



Fish Health Section



FHS NEWS – May 2024

Fish Health Section website: <https://units.fisheries.org/fhs/>

Fish Health Section Facebook Site: <https://facebook.com/FishHealthSectionAFS>

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Would you like your recent open-access publication featured on our Twitter feed? We would like to share one publication per week. Just fill out the form at: <https://forms.gle/NWVXEFOGcdYME6gh8>.

Archive Historic Fish Health Documents and Items

The Archive Committee is looking for historical documents and items that are important to the history of the Fish Health Section. This is a chance to preserve hard copies of past meetings, newsletters, publications, awards, books, and photos. There has also been a request for Business Meeting Minutes from past FHS Annual Meeting (prior to 2016), so we are actively looking for those. We will have to be more selective in accepting old equipment and preserved specimens, as space will not be infinite. All items will be sent to the DC Booth Historic National Fish Hatchery where the National Fish and Aquatic Conservation Archives are located. If anyone has an interest in donating items, please contact a member of the Archive Committee:

Matt Stinson, Chair	mstinson@nwifc.org
Susan Marcquenski	smarcquenski@yahoo.com
Beth Peterman	aep9@msstate.edu

A golden example of what could be donated, please see the selected works by Edwin Linton, available online at [Internet Archive](#).

- Notes on Entozoa of Marine Fishes of New England, with Descriptions of Several New Species. Part II. 1890.
- On Two Species of Larval Dibothria from the Yellowstone National Park. 1889.
- A Contribution to the Life History of Dibothrium Cordyceps leidy, a Parasite Infesting the Trout of Yellowstone Lake. 1889.
- Parasites of Fishes at Woods Hole in 1898. 1900.
- Parasites of Fishes of the Woods Hole Region. 1901.
- Information Concerning Parasitic Worms in Fish. 1916.

MEETINGS, WORKSHOPS & COURSES

American Fisheries Society, Fish Health Section Meeting and 63rd Western Fish Disease Workshop



July 30th – August 1st, 2024

The 2024 American Fisheries Society, Fish Health Section meeting and 63rd Western Fish Disease Workshop will be held at the Riverside Hotel in Boise, Idaho from Tuesday July 30 – August 1, 2024. A full day continuing education session will be held on Tuesday July 30th and will be followed by a welcoming social, with light appetizers, cash bar and a casual session of interesting case studies. The general session will start the morning of Wednesday July 31st and will continue through the afternoon of Thursday August 1. A poster session on Wednesday afternoon will be followed by the meeting banquet.

CONTINUING EDUCATION SUMMARY:

- The continuing education program will cover “Disease Prevention - Finfish Brood and Production Strategies”. This educational session is intended to provide a practical applied approach for disease prevention with the focus being biosecurity, risk management, vertical pathogen transmission, feeding and gut health, general brood management strategies, genetic selection, vaccination strategies, research and practical case studies.
- Total RACE credits for this session are currently in review and will be posted as final approval is received.

MEETING VENUE AND ROOM RESERVATIONS:

- Venue: Riverside Hotel in Boise, Idaho (<https://www.riversideboise.com/>)
- Room reservations: [63rd Western Fish Disease Workshop](#)

REGISTRATION AND ABSTRACT SUBMISSION:

- Continuing education registration: \$75 (U.S. dollars)
- FHS/WFDW registration: \$350 (U.S. dollars)
- Registration and abstract submission: <https://event.fourwaves.com/wfdw63/pages>

CALL FOR ABSTRACTS

We invite you to submit abstracts for the AFS Fish Health Section Annual Meeting and 63rd Western Fish Disease Workshop in Boise, ID. This meeting is scheduled for July 30th through August 1st and will provide an opportunity to share information on emerging diseases, vaccine development, treatments, and research on aquatic animal health. Presentations from academia, industry, government, non-profits, and extension are all welcome.

The deadline for abstracts is July 5th. Abstract instructions and submission guidelines can be found here: <https://event.fourwaves.com/wfdw63/pages>

If you have any questions, please email fishhealthlab@idfg.idaho.gov

JOBS/GRADUATE ASSISTANTSHIPS

MS Assistantship
Utah State University
Logan, UT
Closes June 3, 2024

See attached .pdfs for Green Sucker thiamine deficiency MS and the related study proposal.

PhD Position in Multi-species Landscape Epigenomics
University of Alberta
See attached .pdf for information

Clinical Instructor
Global Center for Aquatic Health and Food Security
Gulfport, MS
Link: <https://explore.msujobs.msstate.edu/en-us/job/507555/clinical-instructor-i-ii-or-iii>

The College of Veterinary Medicine at Mississippi State University is seeking to hire a Clinical Instructor in marine animal health. The position will be supported by and will serve the Global Center for Aquatic Health and Food Security. The position will be based in or near Gulfport, Mississippi with periodic trips to Starkville, Mississippi. Reappointment will occur on an annual basis and will be dependent on funding.

Assistant/Associate/Professor in International Aquatics and One Health
Mississippi State University
Starkville, MS
Links: Tenure-track: <https://explore.msujobs.msstate.edu/en-us/job/507566/assistantassociateprofessor>, Non-tenure-track: <https://explore.msujobs.msstate.edu/en-us/job/507567/assistantassociateclinical-professor>

The College of Veterinary Medicine at Mississippi State University is seeking to hire an Assistant/ Associate/ Full Professor in International Aquatics and One Health. The position will also serve in the Global Center for Aquatic Health and Food Security.

Assistant Research Professor in Aquatic Health
Mississippi State University
Gulfport, MS
Link: <https://explore.msujobs.msstate.edu/en-us/job/506659/assistant-research-professor>

The College of Veterinary Medicine at Mississippi State University is seeking to hire an Assistant Research Professor in Aquatic Health. The position will be supported by the Mississippi State University Global Center for Aquatic Health and Food Security and will be based in or near Gulfport, Mississippi with periodic trips to Starkville, Mississippi.

Zebrafish Related Job Announcements

<https://wiki.zfin.org/display/jobs/Zebrafish-Related+Job+Announcements>

RESOURCES/NEWS

Aquatic Animal Drug Approval Partnership (AADAP) Updates are available by request:

The AADAP Updates feature news on aquaculture drugs currently in the U.S. Food and Drug Administration (FDA) approval process, AADAP programmatic updates, and aquaculture drug use guidance information. If you would like to sign up to receive the AADAP Update, please email to be paige_maskill@fws.gov added to our email listserv.

May 2024 AADAP Update

Annual Aquaculture Drug Approval Coordination Workshop Presentation Opportunity

The 30th Annual Aquaculture Drug Approval Coordination Workshop will be held in Bozeman, MT from July 22nd- 25th, 2024. We are looking for folks to present on any of the following (or related) topics: aquaculture drugs research (antimicrobials, parasiticides, anesthetics, spawning aids, and marking agents), disease models, and new, up-and-coming drugs. If you're interested in presenting, please contact [Shane Ramee](#) with the **topic you would like to present and the length of your presentation by May 20th, 2024.**

AADAP Workshop Registration information:

Registration for the AADAP Workshop is now open. Please visit our [registration page](#) to get signed up. The deadline for registration is **July 15th, 2024**. If you experience any issues while registering, please contact [Paige Maskill](#). Unfortunately, due to staff shortages, we will not be able to provide a virtual option this year.

For more information including a tentative Workshop schedule, lodging, and deadlines for potential Workshop presenters please visit our [Workshop website](#).

AADAP Workshop Lodging information:

A small block of rooms has been reserved at the Best Western GranTree Inn (Workshop location) at the rate of \$279 per night (plus tax). **Reservations must be made by June 24th, 2024** to secure this discounted rate. Contact information for the Workshop hotel is listed below. Make your reservations early!

Best Western GranTree Inn (workshop location): 1325 N. 7th Ave., Bozeman, MT 59715; (406) 587-5261. Be sure to mention the following phrase to secure the discounted rate: US Fish & Wildlife Service - AADAP Workshop.

https://www.bestwestern.com/en_US/book/hotels-in-bozeman/best-western-plus-grantree-inn/propertyCode.27064.html

Thank you! We look forward to seeing you at this year's workshop!



Tracking # _____

Proposal FY 2024

Project Title: Thiamine Levels of Bonneville Basin Green Sucker (*Pantosteus virescens*)

Project Proponent (Principal Investigator) & contact information:

Chad Teal
Assistant Unit Leader and Assistant Professor
U.S. Geological Survey Utah Cooperative Fish and Wildlife Research Unit
Watershed Sciences, Utah State University
5200 Old Main Hill- BNR 165
Logan, UT 84322
Phone: (407) 257-0127
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Project Champion (DWR Project Lead) & contact information:

Robert Shields
Research Program Manager
Utah Division of Wildlife Resources
Logan, UT 84322
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Email: rshields@utah.gov

Introduction/Need

In light of recent genetic investigations, the Weber River Green Sucker (*Pantosteus virescens*) has been taxonomically split from Bluehead Sucker (*Catostomus discotomus*). This new designation could entail Green Sucker being listed as an S1 species in Utah due to its reduced range, low population sizes, and threats to extirpation. Throughout Utah, populations of Green Sucker have undergone range-wide reductions (Budy et al. 2015), with declines in recruitment of Weber River populations being a significant concern over the last decade (Webber et al. 2012; Maloney 2017; UDNR 2020). Decimating factors that are likely limiting recruitment include: invasive species predation and competition, altered flow and thermal-regime, and limited

backwater habitat (Webber 2012; Maloney 2017). However, hatchery rearing of streamside spawned Weber Green Sucker suggests that thiamine levels might also be reducing the survival of young-of-year.

Thiamine (vitamin-B1) cannot be synthesized by fishes directly and must be absorbed from their environment or ingested through their diet. Without adequate thiamine levels in eggs, the fish larvae are not able to develop. Fry from the Weber River that were hatched and reared at UDWR's Logan Hatchery exhibited clinical signs of thiamine deficiency complex (TDC) and concomitant mortality. Due to the early mortality observed in developing fry and the TDC clinical signs being ameliorated by a thiamine bath (R. Shields, UDWR, personal communication), it is possible that the wild, maternal broodstock were thiamine deficient (Harder et al. 2018). This observation led to the prioritization of investigating potential thiamine deficiencies in Weber River Green Sucker for Utah's Northern Region by UDWR for FY 22 (UDNR 2020).

Thiamine deficiencies in fishes can result from either not enough available thiamine in the environment and/or forage base (Balk et al. 2016; Ejsmond et al. 2019), or from thiamine being destroyed by eating a diet high in the enzyme thiaminase (Harder et al. 2018; Honeyfield et al. 2005). In aquatic ecosystems, thiamine is produced by phytoplankton, bacteria, and fungi, and thiamine enters the food web through these lower trophic level sources (Webb et al. 2007; Sañudo-Wilhelmy et al. 2014; Harder et al. 2018). Eggs and yolk sac fry receive virtually all their thiamine via maternal transfer, and it has been demonstrated that supplemental thiamine treatments for eggs can prevent mortality associated with thiamine deficiency in newly hatched fry (Futia and Rinchar 2017; Reed et al. 2023). Underlying mechanisms causing low thiamine levels in the environment and/or forage base are understudied and poorly understood (Harder et al. 2018). However, changes in the algal and bacterial communities of a system could alter the amount of available thiamine in the form of decreased thiamine production or increases of thiaminase (Malyarevskaya 1983; Wistbacka et al. 2002). In addition, exposure to contaminants, such as DDT, can increase thiaminase production and reduce thiamine levels in multiple taxa (Birger and Malyarevskaya 1977; Wistbacka et al. 2002). Conversely, mechanisms for how high levels of thiaminase enter the forage base for fishes is better understood. The most prevalent examples feature the overconsumption by piscivorous species of thiaminase rich forage fishes, such as Alewife (*Alosa pseudoharengus*) introduced into the Great lakes (Tillit et al. 2005) or highly prevalent Sprat (*Sprattus sprattus*) in the Baltic Sea (Karlsson et al. 1999).

Detecting thiamine deficiencies in Bonneville Basin Green Sucker populations, especially those in the Weber River, could help identify a significant limiting factor for their recruitment. If wild stocks of Green Suckers are found to be thiamine deficient, then this could inform management decisions and could direct efforts to the

reestablishment of a high thiamine and/or low thiaminase forage base for this species. Comparisons among thiamine levels in Green Sucker populations will allow for the detection of populations with healthy thiamine levels. This will allow managers to compare river drainage attributes, effluent impacts, invertebrate communities, and other parameters that are known covariates for thiamine level fluctuations in a system. Through these comparisons, targeted restoration efforts mitigating against factors that are likely limiting thiamine availability can be conducted to help bolster struggling Green Sucker populations. In addition, this research will help optimize UT hatchery methods currently used in Green Sucker production by providing optimum thiamine treatment dosages for thiamine deficient eggs.

Objectives and Goals

Investigations into the thiamine levels of the Weber River Green Sucker populations should be conducted to:

- 1) Compare lower (Section 2) Weber River Green Sucker thiamine with other populations in the Bonneville Basin (upper Weber River and Raft River).
- 2) Develop an LC50 curve to determine what thiamine levels are detrimental to the development of young Green Sucker
- 3) Investigate if thiamine supplementation improves early rearing mortality of hatched Green Sucker fry
- 4) Compare thiaminase concentrations in periphyton from the Green Sucker population sample locations

Methods/Approach

- 1) Egg Thiamine Concentration Comparisons, Summer 2024 – Summer 2025

During the spawning season of 2024, UDWR biologists, along with a Utah State University M.S. student, will conduct streamside spawns and collect green eggs from wild Green Sucker from multiple sites, including but not limited to: the lower Weber River – Section 2, upper Weber River, and Raft River. Raft River was chosen due to its relatively stable Green Sucker population and evidence of recruitment. Eggs will be flash frozen on dry ice for preservation and stored at -80° C until shipment to the USGS Columbia Environmental Research Center (CERC) for thiamine analysis via HPLC following protocols described in Futia and Rinchard (2019) and Reed et al. (2023). Habitat data will be collected at each location of Green Sucker capture to analyze in linear mixed-effects models as potential covariates predicting fry mortality in objective 2. Data will be compiled and analyzed with linear mixed-effects models for comparisons of thiamine level differences within each population and among the different populations.

- 2) Thiamine LC50 Curve, Summer 2024 – Summer 2026

A portion of eggs collected from each female during methods described for objective 1 will be fertilized, hatched, and separately reared to 60 days post hatch at UDWR's Aquatic Animal Health and Research Center by the USU graduate student. Data on egg size, fry condition – length and weight, TDC symptoms, and mortality will be collected on fry from individual females. Variability on these metrics will be used to develop LC50 (e.g., the threshold for egg thiamine concentration associated with 50% mortality of fry) for thiamine egg concentrations via three parameter logistic regression (Futia and Rinchard, 2019) using R package 'aomisc'.

$$TDC\ comorbidities = \frac{\alpha}{1 + (egg\ thiamine\ conc / \chi_0)^b}$$

Where α = maximum asymptote, b = inflection point, and χ_0 = slope.

An LC50 curve for thiamine will be developed and a minimum threshold will be identified for healthy Green Sucker development.

3) Thiamine Supplementation and Fry Survival, Summer 2024 – Summer 2026

Half of the eggs from each female collected for Objective 2 will be treated with thiamine baths of varying concentrations and durations post-fertilization and reared separately from the non-treated eggs. Hatched fry mortality will be collected and compared between the treated and non-treated groups using a combination of linear mixed-effects models and three-parameter logistic regression models. This analysis will allow for the identification of effective thiamine bath treatment concentrations and/or durations.

4) Periphyton Thiaminase Concentration Comparisons, Summer 2024 – Summer 2026

Periphyton samples will be collected from the multiple sites listed in objective 1. In collaboration with Freya Rowland at CERC, thiaminase analysis protocols will be developed and utilized to detect differences in thiaminase levels that might correlate with thiamine egg concentrations observed among the various Green Sucker populations sampled in objective 1. This data will be incorporated into the above mentioned linear mixed-effects models to assess its predictive significance for fry mortality studies conducted in objective 2.

Study Area

Northern Region- the lower Weber River, upper Weber River, and Raft River.

Expected Results and Benefits

1) Problem identification: Baseline data on thiamine egg concentrations will provide critical information on the scope of TDC in Bonneville Green Suckers. If thiamine is deficient, these data can inform an egg surveillance monitoring program for TDC for these populations.

2) LC50 concentrations for egg thiamine have been developed for other species, particularly Salmonids, and are species-specific. This curve will be particularly useful to guide hatchery efforts on thiamine treatment and related interventions.

3) The supplemental thiamine treatment trials will help in determining the effectiveness of thiamine treatments at ameliorating TDC in hatchery-reared cohorts.

4) The previously observed symptoms of disequilibrium (corkscrew swimming patterns) observed in fry and the fact that fry quickly recovered when placed in a thiamine bath is highly diagnostic of TDC. Our limited investigation in the role of thiaminase production by periphyton at the base of the food web is highly targeted but a reasonable first step in identifying the putative causes of TDC observed in the Weber River Green Sucker populations.

5) Variances in thiamine deficiencies in Weber River and Raft River Green Sucker and/or thiaminase enriched Weber River and Raft River periphyton, can inform managers in what river attributes might be mechanistically driving shifts in thiamine availability. This information can help managers create targeted restoration goals to maximize thiamine availability for Green Sucker.

Project Schedule

This research will be conducted over a 2.5-year duration, from summer 2024 – winter 2026.

Budget/Compliance Documentation

Expenses	Year 1	Year 2	Year 3	Total
M.S. student salary, 2.5 yrs	\$25,012	\$26,263	\$13,788	\$65,063
M.S. student fringe benefits, 2.5 yrs	\$200	\$210	\$111	\$521
M.S. student tuition, 2.5 yrs	\$12,409	\$12,964	\$6,747	\$32,120
M.S. student health insurance 2.5 years	\$1,918	\$2,071	\$1,119	\$5,108
Thiamine egg analysis (\$60/sample/50 samples per site/4 sites)	\$8,000	\$4,000	\$0	\$12,000

Periphyton thiaminase analysis (\$60/sample/3 samples per site/4 sites)	\$480	\$240	\$0	\$720
Travel expenses for field work	\$80	\$50	\$0	\$130
Collection materials (dry ice, whirl paks, sample jars, etc)	\$200	\$50	\$0	\$250
Shipping for sample submission	\$100	\$50	\$0	\$150
Journal page charges	\$0	\$0	\$3,000	\$3,000
Direct Costs	\$48,399	\$45,898	\$24,765	\$119,062
Indirect Costs (10%)	\$4,840	\$4,590	\$2,477	\$11,906
Project Cost	\$53,239	\$50,488	\$27,242	\$130,968

31% Federal match in waived indirect costs and USGS PI effort of 3-month summer salary, \$19,562 + \$20,708 = \$40,270

Deliverables

The outcome of this project will be a submitted scientific journal article that addresses whether: 1) Bonneville Basin Green Sucker exhibit differing egg thiamine levels, 2) their LC50 for thiamine, 3) thiamine treatment effectiveness and 4) how their thiamine levels correlate to environmental thiaminase present in periphyton samples. The same information will also be submitted as a final report to UDWR and the Research Council by the end of December 2026. Data will be made available to UDWR and ultimately the public via an agreed upon outlet.

DWR Personnel Requirements and Funding

UDWR biologists involved in this project include:

- Northern Region - Chanté Lundskog (FTE Bio I)

Collaborators/Researchers on internal DWR projects

Under advising by Utah CFWRU Assistant Unit Leader, Chad Teal, an M.S. student will assist with sample collections, fry rearing, and conduct data analysis and reporting. Freya Rowland and David Walters with CERC will conduct the thiamine and thiaminase analysis and assist with data analysis and writing. Additional advising and consulting will be provided by Aimee Reed with Oregon Department of Fish and Wildlife.

Other

Egg and periphyton collections will be done in collaboration with UDWR biologists, so new collection permits are not needed.

References

- Balk, L., Hägerroth, P.Å., Gustavsson, H., Sigg, L., Åkerman, G., Ruiz Muñoz, Y., Honeyfield, D.C., Tjärnlund, U., Oliveira, K., Ström, K. and S.D. McCormick. 2016. Widespread Episodic Thiamine Deficiency in Northern Hemisphere Wildlife. *Scientific Reports* 6 p.38821.
- Birger, T.I. and A.Y. Malyarevskaya. 1977. Some Biochemical Mechanisms of Resistance to Toxicants in Aquatic Invertebrates. *Gidrobiologicheskii Zhurnal/Hydrobiological Journal* 13: 69–73 (in Russian).
- Budy, P., M. M. Conner, N. L. Salant, and W. W. Macfarlane. 2015. An occupancy based quantification of the highly imperiled status of desert fishes of the southwestern United States. *Conservation Biology* 29:1142-1152.
- Ejsmond, M.J., Blackburn, N., Fridolfsson, E., Haecky, P., Andersson, A., Casini, M., Belgrano, A. and S. Hylander. 2019. Modeling Vitamin B1 Transfer to Consumers in the Aquatic Food Web. *Scientific Reports* 9 p.10045.
- Futia, M.H., Hallenbeck, S., Noyes, A.D., Honeyfield, D.C., Eckerlin, G.E. and J. Rinchard. 2017. Thiamine Deficiency and the Effectiveness of Thiamine Treatments Through Broodstock Injections and Egg Immersion on Lake Ontario Steelhead Trout. *Journal of Great Lakes Research*, 43(2), pp.352-358.
- Futia, M.H. and J. Rinchard. 2019. Evaluation of Adult and Offspring Thiamine Deficiency in Salmonine Species from Lake Ontario. *Journal of Great Lakes Research* 45: 811-820.
- Harder, A.M., Ardren, W.R., Evans, A.N., Futia, M.H., Kraft, C.E., Marsden, J.E., Richter, C.A., Rinchard, J., Tillitt, D.E., and M.R. Christie. 2018. Thiamine Deficiency in Fishes: Causes, Consequences, and Potential Solutions. *Reviews in Fish Biology and Fisheries* 28:865-886.
- Honeyfield, D.C., Hinterkopf, J.P., Fitzsimons, J.D., Tillitt, D.E., Zajicek, J.L. and S.B. Brown. 2005. Development of Thiamine Deficiencies and Early Mortality Syndrome in Lake Trout by Feeding Experimental and Feral Fish Diets Containing Thiaminase. *Journal of Aquatic Animal Health* 17:4-12.
- Karlsson, L., Ikonen, E., Mitans, A. and S. Hansson. 1999. The Diet of Salmon (*Salmo salar*) in the Baltic Sea and Connections with the M74 Syndrome. *Ambio*, pp.37-42.

- Maloney, B.C. 2017. Evaluating Habitat-based Niche Requirements and Potential Recruitment Bottlenecks for Imperiled Bluehead Sucker (*Catostomus discobolus*). Master's Thesis. Utah State University, Logan, Utah.
- Malyarevskaya, A. Ya. (1983). Influence of Anthropogenic Eutrophication: Effects on Fish in the Form of Blue-Green Algae Mass Development. *Archiv fur Hydrobiologie* 97:417–424.
- Reed, A.N., Rowland, F.R., Krajcik, J.A., and D.E. Tillitt. 2023. Thiamine Supplementation Improves Survival and Body Condition of Hatchery-Reared Steelhead (*Oncorhynchus mykiss*) in Oregon. *Veterinary Sciences* 10: 156.
- Sañudo-Wilhelmy, S.A., Gomez-Consarnau, L., Suffridge, C. and E.A. Webb. 2014. The Role of B Vitamins in Marine Biogeochemistry. *Annual Review of Marine Science* 6:339-367.
- Smith, B. 2022. Genetic and Morphometric Analysis of Catostomid Fishes Show Complex Patterns of Divergence Across Watersheds. Master's Thesis. Idaho State University, Pocatello, Idaho.
- Tillitt, D.E., Zajicek, J.L., Brown, S.B., Brown, L.R., Fitzsimons, J.D., Honeyfield, D.C., Holey, M.E. and G.M. Wright. 2005. Thiamine and Thiaminase Status in Forage Fish of Salmonines from Lake Michigan. *Journal of Aquatic Animal Health* 17:13-25.
- Utah Department of Natural Resources, Division of Wildlife Resources, Native Aquatic Species. 2020 Annual Monitoring and Survey Report for Three Fish Species Bluehead Sucker *Catostomus discobolus*, Flannelmouth Sucker *C. latipinnis*, Roundtail Chub *Gila robusta*
- Webb, M.E., Marquet, A., Mendel, R.R., Rébeillé, F. and A.G. Smith. 2007. Elucidating Biosynthetic Pathways for Vitamins and Cofactors. *Natural Product Reports* 24: 988-1008.
- Webber, P.A., Thompson, P.D., and P. Budy. 2012. Status and Structure of Two Populations of the Bluehead Sucker (*Catostomus discobolus*) in the Weber River, Utah. *The Southwestern Naturalist* 57:267-276.
- Wistbacka, S., Heinonen, A. and G. Bylund. 2002. Thiaminase Activity of Gastrointestinal Contents of Salmon and Herring from the Baltic Sea. *Journal of Fish Biology* 60:1031-1042.

MS Assistantship: UT Fisheries Biology and Conservation
Department of Watershed Sciences
Utah State University, Logan UT

Project Description: We are recruiting a Master of Science Student to begin in Fall 2024 to work on pressing fisheries conservation priorities within Utah. Throughout Utah, populations of Green Sucker *Pantosteus virescens* have undergone range-wide reductions, with declines in recruitment of Weber River populations being a significant concern over the last decade. Recent evidence suggests that thiamine (vitamin-B1) levels in adult Green Sucker might be reducing the survival of their young. The prospective student will be determining:



- 1) If wild Green Sucker are thiamine deficient
- 2) What thiamine treatments are most effective for hatchery practices
- 3) Potential causes and remediation for thiamine deficiencies in Green Sucker populations

Position Duties: This position requires the student to work in a variety of settings. The student will be collecting and processing field samples in multiple UT rivers, attempting various thiamine treatments in a hatchery, and conducting lab-based methods to analyze thiamine levels in eggs and tissues. The student will be using various quantitative methods for data analysis. The student will author manuscripts and present at conferences to disseminate findings. The student will develop highly applicable skills for future careers in fisheries management, aquaculture, ecology, and restoration. The student will obtain mentoring experience working with undergraduate research technicians and will work closely with the Utah Department of Wildlife Resources throughout the project. The selected student will be advised by Dr. Chad Teal (U.S. Geological Survey, Utah State University) in the Technical and Experimental Aquatics Lab. In addition to these research duties, the student will need to successfully complete the required coursework, author and defend a thesis, and graduate with their M.S. within 2.5 years of starting.

Qualifications: B.S. in fisheries, aquaculture, ecology, aquatic sciences, natural resource management or other related fields with a minimum 3.2 GPA (last 60 credits). A good work ethic is mandatory. Preference will be given to candidates that have research experience. Experience working in a variety of settings is preferred. Writing, organizational, data management skills, and quantitative skills are required, as well as the ability to maintain positive working relationships with members of the lab, department, and stakeholder groups. Only applicants that can obtain a valid U.S. driver's license by start date need apply.

Utah State University does not discriminate or tolerate discrimination, including harassment, based on race, religion, sex, national origin, age, genetic information, sexual orientation, gender identity or expression, disability, status as a protected veteran, or any other status protected by University policy, Title IX, or any other federal, state, or local law

Location: The successful applicant will be based out of the Department of Watershed Sciences at Utah State University in Logan, UT. Logan is a relatively small college town located at the base of the Bear River Range and the Cache National Forest, offering a diversity of outdoor recreation opportunities, as well as being within a short drive of Salt Lake City and its many amenities. For additional information describing the department, faculty, and programs see <http://www.qcnr.usu.edu/wats/>. Chad Teal's faculty page can be found at <https://qcnr.usu.edu/directory/wats/faculty/teal-chad>.

Support: Starting annual stipend of \$25,012; plus tuition, fees, and health insurance will be covered.

Closing date: June 3, 2024.

Start date: August 26, 2024.

Contact: Please email a letter of interest, resume or CV, a writing sample, unofficial copies of transcripts, and the names and contact information for three professional references to Dr. Chad Teal, email: chad.teal@usu.edu.



PhD position in Multi-species Landscape Epigenomics (Venney lab)

I am seeking a highly motivated student for a PhD project on multi-species landscape epigenomics. This is a funded PhD position in the Department of Biological Sciences at the University of Alberta (**minimum guaranteed salary of \$25,917/year for 5 years**). The start date is anticipated to be January or September 2025 but is negotiable. Previous experience with genomic data or bioinformatics (Linux and R) is an asset.

DNA methylation is a potential underlying mechanism for phenotypic plasticity and can respond to environmental fluctuations such as climate change. Due to the potential for epigenetic inheritance, populations living in different environments could accumulate epigenetic differences over many generations. These methylation differences could slowly lead to genetic divergence over long evolutionary periods due to the mutagenic nature of DNA methylation.

We will assess variation in DNA methylation due to climatic variation and its associations with genetic variation. We have performed ~16X coverage whole genome methylation sequencing for 80 lake whitefish (*Coregonus clupeaformis*) and 80 brook charr (*Salvelinus fontinalis*): 10 fish per species from eight sampling locations across a latitudinal climatic gradient in Hudson Bay and James Bay. We will combine these data with environmental data and ~20X whole genome sequencing data for the same fish to answer diverse questions on interactions among DNA methylation, the genome, and environmental variation in a natural system.

The successful candidate will be co-supervised by Dr. Clare Venney (<https://clarevenney.weebly.com/>) and Dr. Jean-Sébastien Moore (Université Laval, <https://jean-sebastienmoore.weebly.com/>). The successful candidate can also contribute to upcoming fieldwork in the lab as desired (e.g., potential work in and around Banff and Jasper National Park). Interested candidates should send a CV, unofficial transcripts, and one page cover letter detailing their interest in the position to **venney@ualberta.ca** on or before **July 1st, 2024**.

Please feel free to reach out with any questions at the email address listed above.

Clare Venney
Incoming Assistant Professor
Department of Biological Sciences
University of Alberta