July 26-28, 2016
AkSarBen Aquarium, Gretna, Nebraska
Keith Koupal, Host

JOINT MEETING OF THE
North Central Division of the American Fisheries Society

Centrarchid Technical Committee
Dan Dembkowski Chair

Esocid Technical Committee
Cory Kovacs, Chair

Walleye Technical Committee
(established 1985)
25th Summer Meeting
John Bruner, Chair

And, featuring

Upper Colorado River Endangered Fish Recovery Program

Foreword:

STATE OF NEBRASKA

Pete Ricketts
Governor

OFFICE OF THE GOVERNOR
P.O. Box 94848 • Lincoln, Nebraska 68509-4848
Phone: (402) 471-2244 • pete.ricketts@nebraska.gov

Dear Friends:

On behalf of the people of Nebraska, I would like to welcome you all to our beautiful state filled with amazing wildlife, especially when it comes to our over 100 species of fish.

It is very important to Nebraskans that we care for our wildlife and natural resources here in Nebraska, so I am glad that you all are taking interest in how we can better manage our aquatic resources, which the American Fisheries Society and its local chapters have done since the nineteenth century.

Specifically, you will focus on how to more wisely use and respect our walleye stock, while also discussing the status of endangered fish species in the Colorado River. Your conservation efforts are important. Without your willingness to delve deeply into it, states like ours would not have the body of knowledge we need to effectively manage our fish populations; and, more importantly, we would not be able to understand how these individual species so beautifully fit into our natural environment.

Nebraska is looking forward to hosting you for the 77th Midwest Fish & Wildlife Conference, which will be held February 5 - 8, 2017 at the Lincoln Marriott Cornhusker Hotel in Lincoln, Nebraska and we hope to see you all there.

As you join us from many different states and provinces throughout North America, I hope you will enjoy all the unique beauty and splendor that Nebraska has to offer.

Sincerely,

Pete Ricketts
Governor

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Don Gabelhouse, Jr Nebraska, Fisheries Division Administrator.

As I began thinking about a statement to welcome you, I could not help but reflect on what AFS has meant to me during my career. I have been doing a lot of reflecting lately considering I am retiring on July 8, after almost 43 years in the fisheries profession.

Early in my career, the Midwest Fish and Wildlife Conference was **THE** event I most looked forward to each year. The rest of the year was largely spent doing something that I thought might be worthy of a presentation at next year's meeting. Later on, the Walleye Technical Committee meeting became an event I really looked forward to. Trips to Dubuque were both professionally rewarding and fun! In more recent years, the Fisheries Administration Section became the center of my professional involvement.

It is especially rewarding to see the three NCD technical committees and the Upper Colorado River Endangered Fishes Recovery Program all coming to Nebraska for their meetings. In Nebraska, we take great pride in being hospitable and I know the Nebraska Game and Parks Commission staff will take very good care of you during your stay. We may not be able to compete with what took place in East Dubuque back in the 80's, but I am confident you will have a really good time.
Welcome to Nebraska!
Don Gabelhouse, Jr.

Mayor Jim Timmerman, City of Gretna, Nebraska

It is my pleasure, as Mayor of Gretna, to welcome all participants to the Joint Meeting of the American Fisheries Society Centrarchid Technical Committee, Esocid Technical Committee, & Walleye Technical Committee and the Upper Colorado River Endangered Fishes Recovery Program. The City of Gretna was founded in 1886

and incorporated July 10th, 1889. Gretna began on 80 acres of land that was purchased from the Lincoln Land Company for $560 along the recently completed Burlington Northern Rail line. Many of the early settlers of the village were of Scottish ancestry, and the city's name was inspired by Scotland's Gretna Green. The Platte and Elkhorn rivers are in close proximity to the community along with Mahoney State Park, Schram State Park, The Henry Doorly Zoo Lee G. Simmons Conservation Park and Wildlife Safari, and Platte River State Park, which afford residents easy access to outdoor activities. Please enjoy your stay in our community and hopefully you will be able to take time to visit all of the activities, which we have to offer in Gretna.
Mayor Jim Timmerman, City of Gretna, P.O. Box 69, 204 N. McKenna Ave., Gretna, NE 68028

Tony Korth

Aquarium Director, AkSarBen Aquarium

holding a
Scaphirhynchus albus (Forbes & Richardson, 1905) Pallid Sturgeon

On behalf of the Nebraska Game and Parks Commission I would like to welcome you to the AkSarBen Aquarium Outdoor Education Center. The aquarium is dedicated to promoting aquatic education to its visitors and we are proud to host this year's Joint Summer Meeting of the AFS North Central Division CTC, ETC, & WTC, and the Upper Colorado River Endangered Fishes Recovery Program. We hope you enjoy your time here.

Tony Korth,
Aquarium Director, AkSarBen Aquarium,
Nebraska Game and Parks Commission
21502 West Highway 31
Gretna, NE 68028

NORTH CENTRAL DIVISION OF THE AMERICAN FISHERIES SOCIETY
JOINT MEETING
Centrarchid, Esocid and Walleye Technical Committees

and featuring

Upper Colorado River Endangered Fish Recovery Program

Tuesday, July 26, 2016

Lobby Super-8 Motel 14355 NE-31, Gretna, NE 68028, United States
Phone:+1 402-332-5188; 855-213-0582

7:30 am to 8:00 am Registration, $50 for workshops + $60 for Wednesday & Thursday = $110, **Hilary Meyer**

Prairie Queen Reservoir habitat enhancement tour Steve Satra & Mark Porath
8:00 - 12 pm: Carpool from hotel at 8 am. Steve Satra is coordinating the habitat enhancement tour. He will start at Prairie Queen Reservoir and wind through other lakes from there, and end at Louisville State Park. For those most enthusiastic about learning about building and designing specific habitat projects as well as developing an aquatic habitat program, we would encourage them to ride in the vehicles with Steve and Mark Porath so they can have Q and A interplay while we are transporting between sites. Finish tour around 11:45 am and eat box lunch on way back (about 30 minutes). The sack lunches are supplied by the 4-H Camp down the road from the aquarium.

AkSarBen Aquarium 21502 W. Hwy 31, Gretna, NE 68028-7264, 402-332-3901

12:30 pm to 12:55 pm:
Registration, $50 for workshops + $60 for Wednesday & Thursday = $110, **Hilary Meyer.**

12:55 – 1:00 pm:
Welcome to the Joint Meeting of the WTC, ETC, and CTC **Keith Koupal (host), 2016 Chairs: John Bruner, Dave Woods for Cory Kovacs, Dan Dembkowski**

***Gila elegans* Baird & Girard, 1853 Bonytail**

1:00 – 1:20 pm: **The Upper Colorado Endangered Fish Recovery Program's Nonnative Fish Management: Why Are We Here Today?** Kevin McAbee, Nonnative Fish Coordinator, Upper Colorado Endangered Fish Recovery Program

1:20 – 1:40 pm: **Historical changes of a native fish assemblage in an unregulated western river: a case study of nonnative fish invasion** John Hawkins (presenter) and Cameron Walford, Larval Fish Laboratory, Colorado State University, Fort Collins, CO

1:40 – 2:00 pm: **A Summary of the Current Ecology and Management of Smallmouth Bass in the Upper Colorado River Basin** Tildon Jones, Fisheries Supervisor, US Fish and Wildlife Service, Green River Basin, 1380 S 2350 W, Vernal, UT 84078

2:00 – 2:20 pm: **A Summary of the Current Ecology and Management of Northern Pike in the Upper Colorado River Basin** Koreen Zelasko, Research Associate, Larval Fish Laboratory, Colorado State University, 1474 Campus Delivery, Fort Collins, CO

2:20 – 2:40 pm: **A Summary of the Current Ecology and Management of Walleye in the Upper Colorado River Basin** Travis Francis, Fisheries Supervisor, US Fish & Wildlife Service, 445 W. Gunnison Ave, Suite 140, Grand Junction, CO 81501

2:40 – 3:00 pm BREAK

3:00 – 3:30 pm: **Empirical Research Supports Development of a Multi-Faceted Nonnative Fish Removal Program in the Upper Colorado River Basin** Dr. Kevin Bestgen, Senior Research Scientist, Larval Fish Laboratory, Colorado State University

3:30 – 4:30 pm: ***Panel Discussion*** **The Upper Colorado Endangered Fish Recovery Program's Most Relevant Questions and Discussion Topics for the Technical Committees**

Upper Colorado River
Endangered Fish
Recovery Program

Free Optional Float Trip (First 30 joint meeting registrants). 4:30 pm to 6:30 pm Kayak/Canoe trip (about 2 hours of relaxed paddling)

6:45 pm **Tuesday Social at Louisville State Recreation Area, 15810 Hwy. 50 Louisville, NE 68037-2880 Phone: (402) 234-6855**

Wednesday July 27, 2016

AkSarBen Aquarium 21502 W. Hwy 31, Gretna, NE 68028-7264, 402-332-3901

9 am to 9:20 am **Assessment of growth and relative survival of diploid and triploid saugeye in Kansas Impoundments** Jeff Koch*, Jason Goeckler, Ron Marteney, Chris Steffen, and Josh Jagels, Kansas Department of Wildlife, Parks, and Tourism, *presenter

9:20 am to 9:40 am **In-Lake Hatch Rates and Their Implications for Managing Walleye Populations That Serve As Egg Sources for Minnesota Hatcheries** Dale Logsdon, Minnesota Dept. of Natural Resources, 50317 Fish Hatchery Rd. Waterville, MN 56096 USA

9:40 am to 10:00 am **Turnover Rates of Carbon and Nitrogen Isotopes in Age-0 Walleye (*Sander vitreus*) Tissues Following a Laboratory Diet Switch Experiment** David A. Schumann[1,2*], Christopher S. Uphoff[1,3], Casey W. Schoenebeck[1], and Katie N. Bertrand[2]; [1]Department of Biology, University of Nebraska at Kearney, [2]Department of Natural Resource Management, South Dakota State University, [3]Minnesota Department of Natural Resources, *presenter

10:00 to 10:20 am **Double-crested cormorant management on Leech Lake, Minnesota** Doug Schultz, Minnesota Dept. of Natural Resources **remote presentation**

10:20 am to 10:35 am coffee break

10:35 to 10:45 am **Movement and survival (initial and short-term) of stocked yearling Muskellunge in Spirit Lake, Iowa** Jonathan R. Meerbeek[1] and DJ Vogeler[1] Iowa Department of Natural Resources, Spirit Lake, Iowa

10:45 am to 11:05 am **Identifying Walleye Recruitment Bottlenecks in Northern Wisconsin Lakes-Version 2.0** Jason Gostiaux[1*], Daniel Isermann[2], and Joseph Hennessy[3] [1]University of Wisconsin-Stevens Point, [2] University of Wisconsin-Stevens Point, [3]Wisconsin Department of Natural Resources, Bureau of Fisheries Management, Madison, WI *presenter;

11:05 am to 11:25 am **Stock Structure, Dynamics, and Demographics of Walleyes Spawning in Tributaries to Green Bay** Daniel Isermann[1*], Steven Hogler[2], Wes Larson[1], and Keith Turnquist[3]**.** University of Wisconsin-Stevens Point, [2]Wisconsin Department of Natural Resources, Bureau of Science Services, [3]Molecular Conservation Genetics Laboratory, University of Wisconsin-Stevens Point, *presenter;

11:25 am to 11:45 am **Dynamics and Distribution of the Lake McConaughy Walleye** Benjamin J. Schall[1], Keith D. Koupal[2], and Casey W. Schoenebeck[3], [1] Department of Biology, University of Nebraska Kearney, [2]Nebraska Game and Parks Commission, [3]Minnesota Department of Natural Resources

11:45 am 12:05 pm **Fishes of the Dakotas** Katie Schlafke[1*] and Katie Bertrand[1], [1]Department of Natural Resource Management, South Dakota State University, Brookings, SD *presenter;

12:05 noon to 1:15 pm Lunch Break pork sandwiches with sides supplied by the 4-H Camp down the road from the aquarium

1:15 pm to 1:35 pm **Short-Term Survival of Gizzard Shad After Dummy Transmitter Implantation** Hilary Meyer[1], Robert Hanten[1], Mark Fincel[1] and Jake Davis[2] South Dakota Department of Game, Fish and Parks, [1]Fort Pierre District Office, 20641 SD Highway 1806, Fort Pierre, SD 57532, [2]4130 Adventure Trail, Rapid City, SD 57702

***Xyrauchen texanus* (Abbott, 1860) Razorback Sucker**

1:35 pm to 1:55 pm **Insights into managing wetlands as nursery habitat for endangered Razorback Sucker, *Xyrauchen texanus*, after three years of success at Stewart Lake, middle Green River, Utah** Robert Schelly and Matthew Breen**,** Utah Division of Wildlife Resources, Northeastern Regional Office, 318 North Vernal Avenue, Vernal, UT 84078

***Ptychocheilus lucius* Girard, 1856 Colorado Pikeminnow**

1:55 pm to 2:15 pm **Colorado Pikeminnow recruitment in the Upper Colorado River Basin: a new perspective for the Green River, Utah** Christopher M. Michaud[1], Matthew J. Breen[2], and Kevin R. Bestgen[3]**;** [1]Utah Division of Wildlife Resources, Moab Field Station, 1165 South Highway 191 – Suite 4, Moab, UT 84532; [2]Utah Division Wildlife Resources, Northeastern Regional Office, 318 North Vernal Avenue, Vernal, UT 84078; [3]Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO 80523.

2:15 pm to 2:35 pm **Diary of an Age-0 Walleye in Harlan County Lake** Keith Koupal, Brian Peterson, and Brett Miller, Fisheries Division, Nebraska Game and Parks Commission, Kearney, NE 68847

2:35 pm to 2:55 pm **Short-term mortality and retention associated with passive integrative transponders in age-0 walleye** Daniel J. Dembkowski[1] and Daniel A. Isermann[2]; [1]Wisconsin Cooperative Fishery Research Unit, Fish Propagation Science Center, College of Natural Resources, UW-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481; [2]U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit and Fisheries Analysis Center, College of Natural Resources, UW-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481

2:55 pm to 3:15 pm Coffee Break

3:15 pm to 3:45 pm **Management of Walleye in Washington** Bruce D. Bolding,

Warmwater Fish Program Manager, Washington Department of Fish and Wildlife, 600 Capital Way N, Olympia, WA 98501-1091

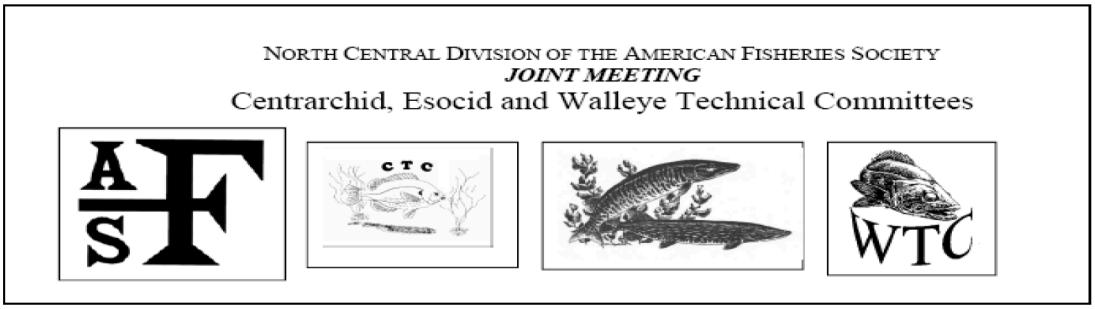
3:45 pm to 4:05 pm **Use of rotenone to improve growth of sport fishes** Ben C. Neely*, Jeff D. Koch, Sean T. Lynott, Kansas Department of Wildlife, Parks, and Tourism, 5089 CR 2925, Independence, KS 67301, *presenter;

4:05 pm to 4:25 pm **Estimating Genetic Diversity Levels in Wisconsin's Feral Walleye Broodstock Populations** *Michael F. Vaske[1], Justin A VanDeHey[1], Brian L. Sloss[2], Keith Turnquist[3]**;** [1]Fish Propagation Science Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481 *presenter; [2]College of Natural Resources, University of Wisconsin – Stevens Point, 800 Reserve Street, Stevens Point, WI 54481**;** [3]Molecular Conservation Genetics Laboratory, College of Natural Resources, University of Wisconsin – Stevens Point, 800 Reserves Street, Stevens Point, WI 54481

4:25 pm to 4:45 pm **Management of Northern Pike in Washington** Bruce D. Bolding, Warmwater Fish Program Manager, Washington Department of Fish and Wildlife, 600 Capital Way N, Olympia, WA 98501-1091

4:45 pm to 5:05 pm **Electrofishing catchability of juvenile muskellunge in northern Wisconsin lakes** Janice Kerns[1*], Daniel Isermann[2], and Timothy Simonson[3] [1] Wisconsin Cooperative Fishery Research Unit, Fisheries Analysis Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481; 715-346-2178, *Presenter; [2] U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit, Fisheries Analysis Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481; [3]Wisconsin Department of Natural Resources, Bureau of Fisheries Management, 101 S Webster Street, Madison, WI 53703

6:30 pm Langdon's Bar and Grill, 11855 S 216th St. Gretna, Nebraska 68028 (402) 934-001



Thursday July 28, 2016
AkSarBen Aquarium 21502 W. Hwy 31, Gretna, NE 68028-7264, 402-332-3901
9 am to 12 noon **Separate Business meetings of the:**

WTC (Chair, John Bruner)

1. Secretary/Treasurer's Report
2. Presentation to Past Chair, Randy Schultz
3. Report of Chair.
4. State & Provincial Reports/Updates
5. Location of Summer meeting 2017 Chair Elect Jeff Koch
6. Future symposia for AFS annual meetings?
  A.) 2017 Tampa, FL: August 20-24, 2017;
  B.) 2018 Atlantic City, NJ: August 19-23, 2018;
  C.) 2019 Reno, NV: September 29-October 3, 2019;
  D.) 2020 Columbus, OH: August 30-September 3 (AFS 150th Anniversary)
7. New Business

ETC (Dave Woods for Chair, Cory Kovacs)

1. Winter Meeting Minutes Approval
2. Budget
3. ETC By-laws review/update
4. State Reports/Updates
5. New Business

CTC (Chair, Dan Dembkowski)

1. Introductions
2. Budget
3. State reports/updates
4. New business

***Gila cypha* Miller, 1946 Humpback Chub**

ABSTRACTS OF TALKS:

(1.) Tuesday, July 26, 2016 3:00 – 3:30 pm: **Empirical Research Supports Development of a Multi-Faceted Nonnative Fish Removal Program in the Upper Colorado River Basin** Dr. Kevin Bestgen, Senior Research Scientist, Larval Fish Laboratory, Colorado State University

The Recovery Program's management of nonnative fish is guided by quantitative evaluations of existing data, empirical research, and technical recommendations. Over the past decade, researchers provided the Recovery Program with evaluations of: response of the native fish communities of the Yampa and Green rivers to nonnative fishes and flows; escapement rates of nonnative fish from Elkhead Reservoir and other upper basin reservoirs; population dynamics of the smallmouth bass and northern pike, with emphasis on the removal programs; population modeling tools to investigate management actions for smallmouth bass; and suppression strategies for invasive smallmouth bass using river regulation to affects reproduction and early growth. These technical recommendations have guided the Recovery Program to implement actions such as disruption of smallmouth bass spawning, netting removal of pre-spawn northern pike, and nonnative escapement prevention for problematic upper basin reservoirs.

Most recently, the investigations into smallmouth bass spawning chronology has presented the potential of using river regulation to ecological disadvantage nonnative smallmouth bass has been considered as a river-wide tool. Otolith microstructure was used to estimate hatching dates and growth of invasive smallmouth bass collected in regulated or partially regulated reaches of the Green River, and the free-flowing Yampa River, Colorado and Utah, 2003-2011. In all reaches, bass hatched later in cooler and higher flow years and earlier in warmer and lower flow years. Total length of Age-0 smallmouth bass in mid-September was positively influenced by length of growing season as well as water temperature and indicated flow reductions from water storage or climate change would increase bass growth and negative effects on native fishes. Management actions such as abrupt flow increases (managed floods), reduced water temperatures, or physical disturbances directed at disrupting spawning smallmouth bass may reduce reproductive success but need to consider effects on other native and nonnative fishes as well as water availability tradeoffs. Increased use of flow and water temperature regimes from dams to reduce negative effects of nonnative fishes, and to increase growth and survival of native kinds, is discussed as a viable use of reservoir water storage and may offer management agencies another tool to achieve a more naturally functioning river ecosystem and enhance recovery of native biota.

(2.) Wednesday July 27, 2016 3:15 pm to 3:45 pm **Management of Walleye in Washington** Bruce D. Bolding, Warmwater Fish Program Manager, Washington Department of Fish and Wildlife, 600 Capital Way N, Olympia, WA 98501-1091

Walleye were first reported in Washington in the early 1960's. Since then, they have spread throughout the main stem of the Columbia River and numerous other waters in the eastern part of the state. They have created quality fisheries for both trophy and harvest and continue to grow in popularity. The Washington Department

of Fish and Wildlife (WDFW) began closely monitoring five of the most prominent populations in 2001 with its Fall Walleye Index Netting (FWIN) program. This has resulted in more effective management through more appropriate regulations because of the clear picture of population status that FWIN provides. With that in mind, Walleye represent a certain paradox in Washington. Even though they are hugely popular with a growing number of anglers, the fact that they are a nonnative predator of salmonids makes them loathsome to native fish advocates. Because of this, their recent "deregulation" in the main stem of the Columbia had led to a contentious situation but the WDFW Warmwater Program remains steadfast in their support and promotion in waters "where appropriate".

(3.) Wednesday July 27, 2016 4:25 pm to 4:45 pm **Management of Northern Pike in Washington** Bruce D. Bolding, Warmwater Fish Program Manager, Washington Department of Fish and Wildlife, 600 Capital Way N, Olympia, WA 98501-1091 Bruce Bolding, Washington Dept. of Fish and Wildlife, Olympia, WA

Northern Pike *Esox lucius* have recently become established in Box Canyon Reservoir (Pend Oreille River) in NE Washington. Because the Pend Oreille River is a tributary to the Columbia River, the possibility for widespread ecological impact is severe. Species that could potentially be impacted include salmon and steelhead, native Pacific Northwest cultural and economic icons. Since a 2004 Box Canyon survey in which pike first appeared, until 2011, work by the Washington Department of Fish and Wildlife (WDFW) and the Kalispel Tribe of Indians Natural Resources Department (KNRD) documented both a rapid increase in the number of Northern Pike and a decline in the abundance of most forage species. In 2011, an important event, which clarified the state's management direction, was to reclassify Northern Pike from a game fish to a prohibited species. This was done to demonstrate the how the state would manage going forward. It was followed in 2012 by a multi-year, targeted suppression effort by WDFW and KNRD in Box Canyon Reservoir. In the first three years, gill netting and angler harvest removed over 16,000 pike, which was an estimated 90% reduction in the population. In the last few years, downstream movement of pike has continued, with surveys capturing several hundred in the next reservoir downstream (Boundary). From there, they have moved an additional 35 miles down into the Columbia River and another 45 miles down the Columbia, to Kettle Falls. The WDFW is working with co-managers to develop a long-term regional management strategy in hopes of reducing future impacts to native species.

(4.) Wednesday July 27, 2016 2:35 pm to 2:55 pm **Short-term mortality and retention associated with passive integrative transponders in age-0 walleye** Daniel J. Dembkowski[1] and Daniel A. Isermann[21]Wisconsin Cooperative Fishery Research Unit, Fish Propagation Science Center, College of Natural Resources, UW-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481; Ph: (715) 346-4350; Email: dan.dembkowski@uwsp.edu, [2]U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit and Fisheries Analysis Center, College of Natural Resources, UW-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481; Ph: (715) 346-3221; Email: dan.isermann@uwsp.edu

We evaluated initial mortality and retention associated with use of passive integrated transponders (PITs) for tagging age-0 walleye *Sander vitreus* by conducting net-pen (N = 18) and hatchery (N = 1) trials during September-October 2015. For the net-pen trials, age-0 walleye (N = 687; TL range = 98-193 mm; mean TL = 152 mm) were sampled from Escanaba Lake, Wisconsin using nighttime shoreline electrofishing. Each fish received one of four treatments: (1) a 12-mm PIT, (2) a soft dorsal fin clip, (3) a PIT and a fin clip, or (4) no fin clip or PIT (reference fish) and were held in net pens for 48-h. We inserted PITs either posterior to the pectoral girdle or into the peritoneal cavity near the lateral line above the vent using a 12-gauge hypodermic needle. Mean mortality rates were greatest for the PIT-only treatment (7%; SE = 2%) and lowest for the reference fish (2%; SE = 1%), but no significant differences in mortality rates were detected among treatments. Retention of PITs averaged 97% across treatments. To evaluate mortality and retention associated with PIT placement, N = 99 similarly-sized age-0 walleye were randomly assigned to one of three treatments: (1) a 12-mm PIT inserted posterior to the pectoral girdle, (2) a 12-mm PIT inserted into the peritoneal cavity near the lateral line above the vent, or (3) no PIT (reference fish) and held in a hatchery raceway for 7-d. Mortality rates were 0% and 14% for fish with PITs inserted posterior to the pectoral girdle and into the peritoneal cavity, respectively; the mortality rate of reference fish was 6%. Additional net-pen and hatchery trials in 2016 will focus on mortality associated with PIT placement and will help determine whether PITs are appropriate for use in age-0 walleye.

(5.) Tuesday, July 26, 2016 2:20 – 2:40 pm: **A Summary of the Current Ecology and Management of Walleye in the Upper Colorado River Basin** Travis Francis, Fisheries Supervisor, Grand Junction FWCO, U.S. Fish and Wildlife Service

Walleye (*Sander vitreus*) have been present in the upper Colorado River basin since 1959, but collections were rare in the Colorado and Green rivers until the 2000's. Beginning in 2010, researcher's documented a substantial increase of walleye in their catch in the lower portions of the Green and Colorado Rivers, the primary nursery areas for endangered Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*). Although no in-river recruitment has yet been documented, spawning aggregations have been documented in recent years and walleye larvae have been captured in two separate years. Two major mechanisms are most likely the culprits to the walleye population expansion in the Colorado River basin. One mechanism is consistent with escapement from upstream reservoirs and is supported by chemical fingerprinting (strontium isotopes laser ablated from otoliths), which identified riverine walleye from three reservoir sources (Redfleet and Starvation (Green River), and Rifle Gap (Colorado River)).. Both the states of Utah and Colorado have been proactive in containing these sources, but illegal introductions into new locations have intensified the problem. Reservoir outlet screens have been installed, piscicide treatments have been conducted, and sterile walleye have been stocked into reproducing populations. The second mechanism intensifying walleye presence in riverine systems could be the accidental stocking of gizzard shad (*Dorosoma cepedianum*) into the San Juan River Drainage in 1998. A consequent

gizzard shad population increase in downstream Lake Powell has supported increased walleye abundance in the lake, and both species have moved into the lower Green and Colorado rivers. Those reaches are the main nursery habitat for early life stage and juvenile Colorado pikeminnow, and at least two instances of walleye predation on large juvenile pikeminnow has been documented. In response to increased walleye abundance, a focused mechanical removal effort began in 2013 and 1,043 walleye have been removed (2013-2015) from the Green River (> 350 river miles) and 666 have been removed (2013-2015) from the lower Colorado River (112 river miles).

(6.) Wednesday ,July 27, 2016 10:45 am to 11:05 am **Identifying Walleye Recruitment Bottlenecks in Northern Wisconsin Lakes-Version 2.0** Jason Gostiaux[1], Daniel Isermann[2], and Joseph Hennessy[3], [1]Wisconsin Cooperative Fishery Research Unit, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481, [2]U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481, [3]Wisconsin Department of Natural Resources, Bureau of Fisheries Management, Madison, WI

Walleye recruitment has declined in several northern Wisconsin lakes for unknown reasons and our goal is to identify the timing and potential causes of recruitment bottlenecks for age-0 walleyes in northern Wisconsin lakes. In the first phase of this project, we identified a recruitment bottleneck for age-0 walleye occurring at or before the larval stage in two lakes where walleye recruitment has declined dramatically over the last decade. We also determined that abundance of age-0 walleyes can be monitored during the first year of life using a combination of towing ichthyoplankton nets at night during mid to late May, micromesh gill nets set in July, and electrofishing in fall. We will discuss our plans and preliminary results for the next phase of this project, which has expanded to include 12 lakes in northern Wisconsin.

(7.) Tuesday, July 26, 2016 1:20 – 1:40 pm: **Historical changes of a native fish assemblage in an unregulated western river: a case study of nonnative fish invasion** John Hawkins (presenter) and Cameron Walford, Larval Fish Laboratory, Colorado State University

The Yampa River, located in northwestern Colorado, flows 205 miles to confluence with the Green River, a major tributary to the Colorado River. It descends from 12,000 to 5,087 ft. elevation and drains > 8,000 mi^2 of the Southern Rockies and portions of the Wyoming Basin. The Yampa River is one of the few western rivers with a natural flow regime and is often cited as the last remaining unregulated river in the Colorado River Basin. Although largely unregulated, it has two, relatively small reservoirs at high elevations on the mainstream (Stagecoach and Catamount) and several other reservoirs on tributaries, all of which contain introduced sportfish. Persistent, but low levels of nonnative fish escapement from reservoirs had minimal effect on the riverine native fish assemblage, but once northern pike and smallmouth bass escaped and established reproducing populations in the Yampa River, we

observed drastic changes to the fish assemblage. Pre-invasion sampling in the early 1980s showed the Yampa River hosted a largely intact native fish assemblage including three endangered fishes (Colorado pikeminnow, razorback sucker, and humpback chub) and native taxa comprised over 70% of the large-bodied portion of the fish community. After northern pike and smallmouth bass were established around 2000, the fish assemblage changed rapidly and native fishes now comprise less than 4% of the fish community in many reaches. Establishment of abundant nonnative fishes occurred in spite of a largely intact natural flow regime, which is counter to theory that indicates natural flows should minimize nonnative species invasions. We describe the historical fish assemblage in the Yampa River, the invasion sequence for northern pike and smallmouth bass, and exceptions to invaded assemblages which may guide restoration management of native fishes in the Yampa River.

(8.) Wednesday July 27, 2016 11:05 am to 11:25 am **Stock Structure, Dynamics, and Demographics of Walleyes Spawning in Tributaries to Green Bay** Daniel Isermann[1*], Steven Hogler[2], Wes Larson[1], and Keith Turnquist[3] , [1]U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit, College of Natural Resources, Univ. of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481, [2]Wisconsin Department of Natural Resources, Bureau of Science Services, Madison, WI, [3]Molecular Conservation Genetics Laboratory, College of Natural Resources, Univ. of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481; *presenter

Green Bay supports one of the most prominent recreational fisheries for walleyes *Sander vitreus* in North America. Management of this fishery is complicated because walleyes spawn in many locations and the fishery contributions of these different locations are not known at this time. Furthermore, it is not known whether these stocks are discrete or if they differ in relation to stock dynamics and demographics. Our objectives are to determine if genetic stock structure is apparent among walleyes spawning in the Peshtigo, Oconto, Fox, and Menominee Rivers and if growth, age composition, fecundity, and other biological metrics vary among these putative stocks. Our initial results suggest that growth and age composition vary among rivers. Our work is part of an ongoing, collaborative effort to learn more about walleye stocks in Green Bay.

(9,) Tuesday, July 26, 2016 1:40 – 2:00 pm: **A Summary of the Current Ecology and Management of Smallmouth Bass in the Upper Colorado River Basin** Tildon Jones, Fisheries Supervisor, Green River Basin FWCO, U.S. Fish and Wildlife Service

Despite occurring in the upper Colorado River ecosystem for many decades at low abundances, smallmouth bass (*Micropterus dolomieu*) responded to drought conditions in the early 2000s with a dramatic range expansion and concurrent increase in abundance. In response, the Recovery Program implemented a smallmouth bass removal program that has evolved in technique, locations, and intensity over time. In 2015, the Recovery Program, through its cooperating partners, conducted smallmouth

bass removal projects in nearly 400 miles of the Colorado, Green, White, and Yampa Rivers. We present a history of the smallmouth bass expansion and the research-driven management actions that ensued. We describe how environmental conditions, especially related to flow and temperature, are important drivers in smallmouth bass riverine production, discussing how low-flow years with early, short duration runoff events (2006-2007, and 2012) produce strong year classes, while high-flow years with sustained, late runoff (2011) produce weak, nearly non-existent year class. We further describe how the Recovery Program removal strategy has evolved to target and remove bass at the highest rates possible, but most importantly focus on removal during smallmouth bass nesting and spawning period. Lastly, we discuss strategies being applied outside of in-river removal, such as changes in fishing regulations, reservoir screening, and evaluating the potential for flow disruption of spawning where appropriate.

(10.) Wednesday July 27, 2016 4:45 pm to 5:05 pm **Electrofishing catchability of juvenile muskellunge in northern Wisconsin lakes** Janice Kerns[1*], Daniel Isermann[2], and Timothy Simonson[3], [1] Wisconsin Cooperative Fishery Research Unit, Fisheries Analysis Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481; 715-346-2178, [2] U.S. Geological Survey, Wisconsin Cooperative Fishery Research Unit, Fisheries Analysis Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve St., Stevens Point, WI 54481, [3]Wisconsin Department of Natural Resources, Bureau of Fisheries Management, 101 S Webster Street, Madison, WI 53703;
*Presenter; Oral

To assess the effectiveness of muskellunge stocking, biologists conduct electrofishing surveys in fall to estimate catch per effort (CPE) and relative contribution of stocked fish. Inherent assumptions of this sampling are that wild and stocked fish have equal probability of capture and that changes in CPE reflect changes in actual abundance. However, capture rates of age-0 muskellunge tend to be low for both wild and stocked fish, making it difficult to determine if electrofishing catch is a meaningful predictor of actual abundance. The goal of our study was to determine the effectiveness of electrofishing for capturing individual age-0 muskellunge by determining locations of stocked fish released into two lakes in northern Wisconsin. All stocked fish received a fin clip and at least 40 fish per lake were inserted with radio transmitters. All fish were released at a single boat ramp on each lake, which followed standard Wisconsin Department of Natural Resources (DNR) protocols. Stocked muskellunge with transmitters were tracked weekly for one month after release. Fish were also sampled weekly using standard Wisconsin DNR electrofishing methods that included a single boat following single line transect around the shoreline of each lake. Comparing known locations of radio-tagged fish to the area sampled by the electrofishing boat revealed that most of the sampling effort was expended outside the area where stocked fish were located. Our initial results suggest that the majority of hatchery fish remained in the vicinity of the release location, with fish moving a max distance of 0.4 – 0.7 km on average away from the release location within four weeks of being stocked. Based on these results, biologists will be able to improve

sampling protocols to evaluate muskellunge stocking success by stratifying sampling effort so that more time is spent sampling where the fish are located.

Importance of work: This study will help to inform scientifically sound management and monitoring decisions concerning muskellunge which represent one of the most popular and economically-important sportfish in the state of Wisconsin.

(11.) Wednesday July 27, 2016 9 am to 9:20 am **Assessment of growth and relative survival of diploid and triploid saugeye in Kansas Impoundments** Jeff Koch, Jason Goeckler, Ron Marteney, Chris Steffen, and Josh Jagels**;** Kansas Department of Wildlife, Parks, and Tourism

Saugeye *Sander vitreus x Sander canadensis* are commonly stocked by fisheries managers in the Midwest to establish percid populations in waters with marginal walleye *Sander vitreus* habitat. Although saugeye are a true hybrid, they are capable of producing viable progeny and backcrossing with parental species. As such, there are concerns regarding unintended reproduction of stocked fish and genetic contamination of percid populations. To alleviate these concerns, Kansas periodically stocks triploid saugeye that are incapable of producing viable offspring. The objective of this study was to evaluate stockings of diploid and triploid saugeye by stocking equal numbers of saugeye fry in five Kansas reservoirs and examining their subsequent survival and growth. In the first two years of the study (i.e., 2014 and 2015), 500 saugeye have been sampled from five reservoirs during autumn night electrofishing. Sampled fish were ploidy tested via flow cytometry using a Coulter counter. In 2014, 44 of 200 (23%) of sampled age-0 saugeye were triploids. Similarly, in 2015, 50 out of 300 (17%) age-0 and age-1 saugeye were triploid. Trends in relative survival by reservoir have been consistent; however, differences in growth of diploid and triploid saugeye have been variable. In general, growth of diploid saugeye has been greater than that of triploids.

(12.) Wednesday July 27, 2016 2:15 pm to 2:35 pm **Diary of an Age-0 Walleye in Harlan County Lake** Keith Koupal, Brian Peterson, and Brett Miller, Fisheries Division, Nebraska Game and Parks Commission, Kearney, NE 68847

Harlan County Lake has been a focus of many presentations throughout the years. The long-term data sets that are being accumulated are continually being examined for trends and patterns that can assist with our abilities to predict conditions and hopefully manage the fisheries community in this system. However, to date we have not paused to examine the within year patterns and how that presents challenges and opportunities for age-0 walleye. This presentation will look at the breadth of abiotic and biotic data that we have accumulated from Harlan County Lake and put them in a perspective of the challenges faced by an Age-0 walleye in this system. Specifically we will examine data that encompasses the variability of abiotic conditions, spatial relationships, diet patterns, growth, and annual sampling.

(13.) Wednesday July 27, 2016 9:20 am to 9:40 am **In-Lake Hatch Rates and Their Implications for Managing Walleye Populations That Serve As Egg**

Sources for Minnesota Hatcheries Dale Logsdon, Minnesota Dept. of Natural Resources, 50317 Fish Hatchery Rd. Waterville, MN 56096 USA
dale.logsdon@state.mn.us

The Minnesota Department of Natural Resources routinely collects gametes from walleye spawning runs from several large lakes, then stocks fry back into those lakes. The number of fry was equal to 10% of the egg take, ostensibly to compensate for lost reproduction from those eggs. To help understand the effects of this longstanding policy on the recipient walleye populations, we manipulated the abundance of stocked fry in four egg-source lakes, marked them with Oxytetracycline (OTC), and resampled them by electrofishing. High recapture rates of OTC marked YOY walleyes allowed the use of Petersen mark/recapture methods to estimate wild fry abundance; and hatch rates were subsequently estimated by comparison of wild fry abundance to estimates of total egg production. Our findings indicate that system-wide hatch rates were much lower than previously thought and historical stocking levels often exceeded natural reproduction in the egg-source lakes. These stocking levels also substantially exceeded the abundance of fry that would have hatched naturally in the absence of any spawn-take activity. Additional results suggest density dependent effects on YOY growth and subsequent recruitment of stocked year classes.

(14.) Tuesday, July 26, 2016 1:00 – 1:20 pm: **The Upper Colorado River Endangered Fish Recovery Program's Nonnative Fish Management: Why Are We Here Today?** Kevin McAbee, Nonnative Fish Coordinator, Upper Colorado River Endangered Fish Recovery Program

In 1988, the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) was established to help bring four species of endangered fish back from the brink of extinction: the humpback chub (*Gila cypha*), bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*). The Recovery Program is a unique partnership of local, state, and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin while water development proceeds in accordance with federal and state laws and interstate compacts. This major undertaking involves restoring and managing stream flows and habitat, boosting wild populations with hatchery-raised endangered fish, and reducing negative interactions with certain nonnative fish species.
The reduction of threats posed by nonnative fishes is increasingly the biggest impediment to recovery of the endangered fish. The Recovery Program began heavily focusing on removing rapidly increasing numbers of nonnative smallmouth bass (*Micropterus dolomieu*) in the Yampa River in northwestern Colorado in the early 2000's, and has expanded this effort to many more locations and river miles. The Recovery Program followed smallmouth bass removal with focused removal of northern pike (*Esox lucius*) in the Yampa River, which were demonstrated to be preying on, and competing with, endangered fish. Most recently, abundance and distribution of adult and late juvenile walleye (*Sander vitreus*) have greatly increased in endangered fish nursery habitats in the lower portions of the Colorado and Green

rivers, which has spurred a third removal effort. The Recovery Program has evolved its removal techniques to become more efficient and effective, has directed efforts to reduce reservoir escapement, and has established a robust policy and outreach campaign to combat these three species. However, the Recovery Program still has not sufficiently met goals for nonnative fish management.

Our workshop agenda today will present an overview of: 1) the results of Recovery Program's mechanical removal efforts (currently covering >700 river miles); 2) populations dynamics modeling for northern pike and smallmouth bass, and tools that were developed to assist in strategic planning; 3) management actions implemented (and planned) to control off channel sources; and 4) policy changes, such as State fishing regulations, intended to message the incompatibility of these invasive sport fish with endangered fish recovery.

Our agenda will conclude today with an open forum designed to query the expertise of the Escocid, Centrarchid, and Walleye Technical Committee membership, and others in attendance, to determine what concepts and ideas we may have not considered. We have specific technical questions for the group's consideration to help guide the conversation. We hope to build a strong networking between our Program and the NCDAFS membership for future collaboration.

(15.) Wednesday July 27, 2016 Movement and survival (initial and short-term) of stocked yearling Muskellunge in Spirit Lake, Iowa Jonathan R. Meerbeek[1] and DJ Vogeler[1]; [1]Iowa Department of Natural Resources, Spirit Lake, IA

Muskellunge angling opportunities in Iowa are a direct result of stocking since natural reproduction is extremely limited. Research studies conducted in the 1990s found that spring stocked minnow-finished yearling Muskellunge survived much better than those stocked in fall and, since 2002, the Iowa Department of Natural Resources (DNR) has exclusively used this approach for all Muskellunge stockings. Initially, success of spring-stocked yearling Muskellunge greatly improved population densities in many of Iowa's lakes. However, since this initial surge, adult populations in some lakes have decreased to levels below management objectives, despite increases in stocking rate and frequency. Mark-recapture studies indicate that individual stocked yearling cohort survival to age-4 was highly variable and has been as low as 7% in recent years. Anecdotal observations at stocking suggest that transportation stress and initial predation may be contributing to these observed decreases in survival. For example, in an effort to prevent the spread of zebra mussels, the Iowa DNR treats all water that leaves their hatchery facilities with the Edwards Treatment procedure. This additional treatment in conjunction with a 6 hour transport time may have potential negative effects on survival of stocked yearling Muskellunge. In addition, stocking stressed yearling Muskellunge directly at boat ramps may be contributing to increased predation (avian and/or fish) and hence, reduced cohort survival. Specifically, managers want to know if the reductions are a result of hauling stress, predation, fish condition, or a combination of factors. The objective of this project was to evaluate post-stocking survival of stocked yearling Muskellunge in Spirit Lake, Iowa and to compare cohort survival via three stocking techniques: (1) stocked directly at ramp; (2) transported to holding tanks at Spirit Lake Hatchery for 36 hours (to allow for hauling stress recovery) then stocked at boat

ramp; (3) transported off-shore via boat and stocked. A sub-sample of fish stocked via each technique were implanted with radio transmitters and followed for up to 3 months. The initial results from this study will be discussed.

(16.) Wednesday July 27, 2016 1:15 pm to 1:35 pm **Short-Term Survival of Gizzard Shad After Dummy Transmitter Implantation** Hilary Meyer[1], Robert Hanten[1], Mark Fincel[1] and Jake Davis[2] South Dakota Department of Game, Fish and Parks, [1]Fort Pierre District Office, 20641 SD Highway 1806, Fort Pierre, SD 57532, [2]4130 Adventure Trail, Rapid City, SD 57702

South Dakota Game, Fish and Parks biologists implanted Gizzard Shad (*Dorosoma cepedianum*) with acoustic telemetry transmitters during the spring of 2014 and 2015. Gizzard Shad have never been implanted with transmitters prior to this study, so a general understanding of post-surgery survival is needed. Our objective was to determine effects of tag implantation and surgery duration on short-term survival of Gizzard Shad. Adult Gizzard shad were collected by shoreline electrofishing during April-May 2014 and 2015. After capture, fish were randomly assigned to the treatment or the control group. Forty-nine fish (29 in 2014, 20 in 2015) were surgically implanted with Vemco V13 dummy tags (13 mm), and 40 fish (20 per year) were considered control fish, where no surgery was performed. Fish were placed in a 4m x 4m x 2m floating net pen, and survival assessed 3 days (2014 trial) and 5 days (2015 trial) post-surgery. We used an analysis of variance to test for differences in survival of tagged and control fish ($\alpha = 0.10$). We assessed effects of treatment, surgery duration (s), temperature (°C), holding time (d) and length (mm) on survival with logistic regression ($\alpha = 0.10$). There was no difference between survival of tagged (86.7%) and control fish (88.3 %; $p = 0.7$). Water temperature was the only significant variable that influenced survival of Gizzard Shad ($p = 0.097$). Interestingly, Gizzard Shad survival increased as water temperature increased. Short-term survival of Gizzard Shad implanted with dummy transmitters was similar to control fish, suggesting that effects of implantation and surgery duration do not have adverse short-term impacts on Gizzard Shad. Mortality rates in control fish indicate that handling protocols may need to be refined to increase survival rates in future research.

(17.) Tuesday, July 26, 2016 1:55 pm to 2:15 pm **Colorado Pikeminnow recruitment in the Upper Colorado River Basin: a new perspective for the Green River, Utah** Christopher M. Michaud[1], Matthew J. Breen[2], and Kevin R. Bestgen[3]**;** [1]Utah Division of Wildlife Resources, Moab Field Station, 1165 South Highway 191 – Suite 4, Moab, UT 84532; [2]Utah Division Wildlife Resources, Northeastern Regional Office, 318 North Vernal Avenue, Vernal, UT 84078; [3]Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO 80523.

Long-term monitoring data is valuable to assess distribution and abundance of fish populations and their response to environmental conditions and management actions. Young-of-year (YOY) Colorado pikeminnow (*Ptychocheilus lucius*)

sampling, ongoing since 1986 in the upper Colorado River basin as part of the Interagency Standardized Monitoring Protocol (ISMP), is used to monitor recruitment of this federally endangered species. Survival of YOY pikeminnow varies greatly between years, independent of spawning success, as a result of numerous interacting biotic and abiotic factors including flow variation, water temperature, rearing habitat condition and availability, and competition and predation by nonnative fishes. Autumn ISMP sampling is intended to provide a large-scale (224 miles of the Green River, 111 miles of the Colorado River) snapshot of annual recruitment following spawning and summer growth periods. 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 basin, the largest remaining population. In light of poor recruitment for more than two decades, preliminary 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) given that experimental water releases from the Flaming Gorge Dam have benefitted other endangered fishes (e.g., razorback sucker). Following a significant effort to analyze available data from 1979 – present, we recommend maintaining summer base flows within a specific range through manipulation of flow releases from Flaming Gorge Dam. This action is needed immediately as it offers the best opportunity to boost survival of young fish that only add to the adult population 5-8 years later. Flow management, along with invasive species control, may provide additional tools to aid recovery of Colorado pikeminnow in the upper Colorado River basin.

(18.) Wednesday July 27, 2016 3:45 pm to 4:05 pm **Use of rotenone to improve growth of sport fishes** Ben C. Neely, Jeff D. Koch, Sean T. Lynott, Kansas Department of Wildlife, Parks, and Tourism, 5089 CR 2925, Independence, KS 67301. Ben.neely@ksoutdoors.com

Gizzard shad *Dorosoma pretense* are opportunistic planktivores that often compete with young sport fishes for available food resources. These interactions have been demonstrated to result in decreased growth within some Centrarchidae (e.g., Bluegill *Lepomis macrochirus*) populations. However, Gizzard Shad can also function as primary forage for other Centrarchidae (i.e., Largemouth Bass *Micropterus salmoides*) populations. Gizzard shad were unintentionally introduced into Montgomery State Fishing Lake in southeast Kansas during a sustained flood event in 2007. In subsequent years, catch rates of Gizzard Shad reached undesirable levels. Rotenone was applied in January, 2014 at a concentration of 7.5 ppb to selectively kill Gizzard Shad and responses of Gizzard Shad, Bluegill, and Largemouth Bass populations were measured. Treatment was successful in reducing number of Gizzard Shad. Catch-per-effort (CPE) in fall gill nets decreased from 45.2/net night in 2012 to

0.2/net night in 2014 to 0.0/net night in 2015. Both Bluegill and Largemouth Bass produced large year classes in 2014 as measured by age-0 CPE estimates. However, mean length at development of first annulus for Bluegill and Largemouth Bass hatched in 2014 with greatly reduced Gizzard Shad abundance did not differ from those hatched in prior years when large numbers of Gizzard Shad were present. Size structure analysis suggests that the Bluegill population was comprised of larger fish in 2015 relative to previous years while size structure of the Largemouth Bass population remained similar. These preliminary results suggest that Gizzard Shad reduction through application of low-dose rotenone has potential to restructure Bluegill populations toward larger fish without having a deleterious effect on Largemouth Bass populations.

(19.) Wednesday July 27, 2016 11:25 am to 11:45 am **Dynamics and Distribution of the Lake McConaughy Walleye** Benjamin J. Schall[1], Keith D. Koupal[2], and Casey W. Schoenebeck[3], [1] Department of Biology, University of Nebraska Kearney, Kearney, NE, [2] Nebraska Game and Parks Commission, [3]Minnesota Department of Natural Resources

Known as a trophy Walleye fishery, Lake McConaughy consistently ranks as the water body with the most fishing pressure in the state of Nebraska. Most information pertaining to the dynamics and distribution of Walleye in this system is anecdotal or antiquated. The population dynamics, seasonal distribution patterns, and habitat associations of Walleye were assessed in Lake McConaughy, Nebraska using data from extensive gill net surveys. Population dynamics data were assessed in spring and fall using otolith-derived ages, and three horizontal lake zones approximating the riverine, transition, and lacustrine zones were used to compare mean catch data. Akaike's Information Criterion were used to elucidate relationships between C/*f* and habitat variables including water temperature, dissolved oxygen, Secchi depth, relative chlorophyll a, and bank slope. Walleye were observed to age 18, and growth data indicate male and female growth rates are faster than North American averages. Spatial differences were observed in catch rates among the three zones in summer and fall 2015 and spring 2016. The results from this study demonstrate the ability of Walleye in Lake McConaughy to achieve trophy size and indicate variation in spatial distribution occurs within the reservoir.

(20.) Wednesday July 27, 2016 1:35 pm to 1:55 pm **Insights into managing wetlands as nursery habitat for endangered Razorback Sucker, *Xyrauchen texanus*, after three years of success at Stewart Lake, middle Green River, Utah** Robert Schelly and Matthew Breen, Utah Division of Wildlife Resources, Northeastern Regional Office, 318 North Vernal Avenue, Vernal, UT 84078

Endangered Razorback Sucker, *Xyrauchen texanus*, have declined in the Colorado River Basin as impoundment-related flow alteration has reduced access to off-channel wetland habitats and nonnative species have proliferated. For decades, survival of wild-spawned razorback suckers to juvenile stages has been negligible, and populations have been maintained by stocking of hatchery-raised fish. Since

2013, however, the management of 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. In 2013 and 2014, after two and three months of entrainment, respectively, many hundreds of juvenile Razorback Suckers were returned to the Green River. After a mild winter and the earliest larval emergence on record, the 2015 cohort of Stewart Lake Razorback Suckers was smaller than expected, but a number of age-1 fish spawned in 2014 were recaptured throughout the 2015 season, confirming successful recruitment. Here we elaborate on the importance of off-channel wetlands to certain life stages of native Upper Colorado River Basin fishes, with an eye towards fine-tuning our management strategy to maximize Razorback Sucker survival and further disadvantage nonnative fishes.

(21.) Wednesday July 27, 2016 11:45 am 12:05 pm **Fishes of the Dakotas** Katie Schlafke[1] and Katie Bertrand[1], [1]Department of Natural Resource Management, College of Agriculture and Biological Sciences, South Dakota State University, SNP 138, Box 2140B, Brookings, SD 57007-1696

Taxonomic keys and museum collections play a critical role in studies of biodiversity and its loss, biological distribution, and historic diversity and environmental health**.** Since the *Fishes of North Dakota* (Hankinson, 1929) and *Fishes of South Dakota* (Bailey and Allum, 1962), no new books have attempted to update the knowledge gained from the past five decades of fish surveys and incorporate georeferenced collections at the state level. The last published book with the most complete accounts of fishes from North Dakota and South Dakota is the *Distribution of Fishes in North and South Dakota Basins affected by the Garrison Diversion Unit* (Owen et al. 1981) which includes point distribution maps, species descriptions, and a dichotomous key of 105 species. Since these publications, 35 species were introduced or discovered in one or both states. This project aims to create a new reference for all species in North Dakota and South Dakota by synthesizing data from both states. The book will include detailed point distribution maps, updated taxonomic keys, color plates or illustrations, and complete species accounts for 140 fishes, including etymology, morphology, habitat, reproduction, food and feeding, and age and growth. This reference will be a valuable tool for students, researchers, biologists, and enthusiasts.

(22.) Wednesday July 27, 2016 10:00 am to 10:20 am **Double-crested cormorant management on Leech Lake, Minnesota** Doug Schultz, MN DNR, Section of Fisheries 07316 State 371 NW, Walker, MN 56484, doug.w.schultz@state.mn.us **remote presentation**

Double-crested cormorants, historically common to Leech Lake, re-colonized the 45,000-ha lake in 1998 and increased exponentially during the early 2000's,

peaking at 2,500 nesting pairs in 2004. Concurrent declines in percid abundance and the associated fishery to near record lows prompted implementation of a lethal management program beginning in 2005 that has continued annually. A complementary diet study was conducted and consumption model developed to estimate annual cormorant predation its potential impacts on the walleye population. Cormorant management has reduced foraging effort and total fish consumption by nearly 90% since 2004. Cormorant diets were highly variable and dominated by yellow perch and *Coregonus* spp., and percid populations and the fishery rebounded by 2008. Some fish population metrics, such as growth and recruitment, were described by changes in cormorant foraging effort while others, such as changes in gill net CPUE, were not. Cormorant predation on juvenile walleye was relatively low (≤ 15% total diet mass) within a year; however, sustained predation on cohorts at age-1 and age-2 may have been sufficient to increase total annual mortality and reduce recruitment to the fishery at age-3.

(23.) Wednesday July 27, 2016 9:40 to 10:00 am **Turnover Rates of Carbon and Nitrogen Isotopes in Age-0 Walleye (*Sander vitreus*) Tissues Following a Laboratory Diet Switch Experiment** David A. Schumann[1,2*], Christopher S. Uphoff[1,3], Casey W. Schoenebeck[1], and Katie N. Bertrand[2], [1]Department of Biology, University of Nebraska at Kearney, 2401 11th Avenue, Kearney, Nebraska 68847, USA, [2]Department of Natural Resource Management, South Dakota State University, Box 2140B, SNP 138, Brookings, South Dakota 57007, USA, [3]Minnesota Department of Natural Resources, DNR Hinckley Office, 306 Power Avenue North Box 398, Hinckley, Minnesota 55037, USA**,** *Author to whom correspondence should be addressed: David A. Schumann; Department of Natural Resource Management, South Dakota State University, Box 2140B, SNP 138, Brookings, South Dakota 57007, USA; Telephone: 605-688-6577; Email: David.Schumann@sdstate.edu

Measuring the abundance of naturally occurring isotopes to disentangle aquatic food webs is now commonplace; however, interpretation of isotope data continues to be clouded by variability in assimilation rates among tissues, species, and age classes within species. We conducted a laboratory diet-shift experiment to refine interpretation of stable isotope data measured from age-0 walleye (*Sander vitreus*) dorsal muscle and whole body tissues. Common to fast-growing age-0 fishes, isotopic turnover, attributed mostly to fish growth, was relatively fast for both tissues during the diet-switch. Nitrogen turnover in both tissues took approximately 56 days following the diet switch. Carbon turnover was faster; whole body samples reflected the new diet after 42 days whereas turnover occurred in 52 days in dorsal muscle tissues. Future research on fishes undergoing diet changes should carefully consider the tissue from which isotopes are measured and the potential for error when measured before the new diet is assimilated. The refinement of stable isotope techniques described herein will clarify interpretation of aquatic food webs by accounting for assimilation during the ontogenetic diet shift in walleye.

(24.) Wednesday July 27, 2016 4:05 pm to 4:25 pm **Estimating Genetic Diversity Levels in Wisconsin's Feral Walleye Broodstock Populations** *Michael F. Vaske[1], Justin A VanDeHey[1], Brian L. Sloss[2], Keith Turnquist[3], [1]Fish Propagation Science

Center, College of Natural Resources, University of Wisconsin-Stevens Point, 800 Reserve Street, Stevens Point, WI 54481, [2]College of Natural Resources, University of Wisconsin – Stevens Point, 800 Reserve Street, Stevens Point, WI 54481, [3]Molecular Conservation Genetics Laboratory, College of Natural Resources, University of Wisconsin – Stevens Point, 800 Reserves Street, Stevens Point, WI 54481, *presenter; Michael.f.vaske@uwsp.edu

Conservation of genetic resources is a challenging issue and a vital component of Walleye *Sander vitreus* management in Wisconsin. Maintaining genetic diversity of this ecologically important predator is important for sustainability and is especially important within the propagation program. Due to the increased production of extended growth fingerlings (6-8" in length) from state and private hatcheries, the Wisconsin Department of Natural Resources (WDNR) has requested assistance to better understand the genetic implications of their current propagation methods. Therefore, the objectives of our research were to (1) compare the genetic diversity within Wisconsin's feral Walleye broodstock with genetic diversity levels in other wild, naturally recruiting, Wisconsin Walleye populations; and (2) determine if varying levels of sampling effort influence measured genetic diversity levels. During 2015 and 2016, fin clips were collected from spawning Walleye. Although genetic diversity was comparable to other northern Wisconsin Walleye populations, our results suggest that effort should be increased to obtain larger numbers of broodfish to increase diversity within progeny. Our results also suggest that broodfish should be sampled over a longer period of the spawn to increase diversity within progeny. Results from this research will be used develop a genetic broodstock management plan to help ensure the WDNR is operating using the best possible management practices.

(25.) Tuesday, July 26, 2016 2:00 – 2:20 pm: **A Summary of the Current Ecology and Management of Northern Pike in the Upper Colorado River Basin** Koreen Zelasko, Research Associate, Larval Fish Laboratory, Colorado State University

Northern pike (*Esox lucius*) was introduced into the Yampa River basin in the 1970's and is now considered one of the upper Colorado River basin's most problematic invasive aquatic species. Its high abundance, habitat use that overlaps with most native fishes, and ability to consume a wide variety of life stages of native fishes, including large adults, are impediments to the recovery of endangered fishes in the upper Colorado River basin, especially displacing the native apex predator, Colorado pikeminnow (*Ptychocheilus lucius*). In response, the Recovery Program began mechanical removal of the species in 2004, and evaluated the removal process in 2012. Results demonstrate that current removal efforts were inadequate to permanently reduce pike abundance in the Yampa River, mainly because combined recruitment and immigration rates exceed removal rates. In response, the Recovery Program implemented more effort to disrupting spawning and reservoir escapement beginning in 2014. These efforts may be effective, because in 2015 abundance and catch rates for adult northern pike were among the lowest observed in most reaches. However, age-0 northern pike catch rates and abundance were the highest on record in

the Middle Yampa River, which raises concerns of a strong 2015 year class and a compensatory population response.

END

AkSarBen Aquarium,
Near Gretna, Nebraska

See you July 2017 at the joint summer meeting in Kansas