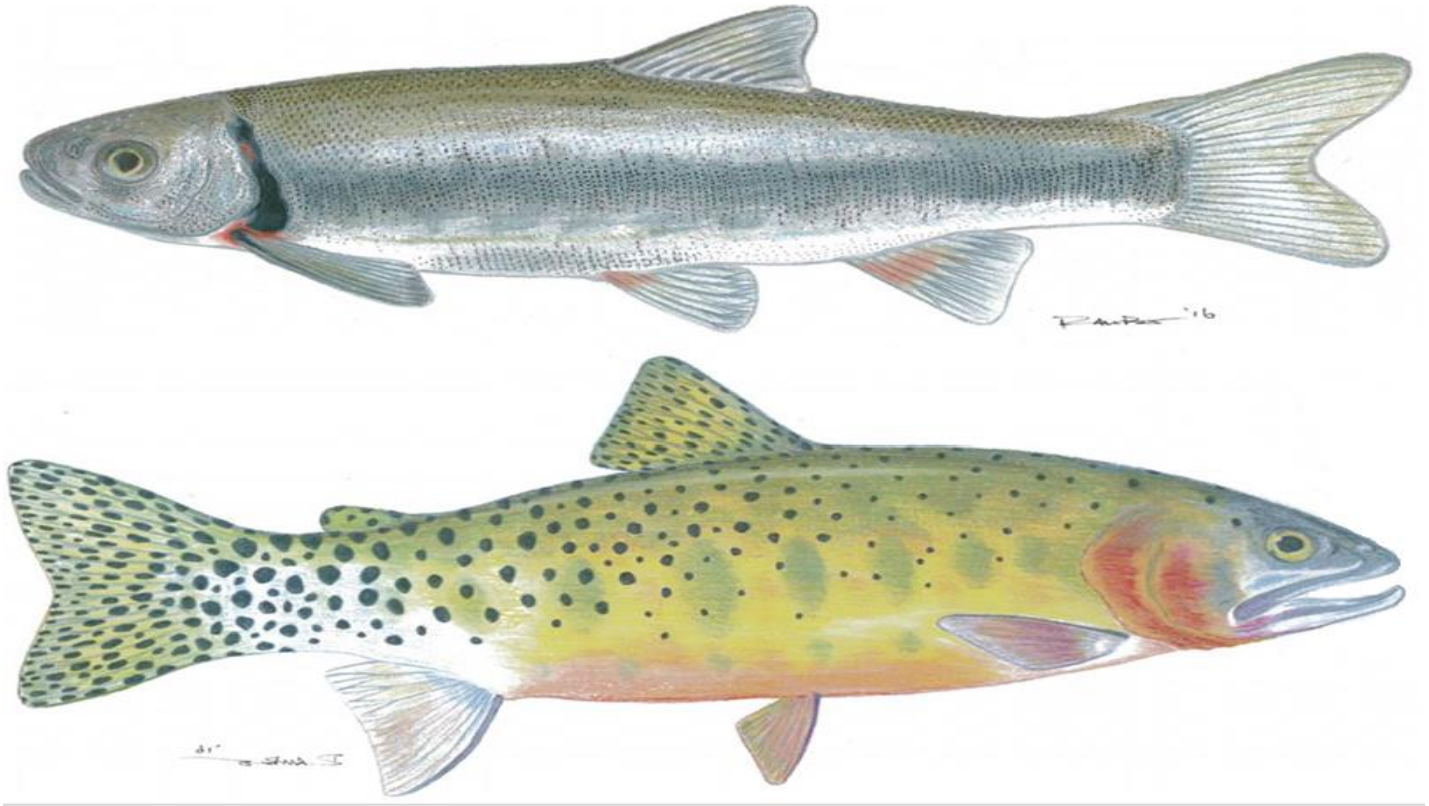
Fish Need Water

Southern Leatherside chub,
Lepidomeda aliciae



Colorado River cutthroat trout,
Oncorhynchus clarkii pleuriticus

Utah Chapter of the American Fisheries Society, Annual Meeting

Falcon's Ledge and Hidden Springs Ranch, Altamont, Utah

March 15th-17th, 2016

2016 President's Welcome

Utah Chapter of the American Fisheries Society, Annual Meeting at Falcon's Ledge
March 15-17 2016

Welcome to one of the nicest places on earth. If you enjoy your time here and the meeting, thank the EXCOMM (if you don't enjoy it, go home and try to figure out what is wrong with you). We have a great opportunity to learn, discuss, and mingle while we attend the meeting. This year's theme is "Fish need water", neatly encapsulated in the clever drawing by Tim Johnson that graces your t-shirt and the back cover of the program. When I told a colleague the theme, they said "that seems obvious." Well, yes it is obvious, but nonetheless it is **the central issue** for fish conservation and management in Utah in the coming years. Climate change, accompanied by changes in flow regimes and most likely overall decreased flows, will exacerbate already difficult problems of maintaining flow and appropriate depths in the waters of our dry state. For these reasons we have invited plenary speakers that will address expected climate patterns, issues of water availability, and possible management actions to deal with these changes. In addition, we have organized a "lightning session" for regional or area updates. These are not meant to be research presentations, rather they provide a status report so we can understand a broad scale view of the state of fish and fisheries across the state. This big-picture view will help as we plan for the future impacted by climate change. I look forward to the meeting and the discussion, conversation, beautiful setting, and great food that will accompany. See you there.

Mark C. Belk
President
Utah Chapter American Fisheries Society, 2016

Business Meeting Lunch Agenda

Falcon's Ledge, March 16, 2016

1. Treasurer's report – Gary Thiede (10 min)
2. Update from Western Division, American Fisheries Society – Travis Neebling (10 min)
3. New President message – Cassie Mellon (5 min)
4. Election results – Bryan Engelbert (5 min)
5. 2017 meeting plans – Calvin Black (15 min)

2016 Utah Chapter of the American Fisheries Society Meeting

Fish Need Water

March 15th-17th 2016

Hidden Springs Ranch, Altamont, Utah

Conference Agenda

Tuesday, March 15th

1:00-4:00 PM	Continuing Education, Aquatic Macroinvertebrate Identification
4:00-6:00 PM	Fly-tying clinic
6:30 PM	Opening Social, Fish Fry

Wednesday, March 16th

Time	Event	Speaker	Title
8:50 AM	**Welcome and Introduction**		
9:00-10:40 AM	**Plenary Talks**		
9:00-9:50AM		Sarah Null	Climate change and Utah's water resources: potential impacts and adaptations
9:50-10:40AM		Clint Muhlfeld	Trout in Hot Water? Conserving Rocky Mountain Trout in a Changing Climate
10:40-11:00 AM	**Break**		
11:00-12:00PM	**Contributed Paper Presentations**		
11:00 AM		Dan Keller	Price River Flow Augmentation by Restoration of Olsen Reservoir Wetland
11:15 AM		Scott Tolentino	Reasons For Recent Increased Natural Recruitment Of Bear Lake Cutthroat Trout (*Oncorhynchus clarki utah*) In Bear Lake 2002-2016
11:30 AM		Dennis Shiozawa	Colorado River/Greenback and Yellowstone/Bear River, cutthroat trout: different fish, similar stories?
11:45 AM		Colton Finch	A future of fire, floods, and fish
12:00-1:30 PM	**Business Meeting Lunch**	**For Lunch Meeting Agenda, See Page 1**	
1:30-3:30 PM	**Lightning Sessions**		
1:30 PM		Ben Brown	
1:40 PM		Paul Thompson	
1:50 PM		Trina Hedrick	
2:00 PM		Bryan Engelbert	
2:10 PM		Paul Burnett	
2:20 PM		Mike Hadley	
2:30 PM		Gordon Nelson	
2:40 PM		Ric Hartman	
2:50 PM		Brett Prettyman	
3:00 PM		Justin Jimenez	
3:10-3:30 PM	**Break**		

Wednesday, March 16th Continued

3:30-5:00 PM	**Poster Presentations**	
	Richard Simkins	Temporal effects of drought on stream fish community structure in a high elevation stream in the Intermountain West
	Josh Verde	Predicting effects of mussel invasion on food web structure in Lake Powell
	Aaron Brooksby	A general survey of metazoan parasites in the fishes of Lake Powell, Utah
	Alex Beck and Ethan Tolman	Countergradient variation for growth in *Galaxias maculatus*
	Weston Gleave	A survey of internal parasites of four species of rockfish in southeast Alaska
	Christian Perry	Comparing Two Landscape-Scale Aquatic Ecoregional Assessments in the Colorado Plateau
	Emily Wright	Determining long-term trends in trout populations using standard stream electrofishing methods: Is the extra pass worth it?
	Hunter Lucas	Ageing and growth of bluehead sucker in the Weber River, Utah
	Thomas Hafen	Temporal and spatial variation in diets of mottled sculpin in the Logan River, Utah
	Justin Dorathy	"Two is better than one"; using multiple methods to improve mottled sculpin density estimates in the Logan River, Utah.
	Chuck Carpenter	Deciphering the Pike Puzzle: Comparing invasive pike body condition and length-at-age to pike in their native range.
5:00-6:00 PM	**Free Time**	
6:00 PM	**Banquet and Awards**	
7:30 PM	**Fundraiser**	

Thursday, March 17th

Time	Event	Speaker	Title
9:00-10:30 AM	**Contributed Paper Presentations**		
9:00 AM		Brian Laub	An Experimental Habitat Enhancement Effort for Utah's Desert Rivers: San Rafael River Restoration Project
9:15 AM		Hayley Glassic	The Influence of Drought-Induced Lake Level Fluctuations on Available Fish Habitat and the Endemic Bear Lake Sculpin (*Cottus extensus*)
9:30 AM		Adam Boehm	Quagga Mussel Containment at Lake Powell: Interagency Cooperation 2015-2016
9:45 AM		Robert Schelly	Refining strategies for nonnative fish exclusion from Stewart Lake, a wetland managed as nursery habitat for Razorback Sucker, *Xyrauchen texanus*, on the middle Green River, Utah
10:00 AM		Ben Stout	Improving our ability to estimate vital rates of endangered fishes on the San Juan River using novel applications of PIT tag technology
10:15-10:45 AM	**Break**		
10:45-12:15 PM	**Contributed Paper Presentations**		
10:45 AM		Jamie Reynolds	Potential predation effects of invasive northern pike (*Esox lucius*) on endangered June sucker (*Chasmistes liorus*) in Utah Lake, UT
11:00 AM		Jereme Gaeta	From phosphorus to fishes: A whole-ecosystem response of a shallow reservoir to drought and an invasive carp removal with an emphasis on endangered fish conservation
11:15 AM		Jordan Detlor	Life history & Demographics of a robust Bluehead sucker population in Ferron Creek drainage, Utah
11:30 AM		Bryan Maloney	Evaluating habitat-based niche requirements for the bluehead sucker (Catostomus discobolus): can we identify the cause of a recruitment bottleneck?
11:45 AM		Levi Simmons	Big fish in a small pond or small fish in a small pond? Investigating arctic char dimorphism with consideration of predator-prey interactions
12:00 PM		Matt Breen	Colorado pikeminnow recruitment in the upper Colorado River basin: a new perspective for the Green River, Utah
12:15 PM	**Box Lunch and Meeting Adjourned**		

2016 Fundraising Items

General Raffle ($1/ticket or wingspan of tickets for $20)	
Sage Pulse fly-rod 4 wt 4 pc from BioWest	All general raffle tickets
Brighton Ski Resort-2 day ski passes	Bucket
Browning floor mats and decal	Bucket
Browning pink cap with flashlight	Bucket
Browning pink earrings	Bucket
Browning pink/brown throw	Bucket
Browning satchel	Bucket
Buck Special knife	Bucket
Camp Chef two burner stove	Bucket
Christenson's Lake Shore Tackle	TBD
Columbia River Knife & Tool Kommer Free Range Gut Hook knife	Bucket
Columbia River Knife & Tool M16 Frame Lock Tanto knife	Bucket
Deer Valley Resort-2 lift tickets for biking or hiking	Bucket
Fish Pond Ice Storm Soft Cooler	Bucket
Lockdown binocular harness	Bucket
Melissa Trammell fish necklace	Bucket
Midway USA Bail-out bag	Bucket
Montana Fly Company fly box and fly tying equipment (2 draws)	Bucket
Museum of Natural Curiosity at Thanksgiving Point- 4 single admission passes	Bucket
Nadi fly-rod with custom Utah AFS logo 4 wt 4 pc; Redington reel; pack of Jim Teeny flies	Bucket
Peter McHugh print	Bucket
Plano tackle box	Bucket
Redington Crosswater wader	Bucket
Redington fishing shirts (3 draws)	Bucket
Redington fly-rod 5 wt 4 pc /Ross Reels combo package from Fish Tech Outfitters	Bucket
Redington Siren wader	Bucket
Red Rock Brewery-$25 gift card (2 draws)	Bucket
St. Croix Legend Silver ice-rod; Pflueger reel	Bucket
St. Croix Trout Series spinning rod	Bucket
Travis Sylvester 14x9 Molten print	Bucket
Travis Sylvester 18x14 Freestone print	Bucket
Travis Sylvester 8x10 Serenity print	Bucket
Travis Sylvester/Montana Fly Company Reverberate Flask	Bucket

Travis Sylvester/Montana Fly Company Sapphire Flask	Bucket
Travis Sylvester-Set of 4 marble coasters with fish prints	Bucket
Utah's Hogle Zoo-2 two person day passes	Bucket
West Coast Shadow Box-Grayling	Bucket
West Coast Shadow Box-Bear Lake cutthroat trout	Bucket
Xevo 500 spotlight	Bucket

Deck of Card Items	**Price per ticket**
Package 1: Benelli Super Nova 12-guage shotgun	$25
Package 2: Remington 270 Model 783 rifle with scope	$20
Package 3: Sage fly-rod 5 wt 4 pc; Sage 2050 reel from Trout Unlimited	$15
Package 4: Camp Chef Smoke Vault 18"	$10
Package 5: Falcon's Ledge 1-year membership; Westcoast Shawdowbox-Tiger trout; Box of flies by John Schultz	$10
Package 6: Travis Sylvester cutthroat prints: 20x13 Metallic-cut; 8x10 Colorado River Cutthroat Trout; 8x10 Bonneville Cutthroat	$10
Package 7: Browning Nontypical 7" Stag Skinner knife; Travis Sylvester 8x10 Ghost print	$5

Plenary Speaker Short Biographies

Sarah Null, PhD

Doctor Sarah Null is currently an Assistant Professor in the Department of Watershed Science at Utah State University. She received her PhD in Geography in 2008 from University of California, Davis. Prior to coming to USU, she worked as a postdoctoral scholar at UC Davis' Center for Watershed Sciences. Sarah's research program addresses the potential to enhance aquatic ecosystems while maintaining water resource benefits for people in water scarce regions, particularly the American West.

Clint Muhlfeld, PhD

Doctor Clint Muhlfeld is currently a Research Ecologist with the USGS, Northern Rocky Mountain Science Center, stationed in Glacier National Park, Montana, and Assistant Research Professor at University of Montana, Flathead Lake Biological Station. He received his PhD in Fish and Wildlife Biology in 2008 from Montana State University (Bozeman). Clint's research goal is to understand how aquatic species interact with physical and biological templates over space and time to inform conservation and management. Specifically, his research focuses on assessing how human stressors – invasive species, habitat modification, and climate change – influence native salmonids and rare alpine macroinvertebrates in the Rocky Mountains of the US and Canada.

2016 Annual Meeting Abstracts

Countergradient variation for growth in Galaxias maculatus

Presenting Authors: Alexander Beck and Ethan Tolman

Contributing Authors: Alexander Beck—Brigham Young University, Ethan Tolman—Brigham Young University, Konrad Gorsky—Universidad de Concepcion, Chile, Evelyn Habit— Universidad de Concepcion, Chile, Mark C. Belk—Biology Department, Brigham Young University

Abstract: Colder temperatures and reduced growing season length encountered by organisms at higher latitudes are important selective pressures for many species. Populations of a growing number of species have been observed to exhibit increased rates of growth at high latitudes relative to populations of the same species at lower latitudes. *Galaxias maculatus* is a small but widespread diadromous fish of the southern hemisphere. This study utilizes daily growth ring data from *G. maculatus* otoliths to determine whether or not a countergradient variation in growth rate is present among South American *G. maculatus* populations. Samples were collected from eleven Chilean rivers. River mouth latitudes ranged from 36.82°S to 47.80°S. The data shows a clear countergradient change in growth rate across latitudes. Individuals reached similar sizes by the end of the first growing season regardless of latitude, although the growing season at southern latitudes was significantly shorter. Southern populations grew at an increased rate over a reduced amount of time.

Presentation Format: Poster
Presentation Type: Student

Quagga Mussel Containment at Lake Powell: Interagency Cooperation 2015-2016

Presenting Author: Adam Boehm

Abstract: Quagga mussel veligers and DNA were found in several Lake Powell plankton samples since 2012. During the winter and spring of 2013/2014 adult mussels were found in the thousands. Lake Powell is listed as “infested” status and it is currently considered an affected water body with efforts being made to ensure all watercraft properly decontaminate (Clean, Drain, Dry or professional decontamination) before launching at another water body. This is the first year Utah Division of Wildlife has implemented an Aquatic Invasive Species program at Lake Powell. A Memoranda of Understanding (MOU) was signed by the Utah Division of Wildlife, National Park Service and Arizona Game and Fish Department. The MOU states that the agencies will work together in the containment of Quagga Mussels at Lake Powell. During the 2015 field season all of the understandings in the MOU where honored by all agencies involved. A new MOU will be signed for the 2016 field season at Lake Powell. The new MOU will take into consideration new recommendations for the all signing agencies.

Presentation Format: Oral
Presentation Type: Professional

Colorado pikeminnow recruitment in the upper Colorado River basin: a new perspective for the Green River, Utah

Presenting Author: Matthew J. Breen

Contributing Authors: Matthew J. Breen, Kevin R. Bestgen—Department of Fish, Wildlife, and Conservation Biology CSU, Christopher M. Michaud—Utah Division of Wildlife Resources, Robert C. Schelly—Utah Division of Wildlife Resources

Abstract: Autumn young-of-year (YOY) Colorado pikeminnow (*Ptychocheilus lucius*) sampling is ongoing since 1986 in the upper Colorado River basin to monitor recruitment success of this federally endangered species. To accomplish this, a sub-sample of backwater habitats that meet specific criteria are seined, focusing on three nursery habitat reaches in the Green and Colorado rivers (335 river miles total) downstream of known Colorado pikeminnow spawning locations. In the Green River, Utah, we observed a marked decline in autumn recruitment beginning in 1994, with the exception of high production years 2009 and 2010, and adult Colorado pikeminnow populations are declining throughout the Green River sub-basin, the largest remaining population. In light of poor recruitment for more than two decades, data from our 2015 efforts indicate successful reproduction and late summer survival, widespread occupation of backwater habitats throughout sampling reaches, and capture of several hundred YOY pikeminnow. One potential explanation for this success may derive from summer flow regimes (i.e., base flow timing and magnitude) resulting from experimental water releases from the Flaming Gorge Dam. Following a significant effort to analyze available data from 1979–2012, we recommend maintaining summer base flows within a specific range through manipulation of flow releases from Flaming Gorge Dam. Flow management, along with invasive species control, may provide additional tools to aid recovery of Colorado pikeminnow in the upper Colorado River basin.

Presentation Format: Oral
Presentation Type: Professional

A general survey of metazoan parasites in the fishes of Lake Powell, Utah

Presenting Author: Aaron Brooksby

Contributing Authors: Aaron Brooksby, Mehmet Cemal Oguz, Mark C. Belk--*Department of Biology, Brigham Young University*

Abstract: Lake Powell, Utah is an important Utah fishery, encompassing a variety of fishes with varying ecological niches. Determining parasite diversity and abundance in fishes is a valuable tool in understanding the fishery. We provide a general survey of the parasites found in all major sport fishes and the majority of other fishes in the system. We collected a total of 240 fish and found 14 species of parasite. We did not find any new species of parasite that has not already been described in the Colorado River system. We can group the sport fishes of Lake Powell into two groups based on parasite infection rates. *Morone saxatalis* (striped bass) and *Sander vitreus* (walleye) exhibit extremely low infection rates, and *Micropterus salmoides* (largemouth bass)*, Micropterus dolomieui* (smallmouth bass)*,* and *Ictalurus punctatus* (channel catfish) exhibit high infection rates. *Pomoxis nigromaculatus* (black crappie) is an intermediate species exhibiting medium infection rates. This study serves as a baseline for parasite community studies in Lake Powell and can provide a comparison to future seasonal and geographical studies.

Presentation Format: Poster
Presentation Type: Student

Deciphering the Pike Puzzle: Comparing invasive pike body condition and length-at-age to pike in their native range.

Presenting Author: Chuck Carpenter

Contributing Authors: Chuck Carpenter, Jamie Reynolds, and Dr. Jereme Gaeta

Abstract: Invasive species are detrimental to native ecosystems through aggressive colonization, predation, and competition for resources. The introduction of an apex predator can alter the native trophic structure. Northern pike (*Esox lucius;* hereafter pike) have expanded their range across the USA. Anglers first observed nonnative pike in Utah Lake, Utah in 2010 after illegal introduction. The presence of pike is extremely concerning given potential predation on the lake's endangered June sucker (*Chasmistes liorus*). A first step to evaluating the effect of this invader on endangered June sucker and the fish community is to understand the basic biology of northern pike in Utah Lake. In 2015, we collected 79 pike from state biologists, anglers, and commercial fishermen. We calculated pike body condition (W_r) and determined pike length-at-age using otoliths and cleithra. We developed a length-at-age model specific to Utah Lake pike and compared these observations to 209 adult pike from their native range in Green Bay, Wisconsin. Utah Lake pike lengths ranged from 82-846 mm, with a mean relative weight of 102, indicating a slightly better body condition than standard. Ages ranged from age-0 to age-7. We hope to expand our preliminary research by acquiring 300 more specimens during the 2016 field season. Our results can assist managers in assessing the potential impact of this invading predator.

Presentation Format: Poster
Presentation Type: Student

Life history & Demographics of a robust Bluehead sucker population in Ferron Creek drainage, Utah

Presenting Author: Jordan Detlor- Brigham Young University Idaho/UDWR

Contributing Authors: Jordan Detlor—Brigham Young University Idaho/UDWR, Eric Billman—Brigham Young University Idaho, Daniel Keller—UDWR

Abstract: The decline of bluehead sucker (*Catostomus discobolus*) in the Colorado River Basin has created a need for monitoring and research to achieve conservation goals. Ferron Creek and Millsite Reservoir have an isolated and robust population of bluehead sucker while other populations in the San Rafael River system continue to struggle. We estimated abundance and annual survival and determined age and growth of bluehead sucker in Ferron Creek and Millsite Reservoir. We conducted a mark recapture study over eight years to estimate population abundance using the Schnabel method and to estimate annual survival using Program MARK. In addition, we collected pectoral fin rays from this population to estimate age and growth. The estimated population size of bluehead sucker >150 mm TL was 7,104 (95% CI= 5,812- 9,134). Annual survival for fish of the same size was 0.919 (SE= 0.0499; 95% CI= 0.7529- 0.9773). The maximum estimated age is 23 years with estimates indicating successful recruitment between 1999 and 2014. Growth patterns and maximum size of bluehead sucker in Ferron Creek and Millsite Reservoir were similar to other bluehead populations. These findings designate this uniquely robust population as a priority for conservation and emphasize its potential as a source population for re-establishing bluehead sucker populations in the San Rafael drainage.

Presentation Format: Oral
Presentation Type: Student

"Two is better than one"; using multiple methods to improve mottled sculpin density estimates in the Logan River, Utah.

Presenting Author: Justin Dorathy

Contributing Authors: Justin Dorathy, Gary Theiede—Department of Watershed Sciences USU, Phaedra Budy—Department of Watershed Sciences and The Ecology Center, Utah State University/U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, Utah State University

Abstract: Mottled sculpin (Cottus bairdi) are an understudied, native, benthic stream fish common in streams of the Intermountain West (IMW). In in the Logan River, Utah, we have learned that population abundance of sculpin is underestimated using standard three-pass electrofishing depletion methods. Our goal was to compare and contrast abundance (i.e., density) estimates and sculpin demographics (e.g., size, age) obtained by 3-pass electrofishing methods and by the sculpin surber-style sampler in the same reaches. Implementing the use of a surber-style sampler in randomly placed points within a sampled reach could improve the estimates. We performed statistical analysis of the data gathered during 2015. We also compared our results with a previous study to aid in determining if the use of a sculpin surber is an accurate way of determining abundance of sculpin. Our results indicate there is a distinct number and size bias with the two methods; relative to electroshocking estimates, density estimates from the sculpin surber are 2 – 16 times higher and sizes of sculpin captured are much smaller (12-~30 mm) sculpin. The 3-pass depletion estimator may provide more precise total population estimates of actual river-wide abundance of the sculpin population; however, the complementary use of the sculpin surber can provide more complete demographic information on an important native stream fish. In the IMW, stream fish diversity is low and native sculpin represent an important member of the fish community; as such, accurate estimates of population abundance are critical for effective conservation and management.

Presentation Format: Poster
Presentation Type: Student

A future of fire, floods, and fish

Presenting Author: Colton Finch

Contributing Authors: Colton Finch, Phaedra Budy—Department of Watershed Sciences and The Ecology Center, Utah State University/U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, Utah State University, Patrick Belmont—Department of Watershed Sciences and Ecology Center USU

Abstract: Wildfire size and frequency are increasing and may be exceeding historic norms. Populations of native fishes may not be capable of recovering from unprecedented wildfires, especially where human activity has reduced habitat quality and connectivity. We used a population viability analysis to predict the probability of persistence of Bonneville cutthroat trout *Oncorhynchus clarkii utah* in steep watersheds of south-central Utah, USA. Treatment watersheds were burned in 2010 in the Twitchell wildfire, which was followed one year later by intense rainfall, large floods, and debris flows. Abrupt changes in channel morphology and water quality severely reduced or extirpated trout populations from entire watersheds. We represented a spatially-structured population of Bonneville cutthroat trout based on known habitat preferences, including the presence of natural and artificial waterfalls (fish barriers). Together with burn severity data, we used measurements of valley confinement, channel morphology, and distribution of debris flows (from high-resolution aerial lidar) to predict stream reaches where trout were extirpated after the Twitchell Fire. We combined these physical and biological habitat characteristics in a stochastic, stage-based matrix model to predict the probability that this spatially-structured fish population would persist after a suite of future wildfire scenarios. We demonstrate that fire occurring in synchrony across multiple watersheds forced Bonneville cutthroat trout populations past a quasi-extinction threshold in 45% of iterations; asynchronous fire caused extinctions in 0% of trials. Local extirpations occurred most frequently in confined valleys downstream of debris flows; fish barriers permanently reduced carrying capacity by preventing immigration to previously occupied reaches. Our results indicate spatial heterogeneity in fire severity and vital rates increase population viability; barriers and valley confinement decrease viability.

Presentation Format: Oral
Presentation Type: Student

From phosphorus to fishes: A whole-ecosystem response of a shallow reservoir to drought and an invasive carp removal with an emphasis on endangered fish conservation

Presenting Author: Jereme Gaeta—Utah State University

Contributing Authors: Jereme Gaeta—Utah State University, Kevin Landom—Utah State University, Ryan Dillingham—Utah State University

Abstract: Utah Lake, UT is a large (>38,000 ha), shallow lake ecosystem near Salt Lake City that has been used as a reservoir since the 1800s. This ecosystem has been highly degraded via direct and indirect anthropogenic disturbances that include the introduction of invasive common carp (*Cyprinus carpio*), high nutrient loads, and drought, exacerbated by water withdrawal and diversion for agriculture. Since the 1880s, nearly all of the native fishes have been extirpated. By the 1990s, a once abundant endemic species of pelagic zooplanktivorous sucker, the June sucker (*Chasmistes liorus*), had been reduced to 300-500 individuals and was federally listed as endangered. A massive stocking program began in the 1990s to recover June sucker, and a common carp removal began in 2010 to improve water quality and increase macrophytes used by June sucker as nursery habitat. Common carp removals have successfully restored small lakes, but have not been attempted at this scale. We used up to 16 years of observations to study the ecosystem response to multiyear droughts, an aggressive stocking program, and a whole-lake common carp removal.

Presentation Format: Oral
Presentation Type: Professional

The Influence of Drought-Induced Lake Level Fluctuations on Available Fish Habitat and the Endemic Bear Lake Sculpin (Cottus extensus)

Presenting Author: Hayley Glassic

Contributing Authors: Hayley Glassic—Department of Watershed Sciences USU, Jereme Gaeta-- Department of Watershed Sciences USU

Abstract: Multiyear droughts are projected to increase in frequency and duration within arid regions across the world. In Utah, multiyear droughts have historically been associated with declines in Bear Lake water levels up to 6.6 meters. Fishes, such as the endemic Bear Lake sculpin (*Cottus extensus*), a species of concern that serves as the prey base for sport fishes in the lake, use littoral substrate for refuge, spawning habitat, and prey production. We tested whether lake level declines reduce the area of littoral cobble available to fishes by creating an elevation-explicit habitat map from surveys of littoral structure. UDWR trawling surveys (spanning 1990 – 2012) were combined with the habitat map to create a mixed-effects model describing *C. extensus* catch as a function of habitat availability at varying elevations. Per meter of lake elevation lost, 19% of the total cobble area of Bear Lake becomes desiccated and Sculpin catch per trawl decreases by more than 15%. With an increase in multiyear droughts projected under future climate scenarios, *C. extensus* population reductions may result in the species' federal listing as threatened or even endangered, the loss of prey base for Bear Lake sport fishes, or the extinction of an endemic species.

Presentation Format: Oral
Presentation Type: Student

A survey of internal parasites of four species of rockfish in southeast Alaska

Presenting Author: Weston Gleave

Contributing Authors: Weston Gleave—Department of Biology BYU, Mehmet Cemal Oguz—Department of Biology BYU, Mark Belk—Department of Biology BYU

Abstract: Although parasites of rockfishes have been documented in several areas throughout the northeast Pacific, no studies have been conducted near Admiralty Island in southeast Alaska. In addition, parasites of *Sebastes ciliatus*, dusky rockfish have seldom been studied. To determine the parasite species found in these rockfishes and to provide a basis for large-scale comparison, we surveyed internal parasites of four species (n=88) of rockfish caught in late June 2014, between Admiralty Island and Kuiu Island in southeast Alaska. We identified six species of parasites among the four species of rockfish. We found no parasites in *S. flavidus*, and only one parasite in *S. ruberrimus*. *Sebastes ciliatus* had three species of parasites, and *S. maliger* had five species of parasites. Species of parasites found in *S. ciliatus* have not been previously documented. Parasite communities in rockfish may be governed mainly by non-equilibrium dynamics.

Presentation Format: Poster
Presentation Type: Student

Temporal and spatial variation in diets of mottled sculpin in the Logan River, Utah

Presenting Author: Thomas Hafen

Contributing Authors: Thomas Hafen—Department of Watershed Sciences USU, Gary Theide— Department of Watershed Sciences USU, Phaedra Budy—Department of Watershed Sciences and The Ecology Center, Utah State University/U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, Utah State University

Abstract: Mottled sculpin (*Cottus bairdi*) are important members of most Intermountain West stream food webs, dominating the benthic niche; however very little is known about their feeding ecology. Sculpin are widespread throughout the headwaters and mainstem reaches of the Logan River, Utah. Our goal was to compare and contrast sculpin diets based on size, location and the year they were collected. Further, we investigated potential density-dependent effects on rates of cannibalism. We collected diets from small (< 100 mm) and large sculpin from six locations in the Logan River during July-August over a three-year span (2012 – 2014). We observed very little inter-annual difference in diet; however, frequency of ephemeropterans in the diets decreased by 20% in 2014. We also observed a noticeable difference in diet composition between sites, across elevation. The major variation in sculpin diets by size was cannibalism; there was no cannibalism by sculpin < 100 mm, and cannibalism by large sculpin averaged 2 – 7% annually. Elsewhere, rates of cannibalism as low as 5% have been shown to regulate population structure. This study provides a more complete understanding of the feeding ecology of an important native fish; and demonstrates that cannibalism is determined by size.

Presentation Format: Poster
Presentation Type: student

Price River Flow Augmentation by Restoration of Olsen Reservoir Wetland

Presenting Author: Dan Keller

Abstract: The lower Price River provides year round habitat for several native fish species including: flannelmouth sucker, bluehead sucker, and speckled dace; additionally, seasonal use by endangered fishes of the Colorado River Basin has been well documented. Dewatering in late summer is a limiting factor for native fish species that we intend to address by securing an emergency pool of water, used to strategically augment base flows and prevent summer fish kills. Olsen Reservoir was built in 1952 on an ephemeral tributary of the Price River to collect and reuse irrigation runoff; however, conversion of flood irrigation to sprinklers resulted in the loss of valuable wetland habitat. The Price River Restoration Technical Advisory Team is seeking funding to purchase water that will be delivered to Olsen Reservoir in early spring and late fall. The advantage of using Olsen Reservoir as a storage site is its close proximity to the Price River confluence, which will decrease water lost to evaporation and ground seepage. Olsen Reservoir is below major points of diversion so water released at this location will remain in-stream to directly benefit fish. Additionally, storing water at this location will recharge a desiccated wetland, benefiting a whole host of wildlife and attracting interest from partners. At this time the project is completely conceptual, however initial meetings with Carbon Canal Company and landowners have been encouraging, giving hope that a truly "win-win" project can be achieved.

Presentation Format: Oral
Presentation Type: Professional

An Experimental Habitat Enhancement Effort for Utah's Desert Rivers: San Rafael River Restoration Project

Presenting Author: Brian G. Laub

Contributing Authors: Brian G. Laub—Department of Watershed Sciences and The Ecology Center, Utah State University, Justin Jimenez—Bureau of Land Management Utah State Office, Phaedra Budy—Department of Watershed Sciences and The Ecology Center, Utah State University/U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, Utah State University

Abstract: River restoration aims to enhance natural processes that create and maintain channel and riparian habitat. Based on several years of biological and geomorphic research, we designed and implemented a process based, experimental, and adaptive restoration plan for the San Rafael River, an over-allocated desert river system in southeastern Utah. Goals of the restoration are to improve habitat for three imperiled native fish and enhance native riparian vegetation recruitment. Activities implemented in 2015 included systematic removal of non-native tamarisk trees, placement of gravel in the river channel, and installation of beaver-dam mimicking structures. Surveys of channel response to these activities and a series of 2-year recurrence interval floods have indicated some new gravel bar formation, as well as some bank and bed scouring and filling around beaver dam structures, changes that added additional habitat complexity into the relatively straight, narrow channel. Some willow sprouting has been observed in areas previously covered by dense tamarisk thickets; however, no cottonwood regeneration has occurred in these areas, due in part to lack of a significant spring runoff flood. Cottonwood planting to enhance recruitment is being planned for spring 2016. Future monitoring will explore whether habitat gains are maintained or lost over time. The experimental approach has allowed substantial learning about implementing restoration in this desert river system, and will be applicable to restoration projects in other desert rivers.

Presentation Format: Oral
Presentation Type: Professional

Ageing and growth of bluehead sucker in the Weber River, Utah

Presenting Author: Hunter Lucas

Contributing Authors: Hunter Lucas, Bryan Maloney, Gary P. Thiede—Department of Watershed Sciences Utah State University, Phil Tuttle—Utah Division of Wildlife Resources, Phaedra Budy—US Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and Ecology Center, Utah State University

Abstract: Bluehead sucker (*Catostomus discobolus*) populations are declining throughout their native range. The bluehead sucker subpopulation in the Weber River, Utah is subject to multiple stressors and as a result, has experienced a dramatic population decline. Our overall goal is to provide demographic, age, and growth information to help manage current and future populations of bluehead sucker. To do this, we aged bluehead sucker using pectoral fin-ray cross sections. Although using otoliths is the premier method for precisely ageing fishes, using sectioned fin rays presents a potentially reliable, yet non-lethal method promising for imperiled fishes. In sum, we aged 70 sucker captured in the Weber River from 2014 – 2015; ages ranged from 2 to 20. Based on size-at-age distribution models, it appears that sucker in the Weber River subpopulation grow larger than in other populations. Additionally, we observed some diversity in the size-at-age distribution among Weber River reaches; the smallest fish were in Section 6 and the largest fish in Section 7. We hypothesize that different temperature and flow regimes among the reaches likely cause this diversity of growth and size-at-age within this subpopulation. This nonlethal method of ageing via pectoral fin rays appears to provide a reliable method to obtain age and growth data for the bluehead sucker, information that will contribute to the conservation of this native and imperiled fish.

Presentation Format: Poster
Presentation Type: Student

Evaluating habitat-based niche requirements for the bluehead sucker (Catostomus discobolus): can we identify the cause of a recruitment bottleneck?

Presenting Author: Bryan Maloney

Contributing Authors: Bryan Maloney—Department of Watershed Sciences, and Ecology Center, Utah State University, Phaedra Budy—Principal Investigator, US Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and Ecology Center, Utah State University, Jereme Gaeta—Department of Watershed Sciences, and Ecology Center, Utah State University

Abstract: Many desert fishes in the USA are imperiled due to low perceived economic worth and over- allocation of water. Bluehead sucker (BHS; *Catostomus discobolus),* endemic to the Intermountain West, are protected by a multi-state conservation agreement, and the Weber River (Northern Utah) population, currently repressed and likely declining due a recruitment bottleneck, is one of the few outside of the Colorado River basin. Over-allocation of water, and the subsequent degradation of in-stream habitat, have resulted in a lack of slow-velocity habitat within the optimal thermal range for BHS. Our objective is to determine whether degraded habitat conditions limit the BHS population in the Weber River and identify options for restoration accordingly. We are locating preferred habitat of spawning and rearing BHS and quantifying habitat characteristics and availability using reach-based surveys. After locating spawning areas primarily in the lower-elevation reach of the Weber River (i.e. near Ogden), we divided the river into 300-m reaches and surveyed all spawning reaches and ten randomly- selected non-spawning reaches for substrate, depth, cover, and habitat units (i.e. riffles, pools, backwaters). Preliminary results suggest that gravels (11-32 mm in diameter) and pools (average size: 194 m^2, > 1.5 m max. depth) are important components of spawning habitat in the Weber River, while backwaters that are larger (range: 3-109 m^3) and deeper (range: 25-87 cm) provide rearing habitat for the most sucker larvae and juveniles. Future efforts will include comparing our results to BHS preferred habitat in a river system with a healthy BHS population, likely the Raft River in northwestern Utah, and laboratory experiments to determine ideal microhabitat (velocity and temperature) for juvenile BHS. By evaluating the habitat needs of the native and imperiled bluehead sucker, this study will help inform future conservation and restoration efforts directed at this declining population.

Presentation Format: Oral
Presentation Type: Professional

Comparing Two Landscape-Scale Aquatic Ecoregional Assessments in the Colorado Plateau

Presenting Author: Christian Perry

Contributing Authors: Christian Perry—Postdoctoral Researcher; Utah State University, Scott Miller--BLM/USU National Aquatic Monitoring Center, Department of Watershed Sciences, Utah State University, Charles Hawkins—Department of Watershed Sciences, Western Center for Monitoring and Assessment of Freshwater Ecosystems, and Ecology Center, Utah State University

Abstract: Regional aquatic assessments are used to prioritize areas for conservation, restoration, or development. They are designed to summarize distributions of species and habitats and quantify stressors. Although these assessments have been used for decades, no standard approach has emerged. Two recent assessments spanned the Colorado Plateau ecoregion. Trout Unlimited (TU) used an indicator-scoring approach to assess the condition of wild trout habitat, and a BLM Rapid Ecoregional Assessment (REA) used "fuzzy logic" to quantify 'aquatic intactness'. Both approaches produced HUC12 watershed scores, and we used a difference map to compare their outcomes. Scores were correlated ($\rho = +0.57$, p-value = <0.01), but REA scores were lower than TU's in 83% of watersheds (mean difference, -0.20 ± 0.21) suggesting the approaches were biased estimators of each other. Given the ecoregion's relatively low elevations and warm temperatures, it is surprising that TU's approach, which focused on trout habitat, produced higher scores than the REA approach, which attempted to assess aquatic intactness. TU assessments typically incorporate trout population characteristics, but here TU only used inputs related to habitat integrity and regional changes (e.g. climate change, introduced species, and land conversion). Inclusion of demographic characteristics might shift TU scores downward. Assessment comparability is likely affected by differences in endpoints, inputs, and methods.

Presentation Format: Poster
Presentation Type: Professional

Potential predation effects of invasive northern pike (Esox lucius) on endangered June sucker (Chasmistes liorus) in Utah Lake, UT

Presenting Author: Jamie Reynolds

Contributing Authors: Jamie Reynolds, Dr. Jereme Gaeta—Utah State University, Department of Watershed Sciences

Abstract: Invasive species introductions are associated with negative economic and environmental impacts, including reductions in native species populations. Successful invasive species populations often grow rapidly until prey species are decimated and a new food web equilibrium is established. Non-native northern pike (*Esox lucius*; hereafter pike) were detected in 2010 in Utah Lake, UT, a highly degraded ecosystem, which is home to the endemic and endangered June sucker (*Chasmistes liorus*). Here we test whether pike predation could hinder the restoration efforts of June sucker. We are combining pike growth and foraging observations with an energy-budget consumption model to quantify lake-wide pike predation on June sucker. Of 79 pike, we found pike consume 5-12% June sucker and 10% white bass (*Monroe chrysops*), a popular sportfish. According to our model simulations, an adult pike can eat upwards of 8-18 young-of-the-year or 2-5 yearling June sucker per year. The growing pike population could hamper restoration efforts and threaten endangered June sucker, a population with a mere 2,000 adults, in jeopardy of extinction. Our findings not only inform pike management efforts, but also highlight the importance of preventing the spread of aquatic invasive species.

Presentation Format: Oral
Presentation Type: Student

Refining strategies for nonnative fish exclusion from Stewart Lake, a wetland managed as nursery habitat for Razorback Sucker, Xyrauchen texanus, on the middle Green River, Utah

Presenting Author: Robert C. Schelly

Contributing Authors: Robert C. Schelly—Utah Division Wildlife Resources, Northeastern Regional Office and Matthew J. Breen—Utah Division Wildlife Resources, Northeastern Regional Office

Abstract: Since 2013, Stewart Lake, a gated wetland on the middle Green River near Jensen, Utah, has served as a promising model for the re-coupling of larval Razorback Suckers with productive off-channel wetland nursery habitat. In a cooperative multi-year effort by Federal and State agencies called the Larval Trigger Study Plan, light trapping is being used to detect the presence of larval razorback suckers in the river, triggering increased releases from Flaming Gorge Reservoir, temporally matching peak flows to the period of larval drift. By filling the wetland during this period and maintaining entrainment until early autumn, three year-classes of wild-spawned Razorback Suckers have been returned to the Green River. Here we consider the ongoing challenge of proliferation of nonnative fishes in managed wetlands, and our attempts to refine a selective picket-weir system to allow larval Razorbacks and large-bodied native fishes access to the wetland while excluding nonnatives. As different nonnative species predominate from year to year, fine-tuning of our management strategy is necessary to maximize Razorback Sucker survival and further disadvantage nonnative fishes.

Presentation Format: Oral
Presentation Type: Professional

Colorado River/Greenback and Yellowstone/Bear River, cutthroat trout: different fish, similar stories?

Presenting Author: Dennis K. Shiozawa

Contributing Authors: Dennis K. Shiozawa--Department of Biology, Brigham Young University, R. Paul Evans—Department of Microbiology and Molecular Biology, Brigham Young University, and Perry Ridge—Department of Biology, Brigham Young

Abstract: Until recently the Colorado River cutthroat trout in the Colorado – Green River system were treated as a relatively homogeneous group. In 2012 the threatened greenback cutthroat trout ("green lineage"), of the South Platte and Arkansas River basins, were hypothesized to have actually originated from trout stocked from the headwaters of the Colorado River in Colorado. A single population of cutthroat trout in the Arkansas River Basin appears to be a transplant from the South Platte River Basin and may be the only extant population of 'Greenback' cutthroat trout in the two eastern drainages. Cutthroat trout from the Green River Basin ("blue lineage") represent what were considered the typical form of all Colorado River cutthroat trout. This information, based on one molecular marker, has confounded management and status of both Greenback cutthroat trout and Colorado River cutthroat trout in the headwaters of the Colorado River. The cutthroat trout in the Yellowstone-Snake River-Bear river basins give insight into the development of separate lineages in the Colorado-Arkansas-South Platte river systems. Yellowstone and Bear River Bonneville cutthroat trout, recognized as sister lineages since the 1980s, separated about 40,000 years ago. Later, at the end of the last glacial interval, trout from the upper Snake River crossed the continental divide into the Yellowstone River Basin. This has generated a genetic pattern reflecting the roles of isolation and glacial advances.

Presentation Format: Oral
Presentation Type: Professional

Temporal effects of drought on stream fish community structure in a high elevation stream in the Intermountain West

Presenting Author: Richard Simkins

Contributing Authors: Richard Simkins, Mark Belk—Department of Biology, Brigham Young University

Abstract: Composition of stream fish assemblages is largely determined by variation in stream flow. The effects of altered stream flow regimes on stream fish assemblages are relatively unknown in high elevation streams. We characterize changes in a stream fish assemblage across a wet to dry cycle, and we compare different grouping schemes to determine how fish respond to changes in flow regime. Yellow Creek, a small stream of the Bear River Drainage in Wyoming, was monitored for 5 years through both high and low water years. Preliminary patterns suggest groupings based on size do not perform as well as groupings based on species or functional group. Further analysis will be done to quantify model fit.

Presentation Format: Poster
Presentation Type: Student

Big fish in a small pond or small fish in a small pond? Investigating arctic char dimorphism with consideration of predator-prey interactions

Presenting Author: Levi Simmons

Contributing Authors: Levi Simmons—Department of Watershed Sciences and the Ecology Center, Utah State University and Stephen Klobucar—Department of Watershed Sciences and the Ecology Center, Utah State University, Phaedra Budy—US Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and the Ecology Center, Utah State University

Abstract: Arctic lake ecosystems respond rapidly to climate change, which can alter fish abundance and diversity. In the Arctic, apex predator assemblages typically consist of arctic char or lake trout, which co-occur with arctic grayling. However, lake trophic structure varies given the low species diversity and variable lake connectedness. Typically, char do not co-exist with lake trout, yet we have recently observed lakes where char co-exist with lake trout, and surprisingly, char are larger and more numerous than lake trout. In this study, we investigated char across two neighboring lake complexes: 1) open lakes with multiple predators and connectivity to streams (char mean TL = 475 mm); and, 2) closed lakes with char only (char mean TL = 230 mm). Our goal was to quantify lake trophic structure and explore potential drivers of char dimorphism using diet and stable isotope analyses. Char diet analyses indicate similar diet composition and seasonal changes in prey selection, and isotopic analyses indicate lake trout are a trophic level above char; therefore, another mechanism likely accounts for char success in these lakes. In the face of a rapidly changing climate, a better understanding of what determines lake trophic structure is required, especially in the future as landscape connectivity may be altered by increased spring stream discharge or increased late-season intermittency.

Presentation Format: Oral
Presentation Type: Student

Improving our ability to estimate vital rates of endangered fishes on the San Juan River using novel applications of PIT tag technology

Presenting Author: Ben Stout

Contributing Authors: Ben Stout—Department of Watershed Sciences, Utah State University, Mary Conner—Department of Watershed Sciences, Utah State University, and Peter Mackinnon—Department of Watershed Sciences, Utah State University, Phaedra Budy—US Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and Ecology Center, Utah State University and Mark McKinstry—US Bureau of Reclamation

Abstract: Accurate estimates of organism's vital rates are essential for tracking and understanding the successful recovery of endangered species. The razorback sucker (*Xyrauchen texanus*) and the Colorado pikeminnow (*Ptychocheilus lucius*) are federally endangered fish historically found in the San Juan River. Population abundance of both fishes appears to have increased but the degree of improvement is unknown. Our goal is to provide robust estimates of survival and trend and to identify influential management actions. Passive Integrated Transponder (PIT) tags to allow researchers to track movement and estimate vital rates of fish. Mobile PIT tag antenna systems (e.g., on a floating raft) have recently been developed to increase resight rates.

Although promising, mobile systems present new challenges to estimation techniques. Tags, not fish, are detected thus increasing the chance that shed tags or dead fish with tags are being detected which could lead to dramatic over-estimation of survival. We need to determine distance and direction moved between detections in order to classify tags as live or dead and develop analytical correction rule sets for use in estimates of survival, etc. Preliminary analysis suggests this method may be extremely useful in censoring data and increasing annual fish resighting numbers. Collectively these techniques should improve the accuracy and precision of estimates of vital rates and provide new information about post stocking location and habitat selection while simultaneously decreasing the resources needed to achieve these results.

Presentation Format: Oral

Presentation Type: Student

Reasons For Recent Increased Natural Recruitment Of Bear Lake Cutthroat Trout (Oncorhynchus clarki utah) In Bear Lake 2002-2016

Presenting Author: Scott Tolentino—Utah Division of Wildlife Resources

Abstract: The Utah Division of Wildlife Resources (UDWR) and Idaho Department of Fish and Game (IDFG) have worked together since the 1930's in managing the fishery of Bear Lake. The "Bear Lake Cutthroat Trout Enhancement Project" was conceived in 1973 by the UDWR and has had at least one full time biologist dedicated mainly to the Bear Lake fishery. The project placed a special emphasis on determining the status of the Bear Lake Cutthroat Trout (Oncorhynchus clarki utah) sport fishery. The main focus of the initial project was on collecting Cutthroat Trout eggs at the fish traps on tributary streams, both in Utah and Idaho. The goal was to propagate enough Cutthroat Trout to maintain a viable sport fishery since it was not possible using natural recruitment due to stream flows being either severely reduced and/or dewatered for crop irrigation in the spring and summer months. During this time (1973-1989) both UDWR and IDFG participated in annual joint meetings to discuss the past accomplishments and future direction of the fishery management on Bear Lake. However, in the late 1980's, the focus of the project began to change to change to managing not only the sport fishery but the entire watershed and fish species complex. A written Bear Lake Fisheries Management Plan was developed in 2008 between the two states which gave further direction to managing the fishery and addressed all fish species, although the results presented here are focused only on Cutthroat Trout. Both agencies, in cooperation with Trout Unlimited and several other groups, including land developers, have worked tirelessly to install fish screens on irrigation diversions on tributary streams to prevent both adult and juvenile fish loss, improved upstream and downstream passage for all fish, worked with irrigators and developers to conserve water through more efficient irrigation practices, and conducted in-stream habitat projects to benefit both the spawning and rearing habitat for Cutthroat Trout. Between the two state agencies, millions of dollars have been spent on these efforts. The results of these projects are beginning to show with greater numbers of naturally recruited Cutthroat Trout being captured in annual gill-net monitoring, in Swan Creek fish trap, and caught by anglers.

Presentation Format: Oral

Presentation Type: Professional

Predicting effects of mussel invasion on food web structure in Lake Powell

Presenting Author: Joshua Verde

Contributing Authors: Joshua Verde and Mark C. Belk—Department of Biology, Brigham Young University

Abstract: Abstract: Invasive species are a major concern for existing food webs in aquatic ecosystems. Negative effects of invasive species include competition with existing species and disruption of nutrient cycling. In 2012, the quagga mussel (*Dreissena rostriformus bugensis*) was introduced into Lake Powell and is expected to move throughout the reservoir in the near future. The quagga mussel has the potential to compete with existing zooplankton and to stop nutrients from entering the pelagic arm of the food web, and instead directing them to the benthos, making them less available to higher trophic levels. To predict the long-term effects of quagga mussels, we will use stable isotope analysis to characterize the food web in Lake Powell. Samples from aquatic and terrestrial primary producers, aquatic primary consumers, prey fish species, and predator fish species will be analyzed for stable isotope ratios. The use of a Bayesian statistical mixing model will allow us to determine the strength of interaction and proportional contribution from prey species to predators.

Presentation Format: Poster
Presentation Type: Student

Determining long-term trends in trout populations using standard stream electrofishing methods: is the extra pass worth it?

Presenting Author: Emily Wright

Contributing Authors: Emily Wright—Department of Wildland Resources, Utah State University, Phaedra Budy—US Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, and the Ecology Center, Utah State University, and Gary P. Thiede—Department of Watershed Sciences, Utah State University

Abstract: Obtaining robust fish abundance and trend estimates are critical for sound management but can be a cost and time burden on fish management agencies using standard electrofishing methods and estimation techniques. Therefore, it is important to evaluate whether these less extensive estimation techniques (e.g., fewer passes or CPUE) are sufficient for capturing long-term population trends, our goal herein. A long-term monitoring program of the fish community was initiated in 2001 in the Logan River, Utah. The primary objective was to determine distribution, population dynamics, abundance, and long-term trend of one of the largest remaining metapopulations of Bonneville cutthroat trout. Fish were collected annually at 8 sites using 3-pass depletions, and annual trout abundance estimates were computed using Program MARK. We also resampled these data to estimate abundances based on less extensive methods (e.g., 2-pass, 1-pass, and catch-per-unit-effort) for each species, enabling us to compare the efficiency of these different methods of estimating abundance, and ultimately in determining population trend. While the less intensive sampling techniques and estimation procedures did capture the same general trends in annual abundance, 3-pass depletion and the associated error estimation procedure resulted in much more precise estimates important for estimating trend (λ). Our results suggest that while a less intensive approach may be feasible at selected sites, 3-pass depletion should continue in at least a few selected and important long-term indicator sites. These results have implications for planning and maintaining long-term monitoring and evaluation programs, in particular when resources are limited as they often are for non-charismatic imperiled fishes of little economic or recreational value.

Presentation Format: Poster
Presentation Type: Student

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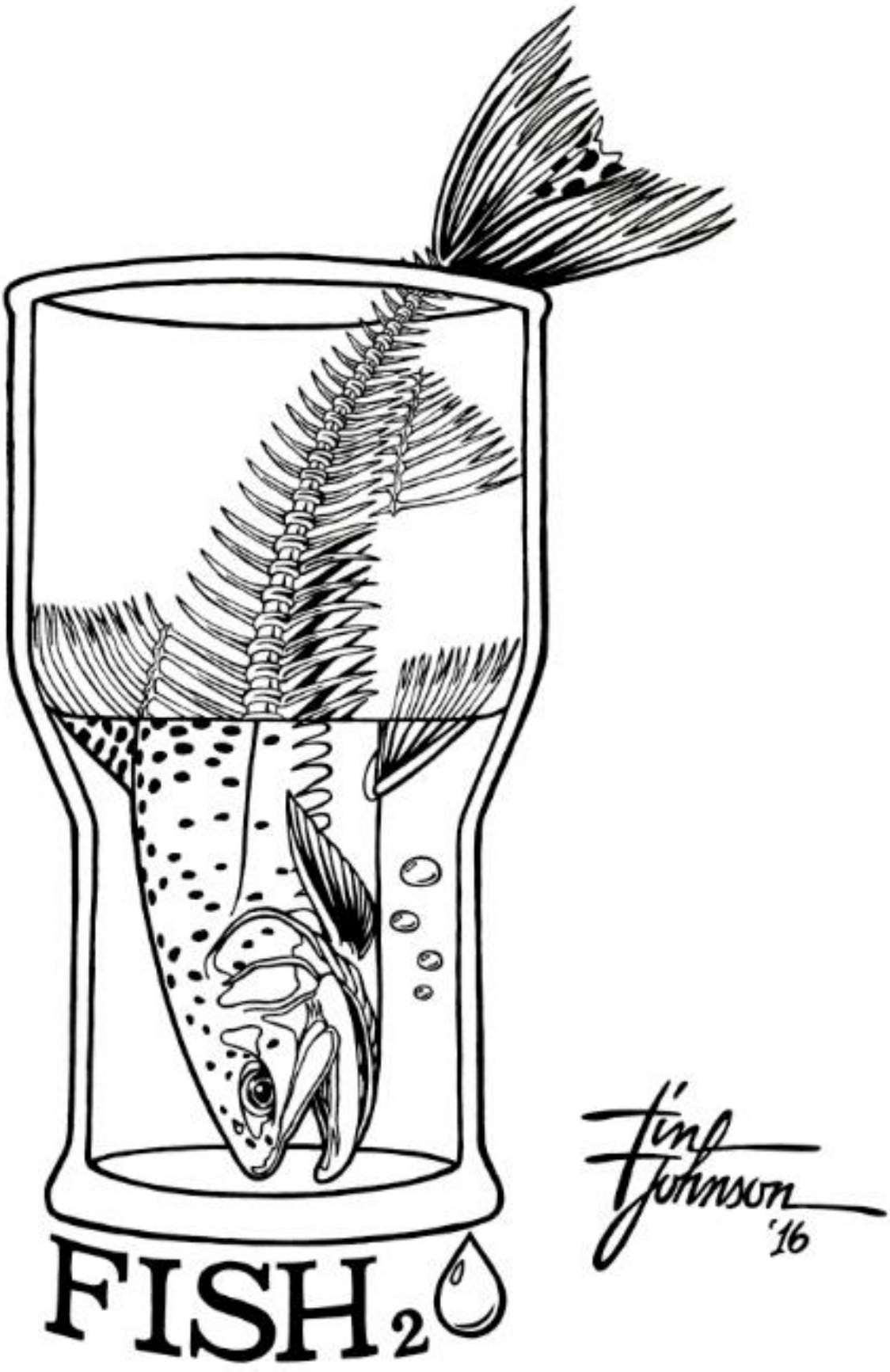
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