2015 PRESIDENT'S WELCOME

I am excited to have the opportunity to visit with you all in Moab, Utah! I encourage everyone to participate in the fundraiser trap shoot on your way home Thursday at the Green River Shooting Sports Park. Members of this chapter have one thing in common, we all work with fish. So your Executive Committee felt it was appropriate to keep the same theme as last year FISH! Something new for this year will be a single session for the presentations. We wanted everyone to have the opportunity to discover all the unique and incredible work the members of this chapter have accomplished. Our Chapter has an opportunity to host the Western Division Annual Meeting in a few years. I hope we accept that challenge and showcase our Chapter to the rest of the Division. I am excited to debut the new website. The future holds a lot of new and exciting things with social media and the new webiste. None of this would have been possible without the hard work of David Tinsley. Thank you to the presenters and the many volunteers who help put this meeting together. I am grateful for my fellow Executive Committee members (Jackie Watson, Mark Belk, Cassie Mellon, Trina Hedrick, Dan Keller and Mike Fiorelli) and all the hard work they have dedicated to our Chapter. Please do not hesitate to let any one of us know if you need anything this week.

Thanks for your support of Utah AFS.

Calvin Black

Calvin Black
President
Utah American Fisheries Society

2014 BEST PRESENTATION AWARDS

The Utah Chapter of the American Fisheries Society is pleased to congratulate the following 2014 best presentation winners:

BEST PROFESSIONAL PRESENTATION:

Travis Neebling, Wyoming Game and Fish (WDAFS), *Hydroacoustic Repeatability in High Savery Reservoir*

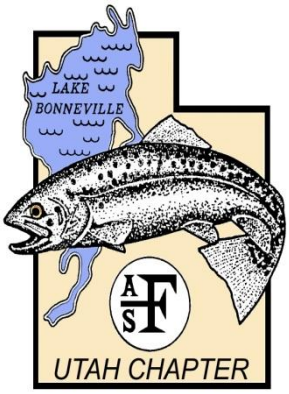
BEST STUDENT PRESENTATION:

Harrison Mohn, Utah State University, *Quantifying Bonneville Cutthroat Trout Spawning Movement within the Logan River Watershed with Consideration to Potential Metapopulation Structure and Management*

BEST STUDENT POSTER:

Kevin Chapman, Utah State University, *Evaluating the Potential Impacts of American White Pelican Predation on Bonneville Cutthroat Trout in Strawberry Reservoir, UT*

Desiree Lindly, Brigham Young University, *Morphometric Variation in June Sucker (Chasmistes Liorus) Brood Stock*



2015 UTAH CHAPTER OF THE AMERICAN FISHERIES SOCIETY MEETING

"FISH!"

March 24 - 26, 2015

Moab Valley Inn

Moab, Utah

MEETING AGENDA

TUESDAY, MARCH 24th

Time	Event	Location
1:00pm – 6:00pm	Registration Table/Information Booth	Moab Valley Inn
12:00pm – 1:00pm	Lunch on your own	Various
1:00pm – 5:00pm	Continuing Education Workshops *GIS Refresher Course (Eric Edgley UDWR)* *Partnering with Beaver in Restoration (Wally McFarlane and Elijah Portugal, USU)*	 Moab Room Canyonlands Room
5:00pm – 6:00pm	Free time	
6:00pm – 9:00pm	Opening Social	Canyonlands & Moab Rooms

WEDNESDAY, MARCH 25th

Time	Event	Location
6:00am – 7:30am	Breakfast (provided)	Arches Room
8:00am – 5:00pm	Registration Table/Information Booth	Moab Valley Inn
8:00am – 12:10pm	Exhibitor and Poster Setup	LaSal Room
8:00am – 8:30am	Conference Welcome (*Calvin Black– UTAFS President)* *Endangered Fishes of the Upper Colorado River Basin – (Chris Michaud – Native Fisheries Biologist, Utah Division of Wildlife Resources)*	Moab Valley Inn *Canyonlands and Moab Rooms*
8:30am – 9:50am *8:30am – 8:50am*	Fisheries Management and Monitoring: Weber River • *The Power and Potential of Partnerships; Building Partnerships in the Weber River Watershed to Protect and Restore Our Shared Values (Ben Nadolski – UDWR)*	*Canyonlands and Moab Rooms*
8:50am – 9:10am	• *Democgraphics, Status, and Restoration/Manangement Implications of Bluehead Sucker Populations in the Weber River, Northern Utah (Phil Tuttle – UDWR)*	*Canyonlands and Moab Rooms*
9:10am – 9:30am	• *Discovery of a Fluvival Population of Bonneville Cutthroat Trout in the Highly Fragmented Weber River (Paul Thompson – UDWR)*	*Canyonlands and Moab Rooms*
9:30am – 9:50am	• *Prioritizing Restoration Actions in the Weber River Basin: Turning Towards Habitat Reconnection as a Critical Restoration Tool (Paul Burnett – TU)*	*Canyonlands and Moab Rooms*
9:50am – 10:10am	Break with Exhibitors	LaSal Room
10:10am – 12:10pm *10:10am – 10:30am*	Fisheries Management and Monitoring • *The Restoration of Bonneville Cutthroat Trout in the Clear Creek Drainage, Utah (Mike Hadley – UDWR)*	Moab Valley Inn *Canyonlands and Moab Rooms*
10:30am – 10:50am	• *Consequences of Seasonal Variation in Reservoir Water Level for Predatory Fishes: Linking Visual Foraging and Prey Densities (Stephen Klobucar – USU)*	*Canyonlands and Moab Rooms*
10:50am – 11:10am	• *Comparative Demography of Two Small Stream Fishes in Response to Variable Stream Flow (Mark Belk – BYU)*	*Canyonlands and Moab Rooms*
11:10am – 11:30am	• *Diamond Mountain Lake Creel Survey: A Comparison of Contrasting Management Concepts (Garn Birchell – UDWR)*	*Canyonlands and Moab Rooms*
11:30am – 11:50am	• *Interactions Between Native and Non-Native Species in the Strawberry Reservoir Ecosystem: Is There Enough Fish to Go Around (Jamie Reynolds – USU)*	*Canyonlands and Moab Rooms*
11:50am – 12:10pm	• *Evaluating the Potential Impacts of American White Pelican Predation on the Fishery in Strawberry Reservoir, Utah (Kevin Chapman – USU)*	*Canyonlands and Moab Rooms*
12:10pm – 2:00pm	Business Lunch (provided)	LaSal Room

WEDNESDAY, MARCH 25th (continued)

2:00pm – 3:40pm *2:00pm – 2:20pm*	Aquatic Invasive Species and Motorboat Access / Poster Session (concurrent sessions) • *The New Kamas Fish Hatchery (Wes Pearce – UDWR)* • *Poster Session*	Moab Valley Inn *Canyonlands and Moab Rooms* *LaSal Room*
2:20pm – 2:40pm	• *Optimizing Methods for Environmental DNA Collection Based on an Assay Developed for the New Zealand Mudsnail Potamopyrgus Antipodarum (Randy Oplinger – UDWR)* • *Poster Session*	*Canyonlands and Moab Rooms* *LaSal Room*
2:40pm – 3:00pm	• *Quagga Mussel Containment at Lake Powell: Interagency Cooperation (Nate Owens and Matt Bartley – UDWR)* • *Poster Session*	*Canyonlands and Moab Rooms* *LaSal Room*
3:00pm – 3:20pm	• *Implication of Quagga Mussels at Lake Powell for Northern Utah Water Bodies and Boaters (Sarah Seegert – UDWR)* • *Poster Session*	*Canyonlands and Moab Rooms* *LaSal Room*
3:20pm – 3:40pm	• *An Overview of the Boating Access Grant (Ty Hunter – UDPR)* • *Poster Session*	*Canyonlands and Moab Rooms* *LaSal Room*
3:40pm – 4:00pm	Break with Exhibitors	LaSal Room
4:00pm – 5:00pm *4:00pm – 4:20pm*	Aquatic Habitat Monitoring • *Yuba Reservoir Breakwater, the Potential Relationship Between Boating Infrastructure Development and Fisheries Habitat Enchancement (Craig Walker – UDWR)*	Moab Valley Inn *Canyonlands and Moab Rooms*
4:20pm – 4:40pm	• *Effects of Overwinter Hydration, Temperature, and Scarification on Seed Germination of Twelve Aquatic and Wetland Plant Species (Eric Wagner – UDWR*	*Canyonlands and Moab Rooms*
4:40pm – 5:00pm	• *The Recovery Potential Screening Tool for Utah: A Method for Prioritizing Aquatic Restoration (Ben Holcomb – UDWQ)*	*Canyonlands and Moab Rooms*
5:00pm – 5:30pm	Free Time	
5:30pm – 6:00pm	Pre-Banquet Sociel/Fundraiser Activities	
6:00pm – 9:00pm	Banquet	

THURSDAY, MARCH 26th

Time	Event	Location
6:00am – 7:30am	Breakfast (provided)	Arches Room
8:00am – 9:40am	Registration Table/Information Booth	Moab Valley Inn
8:00am – 10:00am *8:00am – 8:20am*	Stream Restoration • *Understanding Livestock Grazing and Fish on Federal Lands (Brett Roper – USDA Forsest Service)*	Moab Valley Inn *Canyonlands and Moab Rooms*
8:20am – 8:40am	• *Bringing Back the Trout: Metapopulation Viability of Bonneville Cutthroat Trout in a Fire-Impacted Watershed (Colton Finch – USU)*	*Canyonlands and Moab Rooms*
8:40am – 9:00am	• *The Use of Existing Large Wood and Rock Debris in Aquatic Habitat Rehabilitation After a Catastrophic Fire in South-Central Utah (Nic Braithwaite – UDWR)*	*Canyonlands and Moab Rooms*
9:00am – 9:20am	• *Upper Bear River Stream Restoration (Jim DeRito – TU)*	*Canyonlands and Moab Rooms*
9:40am – 10:00am	• *An Experimental Habitat Enhancement Effort for Utah's Desert Fishes: San Rafael River Restoration Project Update (Brian Laub – USU)*	*Canyonlands and Moab Rooms*
10:00am – 10:20am	Break	LaSal Room
10:20am – 12:40am *10:20am – 10:40am*	Recovery Programs and Fisheries Management and Monitoring Native Fish • *Humpback Chub, Gila Cypha (Julie Howard – UDWR)*	Moab Valley Inn *Canyonlands and Moab Rooms*
10:40am – 11:00am	• *Fish Forensics: Using Otolith Microchemistry to Decode the Mystery of Natal Origin of an Endangered Lake Sucker (Deanna Strohm – USU)*	*Canyonlands and Moab Rooms*
11:00am – 11:20am	• *Use of Remote Pit Scanners to Monitor June Sucker in Utah Lake (Chase Ehlo – Marsh & Associates, LLC)*	*Canyonlands and Moab Rooms*
11:20am – 11:40am	• *Is What You Eat More Important Than What's Eating You? Top-Down Versus Bottom - Up Effects on Body Shape Utah Chub, Gila Atraria (Madison Maxwell – BYU)*	*Canyonlands and Moab Rooms*
11:40am – 12:00pm	• *Using Pit Tag Antennas to Evaluate a Weir Designed to Reduce Entrainment of Endangered Fish in Canals (Peter MacKinnon – UDWR)*	*Canyonlands and Moab Rooms*
12:00pm – 12:20pm	• *Successful Management of Stewart Lake Wetland as a Nursery for Endangered Razorback Sucker, Xyrauchen Texanus, on the Middle Green River, Utah (Robert Schelly – UDWR)*	*Canyonlands and Moab Rooms*
12:20pm – 12:40pm	• *Anthropogenic Stressors of Aquatic Ecosystems and the Services They Provide (Jereme Gaeta – USU)*	*Canyonlands and Moab Rooms*

THURSDAY, MARCH 26th (continued)

Time	Event	Location
12:40pm – 1:30pm	Lunch (provided)	LaSal Room
12:40pm – 2:30pm	Free time	Various
2:30pm –	Trap Shoot (Competitive and Non-Competitive)	Green River Shooting Sports Park

2015 FUNDRAISING ITEMS

GENERAL RAFFLE: $1 ticket or Wingspan of tickets for $20

BioWest Fly Rod – Sage VXP 486-4 8'6" 5 wt. 4 pc	All general raffle tickets
Swiss Army Fisherman's knife	Bucket
Timber Ridge high back shooters stool donated by Cal Ranch (2)	Bucket
Silver endangered fish necklace by Melissa Trammell	Bucket
8x10 Bonneville Cutthroat Print (matted) by Travis Sylvester	Bucket
14x7 Strawberry Cutthroat Print by Travis Sylvester	Bucket
13x8 Tranquility Print by Travis Sylvester	Bucket
Set of 4 marble coasters with fish prints by Travis Sylvester	Bucket
Jim Teeney 4-rod case	Bucket
Two day passes for two people to Hogle Zoo	Bucket
Fish Fossil from Moab Rock Shop	Bucket
One day off road jeep rental from Twisted Jeeps	Bucket
12" dutch oven from Camp Chef	Bucket
Tundra 65 cooler from Yeti	Bucket
Two family day passes to Lava Hot Springs	Bucket
Silver Horde 3 pocket flasher bag full of flies, flashers, and plugs	Bucket
Dale Hepworth print	Bucket
Dale Hepworth print	Bucket
In-Fisherman Smallmouth bass book, secrets books, calendar, and hat	Bucket
In-Fisherman Largemouth bass book, secrets books, calendar, and hat	Bucket
Fish Eagle Classic Spinning rod combo from Cabela's	Bucket
Headlamp and water bottle from Cabela's	Bucket
LED Lantern from Cabela's	Bucket
Cabela's Duffel bag with surprise inside	Bucket
Shimano Caenan 100 reel	Bucket
Frabill Ice combo 22"	Bucket
Glacier Ice combo + Browning knife and bottle opener	Bucket
Browning spinning rod + Knife and bottle opener	Bucket
Glow in dark ice rod set 28, 26, 45" from Christensen Tackle	Bucket

*Each item will have its own bucket. Choose what you put in for!

DECK OF CARD ITEMS

Package 1: Eskimo Mako 8" ice auger Frabil Ice Combo 24" Ice Scoop	$25
Package 2: R.L Winston 9' 5 wt maple fly rod	$10 Small Trout Print
Package 3: Falcon's Ledge 1-year membership Box of 12 flies (John Schultz)	$10
Package 4: 18 x 14 Gallery Wrapped canvas "Freestone" limited artist proof	$15
Package 5: 18x14 cutthroat trout print by Dale Hepworth	$15
Package 6: Smith and Wesson M&P 15-22 .22LR semiautomatic rimfire rifle and brick of .22 shells	$25
Package 7: Campchef Smoke Vault 18"	$10
Package 8: Browning Whitetail Legacy Knife	$10

TRAP SHOOT PRIZES

First Place	Mossberg 12 gauge shotgun
Second Place	Allen shotgun shell bag
Third Place	Allen shotgun shell bag

ENDANGERED FISHES OF THE UPPER COLORADO RIVER BASIN

CONTRIBUTING AUTHORS: Chris Michaud – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Chris Michaud – Native Fisheries Biologist; Moab Field Office; Utah Division of Wildlife Resources; cmichaud@utah.gov

ABSTRACT: The Colorado River Basin drains an estimated 243,000 square miles and includes territory in seven U.S. states and Mexico. The Colorado River flows from its headwaters in Wyoming and Colorado through Mexico to the Sea of Cortez, historically. Habitat within the basin ranges from estuary-like zones near the mouth in the Sea of Cortez to large, warm, meandering river sections to steep gradient, cold temperature headwater streams. Within the basin there are 36 native fish species over half of which are endemic to the drainage; twenty-one species are federally listed as threatened or endangered. The potential for the extinction of four native riverine species, the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*) and bonytail chub (*Gila elegens*), prompted the creation of both the Upper Colorado River Recovery Program and the San Juan River Recovery Implementation Program, involving over 15 collaborating federal and state agencies and private interest groups. These programs work to recover the four endangered species through increasing public awareness, native species monitoring and nonnative control. Declines in these populations are thought to be due to water development and impoundments, drought, changes in riparian vegetation and the introduction of many competitive fish species to the system; to date there have been 72 fish species introduced to the basin ranging in size from 30 mm (*Gambusia spp*) to 550 mm (*Sander vitrius*). The conservation of these species can benefit the system by maintaining a high level of biodiversity. Additionally, the continued presence and recovery of these species could lead to the restoration of historical uses; these fishes, particularly the Colorado pikeminnow were actively fished for, were entertaining to capture and considered quite a treat.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Upper Colorado River Basin

THE POWER AND POTENTIAL OF PARTNERSHIPS; BUILDING PARTNERSHIPS IN THE WEBER RIVER WATERSHED TO PROTECT AND RESTORE OUR SHARED VALUES

CONTRIBUTING AUTHORS: Ben Nadolski – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Ben Nadolski – Utah Division of Wildlife Resources; bennadolski@utah.gov

ABSTRACT: The Weber River watershed provides drinking water for more than 20% of all Utahn's, and provides significant economic and recreational benefits to many people. The demands and encroachment pressures on the Weber River and its tributaries are ubiquitous and diverse, and as a result, the system is heavily managed and fragmented, all of which has led to widespread and long-term economic, socio-political, ecological and recreational implications. In a system that is equally complex as it is important and encroached upon, no single interest or entity can or should dictate the terms of its management or the fate of its future. Therefore, in cooperation with a diverse set of stakeholders and partner organizations, we have developed a new cooperative framework called The Weber River Partnership, which seeks to ensure the long-term sustainability of the natural environment, economy and lifestyles that make the Weber River watershed a unique and desirable place to live, work and play. To date, this broad-based and growing partnership is comprised of over 200 individuals that represent 64 different organizations, and includes members from federal, state, county and municipal governments, non-governmental organizations, private industry, interest groups, private landowners, agricultural producers, water users, water managers, water reclamation districts and at-large community leaders. This new framework has provided a safe and inclusive environment for everyone's values and interests to be heard and considered, and it is proving to be a valuable communication and coordination mechanism for watershed managers, researchers and practitioners as they seek to leverage one another's time, talents and treasuriesstreams.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring: Weber River

DEMOGRAPHICS, STATUS, AND RESTORATION/MANAGEMENT IMPLICATIONS OF BLUEHEAD SUCKER POPULATIONS IN THE WEBER RIVER, NORTHERN UTAH

CONTRIBUTING AUTHORS: Phil Tuttle – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Phill Tuttle – Utah Division of Wildlife Resources; philiptuttle@utah.gov

ABSTRACT: Bluehead sucker (*Catostomus discobolus*) are known to occur throughout the Colorado, Snake, and Bonneville Basins, but until recently little information on this species was known outside of the Colorado River Basin. Recent MtDNA genetics results identified three bluehead sucker evolutionarily significant units (ESUs), which indicate that populations in the Bonneville/Snake Basins are distinct from those residing in the Colorado Basin. These ESUs may be considered different species in the near future. This recent finding has further prompted state wildlife agencies to better determine the population distribution and status of bluehead suckers in the Bonneville/Snake River Basins. In Utah, the Utah Division of Wildlife Resources (UDWR) began surveying in 2003 for bluehead suckers in the Snake, Bear, and Weber rivers. Bluehead sucker populations remain in many sections of the Weber River, a robust population has been discovered in the Raft River, but no populations have been found in the Utah portion of the Bear River. The UDWR began monitoring populations in the Weber River in 2007 with mark/recapture electrofishing and through the use of Passive Integrated Tags; these populations are small and reproduction/recruitment is limited. The Weber River is a highly fragmented stream, but mark/recapture information indicates that bluehead suckers are moving long distances of up to 15.0 km. Additionally, age and growth data collected in 2014 illustrates limited recruitment and or reproductive success within sections of the Weber River. Population monitoring of the Weber River has prompted the collection and transfer of one particular declining population of bluehead suckers in 2015. In an effort to understand and reconnect bluehead sucker habitat and its life history, the UDWR and partners are working together to fund and conduct additional research in the near future. Considering the genetic background, the significant potential for river restoration, and the lack of recruitment, we feel the Weber River bluehead sucker populations are imperiled and warrant additional research and management focus.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring: Weber River

DISCOVERY OF A FLUVIAL POPULATION OF BONNEVILLE CUTTHROAT TROUT IN THE HIGHLY FRAGMENTED WEBER RIVER

CONTRIBUTING AUTHORS: Paul Thompson and Matt McKell – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Paul Thompson – Utah Division of Wildife Resources; paulthompson@utah.gov

ABSTRACT: The presence of large Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) in the lower Weber River prompted the Utah Division of Wildlife Resources (UDWR), Utah State University, and Trout Unlimited to complete a study to characterize the life-history of this population. Between 2011 and 2014, nearly 2,000 Bonneville Cutthroat Trout were marked with Passive Integrated Transponder (PIT) tags and 5-9 Passive Instream Arrays (PIA) were placed into 5-8 tributary streams each year. Bonneville Cutthroat Trout have moved into each of the tributary streams and have traveled up to 27 km to spawn in a given year. These data verify that a fluvial population remains in the lower Weber River. Six mainstem and 10 tributary barriers to fish movement have been identified, however, PIT-tag recapture and PIA data indicate that some of these barriers are more permeable than originally believed during some flow regimes or depending on how some in-stream structures are operated. For example, 28 fluvial Bonneville Cutthroat Trout have been documented to move upstream past a major Weber River mainstem structure during times of the year when operation favored fish passage. To date, one mainstem and two tributary structures have been modified to allow fish passage and other barriers targeted for fish passage are being prioritized using data from this study.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring: Weber River

PRIORITIZING RESTORATION ACTIONS IN THE WEBER RIVER BASIN: TURNING TOWARDS HABITAT RECONNECTION AS A CRITICAL RESTORATION TOOL

CONTRIBUTING AUTHORS: Paul Burnett – Trout Unlimited

PRESENTING AUTHOR: Paul Burnett – Trout Unlimited; PBrunett@tu.org

ABSTRACT: Recent advances in our knowledge about the distribution of native fish populations in the Weber River and their life history requirements have led us to reevaluate our stream restoration priorities in the basin. Previous priorities were focused around physical habitat restoration and bank stabilization, with many of the projects occurring on small scales. Recent movement data for Bonneville cutthroat trout and bluehead sucker have shown a clear need to undertake projects with results that encompass scales much greater than historically appreciated. Our priorities have shifted away from stream channel restoration and towards improving fish passage in stream segments containing important native fish resources. This method of restoration is aimed at increasing the resiliency of these populations by making more and diverse habitat available to the fish in these waters. These advances in our knowledge coupled with a recent effort among watershed stakeholders to improve collaboration through the development of the Weber River Watershed plan have translated into restoration actions that are more focused and meaningful within the basin. In this paper I highlight priority actions that have been taken in the Weber River mainstem and its tributaries to benefit both Bonneville cutthroat trout and bluehead sucker. To date, completed actions include fish passage at one mainstem irrigation diversion, and two barrier removals in direct tributaries to the Weber River, which support Bonneville cutthroat trout. Projects currently planned or scoped include passage at three additional mainstem dams and two more tributary barriers. I also present recommendations on ways to effectively advance complex restoration projects with nontraditional partners such as water users.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring: Weber River

THE RESTORATION OF BONNEVILLE CUTTHROAT TROUT IN THE CLEAR CREEK DRAINAGE, UTAH

CONTRIBUTING AUTHORS: Mike Hadley – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Mike Hadley – Utah Division of Wildlife Resources; michaelhadley@utah.gov

ABSTRACT: The Bonneville cutthroat trout *Oncorhynchus clarkii utah* (BCT) is the only salmonid native to Utah's Sevier River basin. Like many other western native trout, BCT have been lost from much of their historic range due to competition and hybridization with non native trout species, as well as habitat loss and degradation. Recovery and restoration efforts have been in progress for more than 30 years and have successfully prevented the listing of BCT as threatened or endangered. Clear Creek is one of the largest tributaries of the Sevier River in south central Utah. Prior to 1977, BCT had been eradicated from all but one mile of the Clear Creek drainage. Initial plans to restore BCT in three tributaries were expanded after the Twitchell Canyon wildfire burned 45,000 acres across the northern Tushar Mountains in 2010. Post-fire ash flows and flooding caused large scale losses of non native trout in Clear Creek and its two largest tributaries. Between 2011 and 2014, the remaining exotic fish were removed from 61 miles of Clear Creek and four of its tributaries through stepwise chemical treatments. Results of these treatments showed that post-fire flooding had eradicated all non native trout from 29 stream miles, much of which was downstream of the fire perimeter. Stocking of BCT began in 2012 and peaked in fall 2014 when 145,000 BCT fry were stocked in Clear Creek and its tributaries. Four other native fish species were salvaged prior to chemical treatments and will also benefit from the absence of non native fish. With 65 miles of trout habitat, the Clear Creek drainage will sustain the largest BCT population in the Sevier River Basin. This single project will elevate the proportion of the historic range in the basin occupied by BCT from 11% to 15%. In addition, Clear Creek and its tributaries now comprise the largest stream drainage in the state of Utah that is completely devoid of exotic fish species.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring

CONSEQUENCES OF SEASONAL VARIATION IN RESERVOIR WATER LEVEL FOR PREDATORY FISHES: LINKING VISUAL FORAGING AND PREY DENSITIES

CONTRIBUTING AUTHORS: Stephen L. Klobucar and Phaedra Budy – Utah State University

PRESENTING AUTHOR: Stephen Klobucar – Department of Watershed Sciences and The Ecology Center, Utah State University; Logan, Utah, 84322; stephen.klobucar@gmail.com

ABSTRACT: In reservoirs, seasonal drawdown can alter the physical environment and may influence predatory fish performance. We investigated the performance of lake trout *Salvelinus namaycush* in Twin Pots Reservoir, UT, by coupling field measurements with visual foraging and bioenergetic models at four distinct states (early summer, mid-summer, late summer, and fall). The models suggested that trout prey, juvenile kokanee *Oncorhynchus nerka*, are limited seasonally by suitable temperature and dissolved oxygen. Accordingly, prey densities were greatest in late summer when reservoir volume was lowest and fish were concentrated by stratification. Prey encounter rates (up to 68 fish·day^{-1}) and predator consumption are also predicted to be greatest during late summer. However, our models suggested that turbidity negatively correlates with prey detection and consumption across reservoir states. Under the most turbid conditions, lake trout did not meet physiological demands; however, during less turbid periods, consumption reached maximum bioenergetic efficiency. Overall our findings demonstrated that rapid reservoir fluctuations and associated abiotic conditions can influence predator-prey interactions, and our models described the potential impacts of water level fluctuation on valuable sport fishes.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Student
TOPIC: Fisheries Management and Monitoring

COMPARATIVE DEMOGRAPHY OF TWO SMALL STREAM FISHES IN RESPONSE TO VARIABLE STREAM FLOW

CONTRIBUTING AUTHORS: Mark C. Belk, Elias Combs, Josh Rasmussen, Jeff Wesner, and R. Cary Tuckfield – Brigham Young University

PRESENTING AUTHOR: Mark C. Belk - Brigham Young University; Provo, UT 84602; mark_belk@byu.edu

ABSTRACT: Populations of western stream fishes are strongly influenced by variation in stream flow driven by local climatic variation. Drought results in lowered stream flow and corresponding changes in survival and reproduction of stream fishes. We would expect selection to result in similar vital rates for all stream fishes in a given system. To test for differences between species we conducted a long-term mark-recapture study on northern leatherside chub (*Lepidomeda copei*) and speckled dace (*Rhinichthys osculus*) in a small tributary of the Bear River (Yellow Creek) in southwestern Wyoming. Our three recapture efforts included one high water year and two extremely low water years. We calculated survival, transition, and fecundity estimates for "good" and "bad" years and compared resulting demography between years and species. In good years when populations are increasing, juveniles represent about ½ to 2/3 of the population for both species. Both survival and fecundity rates declined in bad years for both species. Overall, speckled dace were demographically more resilient to bad years than northern leatherside chub. Small changes in incidence and severity of drought (or increased water withdrawals) will likely lead to extirpation of isolated populations of northern leatherside chub.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring

DIAMOND MOUNTAIN LAKE CREEL SURVEY: A COMPARISON OF CONTRASTING MANAGEMENT CONCEPTS

CONTRIBUTING AUTHORS: Garn Birchell and Trina Hedrick -- Utah Division of Wildlife Resources

PRESENTING AUTHOR: Garn Birchell; Utah Division of Wildlife Resources; 318 North Vernal Ave.; Vernal, UT; 84078; garnbirchell@utah.gov

ABSTRACT: From April through November 2012 a roving creel survey was conducted at Matt Warner and Calder Reservoirs in northeastern Utah. Both reservoirs are rainbow trout fisheries, but management concepts between the two reservoirs differ. Matt Warner is managed as a basic yield fishery while Calder is managed as a trophy water. As a result of these contrasting management concepts the angler clientele for the two reservoirs also differs. The clientele for Matt Warner is primarily local bait fishing anglers while Calder attracts fly fishing anglers primarily from Wasatch Front counties. Angler use was 92 hours/surface acre at Calder and 76 hours/surface acre at Matt Warner. Despite lower stocking rates at Calder Reservoir angler catch rates were higher at 1.5 fish/hour versus 1.3 fish/hour at Matt Warner. With the angler clientele and regulations at Calder harvest was essentially zero. At Matt Warner anglers harvested over 14,000 fish, which is approximately 25% of the annual stock. Average fish lengths from the creel were 455 mm at Calder and 391 mm at Matt Warner. These averages place fish at Calder close to the proportional stock density (PSD) category of preferred (500 mm) while Matt Warner is close to quality category (400 mm). Fish in the memorable (650 m) and trophy (800 mm) categories were not measured at either reservoir during the creel or during 2012 gillnet surveys. Anglers at both reservoirs were asked to rate their fishing experience and if they liked how the reservoirs were managed. Angler response to angler satisfaction and management was overwhelmingly positive.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring

INTERACTIONS BETWEEN NATIVE AND NON-NATIVE SPECIES IN THE STRAWBERRY RESERVOIR ECOSYSTEM: IS THERE ENOUGH FISH TO GO AROUND?

CONTRIBUTING AUTHORS: Jamie Reynolds, Phaedra Budy, Gary Thiede, Kevin Chapman – Utah State University

PRESENTING AUTHOR: Jamie Reynolds - Department of Watershed Sciences and the Ecology Center; Utah State University; Logan; Utah 84322; Jamie.reynolds17@aggiemail.usu.edu

ABSTRACT: Predation and competition are natural ecological processes, though these interactions occasionally cause concern among humans when ecosystem services are involved (e.g., popular fisheries in highly managed systems). The population of American white pelican (*Pelecanus erythrorhynchos*) at Strawberry Reservoir (Utah) has increased dramatically in the last decade, as have the populations of Utah sucker (*Catostomus ardens*) and Utah chub (*Gila atraria*). Anglers and managers are concerned that predation by pelicans and competition from non-game fish species are negatively impacting the reservoir's prized Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) fishery. This project focused on non-game fishes and is part of a larger project that examines potential pelican predation on fishes, with an emphasis on cutthroat trout. Our goals included assessing potential for net bias, estimating age-class structure and body condition of non-game fishes, and determining the relative impact pelicans have on the non-game fishes of the reservoir. During the 2014 field season, we caught multiple species of fishes using trap nets and gill nets, measured all captured fishes, conducted counts of the pelican population, and gathered pelican diet samples. Using a Kolmogorov-Smirnov test we determined that gillnets are biased towards larger fishes. Based on length-weight regressions and Fulton's K factor, we observed higher body condition for Utah chub relative to Utah sucker. By identifying dominant modes of size-frequency distributions and comparing the modes to age-at-length data from previous studies, we estimated that captured Utah chub were age-1 and older, while captured Utah sucker were age-4 and older. We also evaluated the relationships between the number of pelicans and the catch-per-unit-effort of fishes at four different locations in the reservoir, and observed no clear relationship. These results will provide useful information for fish population modeling in the future, for informing the next and final season of field data collection, and for critical management decisions for both birds and fishes in the reservoir.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Student
TOPIC: Fisheries Management and Monitoring

EVALUATING THE POTENTIAL IMPACTS OF AMERICAN WHITE PELICAN PREDATION ON THE FISHERY IN STRAWBERRY RESERVOIR, UTAH

CONTRIBUTING AUTHORS: Kevin Chapman and Phaedra Budy – Utah State University; Frank Howe – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Kevin Chapman – Department of Watershed Sciences & the Ecology Center; Utah State University; Logan, UT 84322-5210; kevgchapman@gmail.com

ABSTRACT: At Strawberry Reservoir, Utah, potential predation by seasonal flocks of American white pelicans (*Pelecanus erythrorhynchos*) on Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) is perceived as affecting trout spawning behavior and survival. To address this, we are estimating the numeric impact of pelican predation on cutthroat trout and other fishes. To accomplish this, we are PIT tagging trout in the reservoir and at the hatchery and Floy-tagging non-game fish; we are recovering tags by scanning pelican loafing areas as well as tracking PIT-tagged fish movements in and out of tributaries with passive integration arrays. We are also collecting pelican diets and isotopic signatures, and experimentally manipulating the distribution of pelicans via selective hazing techniques in two tributaries. Pelican diet samples indicated >95% of the fish consumed during the study period were Utah sucker (*Catostomus ardens*), while <4% consisted of trout; however, year 1 diets were collected primarily later in the season (e.g., after the peak of the cutthroat trout run). Based on a bioenergetics model constructed from the individual diet analysis and expanded to the counts of the pelican population between 30 May and 30 August, we estimated that pelicans consumed 46 tonnes of Utah sucker and 0.33 tonnes of Bonneville cutthroat trout. Using average weights of the prey, this constitutes 50,223 Utah sucker and 378 trout consumed. Ten of 1095 PIT tags implanted into cutthroat trout were found in pelican loafing areas, as well as 57 tags of 3000 implanted into cutthroat trout stocked in 2013. Ultimately, we will use data from UDWR and our field collections to develop a population model, to determine if the level of predation is significant relative to other sources of mortality. Our findings have implications for the continuing management success of both the valuable fisheries and pelicans in Utah.

PRESENTATION FORMAT: Student
PRESENTATION TYPE: Professional
TOPIC: Fisheries Management and Monitoring

THE NEW KAMAS FISH HATCHERY

CONTRIBUTING AUTHORS: Wes Pearce – Utah Division of Wildlife Resources, Kamas State Fish Hatchery

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ABSTRACT: The Kamas Fish Hatchery was closed down in the fall of 2010 because of possible contamination of whirling disease from a large sinkhole discovered on Beaver creek; that had direct ties to the hatchery water system. A new way to treat all hatchery water had to be developed to continue operation at the hatchery. Construction began in 2011 to install a major filtration and UV system, as well a new recirculation system to improve hatchery operations, in low water years. In 2013, our first year of full operation Kamas Hatchery was able to raise 180,000 lbs of fish for the state of Utah on an extremely low water with year with this new technology.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Invasive Species

OPTIMIZING METHODS FOR ENVIRONMENTAL DNA COLLECTION BASED ON AN ASSAY DEVELOPED FOR THE NEW ZEALAND MUDSNAIL POTAMOPYRGUS ANTIPODARUM

CONTRIBUTING AUTHORS: Authors: Randy Oplinger, Eric J. Wagner, Larry Dalton and Jordan Nielson – Utah Division of Wildlife Resources; John Wood and Patrick Power – Pisces Molecular

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ABSTRACT: Abstract: Environmental DNA (eDNA) collection is a new technology that is being increasingly used to detect species presence. The use of eDNA sampling is currently more accepted among researchers than fisheries managers and use of eDNA sampling among management agencies will likely increase as improvements in sampling methodology and understanding of error rates are made. We conducted a series of laboratory and field studies with the goal of optimizing methods for eDNA sampling for the New Zealand mudsnail *Potamopyrgus antipodarum* (NZMS). We demonstrate that 10 μm pore diameter filters collect NZMS eDNA more efficiently than 0.45 μm pore diameter filters and that the quantity of DNA captured on the 10 μm filters increased with the volume of water processed whereas the quantity of DNA collected did not increase with water volume when 0.45 μm filters were used. We also found that the quantity of DNA collected increased with NZMS density, but that there was no relationship between NZMS density and the average number of DNA molecules collected per milliliter of water filtered. Field sampling showed that the distribution of NZMS eDNA is patchy and that the concentration of eDNA did not increase as water flowed downstream. Finally, our data shows that our assay correctly determines the presence of NZMS in 20% of samples taken at low density (<150 individuals/m^2) and that at these low densities that 14 eDNA samples need to be taken to be 95% confident about NZMS presence and that 21 eDNA samples need to be taken to be 99% confident about species presence. Our data shows that eDNA sampling can effectively detect NZMS and that optimization of sampling methodology can significantly decrease the costs and man-power associated with eDNA sampling.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Invasive Species

QUAGGA MUSSEL CONTAINMENT AT LAKE POWELL: INTERAGENCY COOPERATION

CONTRIBUTING AUTHORS: Nathan Owens and Matt Bartley – Utah Division of Wildlife Resources

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ABSTRACT: Lake Powell is a huge destination location for water related recreation. It was predicted to be the first waterbody of the western states to become infested with quagga/zebra mussels. In 2014 it was evident the mussels were well established in the lake, and the need arose to shift efforts from prevention to containment. Both the National Park Service and the Utah Division of Wildlife recognized this need, but differed in the approach to making the shift. Utah reallocated statewide resources to drastically increase efforts to inspect and educate boats leaving Lake Powell. The National Park Service decreased screening of incoming boats and started education efforts to inform boaters of the issue. Consequently, these efforts lead to some negative impacts to the partnership with the NPS and UDWR as well as the public stakeholders. In order to meet long term goals of both agencies, trust needed to be reestablished in the partnership. This was completed by an increase in communication, more focused/effective meetings, and a joint effort in the indirect but related activity of monitoring the biological advances of the mussels through a series of cooperative interdependent scuba dives. Building on the communication and scuba dives, a core team emerged that was able to pull back from their respective agency needs and establish a consensus on the common ground among all agencies. At this point we were able to shift from independent efforts to a more unified and efficient approach. This has proved to be a more effective approach to the interagency cooperation. However, this still leaves the obvious barriers of differing goals, authority, timelines, agency organizational structures and policies. While there are many challenges to working with multiple agencies, especially between state and federal, common grounds can be established and built upon to result in a mutually beneficial partnership.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Invasive Species

IMPLICATION OF QUAGGA MUSSELS AT LAKE POWELL FOR NORTHERN UTAH WATER BODIES AND BOATERS

CONTRIBUTING AUTHORS: Sarah Seegert - Utah Division of Wildlife Resources

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ABSTRACT: The recent quagga mussel infestation at Lake Powell has the potential to affect lakes throughout Utah. Boats travelling from Lake Powell can spread quagga mussels to the next water bodies they visit. Widespread mussel invasions would have severe economic, environmental, and recreational impacts. In response to this threat, the Utah Division of Wildlife Resources is taking steps to improve boat inspection and decontamination services along the Wasatch Front. Installation of three semi-permanent decontamination stations is planned in 2015 and 2016 in northern and central Utah. In addition, in 2014, roadside inspection stations were operated daily surrounding Bear Lake. Similar inspection stations near Lake Powell are planned in 2015 to contain the mussel infestation. These approaches are designed to maintain motor boat access to Utah's water bodies while protecting the state's water resources from quagga mussel invasion.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Motorboat Access

AN OVERVIEW OF THE BOATING ACCESS GRANT

CONTRIBUTING AUTHORS: Ty J. Hunter – Utah Division of Parks and Recreation

PRESENTING AUTHOR: Ty J. Hunter – Boating Program Manager; Utah Division of Parks and Recreation; Salt Lake City; UT

ABSTRACT: An overview of the Boating Access Grant as to what projects qualify for the grant. Where applicants can find the application, the due dates, and the approval process. Showcase Boating Access Grant projects across the state. Boating activity trends and non-motorized projects on our lakes and rivers. Utah's Boating Program responsibilities and its key messages.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Motor Boat Access

AN ASSESSMENT OF THE BONNEVILLE CISCO PROSOPIUM GEMMIFER POPULATION IN BEAR LAKE, UT/ID 1989-2013

CONTRIBUTING AUTHORS: Scott Tolentino – Utah Division of Wildlife Resources

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ABSTRACT: Hydroacoustic monitoring of the Bonneville Cisco (Prosopium gemmifer) population in Bear Lake was developed by Utah State University (USU) in 1989. USU continued to monitor the population annually through 1996. In 1996, the Utah Division of Wildlife Resources (UDWR) acquired their own hydroacoustic system and compared the dual beam estimates of Bonneville Cisco made by USU to the split beam estimates made by UDWR. Only small, insignificant differences in population estimates were observed. From 1996-2013 the UDWR has assumed sole responsibility of annual, hydroacoustic sampling in order to monitor the population of Bonneville Cisco in Bear Lake. The annual data have that have been collected on a long term basis shows some promise in being able to track stronger year classes of Bonneville Cisco throughout their lifetime as well as recognizing difference in length/frequencies in some of the years. Bonneville Cisco numbers were relatively stable from 1989-1999 and averaged approximately 3-4 million fish. In 2000, their numbers increased, and although more variable, they stabilized at approximately 7-8 million fish from 2001-2014. Finally, it appears the Bonneville Cisco population fluctuations may be correlated with the number of stocked of juvenile Bonneville Cutthroat Trout, but more statistically analyses are necessary.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Professional

STARVATION RESERVOIR FISHERIES ASSESSMENT 2014

CONTRIBUTING AUTHORS: Natalie Boren – Utah Division of Wildlife Resources
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ABSTRACT: Starvation Reservoir is a Blue Ribbon Walleye Fishery located near the town of Duchesne Utah, and is rapidly turning from a regional fishery to a statewide destination fishery. In 2014, the first Fall Walleye Index Netting (FWIN) was conducted which gave fisheries biologists a more in-depth view into the current Walleye (*Sander Viterus*) population within the reservoir. Traditional methods of assessment for this reservoir were limited to a spring/summer surveys using standard experimental gillnets. The FWIN surveys were developed in Quebec, Canada and were standardized by Ontario officials to allow for the collection of biological information to support the management of a *percid* fishery dominated by walleye.

During this survey we collected information needed to characterize the fish community in the form of relative abundance, length distribution and condition. We also collected bony structures from Walleye and scales from Smallmouth Bass (*Micropterus dolomieu*) for development of age and growth data at the reservoir. A total of 392 fish representing 8 species were captured in the 2014 FWIN surveys at Starvation Reservoir.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Professional

AS THE TOAD HOPS AND GROWS: DISCOVERING THE FASCINATING LIFE-HISTORY OF BOREAL TOAD VIA MARK-RECAPTURE

CONTRIBUTING AUTHORS: Samuel McKay and Paul Thompson – Utah Division of Wildlife Resources

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Abstract: The UDWR Northern Region has marked over 2,000 individual boreal toads (*Anaxyrus boreas boreas*) with unique Passive Integrated Transponder (PIT) tags since 1999. Recapture data yields fascinating insights on the movement patterns, survival, growth rate, and population size for select boreal toad populations in Northern Utah. We have aged individual boreal toads at up to 15 years, and documented movements of up to 8 km between sites. The combination of unique radio frequency identification (RFID) technology and multiple surveys over time has allowed the UDWR to evaluate boreal toad population status and response to disturbance (wildfire) in the Grouse Creek Mountains, northwest Box Elder County. Methods of marking boreal toad with PIT tags, modeling population size, developing a growth curve to confidently estimate age by size (SV length), and examining movement patterns between isolated sites are presented.
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PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Professional

INTERNAL PARASITES OF A COMMUNITY OF ROCKFISH (SEBASTES SPP.) FROM SOUTHEASTERN ALASKAN WATERS

CONTRIBUTING AUTHORS: Camille Hull, Mehmet Cemal Oguz, Dennis Shiozawa, and Mark C. Belk
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ABSTRACT: We identified internal parasites of rockfish (family Scorpaenidae) of five different species. Two species were pelagic - Black Rockfish (Sebastes melonops), Yellowtail Rockfish (Sebastes flavidus). Four species were non-pelagic - Yelloweye Rockfish (Sebastes ruberrimus), Quillback Rockfish (Sebastes maliger), Tiger Rockfish (Sebastes nigrosintus). We found Nematodes and Digenea in the Quillback, Nematodes and parasitic copepods in the Black Rockfish, and Acanthocephalans and Cestodes in the Yelloweye Rockfish. The Yellowtail and Tiger Rockfish were clean of any intestinal parasites. We relate this information on prevalence of parasites to pelagic and non-pelagic behavior.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

LOST CREEK

CONTRIBUTING AUTHORS: Kyle Ashcroft and Mark Belk – Brigham Young University

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ABSTRACT: Introduced brown trout (Salmo trutta) are common to many streams of western North America. Brown trout are behaviorally dominant to native cutthroat trout (Oncorhynchus clarkia), and they may be demographically dominant. Demographics of brown trout and native cutthroat trout in small stream systems is poorly documented. We began an experiment to quantify the demographics of coexisting brown and cutthroat trout in a small stream system. Both species were found in the system, Length frequency distributions and abundance estimates indicate that the majority of cutthroats residing in the system are 1 year of age; whereas, the brown trout population is mainly composed of individuals greater than 1 year of age. Although these populations have coexisted for several generations, resident cutthroat trout populations do not seem sufficient to maintain the population. Thus, resident cutthroat populations may be dependent on adults moving upstream from Rex reservoir. Data from additional years will be required to determine how these species coexist in this stream.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

TROPHIC PARTITIONING IN ALASKAN ROCKFISH (GENUS SEBASTES)

CONTRIBUTING AUTHORS: Aaron Brooksby, Dennis Shiozawa, Mark C. Belk – Brigham Young University

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ABSTRACT: Ecological community assembly may follow a pattern of niche partitioning where similar species divide up available resources such that they divide up niche space, or they may be assembled according to a pattern of lottery competition where similar species occupy the same area of niche space, but recruitment of new individuals depends on a lottery process. To test for patterns consistent with niche partitioning or lottery competition models, we analyzed stable isotopes of carbon and nitrogen in pelagic and non-pelagic species of rockfish (genus *Sebastes*) from southeast Alaskan waters. The pelagic species feed at a lower tropic levels compared to the non-pelagic species. Non-pelagic rockfish show little to no niche difference among species. The community assembly of non-pelagic species supports a lottery competition model.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

THE INTESTINAL PARASITES OF A COMMUNITY OF STREAM FISHES IN CENTRAL UTAH

CONTRIBUTING AUTHORS: Matthew Rambo[1], Camille Hull[2], Ashlee Smith[2], Mark Belk[2], Mahmet Cemal Oguz[3]– Brigham Young University

PRESENTING AUTHOR: Matthew Rambo - Department of Biology; Brigham Young University; Provo, Utah; yojinbo86@gmail.com

ABSTRACT: To better understand parasite interactions with freshwater fish hosts, we investigated the intestinal parasites of a community of stream fishes in central Utah. We dissected and examined the intestinal tracts of five species of stream fish. Two species, *Cottus bairdii* (Mottled sculpin) and *Richardsonius balteatus* (Redside shiner), had no observable parasites. In the other three species, *Lepidomeda aliciae* (Southern leatherside chub), *Catostomus platyrhynchus* (Mountain sucker), and *Rhinichthys cataractae*(Longnose dace), we identified six hundred-eleven trematode metacercaria and three adult cestodes. Prevalence and intensity of parasites was highest in *L. aliciae*. Reasons for differential prevalence and intensity of parasites among host fish species are unknown, but there seems to be no relationship to trophic position in this fish community.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

COMPARING TWO METHODS FOR SAMPLING AND ESTIMATING ABUNDANCE OF MOTTLED SCULPIN IN THE LOGAN RIVER, UTAH

CONTRIBUTING AUTHORS: Nathan Malmborg, Gary Thiede, and Phaedra Budy – Utah State Univeristy

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ABSTRACT: Mottled sculpin (*Cottus bairdii*) are an important but very understudied component of many native fish communities of the Intermountain West. Three-pass depletions are one of the most commonly used abundance estimation techniques in stream fisheries science; however, resulting estimates can be biased low and underestimate fish abundance differentially across both species and size classes. Past efforts to quantify mottled sculpin densities in the Logan River, Utah have proven to be inaccurate and imprecise. Therefore, we used and completed a novel sampling technique to estimate abundance and determine bias in depletion-based abundance estimates. Our goals were to compare and contrast abundance and demographics of mottled sculpin between the sampling methods; therefore, we used a modified 0.5 m^2 benthic 'surber-like' sampler at six different sites previously surveyed by electrofishing. We randomly placed the surber sampler 20 times throughout each reach, and then manually disturbed the substrate for capture; all sculpin were then counted, measured, and released. Lengths and ages of sculpin we captured varied greatly between the two sampling methods; most sculpin captured using the surber sampler were age-0, whereas electrofishing captured all age classes of sculpin except age-0. Because of bias in the sizes of fish captured by the two methods, surber abundance estimates were skewed toward small fish (up to 8.8 sculpin / m^2) while electrofishing estimates (0.4 – 1.0 sculpin / m^2) underestimated the abundance of small sculpin. Pairing results between the two methods may be the most accurate means to quantify demographics and abundance of mottled sculpin the Logan River..

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

EVALUATING DIFFERENCES IN ARCTIC CHAR DIETS IN A PRISTINE LAKE VERSUS AN EXPERIMENTALLY FERTILIZED LAKE: IMPLICATIONS OF INCREASED NUTRIENTS ON AN ARCTIC FOOD WEB

CONTRIBUTING AUTHORS: Levi Simmons, Stephen Klobucar and Phaedra Budy – Utah State University

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ABSTRACT: Lakes in permafrost regions of the arctic are limited by nutrients (oligotrophic) and length of growing season, making the aquatic food web extremely sensitive to small changes in the biogeochemical environment. Thus, diets of arctic char (*Salvelinus alpinus*), an apex predator in these lakes, may vary seasonally and temporally depending on the biogeochemical properties of the surrounding landscape. We collected diets from small and large char across the growing season (from June through September 2014) in a reference lake and an experimental lake (i.e., fertilized from 2001 - 2013), and observed distinct temporal fluctuations in char diets between lakes. In the reference lake, all sizes of char fed primarily on mollusks (> 70% of diet by mass) during the early season (June), switched to predominantly chironomids (> 60%) during midseason (July), and returned to mollusks in late season (August – September) supplemented by zooplankton and trichopterans. By composition, diets of char in the fertilized lake were similar; however, seasonal diet shifts occurred approximately 2 weeks earlier for the midseason period and the late season, followed by a period where larger numbers of chironomid pupae and adult trichopterans (>60%). Our results indicate that seasonal availability of prey may be directly related to increased nutrient load in these nutrient-poor arctic lakes, and have further implications for arctic food webs in a changing lake climate that is anticipated to be both warmer and more productive.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

USING MULTIPLE LINES OF EVIDENCE TO ASSESS AQUATIC RESOURCE CONDITION FOR WESTERN PUBLIC LANDS: A CASE STUDY FROM THE NORTHERN GREAT BASIN, USA

CONTRIBUTING AUTHORS: Nicole Cappuccio - Utah State University and Scott Miller – Bureau of Land Management/National Aquatic Monitoritn Center

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ABSTRACT: Macroinvertebrate bioassessment tools are used to determine the biological condition of streams, but they do not identify the stressors responsible for degraded conditions nor the source of a given stressor. To address these issues, we selected sites on BLM land in Northeast California and Northwest Nevada using a spatially explicit random sample. At each site we measured biological, chemical, and physical attributes to make condition determinations. Using a multimetric index, we found 51.5% of stream km within the study area have degraded biological condition. Of the chemical and physical indicators calculated total nitrogen, total phosphorus, and canopy cover are the most pervasive stressors. We found that 68.0% of stream km have excessive total nitrogen, 41.7% have canopy cover below expected conditions, and 36.9% have excessive total phosphorus. Random forest models explained 27.8% of the variability in biological condition using total nitrogen and phosphorus concentrations, riparian habitat complexity, intermittent stream density, and watershed area. We hypothesize that the occurrence of these stressors will be related to the extent of cattle grazing within a given watershed, the predominate land-use in the study area. We are developing random forest models to relate the identified stressors to anthropogenic land uses. For public land management agencies, identifying priority stressors and their likely sources is critical to adaptively managing permitted uses to ensure sustainable resource management for present and future generations.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

FOOD WEB WITHIN FISH LAKE: ARE LAKE TROUT GROWING AS LARGE AS THEY SHOULD?

CONTRIBUTING AUTHORS: Weston Gleave and Mark Belk – Brigham Young University

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ABSTRACT: Lake trout are an important part of the fishery in Fish Lake, Utah. These are relatively slow growing fish with low reproductive potential and long life expectancy. We have performed stable isotope analysis of the aquatic community within Fish Lake to determine trophic relationships. Large lake trout occupy the highest trophic levels in Fish Lake and seem to be feeding on perch, chubs, suckers, and hatchery rainbow trout. Small lake trout share a trophic level with splake and larger rainbow trout and feed on macroinvertibrates and some small fish. There appears to be a lack of recruitment from small to large size classes of lake trout. Analysis of the food web in Fish Lake may suggest some options for overcoming this lack of recruitment.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

PIKE, PERCH, AND WALLEYE: A TANGLED WEB IN YUBA RESERVOIR

CONTRIBUTING AUTHORS: Drew Pitcher and Mark Belk – Brigham Young University; Mike Slater – Utah Division of Wildlife Resources

PRESENTING AUTHOR: Drew Pitcher – Brigham Young University

ABSTRACT: Yuba reservoir has been a conservation concern for several years. Recently the Department of Wildlife Resources has developed a management plan to establish consistent walleye, yellow perch and northern pike populations. To effectively manage these fish populations, it is important to understand at what trophic level these fish feed. We used stable isotope data to determine trophic level of fish in Yuba reservoir. We expected predators to exhibit elevated nitrogen isotope signatures, but similar carbon isotope signatures, relative to their prey. Samples of *Cyprinus carpio, Catostomus ardens*, small and large *Esox luscious, Perca flavescens, Sander vitreus*, and zooplankton were taken from Yuba Lake. Results showed a consistent grouping of walleye (*Sander vitreus*) with a high nitrogen isotope signature. The large northern pike had a lower nitrogen signature than walleye, but their carbon isotope signature was in the same area as the carp. The data suggest that walleye may feed primarily on perch whereas northern pike primarily feed on carp. Full interpretation requires more perch samples.

PRESENTATION FORMAT: Poster
PRESENTATION TYPE: Student

YUBA RESERVOIR BREAKWATER, THE POTENTIAL RELATIONSHIP BETWEEN BOATING INFRASTRUCTURE DEVELOPMENT AND FISHERIES HABITAT ENHANCEMENT

CONTRIBUTING AUTHORS: Craig Walker – Utah Division of Wildlife Resources

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ABSTRACT: Artificial habitats have been used historically by fisheries managers in reservoirs and lakes to attract sport fish, increase angler success, and provide spawning areas for fish. However, the effectiveness of restored reservoir habitats at achieving these outcomes has been poorly documented. Additionally, whether artificial habitat installations increase fish biomass or simply congregate existing fish biomass at improved locations, is still widely debated among fisheries professionals. Efforts are underway in Utah and other states to assess the value of reservoir habitat improvements and develop best management practices related to the type, location, density and abundance of installed artificial habitats. Recently, Utah Division of State Parks and Recreation (Parks) personnel have pursued development and enhancement of boater access facilities at Yuba Reservoir. As part of this effort, Parks personnel proposed the installation of a large rock breakwater adjacent to the Yuba Reservoir State Park boat ramp. During early project planning Utah Division of Wildlife Resources personnel recognized that monitoring fish use of the installed breakwater could provide a unique opportunity to assess the response of fish to a large-scale habitat manipulation and aid in the development of artificial habitat installation best management practices. It is hypothesized that seasonal fish use of this structure will enhance angler success at the Yuba Reservoir fishery and that the breakwater will provide desirable spawning habitat for existing and recently stocked Yellow Perch *Perca flavescens* in this reservoir.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Habitat and Monitoring

EFFECT OF OVERWINTER HYDRATION, TEMPERATURE, AND SCARIFICATION ON SEED GERMINATION OF TWELVE AQUATIC AND WETLAND PLANT SPECIES

CONTRIBUTING AUTHORS: Eric J. Wagner, Randall W. Oplinger, and Gavin L. Johnson – Utah Division of Wildlife Resources

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ABSTRACT: In an effort to create aquatic habitat in western U.S. irrigation reservoirs, the ability to germinate seeds of select wetland and aquatic plants was investigated. Seeds of 12 species were stored overwinter at 3-4°C either dry or wet. In spring, these groups were further divided into four constant temperature treatments (15, 20, 25, or 30°C) and 3 fluctuating temperature treatments (low, moderate, high). Seeds from a subset of species (*Polygonum amphibium, Alisma gramineum, Schoenoplectus acutus, S. americanus*) were scarified using either mechanical abrasion or sodium hypochlorite treatment for 1 or 5 d. All seeds were exposed to a 12 h photoperiod in Petri plates with wetted sand within germination chambers for 57 d. For most species, storing seeds wet overwinter led to higher percentages of seed germination than controls stored dry, and also led to quicker germination. Effects of temperature on germination varied by species. Sodium hypochlorite treatment for 5 d led to significantly higher germination for *Alisma gramineum* and for *Schoenoplectus acutus* at 15°C. The optimal conditions for germination of the species studied still needs further investigation, but the effects of temperature, temperature fluctuation, overwinter storage conditions, and scarification are better known for the species studied.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Habitat Monitoring

THE RECOVERY POTENTIAL SCREENING TOOL FOR UTAH: A METHOD FOR PRIORITIZING AQUATIC RESTORATION

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ABSTRACT: Increasingly, and for good reason, aquatic restoration projects are requiring higher levels of performance with limited financial resources. Historically, projects were typically selected based upon opportunities that were presented. Obviously, that led to fragmented and often, under-executed projects. With this haphazard approach and the challenging dynamics of measuring aquatic restoration success, performance measures and ecosystem functions expected were not met. Ideally, a method that is conceptual, quantitative, flexible, and transparent would be useful to decision-makers, stakeholders, and funding sources of various interests in aquatic restoration. In 2013, the Utah Division of Water Quality (DWQ) in partnership with US EPA crafted a Utah-specific Recovery Potential Screening (RPS) tool based upon a national conceptual framework. At the core, the RPS tool depends upon GIS-based ecological, social, and stressor indicators that ranks restoration potential of waters depending on various scenarios. Initially, this tool was designed to rank water bodies that would best succeed with nutrient reduction resources, and thereby maximize restoration success. However, the tool is much more dynamic and can serve as a collaborative mechanism to rank waters based upon the interests of the users. For example, the tool is being used to inform a 303(d) Vision Plan for DWQ's TMDL program that will guide TMDL prioritization. Currently, the Utah RPS tool has over 200 indicators across the three core areas for selection. Additionally, these indicators are designed and developed to best reflect conditions to rank water bodies based on various spatial scales. Spatially, each indicator was constructed across all HUC-8 and HUC-12 units Statewide and specific indicators can be selected for various scenarios. For example, this flexibility allows scenarios to be generated across a diverse spatial platform from overarching, statewide decisions to high-resolution, watershed-scale levels. Given the plethora of available GIS-based data, it is intended to be a living tool in order to incorporate new and current data.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Aquatic Habitat Monitoring

UNDERSTANDING LIVESTOCK GRAZING AND FISH ON FEDERAL LANDS

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ABSTRACT: Managing livestock disturbance in riparian zones in a manner that protects streams and fish while promoting economic returns for ranchers has long been a goal of federal land managers. Over the long-term there has been a significant reduction in the number of domestic ungulates on federal lands. This reduction has improved conditions of public lands but may have put the ecological integrity of private lands at greater risk. While the numbers of domestic ungulates on public lands have been reduced, their potential impact may still exceed the role wild ungulates played in shaping historic riparian and stream conditions in the Great Basin and Pacific Northwest. An understanding of the historic role of ungulates needs to be integrated into determining disturbance standards and monitoring programs so as to improve overall stream habitat and riparian conditions. Currently monitoring data suggest most federal permittees are grazing in a sustainable manner but individuals not meeting these standards are resulting in a negative perception of the gazing program by the public at large. Many improvements in aquatic conditions could be made by simply holding poorly performing permittees accountable to meet existing standards. This doesn't mean that we can't improve the overall direction of the range management program. Data suggests allotments with streams in drier areas with lower stream power are at greater risk from livestock disturbance than wetter, higher energy streams. While existing livestock disturbance and utilization standards are a good starting point, they may need to be altered in areas with greater risks such as the presence of Endangered Species Act listed species or in susceptible landscapes. This suggests no matter how livestock disturbance is measured that the overall objective heathy aquatic ecosystems and economically viable ranches. This is sometimes lost when we get diverted into nuances associated with describing impacts measured at a specific stream reach.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Stream Restoration

BRINGING BACK THE TROUT: METAPOPULATION VIABILITY OF BONNEVILLE CUTTHROAT TROUT IN A FIRE-IMPACTED WATERSHED

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ABSTRACT: Wildland fires are becoming more frequent, larger, and more severe as forested western landscapes regress back toward natural mean fire frequencies after decades of fire suppression. Although native fish communities co-evolved with and are resilient to natural fire perturbations, uncharacteristic fires can be at odds with fish conservation, especially in physically or biologically fragmented modern watersheds. We estimated the extinction rate of a Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) metapopulation under specified fire regimes on Fishlake National Forest in south-central Utah. We parameterized this model to include demographic stochasticity, movement between subpopulations, and occurrence and synchrony of fire by drawing values from a normal distribution centered on realistic mean values (published or estimated). We simulated these values for each year of a 100-year period using matrix population projection. We conclude that resilience of Bonneville cutthroat trout metapopulations increases with increased subpopulation connectivity and reduced synchrony of fire perturbations. Managing native fish populations to increase resilience to wildfire should include removal of barriers, if possible, as well as promoting asynchronous fire occurrence to allow discrete subpopulations of fish to recover and contribute to overall metapopulation stability.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Student
TOPIC: Stream Restoration

THE USE OF EXISTING LARGE WOOD AND ROCK DEBRIS IN AQUATIC HABITAT REHABILITATION AFTER A CATASTROPHIC FIRE IN SOUTH-CENTRAL UTAH

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ABSTRACT: Large, high intensity wildfires are an important ecological process, but such fires can also be a catastrophic disturbance to riparian ecosystems. The scorched landscapes immediately following wildfires often lead to extreme discharge events that cause downcutting of stream channels, homogenization of river morphology and aquatic habitat, and/or local extirpation of fishes. These results are especially problematic for native cutthroat trout species, which require a diversity of habitat types throughout their life history and are typically isolated to small, high elevation patches within their evolutionary systems. In the summer of 2010, the Twitchell Canyon Fire burned much of the watershed for Shingle Creek and Fish Creek in south-central Utah and subsequent high discharge events left the streams fishless and lacking suitable habitat for a reintroduction of native Bonneville cutthroat trout. A rehabilitation project was initiated in 2014 to make Shingle Creek and Fish Creek once again habitable for native trout. The rehabilitation project attempted to improve aquatic habitat by using excavators to pull existing large wood and rock debris into the active stream channel of Shingle Creek and Fish Creek, as this type of debris can play a vital role in processes that help to improve aquatic habitat and increase fish abundance (e.g., capturing sediment, increasing heterogeneity, catalyzing riparian vegetation recovery, providing cover for fish). Initial results of the project are encouraging because the newly recruited debris appears to be functioning as intended. However, the impact of the project is in its infancy and continued monitoring is needed to assess the true efficacy over the long-term.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Stream Restoration

UPPER BEAR RIVER STREAM RESTORATION

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ABSTRACT: The Upper Bear River (Utah/Wyoming) has its headwaters in the Uinta Mountains at elevations over 10,000 feet that produce an abundance of cold, clear water and is home to Bonneville cutthroat trout and other natives fishes of concern. However, the development of irrigated agriculture in the valleys below has resulted in numerous dams and diversions, which have altered stream habitat, degraded water quality, reduced river flows, and impeded fish passage. To address these concerns, Trout Unlimited has been working with water users and a broad coalition of partners to upgrade and improve irrigation infrastructure to facilitate stream restoration on over forty miles of river. Ephemeral push-up dams that have required annual maintenance with heavy machinery and destabilize long reaches of river are being replaced with permanent rock-weir structures that are fish passable. Stream flows are being restored to over ten miles of river by moving points of diversion downriver, consolidating canals, and improving conveyance efficiency of irrigation water. Fish screens are being installed in canals to provide fish passage and eliminate fish loss at diversions. The work is being conducted with novel funding sources including new federal programs and private partnerships. This project is a first step for stream restoration in the Upper Bear River.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Stream Restoration

AN EXPERIMENTAL HABITAT ENHANCEMENT EFFORT FOR UTAH'S DESERT RIVERS: SAN RAFAEL RIVER RESTORATION PROJECT UPDATE

CONTRIBUTING AUTHORS: Brian G. Laub – Department of Watershed Sciences, Utah State University; Justin Jiminez – Bureau of Land Management; and Phaedra Budy – Utah Cooperative Fish and Wildlife Research Unit, Utah State University

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ABSTRACT: The native fish fauna in Utah's desert rivers is severely threatened by a suite of factors including water development, habitat degradation, and non-native species. Given the multiple threats, conservation of these sensitive species will likely require a combination of management approaches including managed flow regimes and active habitat enhancement efforts. The extensive development of many desert systems has driven an ecological regime shift from braided, laterally-unstable and actively migrating systems towards entrenched, canal-like systems with low habitat complexity and replacement of native with non-native fish and vegetation communities. Thus, simple placement of habitat structures is unlikely to recover properties of dynamic river systems, and restoration will instead need to incorporate approaches that enhance active river processes. Based on several years of biological and geomorphic research, we have designed and begun implementation on a process based, experimental, and adaptive restoration plan for the San Rafael River, a desert river system in southeastern Utah. Activities include systematic removal of non-native tamarisk trees, placement of gravel in the river channel, installation of beaver-dam mimicking structures, and pursuit of managed high flows. Tamarisk removal is predicted to decrease bank stability and enhance lateral channel migration during high flows. Placement of gravel is intended to mimic tributary junctions, which provide gravel for sediment transport and formation of riffle-pool complexes. Installation of beaver-dam structures is predicted to alter flow patterns and promote scour pool development, enhance sediment accretion and promote river-floodplain connection, and facilitate dam-building activity by existing beaver populations. Each of these activities is designed to take advantage of the scour and sediment transport processes driven by natural and managed high flows. An extensive monitoring campaign is currently being carried out to document the effectiveness of these strategies and provide guidance for future desert river restoration projects in the region.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Stream Restoration

HUMPBACK CHUB (GILA CYPHA)

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ABSTRACT: In the upper and lower Colorado River basins there are six distinct humpback chub (*Gila cypha*) populations known to exist in the following areas: Black Rocks, Westwater Canyon, Desolation and Gray Canyons, Yampa Canyon, Cataract Canyon and Grand Canyon. Of the sites actively sampled in the upper basin, the Desolation and Gray Canyons reach is the longest, encompassing about 80 miles of river. Estimating population size within this reach is difficult, as very little movement of humpback chub occurs among sites. Population estimates were calculated for each site and extrapolated across a determined number of available habitat sites within Desolation and Gray Canyons (n=63; Badame, 2010). As approximately 9% (n=6) of the available 63 sites were sampled in 2014 the extrapolated canyon-wide population estimate of 1,863 humpback chub (95%CI=924-2802) may not be an accurate representation of the existing population. The 2014 long term trend site catch per unit effort (CPUE) showed no significant declining trend in annual catch rate (r^2=0.058, p=0.294); however, the measure of recruitment used in this reach, the metric of first-year adults (200-220 mm) as a percentage of total adults captured, has declined from an average of 13% in 2001-2003 and 2006-2007 to just 4% in 2014. Changes in the humpback chub population in Desolation and Gray Canyons are difficult to identify with current monitoring methods, however, conflicting trends in long term metrics may signal an unstable population. Modifications in current monitoring methods, additional analyses and data collection may be necessary to reach meaningful conclusions.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Recovery Programs

FISH FORENSICS: USING OTOLITH MICROCHEMISTRY TO DECODE THE MYSTERY OF NATAL ORIGIN OF AN ENDANGERED LAKE SUCKER

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ABSTRACT: Anthropogenic changes to the landscape of the western United States have resulted in high rates of decline in freshwater species. Like many native endemic desert freshwater fish species, the June Sucker (*Chasmistes liorus*) is currently listed as endangered. Implicit within the June Sucker recovery plan, is that spawning habitat restoration must result in natural recruitment. We used otolith microchemistry to establish natal origins of the potamodromous June Sucker endemic to Utah Lake, UT, ultimately in order to evaluate whether tributary habitat restoration results in natural recruitment. My specific objectives included: 1) quantifying and characterizing the extent of chemical variation among the three main spawning tributaries; 2) determining the relationship between otolith microchemistry and tributary chemistry and; 3) developing and validating a classification model to identify stream origin. We quantified the molar ratios Sr:Ca, Ba:Ca, and Mg:Ca for water and otolith chemistry from the three main June Sucker spawning tributaries to Utah Lake, UT during the summer of 2013. Water chemistry differed significantly among all three spawning tributaries (Sr:Ca P-value <0.05; Ba:Ca <0.05; Mg:Ca P-value <0.05); Ba:Ca and Sr:Ca were identified as the most important variables driving the classification models. We observed a strong linear relationship between water and otolith microchemistry for Sr:Ca and Ba:Ca, but not for Mg:Ca (R^2 = 0.77 P-value <.05; R^2 = 0.83 P-value <.05; R^2 =.0017, P-value= 0.71, respectively). Based on classification models of otolith element:Ca signatures, we were able to accurately classify individual fish to their natal tributary (classification tree 89% accuracy; random forest model 91% accuracy) and to determine if the fish's origin was wild vs. hatchery with 100% accuracy. The use of classification trees and random forest for classification analyses may provide a more powerful method for classification in studies using otolith microchemistry. Overall, this study will aid in evaluating the effectiveness of restoration, tracking progress toward recovery, help prioritize future restoration plans for the June Sucker in Utah Lake, and can be applied to other imperiled systems with species of conservation concern.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Student
TOPIC: Recovery Programs

USE OF REMOTE PIT SCANNERS TO MONITOR JUNE SUCKER IN UTAH LAKE

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ABSTRACT: June Sucker *Chasmistes liorus* is an endangered fish endemic to Utah Lake. Its decline is attributed to overharvest, habitat degradation, and predation and competition by non-native species. A major component of the June Sucker Recovery Implementation Program (JSRIP) is augmentation of the wild population with hatchery reared fish, and over the past two years approximately 2,400 PIT tagged fish have been stocked to study immediate post-stocking survival. The JSRIP operates permanent PIT tag antennae arrays (river arrays) in spawning tributaries, but fish remain in the lake for up to 10 years before they become sexually mature and move upstream to reproduce. Therefore, one component of this study was to deploy remote PIT scanners throughout the lake to monitor recently stocked June Sucker. Up to six, 4-ft x 2-ft antennas (remote units) were deployed biweekly over two summer field seasons and scanning data were compared to the past two years of data collected from river arrays. From July – November 2013 there were a total of 136 deployments of remote units, resulting in 3,385 hours of scanning. This resulted in 69 contacts and of those there were 58 unique fish. From June – October 2014 there were a total of 144 deployments, resulting in 4,167 hours of scanning. This resulted in 477 contacts and 263 unique fish. The majority (76%) of fish was scanned in two locations, "Long Bar" and "Bird Island". Ages of PIT tagged fish were not significantly different between the river array and remote units, but river arrays contacted less than 80% of the fish contacted from the in-lake remote units. This suggests that a portion of PIT tagged fish scanned in the lake have not utilized the river in the past two years. Furthermore, remote scanning was able to identify 'hot spots' or 'aggregates' within the lake at Long Bar and Bird Island, which could prove helpful for large scale tagging events. In conclusion, operating PIT scanners within the lake is feasible and with continued data collection coupled with the river arrays it can provide beneficial information to the recovery program.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Recovery Programs

IS WHAT YOU EAT MORE IMPORTANT THAN WHAT'S EATING YOU? TOP-DOWN VERSUS BOTTOM-UP EFFECTS ON BODY SHAPE OF UTAH CHUB (GILA ATRARIA)

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ABSTRACT: Geometric morphometrics was used to characterize body shape and determine how top-down and bottom-up effects influence the morphology of Utah Chub (Gila atraria). Diet (bottom-up influences), indicated by relative intestinal length, has a significant effect on morphology. Fish with longer intestines had deep, protruding bellies, while fish with short intestines had a more streamlined shape. Differences in body shape between predation environments and non-predation environments (top-down influences) were also significant. Fish in predatory environments displayed thinner, streamlined bodies and longer caudal peduncles than those in non-predatory environments. Body shape in Utah chub reflects both bottom-up and top-down effects, and bottom-up effects account for more variation in body shape.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Student
TOPIC: Fisheries Management and Monitoring Native Fish

USING PIT TAG ANTENNAS TO EVALUATE A WEIR DESIGNED TO REDUCE ENTRAINMENT OF ENDANGERED FISH IN CANALS

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ABSTRACT: The diversion of river water for irrigation or power-generating purposes is well known to have deleterious effects on fish populations. Both Colorado Pikeminnow (*Ptychocheilus lucius*) and Razorback Sucker (*Xyrauchen texanus*) are known to undertake extended spawning migrations, increasing their risk of becoming entrained in irrigation canals, such the one at the Hogback Diversion Canal on the San Juan River near Shiprock, NM. The Hogback Diversion Canal can take > 50% of the river's flow at low-flow periods during the summer. In a 2006 sampling effort, Renfrow et al. seined a total of 11,500 fish in the canal, including 201 Colorado Pikeminnow between 42 and 315 mm in length. Following this study a Value Engineering (VE) team concluded that the most cost effective and efficient means of reducing fish entrainment in the Hogback canal was to construct an 8-foot tall, 550-foot long weir at an oblique angle in the canal, with the goal of passing a few inches of water over the top of the weir that would be diverted into the canal, and maintaining a flow in the canal along the upstream side of the weir that would eventually transport fish and debris along the upstream side of the weir into a return channel back to the San Juan River. No fish-exclusion device of this type has ever been constructed or tested that we are aware of, but if it is effective it could be a useful design at many other locations. In March of 2014 five PIT tag antennas were installed in the facility to determine the effectiveness of the weir wall. In November 2014 a week-long test was conducted to examine the effectiveness of the weir using stocked PIT-tagged fish. We stocked 308 Razorback Suckers and 422 Colorado Pikeminnow into the canal. We detected a total of 161 fish moving through the facility— 143 that were bypassed back to the river and 18 that were entrained in the canal, for an overall entrainment rate of 11%, or 2% of the total stocked.
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PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Recovery Programs

SUCCESSFUL MANAGEMENT OF STEWART LAKE WETLAND AS A NURSERY FOR ENDANGERED RAZORBACK SUCKER, XYRAUCHEN TEXANUS, ON THE MIDDLE GREEN RIVER, UTAH

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ABSTRACT: Among the threats to endangered razorback sucker (*Xyrauchen texanus*) are habitat loss related to flow regime alterations and the introduction of nonnative species. For decades, survival of wild-spawned razorback suckers to juvenile stages has been negligible, and stocking of hatchery-raised fish has been necessary to maintain populations. Here we report on the successful management of Stewart Lake, a gated wetland on the middle Green River near Jensen, Utah, as a nursery for wild-spawned razorback sucker. In a cooperative multi-year effort by Federal and State agencies called the Larval Trigger Study Plan, the detection of larval razorback suckers in the river is used to initiate increased releases from Flaming Gorge Reservoir so that peak flows coincide with larval drift. In early June, 2014, Stewart Lake was filled during this high water period to maximize entrainment of razorback sucker larvae, using a trap and weir system to exclude adult nonnative fishes. The growth and distribution of razorback suckers in the wetland was monitored throughout the summer, with the gate opened for drawdown in early September, after three months of inundation. During draining, a trap was used to sample fishes exiting the wetland, including over 700 juvenile razorback suckers up to 168 mm in total length. The management of Stewart Lake demonstrates how suitable nursery conditions can be achieved for the successful recruitment of razorback suckers, a critical advance for the recovery of this species.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Recovery Programs

ANTHROPOGENIC STRESSORS OF AQUATIC ECOSYSTEMS AND THE SERVICES THEY PROVIDE

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ABSTRACT: Anthropogenic stressors of aquatic ecosystems and the services they provide come in many direct and indirect forms, including invasive species and drought. I am a new assistant professor at Utah State University who uses ecological theory to confront applied issues. I will give a broad overview of my current research initiatives in Utah. My areas of interest include predator-prey dynamics and invasive species management. I will discuss research focusing on the implications of a northern pike introduction in Utah Lake with an emphasis on the potential effects of the invasion on the restoration efforts of endangered June sucker. I am also interested in understanding how drought, in addition to changes in temperature and dissolved oxygen regimes, influences physical lake habitat in a changing climate. Indeed, water storage in lakes and reservoirs throughout the Intermountain West is highly sensitive to drought. Future models predict drought will not only occur more often, but will be more severe and last for longer durations. I propose using current and previous drought conditions as windows looking into the future to understand how decreased lake levels and, subsequently, reduced connectivity to tributaries and a loss of littoral habitat may influence fishes. Specifically, understanding how lakes and fishes have responded to previous and current multiyear droughts may allow us to predict how future drought conditions will affect fishes and fisheries throughout the Intermountain West.

PRESENTATION FORMAT: Oral
PRESENTATION TYPE: Professional
TOPIC: Recovery Programs