Outlet

MONTANA CHAPTER OF THE AMERICAN FISHERIES

January 2019

Hello from Steve Dalbey—Montana Chapter President Elect

Smallmouth bass on Fort Peck with my dog jig

One of the first questions I received after being elected incoming MTAFS President was, "why"? Reading between the lines, the real question was probably, why would someone of your advanced age and at the tail end of their career do this??? The short answer is, it's never too late to serve. The long answer will take some time, so bear with me.

As many of you know, I have been a member of the Montana Chapter for nearly 30 years and a fisheries professional with MFWP for the same duration. The youngest of seven, I grew up on the banks of the lower Yellowstone River near Glendive. Early childhood development included running setlines on the Yellowstone, chasing panfish in prairie ponds and summer vacations to Leech Lake in Minnesota. Fishing was so much a passion that I bucked bales, washed dishes, and sold newspapers to feed the habit.

Careers, like a football game, can be broken down into four quarters. Excitement, exposure and learning define that first quarter; the second is finding your lane in the profession; the third is taking all those skills, combined with the lifelong passion, and getting good projects completed. The final quarter includes a developed appreciation for the long view of conservation efforts and the role that involvement and activism play in shaping decisions. And then, if you are smart, you have established a plan for overtime.

The American Fisheries Society plays an integral role in all these phases. When I first joined in 1989, MTAFS was the platform to network and be introduced to future mentors, be exposed to cutting edge science, and lets be honest, a lot of social interaction. We joke, but don't underestimate the importance of the social components of our gatherings. Some of the best work gets done at breaks and evening socials when old friends connect, and long-lasting partnerships are established. From a professional growth perspective, these are value-added opportunities – take advantage!

As we advance in our careers, the value of AFS develops as you build confidence and find your role in the profession. AFS provides that platform to give presentations on things like burbot conservation in the Kootenai or Walleye Management in the Upper Missouri River Reservoirs. My passion is somewhat different in that I have always been motivated to provide opportunity and access to anglers and other users. I have spent a chunk of my career conserving fish stocks and I rank those projects as some of the most meaningful in my career. Those westslope barriers, brook trout rotenone projects, and pearl dace conservation are lasting and the successful completion of these projects are the culmination of all that we have learned and the relationships that we have built over time. MCAFS and its membership aid in the facilitation of so much of the great work that gets done.

Important Dates

- **January 11, 2018**-Early Registration ends
- Room block ends at Double Tree, Billings
- **January 15, 2019-** Resource Action Fund submission deadline
- Award nomination deadline
- **January 16, 2019**—Abstract deadline
- **January 23, 2019—**Final registration for annual meeting deadline
- **January 29—February 1, 2019**—MT AFS annual meeting at Double Tree hotel in Billings, MT

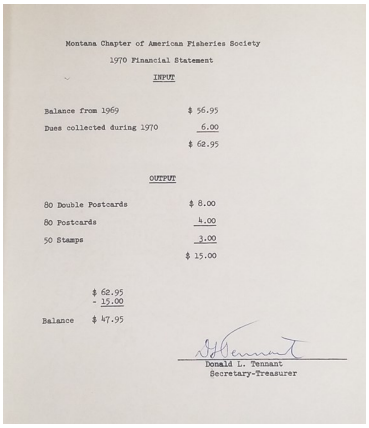
Inside this issue:

Hello Steve Dalbey...continued from previous page

Assisting with one of my first AFS meetings, circa 1989.

Lastly, MTAFS is the professional rock that has been steadfast in advocating for the right things for fish. Whether that is a comment letter on a logging project in key bull trout habitat or a controversial position statement on pallid sturgeon recovery actions, this is the group that has your professional back! Use it to its full advantage whether that's through publications, improving habitat, shaping policy, benefitting imperiled species or enhancement of recreational fisheries.

I look forward to seeing you all at the Annual Meeting in Billlings. I know that is a long way for many, but we need you. We need to hear what you have been working on, how your hunting season went, how that mountain biking trip to Moab was and how the family is. Because that's really what MTAFS is… your professional family.



Montana Chapter of American Fisheries Society
1970 Financial Statement

INPUT

Balance from 1969	$ 56.95
Dues collected during 1970	6.00
	$ 62.95

OUTPUT

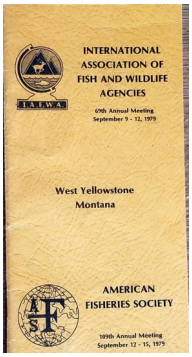
80 Double Postcards	$ 8.00
80 Postcards	4.00
50 Stamps	3.00
	$ 15.00

$ 62.95
- 15.00
Balance $ 47.95

Donald L. Tennant
Secretary-Treasurer

MCAFS 1970 Financial Statement.

Montana Chapter AFS through the years by Ken Stagmiller & Amanda Bryson, Historians



1979 meeting agenda.

As we begin 2019, let's take a look back and reflect on past chapter accomplishments:

- **50 years** ago the chapter balance was a whopping $56.95.
- **40 years** ago we hosted the 1979 AFS Parent Society Meeting in West Yellowstone.
- **30 years** ago we were named 1989 Western Division Chapter of the Year.
- **20 years** ago Tom Weaver was awarded the Montana Fishery Worker of the Year.
- **11 years** ago was the last Montana Chapter meeting in Billings hosted at the Crowne Plaza, Feb 12-15, 2008.
- **10 Years** ago Leanne Roulson took over as the Western Division AFS President.

We look forward to seeing what the Montana Chapter accomplishes in 2019! See you at the annual meeting in Billings!

"FISH CARCASSES, SHREDDED FISH CARCASSES AND AN ANALOG PELLET MADE OF SOY AND WHEAT GLUTEN HAVE SHOWN PROMISE AT CAUSING EMBRYO MORTALITY."

Cutthroat Trout Conservation in Yellowstone N.P. by Phil Doepke

Conservation of Yellowstone Cutthroat Trout in Yellowstone Lake has focused on removal of non-native Lake Trout. The removal effort is being completed with gillnets. Gillnetting Lake Trout in Yellowstone Lake begins as ice is breaking up on the lake, usually mid-May to early June and will continue until late October, when ice starts to form in the marinas, Bridge Bay and Grant. Typically there are four boats on the water six days a week gillnetting during this time. Gillnets are lifted and reset on a rotational basis, over 97,000 net nights (100 meters of net fished for a night) were fished in 2018, with generally a three night soak. Lake trout caught, over 290,000 in 2018, are killed, their air bladders cut, and sunk in water over 65 meters deep, mainly to reduce processing costs and keep nutrients in the system. By-catch consists of Yellow-

Cutthroat Conservation continued

stone Cutthroat Trout and Longnose Sucker and is mostly a non-issue. These non-target fish make up less than 10% of the catch and roughly 40% of the cutthroat trout are returned to the lake alive. Other methods of removal are being researched, which are mostly directed at eliminating embryonic Lake Trout. Presently, organic material on the Lake Trout spawning areas in October with fish carcasses, shredded fish carcasses and an analog pellet made of soy and wheat gluten have shown promise at causing embryo mortality. Lake trout peak spawning in Yellowstone Lake is late September.

Most gillnetting on Yellowstone Lake has been done with Hickey Brothers LLC, a company from Baileys Harbor, WI, but with active fisheries work in Montana, Wyoming, and Idaho.

2019 Annual Meeting by Brian Ertel MCAFS president

Happy New Year, MTAFS members. I hope you all had a wonderful 2018 and will have an even better 2019. As the calendar turned, I hope at least a small part of your resolution this year is to be more involved with our Chapter. Whether thinking about serving on ExComm, chairing or becoming a member of a committee, or volunteering at the annual meeting, it's all rewarding and helps your Chapter. Steve Dalbey, our current President-Elect, is finding this out first hand as he (and others) plan our annual meeting in the "Magic City" aka, Billings, MT.

The theme of this year's upcoming meeting, "**Communicating Fisheries Science in an Increasingly Skeptical Environment**" couldn't be more prudent in the current atmosphere. At a time when sound science is being constantly challenged, it is up to us, as scientists, to make sure we are communicating in the most effective manner possible to ensure our work is understood and accepted. The meeting will help us address what may be shortcomings in the way we disseminate information to the public and each other. Steve and Robert have secured a fantastic continuing education workshop for us. The class, "Persuasive Communication with a Skeptical Audience - Gain the Edge in Difficult Situations", will be taught by Michael Fraidenburg, Owner of The Cooperation Company. Michael has years of experience and I'm sure there is something even the most seasoned of us can learn from him. In addition, there are several exciting symposia to enlighten and educate.

Keeping with our communication theme; the ExComm is working hard to make chapter operations more transparent and clearly defined. We are in the process of developing a Chapter Financial Sustainability Plan. Within this plan we will be laying the ground work for how to maintain our chapter in good financial standing while giving the maximum amount back to membership. We will clearly define how spending occurs and set predetermined amounts for expenditures based on chapter financial holdings. The plan will be available for review and comment by chapter members before being enacted.

An additional goal of the ExComm is to open the communication lines with our current committees. Committee activity has decreased over

Brian Ertel working in Yellowstone National Park.

"COMMUNICATING FISHERIES SCIENCE IN AN INCREASINGLY SKEPTICAL ENVIRONMENT" COULDN'T BE MORE PRUDENT IN THE CURRENT ATMOSPHERE."

2019 Annual Meeting continued

"BECAUSE OF YOU, MONTANA IS VIEWED AS A MODEL EXAMPLE OF USING SCIENCE AND ART TO MANAGE SOME OF THE MOST PRECIOUS AQUATIC RESOURCES IN THE WORLD."

the past several years. We will be putting forth suggestions to increase contact between ExComm and committee chairs and welcome any suggestions membership has on this topic. Some ideas include semi-annual reports to ExComm and having chairs sit in on ExComm calls and meetings.

Finally, we are looking for ways to reinvigorate interest in becoming a member of our chapter and chapter ExComm. Recruitment of ExComm members has become increasingly difficult as we are all expected to do more at work and try to find a balance with work and home. As the meeting approaches, I urge members to take some time to think about how we can increase our recruitment of new members and new ExComm participants. Membership has many benefits and it is truly a rewarding experience to serve on the ExComm.

As we move further into 2019, I know our Chapter and Chapter members will continue to do great things. I want to thank you all for the incredible work that you do to protect the resources of Montana and beyond. Because of you, Montana is viewed as a model example of using science and art to manage some of the most precious aquatic resources in the world. I am constantly in awe of the work that you all do, and humbled to be part of it. I'm excited to see you all in Billings.

Mandeville Creek Restoration and Education Project by Abigail Breuer

Mandeville creek before restoration in 2015

Mandeville creek after restoration in June 2018

Every day, over 2000 students cross Mandeville Creek in order to enter Bozeman High School. Disguised by a straight channel, lawn vegetation, and culverts, few recognized this East Gallatin Tributary as more than a ditch until a group of teachers and community volunteers initiated restoration in 2014. With the help the Resource Action Fund, the informal high school Stream Team is returning this resource to life in order to provide an outstanding educational setting.

Located in the heart of Bozeman, Mandeville Creek offers an ideal setting to demonstrate ecological function in the rapidly urbanizing Gallatin Valley. As a key tributary to the East Gallatin River, the creek once served as high quality aquatic and riparian habitat, hosting Westslope Cutthroat Trout as recently as 60 years ago. In the intervening period, the impact of urbanization greatly reduced its beneficial function. The last Brown Trout, caught in the creek nearly 30 years ago, resides in the Bozeman High science department's collection.

Today, in place of the campus 'ditch', a meandering channel with functional stream geomorphology, inset floodplain and native riparian corridor has been re-established. This upstream reach (1065 feet) was restored from its prior channelized and partially-entombed, underground state due to the phenomenal contribution of 40 Bozeman businesses and organizations in Summers 2014 and 2015.

Upcoming in Summer 2019, the Bozeman School District will enhance the remaining downstream channel (1225 feet), based on the support of the RAF and 319 grant funds. With an outdoor classroom as part of the plan, Mandeville Creek is poised to serve an educational resource for multiple disciplines. By restoring this highly visible tributary, individual impact and cumulative effects are being made tangible to Bozeman High School students and their community for years to come. For more information, visit www.bhscreek.org

Fish Talk Featuring Clint Muhlfeld by Sam Bourret Outlet editor

Outlet: How long have you been a member of MTAFS?
CM: I have been an active member of MTAFS since 1994 when I took my first professional fisheries position working as a fisheries technician for Montana Fish, Wildlife & Parks in Libby. So that makes me a 24-year member of the MTAFS...holy cow I'm getting old!

Outlet: What accomplishments are you most proud of contributing to the Chapter?
CM: Prior to serving as President, I was co-chair of the Species of Special Concern Committee (SSCC) with Wally McClure. At the time, there were many pressures facing Montana's native fishes and their habitats, yet the status of the majority of the 19 species were unknown. Wally and I worked with many experts throughout the state to complete and update the status assessments and provided scientific comments on several pressing issues across the state. I got to know Wally and found him to be an incredible advocate and leader for conservation and management of Montana's native fishes. In 2004, I was President-elect and organized the annual meeting in Whitefish focused on watershed assessment and river restoration. We were extremely fortunate to have Dave Rosgen teach the continuing education workshop focused on river restoration and monitoring. The meeting set record attendance, so we used all the proceeds from the meeting and continuing education course to establish the Wally McClure Scholarship. The idea was to create an annual scholarship for undergraduate and graduate fisheries students to promote academic and professional excellence in the fisheries science, with an emphasis on native fish conservation and habitat restoration in Montana. 2019 marks the 19th year of the Wally McClure Scholarship. I am proud and honored that Wally's legacy will live on by providing educational opportunities for fisheries students in Montana for years to come.

Outlet: You recently finished an appointment as the USGS National Fisheries Program Manager in Washington, DC. What inspired you to take on this role?
CM: The opportunity to serve as the USGS Fisheries Program Manager arose while I was working on a detail as the national drought and ecological flows coordinator for USGS. Prior to that experience, I spent my entire career working as a fisheries scientist in the West and didn't have a good understanding of how the sausage was made back in DC. I enjoyed working collaboratively on a science team to advance fisheries science at a national scale and interacting with folks in USGS leadership. Therefore, when I was offered the position as the National Fisheries Program Manager I immediately accepted the offer. I wanted to continue learning about USGS fisheries programs and helping to support cutting-edge science across the Nation. And I thought that working on the leadership team would give me a new perspective on science policy and program development, forcing me to use the other side of my brain and make a difference in a different way. Most importantly, I wanted to help lead the program in new directions in a future with increasing challenges on our fisheries resources.

Outlet: What was the most challenging aspect of the position?
CM: It was an incredibly steep learning curve. Within a couple weeks, I went from working as a fisheries research ecologist in the north woods of Montana to being in charge of a multi-million-dollar fisheries program across the United States. I had to quickly learn about priority research programs and the process of supporting these activities across all USGS' ecosystem science centers and field stations. The budget issues were perhaps the most challenging, though. When I arrived, the Fisheries Program received a $1 million -dollar reduction, so my first task was to cut the programs that I intended to maintain and grow. That was the most challenging aspect of the position, and perhaps the most challenging of my entire career.

Outlet: What did you learn from the appointment and what were some of the most

Clint Muhlfeld, Ph.D.
USGS Research Ecologist,
Flathead Lake Biological Station, University of Montana
Associate Professor.

"I AM PROUD AND HONORED THAT WALLY'S LEGACY WILL LIVE ON BY PROVIDING EDUCATIONAL OPPORTUNITIES FOR FISHERIES STUDENTS IN MONTANA FOR YEARS TO COME."

"EVERY DAY I GO TO WORK I AM ENAMORED WITH THE BEAUTY OF MONTANA'S STREAMS, RIVERS, LAKES AND NATIVE FISH, AND THE AMAZING PEOPLE WORKING TO PROTECT AND CONSERVE THESE RESOURCES."

Fish Talk featuring Clint Muhlfeld continued

valuable lessons that you will use in the future?
CM: I really enjoyed learning about the cutting-edge science that USGS fisheries scientists and our partners are conducting across the Nation – from the east coast, to the Great Lakes, to the west coast and Alaska. However, the most valuable lessons that I experienced were how to be an effective administrator, decision-maker, and contributing member of a leadership team – all roles that are quite different than my typical role as a scientist and researcher. Managing a national program and charting a new course for the future was an incredibly valuable and rewarding experience. I also gained a deep appreciation for all the amazing folks in DC who are fighting the good fight, working tirelessly to support research, management and policy for our nation's fish and wildlife resources.

Outlet: What was your largest accomplishment from your tenure as acting manager of the USGS Fisheries Program?
CM: My biggest accomplishment was developing and implementing the USGS Ecological Drought Research and Monitoring Program across the US. This new integrated and coordinated research program aims to better understand climate change and drought impacts on entire aquatic ecosystems – from headwater streams to large rivers and lakes – and provide science and tools for decision-makers to take action in the coming decades. In 2018, we deployed sensor networks and collected biological information in several basins across the country to assess how drought influences streamflow and temperature and how this variation influences aquatic species at multiple scales, from genes, to individuals, to populations, and ultimately community dynamics.

Outlet: You have had an outstanding career including a PhD from MSU studying the impacts of hybridization on native fish, working for MFWP and USGS, numerous peer reviewed journal articles including Science magazine in 2018, and recently a Fulbright Fellowship that took you to Norway. What keeps you inspired and achieving in the future?
CM: I love being a fisheries scientist working out of Glacier National Park – it's my dream job. Every day I go to work I am enamored with the beauty of Montana's streams, rivers, lakes and native fish, and the amazing people working to protect and conserve these resources. My career goal has always been to do the best science possible to inform conservation and management, and, ultimately, to make the biggest impact possible. I don't think I've achieved that goal yet – there is a lot of work left to be done to build stronger, sustainable fisheries for future generations :)

What's up with WOTUS by Leanne Roulson

A wetland from the Lee Metcalf wilderness area that would lose federal protection under the proposed change.

On December 11th, the US Environmental Protection Agency (EPA) and the US Army Corps of Engineers (USACE) released a proposed rule that that regulates Waters of the US (WOTUS) to redefine the scope of Clean Water Act protections for certain streams and wetlands. This would replace the 2015 Clean Water Rule and seeks to remove protections for headwater and seasonally-flowing waterways. In Montana, where the west half holds the source of some of the US's major rivers like the Missouri and the Columbia; and the east half has streams that dry out before the fourth of July-that would leave a lot of us hanging.

The twitter version of the 253 pages of the proposed rule is that many headwater streams, seasonally-flowing streams, and isolated ponds or wetlands would no longer be subject to the Clean Water Act. The changes in what is or is not jurisdictional (e.g. legally recognized as a Water of the US) would reduce protections from actions such as discharge into or placement

Whats up with WOTUS continued

of fill or bank stabilization on these waters. An important "so what" aspect is that the new rule dismisses the importance of these waters for maintaining the integrity of downstream waters. We all know that if you make changes to a watershed in one area, that often affects areas up and downstream. This rule dismisses that premise and ignores the scientific basis for the protections put in place under the 2015 rule.

AFS convened a group of fisheries experts earlier this year to develop a manuscript describing the scientific evidence for the importance of headwater streams and the potential effects of adoption of this proposed rule on fish and fisheries. This scientific evidence will be published in *Fisheries* and submitted to the EPA as part of AFS' comments to the new rule.

AFS joined the Consortium of Aquatic Science Societies (CASS) in a statement urging the agencies to consider the far-reaching implications of a narrower rule. The CASS statement notes, "More than a half century of scientific research has unequivocally demonstrated that the physical, chemical, and biological integrity of "traditionally navigable" waters fundamentally depend on ephemeral, intermittent, and perennial headwater streams, as well as the myriad associated lakes, wetlands, and off-channel habitats."

Scientists and managers who deal with water quality, fisheries, wetlands, and impacts to waterways have been awaiting the rule. Should it become final, a fisheries biologist in Montana and other places in the west could see the following changes:

·Rivers and streams that contribute perennial or intermittent flow to downstream traditional navigable waters in a typical year are jurisdictional under the proposal; no ephemeral features are considered jurisdictional under the proposal.

•Isolated lakes and ponds were considered adjacent waters together with isolated wetlands under the expanded definition of "neighboring" in the 2015 Rule. Under this proposed rule, fewer lakes and ponds may be jurisdictional than under the 2015 Rule

•Under the agencies' new proposal wetlands must either abut jurisdictional waters or have a direct hydrological surface connection to jurisdictional waters in a typical year to be jurisdictional themselves; wetlands physically separated from jurisdictional waters by a berm, dike, or other barrier are not adjacent if they lack a direct hydrologic surface connection to a jurisdictional water in a typical year (EPA Fact Sheet).

Most fisheries biologists recognize the value of tributary habitat and associated wetland habitats to fish and wildlife, and the origins and maintenance of almost 30 years of "no net loss" of wetlands policy in the US are firmly based on this valuation. In addition to the changes to stream protection, the proposed rule would make it much easier for wetlands to be lost without requiring mitigation for that loss. This is a prime example of how policy can and will affect your ability to manage fisheries effectively. Even with Montana's Steam Permit system (including the 310 and SPA 124 permits and others), this new rule would potentially reduce the regulation of discharge and fill into streams and wetland areas. Waters in states that do not have similar stream protection laws would be at even higher risk. The science is being dismissed. If you would like to let the decision makers know that, as a scientist, you disagree with the proposed rule, you can submit a comment. Some of the most chilling aspects of this proposed rule are the types of comments the agencies state that they are seeking. Some of the suggested comment topics include:

•Should tributaries be limited to perennial flowing waters only (exclude intermittent streams)?

•Should tributaries be defined by flow level- with a suggested average annual flow of 5 cfs or more?

•Should aerial photos be used to determine whether a stream is perennial?

•Does a break in flow in a channel make a stream not a tributary? (think about the Colorado River on this one).

"IN ADDITION TO THE CHANGES TO STREAM PROTECTION, THE PROPOSED RULE WOULD MAKE IT MUCH EASIER FOR WETLANDS TO BE LOST WITHOUT REQUIRING MITIGATION FOR THAT LOSS. THIS IS A PRIME EXAMPLE OF HOW POLICY CAN AND WILL AFFECT YOUR ABILITY TO MANAGE FISHERIES EFFECTIVELY."

If you wish to comment:

•The agencies will take comment on the proposal for 60 days after publication in the Federal Register. The agencies will also hold an informational webcast on January 10, 2019, and will host a public listening session on the proposed rule in Kansas City, KS, on January 23, 2019. Additional information on both engagements is available at https://www.epa.gov/wotus-rule

•Comments on the proposal should be identified by Docket ID No. EPA-HQ-OW-2018-0149 and may be submitted online. Go to https://www.regulations.gov and follow the online instructions for submitting comments to Docket ID No. EPA-HQ-OW-2018-0149

Montana Fishes Have New Scientific Names by Niall Clancy and Ryan Kovach

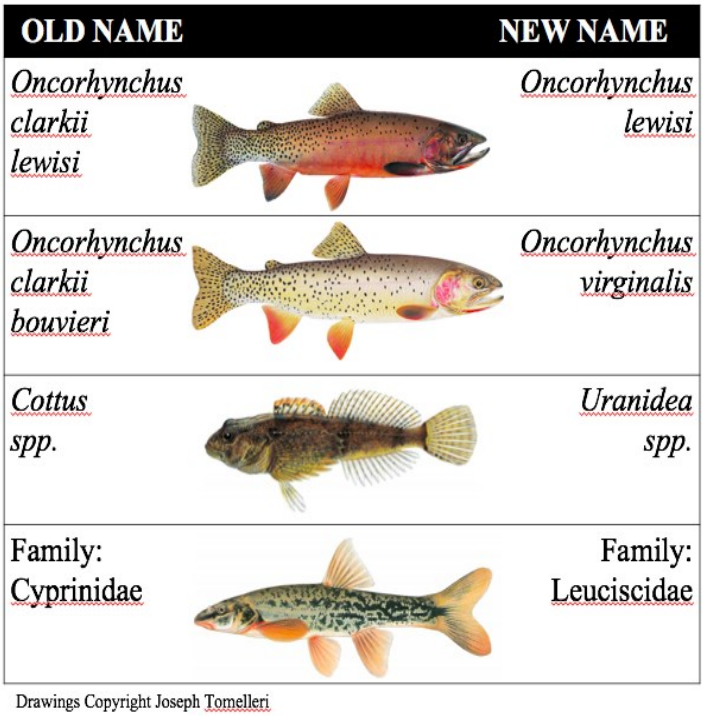
"TIME WILL TELL WHAT WE ARE TO CALL THIS NATIVE FISH - ACCORDING TO TWO CONTRIBUTORS TO THE SYMPOSIUM, THE FINAL DETERMINATION FOR CUTTHROAT TROUT COULD TAKE ANYWHERE FROM 3-YEARS TO A DECADE"

With ever-increasing genetic and taxonomic resolution comes the continuous need to reevaluate evolutionary trees and reorganize species into new families, genera, and species. In a recent paper in the journal *Zootaxa,* researchers from Auburn University and the University of Illinois found that the minnow-family, Cyprinidae, actually constitutes two separate lineages, each deserving of a family-level designation (Tan & Ambruster 2018). While old-world minnows such as Common Carp (*Cyprinus carpio*) are still part of Cyprinidae, new-world minnows, including those in Montana, are now considered a standalone family coined Leuciscidae.

Minnows aren't the only group getting rearranged. North American sculpins of the genus *Cottus* have been split into two different genera: *Uranidea* and *Cottopsis* (Smith & Busby 2014). All of Montana's former *Cottus spp.* now fall under *Uranidea.* The species epithet for Columbia Slimy Sculpin was also changed from *cognatus* to *cognata* (Adams, Schmetterling & Neely 2015). More research concerning Montana sculpins is ongoing and future revisions are likely.

Perhaps most importantly to anglers, Bob Behnke's classic Cutthroat Trout (*Oncorhynchus clarkii*) phylogeny is being reevaluated. While the breakdowns of his four major lineages, Lahontan, Yellowstone, Westslope, and Coastal, remain largely unchanged, a new symposium proceeding from AFS recommends that each of these four groups should be considered separate species (Trotter et al. 2018). Within the species, the contributors to the book suggest that 25 distinct evolutionary units are distinguishable—up from the 14 proposed by Behnke (2010). Whether these units should be classified as separate subspecies, independent evolutionary significant units, or otherwise, is unclear, and an area of future research need.

Should each of the four major lineages be classified as full species, Montana would still contain two types of Cutthroat Trout: Westslope Cuttroat Trout (*Oncorhynchus lewisi*) and the Yellowstone Cutthroat Trout (*Oncorhynchus virginalis*). However, the latter name remains mired in controversy even within the book itself, as various authors also proposed renaming this lineage the Black-Spotted Cutthroat Trout or the Rocky Mountain Cutthroat Trout. Time will tell what we are to call this native fish - according to two contributors to the symposium, the final determination for Cutthroat Trout could take anywhere from 3-years to a decade (Brett Roper and Dennis Shiozawa, *personal communication*).



Drawings Copyright Joseph Tomelleri

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High Resolution Hydro-Acoustic Mapping of the Missouri River Provides a Glimpse of How River Stage Influences 3D Current Velocities and Simulated Larval Drift Paths

By Brian Marotz and Mark Lorang

We surveyed 3D water velocities, current directions and bathymetry in the Missouri River downstream of Fort Peck Dam by drifting downstream, spanning the river in eight boats equipped with Acoustic Doppler Profilers (ADP) and compass-oriented GPS. In 2014, we mapped a 4 km demonstration reach downstream of the Milk River confluence at a discharge of 170 cms (6000 cfs). In 2015 we mapped the same site for 50 km at a discharge of 127 cms (4,500 cfs) and in June 2016, we mapped 338 km from the Milk River confluence to the headwaters of Sakakawea Reservoir, North Dakota at a discharge of 247 cms (9,000 cfs). Flow surveys allowed simulating particle dispersal to mimic drift dynamics of endangered Pallid Sturgeon larvae. Unlike passively drifting particles, free-embryos swim in short random bursts, so they can resuspend in low-velocity habitat and continue drifting downstream. However, water velocities throughout most of the river exceed the motility of embryos and larvae.

The two short reference reaches provide only a glimpse of stage effects on drift paths. At the lowest discharges (127 and 170 cms) drift paths converged within the confined channel so very low dispersion occurred (Figure 1). At the highest discharge (255 cms) drift paths rapidly dispersed from the thalweg into low-velocity habitats (Figure 2).

Repeat surveys of the study reach at higher and lower discharges would allow precise simulations of how stage change affects larval dispersal rates, and identify the range of dam discharges that optimizes dispersion into rearing habitats to facilitate pallid sturgeon recruitment. Our research supports controlling dam discharges during the larval drift phase, which is important for larval survival and recovery.

"FLOW SURVEYS ALLOWED SIMULATING PARTICLE DISPERSAL TO MIMIC DRIFT DYNAMICS OF ENDANGERED PALLID STURGEON LARVAE."

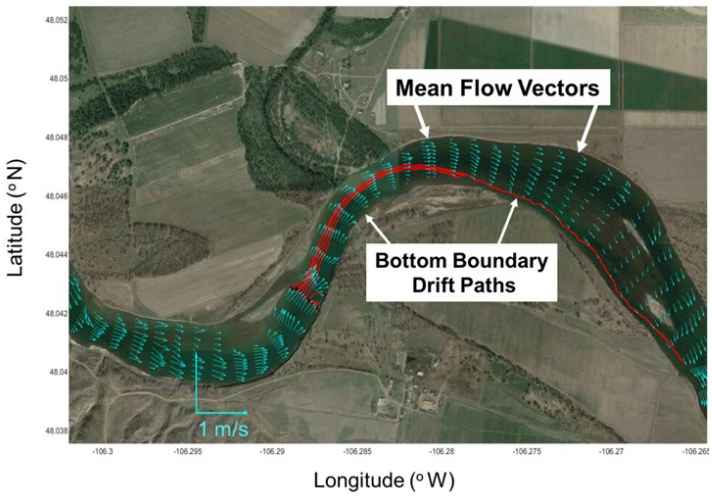

Figure 1. Mean water column flow vectors (light blue arrows) and convergent particle drift paths (red lines) at a discharge of 127 cms (4,500 cfs). The light blue arrow length indicates 1 m/s velocity.

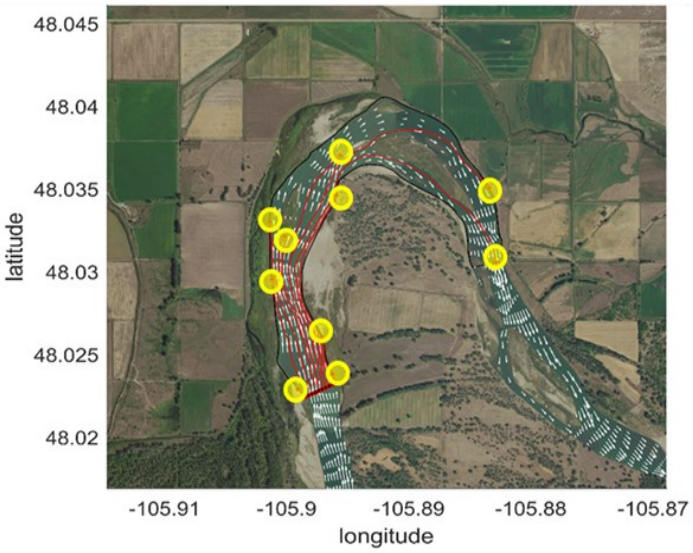

Figure 2. Mean water column flow vectors (white arrows) measured at a discharge of 127 cms (9,000 cfs) and particle drift paths (red lines). Yellow circles indicate drift paths that disperse from the thalweg and stall in low-velocity habitats of eddies.

https://units.fisheries.org/montana

MONTANA CHAPTER OF THE AMERICAN FISHERIES SOCIETY

The Montana Chapter of the American Fisheries Society was chartered in 1967. Among its objectives are conservation, development, and wise utilization of the fisheries; promotion of the educational, scientific, and technological development and advancement of all branches of fisheries science and practice; and exchange and dissemination of knowledge about fish, fisheries, and related subjects.

We are looking for MTAFS chapter members to organize a summer 2019 workshop. This is an important and unique aspect of the Montana Chapter, and we want to continue the tradition. Please contact President Brian Ertel with questions and inquiries.

Your Chapter's ExComm and Committee Chairs

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