With all these wildfires destroying the river right now, I mean, the river's still running mud down this way.

You know, fish will do their best to survive but we have these major fires. As soon as we get heavy rain, like we did in the first part of August, if everybody knows, the river almost took all the oxygen out of the water again and almost killed, you know, a lot more fish. It did kill a few but not as many as it did last time.

So it's all that cold water and stuff in the river that we need from all these streams, even the Shasta and Scott, I know we're talking about them. But all these

streams are important for the Klamath Basin and for everything we've got to do. And when the dams come out, the river is going to change, and we're going to have to work on the river corridor in the mid-Klamath, all the way down to the mouth, and all the way up to Canyon Dam to help the river get back into its natural state. And by having the minimum flows on the Shasta and the Scott, it's going to protect some of that red stock salmon that we have right now. So just with the regulations now, it's just barely minimums, but it's doing its job. And if we take away from that now, it's going to help.

And we're not out of drought yet. Just because we had one good winter, you know, and everybody thinks we're out of drought. We're not out of drought. And I just got back from a Water Board meeting just the other day in Sacramento, and I was telling them, I said, "November, with all the rain we had here in Happy Camp and all the snow we had," I said, "I went out in my yard and said, 'Oh, this would be a good time to dig some postholes.' I got down in the ground about maybe ten inches at the most and the ground was hard. In middle of November, I was pulling dirt out, and it was still making dust."

So if you have 15 years of drought, it take -- you know, it's going to take three or four years of good, hard winters to even put water back in the ground.

So I just wanted to let everybody know, you know, like I told them, and they started agreeing with me that, you're right, Mr. Hockaday, because all the water and rain that we have now with this dry weather and these dry grounds and caused these floods is because the water can't soak in. It doesn't have time to soak in, because when you're getting two inches of rain in an hour's time, it doesn't got nowhere to go but down the hill. And so, you know, it affects everybody, you know?

So we need these emergency flows for the Scott and the Shasta until, you know, everything subsides, you know, back to normal, which we all don't know because we all can't predict the future. But we can do a lot of preventings [sic] to save our fish, you know, or save fish for everybody, not just for tribes, but for commercial fishermen. People will come up here on vacations from back in New England to go fishing here.

This morning, I was at the liquor store at Happy Camp. We have some people from Maine over here right now with fishing guides on the Klamath River enjoying their vacation over here, and the river is muddy. And the guides tell them, "Well, we'll give it a try, but we can't guarantee, you know, you're going to catch any fish." But they're still willing to come over here and try, and I think that's great for the communities on the river, just

not for the Happy Camp area.

So there's a lot to do with these flows. These flows mean a lot to a lot of people. And I know these flows mean a lot to the farmers. But you know, somebody's got to take a sacrifice, and the fish and the tribes have been taking a sacrifice for the last 20 years. It's time for the farmers to realize that, you know, they only have to do three crops a year, they can't do that fourth crop. I know it takes money away from their bank accounts and stuff, but talking to some of the farmers out there in Shasta, the Scott and Shasta, they can live on three crops, they told us, but there's a lot of people that say they can't, but there's lots of them that say they can.

I appreciate you guys listening to me today. I don't want to keep on going on, because I know we've all got lots to do today, but thank you for letting me speak my mind.

Be well.

MR. EKDAHL: Thank you, Councilmember, for your participation and your comments.

I have another question for the panel, after which I think we may be able to turn it over to comments if there are any for this section.

One of the things I think I probably should have talked about up front is, you know, this workshop is

specifically focused on emergency regulations, the technical elements that go into a potential readoption of emergency regulations at some point in the near future. And so we're focused on your very discreet short-term actions, and we aren't having the broader discussion about long-term regs and the petition that will come at a separate time.

So the question is, and admittedly this blurs the line between the e-regs discussion that's going to come up, one of the images we saw earlier was a completely dry Shackleford Creek, and the e-regs, you know, have been characterized as a blunt tool for the main stem, whereas maybe some of the habitat or better functional type flows would be more prioritized for summer in some of the tributaries.

And I guess my question, again, it's not very well phrased or asked, but given the short-term nature of an emergency regulation, should the Board consider focusing on flows or habitat in some of the tributaries at other times of the year, as opposed to solely focusing on main stem flows for the entire year?

And hopefully, again, that makes sense. If not, please ask for some clarifying questions. And I'll turn it over to the group.

MR. HARRIS: Yeah, I'll go ahead and start off.

You know, I think that's a valid question. I think one of the things we'll talk about in our presentation is, for an emergency regulation process and the data we have, the ability to properly manage it at the USGS gauge. I think another important consideration is that the fisheries component of the Scott Valley doesn't end at the USGS gauge. There's a whole entire canyon that needs to have and does have salmonid use over the summer, primarily omicus, but also other resident endemic fish.

So I think if there's a desire to start looking at the tributaries, I think that's something that we could discuss. I just, at this point, I would have to figure out, I think we would all have to talk more about how that would actually work. There's a limited number of gauges, there's a limited number of information that's shared, and how we would do that quickly and timely to be able to do that type of flow thing. And so maybe it's not necessarily one or the other but it's both in a way that works out and still tries to meet our overall drought goals of basically coming up with those belly-scraping flows.

So I know that didn't completely answer your question, so --

MR. EKDAHL: No, that's fantastic. Thank you.

Others that want to weigh in here?

MS. SCHAEFER: Sure.

MR. KANE: I would agree with that. We have. CDFW recommended the emergency flows. Those are based on the Fort Jones gauge, and the Shasta, they're based on the existing gauges there. That's the best available science. We believe that's what the reg should be based on.

Obviously, the fishery is distributed throughout the system. As we get more gauges online, you know, we could reevaluate that someday, but I don't think we're there yet.

MR. EKDAHL: Sarah Schaeffer, I think you have your hand up as well.

MS. RAGAZZI: And then Mike.

MR. EKDAHL: And then Mike.

MS. SCHAEFER: Just stating that the one gauge down, the Scott River gauge down close to the canyon there is not enough. It's not enough. I mean, the fish might be able to make it through the weir and above that in the main stem, and yet the tribs are still dry. And the tribe, our tribe just received a grant funding to place a series of real flow gauges throughout the Scott Valley, and we will definitely be focusing on tributaries wherever we may have access so that the fish can have access.

And that's one of the biggest problems in the Scott is just lack of access to these traditionally very productive tributaries that these fish used. So, yeah, we

need more gauges. We need more flow standards throughout the valley, like some sort of adaptive management situation would even be, you know, ideal where we could, you know, measure flows and have that available for some, you know, real-time adjusting.

But it's not just emergency flows we're hoping for. We're hoping for recovery flows, and we're hoping that that's going to be measured somewhere other than just the Scott River Gauge.

MR. EKDAHL: Great. Thank you.

Mike Belchik?

MR. BELCHIK: I'll pass. I think Sarah nailed it.

MS. AUE: Hi. I was wondering if, and this is a question for anyone on the panel, if you have comments? In the workshop that we held on the petition, there were some -- excuse me? Sorry, yes, the hearing we held on the petition. This is the workshop. There were two very different views presented of what is happening with the fishery specifically on the Scott.

There was the suggestion that the fishery on the Scott had reached a very low point by the late '70s and that two brood years have been on a steady recovery since then in light of tributary-focused recovery actions. And then there's also the narrative, sort of the longer

narrative of a sharp decline and the story of the -- or the trajectory of the third brood year, which had been the strongest, and then fell off quickly.

And, Mike, I know you had a slide and touched on this briefly, but I wanted to open it up for everybody. If there's more context sort of about the different path that those fish have taken and what that means in terms of a recovery flow -- or not a recovery flow but emergency flow in the Scott River specifically?

Everyone can think about it for at least as long as it took me to articulate the question.

MR. HARRIS: I wasn't sure if I wasn't allowed to answer first, because I'd already spoken about it, or you're looking for other people too.

MS. AUE: You look like you're allowed.

MR. HARRIS: Okay. Well, I just wanted to make sure you were -- I wasn't jumping at anybody.

If I understand the question, is it are the populations doing well or are they stable with in terms of the emergency flows? And I think what we're seeing, at least when I look at the data and I look at the population estimates from the past, we've sort of set a new baseline, a very low baseline, a baseline that's not consistent with what the populations were, even when you go back to the '60s and when you go back even farther with Mr. Belchak's

data.

So I think when we say that the fish are doing well and they're recovering or they're transitioning upward population wise, we're celebrating numbers in the thousands when at the same time, you know, even that, was it the 2018 cohort showed that at times we could have over 2,000, the habitats able to actually do that. The intrinsic modeling that NMFS did said there's supposed to be 6,500 fish within the system. And even if you have that number, which is not a scientific approach, but even if you just said, hey, let's go with three, most of the brood years are significantly way below that.

So while we are seeing trends and we are seeing things that are real positive, on some of the brood years, they are still very stressed. And a lot of incredibly great restoration has gone on. You know, back in the '60s, though, we had thousands and thousands of fish at a time when we had, I think, 10 or 15 fish screens in the entire watershed. So something's happened between that time period in the '60s and even just using that small truncated timeframe where these populations have dropped down to a level.

And I think the concern is when you get to a certain level, you get to that devastation threshold where any series of events that could happen that could actually

just take that population out.

And I think we saw that with the 2018 population during the 2014 and 2015 droughts where we lost 90 percent of that. And the bigger population you have, I promised I wouldn't use the word stochastic (phonetic), but I'm going to use it, the bigger population you have the more robust it is to be able to take on stochastic events, you know, catastrophic events where you have something, like if we had in the Shasta River, you had a Pantera (phonetic) spill and you had just this catastrophic event where it wiped out most of the -- you know, (indiscernible) started going down there because we don't have a lot of populations in a lot of the tributaries and stuff, you'd be looking at, you know, pretty much the loss of that brood year, so --

MS. RAGAZZI: So just a quick follow up on that specifically. And I don't know, it looks like Chairman [sic] Hockaday has his hand up.

Getting at those events, it seems like the climate is more uncertain these days. We are seeing wildfires that are damaging the surface and then running off into the streams, causing additional difficulty for fisheries and habitat.

So thinking about the state of the fisheries in light of sort of where we've been versus where we're going and the importance of, I guess, emergency regulations

flows, the state of the fisheries in general, I'm sort of putting it out there, are we at a sort of different point in time than we have been historically based upon where we're at with climate and other things?

But it looks like Chairman Hockaday maybe had something related to the last question.

MR. HOCKADAY: Can you guys hear me? So I don't know. I'm out on the mountain. Can you hear me?

MR. EKDAHL: Yes.

MR. HOCKADAY: Okay. Thank you.

I sit back here and listened to all the data and I listened to you guys talking about the brood stock and everything in the river. So even if you went back into the '60s, you know, there was still 100,000 salmon going up the Scott River. But you got to think at the same time, the river was flowing all year round.

And then on the Scott and Shasta, there weren't that many farms in the '60s. They weren't that big. A farmer only had maybe 200 acres and he lived within his means in that acres. Nowadays, they want to take all the water and make land. It's just like up on the upper basin, up on upper basin, Tule Lake. There used to be a lake in 1908. Now there is no lake. It's because everybody got greedy and wanted more hay, more potatoes, whatever to feed the world. But they forgot that when you take away, you

take away from the environment, you take away fish habitat, bird habitat, all the habitat, even on the Scott. On the Scott River you don't see eels and lampreys anymore.

You hardly -- you don't even see the beaver. It used to be Beaver Valley. You don't see them no more. You took them. By progress and making a living, don't get me wrong here, everybody's make a living, but it's taken away from the natural resources that used to be there. Everybody thought since there was 100,000 salmon in the Scott River, that they'd be there forever. Look at us now. We're lucky to see 200 salmon spawn. They can't even get up in the upper basin. They can't even hit French Creek in the fall time.

So those flows, what we can do now is going to save what we can save and those flows should be, I would say, permanent. We need higher permanent flows on Scott and Shasta.

That's all I have to say. Thank you.

MR. EKDAHL: All right, let's go to comments.

Oh, Mike, go ahead.

MR. BELCHIK: Yeah, you had two questions. One was about the relative strength of the brood years on the Coho. And, you know, there has been some good news there. I think, you know, a lot of community groups and farmers have really made efforts to restore some of the Coho, and

so we have seen that.

But Mike Harris is right. We're rebounding from a really low baseline. And although there is good news, it's a slight rebound after -- on the tail end of a really long decline. So I think we need to be really careful and keep our perspective.

The other thing that Mike said I really agree with and that has shaped our strategy is the idea of genetic and geographic diversity as a means to conserve the species as a whole. This is something that has really been overlooked. This is a driving factor behind trying to get fish reintroduced to new habitats above where the dams are, but also is a driving factor in preserving all the areas of the Scott River. So you talked a little bit earlier about the tributaries. Each one has a role to play and each one has its role to play in the geographic diversity of the fish.

There was another point about, oh, in the face of climate change. So right now, climate change is hitting us earlier than we thought. We thought we had like 20 more years, I think, speaking personally, you know, having written our Climate Change Response Plans in 2008, 2010, but it's right here on us now. And so we're starting to see it. We're seeing loss of snowpack.

And in particular, I think the thing that

everybody underestimated was the role of catastrophic fire and what's been happening with that. So we look at the McKinney Fire footprint and how it continues to bleed sediment into the Klamath River and other fires, and it's an every-year thing now.

All of this just emphasizes the need to fix all the watersheds, and everything I said earlier about the Scott and the Shasta needing substantial habitat fixes and water itself, but it really isn't that simple. When you look at the Scott River and what is really going on there, you know, the loss of the beaver dams has sped up the evacuation of water from the system. We have an incised channel that has then been riprapped, the water table drops, the riparian vegetation is not able to protect it. It just becomes a vicious circle and all of that leads to more dewatering and everything.

We've got to get at the root of the system and figure out how we can fix it from a process-based fixing and not just a symptom-based. So I do believe the emergency regulations and interim flow standards, as we stated in the hearing, are an important element of fixing the Scott. We're witnessing an extinction right now of the fall run Chinook above the canyon. We're only going to have a canyon population, and as CDFW pointed out, they're vulnerable. They're really vulnerable. I mean, the canyon

flood 50,000 CFS in the 1997 flood, every red in there was wiped out, and that could happen again.

So when we talk about our overall strategy on the Scott, we've got to get at the geomorphic, the water routes. They integrate the water table and the groundwater withdrawal and get at the whole system. The emergency regs and even any permanent interim regs are a stopgap to just stave off extinction. If we want to recover the fish, we're going to have to think broader. We're going to have to involve the landowners. We're going to have to do restoration, but we're going to have to institute flows that are capable of supporting recovery of the fish.

MR. EKDAHL: Nate, go ahead.

MR. KANE: Just two really narrow points. I think everyone else covered most of the big ones.

The NMFS Recovery Plan doesn't just speak of the 6,500 spawner goal and the 250 coho depensation threshold. It also talks about volatility, and that's a really important metric. And what we've seen is not only a very low population, but a very volatile population, and we need to get to that high level of spawners with a steady, stable population.

And that volatility, it demonstrates the amount of risk that these populations are exposed to. Right now they are entirely -- the coho passage is entirely dependent

on a big November rainstorm, essentially, because without that, there's really no base flow. There's no way to get them up out of the system.

We need those base flows in drought years so that when we get only a little bit of rain, or like this year, where we got a good deal of snow in December, the fish can still make it up there, because this year, we had a great water year starting in January, but it was too late for the coho. We saw a number roughly equivalent to the depensation threshold. Snorkel surveys and the spring run survey confirmed that there were just not that many COHO in the system. The migration numbers, not that good, and that just shows the amount of risk that these low flows have created for the coho population.

MR. EKDAHL: So with that, I do want to turn it over to -- oh, Jeff, go ahead.

MR. ABRAMS: Yes, thank you. Yeah, I don't want to reiterate what everyone said, although I do agree, you know, we're talking about coho populations that are showing some improvement, but very low numbers to begin with. You know, we also have spring run populations that others have mentioned are completely extirpated from the Scott and Shasta. Meanwhile, with dam removal, we're planning to reintroduce spring run above the dams. So hopefully the Scott and Shasta will be areas where those fish can

repopulate in the future as well.

But I wanted to mention on the climate change point, you know, climate change is an extent threat for all of our species, but this area has potential, you know, refugia, given the coastal climate and the way that, you know, the ocean interacts with our climate here. And although we expect less snowpack in the future, the spring run or the spring-fed systems are an important climate refugia for those fish as they move inland, you know, especially in the Shasta.

Thank you.

MR. EKDAHL: Okay. Great. Thank you.

I'm looking at time and we are right at 10:49. So rather than try and squeeze in, I know we have two folks who have raised their hand for comments here, but in keeping with the schedule, we're going to take our break and reconvene with the next panel at 11:00. And if those commenters are able to stick around to the end of the day, please encourage them to do so.

A huge thank you to all of our panelists today, I immensely appreciate the time and the input. This was a really helpful dialogue.

I do also want to just take a note, you know, that we have a number of representatives of the agricultural community today. And I can rest assured in

saying that, you know, they don't go out and say, we're planning to take all the water. That's why we're all here; right? We're here to try and have a dialogue about a productive way to move forward. And so just appreciate the kind of collaborative nature of all the questions and inputs for the rest of the day.

So with that, let's reconvene at 11:00 and we'll go from there. Thank you.

(Off the record at 10:49 a.m.)

(On the record at 11:00 a.m.)

MS. RAGAZZI: Okay, I'm going to invite Sari, Michale Harris -- Sari Sommarstrom, Michael Harris, and Gary Black to come up and take their seats, please, so we can get started again.

You're right here, Sari.

(Background conversation)

MS. RAGAZZI: Michael Harris, you're being paged to the front of the room, please. Eli and Michael Harris, please. Really?

Thank you, Gary. You're right here.

(Background conversation)

MR. EKDAHL: All right, so we're right at 11 o'clock and we're still looking for -- I think Gary is coming, coming right up.

A quick note as we go forward to the next portion

of the meeting, we have a panel on the e-regs. We have a number of speakers and we are actually going to break for lunch part way through. So we'll go through some of the speakers and then take a break and come back with the rest of the speakers; right? We are asking that all of them sit up front for the duration of both portions, just so we can have a kind of more community focused response and Q&A.

And then one last note, I didn't touch on this in the beginning and I was supposed to, looking at my notes, this is part of a broader process where the Board is looking at potential emergency regulations. This is not the last opportunity that people will have to weigh in on a potential emergency regulation.

If we go back to the August 15th hearing, the direction was to move forward as quickly as possible to hold a workshop and to report back to the Board and make a recommendation about timing thereafter. So that is still on the table that will come forward. Even when, let's say if we do propose draft emergency regulations, those do have to go out for a minimum public comment period. There will be an opportunity for the public to weigh in on those as a draft. There's an opportunity for the public to weigh in at the Board meeting. And there may be additional opportunities for public engagement.

We are actively, I don't think we're tipping our

hands so much, but we are actively looking at holding a community meeting in Yreka. We're trying to narrow down and actually reserve the room, which has been a little bit of a logistical hurdle. So we can't say the official date yet because we don't have an official date yet, but we want to have something in person, which will provide an opportunity for people to weigh in and just receive information. So a number of additional opportunities going forward.

If participants here or anybody wants to submit recommendations, even now, even before the draft regulations come out, if we have draft regulations, use that email address that we showed upfront, scottshastadrought@waterboards.ca.gov. That is our kind of community email box. We look at it all the time. If you have thoughts, ideas, requests for engagement, if you want to talk to us on a separate trajectory, please reach out to us there and we'll respond back to you pretty quickly.

So with that, I want to sit down and I'll turn it over to our next panel. Our panel is on emergency flows, and I have -- yeah, give me one second to get some things set up here.

We've had a number of additional Board members join us. Board Member D'Adamo is here, if you want to raise your hand? And then Board Member McGuire is here in

the room. We also have Board Member Morgan, who I believe has joined us on the zoom platform. So a number of attendees and thank you again for joining us today.

We have three panelists before lunch and then two panelists after lunch. The first panelists will be California Department of Fish and Wildlife staff, which we'll have 25 minutes, Sari Sommarstrom for 15 minutes, and Gary Black for 15 minutes.

And with that, we'll go to the next slide and turn it over to Michael Harris at the Department of Fish and Wildlife after I read the questions.

Please provide support and background for the drought emergency minimum flows with a focus on the summer flow of 50 cubic feet per second, or CFS, in the Shasta River and the summer and early fall flow requirements on the Scott River. What other factors should the Board be considering with respect to emergency flows? For example, provide recommended ramp down flows at the end of regulation, et cetera.

And with that, Mr. Harris, thank you.

MR. HARRIS: Next slide. Excellent. Sorry. All right. Great. Next slide. Next slide.

I just want to start off with just a little bit before I go into the goals of the emergency drought flows to give a little bit of background about why the Department

is providing these in-stream flow numbers.

We're a trustee for California fish and wildlife resources. We have jurisdiction over the conservation protection and management of fish, wildlife, native plants and the habitat necessary for biologically sustainable populations of those species. We have a environmental review and permitting programs that implement California Fish and Game Code, California Code of Regulations, and other statutes to the state of California. We implement programs, such as the Lake or stream Bed Alteration Agreement Program. We implement the California Endangered Species Act. We are a public trustee agency for participation in the California environmental quality act.

Next slide, please. Oh, the same slide. Don't go anywhere. Sorry.

So this slide describes the fundamental approach we took when we were asked to provide minimum drought emergency flow recommendations, often referred to as Joe's flows or belly-scraping flows. The three main objectives were avoiding the extinction vortex caused by poor genetics, minimizing catastrophic events, and maintaining life history diversity. We want to maintain sufficient sports for -- stocks for sport, commercial, and tribal fisheries. And we also want to acknowledge that every CFS matters. Increased flows result in better access to

habitat, mitigating temperature impacts, and necessary food production.

Due to the nature of the regulation of asking for minimum flows, we did not include a model temperature standard in our recommendations. Generally we know that cold water inputs at higher volumes tend to reduce temperatures as the surface area to volume ratio decreases. As noted in the upcoming species status slides, which we actually did first because I got the order wrong when I set the presentations up and I apologize for that, we are continually trying to increase cold water flows and eliminate warm water inputs.

Next slide, please.

So I just want to talk a little bit about the USGS Scott and Shasta reference gauges. For decades, we've used the USGS gauges on the Scott River at Fort Jones and on the Shasta River at Yreka to help us predict habitat conditions, adult and juvenile migration, inform restoration, conduct surveys and develop reports. These locations are maintained and operated by the U.S. Geological Survey and therefore have a great record of quality assurance, data transparency, and funding dependability. These are locations we have provided the emergency drought flow targets for.

On the Scott River, the Fort Jones gauge had

specific water rights assigned to the Forest Service in 1980 after CDFW data collection efforts, years of information sharing, debate and court decisions. These amounts are necessary to provide the minimum substance level fishery conditions, including spotting, egg incubation, rearing, downstream migration, and summer survival of anadromous fish that can only be experiencing critical dry years without resulting in depletion of the fisheries resource.

There is an additional water right that the Forest Service has for in-stream uses within the Klamath National Forest for incremental fish flows, recreational and scenic and aesthetic purposes.

Our recommendations were built on the premise that we had to have something that was enforceable, and these locations provide assured data every 15 minutes to a website that can be accessed real time by the public. On both rivers, but particularly the Scott, there are not enough gauges or water master tools to provide flows on a real time basis. Furthermore, some flow data is not publicly available and therefore lacks the transparency both communities and agencies need. Funding and access and local support to conduct updated in-stream evaluations has not been available to us.

Lastly, one of our enclosures to the June 15th,

2021 State Water Resource Control Board letter was the 1974 CFW summary to streamflow needs for salmonids in the Scott River. And I just want to note that if we talk about tributaries, there were actually numbers in there for individual tributaries. And that is the last on-the-ground in-stream flow study for the Scott.

So next slide, please.

So I want to talk a little bit about in-stream flow components. Development of in-stream flow criteria for fish involves evaluations of flow conditions during all life stages, adult migration, spawning, red protection, juvenile rearing, small out migration. There's been a lot of discussion about in-stream flow needs during adult migration for passage, and we'll talk about September flows later in the presentation, but we want to make sure people understand that in-stream flow is more than a adult passage.

Flows are needed to ensure that adults can successfully spawn and that those reds are protected and kept in suitable water quantity and quality conditions. Once juvenile fish emerge from the gravels, in-stream flows are needed to ensure they're suitable and stable rearing habitat, especially for coho salmon and steelhead who reside for a year or more in freshwater before heading to the sea.

So the next three slides, I will describe some details the department considers when determining adult migration passage flows.

Next slide.

So I apologize for this slide. I tried to illustrate depth criteria and you can tell I'm not quite the graphic artist I should be. This example demonstrates the CDFW and NOAA Chinook salmon adult depth criteria during migration. Depth criteria is the minimum depth needed to provide fish safe passage. We'll discuss on the next slide the need for these minimum depths. Depths is measured from the pelvic fin on this fish to the bottom of the blue line. Criteria for adult Chinook salmon is 0.9 feet or 10.8 inches, 0.7 feet or 8.4 inches for both coho and steelhead. So the top line is the depth criteria for Chinook and I just added three and six inches there for examples.

Next slide.

So sufficient depth is needed during migration to spawning grounds for volitional passage, thermal protection and protection for predators. Adequate flows also reduce the amount of energy the fish expends during migration and this helps ensure enough energy remains for red building.

There's also the reduction in injury potential when depth criteria is met. This is particularly important

to steelhead who can survive after spawning and out migrate to the ocean again.

Fish can pass at lower depths in the criteria, but for salmon that has declined in the watershed and statewide, like Chinook salmon, every fish we can get into the spawning grounds in sufficient shape to successfully build the red and spawn is essential.

We'd also like to recognize that although fish may volitionally pass through a particular section of river at a certain flow, this does not describe the complete passage of fishery conditions in the watershed for fish. The Scott River main stem, for example, has four locations that are known passage barriers, two in the canyon and two in the valley. There are also numerous tributaries inaccessible due to dry confluences with the main stem.

Next slide, please. Please?

So this is just an illustration, and you can tell it's a little lump there, this is from a Central Valley stream. This is the same critical riffle at a slightly different angle, but you can see the fish on the left attempting to pass the riffle at about three inches or so of water, and on the one on the right between six and seven, just to illustrate the difference between flows and depth.

Next slide, please.

All right, let's move to the Scott River.

Next slide, please.

We took a close look at the 1980 Scott River adjudication, including a summary of the 1970 petition and our Department's efforts to summarize an adjunct model flow needs in the 1974 document. The Forest Service water right in the adjudication has a very clear intent to provide a minimum amount of water only in the driest years to sustain a viable fishery. It was not established as a goal or sufficient measure of success.

The reports listed on this slide were included as our enclosures to our June 15th, 2021 letter to the State Water Resource Control Board to provide context and support for our recommendations. We used the Forest Service water right as a starting point when determining our emergency flow recommendations. Some adjustments were made based on specific resident recommendations from various commenters throughout this process.

Next slide, please.

As I mentioned in the previous slide, in 1974 the Department wrote a report summarizing the Scott River basin conditions for salmonids to inform the 1980 adjudicated water right for fish at the Fort Jones flow gauge. The Department spent ten years collecting data, developing this criteria, and it's the last time we had good access to

collect on the ground data in the basin.

It should be noted that this data set, which led to the flow recommendations for Forest Service water right for fish, was collected prior to increased water usage in the watershed.

These recommendations provide minimum salmonid flows needs and the temperature and key tributaries based on data collected at 22 cross-sections for temperature locations and three flow gauges, in addition to the USGS flow gauge.

Next slide.

The results of the 1974 report summarized minimum in-stream flow recommendations for salmonids by month for the Scott River main stem. There are also additional recommendations for spawning and rearing in the tributaries, as well as the East and South Forks. There are even minimum flows recommended between spotting peaks of three distinct annual run timings for steelhead and the Scott River. This report the Board already has, but it's available to request from anybody on our website and I can give that link.

During the development of the Watershed-side Permitting Program, there were concerns from the community that we needed to update in-stream flow studies. We contracted with Normandeau Associates in 2012 to develop

flow study designs for both watersheds, the Scott and the Shasta. We were largely able -- not able to do that due to landowner access and the will to actually complete the studies.

These study plans are still available. They've been there since 2013. And if we want to have strategic discussions about in-stream flow studies, they're available for us to use. And I would say though, however, that that was nine years ago and we needed to figure out something immediately at this point for the Emergency Drought Regulations.

All this is to say, we considered other specific possibilities, we evaluated existing stream gauges and associated data gaps, and we recognize the transparency, data quality and funding stability of the USGS Fort Jones gauge and opted to recommend that site as the perimeter for upstream watershed conditions.

We also considered the U.S. Forest Service water right based on the best available on-the-ground data that currently exists for Scott River flows. As new information becomes available, we will continue to evaluate these flows and we believe this to be a reasonable approach.

Next slide.

So we want to show you how we thought about our November-December emergency regulation flow recommendations

on the Scott River, specifically for listed coho salmon who begin migrating into the river in November. We compared gauge flows to field notes for 2020 and offered some tough scientific choices, knowing we were in a severe drought. In our June 15th, 2021 letter to the State Board, we briefly described when important reaches were disconnected, connected, reconnected, and when certain reaches were accessible for adult salmon. Across the top, the blue square summarized main stem and tributary connectivity during migration. Across the bottom, the blue circle summarized coho access to the various habitats.

Starting from left to right, coho salmon were first observed in the Scott River Canyon on November 9th. The cohort did not move through the fish counting weir until rains increased flows from November 17th to number 19th. Once through the fish counting weir, these adult coho were not able to migrate past Reach 9, which is seven miles up stream of the fish counting facility until a second winter rainstorm that began on December 16th. So this cohort's migration was delayed for about a week in the canyon and another 27 days in reach nine.

The tailings connected on January 2nd, which provided coho more tributaries and mainstream habitat for spawning. However, it wasn't until January 12th that a final flow bump connected Kitter and Patterson Creeks,

providing coho with access to the entire watershed.

When salmon spawn -- or when salmon returned to spawn, they do not eat. They save all their energy for migration and spawning. So it's important to get these fish to their spawning grounds as quickly as possible. Energy is expended while they hold waiting for the river to connect, providing spawning to access to spawning grounds.

2020 was the last time the adults from a large coho salmon cohort were in the system. They were first seen on November 9th in the lower Scott and did not have full river access until January 12th, 64 days later. While we do not know how long these fish would wait to spawn, we do not feel the 64 days of waiting for full river access on the Scott is protective of an ESA and CESA listed species.

Next slide, please.

Next, I want to talk about our September flow recommendations to the Scott River. For the month of September, we plotted annual discharge from 1942 to 2020 and then sorted by five water year types ranging from extremely wet to critically dry. We then calculated mean September flows and separated them by pre and post 1980. Multiple factors have identified a leading reduction in mean September flows since 1980, climate change, overstocked forest, conversion to groundwater, lack of the ability to groundwater recharge, and we took these factors

into consideration when developing our September flow targets.

You can see a significant and sudden drop in available fish flows in all years, but particular concern is the critically dry year. You can see that in even more water years, we're generally not obtaining the Forest Service water right of 30 CFS in September.

We want to emphasize, one, the Forest Service water right was only supposed to be the bottom bar in critically dry years, and two, recent changes have occurred resulting in reduced average September flows when similar amounts of discharge were previously available.

We should examine our migrating to spawn into the spawning beds of the Scott River during the month of September. And you can see the reduction of Scott River flows that has occurred since 1978. This drop in flows during migration is concerning because passage into the Scott Valley for spawning is critical for the protection of reds during high flows.

The Scott River flow velocities are much higher in the canyon in the valley, which can lead to red scour during high flow events resulting in lower survival. And we discussed that in our previous presentation regarding the sacrifice that we collected in our rotary screw traps this year.

Next slide.

This is a table of the Scott River emergency flow modifications. As you can see, there has been a significant amount of information sharing, data gathering, model analysis and review of existing conditions as it led to the emergency belly-scraping flows that are here before you today in this table.

CDFW submitted to the State Water Resources in May of 2021 the 2017 Scott River in-stream flow criteria to further discussions on solutions to address the current dry conditions and ongoing water use impacts in the Scott River. The 2017 criteria describes the methods and results of an analysis using historical flow data and regional regression relationships to develop in-stream flow criteria suitable for an anadromous of the Scott River.

Following the governor's extension of the drought proclamation to include the Klamath, CDFW submitted emergency drought flows for the Scott River that were largely based on the Forest Service's water right and table 1 of the adjudication. As I said before, these flows are needed to provide a minimum substance level of fishery in the Scott. Deviations from the Forest water right occurred for various reasons, such as trap manager and passage flows observed, ramp down flows to avoid stranding, identifying an achievable summer flow, and simplifying targets by

averaging when feasible. The flow changes highlighted in the table under the columns labeled Proposed Regulation Flows 2021, and Proposed Regulation Flows 2022. The reasoning for those changes are in the column to the right labeled reason for modifications.

Next slide, please.

So I just want to talk a little bit about the emergency drought flow effects in the Scott River. Tributary data from the westside tributaries of the Scott were analyzed by Eli Asarian during the implementation of the LCS Program in 2022. He is presenting those finds today, but summarized them very, very briefly.

The flow gauges of both French and Shackleford creeks, two of the most productive coho stream tributaries in the Scott, showed substantially higher flows in 2022 when compared to the base flows of 2020 and 2021. The main stem did not show the same increase in flows, presumably because groundwater pumping was only curtailed at 30 percent reduction in pumping while surface water diverters were fully curtailed.

The main stem is dominated by groundwater pumping while the tributaries are primarily surface water diversions. Groundwater data was shared with the Department from one landowner in the main stem and the Quartz Valley Tribe. Both data sets showed higher water

elevations in 2022 when compared to 2020 and 2021 groundwater elevations.

Being this was the third year of drought in a row and groundwater elevations decreased from 2020 to 2021, we assume the notable groundwater elevation increase was in response to curtailment compliance and implementation of the LCS actions. This indicates that -- this data indicates to us the flow conditions of the West side tributaries, as well as groundwater elevations, were improved during implementation of the Emergency Drought Regulation, improved surface and groundwater conditions, support connectivity during migration of salmonids.

We also would like to note that during the summer of 2022, CFW field crews performed snorkel surveys on four reaches in the lower Scott Canyon. Surveys occurred when the Scott River gauge station was reading about 41 CFS. Crews noted then that all salmonids were observed in good condition of this flow and corresponding stream temperatures flows. Flows then dropped approximately 30 CFS to 9 CFS at the U.S. Fort Jones gauge between the July and the August surveys. Water temperatures varied according to location. Some sites increased and others decreased based on tributary contributions to the main stem. Snorkel crews noted that salmonids exhibited fungal infections and anchor worm parasites in all but one survey

reach. Approximately a dozen dead fish were seen at one survey location, a mix of salmonids, native and non-native fishes.

Flows remain similar during the following up surveys completed in September, but the water temperatures had decreased throughout the reach. Fish densities increased as the season progressed in reaches with cooler water. Fish exhibited parasites and disease at some locations, but not all. CFW will continue to survey reaches in the Scott Canyon to understand fish health and movements and varying flows and water temperature conditions. While thermal refuge seems to provide some relief to ambient Scott River conditions, fish density, disease, and predation rates in these areas continue to be a concern.

Next slide. Next slide.

So next I will share the information that the Department utilized for developing the emergency flow targets on the Shasta River.

The Shasta River adjudication does not have a water right aimed at protecting the Shasta River fishery like the Scott River does, but what we did have available was flow assessments contracted by CDFW to McBain & Trush in 2013. McBain & Trush used regressional models, standard setting methods, riffle crest measurements, one and two

dimensional hydraulic modeling, habitat mapping and photo documentation to summarize in-stream flow needs at the USGS gauge of the Shasta River in Yreka. And this assessment was also included in our June 15th, 2021 letter.

We also looked at the Diaz and Noel (phonetic) Technical Memorandum and provided a summary of the temperature -- summary of the modeled unimpaired flow and temperature values along selected points of the Shasta River. And finally, as with the Scott River, subject matter experts provided input and we made some adjustments based on current conditions.

Next slide, please.

So the McBain & Trush 2014 Shasta River Canyon Study looked at five different life stages of Chinook salmon, coho salmon, steelhead. They developed in-stream flow needs for a wet normal year and a dry water year type. They used multiple analytic approaches developing for the development of the in-stream flow needs document. They also had looked at historic and present life history timing, direct measurement of riffle crest thalweg depths, as I said before, photo documentation and photographic time series, Thompson criteria, and an evaluation of stream flow, of maximum daily temperature, stage versus discharge regression analysis to successfully develop a relationship between depth and stream discharge, as well as 2d modeling,

and (indiscernible) perimeter.

It's important to note here that this is the best available science to us to use in the Shasta and these methods are tools to develop flow criteria that we can consider and then refine by applying local knowledge and expert professional judgment. Life stages looked at included early adult Chinook salmon migration, adult salmon spawning, fry and juvenile salmonid winter rearing, juvenile salmonid growth and smolt out migration, and juvenile salmonid rearing summer base flows.

Next slide.

So as with the Scott River, there has been a lot of discussion that the flows we recommended on the Shasta have not been present in all but the wettest years. In 2021, when we were developing our flow recommendations, we modeled unimpaired flows, mean daily flows over the period of record from 1933 to 1922, and the proposed emergency regulation flows. As you can see in the graph on the left, our proposed base flows were below the mean daily flows at the Yreka gauge currently studied during base flow.

We also provide a gauge data from previously critically dry years that shows two things. One, there's a significant and immediate reduction in available flows at the beginning of the irrigation season around April 1st or 2nd. And two, there's a significant and just as immediate

increase in available flows upon the end of the irrigation season around October. This data indicated there wasn't enough water in the Shasta to meet the flow criteria we were asking for.

The proposed flows were tested during the implementation of the 2022 Emergency Drought Regulation. These flows were met at the Yreka engage during base flow with one violation mid season that was quickly corrected by Water Board enforcement staff. The CDF feels these are appropriate and achievable flows.

Next slide.

The proposed emergency regulation flows for the Shasta were largely based on a flow study conducted by McBain & Trush for the Shasta River Canyon. Modifications were made in response to comments that the McBain & Trush study did not evaluate a quickly dry year and that the desired ecological conditions expressed in the study were too high for the drought conditions of 2021 and 2022.

The Department's Water Branch conducted an internal review of the McBain & Trush models using a critically dry year scenario. This resulted in the highlighted flow reductions you can see in the column labeled Modified Regulation Flows 2021, along with the column on the right that lists the reasoning for the deviation from the initially proposed regulation.

You'll also notice the highlighted changes made in 2022 that were based on professional opinions that ramping down to avoid stranding fish in the spring and ramping up for migration in the fall is better for fish than having large jumps in flow requirements.

You'll notice that we do not recommend any changes for the period of April through June. This is a time when salmonids are growing and developing quickly. Days are getting longer, water temperatures are increasing, so more food is available in the system. This can lead to better survival for fish as the fish make their way back to the ocean. Maintaining a reasonable amount of flow during this period is important for this very reason.

The summer months of June through September are also important to have steady flows so we do not dewater important side channels and other habitats to support coho, steelhead and Chinook out migration and/or summer rearing.

Next slide, please.

We did see habitat improvements with the implementation of these flows in 2022. Water temperature analysis by Regional Water Board staff will show temperature decreases during the 2022 curtailment, and this information will be shared later today.

CFW conducted fish surveys and sampling in the Shasta Canyon during implementation of both the 2022 and

the 2023 emergency regulation. Out migration fish trapping operations in the canyon just upstream of the Klamath confluence were still catching salmonids on June 30th of this year. Trapping operations were halted due to safety concerns of surface water temperatures and our ability to move the trap safely when the river drops.

The snorkel surveys the following month in July observed Chinook juvenile still residing in the canyon. This confirms adequate temperatures existed for at least some portion of the summer base flow during implementation of the emergency regulation. It also adds more valuable information in our discussion regarding whether the summer water quality conditions in the Shasta Canyon are suitable for salmonids.

And lastly, I have included the USGS river gauge near Yreka hydrograph from 2021 to '20 -- to date. The orange arrow is indicating the base flow improvements seen during the implementation of the 2022 Emergency Drought Regulation, at times up to 40 CFS over the previous drought year base flow.

Next slide, please.

In summary, we reviewed all pertinent scientific studies regarding flows and fish presence in both watersheds. We solicited information from the public and continue to do so. We want to reiterate, the flow

recommendations are the absolute minimum required for species survival. We want to avoid any potential future listings for other species. And we're looking at all life stages of our three most vulnerable species to maintain stream function. And while we are not proposing any changes to the current emergency flow criteria, we will continue to collect, review, and consider information as it becomes available.

Thank you.

MR. EKDAHL: Thank you. And thank you for finishing under time, 24 minutes exactly.

Next up, we'll turn it over to Dr. Sari Sommarstrom.

And the questions we have here are: What emergency minimum flows do you propose and what scientific data and information support these flows? What other factors should the Board be considering with respect to emergency flows, such as providing recommended ramp down flows at the end of the regulation?

And then this last bullet, the flow requirements in the Scott watershed were not met in the summer and fall of 2022, even though curtailments were in place. The Board has received conflicting input regarding these flows, one set of inputs stating that the flow targets are too high and cannot be met in certain water years at all, another

set of inputs stating that noncompliance with curtailments and additional curtailment of groundwater would have resulted in higher flows, then another set focused on improvements in the system, even when target flows themselves are not reached. What factors or information should the Board be considering relative to the fact that flows were not met?

That last bullet is a long one, but, yeah.

And with that, we'll turn it over, and thank you. Is your microphone on? See if there's a --

DR. SOMMARSTROM: All right. There we go. I'm Sari Sommarstrom. I'm a retired watershed consultant and worked with the Scott River Water Trust for about eight years.

I want to talk about location, timing, and expectations next.

Next.

I feel like if we can't get to the same expectations, we're never going to get to success as a group, which is what the problem solving is about. What do we/what can we agree on with joint fact finding?

And so I'd like to start with what is the natural condition of the Scott River that we're hoping to at least mimic, knowing that there's 7,000 people living there now, and it's not totally unimpaired? But let's at least agree,

can we agree, on which stream reaches naturally are not perennial, that means they're ephemeral intermittent, which stream reaches are alluvial fans, and those that don't support good spawning gravels naturally, and those that would not support good rearing habitat.

Thank you. Next.

So when I moved there in 1988, I came with preconceived notions from working on the eel in the Russian River. And I realized this is a whole different beast over here in the Scott. And so I want went back to start looking at the history of what was this like once upon a time.

And so the oldest thing I could find was an 1852 U.S. Army map of the Scott River. And it's reasonably accurate in terms of proportions, which I think is really interesting, and it shows a solid main stem. It wasn't a big marsh. The mouth of Etna Creek has been moved from there, whether it was the 1861 Flood that did it or what, but that's changed. Other than that, there's only a few streams on the west side that were even considered mappable in the fall of 1852.

Another observer in 1851 said, there's only two or three small branches which continue to flow during the dry season. Again, this is before big diversions.

So next.

An 1882 topo map. This one's the Scott Valley on the left, Shasta Valley on the right. Topo maps are really interesting because of how they identify continuous stream reaches. And I don't have the resolution to zoom in on that one, but the one on the right is a 1955 USGS topo map. And back then, they used to make solid blue line for perennial stream and then dash-dot blue line for ephemeral. And again, if you could zoom in, Kitter Creek is shown as an ephemeral reach there around Greenview in the valley.

Next.

So the reason why especially Kitter Creek is not connected in the low flow season is that it's a large alluvial fan coming out of these western mountains. Our mountains on the Scott range there are quite young still. They're highly eroding. And we get heavy rainfall on the west side and that creates this erosion pattern called alluvial fans -- next -- which lead to big braided streams coming out. There's just a lot of gravel coming out of these young mountains as the steep mountains hit the flatter ground of the valley and there's not enough energy to carry the gravels further.

So this is Kitter Creek, where it showed up as an ephemeral stream on the 1955 map. But this is after, you know, high flow this December.

There are other alluvial fans.

Next.

And also this was acknowledged in 1958 by the USGS Groundwater Study, that most of the tributary reaches from the north and west have only a year-long flow in the upper reaches, but they're dry in the summer months because the water is sinking into this coarse gravel, and the flow won't normally maintain after the beginning of July. And this is pre-pumping conditions.

Next.

Alluvial fans, upper Shackleford is an alluvial fan. Patterson Creek at Highway 3, Etna Creek at Highway 3. That doesn't mean there isn't good habitat in other areas. Upper Etna had a nice coho run this last winter. Upper Patterson, we've leased water from there for the Water Trust. Yes, there's good habitat, but just by seeing this alluvial fan reach, you'd think, oh, this is terrible. But unfortunately this is what mother nature has done to us, even with no diversions.

Go. Next.

Gravel quality. Spawning gravel is not equal everywhere. This was some sediment study I did in 1990. And just a rather crude overall qualitative summary there, but there is a reach there, upstream and downstream at Fort Jones, that is the worst gravel quality. We'll see a sand-bed stream. It's not a gravel-bed stream there. There's

different causes that have changed us over time, but that is the lowest gradient reach. It's the flattest reach in the valley. That is where the fines are going to be deposited naturally. And this is a granitic watershed. And when granite erodes, even in the wilderness area, sand decomposed sand comes out of that. We have to have some place for the sand to deposit. Hence, not all miles are equal.

Next.

Quality. We also have good rearing habitat, like I said, in the tribs, often above these dry sections that you see at the Highway 3 Bridge, and then we have poor sections, like River Mile 35 there, which is again, that sand-bed stream and low gradient. It has been straightened for a few miles in here but it -- and it would not be a tight meandering stream just based on the grading. Big Slough is a tight meandering, again, based on natural gradient. There's only so much you can do with this natural conditions we've got.

Next.

And so locations, we need to agree on where are the historic and current spawning sites. And if you know where the spawning sites are, you tend to know where the rearing sites are, but there is definitely some movement. We've had spawning ground surveys for at least 20 years in

the Scott. So it's not just the count of what comes into the valley but where do those fish go? And you can match up with those locations with the flow. And that data is all available online.

Next.

1962, this is where Fish and Game did some of their spawning surveys. And again, you'll see that middle section around Fort Jones, there was no spawning there. Again, it's just naturally not good spawning gravels, so they want to go below there, they want to go above there. So we've got to get them through and that tends to be part of the disconnected reach.

On the right, the Fish and Game in '74, with the report that Mike referred to, adopted that same map on the left to say, Chinook spawning is in the main stem. Now and then they will go up in the tributaries when the flows are nice, but their primary spawning ground, based on historic data, is the main stem.

Next.

2019, Chinook red locations. QRCD (phonetic) does this. So here you can validate, how far did they get up and look at the timing in those reports and match it up with what the flows were, did they get where they needed to get?

The tailings is always another problem. That's a

different flow standard.

Next.

Coho, same thing. The Fish and Game in '74 said it's the tributaries, it's the tributaries, it's the tributaries. In 2010, this is where they were, the tributaries, the tributaries. This is what we need to focus on if you're going to look at species and life stage and what is important.

Next.

Rearing habitat. We have a lot of data on rearing habitat, quality and quantity found in many reports since at least 1990. The Water Trust did annual monitoring reports. Every time we released it on these tributaries, it tells you where the fish were and what flows they were. We don't have to guess. We don't have to go to 50-year-old guesstimates from the 1970s. We now have data, including the one on the bottom there, which just came out this week from the Watershed Council, again, observing fish locations, rearing, and water quality conditions.

Next.

So we have the timing of flows. We have location and we have timing. It's all about matching needs of water with locations and timing. Chinook are in on October. They're pretty much out by the end of June based on our data. So Chinook have to be protected in the right

locations at this timing. Coho come up in November through January, again, by all historic records and current records, and the out migrant overlaps with the Chinook. But they have to rear here, as Mike said, year round. So wherever the Coho are, that's a more year round expectation on where the juveniles are.

Next.

And so we have good data, like I said. We're not wild ass guessing like we did in the '70s. And we have a fish counting weir at River Mile 18 that's been in there since 2007. It's an excellent source of adult Chinook and coho salmon passage. And there's annual reports that summarize that data. And then the raw data is a day by day, flow by flow.

Next.

So here's an example of one of the issues. What percent fall Chinook is in the canyon versus the valley? Because we've got River Mile 18, and this tells you what goes above there to some of the better spawning gravels. So again, there are spawning gravels in the canyon. As those old maps showed, that is a natural distribution. A hundred percent is not expected in the valley.

So October mean flow there from '08 to '21, '22. The orange or light green, whatever color it shows up there is -- every time the October mean flow was below this 40

CFS target flow, then e-regs, despite it being below that, over 50 percent of the Chinook got into the valley. And the dark green on the right column was these years, which we know were the problem years 2015, 2018, '20 and '22, where it was less than 50 percent. And so we can match up if you have an expectation to get most of them in the valley. And the graph on the right shows that, and also flow by numbers and percent.

Next.

So the concern is, if there's too many in the canyon, isn't that terrible? So in 2020, 69 percent were below the weir, and this is brood year, and brood year '21, 29 percent were below. There was that nice peak flow. The average since 1999 on this kind of data is 137. Young fish, zero-plus were produced per adult. Despite two drought years, the '21 ratio was 251. And then supposedly the worst year, the 2020 with all those 69 percent stuck in the canyon, had also a very good higher than average. So those were two drought years with very high survival.

And I think that's what we have to focus on is what is the fish results of what's going on with the different flows rather than losing 50 year old data? Thank you.

Next.

So one reason is low expectations. We have

precipitation trends versus flow trends. And precipitation, this graph goes back to 1936, so (indiscernible) precipitation, the median is just over 20 inches and -- excuse me, mean. And it's fluctuated, but in the last 15 years, you can see it's dramatically gone down. And so you have to look at supply and not just the demand side of the equation. And your regs have been looking at the demand side.

We also have to look at what's going on with the supply side. And this is what Mother Nature is giving us is really on the downward trend. And we all know we need to adjust to what do we do about this.

Next.

So the magical numbers that show up in the decree and in the in-stream flow recommendations were not for the main stem, were not based on real-world data, they were just based on a percent of mean annual flow. So the summer rearing of 192 CFS for the Scott River was based on a 30 percent. This is from that 1974 report of a mean annual flow for just nine years, water years 1960 through 1969. I don't know why just not the whole period of record was chosen but just kind of a -- well, it didn't definitely capture the '64 and getting a higher mean annual flow and then taking 30 percent of that to come out with 192. And for the spawning season, it was two thirds, 67 percent to

come up with 426.

Next.

Those numbers then got translated into the decree. The third column over there, Scott River Decree total, you'll see that similarity of where it's 426 and the 192.

And then to the left there, as Mike said, this is split into two paragraphs for the Forest Service water right, 200. And this is State Water Board staff that did this, took that total number and split it up into a critically dry Table 1 and Table 2.

And then the far right column is what the emergency regs were, that Fish and Game recommended, very similar but not quite identical to the column on the left but very similar. And that's where Mr. Croteau (phonetic), I think, came up with those numbers because there was some. But again, the water right, I can go into the -- Marianna and I can go back and forth on where is that Forest Service water right really addressed in terms of its priority within the whole decree. That's a whole other issue.

Next.

So the Permanent Flow Petition did go for this 2017 flow criteria critique, and I'm not going to go into great detail on that here. It kind of deserves its own full workshop, but it was not also based on reality

efficient flow response. It was an abstract hypothetical one.

Next.

And we know we can get Chinook spawners up with pretty low flows. We don't necessarily need a critical riffle analysis. We've seen the fish, because of these spawning surveys, get up to these areas with lower flows than what the model numbers say.

Next.

Again, here's just the fall flow, September, October, November, comparing mean monthly flow to the proposed petition flow compared to the e-reg flow. And the proposed petition flows for September and October were higher than mean monthly for the 80 year period of record, which is questionable when it's needed.

So let's compare these flows here -- next -- to what we've actually seen. Okay, I'll just -- here's where -- how CDFW did that. Again, this is worth a whole other -- I don't want to go into the details, but those three models coming up with the permanent flows have a lot of weaknesses.

Next.

They did not use real-world data. They're hypothetical. That methodology is not intended for prescribing instream flow standards for, you know, for

research purposes. And using those numbers, we would never be able to do aquifer recharge in the wintertime.

Next.

So we do have real-world flow and fish data. Just like I say, we may be missing some places, but we know it's spawning access. We know it's spawning successes.

Next.

Just looking at one example, year 2012, for instance, we have data on daily fish numbers coming through the weir. We have flow numbers. In 2012, October 5th, one Chinook, the first Chinook, came in at 21 CFS. That was enough to get them up through 18 miles. And just the numbers kept building, building, and building up as the flows just gradually went up. Sometimes the flows just dramatically go up to 500 CFS and we don't catch this. We don't catch this minimum. And then October 27th, four coho started coming in, October 27th, at 41 CFS.

So this kind of data is there for every year going back to 2007 for these two species. This is the kind of analysis I would like to see next.

MR. EKDAHL: Just a quick note that you are at 16 minutes, so if we can wrap up shortly?

DR. SOMMARSTROM: Oh, you're going to give me a five-minute warning. Okay, I'm almost there. Oh, I'm sorry. I was looking at my slide. Yeah, okay, sorry.

So we have different years. 2013, you know, we got all these spawners at 73 percent above the weir with a very low meeting flows. And in 2013, we had 2,700 coho. They got up adequately at a mean flow of 50 CFS, close to your recommended flow of 60. However, the trips were not connected due to really bad weather conditions that year.

So I can say you can look at the minimum flow. Does it get you where you want them to get to?

Next.

So we just have this kind of data for 2009, another drought year, which percent got up. 2015, what got up and didn't.

Next.

Then we got the most recent years and then compare it to the flows versus your recommended.

Next.

And if you look at just the winter flow need modeled, the models at 362, the real flow data shows we had plenty of access for the coho in the 54 to 80 -- 180 range. We didn't need to go to that model flow. We have the data to show your access. And then we have the survival with the outmigrant.

Next.

So what is my definition of success? I think we need to meet realistic expectations within the context of

the Scott River. It is an undammed river with no surface water storage for control releases. You're expecting to get flow releases out of groundwater that doesn't happen the way you can on a dammed river. And we need to use real fish flow and data and -- flow and fish data for location and timing of what we're talking about. And we need to define expectations of spawning distribution, percent locations, and Mother Nature, this is what they do in a good flow.

I mean, we're always challenged by saying this isn't good enough. What is good enough for percent spawning distribution? We have the data to show that and we have the survival.

We need to address how, when, where the tributary flows affect coho distribution and survival. I agree with Michael Harris on that, the tribs are important. And that we need to ensure that aquifer management for flow expectations requires supply as well as demand management. And we'll talk about that later with the LCS talks, how do we get into that?

Thank you. Sorry if I was over.

MR. EKDAHL: No. Thank you. Still pretty close on time and appreciate the very thorough overview in, admittedly, a very short amount of time to go through a lot of data, so I appreciate it.

DR. SOMMARSTROM: Thank you.

MR. EKDAHL: Let's see, let's next turn to Gary Black, and we have two questions. What emergency minimum flows do you propose and what scientific data and information support those flows? And then the next question, what other factors should the Board be considering with respect to emergency flows, such as providing recommended ramp down flows at the end of the regulation?

Thank you.

MR. BLACK: Thank you. Thank you for the opportunity to be here. Again, my name is Gary Black and I'm here on behalf of the Shasta Valley Producers, but also with support from Siskiyou County Farm Bureau, Shasta River Watershed Conservation Group, and just involved in the product of agriculture. So again, I appreciate the opportunity to be here.

And my question is -- next slide, please -- or one of the -- the first question I got was, what emergency flows do you propose and what scientific data and information support these flows? So I think that's a pretty straightforward question. And I'm going to approach this question by first reviewing the Emergency Drought Regs.

But I first want to say that, you know, we

recognize that there's, you know, a lot of things going on. We recognize that you, the Board staff and the Board, are trying to balance some really difficult issues. And it's been a long struggle between, you know, agricultural needs and in-stream flows in both watersheds.

And so I think both watersheds get paired together because those conditions exist in both watersheds, but they're very different watersheds. And I think that if we narrow down into each watershed, while some of the issues are the same, the uniqueness of the watersheds forces to differ. And hopefully we'll get into that a little bit. But I think, you know, it's not a one-size-fits-all for the Scott that will work in the Shasta and vice versa, simple to say.

I also wanted to, you know, acknowledge that, you know, in the previous panel that we acknowledge the, you know, the importance and the condition of the salmon runs and the importance it is to our downstream communities. And the fact that, you know, the Yurok Tribes and others have foregone harvest, we take that seriously. And, you know, you've placed your trust in us this year that those fish that you've foregone are going to end up, you know, hopefully providing a productive life cycle and there'll be an investment in your future. I think we accept that task.

And I think the agricultural community in both

watersheds is very serious about the condition of fisheries and our responsibility to enroll those fisheries. What's happened over the last 25 years with education of farming with salmon is we've become very educated about what fish need. And sometimes the limitations are funds, willingness, cohesive designs, and partnerships. And so those are the things I think we need to work on.

So I better get moving on my 15 minutes, but I wanted to get that out of the way.

Next slide, please.

I'm going to first acknowledge that we want to see some changes in the regs for the Shasta River, but we're not proposing a total rewrite. We think there's a lot of necessary components in the previous e-regs. And we recognize that there's not time for a total rewrite, nor do we think there's a necessary need for a total rewrite.

We do feel that there is importance to address during the over-summering period with the minimum flow of 50 CFS in the canyon. We don't feel that the value that that 50 CFS provides in the canyon justifies the impact to agriculture during that same period. We feel that there's a better way to offset the fishery benefit by focusing on the over-summering areas that the fish identify, that the fish utilize, and not trying to extend an effort to where we create over-summering habitat or justify this as over-

summering habitat in the canyon. And I think, you know, Mike addressed that, you know, that those are warm temperatures. And that's difficult country there. And water quantity and water quality have a relationship, but there's only extent to that relationship to so far.

And you know, beyond that, all of this is a work in progress. And, you know, we're not proud of the fact that we're making the argument that, you know, the canyon is not an over-summering habitat currently. Hopefully, it can be at some day, but there's a lot of things that have to happen in place before that happens.

So at that point, you know, I'll prelude that we just feel that over-summering habitat justification in the canyon and 50 CFS going to the canyon is not justified. And we'd like to see that focus placed elsewhere in the watershed where the fish are actually utilized.

Next slide.

This is just a less sexy graph than Mr. Harris's on the evolution of the e-regs, but it shows the change over time and that the process works. You know, there's been recommendations for reevaluation and that occurred and there was change. I'm not saying that happens every time. There's compromise. I think that that's the right process of what we're looking for.

I highlight the red because that's where the

impacts are at. And I see now that you can't see the numbers in the red, so my apology there.

Next slide, please.

So I recognize that there's strong opinions, you know, about flows in the canyon and that there's value in flows in the canyon, you know, beyond just the existence of fish habitat. And I recognize that there's short-term and long-term objectives and values and there's varied inputs. And a lot of the impacts on water quality and temperature that are currently in the canyon are a condition of actions upstream. And we have a lot of work to do in agriculture to improve those conditions. And maybe, hopefully, someday we can get to the point where the canyon is closer to over summering habitat, or its habitat value extends further into the summer and recovers faster in the late summer and fall. But trying to achieve a suitable temperature in the canyon should not be a consideration of emergency curtailment.

Next slide, please.

These are just some pieces within McBain & Trush. I highlight them, not necessarily to rub it in anybody's face, but they're in there and they're the alternative that we want to look at for the short term e-regs. Again, long term, we want to build something with the agencies, with the tribes, with the NGOs that looks more like, you know, a

properly functioning condition throughout the season. But at this point in time, these are the objectives that we look for, that we look for a different way to quantify over-summering value in the Shasta.

Next slide, please.

So our approach would be based on some type of a balanced summer emergency regulation where we still use the Yreka gauge, but we aim for a lesser value and we extend some of our energy to highlight a different methodology in order to implement cold water protection expansion projects where the fish are currently utilized over summering habitat, and that's in the southern portion of the watershed. In the springs it's cold water tributaries, such as Parks Creek, Big Springs Creek, and specific springs within those reaches. And so it's an exchange for reducing canyon flow in the summer for commitment to protection of an expansion of habitat in the upper portion of the watershed.

And I think because we don't know what type of water year we're going to have in 2024, and I think because the objective in my mind of this emergency period isn't necessarily just to get through one more year but it's to inform ourselves, and so I think it's worth trying to develop a process to where we imagine a water year type in 2024, and that we have at least two water year types that

we potentially consider, you know, at something like a normal or drier -- or a normal or wetter and a drier than normal type, where we have a sweat in our objectives based on what water year type we're going to have in 2024. I think that informs management in the future and moves us towards longer term treatments and hopefully, you know, informs what's successful and what's not.

I recognize that these emergency regs need to be implementable and trackable. And I recognize that the current format provides that. And I also want to highlight that water quality in the Shasta is a limiting factor and, yes, it's connected to quantity. But in the Shasta, water quality is a limiting factor. And so the State Water Board is limited because you only have controls to lever water on for egg or off or reduce for egg and the reverse of that, more for water. So the limited portion of quality is based on long-term function, TMDL, working with the North Coast Board.

Next slide, please.

So the scientific data and information is used to justify our approach for minimum in-stream flows in the canyon. And again, we're proposing a minimum in-stream flow in the canyon with the potential to build upon it based on year type. And so what we're first presenting here is just the bare bones minimum belly-scraping

condition for canyon minimum flows throughout the calendar year.

Next slide, please.

These are just our recommendations SPB proposed compared to 2022 regs that were implemented in '22 and '23. And so you can see variations, you can see reductions throughout ours, and then there's justifications to the right for those values.

How am I doing on time? I'm I halfway? Three minutes left? What happened to the time?

So you can see, you know, there's a variation in time.

Next slide, please.

I don’t think I read the comments there other than just, you know, a proposed reduction moving forward.

Next slide, please.

Again, reduction in flows at the canyon with a water temperature trigger for July through August.

I'll move forward to the next slide.

So our over-summering approach also would combine the minimum flows of the canyon with coupling with the over-summering objectives of the Safe Harbor Agreement where nearly all the over-summering habitat is located, and that we consider developing a process where we provide an LCS for the Safe Harbor participants in order to protect

and expand the over-summering habitats as they've made in their Safe Harbor commitments.

We'd also like to see, and we feel that would provide flexibility for the State Water Board to finish evaluation on the petitions that were submitted and make those conclusions by March 1, 2024 so that we know that those contributions are secured and provided for the in-stream benefit.

Next slide.

So we're proposing, you know, on top of minimum flow and Safe Harbor, some evaluation of normal and wetter where we provide, you know, potentially additional flows in the spring to extend the out-migration piece, like you saw this year where we mentioned that fish were in the canyon and they were trapping fish through June. We like that. We want to help out on that on these better years. And just to highlight that Safe Harbor helps do that as well.

Next slide.

Again, just justification for Safe Harbor objectives.

Next slide.

Real quickly, in 2023, we implemented this proposed agreement after the EREGs finished from 08/01 to 09/30.

Next slide.

And you can see there with our internal objectives, we did a pretty nice job of meeting that, utilizing riparian users, groundwater users, adjudicated users. We can do this. You need us locally and we can do this and we can help out.

Next slide.

Transition to long term, our approach helps us build to a long-term strategy. That's really all I'm saying here and that's what we like about it. It's not a one-year deal. It's an evolution.

Next slide.

These are just some highlighted comments that we think the e-regs need to revise. We would like to provide or offer a red line of the 2022 regs that consider surface water, groundwater, LCS boundaries to be less defined rather than full tributary, stock water prohibition shortened or based on a reasonable flow values, recognizing that recharge and recharge research is an investment in the future in both watersheds, and we'd like to see some flexibility built into that. We'd be happy to work with you on that.

Next slide.

So we want to address the flow issue with the Board, with the tribes, with the NGOs, everybody that's interested. We don't think you can do this without us.

We've broadened our vision not to just be within our watershed, but the entire Klamath Basin. We ask that this process respect and complement ongoing processes, including the SGMA process that's provided us valuable information as fast as it can. And we want to remind that even though we all get in a rush and there's a lot of political pressure out there, science has to lead these processes. It just must.

Thank you.

MR. EKDAHL: Thank you very much. That brings us to the end of panel two, part one.

We're going to take a 40-minute break for lunch. It's five after 12:00, so we will reconvene very promptly at 12:45. Thanks, everyone, and we'll hold questions until after the second part of the panel.

(Off the record at 12:05 p.m.)

(On the record at 12:50 p.m.)

MR. EKDAHL: Okay, it's 12:50 right on the dot, so let's reconvene panel two, part two. And up next we have Eli Scott from the North Coast Regional Water Quality Control Board for 20 minutes, followed by Dr. Thomas Harter and Leland Scantlebury from UC Davis, followed by Bronwen Stanford from the Nature Conservancy for 10 minutes.

And with that, I'll turn it over to Eli. Great. Thank you. I probably need to read the question too, so

pardon as I get my reading glasses, which I can't read anything, like the clock is currently running.

Please provide -- I didn't hear what you said and I don’t believe I want to -- please provide a brief overview of your February 10, 2023 analysis of the MIC (phonetic) public memo dated June 13th, 2023 regarding CDFW in-steam flow recommendations for the 2022 readoption of Drought Regulations, as well as other water quality data and info pertinent to evaluating the impact of the emergency regulation.

The second bullet is: Did water quality change in the Scott and Shasta following implementation of the e-reg flow requirements? If so, describe the data and changes that were observed, and any associated conclusions regarding benefits of water quality parameters associated with Scott Shasta fisheries.

MR. SCOTT: Okay, well, good afternoon. I'm Eli Scott. I work for the North Coast Regional Water Quality Control Board. I'm a Senior Environmental Scientist and I do watershed stewardship in the Scott and Shasta, which essentially is regulatory and nonregulatory solutions to water quality issues.

I'm going to try this pointer. Hey, you work.

Okay, so here's what I'm going to go through. There's a lot of information here, and I'm going to go

really fast, so buckle up. I'm going to briefly talk about flow and how it relates to the Scott and Shasta TMDLs, the data collection efforts that we've been conducting in both watersheds, and water quality observations that go to answer those questions. And I do them in reverse. I talk about the Scott first, and I think I'm just biased by my last name, so my apologies.

So we've been talking about these watersheds all day. I just want you all to keep two things in mind. As Gary black mentioned, they're very different watersheds. The Scott is a snowmelt-driven deep alluvial basin. The majority of precipitation falls on the west side. And you can see in the map there, the concentration of tributaries on the west side just speaks to that hydrology.

The Shasta, on the other hand, is spring-fed, volcanic. It has stable base flow. The majority of the water in the Shasta River comes up from the ground under that first A in Shasta on the map, so right smack dab in the middle of the watershed.

The Scott has two TMDLs for excess sediment and elevated temperature. It was listed as impaired for sediment in 1992 and listed as impaired for temperature in 1998, and the TMDLs were approved in 2006.

On the Shasta side, it's impaired for dissolved auction and temperature. And it was listed for dissolved

auction in 1992 and temperature in 1994, and those TMDLs were approved in 2007.

So these TMDLs are long range plans. They aim towards watershed-scale recovery, and that's what the Regional Water Board is focused on, so you'll notice that that's where the focus is on this particular presentation as I get into it.

With respect to flow as a driver of impairment, the temperature impairment is driven by five main factors, and I'm just going to focus on those two bold ones because that's where stream flow comes in. So as stream flow is affected by groundwater accretion, we see impacts of temperature from that, and as stream flow is affected by surface diversion, especially in the tributaries, we see temperature impacts from that.

Specific to groundwater accretion groundwater is a source of cold water in the Scott in the summertime. Contributions from groundwater develop thermal refugia and provide increased flow and thermal mass. That thermal mass buffers temperature changes from atmospheric temperature and solar radiation, the two drivers that we do not have control over, and also buffers change from inputs of warmer water, whether they be warmer tributaries or tailwater flows from irrigation, which are fairly minimal in the Scott but do occur.

It also increases -- increase in flow also reduces travel time and that reduces the time a unit of water is exposed to solar radiation, reducing the impact from that driver. Increased flow also increases pool depth, providing additional temperature refugia as the deeper pools stratify in the summer.

Looking at how surface diversion affects temperature, like I said this is especially important in smaller tributaries which tend to host the over-summer juvenile salmonid rearing, especially for coho. Total diversions in those smaller tributaries can constitute a large portion of total stream flow. And so tributaries like French Creek, Shackleford Creek, Kitter Creek above the little fan and these for Scott River, you can see those impacts.

Shasta River, moving over to that watershed, also has five anthropological impairments that were very consistent with the Regional Board, and two of them are affected by stream flow, again, consistency. So that's groundwater accretions and spring inflows, and then stream flow affected by surface diversions. There's kind of a theme here.

So to illustrate just how important the cold water spring inputs are in the Shasta, back on June 16th of 2022, the Watermaster went out and measured Big Springs

Creek and Little Springs Creek. Those two tributaries combined produced a flow approximately 73 CFS. Shasta River downstream of the confluence of Big Springs was measured at the Granada Irrigation District pumps at 92 CFS on that day, which means that Big Springs and Little Springs combined constitute about 80 percent of the flow in the Shasta River on that day.

Smaller spring accretions within the watershed help enhance those low those cold water sources by providing additional cold water inputs and also providing localized over-summer temperature refugia dispersed across the watershed.

So here's a picture of me in the Shasta River, just to really put a fine point on this. I'm out there doing science work with a really important science thing in my hands. Above the confluence of Big Springs Creek, you can see the water comes up to about my ankles, and if I were in the thalweg, it would probably be up to my knees, so fairly shallow, about six feet across, maybe a little bit more, and this is on April 15th, 2021.

Big Springs Creek on that same day you can see me also doing important science work with science things and the river is much wider there. There's tons of flow coming out of that cold waterwheel structure. It just shows how much flow is coming out of Big Springs Creek in proportion

to the Shasta River upstream of it. And that flow is cold and high quality.

Now moving back -- this should say Shasta, my bad -- so surface diversion from the Shasta impact stream flow, if we look at the aggregate flow of surface diversions downstream of Big Springs Creek, they can range from 60 to 120 CFS based off of availability. This diversion decreases the thermal mass that we were just talking about that comes from the Big Springs and decreases velocity which increases travel time and the impact of air temperature and solar radiation, again, those two factors we can't control on in-stream temperatures. And that, also, those diversions also end up increasing the overall heating effect of irrigation tailwater, which is a much bigger problem in the Shasta than it is in the Scott.

So how are we collecting data? In the Shasta, we have the Stewardship Monitoring Network, which is a network of continuous temperature and DO stations. There's about 33 temperature stations, I may have misadded but somewhere around there, and 10 dissolved oxygen stations, and some of these stations have a historical record that goes back to the mid '90s.

On the Scott, we've established -- and I should say the stations in the Shasta are managed predominant predominantly by the Shasta Valley RCD and it's a

collaborative network of water quality monitoring stations.

In the Scott the Regional Boards established seven biosimilarity conditions monitoring stations. This is to inform an impairment that was listed in 2012. They're mostly focused on the main stem. We do biweekly nutrient sampling and photo point monitoring, and have continuous temperature and dissolved oxygen stations established there as well. We also do a summertime base flow measurement in late July each year as best we can. And we do the California rapid assessment method for riparian health every five years, which we've only done once so far because it's only been, you know, three years of data collection.

So to assess the impacts of the emergency regulation, this is where I'm doing it backwards, I'm choosing two of those stations. The downstream station, which is the northern station because Scott River flows north, is Scott River below Eller Lane. The upstream station is Scott River below Youngs Dam. And we were given access by a landowner to the groundwater monitoring well data that they're helping UC Davis use for the Scott Valley Integrated Hydrologic Model, so we'll be able to look at groundwater conditions.

I want to caveat that we're really focused on site-specific changes between the two years. That will

give us information that can tell us what's going on, but we really need a more comprehensive data collection effort to have a watershed-wide view on the impacts of these regulations.

So looking at the effects of emergency regulations in-stream with the photo points, at the downstream station on August 11th, 2021, before the regulations were in place, you can see conditions are pretty dry. That is not water that’s circled. That's actually just some debris in the channel.

We fast forward a year to August 17th, 2021, after the regulations are in place, you can see an isolated pool which is sustained by groundwater surfacing at that point. Still not ideal conditions but it's a changing condition.

Moving to Scott River below Young's Dam, on August 11th, 2021, before the regulation, also very dry, though there is more water present, there's more groundwater and surface water interactions at this location in most water year types.

We fast forward a year, you can see what I would consider more water in-stream covering much of the cobbles there. And in terms of observations for fish when I was there, I'm not a fisheries person but there were fish present both years at this point. I don't know what type

they were. I don't know how to type fish, but they were there. And, you know, it seemed like, behaviorally speaking, they were doing a little bit better in 2022 and 2021.

Looking at groundwater, so just to explain this graph a little bit, the y-axis is depth to groundwater expressed as feet below ground surface, and the x-axis is date, and the red box is when there were no regulations in place, the green box is when there were regulations in place, and all those dots are groundwater elevation measurements that were recorded daily by an automated logger.

So on August 9th, 2021, the maximum extent of depth to groundwater that year at this location was 18.8 feet. On September 14th of 2022, the maximum extent of depth of groundwater at this location was 16.3 feet. So not as deep after the regulations were in place.

So just to get into why this may be, looking at sort of the water supply side of things, precipitation records at these three gauging locations that exist in the Scott River, this cumulative rainfall measured at those locations, relatively similar, not much difference between 2021 and 2022. If we look at snowpack, a pretty significant difference. In 2022, there was significantly less snowpack as reported by the snow surveys conducted by

the U.S. Forest Service and their partners in the Scott watershed, 27 percent as opposed to the 73 percent in 2021. So we see a drier water year in 2022 than in 2021. And despite having that dryer water year, we see elevated groundwater conditions.

This is just showing temperature data expressed as box and whisker plots. So that dark bar in the middle would be your mean and then your spread of data around that mean. There's not much of a good story to tell. Well, there's not much of a story to tell in temperature between 2021 and 2022.

And I need to explain this graph again because it's a bunch of numbers on axes. So the y-axis is degrees of surface water temperature, expressed degrees as Celsius, and the x-axis is station location relative to the mouth of the Scott River. So the lower numbers is river mile. The lower number will be downstream, higher number will be upstream. So the downstream sites on the right side, the upstream sites on the left side.

But again, you can see some stations are cooler in 2022. Some stations are actually warmer in 2022. So we don't really see an expression of those different groundwater conditions in in-stream temperature between those two water years. What you do see in 2023 is generally cooler conditions across the board, which speaks

to a good water year or a better water year where there is more groundwater surface water interactions.

So the good that we can point out, we had increased groundwater elevations in 2022 as compared to 2021 and increased wetted area across much the watershed, especially at those two locations that I showed. Well, really, especially the upstream location. The downstream location had more water but it really wasn't that much more wet.

The less good, summer groundwater-fed base flows were insufficient to counter the effects of atmospheric temperature and incoming solar radiation which are, again, the two factors we can't control. We also had the fourth lowest Chinook run in Scott on the 45-year record according to CDFW's numbers that came out in their final report. And only about seven percent of those estimated returning spawners made it into the valley, so there was definitely an access issue.

So in terms of thinking about how we focus on fall flows going forward to help those Chinook come in, much of the Scott River management comes down to timing, timing of things we can't control and timing of things that, you know, the greater community and regulatory agencies can help folks think about how that could be controlled. So the timing of fall and winter precipitation

we can't control that. We got late winter -- early winter precipitation, late fall precipitation in 2022 and we saw the consequences of that.

The timing of snow melt, which dictates the amount of water in the springtime that can be used for groundwater recharge, we don't have control over that and we had a pretty cold spring in the Scott in 2022.

The timing of groundwater extraction is something that we can control, either through cutoff dates or utilizing surface water in the form of in the recharge instead of groundwater in the early part of the irrigation season and preserving that groundwater recharge and topping off the aquifer for the summertime. We can also control the timing of groundwater recharge to a certain extent which will also help us time when in stream accretions of groundwater can come into the main stem and support flows for Chinook.

We really need to understand how each of these efforts tie into timing and how each other -- any other effort we put in -- we put effort into comes into timing. And we need to clearly quantify the timing uncertainty in the models that we use to make these management decisions that includes both groundwater surface water Scott Valley Integrated Hydrologic Model, as well as NOAA's river forecasting model, different things that tell us, hey,

we're going to have this flow at this time. We want to know how many days, plus or minus, we're going to, you know, have in that forecast.

So recommendation, I changed this. Okay. Actions for supporting these falls is really what this should be called. I actually was changing this presentation up until this morning, so my bad. The strategic irrigation management, that means establishing thresholds for groundwater elevations that trigger a change in irrigation practices. We want to know, like how much groundwater do we actually need in the system to support the flows that we want to support fish? And when we reach that threshold, what changes can come in place to support extending those flows for the longest time? It could be cut-off dates, it could be based off of water your type, it could be changes based off of water type.

We need to implement not only managed (indiscernible) for recharge, which have been huge efforts to do, but also in-lieu recharge to the fullest extent possible, coupled with service diversion limitations tied to flows at the Fort Jones gauge. The modeling that's been done by UC Davis has shown that that can result in some water that stays in the system.

And then in improving irrigation efficiency where appropriate. I want to say the agricultural community on

the Scott has been very proactive about improving irrigation efficiency long before the emergency regulations were put in place. Many people utilize low moisture sensors, low elevation irrigation applications through center pivots, but there's still more savings that can be made. And if we can do it in the areas where it matters to have water savings, that could result in some additional water in the system.

So moving over to the Shasta, I'm way behind, I'm way behind time, but I'm going to get into this really quickly. So I'm going to characterize a couple of things that I call flow experiments. They weren't really flow experiments but they give us that opportunity to look at the impact of flows on water quality and offer some hypotheses regarding the drivers of the water quality conditions we preserve -- we observe.

So real quick on this chart, the gray line is dissolved oxygen conditions. The orange line is temperature. Those two are measured at Salmon Heaven which is location in the Shasta River Canyon at the TMDL compliance point. The blue line is a hydrograph during Shasta River water Associations violation of the curtailment, which was from August 17th to August 25th, where we saw pretty big drop in flows.

And we saw impacts to water quality. You can see

the diurnal trend, that's the daily extent of maximum and minimum concentrations of dissolved oxygen, expands when there's less water in the column, and that presents fish conditions that are not ideal. Fish don't like too much oxygen in the column and they certainly don't like too little. And we can see those conditions get exacerbated when that drop in flow happens.

Maximum temperatures, as you can see, also creep up during that flow drop and then come back down after flow is restored. Just to quantify that a little bit, despite seeing a daily average maximum air temperature fluctuation of about 0.51 degrees between pre diversion, diversion and post diversion, we saw a increase in temperature of 1.86 degrees during the Shasta River Water Associations diversion, so that's two degrees of average daily maximum temperature increase.

Moving to the Podlech recommendation, I think Gary Black spoke a little bit to this so I don't need to go about -- go around the background. You know, he proposed a 30 CFS change in the minimum in-stream flows in the summer from 50 CFS. So the State Board came to the Regional Board and said what do we think that would do to in-stream conditions? So we were able to identify three flow regimes, the baseline which is pre-curtailment 2021 July flows. Mr. Podolak's recommendation was 30 CFS, so you can

see the hydrograph for the Shasta River and Yreka right there.

I looked through the hydrograph to find a period that would be around 30 CFS and still have temperature data recorded at Salmon Heaven and was able to identify a period in 2018 July, which is really nice because it's also in July. And the curtailment, we looked at 2020 July flows. We looked at maximum temperatures on a five-day rolling average, and then at Salmon heaven, as well as maximum -- weekly maximum temperatures longitudinally across the Shasta River.

This red line that didn't show up really well but the text is relevant and speaks to it. So all study windows had relatively similar average daily maximum air temperatures which indicates a similar driver in the impact of air temperature on water temperatures. The Podolak flows also had the lowest average daily maximum solar radiation, where we would expect to see some lower temperatures, because there's less incoming sunlight to heat up the water column.

Essentially what we saw is the Podolak flows showed a 1.1 C reduction in daily average maximum temperatures over the baseline. The curtailment flows of 50 CFS showed a 1.8 C reduction in daily maximum daily average maximum temperatures over the baseline. And there

was a greater reduction in stream temperatures with 50 CFS despite having the highest average daily maximum solar radiation incoming which means there's more sunlight to heat up the river.

So looking longitudinally, the green line here is the curtailment flows at different stations across the river. The red line is -- it should be orange, actually, I was trying to not make it red -- is Michael Podolak's recommendation the blue line is baseline. What we see is the curtailment flows showed a consistent improvement in in stream temperature from River Mile 25 to the mouth. And I should mention, the zero on the x-axis is the mouth of the river. The 40 is the upstream extent of this study. And then the y-axis is maximum with the maximum temperatures expressed as degrees Celsius.

The Podolak flow did show some improvement from River Mile 25 to 15, but then that quickly moved back to baseline conditions as you got further down the river. The curtailment flow may have provided more habitat downstream of the big springs confluence to support over-summering juvenile salmonids. Where the downstream extent of that really ends for like ideal conditions, we don't really know, we don't have data on, but you can see there's a 2.41 degree difference between curtailment at the mouth and Podolak recommendation.

Now CDFW did get out in the river in 2022 on July 27th to look for fish in what I'm calling the search for salmon, I made that up, I like alliteration, and they found steelhead. So that indicates there's the potential for cold water refugia being utilized for over-summering that year.

And just to real quickly wrap up, I have only a couple more slides, I'll be very brief, 30 CFS may provide some temperature reductions but not as much as 50. And the WMT analysis showed that water quality benefits from curtailment lasted all the way down to the mouth of the river. And we hypothesized that's due to that reduced travel time from increased water velocity. Reductions of tailwater inputs probably had something to do with it, due to it, because of reduced irrigation diversion, and preservation of local cold water inputs which provide refugia.

But when it comes down to it when you look at the TMDL and what the Regional Board says needs to be done on the Shasta, from a water quality standpoint, looking at species recovery as opposed to just survival, 50 CFS represents a water quality belly-scraping flow. And that's going to be a long-term thing that gets addressed over the long term, like Gary was referring to, but it did provide a benefit. And we believe that's mostly due to the increased

cold water from Big Springs due to the priority of Big Springs Irrigation District's right. They were the first to be curtailed. It looks like, from the data that I've seen, that they pull water from the same formation as what supports cold water flow from the Big Springs complex.

And then that, coupled with decreased surface water diversions during the critical summer period, preserve that cold water further downstream, and so we observed decrease in stream temperatures in the most downstream reaches and potentially increase habitat availability for salmonids during summer months.

And this should say thank you, not questions because I'll be held to the end.

MR. EKDAHL: Thank you.

Let's go to the next slide. This is for Dr. Thomas Harter and Leland Scantlebury from UC Davis, and also Bronwen Stanford, the Nature Conservancy. So I'll read both questions here and not read them in between the UC Davis presentation and the Nature Conservancy presentation.

Some third parties characterize the existing Scott Valley integrated groundwater hydrologic model results as saying that the emergency levels are too high and will be impossible to meet in most years. Is this a fair characterization? Why or why not?

And then what other factors should the Board be considering with respect to emergency flows, including providing recommended emergency dam flows at the end of the regulation?

DR. HARTER: Thank you, Erik. My name is Thomas Harter. I'm at the University of California Davis, and this is really the work of current and former students. Leland Scantlebury is now my main architect on this integrated -- Scott Valley Integrated Hydrologic Model. Claire Kuba (phonetic) is working with us as well. She was a Ph.D. student (indiscernible) that worked on that. Eunice Pushik (phonetic) helped me today with some of the graphics. And Laura Foglia and I have been working on the Scott River and on the Groundwater Sustainability Plan for a number of years now. And Laura was one of the early developers on that model.

So I'm going to start with my conclusions. And I'm going to focus on the question, whether the proposed emergency flows can be achieved.

Without any actions, the flows, if you look at the record for the last 80 years, they would be achieved in one out of four years of the last 30 years. And I'll get into more details later. In the 2000s, I actually should say since 2000, not since 2020, in the last 20 years, one in five years would have met these minimum flows without

any actions.

If you apply the curtailment rules that we had last year very roughly, using our model, in 24 or 32 years, because only 8 years in these last 32 years actually were pretty much above those emergency flows without any actions, so in the other 24 years we applied the curtailment rules, we see some improvements in compliance in the fall. We don't really see a big-picture improvement in compliance with the proposed flows in the summer.

If we were to do a full curtailment, just watered in a 30 percent curtailment on the LCS, if you take the LCS out and do full curtailment of groundwater and surface water on these curtailment dates when the flows go below the required flows, in those 24 -- those 32 years, then we do see both significant more compliance in the summer and more compliance in the fall with these specific flows.

So that said, let me just kind of illustrate this and start with the graph that I showed in August, which showed the compliance of the flows over the last 80 years with the CDFW 2017 flows in the original (indiscernible) petition. And let me sort of explain what this graph is.

So this graph shows every day of the year, from left to right, starting January 1st on the left through December 31st on the right. The vertical lines are the first of the month, every month of the year. From the

bottom to the top, I'm basically lining up 1941 as a line, then 1942, the next line, and I go all the way to the top, which is 2023. And this was basically showing green if the flows are above that flow rate, that recommended flow rate, and red if the flows are below. So it's just an on-off thing. This is the CDFW 2017 table that I used for that graphics.

If I do the same thing using the emergency flow table, then the graphic looks very different. And what you can see is if I look at this until the 1977, in basically most years other than 1955, 1958 and maybe 1973, there wouldn't have been any curtailments, more or less. There was basically a curtailment free.

In the period between 1977 and 2000, we see significantly more summer flows. So those are the middle right side where we load the required flows going into the fall.

And then when we get into the 2000s, after 2000, most years we are actually below these flows. And it's in the last 23 years, it would have been 19 years where we would have significant curtailments throughout.

And what I'm indicating in white here are the years in the last 32 years -- in the last 42 years that wouldn't have had curtailments. So I'm going to kind of call these three periods, the surface water irrigation era

until 1976. And in the 70s, we added a lot of groundwater irrigation, we pressurized, we went to wheel lines with sprinklers, we did more efficient irrigation, we added pumps, we drilled wells, so now we have the pumping era starting in the 1970s. And then superimposed on that since 2000, we're in what some people have called a megadrought. And we see the additional intensity of that megadrought in this graph very clearly.

So we want to use the Scott Valley Integrated Hydrologic Model to ask the question, if certain actions had been done, and in this first presentation, I want to focus on the curtailment action, if the curtailment action had been done, what would happen to this graphic?

The simulation starts in 1991, actually October of 1990, and this latest version of the simulation actually goes through last Saturday. So the end of the line at the top right, that's last Saturday, September 30th, end of 2023 water year. So I'm going to take that, I'm going to go specifically at summer flows on one, and I'm going to keep that white box, and the right white box is the fall reconnection flow, which has its own. As you've heard in these presentations earlier, that that flow in the fall is really critical for the migration of the Chinook, and then later for coho salmon.

So first I want to show how well the model does

or does not do relative to what we have observed. So I'm going to take what I had in the previous slide, put this at the top of the graph, and I'm going to show you at the bottom of the graph how that looks like in the model.

So the bottom graph is based on modeled flow at the Fort Jones gauge, the outlet of the valley, from 1991 through last Saturday. And you can see the model is a little bit more conservative. It shows it's more often below the required flows than we saw in reality, so it's a little bit on the conservative side. It's not perfect, but the overall pattern is very similar. And this is just one way we do comparisons. We have others.

So what I'm going to do now is I'm going to put in the dates at which occurred -- first curtailments would have occurred in the past had we had rules from 2022. And that's just basically the first date when this curtailment occurred. Those are the white dots in the top graph. I covered them in the bottom graph because what I'm going to show next is simulations where we take these curtailment dates, even though they're not -- they wouldn't be consistent with the exact flows in the model, we take the curtailment states that we would have had using the actual flows on the Fort Jones gauge in the last 40 years, 30 years, and we implement a scenario in the model where every year where we have these curtailments, so that's all but

eight years, we curtail surface water diversions on that date for the rest of the year. This is different from what actually happened or what might have happened, but we basically in this scenario that I'm going to show you, and let me go there on the next slide.

So in this scenario, we curtail flows on those dates that are shown in white. And there's eight years where we don't curtail. And that's surface water. For groundwater, we have, in those years where we have surface water curtailments, we have the LCS that is a 30 percent reduction in groundwater pumping. So each year that has one of these white dots in there has a 30 percent reduction in groundwater pumping, and it has a full curtailment on surface water, starting with the white dot and going through the very end of the year. And this is the result just in terms of compliance with the proposed flows.

So the red times are times when the flows would still be below this target level. And what you can see for 2022, which is the second to top line, when we curtailed in early July and we had this 30 percent reduction in groundwater pumping under the LCS, the model says don't expect flows to go above the required flows because you do that.

So the other scenarios that we ran is a scenario where we actually did full curtailment on both overlying

groundwater pumpers and surface water users, and then it looks like this. And then we get actually compliance with these proposed flows in most years. There are still a number of years where there is going to be significant times in the summer where the flows are below, despite the fact that we curtail the most important -- the biggest improvement is in the fall flows, which are now almost always above the required levels. So that speaks to the question of sort of the big lift that would really have to happen in order to make that goal.

Differences in stream flows are illustrated in this graph. These are the monthly mean flows. The blue column is the actual measured observed mean flow between 1990 and 2023. The red bar shows the base case, so the simulated case of the blue side, and also shows how good or bad we simulate this. And then look at the gray bar and the yellow bar relative to the red bar. It's basically the improvement in stream flow under the 30 percent LCS and under the full groundwater curtailment with full surface water curtailment in both those scenarios. And you can see, the big improvements happen starting in July, and then really in August and September and October, especially if there was a full curtailment.

And on the right hand side, you can see this in numbers. We get an average in September through November

with a 30 percent curtailment on groundwater pumpers and full curtailment on surface water users. We have a 15 CFS increase in flow. If it was a full-full curtailment on both groundwater and surface water users, it would be a 33 CFS increase in flows, which is about the difference in flows, that I think Michael showed earlier, pre-1977 and post-1977, that 30 CFS.

And, in fact, this scenario very much goes back to that, what I call the surface flow era. If we had this, as you can see, the curtailment would happen in the very driest years, as early as May 1st. It wouldn't be in the irrigation season. In many years, it would happen sometime in June. And then in many years, it would happen sometime between mid July and about August 1st. And so that's kind of what, in fact, we had when we only relied on surface water in the past.

And then the other thing that I wanted to show is that in terms of what the model tells us with respect to ET, we would have expected from the model that there's some ET reduction in the fall. We didn't really see in the model big ET reductions over the summer.

So that brings me to the end of this part of the presentation.

MR. EKDAHL: Thank you very much.

I think next up we have Bronwen Stanford from

TNC.

MS. STANFORD: Thanks so much. So I'm the lead river scientist for the Nature Conservancy, and I'm going to be reflecting on the groundwater model from a more in-stream flow perspective.

So next slide, please.

This is another version of the data that Thomas Harter presented at the beginning of his presentation. So this is taken from the Petition for Rulemaking to Set Minimum Flows on the Scott River that was submitted earlier this year by the Karuk Tribe and others. It's showing mean August flow over the full period of record for the Fort Jones gauge. And the lower dashed line is 30 CFS, the previous e-regs target.

And as you can see in prior decades, flows are pretty consistently above that threshold in August. And in recent decades, flows have consistently been below that threshold, exposing the species that are the fish and other species that are living in and around the Scott River to a high degree of stress.

Next slide.

Interim criteria are needed until permanent criteria can be developed for the Scott and Shasta. As many other speakers have referenced, flow criteria speak to reduce extreme stress to aquatic life from low flow

conditions. Year-round environmental flow criteria are necessary to prevent further decline of listed species, and interim criteria should be adopted to protect in-stream condition while those permanent criteria can be developed.

Also echoing things other speakers have mentioned, these criteria need to apply to both surface and groundwater use because, as we understand for these rivers, surface and groundwater are tightly connected.

Enforcement and measurement and monitoring and improved data is going to be also necessary to ensure compliance and make sure that we are understanding and representing the watershed as well as we can.

Next slide.

So this is echoing a point that several people on the fisheries panel this morning made. Flow criteria are needed for the full year to protect ecological function. The Scott and Shasta are both perennial rivers and they need water year-round.

I'm part of the team that developed the California Environmental Flows Framework, or CEFF, and the foundation of this framework is this idea that there are five functional flows that are needed to protect ecological function in California's rivers and streams. These are the fall pulse flow, an elevated wet season base flow, peak magnitude or flood flows, a spring recession flow that's

gradual and goes down to the dry season base flow.

Next slide.

Each of these flows performs really important functions for rivers. So the dry season base flow, which is what we've focused a lot of our discussion today on, is important for juvenile rearing, temperature management, as we just heard from Eli, and providing connectivity for migration. And so, as Sari Sommarstrom and some others have mentioned, not all reaches are the same in these rivers, and giving a fish the ability to move to find a habitat that is suitable for them is extremely important. And dry season base flows are also important for sustaining riparian vegetation, which can help maintain water temperatures as well.

The other four functional flows are also critically important. They provide things like migration cues, and again, water quality maintenance. High flows can provide floodplain access and maintain long term habitat condition.

Next slide.

So given all this, it's really important that emergency flows are designed to protect ecological function, rather than just being based on our assessment of what is easily achievable. Naturally occurring dry years represent highly stressful conditions for many species, and

criteria must be set higher than drought low flows to protect river health.

In times when perhaps flows are so low that even emergency flows can't be met, water remaining in streams should be the full natural flow. And as I'll continue to explore and we saw a little bit in the previous talk, there is a lag in the system, so curtailments are going to be needed to maximize the number of years that can meet flow criteria and we're going to be able to need to adjust those to make sure that we are aiming towards those important targets.

So I created a cartoon to walk through this on the right. So you can see this, again, is average flows in August for a hypothetical reach. And you can imagine that flow could vary over time by water your type from an extreme wet year through an average year through a critically dry or extreme dry year.

Next slide.

And you can imagine imposing a minimum environmental flow for this system, maybe the minimum that we feel like will protect ecological function, that belly-scraping flow that many people have referenced.

Next slide.

And we can imagine that if we're meeting this target, then we're going to at least have that minimum

environmental flow in the extreme wet year, the wet year, the average year, the dry year. It's possible that in the extreme dry year we could do everything we could and still not meet it but there would still be, to the question that was posed for this session, there would still be benefits. We're getting as close as we can and we're protecting that flow in other years where it's more achievable.

Next slide.

However, if we instead manage for an extreme drought flow -- next slide. Sorry, next slide, please. Please wait until animated. Oh, one back. One back. Okay.

Instead of managing for an extreme drought flow, we might end up with a situation where species aren't getting the flow that they need in years where it could have been achievable and we're lowering that threshold beyond what is the minimum that's needed for the environment.

Next slide.

I also want to really emphasize that long-term criteria need to include the full suite of those five functional flows. And they also need to vary by water year type. So, for example, we would have higher thresholds for this dry season base flow in wet years and perhaps lower in dry years. I think this is something that Gary Black

mentioned in his presentation as well.

Next slide.

So turning with that perspective focused on ecological function to the e-regs, they actually are achievable based on a lot of the modeling that Dr. Harter and his team have done. So these are some of the slides that he had presented back in the August presentation and I'll just talk through these as sort of a compliment to the information he shared in the last talk.

So we've sort of -- we're superimposed the e-regs as that red line. And this plot is showing the model output for flows on a log scale. The shaded gray area represented flow in 90 percent of years, so that white space below the gray line is only a space you would be in in the driest 5 percent of years. So this is showing that within a July -- this scenario is for July 15th curtailment, so regardless of in-stream flow, irrigation is curtailed starting July 15, and it shows that in all but the 5 percent driest years, so 5 out of 100 years, you would be easily meeting those requirements in a critical August to November period.

Next slide.

And the modeling that his team has also done has also shown that the timing of curtailments is really important. So just to step through a few, this is that

same plot. You can just look at that blue U.S. Forest Service line. And this first scenario is for irrigation curtailment starting July 1st. You can see that the blue line -- the gray bar is tighter and the blue line is further below it.

Next slide.

Here's the July 15th. The gray has sort of expanded.

Next slide.

There's now some overlap between that blue line and the gray line with the curtailment starting August 1st.

Next slide.

But if the curtailment doesn't begin until August 15th, there does begin to be an overlap and there will be a substantial portion of years where it may not be possible according to this, these modeling results, to meet the e-regs. So the model shows fewer benefits later in the year because of this lag. As you turn off groundwater pumping there's going to be -- you're not going to immediately get a responsive surface flow, it may be too late. And a lot of the irrigation water has already been applied.

Next slide.

I just also wanted to note that additional information on water use can help improve the modeling of the curtailment scenarios. And I know that's something

that everyone in this group has been thinking about a lot.

Next slide.

One more plot. I think this is something that Thomas said he was possibly going to share this afternoon. This is another way of thinking about the effect of curtailment. So this is a plot looking at fall reconnection, thinking about the timing where at the Fort Jones gauge you would see flows hitting that 40 CFS threshold, which is likely to result in connection for the Scott River.

So if we start with that gray line, which is business as usual from the model, we can see that by September 15th, there's connection in about 20 percent of years. And it takes until December 15th to get connection in 100 percent of years.

Next slide.

If we curtail earlier we can shift that line up. So if we go all the way to the July 15th curtailment, that green line, we're almost always connected by September 15th and we get 100 percent connection. We're at that 40 CFS target by October 1st in all years. So earlier curtailment results in earlier reconnection.

Next slide.

A lot of the discussion I provided has been really focused on the Scott, because that's the groundwater

model that that we have that we're discussing here, but wanted to note that the Nature Conservancy and partners have also developed some other tools that can support flow criteria development that are available on our website that include information on ecological flow criteria and also natural baseline data for both the Scott and the Shasta.

Next slide.

So in conclusion, the emergency regulations are appropriate, they're needed. Perennial rivers need flow year round. It's important that interim criteria are designed to protect ecological function. Modeling shows that the emergency regulations are achievable with curtailment in almost all years. And there are also additional tools that can help inform criteria development in the Scott and the Shasta Rivers.

Thank you.

MR. EKDAHL: Fantastic. Thank you.

So our time is 1:37. I believe that completes our scheduled speakers for panel two. Because of when we started, I'm just looking at the calendar and the schedule, I believe we have until 2:00 pm for questions, response, and potential comments if we have time for them. And then we'll take a ten-minute -- is it a ten-minute break or it's a five? -- it's a five-minute break, after which will convene panel three.

So with that, I want to turn it over to my colleagues to see if there are any initial questions, and I have a couple if not.

MS. RAGAZZI: I'm going to go back a little bit. First panel, part one.

Gary, Mr. black, when you talked about, in the Shasta, about over-summering habitat, I think somewhat in lieu of the same flow requirement that's in place now, and providing LCS coverage to those that are part of Safe Harbor, I wanted to better understand what you meant when you propose that about what that LCS coverage is envisioned to be in what those Safe Harbor folks are providing relative to being under a Local Cooperative Solution.

MR. BLACK: Yeah, so the concept would be that there would be a reduced flow requirement at the canyon at 25 to 30 CFS, depending on temperature, in exchange for protection of cold water over-summering areas, primarily, in my opinion, nearly entirely within the Safe Harbor area for those participants within the Safe Harbor that would be willing and interested in doing that. And I have reached out to a good number of those folks and there is interest in developing an LCS similar to the scope of this Safe Harbor objectives.

And so those values would be the result of protecting water and implementing conservation projects and

exchanges, for instance, cold water -- or warm water for cold water exchanges. They release those spring waters to provide dependable and expanded over-summering habitat and those areas where fish utilization is the heaviest.

MS. RAGAZZI: I might need to follow up with you more on diving into the specifics.

MR. BLACK: Yeah. To go into further detail about, you know, where and when and how much, it would be a follow up discussion.

MR. EKDAHL: I just wanted to ask you a follow-up question. It may be a little pointed, and I don't mean it in a pointed way, but -- and if I misinterpreted, please correct me, I'm trying to remember the multiple presentations ago, but I think one of the comments was that we shouldn't use water quality as the basis for an e-regarding; was that -- is that correct?

MR. BLACK: I'm not sure that I said that we shouldn't use water quality as an e-reg. Water quality is a factor that has -- that, you know, limits the fishery value. And so when you look at the canyon values, and knowing that temperature and, you know, and the other parameters are important for fisheries utilization, I would say that water quality is an important factor and that, you know, that has to be measured in addition to just wet channel and BMI coefficients.

And so maybe I missed it is or is not. I can't remember. Yeah.

MR. EKDAHL: Okay. No, I think that clarifies my question. And I wasn't interpreting that you're saying, no, don't consider water quality, but just wanted to get a little bit more nuanced and understand the nature of the comment a little bit more directly.

MR. BLACK: Yeah, I think it was specific to the canyon and the value of the canyon flows for fisheries compared to the impact for agriculture.

MR. EKDAHL: Okay. Okay. Thank you.

Do you have a follow-up?

MS. RAGAZZI: I do.

MR. EKDAHL: Yeah. Go ahead.

MS. RAGAZZI: So this is a question for the panel as a whole. And this actually is one that was submitted to us, so I'm going to attribute it but I'll ask it.

58 Chinook made it above the Scott River counting station so far this year, whereas last year zero fish made it through in the same time period. One difference between the two years is that the -- this year's flow is significantly higher. It's been asserted that fall Chinook are predisposed to stage or spawn below the Scott River counting facility.

And so wondering if the panel can offer

additional thoughts explaining this year's escapement in the valley, besides the difference in flow?

MR. BLACK: I didn't understand the question.

MS. RAGAZZI: So this year, 58 fish have made it through the counting, whereas of -- well, at least this week. And a year ago, there were zero that had made it through. One difference or the difference that's being asserted that's changed between those two things is the flow conditions are better this year than last year.

Is there any other explanation that folks have for why fish are moving up this year as earlier than last year and beyond that difference?

DR. SOMMARSTROM: I'll jump in. I mean, it was 7 CFS last year was almost 50 right now. So, yeah, we definitely know what's too little and we know what's enough and it's somewhere in between. And, frankly, 40 CFS is not the connection criteria. It disconnected between 18 and 20 and most years.

And we know Chinook have gotten in here from that data I showed in 2012 at '21, getting through the weir. That doesn't mean they get very far. It's not an ideal flow but it's connection flow.

So I think we have to qualify what our expectations are and how we use those terms, you know?

But, definitely, the timing of the fish has a lot

of different other things, temperature, you know? Mike can address this more, but when we met with Morgan Kineckly (phonetic) at the weir a few weeks ago, he just said every time he tries to predict a fixed number, Mother Nature throws him off and it's something else that triggers it.

So it is very hard, for sure, or unpredictable sometimes. But definitely, the flow was too low last year and it's adequate this year.

MS. RAGAZZI: And I have one more question, at least that I had noted here, and it goes to Dr. Harter and Bronwen's presentations specifically.

So it looked like we got to see modeling results. And my takeaway from it in terms of the difference between what Dr. Harter presented versus what Bronwen presented, one of them was looking at the curtailment date as the trigger for when diversion ceased and what happened in flows relative to that.

And when you saw that you -- when you look at it from that perspective of like curtailing based upon a specific flow as opposed to based on a specific date, you will see different impacts result in terms of how often or frequently you can meet the fall flows. And it appears that maybe it's too late. If you let things get to a certain flow, you end up in a situation where it gets to a point where the flows get too low and they don't rebound as

quickly in the fall, as opposed to a date specific where we tend to see flows rebound more consistently or be able to meet and achieve the fall flows more consistently.

DR. HARTER: Yeah. And, Bronwen, you jump in.

What I would like to emphasize, and I'm going to show some more of these graphs in my second presentation, Bronwen didn't have the benefit of having access to graphs that I showed because Leland just finished these simulations that run through last Saturday, yesterday, and what Bronwen used, which was July 15th to August 1st, consistent full curtailment date, provides about, roughly speaking, similar results to what the variable date full curtailment provides in my graphics. So it's similar outcomes. There's not fundamentally a big difference.

We could look into that, you know, is it a variable date or is it a fixed date better? The message was that it takes a curtailment that is in many years before August 1st, some years even June, to actually get to where these flows are met, this suggested for us, which is -- this is no comment on all the other benefits that may have been achieved last year with a 30 percent reduction in groundwater pumping, not a full reduction of groundwater pumping. That's not -- we're not commenting. You know, this is not meant to be a comment. It's just purely looking at are these thresholds met and how often are they

met if you do something or if you don't do something?

And I think the main message is that without doing anything, you would end up in one out of five years only not doing curtailments. That is in four out of five years under the climate we've had in the last 20 years, you would be in a curtailment situation.

MS. STANFORD: And I think --

MS. RAGAZZI: Bronwen, did you --

MS. STANFORD: -- yeah, I think I would just add to that that I think sort of to look at that on the flip side, the data also consistently show that you can meet the e-regs through curtailment. And I think it's true that if we wait until the in-stream flow levels reach the target that we would like to stay at, it may be hard to maintain that level because there is a lag effect and groundwater levels may already be low, especially if we're not curtailing until late in the season. But that we are, if we do, if we're thoughtful about how we curtail the modeling results that we have so far do show that that we can reach those targets.

And, yeah, I think that is the difference between like the plots that we showed was are we, exactly as you said, Erin, are we taking a single date every year or are we picking a threshold and varying the date? So two different ways of looking at the data.

MR. EKDAHL: I think Erin asked the same question I was going to ask which was, you know, looking at both sets of the model results or the graphs that were displayed today, in the future, you know, again, this workshop is focused on emergency regulations, but in the future, could the model be used in part to base a curtailment date or a cutoff date based on the water year that had been observed so far? And it seems like it, but I'll turn over to Thomas from Bronwen.

DR. HARTER: Yeah, I think that that's a great question to ask. And in some ways I can comment on set up later.

I think having the model available, it puts together all of the different tools that we have in one consistent framework. It puts together our water level observations, our stream flow observations from the last 40 years, water level observations that we've had. It puts together our knowledge of the geology, of the hydrology, the land use, the practices on the ground, what irrigators do and how to decide. And so I think it is the best possible tool we have available to make forecasts based on information to date and to use it as a way to say if, you know, in March or in April, here's what we expect to happen given the snowpack given, given what this winter looked at, looked like and make some predictions of what might happen

going down the road.

Claire is also working on some statistical analysis to do something similar in combination with the model to essentially get to a place where we're not just saying this was a wet winter, but we're looking at more specifics of the basin and where it is with respect to snowpack and rainfall and stream flows and groundwater levels, and use the tool that we have to make those kinds of forecasts to then decide what needs to be done.

MR. EKDAHL: Thanks.

Any other questions or any other responses from the panel? I do have some additional questions, I can keep going, but I want to see if there's others.

I want to ask then kind of an extension from the last one and Dr. Harter's response, but to Sarah and Eli, although not specifically, right, everyone feel free to jump in, what do we do then in these years where we don't have any reasonable expectation of actually hitting the e-reg flows?

I mean, I think that is a takeaway that there will be some years where, you know, if you didn't have a drop of irrigation still probably wouldn't hit the flows. I'm greatly summarizing maybe, but what is our response then? And does that almost kind of conversely argue that, you know, in those types of years, you have almost a

different type of e-reg target, or it wouldn't be an e-reg but like a different kind of flow chart?

It's a broad question.

Sari?

DR. SOMMARSTROM: I mean, we're talking summer, August, that's not a fall Chinook time. That's a coho time --

MR. EKDAHL: Okay.

DR. SOMMARSTROM: -- and a steelhead, and they tend to overlap, and they're varying habitats. So you target the varying habitat and make sure that that does as best as you can. It doesn't have to connect. Again, I found that out with these tributaries for years of working with them, you just make sure you get enough flow to keep those fish going as well as possible.

And so it's a timing issue and a location issue. So having to try and meet that River Mile 21 U.S. gauge target and main stem flow River Mile 30 isn't helping any of the summer over-summering fish.

So we got to match the need with the action. And some of that is a long-term action, I agree, not an instantaneous action, but that's where I feel we've missed the target here. What are we helping in August? It's not Chinook, it's the summer rearing, and where is that summer-rearing habitat? So October, that's the time we've got to

get those flows in. As we know, seven was too low last year.

And so anyway, I don't know if I'm answering your question, but that's the way I'm seeing what you're asking for when you got really bad years.

MR. EKDAHL: It does, but then it also raises another question, so I'll jump in and ask it and then you can come back to the other broader question.

But the other takeaway I think from, Eli, your presentation is that even if we didn't hit the flow targets, we saw notable improvements in groundwater level. We saw notable improvements in other kind of just general habitat areas in the main stem at a minimum. And so the curtailments, even when we don't hit the full flow targets, do have a net benefit potentially leading to earlier connectivity in the fall.

And so if we are focused on earlier connectivity, it also then doesn't argue that we just shouldn't focus on any curtailments or reductions during that summer.

So how do we, how do we bridge those two very seemingly conflicting needs?

And I would say Bronwen has her hand up, too, so maybe Eli and then Bronwen?

MR. EKDAHL: Elise and then Bronwen and the others.

MR. SCOTT: Yeah. Well, what you just said kind of gets to my thinking. I totally agree with Sari that in these really critically dry years, we do have to focus on the habitat that's working for us. I think that that's critically important because, you know, those fish are going to continue to see the future generations of fish.

But I think there is a process around setting up the water table for the next round of fall and winter precipitation and giving that Chinook migration the best chance it can possibly have. We can't control when the precipitation comes in, but we can think about how we can best set that up.

So that would be my response. And I don't have a good how to do that because I think there's a lot of uncertainty there, but I think that's a good goal.

MS. STANFORD: And I think I'd add to that that --

MR. EKDAHL: Bronwen, go ahead.

MS. STANFORD: -- sorry, yeah. I think I'd add to that that these are these extremely dry years are going to be extremely stressful for fish and for the river ecosystem as a whole, sort of regardless of what action we take. And it's sort of even more important to maintain as much water as we can.

So I think the emergency regulations are already

a lot lower than the flows that CDFW had recommended. These are already sort of very, very designed to be sort of very minimally protective flows for extreme conditions. Please correct me if I'm wrong, Mike. So, the fact that it's challenging to meet these flows in extremely dry years is not a reason to adopt an even lower flow. I think it's sort of the reason we need that flow so that we can get as close as we can so that we aren't threatening these species with extirpation and losing that whole cohort.

So I don't -- even if it's hard to meet in some years, that doesn't mean we shouldn't. That's almost like more reason to try, in my opinion, for the health of the ecosystem and the fish.

MR. EKDAHL: Please.

MR. HARRIS: Well, I really appreciate the conversation because, you know, the fish didn't know that there was a pumping era and a megadrought. And the flows we provided to the Board were fisheries flows. They were flows necessary for fish, these bare minimum flows through a drought. And so regardless, between 1990 and 2001, there's been changes from 1958 to 2022, that doesn't change the fisheries needs.

So I just wanted to say, I really appreciate the idea of the discussions moving towards what do we do when we can't meet those needs versus talking about lowering the

actual numbers, because you can't lower them anymore. They're already belly-scraping. And they're not dependent on how much water is in the system, they're dependent on the bare minimum the fish need to actually maintain, not recover, not get better, but just basically maintain through a drought.

MR. BLACK: Can I jump in?

There's a number of years where the models show that these instances occur. And, you know, there's the other balance of that, and it's what do you do with agriculture in those years in those instances? And so, you know, you need to look at the subsistence of agriculture, as well, and how do you handle that in those off years?

And, you know, I think we would need to do a full system analysis before we start concluding pumping and pre-pumping years compared to other conditions that are out there. Geomorphological changes, for instance, we've heard a lot about that. We don't have any study on that. Water budget, you know, inflow versus outflow, uplands.

I think, you know, yes, we're talking about emergency conditions and we need to define a year type for when those emergency flows are not achievable because that's going to happen. And so we need to spend time prepping for that.

And we also need to start working now on the long

term and addressing those issues and building a model that goes from ridge top to discharge and considers all the communities that depend on that within the valleys, downriver, and try to figure out what's the best thing to do with the limited resource that we have. Just there's too many years that we would wave off in these instances and it's our responsibility to figure that out.

MR. SCOTT: And I just want to add on to that. You know, the Scott River main stem was engineered in the last hundred years to drain. It's deeply incised in the middle main stem and there's maybe a handful of geologic control points that act against that. One is, I think, upstream of Fort Jones and one is downstream of Reach 9, where you've got bedrock that holds the water in. But there's still, above that point, 15, in some cases, feet of incision that just drains as soon as it can drain.

And if we want to sustain flows as much as we can, we need to address that, as well, simultaneously while focusing on water use measures, because that -- if we can keep that water in the subsurface longer, I think that we have a better chance of working through some of these more challenging years. But that's one of those long-term solutions and it has to start now, so --

DR. SOMMARSTROM: Can I just address the word belly scraping? It's really gotten (indiscernible).

As you can see with my photo that I showed several times of belly-scraping Chinook, that is not unusual, it's not harming them, they are dying. They are using their bellies to create new reds, you know? And so I think our definition of what we mean by belly scraping, what is adequate, we have seen, we know for sure what the minimum flows are. And their bellies are scraping, and their dorsal fins are out of the water, and they're getting up 50-plus miles in the Scott to adequately and successfully spawn.

So that term belly scraping, to me, just isn't reflective. Maybe you're trying to say it is a harmful thing, I don't know. It's just it's not a very helpful term for what we really need is minimum flow. So that's my thing on that term.

MR. EKDAHL: We've internally talked about different terminologies that we can use and we've thought about bare minimum flows, but then we didn't vote for that one because we thought we might be establishing a flow to manage for bears and we're not doing that quite yet. So baseline minimum flow, something like that, but, yes.

DR. SOMMARSTROM: They eat those fish too. Yeah, we've got to help with bears.

MR. EKDAHL: Very good. All right.

So I think we are at 1:59, right at 2:00 p.m.

We'll take our commenters, we had about 10 or 11 that had requested to provide comments on this section, we'll move those to the end of the day. We'll take a five-minute break and we'll reconvene promptly at 2:05.

Thank you.

(Off the record at 2:00 p.m.)

(On the record at 2:07 p.m.)

MR. EKDAHL: All right, it's been five minutes. Our official break time is over. If we can bring everyone back up to the front we'll get started.

So if you give me the two seconds to find my glasses, and --

MS. RAGAZZI: There's apples and chocolates in the back of the room.

MR. EKDAHL: Apples and chocolate in the back of the room. These apples are from Erin's own personal tree and rumor has it they're very, very good, so please take one or more.

MS. RAGAZZI: Or more.

MR. EKDAHL: Let's see. So we, for the next hour and 25 minutes, we are going to talk about groundwater Local Cooperative Solutions. And for this one, the State Water Board will give an overview of the Groundwater LCS Program. Adam Weinberg is going to do that. And then each listed speaker will have up to ten minutes to respond to

specific questions provided by the Board staff related to groundwater LCSs. We have Chris Voight, formerly with the Siskiyou RCD. CDFW staff, Mr. Harris, again, thank you for your continued presence at the front of the room. Dr. Harter, also thank you for your continued presence at the front of the room. And Theo Johnson from the Scott Valley Agricultural Water Alliance.

And so with that, I'll turn it --

MS. RAGAZZI: And Eli Asarian.

MR. EKDAHL: Oh, and Eli Asarian. Thank you. I should have said Eli. He is right in front of me. Thank you for joining us and talking about the OpenET work, which I think has generated a lot of interest and will continue to do so.

So with that, I'll turn it over to Adam, and we'll go from there.

MR. WEINBERG: Great. My name is Adam Weinberg. I am an Environmental Scientist in the In-Stream Flows Unit in the Division of Water Rights. I'm just going to provide a pretty brief introduction to the LCS topic. The other folks are going to provide much more in depth information.

The next slide, please.

So an LCS was a voluntary binding agreement between a landowner or group of landowners and the Water Board. And by this we mean that a landowner was not

required to participate in LCS in order to comply with the emergency regulation. However, once the landowner did elect to enter into an LCS, that agreement was legally binding.

So the LCS provided the landowner with an opportunity to propose operating their ranch in a way that reduced water use or provided other fishery benefits, that the proposal met all the LCS requirements, it was listed as pending or approved by the Water Board on our Scott-Shasta Drought website. If an LCS was listed as pending or approved, the diversions covered by the LCS were exempt from curtailment, as long as the landowner adhered to the terms of their LCS plan.

As you can see here, there are several types of LCSs. The scope of these LCSs included individual landowners, tributary-wide LCSs is and watershed-wide LCSs. The LCS Program that received by far the most participation was the Groundwater LCS for Individual Landowners in the Scott Watershed. And I will describe that program in more detail on the following slides.

Next slide, please.

All right, the groundwater LCS Program was for landowners with overlying groundwater rights. Each groundwater LCS had a minimum water conservation target as applicable to the overall April through October growing

season, and also other -- had to be met in specific key months.

In the Scott River watershed, those key months were July through October. And the minimum conservation targets for that and the overall irrigation season were 30 percent relative to the operation's 2020 or 2021 overlying groundwater use.

In the Shasta the key months were June through October, and the minimum conservation targets were 15 percent.

Next slide, please.

Each groundwater LCS proposal was required to have a narrative description of verifiable conservation actions that can be monitored. It had to demonstrate that water savings can be achieved. Lots of folks provided a spreadsheet with calculations of how they're going to achieve that savings that provided description of their place of use, such as a map of the lands covered by the proposal. And they had to have a signed binding coordination agreement. The binding coordination agreement is a legally binding agreement between the landowner and a third-party entity. The third-party was responsible for verifying that the landowner implemented the conservation actions described in their LCS plan. The third-party entities in 2022 were CDFW and the Siskiyou RCD.

Next slide, please.

The landowners were allowed to use any conservation actions that could be both monitored and verified by the coordinating entity. These actions included, but we're not limited to fallowing, shutting off fan guns, converting less efficient irrigation equipment to more efficient irrigation equipment such as from real lines to pivots, switching crop types such as from alfalfa to grain, installing soil moisture sensors. As you can see here, the list goes on, and this is not an exhaustive list.

Next slide, please.

2022 was the only year that the emergency regulation was in effect for the entirety of the irrigation season. In the Scott River watershed, 46 groundwater LCSs and one individual or better LCS proposal met all requirements. These 47 LCSs were listed as pending or approved on the Water Board's website. Landowners with LCSs in pending status were told that their LCS was approvable and they should follow the terms of the LCS. Due to staff workload, Water Board staff did not issue approval letters for many of the pending groundwater LCSs.

The 47 pending and approved LCSs in the Scott River watershed represented about 97 percent of the acreage in the Scott River watershed that is irrigated by groundwater. It is approximately 50 percent of the total

irrigated acreage in the watershed.

The map on this slide shows the parcels that were included in the groundwater LCS plans that were implemented in the Scott River watershed.

I will also note that there were enforcement actions taken against four overlying groundwater pumpers in the Scott River watershed that were not enrolled in the groundwater LCS program.

That's all the information I have for you today, so thank you.

MR. EKDAHL: Thank you. And the transition occurred right after I took a giant bite of apple in perfect timing.

But with that overview, I'd like to turn it over to our panelists. The first up is Chris Voight, formerly of Siskiyou RCD. We have four bulleted questions here.

What observations do you have from assessing groundwater Local Cooperative Solutions?

Question two, what was your role in verifying compliance with the groundwater Local Cooperative Solution commitments?

Three, are there recommendations that you have that would improve the process of developing and verifying groundwater Local Cooperative Solutions?

And lastly, should future groundwater Local

Cooperative Solutions, if adopted, incorporate conservation and efficiency investments made prior to 2021? If so, how?

And with that, we'll turn it over to Chris.

MR. VOIGT: Okay. Thank you very much. Glad to be here. And I'm here to tell you about my experience administering this Local Cooperative Solution in Scott Valley in 2022.

Next slide.

So I'm going to answer these questions in a slightly different order than they were presented. I'll start with my role in verifying. I was tasked with developing the entire program, so I communicated with potential participants on the front end and was available for them as needed during the development process of the curtailment plans.

Next.

I reviewed their plans and signed people up for the Local Cooperative Solution and the binding agreements. Once I saw 30 percent savings on their plan -- next -- developed their field verification -- developed the field verification process, carried out all field verification visits.

Next.

And I was in communication with Water Board representatives Adam Weinberg and Kevin DeLong periodically

throughout the entire process.

I'm sorry, Kevin, it looks like I got your name wrong. It's Kevin DeLano.

And next observations that I had from the assessing the LCS -- next -- first, I want to speak to the large amount of trust that was involved by all parties. The Water Board had to trust that all participants would adhere to the terms of their curtailment plan. And the Board also had to trust the third-party verification process, that it would be implemented, that it would be meaningful and able to be documented, that sort of thing.

Next.

Participants had to trust the Water Board that they would honor their curtailment plan without additional restrictions added at a later time. And the participants also had to trust that the third-party verification process would be honest and fair.

Next.

The third-party verifier had to trust the participant that they would and did adhere to their 30 percent curtailment plan and also trust the Water Board that they would honor a participants curtailment plan once approved without additional restrictions added on at a later time.

Next. Next slide, please.

Other observations.

Next.

I wanted to speak to the attitude of the participants. Once potential participants heard that the curtailment order was going into effect, they wanted to sign up as soon as possible so that they could continue to irrigate at a reduced rate of 70 percent as opposed to nothing at all if they didn't sign up. Most participants were able to come up with a plan by April and they adhered to that plan for their entire irrigation season starting in April.

Regarding the field verification of the curtailment plan, some participants started the inspection process well before the actual curtailment order went into effect out of an abundance of caution and a willingness to adhere to the plan. Overall, for all participants, there was a willingness to engage and ensure compliance.

Next slide.

Other observations. I want to talk about some of the techniques used to achieve the 30 percent savings plan. This is a little redundant from Adam's presentation. But irrigation, changing irrigation practices was the biggest way that people were achieving the savings. Just a list of the few ways.

For pivots, the switch to low-energy spray

application nozzles from the older conventional nozzles was a big one that people did.

Folks that had a variable frequency drive pump were able to realize some water savings by those pumps are more sophisticated and you don't have to run as much pressure through the whole system and it saves water in that way.

And then finally, they reduced the water per pass by either reducing the amount of applied water per pass or just increasing the speed of the pass without reducing the rate of application.

Next, please.

So for wheel lines, you know, the biggest savings one could do would be to switch to a pivot, but that's a big deal and I don't know that anybody did that as a result of this, as a result of the curtailment. So that's sort of a bigger long-term thing. But other than switching to pivots, folks with wheel lines could switch out to smaller valve size, which a lot of folks did, and then finally just reducing the set times. It was very common for folks to reduce from say like 12 to, you know, 10 or 9 hours a pass. K-lines and pods, similar to wheel lines, the only thing you could really do there was reduce the time of irrigation.

Next, please. Next slide.

More observations.

Next.

Other ways that participants reduced water use was conversion to wheat from alfalfa, and in that case, the irrigation was finished by late June or early July.

And then fallow, a lot of corners didn't get irrigated with wheel lines or pods. And then, also, less productive fields or fields that had like, you know, weak or shallow wells were fallowed.

Next, I want to talk about some of the limitations of the compliance monitoring of the onsite field verifications. The pivots were easiest to monitor because I could just look at people's settings on their box and see what they were set to. And it was also easy to verify that the new LEPA or LESA nozzles were added on.

Flood irrigation was easy to verify because for flood irrigation, it's like a several-day cycle so to get water down from the top to the bottom of the field. So the pump was either on or off and the flood irrigation cycle is predictable. And there's really no point in doing a partial flood cycle or even extra flood cycles. That kind of messes up the balance.

Wheel lines were easy to see that nozzles had been changed, but I had to trust folks on their word that the set times were reduced.

And then with K-lines and pods, similar to wheel lines, you just had to trust, you know, people's word about their irrigation times being reduced.

Next, please.

Other recommendations. This was a tough one for me. I wish I had more for you. Certainly, streamlining the process would be better for everyone, especially on the front end.

Next.

One idea that I had, and I wish I had more ideas for you, but maybe like a group of different spreadsheet standardized templates to use, say like maybe five or six different styles from simple to more complex or maybe developed for different crop type or irrigation methods. And, yeah, maybe having something like that might help the approval process.

I wish I had more ideas. I'm kind of hoping in discussion that other folks would be able to chime in a little bit on that.

And then other recommendations.

Next, please.

I would just want to speak to the communication overall was really pretty good, but it can always be improved. I thought communication with the Water Board representatives was good, but some participants struggled

with getting the information because most of it was found pretty much exclusively online, and some folks don't really do computers at all. So I did my best to be able to help guide them through the process.

And some participants struggled with creating the plan in the spreadsheet form, but I know Adam and Kevin were able to help them with that so that was appreciated.

Other recommendations. I would say we need to continue to build trust. Trust but verify. Where have we heard that before? From my perspective, all parties involved did a good job at the trust thing. And the field verification is crucial because without that, nobody really knows if participants were adhering to the plan or not.

Next, please.

Other recommendations. I would say more carrot, less stick. I'm making some gross generalizations here, but I found this to be true. In my experience, agricultural groundwater users in Scott Valley, they understand the situation and nobody wants to use more water than they really need to. And folks want to and generally always do operate as efficiently as possible at all times to keep costs down, but usually irrigation efficiency improvements come at a pretty substantial financial cost. Low interest agricultural loans specifically for irrigation efficiency improvements, subsidy programs for pivot

conversion and availability of soil moisture sensors could help improve engagements with these opportunities for improvement of irrigation efficiency.

Next.

Finally, the last question here, should future LCSs, if adopted, incorporate conservation and efficiency investments made prior to 2021? And if so, how? I'm going to tell you, yes. Ask for verifiable records, such as receipts for new equipment purchased and electric bills going back to, I would say, I like the idea of going back to our previous drought, like the middle of the previous droughts, which was from 2011 to 2017. Say, let's go back to 2014. Some more progressive agricultural groundwater users started making certain irrigation efficiency improvements, you know, back then and have been operating as efficiently as possible since before 2020. So I think it would be good to give those folks credit for some of those improvements.

And I think if -- I'm not sure where I am timewise.

One last thing, I don't have a slide for this, but just wanted to ask the question, you know, did it work? Oh, I got a couple more bullet points here. Yeah, there's room for efficiency improvements, but many folks don't have the money to pay for those improvements out of pocket.

There is a need for financial aid for water users to carry out these efficiency improvements, whether it's a conversion from wheel line to pivot or simply a free or heavily discounted soil moisture sensors. I think any additional resources would be welcome.

And finally, I'm going to speak to the continuous need for more long-term in-stream flow monitoring in the main stem Scott River and the western tribs. A lot of times it's just piecemeal, you know, a couple, two, three years, and we really need to have a consistent long term record. That would be helpful.

And then finally, additionally, continuous real-time monitoring, precipitation, soil moisture, ET, and also groundwater wells at several locations throughout the valley would be helpful to refine our understanding Scott Valley's water balance.

And that's all I have for you today. So I think I'm just going to end it here. Thank you very much, folks. Appreciate it.

MR. EKDAHL: Great. Thank you very much.

Let's move on to our next speaker, Eli Asarian from Riverbend Science. No, sorry, you are correct. It is CDFW. This is listed anonymously, "CDFW staff," but I just skipped right over that.

So turning it back over to Mr. Harris, what

observations do you have from assessing groundwater Local Cooperative Solutions?

What was your role in verifying compliance with the groundwater Local Cooperative Solution commitments?

Do you have recommendations that would improve the process of developing and verifying?

And should future LCS, if adopted, incorporate conservation and efficiency investments made prior to 2021? And if so, how?

MR. HARRIS: CDF was selected by about half of the landowners to be the coordinating entity for implementing the LCSs in 2022. A little over half of the CDF LCSs received an onsite inspection. CDF developed a rather specific checklist identifying all proposed LSC actions and this was used to verify during site verification. An example of that checklist is on the right side of the slide.

During the CDFW inspections, not all actions proposed were verified for various reasons. For example, fall fallowing was a common action to reduce water usage. But if this inspection occurred during June or July and coupled with other actions, the fallowing may not have been verified.

The reporting requirement for CDFW was met for 69 percent of the LCSs monitored by the department. The

months most frequently not reported were September and October, presumably because people were not diverting and thought they didn't need to report. But it is still required and necessary to evaluate conservation actions during that time.

For all foregoing and fallowing, a fourth cutting were common conservation actions proposed. 15 LCSs identified fallowing or foregoing their last alfalfa cutting as contributing to 30 percent reduction. So reporting during the fall was the most critical time for those LCS report holdings to report to us.

We have summarized the proposed LCS actions by acreage with the exception of the Shasta River, which only had one LCS for a CFS dedication. The table on the left lists all the actions submitted from landowners. The table on the right is a summary of those actions compiled and categorized by acreage.

It is important to note that many ranches were implementing multiple actions, so the acreages you see here are summarized and are duplicative of some acres.

The proposed water conservation actions that were applied to most acreage were, in order of magnitude, nozzle size and pressure reductions, fallowing a fourth cutting of alfalfa, set time and application rates reduced, conversion to grain, and shutting off irrigation of field corners.

The easiest actions to verify were fallowing and crop conversion. These actions did not require data analysis to verify, and this should be noted as we think about refining this program to be utilized in the future. The hardest to verify without pumping data were irrigation infrastructure upgrades and reductions in water usage. Moving forward, these types of actions require data submittal to properly verify compliance with the LCS program.

The development of LCSs has fostered beneficial relationships, discussions, and actions in both watersheds aimed at reducing water usage. They've also provided CDFW a better understanding of on-ranch operations and provided opportunities for discussions of best management practices that have the potential to improve fish habitat conditions in the watersheds.

CDFW continues to support meeting drought emergency flow requirements through implementation of Local Cooperative Solutions. However, not enough data was provided to evaluate the effectiveness of the program with scientific certainty. Moving forward, we have recommended modifications, which we'll discuss next.

CDFW is committed to continue to work in both watersheds to develop and refine the LCS process and develop new LCS proposals in both watersheds.

As the coordinating entity, CDFW has a variety of lessons learned from the implementation of the LCS Program during the 2022 growing season. These are a few of the recommendations we feel would ensure the program better moving forward.

Starting with the application process, it would be helpful for the landowner if we can provide a variety of clear alternatives and expectations for the LCS participant to choose from. This ensures that we get all the data needed the first time and allow for quicker LCS review and approval. The list of opportunities would be developed based on the actions submitted by landowners in 2022.

We also suggest an enrollment day deadline for LCS application submittal that allows for a review, as well as State Water Resources Control Board review and approval prior to the onset of planting so ranchers can plan for the season. We received feedback from landowners that there was confusion on the LCS approval process. Some are waiting for approval before implementing their actions. And we also received feedback from ranchers that baseline water use was too high.

And lastly, data collection and sharing requirements are truly necessary to ensure compliance, as well allow us to learn if the implemented LCS strategy was effective at reducing water usage at the desired rate.

In summary, the Department is supportive in a Local Cooperative Solution Program for implementing in stream flow regulations. We have developed a good understanding of the existing program benefits, as well as the recognized shortcomings. We are providing our recommendations for the program moving forward in an effort to streamline the approval process.

Having a solid understanding of baseline water use is of course the foundation of the program of which to build upon. We think that we can then provide landowners with clear water savings options.

We also want to reiterate that we appreciate the open dialogue happening between the Department and landowners that has come from this process. Information sharing and relationships between landowners and agencies will help us find, develop, and implement solutions in these rivers.

And lastly, we are interested in implementing LCSs that have equal or greater than conservation values than the curtailment. To achieve that, they must be specific, measurable, achievable, relevant, time bound, and binding.

Thank you.

MR. EKDAHL: Great. Thank you.

Now, after two botched introductions, hopefully

I'll get this one right.

MR. ASARIAN: I'm rooting for you.

MR. EKDAHL: Eli Aarian from Riverbend Science, three questions.

Please provide a brief overview of your report evaluating the hydrologic effects of 2021-22 Scott-Shasta irrigation curtailment using remote sensing in-stream (indiscernible) gauges and its findings.

Question two, what conservation actions would best support the regulations' goals of enhancing stream flow while providing for other beneficial uses of water? Why?

Question three, given the lack of groundwater pumping information, what water use baseline would you propose to evaluate new groundwater for Local Cooperative Solutions?

Thank you.

MR. ASARIAN: All right. Good afternoon, everyone. Thanks for the opportunity to speak with you. I'm going to jump right in here since the questions have been already read.

I want to start by talking about the different fates where water can end up when it's put into the irrigation system. So a good fraction of it ends up as consumptive use, otherwise known as evapotranspiration or

ET. And that can be split into a productive use, which means the crop is actively using that water, it's producing biomass, it's producing crop yield, it's doing good stuff.

Or it can be unproductive wasted water. This is water that there's literally no benefits that come from it. So that's water that leaves the sprinkle ahead and is blown away by the wind. It's water that lands on the leaves of the plant and evaporates or it's water that evaporates from the soil.

There also is reusable return flows. So if excess water is applied to the field, it runs off or soaks into the ground. And that water is not lost, it's just put downstream or available for later use.

So when we want to try to reduce water scarcity at the basin scale, what we need to do is focus on reducing the consumptive use and if we -- because that's what really matters. Those are the losses at the basin scale. And if we want to do that in the least painful way possible for agriculture, we want to focus on that unproductive wasted water that we're not getting any benefits from.

So how do we do that? So Sarwar and Peters have this great paper that they titled, "The More You Expose, the More You Lose." And they talk about how the more efficient sprinkler systems have large drops that are released close to the surface of the soil and that way you

have less wind losses. That's why LEPA is such a great technology, because there's no wind losses and there's no canopy interception. So there's a limit to how much water you could save but it's on the order of, you know, 5 to 20 percent, something like that. So it's worth doing, but it's probably not, you know, the entire solution.

These are images here from the, oh, sorry, from the Sentinel satellite showing the greenness of agricultural fields in the Shasta and Scott in 2020 and 2022 in mid-August. I've highlighted some areas in the Shasta there with black dashed ovals that show areas that were really green in 2020 but were not green in 2022. In the Scott, we really don't see that systematic pattern of differences in greenness. It's pretty similar amount of green.

So to quantify water use, we rely on data from a satellite called Landsat. And in the right panel there, you can see what's called the thermal sensor from the Landsat, and it's able to read the skin temperature of the earth. And just as when a human being, when we are sweating and our sweat is evaporating, it cools our skin down, it's the same thing that happens in a plant, where when they're actively transpiring water, it's cooling down the surface of the leaf. And the satellites can see that. For example, you can see the center pivots are a bright

blue color compared to the fallow fields and the dry hillsides are red.

And that thermal sensor is one of the primary inputs into OpenET, which is, you know, a big, complicated satellite math thing that all these other people are doing. And this project is just summarizing that data. So I don't have time to talk about the methods, but you can ask if you want to discuss.

So for the totals in Scott, the consumptive use went up by about 4 percent between 2020 and 2022, whereas in the Shasta, they went down by about 25 percent.

Another way to look at this data is to convert the units to cubic feet per second. So the right panel shows the consumptive use in the ag fields in Shasta and Scott. The left panel shows the river flow. And so what you can see is that during the mid-late summer there's, you know, vastly more water being used by the crops than is remaining in the river. And if we look at the difference, the reduction in consumptive use that we saw in the Shasta in 2022 is pretty similar to the increased in-stream flow that we saw in Shasta in that same year. And similarly in the Scott, where there was not a reduction in consumptive use, there was not much of an increase in stream flow.

These maps show the percent reduction in consumptive use from 2020 to 2022. The left is for

individual fields and the right is for the whole LCS scale. And so most of the LCSs in the right panel there are either -- they're the bright yellow, or it's bright on my computer, it's not that bright on the screen, the bright yellow is an increase or the pale orange is a less than five percent reduction. That's where most of the fields were at.

There were two ranches that had really high reductions of about 20 percent. And one of them in their LCS said that they were not irrigating about 30 percent of the area, and another one said they were not irrigating after June 30. So there were some ranches that saved a lot of water, but most it was marginal.

Uh-oh, I lost my ability to advance here. Can you help me with that? Oh, sorry. Yeah, perfect. Okay. Thank you.

So whereas in Shasta, we did see big reductions in consumptive use, it was mostly in areas that were surface water irrigated or the groundwater irrigated Big Springs Irrigation District that was also curtailed.

So why was there differences in the Shasta compared to Scott? One big difference is that the Shasta, most of the water use is surface water diversions and there's a watermaster who actually, you know, keeps track of where the water is going, compared to in the Scott, it's

mostly groundwater, everyone has their own well, and they can pretty much pump as much water as they want to, so it's harder to track.

The LCSs in Scott were supposed to reduce the amount of pumping, but it seems like that was ineffective, at least based on the consumptive use. So I wanted to provide some suggestions for improving future LCSs.

The first is that I think the LCSs should really focus in on reducing the consumptive use as the primary thing. I would also just throw in here that I think the fall and winter stock water, you know, that's not related to consumptive use, but I think that's important too.

And I think there is a need for better verification and recording. In 2022, it was, you know, it was a lot of self-reporting. There were some, you know, field verification. But as the previous presenter said, there's only so much you can see from going out to a ranch once or twice, especially if you're not there in September.

And I think in the future there should be more emphasis on, you know, durable, documented, independent, verifiable records. So things like water meters, electric meters, remote sensing, even just well-organized photos taken strategically would work. And things that are unverifiable, I have a hard time seeing how, you know, that can be justified as included in an LCS. So the things like

about how many hours per week is the irrigation system running? If there's not a meter, there's really no way to, you know, to verify that, unfortunately.

I think there's a need to improve the baselines. And so one of the things is that it seems like the baselines in the LCSs was inflated or exaggerated. You know, the average usage applied water per acre was 44 inches in the LCSs, whereas what is included in the groundwater model is 22. That's almost 100 percent greater. Theoretically, it should be the same number, not 100 percent a difference.

What the right number is, you know, I don't know. I'm guessing it's probably somewhere, you know, in the middle. But there's another reason why having metering would really help us answer that question so we don't have to speculate about it.

Other recommendations for baseline? I think a multi-year baseline would be really beneficial because there's things like for crop fertility reasons, the periodic rotation of grain into fields that are primarily alfalfa, that's not necessarily a water management thing, it's just part of the standard practice, as I understand it. So if people could sort of pick whatever year they wanted as their baseline, if it were me picking, I would pick the year that I had planted all alfalfa; right? And

then I could plant some grain this year and I would get some credit for that. So I think having a multi-year thing.

And I think also having it based on documented verifiable records would reduce the incentives and opportunities for setting a higher baseline than maybe is realistic.

I think, also, it would probably make sense to set the baselines based on the historical amount of irrigated acreage rather than on the historical amount of water use. If you're basing it based on the historical water use, you're essentially incentivizing the people in the past who wasted a lot of water.

So just to do an example, let's say I was a rancher and I installed a LEPA system five years ago and I've been saving, you know, 10 or 15 percent of water ever since I installed that. My neighbor didn't do anything, has been irrigating at, you know, 80 inches, which is what some of the LCS has said they were applying, so he's irrigating at 80, he can cut that down to 55, save 30 percent, not have to fallow any of his ground, and I would have to follow some of my land even though I've been saving water this whole time.

To me, that doesn't really make sense. So I think setting it based on historical irrigated acreage.

There are ways to reduce evapotranspiration. So I talked about the more you expose, the more you lose, and the importance of driving down that wasted water; right? It's not a free lunch because it's expensive, but it's -- you don't harm agricultural production in that way.

The other stuff, you know, does require reduction in the productive uses. So switching crops, early cessation of irrigation, I think that should be verified. You know, you're not saving water if you're triple irrigating in July to supercharge your soil moisture and then not irrigating in September.

Then fouling either, you know, for a whole year or for permanent purchases.

And then avoiding things that increase water use, like converting flood to an inefficient sprinkler, you're going to increase your wind losses and you're going to irrigate the high spots in your field that weren't well irrigated before.

So, you know, if the purpose of the LCS program is to meet the flow thresholds, I think they should meet the purpose of being equal then or better than the curtailment. It's important, I think, to provide people with flexibility because the individual ranchers, they know how best they can meet on their property by a certain percent reduction. So they should have the flexibility to

figure out how to do that.

But I think with that flexibility comes, you know, transparency and accountability for results. And I'd ask the question: Is the purpose of this regulatory program to show activity, like, hey, you know, we're trying something, or is it to actually achieve results?

Thank you.

MR. EKDAHL: Great. Thank you.

Going next to Thomas Harter, two questions.

What actions would support the regulation's goal of enhancing streamflow and providing for other beneficial uses of water and why?

And given the lack of groundwater pumping information, what water use baseline, if any, would you propose to evaluate new groundwater LCSs?

DR. HARTER: Thank you, Erik. And I'm Thomas Harter, University of California, and I'm working with Leland Scantlebury and Claire Kuba, you know, so she can brief fully on this.

And I want to focus mostly on the first question and sort of expand on using the graphs that I showed earlier, and then Bronwen, she'll kind of expand on that to focus on what can be done in addition to -- we looked at two alternatives in the earlier presentation. One was the LCS Program, and one was a complete curtailment with a

variable curtailment start date.

As part of the Groundwater Sustainability Plan development in the Scott Valley, which Laura Foglia and I were the technical leads for, the Advisory Committee that developed the Groundwater Sustainability Plan had long and hard discussions around what can we do about streamflow? And it is the only Groundwater Sustainability Plan, to my knowledge, that actually didn't say we're going to stick with the 2015 -- or actually the 1990 to 2015 baseline. we're going to improve on that baseline through some practices. And the question that the Advisory Committee asked itself: How much of the stream depletion that has been occurring in the base period prior to 2015 can be reasonably reversed to meet some of these goals that have been spelled out today?

Managed aquifer recharge and in-lieu recharge has been mentioned several times today. That was the major practice that was most favored by the Advisory Committee, and that was used to set the minimum threshold for improving on stream depletion. It provides up to two weeks earlier reconnection dates, very roughly speaking, except for in the most dry years when we can't really do a managed aquifer flow recharge because we don't have the winter and spring flows.

A 20 percent reduction in consumptive use and a

corresponding reduction in irrigation demand would also provide significantly earlier reconnection dates in the falls, but again, not in the driest years.

An August 1st curtailment date on alfalfa or August 1st curtailment each year on all crops, which is somewhat similar in effect to what I showed you with the full curtailment with a variable date, that will in fact bring most fall flows above that 40 CFS threshold that we used in the Advisory Committee, among several other thresholds, except for in the very, very driest year.

There was also the discussion of some kind of off-stream reservoir or multiple off-stream reservoirs that provide up to 60 CFS of flows, and if it's large enough, potentially flows even in the driest years. And for that purpose, we've also run several benchmarks scenarios to look at unimpaired conditions to kind of compare what we can gain relative to the maximum possible gain if we consider unimpaired to be maximum possible.

So those are kind of key conclusions here. The takeaways at the Advisory Committee level and in the development of the Groundwater Sustainability Plan, this question has been actually pondered quite extensively, including actually having done an economic analysis that you can find in the Groundwater Sustainability Plan that looks at some of the bulk costs of implementing some of

these measures.

So let me go back to this graph and sort of discuss what can be achieved with these various actions. I'm taking those green and blue graphs that I showed earlier, and I scrunched them and I put them over this other graph that Bronwen showed.

What this new graph is, it's actually more information than in the green and red graph. The green and red graph just tells you on which day of the year, left to right, in which year from 1991 in the bottom line to 2023 in the top line, you're either below in red or above your emergency streamflow table.

What the lower graph shows for each month of the year, it shows the band of flows, the range of flows that we see between 1991 and in these three graphs, 2023. In the following graphs, it's just through 2018. These are new simulations that we just generated, as I said, this week. The following graphs will be from the GSP where we used simulations from 1991 through 2018.

I want to go into what this graph is. So in the middle, you see a red line with dots. Half of the flows are above that line. Half of the flows are below the red line. So in a 20-year period, 10 years are going to be above the red line and 10 years are below the red line.

The dark gray area around that red line with the

dots, that's 10 of 20 years are going to be within that dark gray area.

Then there is a light gray area that you can barely see here in the room, maybe better on your computer screen. There's a light gray area above that dark gray area and a light gray below that. There are going to be five -- no, 4 in 20 years that are going to be in that light gray area on the top. Those are the wettest years. And the driest years are going to be in that light gray area below the dark gray area, and it's 4 out of 20 years. And then there's going to be 1 year out of 20 that's going to be outside above, and 1 in 20 years that's outside below.

Okay, the part I want you to focus on is the light gray part that's below the dark gray part. That's 4 out of 20 years, 4 or 5. Basically, it's the driest years we have. It's the driest 4 years out of 20 in each of the 12 months of the year. The zig-zaggy lines, the red zig-zaggy line is the emergency flow table, the blue zig-zaggy line is the CDFW 2017 minimum flow table. So let's focus on where that light gray area below the dark gray area is relative to the emergency flows, which is that red line that's zigzagging across the graph.

On the left side, that's how we simulate the last 40 -- 30 years -- 32 years. And that, yeah, even the

median flow, the line with the dots, is well below that required flow.

When we do the LCS, like we did last year, in 24 of 32 years where we are not meeting the minimum flows at some point in the summer, when we do that it gets scrunched up, as Bronwen said, and especially in the late fall, we get much, much closer to those minimum flows, but in the summer, we are not.

When we do full curtailment of all groundwater uses and all surface water uses, that is no more irrigation at some point between June and August, depending on when flows fall below the required flows, then in fact we get full compliance, almost full compliance in the fall. In most years, except for the driest, we get compliance in the summer. That's the right graph.

Now these graphs will not be in the GSP. What we have in the GSP is a number of other graphs that look at other options. The managed aquifer recharge to MAR (phonetic) and ILR, managed aquifer recharge to (indiscernible) recharge is the upper. The third graph in the upper row, the 20 percent reduced crop ET is the fourth one. The thing to look at is where is that light gray area below the dark gray area relative to the red line, and how does that change in time?

I'm not going to belabor these graphs, but they

sort of show some of that variability. One thing is some of the unimpaired scenarios that we've looked at. The one I want to look -- I want you to look at are the top two right graphs. Those are unimpaired scenarios that assume that instead of agriculture, you would have some landscape with, as Sari described.

The gentleman that described the 1852 Scott Valley talked about it being pastoral land with bunch grasses and clover and riparian stream corridors. So if you assume something like bunch grass and clovers, which has a rooting depth of about up to seven feet, eight feet, and we assume some wicking depth and say at 15 feet groundwater table depth, there's no more ET, then from 15 to zero, it sort of increases incrementally as the water table rises.

And with that kind of an assumption modeled, but no irrigation, we get these graphs in the upper right-hand side where in most years we are, in fact, about fewer in-stream flows, the most driest would still fall below those flows in the fall.

And then we had our curtailment once. Let me go to this graph last to sort of show that. Again, this is the three scenarios that I showed that we just did this week with the emergency flow. The LCS was done last year, being the red line, the gray line being the base case, and

the purple line being a case where there's full curtailment every year for the rest of the year once flows fall below the emergency flow table.

What this is, again, it's basically looking at that date when that threshold of 40 CFS is exceeded in the fall and sorting the years from the earliest to the latest and putting them on -- sort of stacking them on top of each other. So the more they're stacked, the earlier this -- or one other way that I look at it is the more that line moves to the left, the better we are relative to the base case, which is that gray line. So the way I like to look at it, look at how these lines move to the left and how much they move to the left as a result of different actions.

So this is a new one, but in the GSP we did lots of different scenarios and they showed these improvements where these lines move from the right, which is the base case, to the left. So we did different MAR and ILR scenarios. We did reduced crop ET's in the lower left. We did look at irrigation efficiency. We looked at groundwater curtailments. And you can see that many move in the middle part, that is sort of the middle kind of years, not the wettest, not the driest, they move by about two weeks, some even move by a month. The driest year, which is the one at the top, we see the least movement with many of those actions, except for we do curtailments.

This next one summarizes, in the upper left, the full curtailments. When we do full curtailments any time before August 1st, then in fact most years we never see disconnection, except for 1 in 20 or 1 in 10. Curtailment dates that are after August 1st, we still are going to have, in dry years, disconnection in the fall.

We also, in the GSP, have some partial unimpaired scenarios. We have the full unimpaired scenario in the lower left where the bunch grass with an extraction depth of up to 15 feet is the two top lines, the purple and the red line. So that would be sort of your benchmark for an alternative landscape. And then we have the reservoirs, both the small reservoirs and the large reservoirs.

All of this is documented in the GSP, and we hope to have an update, because the curtailments and the unimpaired GDEs (phonetic) are not documented there, and hopefully we'll have that for the workshop that we do on swim next month.

So those are just some of the metrics that we used on the Advisory Committee level to see how flows can be improved at the Fort Jones gauge. Of course, the model has other results in terms of water table and which part of the stream are flowing, which parts are not.

The piece that's also in the plan is the economic analysis. One of the things that the Advisory Committee in

the end decided is that having curtailments every year sometime in July already, and forgoing not just a fourth cutting but also the third cutting on the alfalfa, which is essentially a third reduction then in the crop production, we did the economic analysis on that particular one, forgoing just the alfalfa production on the third cutting, and that was a 20 percent reduction in the economic output on the farm level.

With that, I think I'm done.

MR. EKDAHL: Thank you. Let's go right to our next speaker, Theodora Johnson, and we have two questions, if we go back one slide.

What conservation practices did parties implement to reduce water use during the e-regs beyond those implemented as part of the LCS solutions?

What additional actions or practices are planned to reduce water use moving forward?

And lastly, are there additional components or approaches to groundwater LCS that the Board should consider given the goal of enhancing flow and providing for other beneficial uses?

MS. THEODORA: Thanks. Hi, my name is Theo Johnson, and I'm a spokesperson for the Scott Valley Agriculture Water Alliance. I'm also a Scott Valley rancher.

I think one thing I wanted to get across today is that we have belly-scraping years, too, and there's been quite a few of those lately. These dry years, they're hard on all of us, so we can't always just keep turning down the dial on agriculture and expect us to survive. So I hope everybody's keeping that in mind as we look at all these different scenarios of, you know, July 15th. How about August 1st? I think it's important we ask some producers, can you survive that? So that's something I try to do.

Recently, in light of the 2022 LCSs, it's hard to capture what the effects were on the producers, and I don't know if anybody really tried to do that yet, but I try to capture that today to some small degree.

I think I would like to -- I can race through this. Everybody's talked about what was done in the LCSs. I don't want to belabor that, but I do want to note that landowners with, you know, half of the acreage that was surface water irrigated could not qualify for an LCS the way the regulation was written. So, therefore, they were 100 percent curtailed as of July 2nd.

I'll move on. These are some experiences that I just asked people to give me some of their responses of what happened to them in 2022. 25 percent to 30 percent hay production reduction. Everybody had the response of not being able to sleep at night. Sold cows. Lost 35

percent hay production. Sold cows had a 50 percent loss, some of them, because the market was down at the time during a drought. It was a bad time to sell cows.

There was a large hay grower who said if he hadn't had new irrigation systems, he would have been hit very hard, but he was able to implement some of these technologies that you've been hearing about, center pivots, LEPA. But I just want to make a note that a new pivot, your average pivot, is $120,000 to put in. And to switch to LEPA, $15,000 to $20,000.

So we're talking about big investments. Not everybody's prepared for that. And we've had some hard years lately and not everybody has that cash lying around. Even if we get some help, you know, cost share through NRCS, that's 50 percent cost share on a $120,000 pivot. We could use some assistance. I don't know what form that comes in, but it's a good way to save water, but it's not easy to get there for everyone.

The last one, this was just a cattle ranch that had only surface water, and you can see what happened to them. And we sold all our cows after 70 years of the family being in business on that place. And, you know, the landowners, it's hard for them to even look at.

So I'm going to make a note that these people are at the bottom. They have a high priority water right at

the lower end of Shackleford, very lowest end of Shackleford Creek. And in order for them to get that water right, there has to be water in the stream for them to get that water right. So I think if water rights, the Shackleford decree is properly enforced, there will be water in the stream to get the toshers their water.

We know that Members Firestone and McGuire just saw this ranch recently, so they can attest to what it looks like now.

This is another ranch. I just, I wanted to highlight some of their experience. It's a very common experience or just your average. A lot of people in the valley produce hay for their own cows. And a lot of people had to sell cows at a time when the prices were low. And I will say for the hay producers, and they've told me, you know, if it weren't for the high hay prices last year, we would have been in a world of trouble. Unfortunately for the cattle producers, that was a really tough time because we had a lack of pasture happening and we had record high hay prices. So staying in business was tough.

Reestablishing pasture once it dies takes several years, and it's very expensive. And in the meantime, your cows need a place to live. When you sell cows during their productive lifetime, now prices have gone up, we've had some rain, the cattle prices have gone up, you can't just

go back to the sale and buy a bunch of mother cows that you just sold last year for the same price. And if you hold onto some of your heifers and try to, you know, build your herd that way, it takes five years to turn a profit off of a heifer that you keep yourself. So it's a long-term investment, and we're seeing some really tight times right now. Extreme stress on this family.

I'm sorry, I've got to go faster. I forgot to set my timer. Do you have the time? I have five left. Okay.

This is just a little bit more on the pasture. I mean, when we don't have winter stock water it really, really reduces the amount of groundwater recharge that we get, and it reduces our sub-irrigation, increases the need for groundwater pumping where possible. But as we know, not all places have the option of going to groundwater. Having dry ditches increases the lag time. On my place, we didn't get our -- it usually takes us a week to charge up the ditch and get our irrigation water in April. It took us a month, not having those ditches charged over the winter.

And I just want to make a note. When you're growing pasture, a 30 percent loss of plant growth equates to 60 percent loss of forage available, because proper grazing management requires that you leave a certain amount

of plant so it doesn't do damage to the plant and cause it to stop growing. You want to prevent that stress to the plant so it will keep producing. And so it's actually a double, hits you double. When you're reducing by 30 percent, you're losing 60 percent because you've got to leave some.

I want to note the humps in this picture. You can't see it. I'm sorry. Alfalfa, that nice alfalfa field, it has very uniform, interesting looking little humps in it because where the drains of the wheel line drain when it's being moved, you see how much more water is getting in those little zones and it's creating little humps. And so I just wanted to show you that alfalfa and the unevenness here, that's unusual for these fields. They're usually even. So there was definitely real hits.

I'm not sure what happened with the open ET readings because I showed your report around Mr. Asarian's report and people went, wow, that doesn't match what I had in my field. We definitely had a fallowed place here. And I know somebody -- Brandon Fawaz will be speaking more on his experience of looking at specific sites on the ET report and kind of how that -- ground truthing that and some of his observations. But it didn't seem to match up with what we know happened in '22, which is there was a lot of fallowed ground, as you can see here. You can see the

ring around this pivot. A lot of people turned off their end guns and had dried up their corners. You see a lot of pasture that's followed here. Why not switch to grain permanently?

I think I could come back to this if somebody wants me to hone in on this later. There's real reasons why we can't just -- it's not -- it's usually a breakeven crop. We can talk about the details later, but it's usually just rotated through with our alfalfa, and so I'll move on.

No compensation for the 2022 emergency regulation losses. And the Farm Service Agency Program through USDA is not designed for these types of cuts. You don't get any payment for a 30 percent reduction in your irrigation. It's just not something they can do.

So our recommendations, and I've been talking at length with Farm Bureau, Siskiyou Farm Bureau and the GSA, and we would really like to see some flexibility. But like Gary Black was saying for the Shasta, we don't -- we're not probably talking about total rewrite, but I think we can make some tweaks and improvements.

Our base, we would like to see a wet or dry year type kind of scenario where we see different types of cuts depending on year type.

And then I think it would be nice to have a suite

of options maybe, and here I'm just looking at two, but one option for your LCS might be very similar to the '22, but you could encourage a bigger shift to earlier season irrigation with less later in the season and allow more flex time around the end and first of the month, which I think was allowed last, I know it was allowed last time, but I think without having to do the kind of more onerous reporting on that.

And option two would be instead of a pumping reduction percentage, we would see a percentage of acres being non-irrigated after a certain date, so 15 percent off after July 15th and so on. As you can see here, I think that's a good option possibly for the alfalfa growers. But as I described earlier for pasture, pasture can't withstand that kind of extended periods of drought, so this might not be something that's workable for pasture.

I've heard this several times about the simplifying the process of facilitating compliance with standardized farms. I think it's a big -- it would be a big help. And if we had a little more staff help to make sure, like just maybe like a physical presence of somebody that could be there on a regular basis to help people make sure that they're complying before they, you know, get a surprise letter in the mail, that would be really nice. There was multiple accidental reporting errors that

resulted in fines in '22. And if we could avoid that just by having some more help, that would be nice. Not everybody knows the number to call or how to send an email, you know. Sorry, that's just the way.

So other recommendations, not all, we can't just focus on LCSs to help the situation because, as I mentioned, surface water irrigators can't -- couldn't qualify for the LCSs. So if we could remove the restriction on winter stock water and do as much managed aquifer recharge as possible and in-lieu irrigation? We ran into problems having high restrictions on our winter water that we really should have been putting that water in the only reservoir we have, which is underground, and our snowpack. That's the reservoir we have no control over.

We would like to shift the focus to tributaries where fishery is happening in the summer months. And I think if you look at it, we have enough flow gauges on the important tributaries, and we have enough fish data on those important tributaries to know -- okay, I'm at zero -- to know what is needed. So I think that's something that we collaboratively need to get the local people who know what that data says, sit down, decide on what's reasonable, and then put focus on those tributaries in the summer and bring down the requirement in the main stem where it's not as important.

The rest of these slides are -- we've talked about the different ways. But I guess I just want to highlight that if we're going to stay in business, we're going to need financial and technical assistance to further reduce the amount of water we're using. It's not impossible to do, but it takes time and it takes money.

And so these are methods, I'm just going to run through this, you know about these, or we can talk more details about what these methods are. Some of them are being used, but there's a lot of opportunities to do more if we just have the resources to do it. And there's a lot of opportunities to do managed aquifer recharge and in-lieu recharge.

And so I think I'll end on that. Look at those adorable kids. What's that? Okay, we have apples. Thank you. We have bumper crops of apples.

MR. EKDAHL: All right. Well, thank you all. We have about seven, eight minutes for the Q&A session. We may go a little bit longer depending on how many questions we have.

I'll just jump right to my first question, which I think is the, for me, it's kind of the elephant in the room. What's up with the difference between the ET LCS numbers and everything else we've heard, which is the evidence on the ground that seems to show that people

really did reduce the benefits that we did observe in the stream flow, the much improved groundwater elevations, so by all the compliance from both the RCD and I think CDFW who did observe for the most part compliance with the LCS reductions?

So, you know, one narrative is saying the LCSs didn't do anything. Every other line of evidence says the LCS pretty much did what they said they were going to do.

I'll turn it over to the entire group.

MR. ASARIAN: I guess everyone's looking at me. Well, so a few things.

I think 2022 was an overall wetter hydrologic year than 2021. Like Eli showed, the other Eli, not me, showed the snowpack or precipitation and that it was better than or similar --

MR. SCOTT: It was better than '21.

MR. ASARIAN: Okay. Yeah. But if you look --

MR. SCOTT: It was better in '21 (indiscernible).

MR. ASARIAN: -- I believe if you look at like, you know, the April, May, June flows on the main stem Scott, and also the Salmon, which is over the hill, Salmon River, the flows were higher in 2022. So it was more runoff coming into the valley.

So I think that part of the increased groundwater, some of that was the inflow from tributaries.

One explanation, which is that if the 44 inches of applied water for the baseline is correct, which I don't think it is but maybe it is somewhat less than that, then it could be that for 50 years or however long people have been massively over irrigating. And so if you stop massively over irrigating, then you don't change the consumptive use because the crops had the water that they needed. There's just more water cycling through the system. I don't know that that is probably true, but that's a potential explanation.

So I'm really interested in finding out these areas that people are talking about where the OpenET maybe didn't match with people's on-the-ground experience and sort of drilling into those areas and looking at what happens to look at that. I don't know.

MS. THEODORA: Yeah. I think --

MR. ASARIAN: There's lots of different sensors on the satellites and different satellites on different days, so it could be interesting to look at that.

MS. THEODORA: Right, it could be an interesting tool, but I would welcome the chance to go in ground truth and see.

MR. ASARIAN: Yeah.

MS. THEODORA: It's too bad it's hindsight now. It's hard to go back. And I tried using Google Earth maps

to see if I could take photographs and you can't go back and do that. I tried to compare years and apparently they have a really weird way of compiling photos. And none of us took pictures in advance to '22 because we didn't realize we would need to.

But I did talk to people with drones and asked them, I tried to find photos going back and they went, "Sorry, we don't really have anything before '22." They weren't flying their drones before that, dang it.

But I think it would be interesting to figure out, this question out of why they don't seem to match because we did -- like Brandon, like he said, well, he can talk more. I don't know if now would be a good time. If that's amenable to you to let Brandon talk a little bit about his --

MR. EKDAHL: I think, yes. I mean, I think the conversation is appropriate, and please come up and introduce yourself if you can, either at the dais, or sit up front.

MR. FAWAZ: Hi, Brandon Fawaz, and I am with Siskiyou County Farm Grant Farm in Scott Valley.

I have spent and played time on this OpenET website for years before I knew any of you all here because it's fascinating to me. I've subscribed to private services to try to find satellite imaging daily to help me

with my farm management. So when I saw Eli's report, I was intrigued and a lot of people asked me about it. And I built a little bit of a spreadsheet I'd be happy to share with you some other time, but it's not in this room right now, but here's some takeaways.

For one, in determining ET, you have to have the right crop because the right crop coefficient has to be in there. The OpenET website massively mislabels the vast majority of crops in Scott Valley. Me personally, I had fields that were grain that are labeled as alfalfa. And then in 2022, when we had grain, it shows higher ET than other years when there was alfalfa and grass alfalfa, and now in 2023, when I'm back to alfalfa and had a full season of irrigation.

I don't know how to explain that from what their satellite imagery does but I have the partial theory that there must be something that the satellite sees relating to the density and the -- I don't know if it gets the height or something of a crop. But I had a grain crop that was literally up above my chest. And I think that that huge crop must show something to the satellite that makes it think it used more water than it did. Why it doesn't account -- and I have a drone picture of the harvester in the field -- why it doesn't account for that field then being brown and harvesting the field, we just thought it

was neat to have a combine dumping grain on the go like a farmer in the Midwest. And now it's like, oh, this is proof. We have this pictures of this brown dry field later in the summer, and that's not reflected in the OpenET's data.

If you look at the Tozier pasture that the two Board members saw and was pictured up here, I think that would carry a fire right now with a match. But OpenET shows more water use on that field in 2022 when it was dried up and killed than it does prior to that when it was irrigated.

So I think having another tool in the toolbox would be awesome to help figure this out. But it is not a tool that can be used today to help regulate us or to guide, you know, other interests and their goals. But I think we need to explore how it can be used, but we can't use it the way we're thinking about it right this very second.

Thank you.

MR. EKDAHL: That's very helpful. Thank you.

One thing I just want to bookmark, and we're engaged in work with the OpenET group as well, largely in the Delta, but then considering how we incorporate it into the revision of the new water rights data system and kind of planning for the future.

But I think if at all possible, I'd love to try and connect our work with both of you and the group workgroup, and with Scott, because I completely agree, like this is such a potentially amazing tool, but where these discrepancies come up, it's a real opportunity to drill down into why those discrepancies occur and maybe get some better outcomes from it down the road.

So just something that we may reach out to folks to follow up on in the next couple of months.

MS. RAGAZZI: I just wanted to put up a flag for EO to follow up with you about the reporting and violation side of things, because I don't think any of those were groundwater Local Cooperative Solution folks, but I think we should check, touch base and follow up on those specifically. I don't think this is the right venue to do that, but I think we should do that.

MR. EKDAHL: Yeah. My understanding is that we didn't do any enforcement on the LCS component things, but it was about probably other reporting requirements for water rights, which admittedly are complicated.

But, you know, going forward in the future, I think trying to bring somebody up, we can't do it for every watershed, but where appropriate and where helpful, reach out to us and let us know. I think the reporting deadline is February of this year. We've shifted timelines a little

bit. And so, you know, in December, January, maybe we can try and bring some folks up and just have a live in-person team with some computers that help people do that. We've done that in other watersheds and other settings.

So very much, we want compliance as well. We don't want to just go out and force on the failure to file issues, but we do when we have to, yeah.

Let's see. I know we're past time, but let's go a little bit past time and we'll take a longer break and we'll just move things back a little bit.

Do you have a question?

MS. AUE: I did. Actually, Eli, I'm going to put you back in the hot seat. Because I'm a lawyer, full disclosure, I don't really understand the report, like so many things that come across my desk. But I was really curious about two things.

And first of all, it was really mind-opening to start thinking about just the consumptive use fraction as opposed to diversion, because in my world I think about diversion amounts all the time. That's like my unit. That's my, you know, that's my home place. So that, I mean, thank you. That's super interesting.

But I was really confused how -- about the conversion of ET specifically from groundwater into flow. I didn't follow at all how that would happen.

And then, Thomas, I see you smiling. If you have a way to explain it, that's great. Eli doesn't have to be alone in the hot seat.

And then the other big question is just about timing. And it's really not fair to give you this question because that's not what your paper was about at all. And that's about like sort of, you know, in different places, if you are pumping water, that's going to have a very different effect on the stream. And I'm assuming that the same thing is true, that if you're applying water, if you're pulling out water, and then it kind of takes different amounts of time to get back into the aquifer, did you -- like were you able to make any assumptions about any of those timing factors?

Because those were just two things that jumped out of me and the entire mass of things that I didn't, frankly, fully understand in your report.

MR. ASARIAN: Yeah. So I think you're totally right that timing is important. I like to emphasize the consumptive use because I think a lot of people have kind of a free lunch kind of idea about water. Like if we take a ditch and we line the ditch into a pipe and, you know, then there's all this extra water that's just going to magically appear. And that's not how it happens. You need to, if you're doing an efficiency project, you have to look

at the water budget before the project and after the budget and, you know, what was going into groundwater versus what was going into the ET and all that kind of stuff. So that's part of why I focus so much on the consumptive use.

But you're totally right that both for recharge and pumping, timing is important, and the distance and all of that. Like that's a main reason why having a groundwater model is really useful because I don't know how else to answer those questions other than to use the model.

And the first question I didn't totally understand what you're saying. What is the link between -- how does groundwater ET get to stream flow?

MS. AUE: Yeah, you had some charts that were showing like --

MR. ASARIAN: Oh, just the ones that I showed in here?

MS. AUE: Here, and I think you had some similar things --

MR. ASARIAN: Yeah. So --

MS. AUE: -- in your report --

MR. ASARIAN: -- so --

MS. AUE: -- where you were like, okay, there's -- you know, the reduction wasn't 30 percent, it was closer to, you know, something else and in some places increased. And this is, yeah, this is sort of similar to

that, so --

MR. ASARIAN: Yeah, so that was just a volumetric conversion of taking the entire amount of consumptive use in the valley by month and just doing the unit conversions, so dividing the total volume by the number of -- I might not be saying it exactly, dividing by the number of total seconds in the month and the number of cubic feet in the month. Maybe one of those is a multiply, but it's essentially just taking that total volume and just apportioning it to an instantaneous basis.

So it doesn't necessarily mean that if the, you know, the crop water use for the valley in the Shasta was 300 CFS, it doesn't necessarily mean that if there was no irrigation that 100 percent of that would have appeared as 300 CFS in the stream, but it's just, that is the volume. But, actually, translate that into --

MS. AUE: Okay.

MR. ASARIAN: -- like what the stream flow of that would be.

MS. AUE: So you were talking about CFS not as a stream flow, but as like --

MR. ASARIAN: That’s right, just purely a unit conversion.

MS. AUE: -- another way to think about --

MR. ASARIAN: A unit.

MS. AUE: -- how much water is in an aquifer?

MR. ASARIAN: Yeah.

MS. AUE: Okay.

MR. ASARIAN: Converting a volume to a rate --

MS. AUE: That's --

MR. ASARIAN: -- a volume per month to an instantaneous rate, yes.

MS. AUE: That makes much more sense. Thank you.

MR. EKDAHL: I have one more question, then we'll go to break.

In theory, you kind of touched on this, you know, we did throw around a lot of numbers, curtailment on July 15th, curtailment on August 1st. And it's really hard to understand what that means to people who live and work in the valleys.

What would it mean, you know, if we said on a wet year, curtailment at August 1st versus August 15th, in a dry year it's some other number, is that something that is even remotely within the realm of something that growers would be able to adapt to or is it almost impossibly difficult? I know that's a very open-ended question but --

MS. THEODORA: I think it depends on which type of producer you're talking to. If you're talking to an alfalfa grower, you can talk to him right now. If you're talking to a cattle producer, you're talking to her right

now. Pasture just doesn't survive as well being turned off 100 percent. I did talk to one person who decreased the amount of water he was putting on his pasture and he said, "I was actually surprised at how well it did, and I think I might keep going with the decreased amount."

So there's definitely room for improvement on making sure we're putting down an amount of water that isn't excessive. And I think we could use some help getting there. This is what's hard. It would be great to have a longer period of time. And when we're talking about a possible potential thing, I'd really like to get into the permanent thing, I'd like to get into this, but if we could have help with the individual farm plans to make sure that you're not -- we don't really want to waste energy, pulling water out of the ground and sticking on the grass that doesn't appreciate it.

So but I'll just -- that was a long answer to short question. Pasture doesn't do real well. There's probably a point later, maybe in September, where it's going to do okay. But I would have to start talking to my neighbors and ask them, what would your date be where you would feel comfortable, like you're not going to kill pasture? Now, granted --

MR. FAWAZ: So I'll give you the 30 second answer on alfalfa. And, you know, I think we're past the smoke

and mirrors are trying to confuse each other, so I'm going to be honest with you. The ag commodity is doing about a seven-year cycle from my experience. I could show you back past years how it's been. One out of seven years I make pretty good money and one out of seven I legitimately lose some money. Usually those are back to back and it balances. It's the way it is. There's an old saying, you show a farmer a profit next year, I'll show you a surplus. That's kind of what happens. So it's the other five years that we have to sustain and have stability and to be able to continue to do what we do.

And when you talk about an August 1st to 15th curtailment, what you're basically saying is a two-cutting system. There is no way we can start and have three cuttings done by then. And so on those other five years, a two-cutting system for me, and I think I'm one of the larger producers, I'm not heavily debt loaded, but I am some debt loaded, I will not pay back my line of credit, pay the bank back as required for the year and be able to make my mortgage.

The only person that I see it really working for is a producer that has completely paid-for land which, you know, is a generation older. I'm first generation. It has to be someone that is completely paid for. They could survive. They wouldn't get ahead, but they would survive.

And that is not what you have in Scott Valley. As you know, there's no corporate arms and no hedge funds. You have people like me and her raising our kids, not our kids together, but our kids -- and that'd be some explaining to do.

But that's what you have. And that's, if you want the honest answer, how it is. And that's what it would be.

MR. EKDAHL: Thank you.

All right, well, with that, it's 3:31. Let's take a ten-minute break. We'll come back at 3:41 and we'll have our data discussion. And then following that, we'll do wrap-up in public comments. Thank you.

(Off the record at 3:31 p.m.)

(On the record at 3:43 p.m.)

MS. RAGAZZI: Okay, everybody, we're a couple of minutes over, so I'm going to try and get us all back together so we can move on with our next topic, which is data, and so that then we can move on to comments because I know a lot of folks have lined up for providing us with feedback and comments on what they've heard today and what else they want to share on the topics we've been talking about.

So our last speaker of the day is one of the State Water Board staff Shahab is -- sorry, I ran back

here -- here to tell us some information about data. After that, I'm going to invite Dr. Foglia to come up from UC Davis to talk a little bit about the data efforts we've had, as well, and the coordination that we've had with UC Davis regarding assisting us with pulling together data and working with the county to help facilitate the Board having a better understanding and the data set to work with.

So with that, I'm going to say that Shahab is going to provide an overview of the data available to the State Water Board, as well as a summary of what data are needed and for what purpose. He's also going to provide an -- well, we've already heard an overview of the current modeling efforts in the watersheds, and so Shahab at the end may touch on the status of the models that we're working with UC Davis on and the remaining work that's out there and timelines for that being completed.

I do want to flag that we are working with UC Davis to try and set up a Modeling 101 workshop in the near future as well. So that's something to look forward to coming out of our shop. So if you're interested in that, make sure you're on our email subscription list. That’s a good way to track what's going on.

Thank you, Shahab.

MR. ARAGHINEJAD: Thank you, Erin.

Hello everyone. My name is Shahab Araghinejad.

I'm an Engineer at the In-Stream Flow Unit of the Division of Water Rights, State Water Resources Control Board. In the next 15 to 20 minutes, I will talk about the status of available groundwater and surface water data in the Scott River and Shasta River watersheds and the need to complete those data for better understanding of the water resources in these watersheds. I will start with the groundwater data in the Scott River watershed.

Next slide, please. And next again. And next, sorry. Thank you.

Well, this slide shows the density of agricultural wells in the Scott River watershed. The red color shows areas with high density of wells and blue color shows areas with low density of wells. This map was provided based on 264 agricultural wells reported by the Department of Water Resources latest well compilation report as linked at the top of this slide. As noted here, the number of reported ag wells here include inactive and abandoned wells too.

Next slide, please.

This figure shows the temporal trend of ag wells in the Scott River watershed. Blue columns are the number of wells added each year since 1953 and green line shows the same numbers cumulatively. Based on a survey by UC Davis as part of the (indiscernible) and the stream model,

in 2010 there were 182 active ag wells in the watershed, which is different from 240 wells reported by DWR for the same year. The size of this difference indicates a discrepancy between number of ag wells tracked by DWR and number of ag wells in the watershed.

Next slide, please.

There are various groundwater monitoring networks in the Scott River watershed, as listed in this slide. SGMA monitoring network, UC Davis, and UC Cooperative Extension, Department of Water Resources and CASGEM (phonetic), and Quartz Valley Indian Reservation Network. And the others with the question mark here is to remind me to ask you, I mean ask you if you are aware of other sources of groundwater data in that watershed to let us know so we can contact them and collect more data.

Well, at this time, the Board's groundwater level data set is consisted of 19 wells received from GSA Technical Team and 27 wells from Quartz Valley Indian Reservation Network. Quartz Valley Indian Reservation wells are concentrated in the Shackleford subwatershed on the left side of the map. And GSA wells are distributed along the Scott River. These wells are shown as pink circles on the map. It's shown like maybe reddish circles on the screen.

The wells have available data for various time

periods in the range of 2007 to 2023. With the minimum time frame of 2021 to 2023, nine of wells received from GSA Technical Team have only monthly groundwater level readings. Ten other wells received from GSA Technical Team are continuous, but we have only monthly maximum, minimum and average data of the groundwater level of those wells.

GSA Technical Team is working on the verification of continuous data. The continuous data would be shared with us after being verified by GSA. All the GSA data were shared with the well owner's permission.

Additionally, DWR and CAST-GEM data are publicly available in this watershed, but those data have very limited details so are not very helpful really for a detailed hydrogeological analysis.

Next slide, please.

Well, more groundwater data are needed in the Scott River watershed, particularly for yellow highlighted zones shown on the map, Reach 9, Kitter Creek subwatershed and between Etna Creek and Killer Creek are areas where groundwater data is needed for the reason presented here. Reach 9 is the final passage barrier for Chinook salmon to get to the upstream of river. This was a gaining reach in the past, but it has not been the case in recent decades.

Groundwater and status water interaction is of high interest in this river ridge. Kitter Creek is a major

tributary to Reach 9. Groundwater level impacts Kitter Creek connection to main stem. Also, groundwater data is needed between Etna Creek and Kitter Creek for information about incoming mountain front recharge from the west side tributaries that may inform summer base flow levels in the main stem. We understand that there are not many wells on the west side of the Scott River, but any data about the existing wells would be really helpful to fill in the data gap in these areas.

So far, I have talked about the groundwater-level data only. It should be noted that groundwater pumping data is another important variable that is needed for water resources analysis. I have one slide later in the presentation to talk about groundwater pumping data.

Next slide, please.

Now I'm moving to the Shasta River watershed groundwater data.

Please, next.

This slide shows the density of agricultural wells in the Shasta River watershed. Red color shows areas with high density of wells and blue color shows areas with low density of wells. This map was provided based on 297 agricultural wells reported by Department of Water Resources latest well completion report as linked at the top of this slide. As noted here, the number of reported

ag wells includes inactive and abandoned wells too.

Please, next slide.

This figure shows the temporary trend of ag wells in the Shasta River watershed. Blue columns are the number of wells added each year since 1952 and green line shows the same numbers cumulatively.

Please, next slide.

SGMA and CAST-GEM are the major active groundwater monitoring plans in the Shasta River watershed. Please let us know if you are aware of any other groundwater monitoring network in this watershed.

The Board's groundwater level data set at this time is consisted of ten wells with different time period as available data received from GSA Technical Team. Continuous data exists for all ten wells. For nine wells, we have received monthly maximum, minimum, and average data. Similar to Scott Valley, the GSA Technical Team are verifying the continuous data. So those data will be shared with us after being verified by GSA Technical Team. And all well data were shared with us with the well owners' permission.

In addition, we have received historical measurements of 14 wells in the Big Springs area in the period of 2010 to 2018. These 14 Big Springs wells are not currently monitored and therefore are not shown on the map.

And I forgot to say that all those received wells with the groundwater level data are shown as reddish circles on this map.

Next slide, please.

For the reasons shown in this slide, we need more groundwater data in the Shasta River watershed. This slide shows four zones in the Shasta River watershed. All of these zones have groundwater users that impact either main stem or territories of Shasta River. The zones shown on this map are Big Springs Creek subwatershed northeast of Dorena (phonetic) Reservoir, Yolo-Shasta (phonetic) and between Gazelle (phonetic) and Granada (phonetic). To regulate groundwater use when more flows for fish are needed downstream of Shasta River, up-to-date groundwater data is needed at these zones.

Next slide, please.

As I mentioned before, groundwater pumping data is another quantity that is needed in addition to the groundwater level data. Groundwater pumping data measurement is more difficult and more expensive than groundwater level data. Our main source of data regarding groundwater demand in the Scott Valley is UC Davis SVIHM model.

There are also other alternatives to estimate groundwater demand. Actual evapotranspiration is one of

those alternatives.

I got this figure from Mr. Eli Asarian's recent report which shows actual ET in the Scott River watershed in various years. Even with these existing alternatives for groundwater pumping data, still, direct groundwater pumping data and a direct groundwater pumping measurement is a needed key information for us. Groundwater pumping data is needed to verify estimations obtained by either of these alternatives. Furthermore, other data such as field measured evapotranspiration would be really helpful to verify remote sensing-driven ET data as was briefly discussed in the previous session.

Next slide, please.

Now I'm moving to the Scott River watershed again and streamflow data. There are four USGS gauges. USGS and DWR telemetered stream gauges in the Scott River watershed. USGS Fort Jones gauge with the period of record of 1941 to present is the most important gauge. Fort Jones gauge is shown as a green star on the map. The other existing gauges are shown as light green squares on the map where the staff received inputs from CDFW, Scott Shasta Watermaster District, and local community members on potential new stream gauge locations. The desired gauges are shown by pink squares on the map. Seems like more red squares on this map.

Well, the desired gauges, the major criteria used to propose and rank new gauges are support better understanding of water balance, assist water quality management, monitor important local fish habitats, monitor 7107 dedications, and increased number of telemetered gauges.

Next slide, please.

The ten desired sample gauges are listed here for the Scott River watershed and ranked by their importance. It has been proposed to have new gauges on Kitter Creek, main stem of Scott River, Mill Creek, Sugar Creek, Miners Creek, Etna, South Fork and East Fork Creeks, and Patterson Creek. This rank is based on the input received from various experts.

I'm not going through the reasons of why these gauges are needed, but some details are presented in this slide for your future review. And please, when you have time and when you read through these reasons and details of these gauges, please let us know your feedback on either of these proposed gauges and priority of having them on the Scott River watershed.

Next slide, please. Next.

Twelve telemetered stream gauges exist with different data availability in the Shasta River watershed. At first glance, it seems that Shasta River watershed has a

good population of a stream full of gauges. But the reality is that most of the gauges have very limited data. The existing gauges are color coded by dark green for the most reliable gauges and light green for the gauges with very limited data. Some of the light green gauges have been inactive for a while and a couple of them are brand new gauges with no historical data yet.

Board staff received input from CDFW, Scott-Shasta Watermaster District, and local community members on potential new stream gauge locations. Major criteria used to propose and rank new gauges are similar to the criteria presented for the Scott River watershed. Desired new gauges are shown as red squares on this map.

Next slide, please.

This slide shows the ranked desired stream flow gauges in the Shasta River watershed. It's been proposed to have new gauges on Lower Shasta, Little Shasta and Parks Creek. Again, I'm not going through the details of these desired gauges, but some details are presented in this slide for your future review. And please let us have your feedback regarding the information provided for these slides.

Next slide, please.

Now I'm concluding the presentation. Voluntary and/or regulatory data needs to fill groundwater and

surface water gaps are listed in this table. More groundwater-level data is needed. Pressure transducers are available for those who want to contribute to sharing groundwater data. Groundwater pumping data is another needed data.

For surface water, new stream gauges are needed, as well as frequent reporting of diversion plans and real-time diversion measurements.

There are other data needs that were not discussed in this presentation, data such as soil moisture, precipitation data, other meteorological data and fisheries data. Also, we just talked about data, not any existing information and reports based on the process data. In future presentation, we cannot talk about other types of data and existing information in both watersheds.

And next to the final slide, please.

And this final slide presents options for obtaining data, which are voluntary sharing of historic and ongoing groundwater data and required data as part of groundwater Local Cooperative Solution or an information order.

With that, I'm going to conclude my presentation on the data needs. I still have time. Do you want me to go through the next step of SWIM model development?

MS. RAGAZZI: Not today, but we are going to

invite up Dr. Foglia to say a few words. You can invite --

DR. FOGLIA: I just wanted to say thank you to Shahab for summarizing all the data.

MR. EKDAHL: Laura, can you introduce yourself quickly?

DR. FOGLIA: Sure.

MR. EKDAHL: Thank you.

DR. FOGLIA: Laura Foglia, Larry Walker Associate at UC Davis. And I work with the GSA as -- for the Technical Team, and we worked a lot with Shahab.

I just want to acknowledge that the stakeholders, they came together. So when we started collecting the data, you know, it was in the moment when the GSA didn't have any funding. So it was not easy, also, for us to -- the continuous data were installed, but we didn't even have the time or staff to go out, gather the data.

But I have to say that everybody responded really quickly. And I think what we shared is not all of it, but what I can see is that every time we have a meeting, there are more people interested in sharing data. So I think it's just a question of time.

For Shasta, honestly, we didn't realize right away that the data were needed. And in Shasta, really, there were no efforts from your side, for example. So it was a little bit more difficult to start gathering the

data, but they are coming together.

I also got a big data dump from Little Shasta last week. We just need to go through the data, clean up, share and control.

But things are -- I just want to say that things are coming. So I hope that we can stick as much as possible into the voluntary sharing and step-by-step we will get to where we need to go.

At the same time, I also want to say a couple of words about the Shasta watershed. The two watershed are in different stages of development, I'd say. I mean, in Scott, you saw that there is a model, there is a lot of work. In Shasta, there is a model, but for two years, basically nobody worked on it because there were no fundings.

So now we started again and now USGS is working with us. So we have a long list of updates to make, but the Shasta model needs -- we cannot do the same things in the Shasta watershed as what is happening in the Scott.

So just want to -- I hope we can keep collaborating on the Shasta model and we don't go in different directions now that now, also, USBR and USGS are doing the same thing. So we don't want to come up with three different tools telling us different things. So maybe we can join forces.

And that's it.

MS. RAGAZZI: Thank you.

MR. EKDAHL: No, thank you. And absolutely, I think there's the ongoing need to continue to work on the data and data collaboration. We do have the bi-weekly meetings where we're really trying to use those to help kind of centralize what's there and what's available.

But I also want to be, you know, very direct for those in the room and those that are listening. We're looking at the informational order component of the e-reg as a possible vehicle to help expedite some of the data collection. And the maps that Shahab showed where we don't have, really, groundwater information in big chunks of the Scott and the groundwater extraction data, we just heard this whole panel about what's real? Is it this OpenET value? Is it some other thing? What has been the practical effect? And that could have been resolved if we had had meters or some sort of metering information on some of the groundwater extraction wells.

So something that we're thinking about, nothing's been decided, and we want to hear input from everybody about what that might entail and how we can get some of that information more quickly and expeditiously, and how it can feed into the GSA and GSP work. We also don't want to do this isolated in a way that's not going to be useful or

productive.

So lots to contemplate and think about there. And it's a tough question for sure, but want to raise it and make sure that everyone's aware of it.

So with that, I think that is the wrap-up of our data section.

And we do now want to turn to public comment. We have a number of folks in the room. We're going to start with those that are in the meeting room itself. And the first three that I have are Ryan Walker from Siskiyou County Farm Bureau, Brandon Fawaz, Siskiyou County Farm Bureau and farmer of Scott Valley, and Cody Phillips from California Coastkeeper Alliance. We are going to adhere to a three minute per person timeline.

So with that, I'll call off Ryan. Thank you. You may have to turn -- yeah.

MR. WALKER: There we go. I'm not a microphone turn-on-er, but I'm President of Siskiyou County Farm Bureau.

I want to thank the Board staff for putting this together. I think it's been really useful. And I want to thank the Board members who have taken time to come up and to meet with us.

I feel like a lot of stuff has been covered today. People want to get on the road and we have a good

line of communication. So I'll just leave it at that. But thank you for your effort on this.

MR. EKDAHL: No, thank you.

And just a note, if someone does require translation services, please let us know either in the Zoom. We do, I believe, have the translator available, but so far no one has raised their hand.

Next up, Brandon Fawaz.

MR. FAWAZ: Hi, Brandon Fawaz, Siskiyou County farmer and Farm Bureau member.

I'd like to start off by thanking you all for the opportunity to speak here again today and address a couple of comments that I've heard throughout the day, and then move forward to some things I've prepared.

First, when we talked about what was the true baseline use of the 2020 year that most people have used as their establishment in the LCS, I point out to some research from Steve Orloff from back in 2015 and '16, and on my farm, he observed on an alfalfa field, and a grass alfalfa field would be more, a 38.7 inch irrigation for that season, and found that most other farmers drastically under irrigated when they were in the 20-some inch range and took their soil into a soil depletion level on moisture as categorized by NRCS and something that they don't recommend.

So just in thinking about where some of those numbers originated from, you know, that's a little bit of an insight.

And, you know, spoken a little bit earlier, thank you, on regarding the OpenET model, I would throw out that I had four fields that kind of all touched each other that stretched three quarters of a mile. And so that was not a small area, but a very large area, our field size, that it was off from grain to alfalfa. And so that was something that, you know, has a large error there.

As we start talking about what other curtailments could look like, July 15th, August 15th, and as I said earlier, that's death on most farm models in Scott Valley. We are lower-valued crop, alfalfa and grain. We don't have crop insurance as an option like the Midwest. We can't have a crop loss and have something as a backstop to fill us back and make us whole like some other areas do.

You know, we do live in a disadvantaged community. I'm on our local school Board. From when I graduated high school in 1998 until today, we've seen a drop of about 30 to 40 percent in our high school. If we lose one more funding block and one more teacher, I can't put an English teacher in every class. I can't have one for freshmen and one for sophomores, et cetera.

We're losing working class jobs and agriculture

provides working class jobs. If I have to figure out how to survive and only pay my mortgage, maybe I figure it out. Eleven people depend on me every other week for their paycheck so they can pay their rent, make their car payment and they can live. They will not all figure it out because when you look at 20 percent of my budget, the very first place I'm going to have to cut is payroll.

We see the high fuel price, that's about seven percent of the budget. It's going to be a big cut in labor. And where do those people go? Not to our area.

To move on, so let's talk about something more positive. What can we do? Well, I cannot guarantee results and no other farmer can. What I can guarantee is that what we tell you we do and what we work with you doing, we'll be honest. We can guarantee that.

You know, I have some ideas looking for what might work better. You know, I think looking at what we'll call the classic LCS, in my personal LCS, I have like 400 acre feet of water, I think, available in September. I would always think it would make sense to have the option to move that sooner in the year. So don't force me to use water in September. If I want to use it in July or June, let me do that. That's not currently allowed. That could be a fine-tuned tweak that we talk with that I think would make it better for everyone. And I doubt there would be

objections.

Another thing is we talked about, you know, what would maybe a staggered approach look like? As an irrigator that had done a pretty good job being efficient along the way, what if we had something that was easy to verify we had 15 percent of our acres off on July 15th and no fall plant, no irrigation after that, 50 percent off in the middle of August, and 90 percent off or something at the end of August, you know, done?

You know, that's something that we could do. That would put us into a three-cutting system guaranteed. That's something Councilmember Hockaday mentioned as something he would like to see. And it's something, while we don't like it every year on a normal to a dry year, it's something we could do, not liked but do. I did that voluntarily in 2023 in this current year.

As we develop some of these plans, though, I think we have to recognize unintended consequences. I did fall plant one small field of alfalfa this fall and I'll use about four inches of irrigation water. That's going to save 12 to 15 inches of water next summer.

So how do we work through that? Use a little bit this fall. So it was a decent year, there's water in the river. I thought, well, it won't be bad to pump a little bit because look at what I'll save next year when it's an

unknown year.

So let's just be careful in how we make something that is really black and white and we don't recognize. You know, I don't know how to craft a regulation and you don't know how to run a farm, so you got to figure out how to kind of marry those two together a little bit.

And, you know, I'm all open. I've talked with many. We're trying to do a project on some conjunctive use because I do farm on Reach 9. There's a river there. How can we use some of that water in April, May and June when it's just going to the ocean? How can we use it on our farm then and then later on use groundwater?

And you guys say you want data. Data is our friend now. There was a time period where maybe we didn't like it. We want to understand stuff as much as you do. So you got to help us tell us what you want.

As always, open invitation to come up, meet with us and explain what you want so we can help.

That's all I have to say. Thank you.

MR. EKDAHL: Great. Thank you.

Next up, Cody Phillips from California Coast Keeper. And then following that, we will have, if you give me one moment, Nathan Kane, David Webb, and Angelina Cook, who should all be in the room. And if they're not, let me know.

MR. PHILLIPS: Hi. Good afternoon, Cody Phillips with California Coastkeeper Alliance. I'll make my comments kind of brief because today was a long day and we heard a lot of really good information and data from all sides.

I think the main takeaway is that in a drought, we're all squeezed, fish, farmers. Everybody really has to sacrifice. And we heard from the first panel that this squeeze has really been borne mostly by tribal communities since water has really been developed. Since 2015, the Yurok Tribe hasn't -- or sorry, the tribe hasn't had a commercial fishing industry.

And so I think to be clear, we need to have these emergency regulations be based off of what these fish need. We've called them belly-scraping flows. I think sublethal or near-lethal is a bit more accurate. Anything less than that will result in more harm. They maintain the status quo, but the status quo is already fairly degraded.

Going to some of the points from the panels today, there are some questions about flows in tributaries and throughout the watersheds. I want to point out that in the Shasta, there are definitely several studies throughout the whole river. There is one, another McBain & Trush study that focused on the big Springs complex, which is an essential component of the river, it has most of the cold

water, it has most of the flows, and so we think that study can't be ignored in these emergency regulations.

There was a more recent study that looked at flows in the Little Shasta as well. We think that would be an important tributary for these fish.

Let me see. Sorry, long day, a lot of notes.

Yeah, just to get back to the point that these emergency regs need to be focused on what these fish need. We're all squeezed in this drought and these fish have suffered forever. They've borne the brunt.

Thank you.

MR. EKDAHL: Thank you.

Next up, Nathaniel Kane, David Webb, Angelina Cook.

And just a note that if people still do want to make comments in the room, there is still time (indiscernible) barcode, but there is still the opportunity.

Please, go ahead.

MR. KANE: Good afternoon. Nathaniel Kane on behalf of the Karuk Tribe, PCFFA, IFR, and Environmental Law Foundation. I already had a chance to speak this morning, so I'll keep this extremely brief.

I just want to give this Board and staff an enormous amount of credit. In the last two or three years

we've been working on this we have gone from talking about whether we're going to address this problem to how we're going to address this problem, and that is a huge step. You know, I am really pleased with a lot of the progress we've seen. I want to keep momentum going.

Just a few comments on some of the later panels.

Baseline, let's figure out how to define it with numbers, with data.

Number two, public comment on the LCSs. I think that we in the environmental, tribal, and environmental justice community have a lot to add with evaluating these. We can help ground truth. We can help figure out some of these questions. Right now, a lot of the decision-making is going on behind closed doors. We think we can help. If they get posted for public comment, we can take a look, we can check math.

Last, this has been mentioned, economic analysis has to go in all directions. The harms to the fishery, the harms to tribes are real. They need to be counted.

That's it. Thank you. This has been a really wonderful day. I've learned a ton. Look forward to engaging in the future.

MR. EKDAHL: Thank you.

Next up, David Webb.

MR. WEBB: Hello. David Webb, Friends of the

Shasta River. And I, too, really want to thank all of you and everybody here in the room for this great discussion and forward progress on finally trying to figure out what is a more fair, more appropriate sharing as a public trust resource.

In looking at this, we focused on the Scott River because there was a lot more activity there, a lot more data there, and actually focused strictly on the groundwater LCSs and found some things that didn't seem right. We noted that reported applied water that was used as baseline range from nine inches all the way up to 135 inches, or 11 and a quarter feet of applied water to a field, where the average normalized by the acre was 44 inches. And we're wondering how that meshes with Dr. Harter's modeling where he's using 22.6 inches as the amount of applied water.

And I think if we're going to trust the groundwater model, it should match what the ranchers are reporting as using. And if we're going to trust what the ranchers are saying, it should match what the model says they should be using. And I don't know which to trust if either. I really value what Mr. Fawaz said. It seems like that's some pretty good, solid real-world experience. And it certainly seems more consistent with published values. So it really needs to be resolved, at least for our mental

clarity sake and so we can trust what we're going to be relying on.

Regardless, I don't see how anybody could be applying 135 inches. It sounds like a math error, but somehow that math error slipped by the intake process, slipped by the intermediate review by Fish and Wildlife, and slipped by the review here. It should have raised a red flag and said, this can't be. Maybe it is true, but it should at least have had an explanation and I doubt that it got one. And whatever we use really does need to be close to the model amount. Nobody can afford to pump and waste water to that degree.

So when looking at the LCSs, it looks like about 78 percent of them were claiming a baseline of 36 inches or more. If Dr. Harter's model is correct, that's about the cutoff line for red flag saying, are you sure? And that's 78 percent is, you know, that's 13,375 acres. That's a large percentage of what's out there where we all wonder, is this accurate reporting or is this inflated reporting so as to reduce it by 30 percent and come out right about where you need to be?

I think I'll leave it there. We've got some recommendations we'll send you a written comments. And I really appreciate the opportunity to speak to you all.

MR. EKDAHL: Thank you.

We do have one more in-person commenter, or actually a couple more. Angelina Cook and then Kasil Willie or Willie Kasil. I'm not sure if maybe the first and last name have been transposed.

MS. COOK: Good afternoon. My name is Angelina Cook. I live in McCloud and I have been building capacity for ecosystem restoration in Siskiyou County for almost 20 years.

Today, I'm commenting on behalf of California's Sport Fishing Protection Alliance. And we appreciate this opportunity to support the Water Board in your duty to protect the public trust by restoring flows capable of supporting anadromous fish in the Shasta and Scott Rivers.

Amidst all the details presented here today, one fact remains that ecosystems are the basis for human economy and healthy rivers are the surest sign of an intact ecosystem. If ranchers and farmers truly want to continue water-reliant land-based livelihoods, rehabilitating healthy rivers is critical.

Flows in both the Shasta and Scott Rivers have failed to protect fish for more than 30 years, And parts of the rivers run dry or close to dry in many years, yet water accounting remains sorely inadequate and voluntary agreements have not resulted in the habitat improvements required to protect these critical ecosystems.

The very real and growing threats of drought, wildfire, and species extinction signal that the time for business and government as usual is over. Every stakeholder must accept that California's water is over allocated.

In order to ensure that conditions don't continue to deteriorate, serious demand reductions are necessary and overdue. The dewatering of salmon stronghold rivers cries out for the Water Board to mandate accuracy, clarity and consistency in water accounting, adopting flow thresholds determined by CDFW's best available science, followed by verifiable enforcement mechanisms are essential first steps, especially in counties that are not covered by California's policy for maintaining in-stream flows and coastal streams.

Northern California has multiple groups who have spent many years participating in collaborative water data management forums, such as OREM (phonetic) and SGMA. We are tracking progress and we would very much like to assist the Water Board in improving water use accountability and regulatory enforcement at the local level.

Thanks again for facilitating this workshop and doing everything in your power to help Siskiyou County make sure that Klamath Dam removal results in salmon recovery.

MR. EKDAHL: Thank you.

Next up in-person, I think we have one remaining speaker, Kasil Willie.

MS. WILLIE: Good afternoon. I'm Kasil Willie. I'm Pomo, Wintun (phonetic), Wailaki and Paiute, and I'm a staff attorney for Save California Salmon.

I just want to bring us back to what we heard at the beginning of the day from the tribal members and tribal representatives. We've heard about how important water is for agriculture and I understand there is a need, but at a certain point we're talking about prioritizing profits of primarily white agricultural interests over cultural traditions of the California's native people who have gone through countless atrocities, including state-sponsored genocide.

To touch on the economics, as was stated earlier, when salmon seasons are canceled he economic health of tribes fall. Tribes have suffered years of economic loss and their high poverty rates because of the commercial fishing cancellations. Comparing the economic loss of the agriculture industry to economic loss of tribes is not a fair comparison to make because tribes already have to fight against a system that was designed to exclude and eliminate them.

Farmers and ranchers are already at an advantage over tribes because they have been able to establish

themselves in the traditional homelands of the tribes and they have water rights that were taken from tribes who were there first. Tribes should not have to bear the burden of low flows.

The presentation at the beginning of the day from Sarah Schaefer representing Quartz Valley Indian Tribe, highlighted the fact that poor salmon returns affect not only the physical health, but also the mental health of tribal people due to the dietary shift that happens when tribal communities are not able to consume traditional amounts of salmon and cannot participate in cultural fishing. I want to emphasize that salmon and river health is directly correlated to health of already vulnerable tribal communities.

Today, we have seen several slides of information and data regarding steep decline in salmon populations. We've also seen the benefits of increased flows that came out of past curtailments. Establishing high enough flows for fisheries by emergency regulations is necessary for the restoration of fisheries in the Scott and Shasta and are absolutely essential for the health and benefit of California's tribal communities.

Thank you for your time.

MR. EKDAHL: Thank you. I'll get the mic a little closer.

We next are going to turn to our online speakers. We have three lined up right now. There may be more. Nick Joslin from the Mount Shasta Bioregional Ecology Center, followed by Konrad Fisher from the Water Climate Trust, and Regina Chichizzola from Save California Salmon.

If you are ready, you should be able to be unmuted and go from there.

MR. JOSLIN: Thank you. I'm going to pass on making a comment today because it's been a long day, so I'll save it for someone else. Thank you.

MR. EKDAHL: Thank you. Let's then go to Konrad Fisher.

MR. FISHER: Hi, thank you. Yes, Konrad with Water Climate Trust. My home is on the mid-Klamath River in Karuk territory. It's my favorite place on earth and it's a place that is also impacted directly by what happens in the Scott and the Shasta River.

I'm also a non-native water right holder. I have riparian pre-14 and adjudicated water rights in California, so I would like to show a little bit different perspective.

Just like we know land was stolen during colonization of California, water was also stolen in the form of forming water rights, of which I'm a holder, and a lot of the other farmers -- and a lot of the farmers on this day are as well. These don't necessarily belong to

us, to me or us.

The people who were here first have a right to enough water in the rivers for fish, not just to avoid extinction, not just to get off the endangered species list, but to maintain cultural traditions. And the Water Board recognized that when they recognize tribal beneficial uses of water. I went through a three-year process where tribes from all over California were invited to Sacramento to say what their needs were. The Water Board adopted it as beneficial.

So that should be the ultimate objective here. If that's too much, the objective under that it was adopted by Congress and California legislatures when they adopted an Endangered Species Act could be another objective.

So I would just say, this day has felt very one-sided, talking about the economic needs of farmers. I would say let's flip the script. Since colonization to today, it has been the water diverters must be convinced to give up enough water to maintain salmon. Let's flip the script. Let's follow the science. What does the science say the fish need and pursuant to the objective already established in law? And let's do that. We can still have voluntary solutions, but within that cap of what stays in the river, that should be the bare minimum.

So today is a lot about science. How do we

achieve this management goal? Which again should be what was adopted by the legislatures of California and Congress. It needs to be based on objective science. And there was some science presented here today that I would argue is not objective.

When you produce a model, what's very important is what data you put in the model. And I will say, Dr. Harter's model is not broken, but the assumptions going into it, when he concludes you can't achieve certain things, are baselines that are provided to him and accepted by him by agriculture. So we need to verify these, verify the data that goes into certain models and follow the best available science on what fish need to achieve objectives that were already established.

So let's keep moving forward, but we really need to work on water accounting and let us know how we can help. I've been part of a study on environmental water transactions and I've seen every trick in the book. We need water accounting just as we have accounting on how we spend money.

Thank you.

MR. EKDAHL: Great. Thank you.

Next up is Regina Chichizzola.

MS. CHICHIZZOLA: Hello. Can you see me? Oh, there we go. Okay. I think I started my video.

MR. EKDAHL: No. Yeah.

MS. CHICHIZZOLA: Thank you very much for -- okay. Thank you very much for hearing from me today. My name is Regina Chichazzola. I am the Director of Save California Salmon, and I do live on the Klamath River here in Orleans.

I also am a little disturbed with the way some of these meetings have gone. I'm going to try to focus on the science, which is the purpose of this meeting. But there was a couple of things I wanted to say first.

One is we were really involved in the creation of the Racial Equity Action Plan, and the passing of the resolutions both on the North Coast Water Board and on the state Board, and I feel like this action plan and resolutions are kind of being violated with how these processes are going. I don't see an effort to make sure that the communities of color that are impacted are actually able to be weighing in here. And many of them also have science that they could be presenting. So I just wanted to bring that up very quickly and then move on from there.

Because I do live in Orleans, all of the houses I've seen in the Scott Valley and schools and a lot of the things I've seen up there are way nicer than anything that we see. Our schools are very underfunded. You know, we

deal with the loss of salmon every single day. You know, people are losing their boats for commercial fishing industry. People haven't been able to catch salmon for two out of three years, not even for ceremonies.

I mean, we really have to look at, if we're looking at economic impacts and economic sciences, we really need to look at these downriver communities too. And we really need to actually walk our talk as far as racial equity and respecting of tribes.

That said, I'm going to try to go right back to science and your responsibility, which is to protect the public trust. It's to listen to the data and science. It's not to make sure one community is whole and above all others.

What we're fighting about here is belly-scraping flows. And they are supported by decades of data. Multiple studies all have been presented and talked about. That's what we're fighting about. And ultimately we're looking for more than belly-scraping flows. We're looking for more than just making sure that not all of the endangered species that you're tasked with keeping alive are dying in the rivers. And so this conversation is going to have to change a lot.

And I wanted to echo what the Nature Conservancy said earlier in the day, that, yeah, maybe the science

shows that there'll be a few years out of a hundred that we can't actually meet these belly-scraping flows. But the way that regulation works everywhere else that I've worked within the state is, and science in general, is that there is sometimes uncertainty, especially when we're looking at climate change. But that doesn't mean we don't have regulations. That doesn't mean we don't have standards and laws. And so it's not an excuse to not take action. The studies are showing that in almost all the years, we can actually meet these flows, especially if the timing is done correctly.

And you know, salmon can deal with some drought years and some bad years. They can deal with spawning at the wrong times of year sometimes. They just can't deal with perpetual drought that's brought on by humans. And that's a situation we're in right now. Every year, almost, is a bad year. And that's because of what humans are doing to the environment. And it's because the Water Board is not stepping up in the way that you need to and doing your job and protecting beneficial uses.

I'm going to try to go quick because I'm getting close to time, I'm guessing.

But the last thing I wanted to talk about --

MR. EKDAHL: Yeah, you are technically over time, so if we can wrap up quickly.

MS. CHICHIZZOLA: Okay, the last thing is the LCSs. Some people are reporting using 50 inches applied water per acre. And some are saying they're using 20 to 30 and that's actually probably the proper baseline. People are gaming the system. It's not fair. We need real regulation. We need real standards and we need them in place. And you are screwing over the farmers that are not trying to game the system by allowing these LCSs to go forward the way they are and have it allowing self-reporting.

So please make the right decision. Please save our fish. Please save our communities. Thank you.

MR. EKDAHL: Thank you.

I do want to make a quick kind of comment. There have been a couple notes, you know, how can this group or community provide additional information and help out? And this question of downstream economic impacts, I think, is a really significant one and one that we don't have a lot of data on. And so if there's information related to those downstream economic impacts, I would encourage folks to please send it our way. Again, that drought email that we -- scottshastadrought@waterBoards.ca.gov. I think it will be very, very important for how we consider moving forward.

I think we have two more commenters, and then

that actually wraps up, and then I have some very short closing remarks.

Glen Spain from the Pacific Coast Federation of Fishermen Associations and Institute for Fisheries Resources, followed by Amber Jamieson from the Environmental Protection Information Center.

And Glen Spain.

MR. SPAIN: Thank you, Erik. And thank you all in the panel. This has been very helpful.

Talking about coastal and downriver impacts, you've got to understand that the impacts of what we do in the Scott and Shasta have repercussions all the way up and down the coast. We in the fishing industry are organized under a principle called weak stock management.

Whenever there's a river where the stock is too low, that triggers closures all the way from Monterey all the way up to the Oregon-Washington border. That's what we're seeing today. It's part of the closure that we've got in past years. It's been a $100 million or more minimum more losses to coastal communities and thousands of jobs. Those boats you see in the background, they shouldn't be there. They should not be idle. They should not be sitting there. They should be out fishing, but they can't be. And they can't be because primarily driven by the Klamath and the weak stocks in the Klamath, which are

right now at struggling to meet even three percent of historic abundances. We can't even get enough fish out of the river systems, including the Scott and Shasta, and particularly with Scott and Shasta, either coho or Chinook to meet the minimum requirements to maintain the next generation.

That's where we are. And that affects everything up and down the coast. We are closed now in what was once the most productive fishing industry in the West coast.

In terms of the model, I just want to point out that, and thank you, Dr. Harter, what your model says, given that the assumptions are all business as usual, is that the current situation is unsustainable. If you can conclude that there's many years where we cannot meet even the minimum flows, these are not recovery flows, these are minimum survival flows for the fish, then by definition, the system is over-appropriated and unsustainable. And that's what your model is showing.

I'm interested in using that model to see what we can do in terms of mitigation. And the presentation by the Nature Conservancy, I started to take some of that model and look at what we can do in mitigation. There are a lot of things we could do.

More efficient water use, groundwater recharge systems, recycling of irrigation runoff, change season

structure, change cropping structure to make better use of more profitable, less water-intensive crops, change cropping patterns, particularly metering. We need metering and gauges in a lot of different places. And that's all -- it's all good. If we have no data on which to make decisions, we're not in a good situation. All of that is necessary.

And again, ultimately, if you conclude that you cannot meet the minimum flows needed, you are condoning extinction. The solution then is the obvious and fairest alternative, and that is re-adjudication. Sari Sommarstrom pointed out, the re-adjudication data is more than 43 years out of date. There's a lot more data. That adjudication needs to be redone based on modern standards and based on modern needs and taking into account a buffer zone for climate change.

Thank you.

MR. EKDAHL: Thank you.

Before we go to our last speaker, there are four speaker cards that were turned in and the speaker is not on the Zoom platform. So if you're watching on the live stream or the YouTube channel, please send us a note and jump over to the Zoom platform.

Felice Pace, Jim Smith, Josh Cahill (phonetic), and Aaron (phonetic) Hockaday, if you are planning on

speaking, please migrate over to the Zoom platform if you can.

Otherwise, Amber Jamieson.

MS. JAMIESON: Hi. Thank you for allowing us this public comment opportunity. My name is Amber Jamieson and I'm the Klamath River Advocate for the Environmental Protection Information Center.

And I would just like to request that you make emergency regulations that set the foundations for permanent minimum in-stream flow regulations in the Scott and Shasta with the goal of recovering salmonids. Emergency regulations need to be implemented as soon as possible. Otherwise, these salmon populations are at the mercy of nature and their survival will depend on the will of irrigators.

When the emergency regulations ended on July 31st of this year, flow levels on the Shasta went from 54 CFS down to 22 CFS. The river was reduced by 59 percent overnight. In this instance, irrigators have displayed an inability to allow for proper flows to sustain salmon and salmon surveys reveal that they were not present in the system until the rains came. This demonstrates that voluntary agreements are ineffective.

Spring Chinook have already been allowed to be completely extirpated from both the Scott and Shasta

Rivers. We cannot allow this to happen to other salmonids that are hanging on by a thread in these systems.

The Scott and Shasta Rivers are integral to the Klamath Dam Removal and River Restoration Plan because these watersheds are so close to the dams that are being removed. And the fish that inhabit them will provide a central salmon genetics for repopulating the upper basin. With the nation's largest river restoration so close to completion, it would be a shame to allow salmonids endemic to the upper reaches of the Klamath to be extirpated as has already happened for the spring Chinook. The mid to upper Klamath metapopulation has never been more integral to the overall health of the Klamath fisheries and the Scott and Shasta are key watersheds to ensure resiliency between now and the restoration of the upper basin salmon populations.

I'd also like to highlight that in addition to the downstream economic impacts, there are also serious social impacts. When the commercial fisheries closed for the tribes in 2015, there was a huge spike in suicides. The Yurok Tribe has had to declare a state of emergency because of the suicide epidemic. And I have a friend who lost her father, she lost her brother, and she lost her best friend because they could no longer fish. They could no longer provide for their families. And there's a serious disconnect when we're prioritizing irrigation for

profit over lives and over subsistence and over people being able to survive and provide for their families on their traditional foods that they've done since time immemorial.

I'm imploring you to please make an emergency decision as soon as possible, emergency flows as soon as possible, and have those in place until you make permanent flows. And, you know, like the Department, I believe, said that they support you doing these voluntary agreements as long as there's time -- you know, it's a bound agreement where there's time and milestones and parameters that are set. But it doesn't seem like that's necessarily a voluntary agreement if you have to have, you know, the regulations around it.

So really I think the key is having these regulations in place and it sounds like the farmers are willing to do all the things that you're asking. So please do make this decision as soon as possible. I think the fisheries depend on it and the upper Klamath basin depends on it and the people who survive off of the fish depend on it.

And thank you so much.

MR. EKDAHL: Thank you.

I believe that ends all of our commenters, and so I will wrap things up really quickly.

First off, thanks to everybody for participating, both those in the room and on the Zoom platform. It's an immense opportunity to hear just great science and great input and great feedback all around. So we look forward to engaging further.

I wanted to touch a little bit on how we will be engaging further. When the Board directed staff to move forward on an emergency regulation, but do the outreach component back in August, you know, we're holding this workshop and we will be taking some time to basically compile the information and the feedback that we received here and then communicating with our executive management and our Board on a potential timeline for moving forward. No decision has been set yet and we will look at updating the public in the near future. We will continue to provide updates that are hydrologic updates as every part of every Board meeting, usually every Tuesday morning.

And we are also looking at holding a in-person one or two day session up in Yreka and Siskiyou County. Again, we haven't quite been able to solidify the venue yet, but we are looking at maybe the end of October. I don't want to have people go and reserve time on their calendars until we reserve the room venue. So we will update that as fast as we possibly can. And that meeting will be an opportunity just to hear feedback in general

from those that couldn't travel down or participate today, as well as an opportunity for Board staff and potentially others to see the watersheds and maybe do some site-specific kind of tours and opportunity to take a look at things on the ground. So stay tuned. More opportunities coming up there.

Again, as we talked about earlier, there will be multiple opportunities if a draft emergency regulation does move forward. The Board usually has been aggressive in trying to provide at least some additional public comment period prior to a formal Board consideration of an emergency regulation. Depending on timelines, we may try to do that, we may not. We at a minimum will provide opportunity at the Board a potential Board adoption meeting, again, if a draft EREG is proposed and placed before the Board for their consideration.

So with that, again, if there's additional information, please send it to our email, please give us a call, email us individually, and we look forward to communicating and talking with everybody.

Thank you for staying so long on a Friday afternoon. That's all. Thank you. Bye.

(Whereupon the workshop concluded at 4:45 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of November, 2023.

Elise Hicks

ELISE HICKS, IAPRT CERT**2176

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

November 9, 2023

MARTHA L. NELSON, CERT**367