

Spring/Summer 2019

# The Confluence

Newsletter of the Rogue River Watershed Council

## *The Genetic and Evolutionary Basis of Spring-run Chinook Salmon*

by Tasha Thompson

Spring-run Chinook are, in many ways, unparalleled among Pacific salmon. They are prized for their deliciously-high fat content, play central roles in the indigenous cultures of the Pacific Northwest, and transport marine nutrients into upper watershed ecosystems. Despite their importance, more than a century of habitat destruction from human activities such as logging, mining, and dam construction has led to dramatic declines across their range, with many watersheds losing them entirely.

Understanding the genetic and evolutionary basis of spring-run Chinook is an important issue for conservation. An understanding of the genetics can provide tools with which to inform and monitor conservation action, and an understanding of the evolutionary history provides information on how easily spring-run Chinook might re-evolve if lost. Recent research conducted by myself and others sheds light on both of these questions, and the Rogue River has played a major role in our studies.

We began our research by comparing the genomes of hundreds of spring-run and fall-run Chinook from rivers all along the west coast, including the Rogue. The results were striking, suggesting that a single region of the genome determines whether a Chinook is spring-run or fall-run. Furthermore, the spring-run version of this genetic region only evolved once, suggesting it is unlikely to quickly re-evolve again if spring-run Chinook were to go extinct.

We used this data and additional analyses to develop a simple genetic test to easily determine if a fish is spring-run or fall-run. To validate the test, we analyzed Chinook sampled from the upper Rogue in late May, as well as Chinook sampled from the lower Rogue (Huntley Park) in mid-September. All late May fish tested positive for the spring-run genetic variant and all mid-September fish tested positive for the fall-run variant. We also looked at Chinook that migrated during intermediate times (i.e., mid-August), and found that most of them were hybrids between spring- and fall-run Chinook.



Photo: Public Domain Image—P1XN10

This genetic test can now be used to monitor and inform conservation of spring-run Chinook in the Rogue. For example, the test could be applied to carcass samples collected in surveys to improve estimates of spring-run abundance, to juvenile samples to estimate spring-run spawning success and pinpoint rearing locations, or to adults to inform fishery regulations.

The Rogue River is one of the last strongholds of wild spring-run Chinook, and this new understanding of their genetic and evolutionary basis will hopefully be useful for keeping it that way!

*Tasha Thompson is a Ph.D. Candidate in the Integrative Genetics and Genomics Graduate Group at University of California, Davis.*

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## The Confluence Spring/Summer

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*RRWC's mission: Stewardship of the Rogue River watershed through restoration, education, and community involvement.*

*RRWC is tax-exempt under section 501(c)(3) of the Internal Revenue Code and a recognized watershed council. Watershed councils were authorized by the Oregon Legislature in 1995 to promote and implement voluntary cooperative conservation actions.*

## Notes from the Executive Director's Desk

Most of us don't spend nearly enough of our busy lives going to places we've never been, or looking at familiar places in a different way.

I came to the executive directorship through a series of explorations. It started along a small creek that ran through a suburban Chicago neighborhood where exploring meant finding Brown Bullheads and garter snakes, capturing crawdads and eastern toads, and experiencing groundings from missed dinners and countless good memories with friends I still talk with today. A few years back, exploration led me to this position – one far removed from “the field” – to oversee the management, organization, and administration of a non-profit with a mission to improve water and habitat quality and engage the community about the importance of watershed health.



Photo by Justin Clifton

I find every exploration to be rich in rewards. The Council is focusing on exploration this year and we encourage you to do the same. Please, head to some new part of the Rogue and immerse yourself. Take a long hike. Grab your swimming gear and jump in (I highly encourage a mask and snorkel so you can see what's swimming along with you). Or just sit on the edge of a stream or on a rock overlook and let your mind take in your surroundings. Open your ears and your nose in addition to your eyes. You will learn a lot. I promise.

If you're uncomfortable striking out on your own, we've organized three “hike and learn” adventures for you to round out your summer explorations:

- visit and learn about large spring habitats in the upper Rogue, including Big Butte Springs – primary source of drinking water for 140,000 people in the Rogue Valley: “Springs in Summer,” August 17
- be astonished by leaping Chinook Salmon at Rainie Falls in the Wild Section of the Rogue River: “Flying Fish,” September 13 and 20

Keep an eye out for announcements. All hikes will be led by RRWC staff and board members so you'll have a chance to ask questions about the current and future activities of the Council, while experiencing the watershed in a new way.

I look forward to seeing you somewhere enjoying the beauty and grandeur of the Rogue!

## ...and from the Board Chair

Greetings – from the new chair of the RRWC Board of Directors! I've been “on the job” now for six months and am continually amazed by all of the great things our small staff is doing for our large watershed, for the benefit of fish, water quality, and even the human community. From dam removal and near-stream restoration to outreach in the forms of guided hikes and community outreach events, they're definitely making a positive impact in furthering our organization's mission. Of course, I realize that none of these great efforts could be done without the support of our funders, donors, and volunteers – in other words, folks like you. I'm proud to be one of those volunteers – even if serving as the chair seems more like work some days than volunteering! But, I'm looking forward to serving as chair, and you'll even see me out on one of the hikes Brian mentioned above. We all can take a role in serving our watershed!

# Rogue Fish Migration Day 2019

Last year we participated with hundreds of other groups around the world in celebration of World Fish Migration Day. The weather wasn't very pleasant, but we had so much fun at our event we thought, "Why wait until 2020 for our next celebration?" And so we didn't! In April we, once again, gathered nearly 20 exhibitors and ten very generous sponsors to present Rogue Fish Migration Day complete with an activity fair, costumed kids' dash, and 5K migratory run. The Grants Pass School District generously allowed us to use North Middle School and grounds for the event again, a fellow riparian restoration specialist designed a great t-shirt for us, every board and staff member was on hand to help, and the weather actually cooperated—for the most part. Participants were able to make fish prints, practice casting for fish, go on a nature walk, get in the creek to look for macroinvertebrates, build a stream, see live steelhead, and more! We launched a new activity, Watershed Jeopardy, and had the popular lamprey board out for picture-taking. Participants in the activity fair and 5K run had a chance to win several great prizes donated by local businesses (from Grants Pass as well as Medford), and activity fair participants were issued a passport that they could get stamped at each migratory stop.

Plans are to continue the event every year on the first Saturday in April, so plan on migrating over to North Middle School in Grants Pass next spring for our third Rogue Fish Migration Day!

A big thanks go to our fabulous exhibitors: Bureau of Land Management, Klamath Siskiyou Wildlands, Middle Rogue Steelheaders, Oregon Caves National Monument & Preserve, Oregon Dept. of Fish & Wildlife, Oregon Parks and Recreation Department, Oregon Water Resources Department, Pacifica's Caterpillar, Rogue Climate, Rogue River-Siskiyou National Forest. Rogue Riverkeeper, Rogue Valley Council of Governments, Southern Oregon Climate Action Now, Southern Oregon Fly Fishers, Strauss Ecological Services, The Freshwater Trust, and US Army Corps of Engineers.



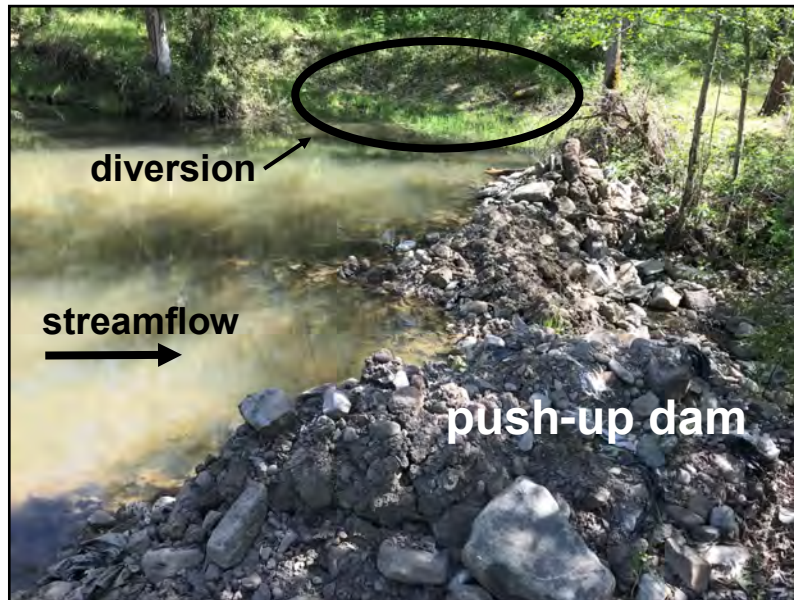
## Thank you to our 2019 Rogue Fish Migration Day Event Sponsors:



## RRWC PROJECT PREVIEW

*Salt Creek C2 Ranch*

Driving up Lake of the Woods Highway (US 140), you may have noticed a sign pointing out Salt Creek, a major tributary of Little Butte Creek entering from the north. Although it might not look like much from the highway, Salt Creek is an important stream for endangered Coho Salmon and steelhead as it maintains cold water temperatures throughout the summer, providing essential over-summering habitat for these fish. And like many larger creeks in the area, Salt Creek is also used for irrigation during the summer by multiple landowners. Much of this irrigation is made



possible through the use of push-up dams, installed to divert flow from the stream into an irrigation ditch. Push-up dams are constructed by mechanically moving streambed gravel and rock, and often impede passage for juvenile salmonids looking for a cool water refuge from high summer stream temperatures, such as those in Little Butte Creek. Cool stream temperature (<64°F) is a critical environmental factor in salmonid growth and survival, so access to these tributaries is vital.

Last summer (2018), we worked with a landowner on Salt Creek to remove two seasonal push-up dams and improve the irrigation system by installing permanent concrete intake systems at both diversion points, making seasonal irrigation easier to manage and improving fish passage in the summer. We are now working upstream of this first

project site with C2 Cattle Company to improve irrigation at two of their diversions, as well as improve instream habitat by placing large woody debris in the creek. The work will be similar to that done downstream with the addition of wood to aid in gravel retention, which provides important spawning habitat for adult Coho Salmon. We are just beginning to write grants for this project, which we hope to implement next summer (2020). When implemented, over two miles of access will be improved for juvenile salmon and steelhead on Salt Creek.

## OFF THE RESOURCE SHELF

*World Fish Migration Day, Chinook, Jacks, and Push-up Dams*

Interested in learning more about some of the topics in this newsletter? Here are some online resources that you might find interesting:

An inspiring and informative [30-minute video](https://www.facebook.com/WorldFishMigrationDay/videos/2347286628873068/) about why open rivers are important all over the world and how World Fish Migration Day helps spread this message <https://www.facebook.com/WorldFishMigrationDay/videos/2347286628873068/>

A [10-minute radio report](https://soundcloud.com/kmudnews/uc-davis-researchers-identify-genetic-differences-between-spring-run-and-fall-run-chinook-salmon) on the difference between spring and fall Chinook Salmon <https://soundcloud.com/kmudnews/uc-davis-researchers-identify-genetic-differences-between-spring-run-and-fall-run-chinook-salmon>

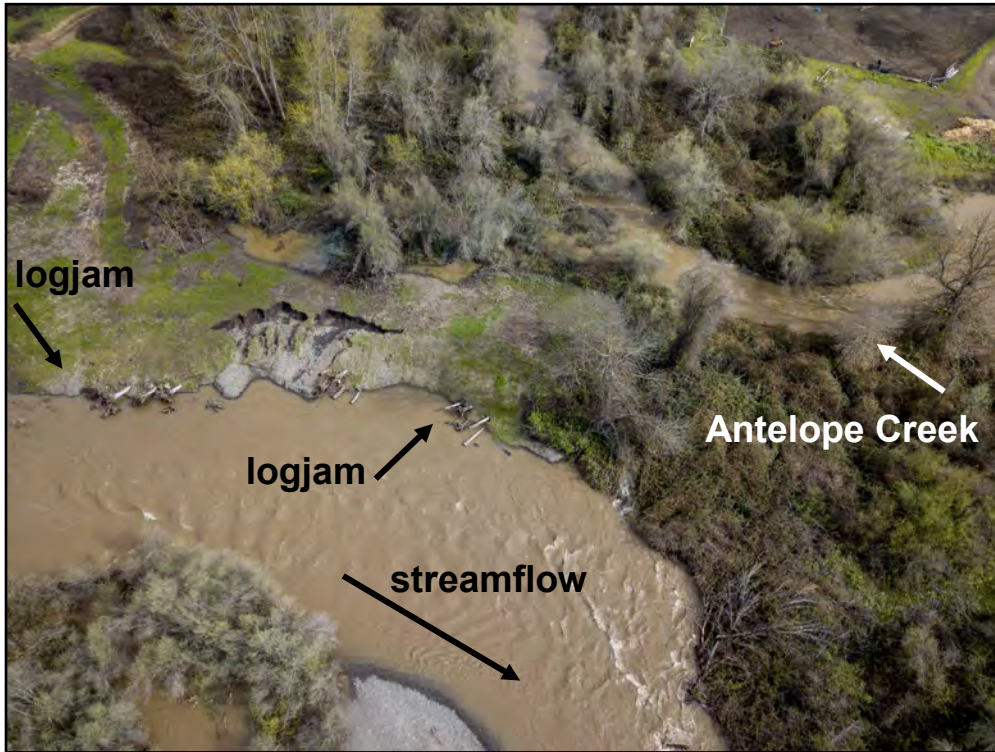
A [brief article](https://www.sciencemag.org/news/2018/05/salmon-spawn-fierce-debate-over-protecting-endangered-species-thanks-single-gene) on whether a difference in a single gene should be enough to qualify a population for Endangered Species Act protection <https://www.sciencemag.org/news/2018/05/salmon-spawn-fierce-debate-over-protecting-endangered-species-thanks-single-gene>

A fascinating and beautiful [photo series](https://www.salmonography.com/Salmonid-Topic/Jack-Salmon/) of jack salmon during spawning <https://www.salmonography.com/Salmonid-Topic/Jack-Salmon/> (If you look at nothing else in this newsletter, go to this site! It has much more than just photos of jacks...incredible underwater photography of all kinds of salmon and steelhead (albeit in Alaska).

A dated (1999), yet informative, [ten-minute video](http://irrigationtoolbox.com/WebPages/VideoPages/Video007.html) that gives a good overview of what a push-up dam is and several alternatives to them <http://irrigationtoolbox.com/WebPages/VideoPages/Video007.html>

RRWC PROJECT UPDATE

# Little Butte Creek Floodplain in Action!



Flows that topped the bank of Antelope Creek caused the erosion seen between the installed Little Butte Creek logjams

Note the connection between the mainstem of Little Butte Creek and the constructed side channel



Last summer RRWC implemented a complex floodplain restoration project on Little Butte Creek in partnership with the City of Eagle Point. This winter during and after high flows, we were able to see this project working as it was intended. Three large logjams that were installed held the bank in place as neighboring Antelope Creek sent flows cascading out of its floodplain and over the logjams. As seen in the photo to the left, the logjams held the bank everywhere except for the section where no logs were placed. But that's alright because a couple of weeks later, that area was planted with native species such as cottonwood and willow that will send roots into the soil and aid in continued stabilization. There was also a section that was recontoured to create a floodplain space where high flows could dissipate and decrease the energy sent downstream and reduce flood impacts. This new floodplain created space for water to flow and it functioned the way it was designed to function. Finally, part of this project regraded 800 feet of side-channel habitat that provides refuge for juvenile salmon from high flows. Once the waters receded a bit and cleared up, we were able to see over 50 juvenile fish in the side channel, which had slower flows as well as wood pieces to provide cover from the nearby heron rookery. Seeing is believing—this project was a true success, and incredibly rewarding for all involved!



## SPECIES SPOTLIGHT

## Chinook Salmon

By John Speece

The Chinook Salmon (*Oncorhynchus tshawytscha*) is the largest of the Pacific salmon species. Also known as a king salmon, Chinook are Oregon's state fish. Their range includes the coasts of Alaska, western Canada, Oregon, Idaho, Washington, and northern California.



Photo: Public Domain Image—PIXNIO

After hatching, the fry, as recently hatched fish are called, remain in the stream for varying lengths of time, ranging from a few months in warmer waters to a year or longer in cold systems. Once ready, the fry make the downstream journey to the ocean where they mature to adult size, ranging from 30-110 pounds. These colorful fish are blue-green on the head and back and silver on the sides, with the males exhibiting a distinctive hooked nose and a ridged back.

One of the true miracles of life, these fish are known to travel vast distances while in the ocean before returning several years later to their birth stream to spawn. Upon returning, both male and female develop a reddish tint around the back fins and tail. Adults will lay eggs in fast-moving freshwater streams and guard their nest as long as possible.

It's during this return trip that Chinook Salmon adults encounter many stressors that can affect their return journey. These stressors include blocked access to spawning grounds, habitat and water quality degradation, and other environmental conditions. Because of this, two species of Chinook Salmon are listed as endangered and seven species are listed as threatened under the Endangered Species Act.

Throughout their range, Chinook play an important part in Native American tribal religion, culture, and subsistence, and have for thousands of years. Chinook are popular among the sport fishery, too, and are coveted among most sport and commercial anglers.

John Speece is RRWC's water quality project manager.

### UPCOMING EVENTS

## Mark Your Calendars and Plan on Attending . . .

July 24: Ashland Creek Dam Removal Presentation by RRWC Fish Passage Project Manager Alexis Larsen; Northwest Nature Shop, Ashland

August 17: Explore the Rogue: Springs in Summer; a "Hike and Learn" event in the upper Rogue

September 13: Explore the Rogue: Flying Fish; a "Hike and Learn" event viewing salmon at Rainie Falls

September 20: Explore the Rogue: Flying Fish; a "Hike and Learn" event viewing salmon at Rainie Falls

September 28: Bear Creek Greenway Cleanup

September 28: Upper Rogue Cleanup

October 5: Bear Creek Salmon Festival; Ashland

October 19: Bear Creek Fall Fest; Bear Creek Park, Medford

October 26: 3rd Annual Celebrate the Rogue! dinner and auction; Inn at the Commons, Medford

More information on each event will be posted on the [RRWC online calendar](#)—keep checking in for more details!

# Around the Watershed

The Rogue River Watershed Council welcomed a new director to the board this January, Susan Maiyo. Susan comes to us with a rich history that crosses all RRWC program areas! Now retired, Susan was the lead fisheries biologist for the U.S. Forest Service, Rogue River-Siskiyou National Forest. For over twenty years she worked in natural resource management with an emphasis in Endangered Species Act consultation for management activities, stream and riparian restoration planning and implementation, fisheries and aquatic monitoring, and environmental education with a focus on partnerships. We're delighted to have her on the team!



Susan Maiyo

RRWC is pleased to announce our scholarship awards for 2019 to Tessa Armstrong from Hidden Valley High School and Randy Harp from North Valley High School. These two students were each awarded \$1,000 scholarships for their academic excellence and their intention to pursue college degrees in natural resource management. This is the fifth consecutive year that we have offered scholarships to Josephine County high school seniors pursuing careers that will lead them to being leaders in natural resource stewardship. Congratulations, Tessa and Randy!

And here are some pictures from Festival on the Rogue, an event we presented in partnership with Shady Cove community volunteers in early June:



Rogue River Watershed Council executive director Brian Barr with scholarship winner Tessa Armstrong

## UNDER THE SURFACE

### Size Matters

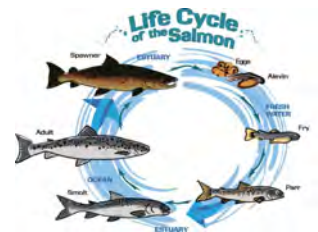
by Jay Doino

I'm tired of writing about Chinook. Chinook this. Chinook that. Chinook, Chinook, Chinook. Don't get me wrong – they're Oregon's iconic state fish, economically significant, and yummy. They're also what I'm supposed to write about – to complement other (inferior) blathering (about Chinook) elsewhere in this newsletter. Whatever. All pays the same. \$0.00.

Editors be damned! I'm writing about jack salmon. First thing to know is jack salmon isn't a salmon species at all. "Jack" describes a life history variation occurring in many (all?) salmon species (Chinook included) and almost exclusively in males. The key characteristic making jacks jacks is reproductive age. Rogue Chinook jacks spawn at just 2 years old, considerably younger than the majority of Chinook spawners (usually 3-4 years old). Consequently, they're smaller, usually less than 24 inches. Anglers and fish managers alike regard these small spawners as harbingers of next year's run. Jacks comprise just one part of a year class, most of which remain in saltwater while jacks are busy making hay. So, if there're lots of jacks returning to spawn, then a good run of three-year-old fish should follow the next year.

There's a good deal more to discuss about jack life histories though I've not the space to tell it. Admittedly, I don't fully understand the advantages this behavior confers on individuals/populations. I do understand that varied life histories make any population more resilient to perturbation. If all individuals in a population did the same thing all the time, it wouldn't end well. You know...don't put all your eggs in one basket. So don't be fooled. Sometimes smaller is better.

Jay Doino is a fisheries biologist who has been working in the Rogue Basin since 1999.



From Field Guide to the Pacific Salmon, by Adopt-a-Stream



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## Support Our Work!

### Make a Donation

All donations are greatly appreciated, put to good use, and are tax-deductible. Donate online at <http://www.rogueiverwc.org/get-involved/donate/>.

### Bottle Drop Redemption

Open a Bottle Drop account at an Oregon Redemption Center, drop off your cans and bottles, then transfer your donation to RRWC [online](#).

### Fred Meyers Rewards

Help RRWC earn donations by shopping with your Fred Meyer Rewards Card. Link your card to us at <https://www.fredmeyer.com/topic/community-rewards-4>. Search for us by name.

### AmazonSmile

Online shoppers can go to [smile.amazon.com](https://smile.amazon.com), click on your account and select RRWC as your charity of choice at no cost to you.

