

Volume 45 | Issue 1 | Spring 2021

TRIBUTARY

Western Division of the American Fisheries Society

Advancing fisheries and aquatic science and professionals in western North America.

**In this issue: President's Hook,
Officer Elections, Committee &
Policy Updates, Small Project
Grants Updates, and more...**

President: Todd Pearsons **President-Elect:** Dan Brauch

Vice President: Laurie Earley **Past-President:** Dan Dauwalter **Sec.-Treasurer:** Travis Rehm

Student Representative: Emily Chen **Tributary Editor:** Tim D'Amico

*PRESIDENT'S HOOK***Todd Pearsons**

Great music deserves to be amplified. It deserves to reach the ears of those that can benefit from hearing it. Great music moves us to dance, reflect, relax, and rejoice. Whether it is classical, blues, bluegrass, gospel, or rock, music can change our lives for the better, but only if we can hear it.

Science is like music; it must be amplified so that others can benefit from it. Science that settles into the bowels of file cabinets or hard-drives rarely moves people to informed action – because few people know about it. Amplification of science includes objective communication to other scientists, decision and policy makers, and the public. Scientists do a great job of communicating to other scientists through professional meetings and journals, but we often fall short in communicating science to policy and other decision makers as well as to the general public.

Scientists have a sacred trust to generously share information for the benefit of all. Communicating science is a stewardship responsibility that can result in improved stewardship of natural resources that we all depend upon; water, air, land, and associated living things. In some cases, this will be the difference between life and death, efficiency and waste, or diversity and extinction. Science can inform actions that will determine whether sufficient drinking water is available for all children, whether a majestic species of fish can be seen and harvested by future generations, or whether we have preserved options for future challenges that we don't even know about. It is sobering to think that our work can have such dramatic influence.

Now more than ever, we must turn up the volume of science and advocate for the use of science to inform important policy decisions. Objective science informs decision makers about consequences of land and water uses; without it we often have uninformed and sometimes unwise decisions. With science, societal values can be accurately translated into management decisions. We can be proud to know that the science we communicated was used to benefit society.

Applied fisheries and aquatic science will become more important as human populations increase and as technology accelerates the potential for threats to,

and restoration of, desirable ecosystem processes. We will need more and better science to help us make increasingly difficult decisions and trade-offs. This is a high calling, but one that is well worth the effort.

I invite you to participate in continuing conversations about amplifying science in a changing world during our annual general Western Division AFS meeting. For the benefit of aquatic species and humans alike, we must find ways to conduct the most important science; communicate it in ways that can't be ignored and maintain credibility so that people will believe what we say. We are attempting to amplify the great symposia that occur during our meeting by asking organizers to generate outcomes that will go beyond our meeting.

As I see it, ignorance of fisheries and aquatic ecosystems is our arch enemy. We should fight against ignorance by communicating science to other scientists, decision makers, influencers, and the Public. We should advocate for conducting and using science to achieve sound management and policy decisions. We should expose suppression and misuse of science and enhance scientific credibility by attempting to maintain purity of the scientific enterprise. It is my hope that elevating science will help influencers and decision makers to achieve what is best for current and future generations.

I challenge you to set your mind and voice on amplifying science. Shout your findings from the mountaintops, get a bigger bull-horn, write with a bigger pen, hit the drum harder, and crush ignorance all with humility. Develop your communication skills and ex-



*PRESIDENT'S HOOK, cont.***Todd Pearsons**

pand your networks. Let's turn up the volume and let our science be music to the ears of those that are thirsty for stewarding the inheritance and legacy of our fisheries and aquatic treasures.

Scientifically yours,
Todd Pearsons, Ph.D., FP-C; President, Western Division American Fisheries Society

WDAFS MISSION/VISION STATEMENTS

Mission and vision statements can help us to focus our efforts on what is important, unify our aspirations, and inspire us to do something bigger than ourselves. To my knowledge, the Western Division of the American Fisheries Society has never developed, adopted, and formalized mission and vision statements. In order to fill the gap and to communicate why we exist and what we are aiming towards, the Executive Committee of the Western Division of the American Fisheries Society has recently approved the statements below.

WDAFS MISSION: The mission of the Western Division of the American Fisheries Society is to: 1) improve the conservation and sustainability of unique fishery resources and aquatic ecosystems in western North America by advancing fisheries and aquatic science and promoting the development of fisheries professionals, and 2) serving as an effective bridge between the Society and Chapters within the Western Division, promoting communication among and support of the Chapters and membership, and being the American Fisheries Society's representative to the public in western North America.

WDAFS VISION: The Western Division of the American Fisheries Society seeks to be recognized as the pre-eminent organization providing fisheries information to decision makers in all arenas of western North America. While fulfilling our vision, we will recruit and develop new fisheries professionals by offering learning and training opportunities crucial to maintaining a well-trained profession, support programs and efforts to increase diversity and inclusion,

and enhance the value of American Fisheries Society professional certification.

WDAFS SLOGAN (for use on letterhead): Advancing fisheries and aquatic science and professionals in western North America.

WDAFS CHALLENGE: Ignorance of fisheries and aquatic ecosystems is our arch enemy. We will fight against ignorance by communicating science to other scientists, decision makers, influencers, and the Public, and we will advocate for conducting and using science to achieve sound management and policy decisions. We will expose suppression and misuse of science and enhance scientific credibility by attempting to maintain purity of the scientific enterprise. It is our hope that elevating science will help influencers and decision makers to achieve what is best for current and future generations.

I hope that these short organizational statements will aid in your understanding of the Western Division and that you will find your niche in helping us achieve our mission and vision. No individual can accomplish these statements alone, however we can do great things together as we strive together for a better future.

Piscatorially yours,

Todd Pearsons, Ph.D., FP-C

President, Western Division of the American Fisheries Society

UPCOMING DATES & DEADLINES

Please visit the [website](#) for details regarding abstract submissions, registration, photo and film submissions, and the WDAFS business meeting for the upcoming 2021 WDAFS Meeting



Amplifying Science in a Changing World



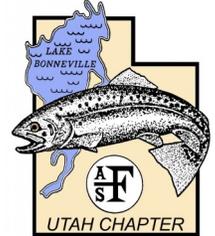
Western
Division

2021 Virtual Annual Meeting
Hosted by the Utah Chapter

Annual meeting will be held virtually from May 10-14th!



Symposia have been set, and the call for abstracts has been extended until April 2nd. Join us in May as we present, network and engage scientific minds in western fisheries topics!



Aquatic resources and the professionals who research and manage them face dynamic challenges. Now more than ever, scientists need to adapt and inform our approach to sustaining aquatic stewardship. However, the advancement and amplification of science has been hindered recently by multiple causes. Science is being threatened from without and within: credible science is being minimized by some in influential positions and some scientists are misrepresenting science in order to advance their personal values.

Updated meeting information, including registration and meeting schedule available:

<https://cvent.me/34EAB3>

Twenty-one exciting symposia topics including:

- No water, no fish: understanding and using water policy in fisheries solutions
- Climate change effects on fish and fisheries in a changing world
- Integrating angler-derived information into fisheries management
- Techniques, tools, and innovations in aquatic habitat restoration
- Hatcheries in a changing world
- Warm water sportfish management in the West
- Assessing fish movements across habitat networks using PIT technology
- Steelhead recovery: what we know, what we don't know, and what we need to know
- Western endangered sucker
- Basin events to coastal impacts (BECI): an intelligence system for fish and people
- Western Native Fishes

Continuing education workshops including:

- Aerial Imagery
- Electrofishing theory and techniques (Jim Reynolds)
- Mobile data collection tools
- Conservation Genetics
- Federal Permitting 101
- Bayesian Techniques
- Communicating Science
- And More!

The 2021 WDAFS Meeting will also include additional events, including

Aquatic Film & Photo Festival

Three exciting Plenary Sessions

Social Events

WDAFS Business Meeting

WDAFS OFFICER ELECTIONS

It is once again time for Western Division AFS Officer Elections. Current election positions include, WDAFS Vice President, WDAFS Secretary/Treasurer, and WDAFS Student Representative. Please read the following biographies of our incredible candidates for each position and look for your ballot from the

WDAFS listserv in late—March or early—April. Participation from WDAFS members in good standing with the Society is highly encouraged, as these candidates will represent you and WDAFS into the future. Thank you in advance for your participation in this year's WDAFS Officer Elections.

WDAFS VP Candidates

Eric Fetherman (Colorado Parks & Wildlife)

As the son of parents that both graduated with degrees in wildlife biology from Colorado State University, I grew up hunting, fishing, and exploring national parks on family vacations. Some of my favorite memories are of trout fishing in Clear Creek, ice fishing in Granby, and after-dinner trips to local city ponds to catch bass, crappie, bluegill, and sunfish with my father.

I started my career in natural resources at 13, working as a park naturalist aid at a local city park, where I worked through high school. I began working toward a degree in wildlife biology at CSU in 2002. However, the summer after my freshman year, I was hired by the USFWS to help raise razorback suckers at the Ouray National Fish Hatchery in Utah, and I became hooked on a career in fisheries. I picked up fishery biology as a second major, and was hired as a technician by then Colorado Division of Wildlife, helping rear and develop whirling disease-resistant rainbow trout. I graduated with a B.S. in wildlife biology with fishery biology as a second major in 2006. My work with CDOW led to graduate work at CSU where I earned my M.S. in 2009 and Ph.D. in 2013, working on development and reestablishment of WD-resistant rainbow trout populations in Colorado. I was hired as an aquatic researcher by Colorado Parks and Wildlife in 2011. My research focuses on salmonid diseases, brood stock development and hatchery production, and sport fish population dynamics. I also have the privilege of serving on three Ph.D. committees as a CSU affiliate faculty member, and enjoy the opportunity to mentor the next generation of fisheries professionals. I was honored to be nominated for and receive the Colorado/Wyoming Chapter Outstanding Mentor Award in February 2021 for my work with these students. I have worked on some great projects and with some incredible colleagues during my career, which has led to the authorship or

co-authorship of eleven AFS publications in JAAH, NAJFM, TAFS, and NAJA. I have also served as a reviewer for JAAH, NAJFM, and TAFS, and am currently a member of the Best Paper Award Committee (NAJA) for the Society.

The American Fisheries Society has played a large role in my career and success as a fisheries professional. I have been a member of the CO/WY Chapter, Western Division, and Society since 2006, the Fish Health Section since 2011, the Fish Culture Section since 2016, and the Fisheries Management Section since 2017. As a graduate student, I was a member of the Western Division AFS Student Representative Committee which helped establish the student rep as a voting member of the WD Executive Committee. As a member of the CO/WY Chapter, I served as co-editor of the Chapter newsletter and member of the Environmental Policy Committee before being elected to the Executive Committee and serving as Secretary-Treasurer, Vice President, President, and Past-President of the Chapter. The CO/WY Chapter received the 2019 Outstanding Small Chapter Award from both the Western Division and Society at the AFS-TWS joint meeting in Reno following my year as Chapter President, and 2020 Outstanding Small Chapter Award from the Western Division during my year as Past



*WDAFS OFFICER ELECTIONS, cont.***WDAFS VP Candidates**

Eric Fetherman (Colorado Parks & Wildlife)

President. I am proud of the Chapter's many accomplishments during my tenure with the CO/WY Executive Committee, including hosting a joint Chapter meeting with the Utah Chapter, the establishment of an endowment fund for the Colorado Mesa University Subunit, increased participation from aquaculture personnel in our annual meeting which lead to one of the largest meetings in Chapter history, and formation of the Chapter's Diversity and Inclusion Committee, among many others. I was able to continue my AFS service in 2020-2021 as a member of the Chapter Arrangements Committee, helping put on the Chapter's first ever virtual meeting, and the Western Division Resource Policy and Environmental Concerns Committee. My participation in AFS has taught me a lot about myself as both a fisheries professional and a leader.

As a graduate student and professional, I have been lucky enough to attend and present at many Chapter, Fish Health Section, Western Division, and Society meetings over the years. I look forward to and enjoy attending these meetings, learning about all the great work being conducted by other fisheries professionals, and connecting with members during the socials. I have met some amazing colleagues and good

friends at these meetings, and some of my favorite projects and collaborations originated over a beer at meeting socials. The ability to bring together and facilitate communication between the diverse groups within our profession is one of the great strengths of AFS. As President of the CO/WY Chapter, I took advantage of this aspect of AFS, putting together an opening session on aquaculture and working with state and private hatchery personnel to attend and present at the meeting. The meeting was a huge success, and facilitated communication, teamwork, and camaraderie among the various aquatic sections and disciplines in both states. If elected, I hope to continue the tradition of hosting fun, productive, and informational meetings at the Division level so they can continue to be a useful forum for social and professional engagement. Whether we are working from home, in the office, or in the field, need to hold meetings over Zoom or can meet in person, I hope I can play a role in making AFS a safe and productive place for information dissemination, communication, and fellowship for all Western Division members. I am excited for this opportunity to continue my involvement with and service to AFS, and thank you for your consideration of me as a representative of the Western Division Executive Committee!

WDAFS Secretary-Treasurer Candidates

Laura Burkhardt (Wyoming Game & Fish Department)

I am seeking election to the office of Secretary-Treasurer to continue to give back to the American Fisheries Society (AFS). Throughout my career, I have found participation in AFS to be very rewarding and have enjoyed being a part of the community within the Arizona-New Mexico, Montana, Dakota, and Colorado-Wyoming Chapters. I have enjoyed supporting AFS by serving in several planning roles for the Western Division, including Poster Chair and on the Program Committee. I served for ten years on the program committee for the Colorado-Wyoming Chapter and for the last several years on the Environmental Policy Committee. Early in my AFS involve-

ment, I also served for two years as the Newsletter Editor for Arizona-New Mexico Chapter.



*WDAFS OFFICER ELECTIONS, cont.***WDAFS Secretary-Treasurer Candidates**

Laura Burkhardt (Wyoming Game & Fish Department)

I am currently an Aquatic Habitat Biologist with the Wyoming Game and Fish Department focusing on stream restoration and protection projects in the Cody area. I am a certified fisheries biologist and have held fisheries management and research positions in Montana and Arizona. I also spent many years working for an environmental consulting firm on fisheries research and energy development projects across the

West. I grew up in Wyoming, completing my bachelor's degree at the University of Wyoming and my Master's degree at the University of Arizona. Throughout my career, I have found that the most rewarding work I have done is in habitat protection and restoration, and sharing my love of nature with kids.

WDAFS Student Representative Candidates

Kat Dale (University of California, Santa Cruz)

My name is Kat Dale, and I am running for the position of WDAFS Student Representative. I'm currently a 5th year PhD student at the University of California, Santa Cruz, where I've been involved with the Santa Cruz-Monterey Bay Area student subunit since my first year. I'm currently in my second non-consecutive term as president (I have also served as the PR chair and past-president, in addition to my first presidential term). Since I've been involved with SCMBAS, we have won the WDAFS Outstanding Subunit award four times and the national Outstanding Subunit Award twice. I have absolutely loved helping develop, fund, or run interesting events for our members and our community, as well as helping our members channel their interests and passions into programs of their own.

I have been interested in getting more involved at higher levels of AFS for a while, and the Student Representative position is a perfect opportunity to do so. I'd like to continue Emily's work of cultivating connections across student subunits, especially with colleagues in Mexico and Canada. I have some experience connecting subunits already -- in 2018 and 2019, I ran a "tri-subunit retreat" with student leaders from the other California subunits, both of which were an absolute blast. I look forward to polling student members about what kinds of skills or professional development opportunities they would find useful and run appropriate events at the WDAFS meeting and through the fall Student Symposium. I

recently ran a [virtual] student-mentor networking event at the California-Nevada Chapter annual meeting that was a lot of fun, and it would be great to run something similar at the WDAFS meeting!

As a marine ecologist, I would bring an oceanic perspective to WDAFS. My dissertation work focuses on the dispersal and movement of fishes in the Eastern Pacific, primarily using marine eels as a model system (see my obligatory "fish holding photo" for the largest California moray I've ever caught, from Baja Mexico). I'm also examining general trends of larval fish abundance and movement off southern California. My research uses a wide range of lenses to examine dispersal, from genetics to Bayesian statistical models to otoliths to morphology. As WDAFS Student Representative, I'd love to help other students develop a diverse "toolbox" of their own! For more about me, check out my [website](#) or [Instagram](#).



*COMMITTEE UPDATES***Diversity & Inclusion Committee**

Laura Slater (WDAFS Diversity & Inclusion Committee)

Diversity, Equity, and Inclusion in Fisheries



First, I would like to introduce myself. My name is Laura Slater, and I became chair of this committee in December. As a member of this committee since 2018, I have enjoyed the opportunity to learn from our former chair, Cheyenne Owens. Our committee will miss her leadership, though we are happy she has professional and personal opportunities carrying her forward along life's journey.

Our committee is comprised of amazing members dedicated to increasing diversity and inclusion in the fisheries field. This work is important to ensure those who come from underrepresented or marginalized backgrounds are supported, feel that they belong, and are encouraged to engage in their respective places of work or learning in the fisheries field. Increasing contributions from a diverse membership will strengthen our collective science, communication, and collaboration efforts. If you have ideas or experiences that we can learn from, we welcome your input. Likewise, if you would like to become involved, we welcome your participation.

Our committee developed a list of articles, websites, and videos that we found helpful as we continue to

learn and become more self-aware in how our biases and preconceptions impact others, especially those who are underrepresented in STEM. We partnered with the Society's Equal Opportunity Section to share and continue to curate this resource list (<https://diversity.fisheries.org/resources/>). We hope you will join us on this learning journey.

I am excited to promote two events during the upcoming virtual Western Division Meeting (May 10-14): a continuing education workshop on Unconscious Bias and a symposium focused on "Diversity, inclusion, and equity: informing and adapting". We welcome your participation in these events.

Our committee is strengthening our communication with individual chapters. We established liaisons from chapters that have committees focused on diversity, equity, and inclusion. Our goals are to share ideas and initiatives and provide support towards addressing identified needs. We will highlight and share achievements from chapters in future Tributary issues; if you have anything you would like us to share, please let me know (laura.m.slater@gmail.com).

Resource Policy & Environmental Concerns Committee

Bob Hughes (WDAFS Resource Policy & Environmental Concerns Committee)

The Resource Policy & Environmental Concerns Committee (RPECC) has organized a session, Effects of Agriculture on Streams, for the 2021 WDAFS virtual annual meeting. Eleven speakers from 5 states and 3 nations have agreed to present. That session and a draft letter to decision makers will be used to develop a manuscript for submission to Fisheries. In addition,

the RPECC is currently reviewing the pros and cons of Congressman Mike Simpson's proposal to breach the four Lower Snake River dams. If you have pertinent citable information in that regard, please forward it to Bob Hughes (hughes.bob@amnisopes.com).

*COMMITTEE UPDATES, cont.***Western Native Fishes Committee**

Timothy D'Amico & Luke Schultz (WDAFS Western Native Fishes Committee)

The Western Native Fishes Committee continues to work towards our mission of promoting stewardship of native fishes within the Division boundaries. With that in mind, coupled with the WDAFS theme of amplifying science, we are proud to announce two endeavors we have undertaken. As we have done historically, we are hosting an annual Native Fishes symposium at the 2021 Virtual WDAFS meeting and

we look forward to your abstract submissions. Additionally, we will be taking an active role in helping the *Salvelinus confluentus* Curiosity Society (ScCS) conduct their annual meeting, scheduled for mid-summer 2021. Please see below for details on the ScCS and look for details regarding their upcoming virtual meeting.

Salvelinus confluentus Curiosity Society

Kevin Netcher & Scott Maclean (*Salvelinus confluentus* Curiosity Society)

Bull Trout have continued to be listed in the US under the Endangered Species Act since 1999 and are listed in Alberta, Canada under the Species at Risk Act. The *Salvelinus confluentus* Curiosity (ScCS) was formed by fisheries biologists from the northwestern US and Canada in 1989 to share information and to promote the conservation of the species. The primary activity of the ScCS is an annual workshop held in a field setting in one of the western states and provinces on a rotating basis to help local biologists collect needed data on the species, provide a forum for the exchange of information, and to introduce those attending to the habitats, management, and research

related to Bull Trout in other parts of its range.

ScCS was adopted as part of the Western Native Fish Committee of WDAFS in spring of 2019. At that time ScCS also launched a free online library containing more than 9,000 documents related to Bull Trout. Information on the library, including access, can be found on the WDAFS website at <https://wdafs.org/about-us/committees/western-native-fishes-committee/salvelinus-confluentus-curiosity-society-bull-trout-library/>



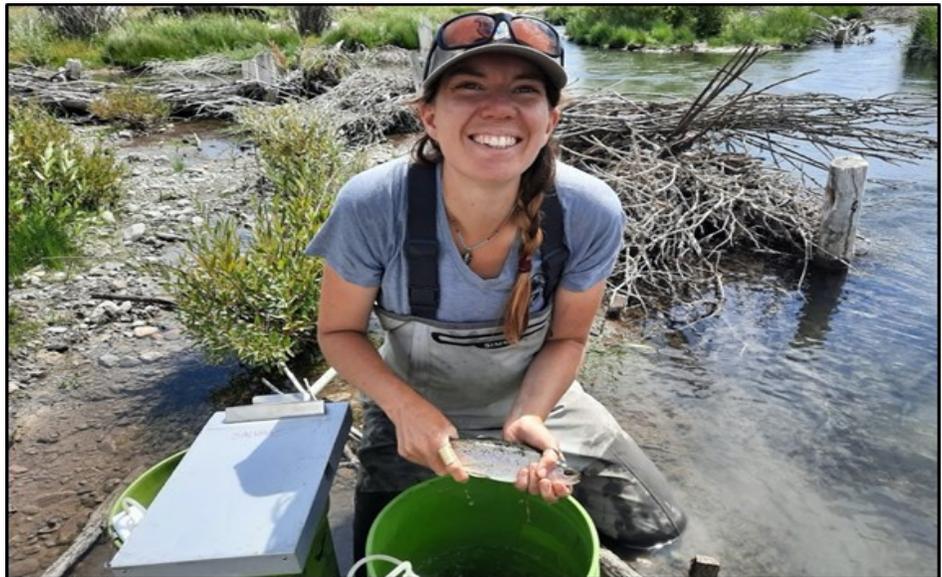
*COMMITTEE UPDATES, cont.***Early Career Professionals Committee**

Alexander Tasoff (WDAFS Early Career Professional Committee)

The ECP committee will host its winter webinar on March 19th. The event is called Three Steps to Growing Your Resume as an ECP. It will cover the essentials of professional networking, post-graduation activities, and finding hidden job or volunteer opportunities in the competitive fishery science field. Our presenter is Kat Gillies-Rector, a passionate regional fisheries biologist at the Idaho Department of Fish and Game (IDFG).

Kat has mentored students and ECPs for the past six years. She has provided career guidance to seasonal IDGF employees; created "how-to" documents to help ECPs find graduate positions and jobs; and conduct professional development exercises like resume/cover letter instructions or mock interviews. She is strongly committed to teaching, and has been actively involved in the OR and ID state chapters of AFS since 2009.

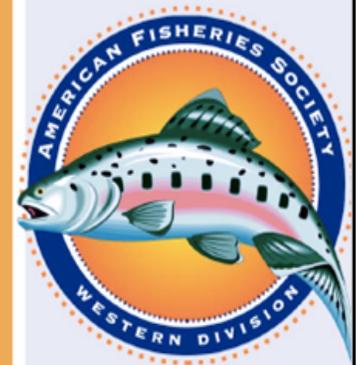
Attendance is free but please register for the event prior to March 18th. The event will occur on AFS's webinar software, which may need to be uploaded to personal computers. We look forward to your attendance.



3 Steps to Growing Your Resume as an Early Career Professional

Finding meaningful and beneficial experience at the beginning of your fisheries career

Kat Gillies-Rector - Regional Fisheries Biologist, Idaho Department of Fish and Game



SPECIES SPOTLIGHT

Steelhead Trout *Oncorhynchus mykiss*

Bryan Matthias (United States Fish and Wildlife Service)

Among California's native salmonids, *Oncorhynchus mykiss* display the most diverse life-history patterns (Williams 2006). *O. mykiss* have evolved a diverse array of pathways to complete their life cycle, with two distinct life-history variants: an anadromous form which migrates to the ocean for part of its life cycle (i.e., steelhead) and a freshwater resident form which completes its life cycle in freshwater (i.e., rainbow trout). These life-history pathways are further differentiated by variation in fresh and/or saltwater rearing time, age at maturation, repeated spawning, etc. (Moore et al. 2014, Hodge et al. 2016). This life-history diversity has led to challenges in monitoring *O. mykiss* population status across the Central Valley.

available habitat and all spawning habitat for 38% of historical steelhead populations (Lindley et al. 2006). Although *O. mykiss* are distributed throughout most Central Valley watersheds, the proportion of *O. mykiss* that adopt the anadromous life-history pathway has declined over the past few decades, especially in the San Joaquin River Basin (Williams et al. 2016). The continued decline in Steelhead abundance highlights the need for coordinating future research and monitoring of these populations. To facilitate this effort, the Delta Stewardship Council recently hosted a workshop focused on challenges in managing and monitoring *O. mykiss*, discuss monitoring efforts outside of the Central Valley, and begin planning future monitoring efforts (CA Delta Stewardship Council; materials and recorded presentations under the 2021 February 17th to 19th Steelhead Workshop).



© Jake Osborne, USFWS

California's Central Valley Steelhead were listed as threatened under the Endangered Species Act in 1998. It has been estimated that impassible dams in the Central Valley block access to 80% of historically

In the past, much of the native salmonid monitoring efforts in the Central Valley focused on *O. tshawytscha* (i.e., Chinook salmon) and very few programs were able to monitor Steelhead with meaningful confidence (Eilers 2010). Over the past decade, several *O. mykiss*-specific monitoring programs in the Sacramento River Basin have been implemented (Beakes et al. 2021). Additional efforts are underway to develop analyses using data from various monitoring programs to predict drivers of *O. mykiss* populations, including abundance, survival, growth, migration characteristics, etc. for both anadromous (juvenile and adult life stages) and freshwater resident life-history pathways (Beakes et al. 2021, and associated presentation). Finally,

it is an exciting time to be studying Central Valley *O. mykiss* because efforts are underway to develop a monitoring plan for the San Joaquin River Basin (Israel et al. 2021).

*SPECIES SPOTLIGHT, cont.***Flannelmouth Sucker *Catostomus latipinnis***

Zachary Hooley-Underwood & Daniel Cammack (Colorado Department of Parks and Wildlife)

Large-bodied, long-lived, and visually striking, Flannelmouth Sucker *Catostomus latipinnis* have experienced a greater than 50% range reduction in the Colorado River basin, to which they are endemic (Bezzerides and Bestgen 2002). Recent data collected through sampling efforts, inter-state PIT tag detection, and shared databases illustrates the mobility of this species. Flannelmouth Sucker can travel hundreds of miles and use a wide variety of habitats to complete life history requirements.

One Flannelmouth Sucker, originally PIT-tagged on the Green River in Stillwater Canyon, Utah, was subsequently detected across multiple years on arrays located in the Dolores River near Slick Rock, Colorado, representing at least a 500-mile journey. Other movements of more than 100 miles have been made by individual fish tagged in the Colorado River, dispersing to major tributaries such as the Gunnison River.

Not only do Flannelmouth Sucker move great distances, but they do so in great numbers. In the San Miguel River, a major tributary to the Dolores, nearly half of all tagged individuals have been detected in the Colorado River, over 60 miles downstream, and many fish make this migration annually. Thousands of Flannelmouth Sucker spawn in Cottonwood Creek, a small intermittent tributary to the Gunnison River near Delta, Colorado, when water is available (Hooley-Underwood et al. 2019). Annually, this stream runs for three months at most (April-June), but in years

with poor snow accumulation, it does not run. Based on trap captures and PIT tag detections, a minimum of 3,112 individual mature Flannelmouth sucker use the creek in some years. Also of interest is the fact that up to 71% of PIT-tagged individuals return to the creek annually. The large numbers of fish and high tributary fidelity may indicate that Cottonwood Creek offers favorable spawning habitat over more permanent options in close proximity to this creek.



© CDPW

As detections of PIT-tagged Flannelmouth Sucker increase throughout the Colorado River Basin, and more diverse habitats are sampled for the species, more evidence of the mobility of this species is likely to emerge. Maintaining connectivity between river systems, and between mainstem and tributary habitats, may be necessary to sustain current populations of Flannelmouth Sucker. Opening up new connections may aid the recovery of the species.

WDAFS SMALL GRANT UPDATES

Per- and Polyfluoroalkyl Substances (PFAS) and Mercury in Coastal Beaufort Sea Fishes of Subsistence Importance

Kevin Fraley, Wildlife Conservation Society
 Carolyn Hamman, University of Alaska Fairbanks
 Trent Sutton, University of Alaska Fairbanks

Background

Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals found in firefighting foam and household products (e.g., carpeting) that are released into the environment during firefighting training, from manufacturing facilities and landfills, and via atmospheric deposition from emissions. Globally, PFAS have been released into soil, groundwater, and surface water, causing large-scale environmental contamination at thousands of locations. Many of the molecules are bioaccumulative, and human and animal exposure to PFAS has been linked to reproductive harm, developmental problems, and ulcerative colitis. Currently, there are no practical methods for remediating PFAS contamination once it has entered ground and surface water, and regulation and cleanup efforts are lacking.

Recently, harvest and consumption of wild foods has led to exposure to PFAS (and other contaminants such as mercury), leading to state and local testing of wildlife and fish tissue near contaminated areas. The results have led to issuance of consumption advisories and hunting and fishing closures in some instances (Figure 1). In Alaska, there are numerous PFAS-contaminated sites, and some testing of water and fish contaminant levels has occurred, resulting in several water bodies being closed to harvest of sport fishes. However, the water and fish in many potentially contaminated water bodies remains untested.

In Arctic Alaska, the possibility of contamination of subsistence wildlife and fishes that Indigenous and rural residents rely upon for food security and cultural identity is of special concern. There are few point sources of PFAS and few anthropogenic mercury point sources in the Arctic, but long-range pollutant transport has resulted in the accumulation of PFAS and mercury in Arctic marine mammals and fishes. However, little contaminant research has been done in the Beaufort Sea near the Prudhoe Bay oil-field industrial complex, which is a possible source of contamination. Diadromous and marine fishes are harvested nearby by rural subsistence users, (e.g., up to 80,000 Coregoninae whitefishes annually in the Colville River delta), and thus contaminant surveys are needed to ensure human health.

Given this need, we applied for and received a 2020 WDAFS Small Project Grant to conduct an initial survey of

PFAS and mercury contamination in the muscle tissue of four species of diadromous and marine nearshore Beaufort Sea fishes of subsistence importance. Our goals were to establish baseline contaminant levels and ascertain whether a health concern may be present for local residents.



Figure 1: A sport fishing closure sign posted at Kimberly Lake, North Pole, Alaska, due to PFAS contamination emanating from the former Flint Hills Refinery.

Progress and Results

While fieldwork deployment was challenging and limited during the 2020 field season in Alaska due to COVID-19 travel concerns and restrictions, we were able to collect 2-5 individuals of each species of interest for contaminant testing. Fish were collected during annual monitoring work for the University of Alaska Fairbanks Beaufort Sea Nearshore Long-Term Nearshore Fish Monitoring Program in late July-August 2020. Fyke nets were employed to capture fish at four sites in the estuarine band of the nearshore Beaufort Sea adjacent to the Prudhoe Bay oil-field industrial complex (Figure 2).

Four species were selected for contaminant analyses to include a wide range of life histories, and the largest indi-

WDAFS SMALL GRANT UPDATES, cont.

viduals of each species were retained to capture bioaccumulative effects. The focus species included the diadromous Broad Whitefish *Coregonus nasus* (Figure 3), Dolly

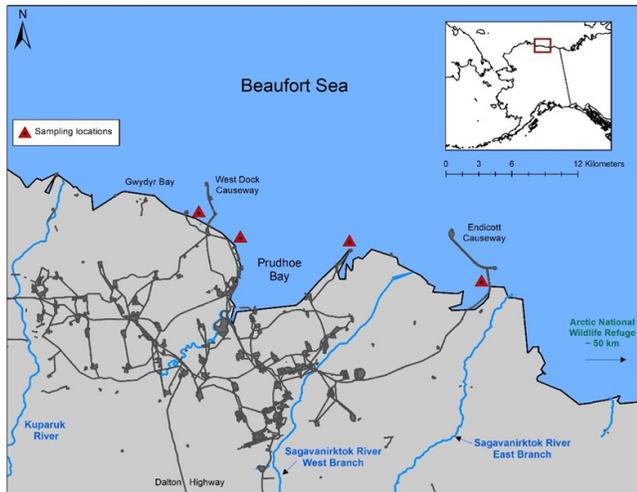


Figure 2: Map of the Beaufort Sea near Prudhoe Bay, Alaska. Fyke net capture locations are denoted by triangles.

Varden char *Salvelinus malma*, the marine Arctic Flounder *Liopsetta glacialis*, and Saffron Cod *Eliginus gracilis* (Figure 4), all of which are commonly harvested and consumed by local subsistence practitioners. Muscle tissue was extracted in the laboratory, and a composite sample for each species (muscle tissue of all individuals combined; necessary due to high cost of PFAS analysis) was sent to Eurofins TestAmerica Laboratories for PFAS and total mercury analyses.

Laboratory results delivered good news: PFAS and mercury concentrations in all fish species were at very low or nonexistent levels. Total mercury in muscle tissue ranged



Figure 3: Kyle Gatt holds a Broad Whitefish caught in a Beaufort Sea Nearshore Long-Term Nearshore Fish Monitoring Program fyke net.

from non-detectable in Dolly Varden char to 30 ppb in saffron cod, with the diadromous fishes exhibiting lower levels than marine taxa. These levels are well-below the most stringent fish consumption health advisory cutoffs (lowest we noted was 150 ppb), which differ among states and institutions. Our PFAS results were complicated slightly by blank contamination that occurred at the Eurofins Test America Laboratory, but all analytes for all species were less than 3 ppb, which amounted to trace or nonexistent amounts. These values were also well below the level of the most conservative health advisories that we are aware of to date (9 ppb).

While our results are positive for subsistence harvesters, it should be kept in mind that our sample size was low, other fish species should also be tested in the future, and regional values could potentially differ. Additionally, high levels of contaminants (including PFAS) have been found in ma-



Figure 4: Carolyn Hamman holds a Saffron Cod caught in a Beaufort Sea Nearshore Long-Term Nearshore Fish Monitoring Program fyke net.

rine mammals that are harvested by Alaska Native Peoples for subsistence needs, and this needs to be investigated further. Thus, there is much more work to be done within the environmental and fisheries fields on the PFAS topic. More generally, in Alaska and elsewhere, broad-scale PFAS surveys of the environment, fishes, and wildlife still need to be conducted, particularly near known point sources, to identify and respond to possible instances of human exposure to these harmful chemicals.

Meet Your WDAFS Officers



President

Todd Pearsons

Hometown: Woodland Hills, CA (via Boston, MA)

Education: PhD, Oregon State University

Employer: Grant County Public Utility District (Science), Ephrata, WA

Interests: Underwater photography, Biblical archaeology, Krav Maga, human powered transportation, water sports, drums, blues harmonica



Past-President

Dan Dauwalter

Hometown: Carver, MN

Education: PhD, Oklahoma State University

Employer: Trout Unlimited (Science), Boise, ID

Interests: My interests center on outdoor recreation: mountain biking, rafting, fishing, hiking. I also play hockey, and I traveled Spain, Wales, and Switzerland for two months in 2019. It was the trip of a lifetime (photo from Spain)!



President-Elect

Dan Brauch

Hometown: Meeker, CO

Education: B.S, Colorado State University

Employer: Colorado Parks and Wildlife, Gunnison, CO

Interests: With two high school kids, I enjoy participating in their activities (4-H, science-o, drama, etc) but also find time for hiking, hunting, fishing, and motorsports. My wife, kids and I look forward to expanded travel opportunities.



Vice President

Laurie Earley

Hometown: Colchester, VT

Education: BS, University of Rhode Island and MS, Auburn University

Employer: U.S. Fish and Wildlife Service, Red Bluff, CA

Interests: I love outdoor recreation activities in the sun, snow, and water with my husband and two dogs. I also love to travel and when at home I like to spend time gardening, cooking, listening to music, and reading.



Secretary-Treasurer -

Travis Rehm

Hometown: Dillon, MT

Education: MS, South Dakota State University

Employer: Spokane Tribal Fisheries

Interests: I enjoy spending my leisure time outdoors. The majority of that time is spent chasing anything that swims with a fly rod or hunting western big game.



Student Representative - Emily Chen

Hometown: Oak Creek, WI

Education: MS, Humboldt State University

Current PhD Student in Carlson Lab at UC Berkeley

Interests: I enjoy *leisurely* outdoor activities such as camping, hanging by the river, crabbing. When indoors I like to paint, strength train, read statistics, and ponder the future of salmon in California