



Rejuvenating Reservoirs

Reservoir Fisheries Habitat Partnership

6th Annual Meeting

Ogden, Utah

November 5 - 8, 2012



Coordinator's Welcome

The Reservoir Fisheries Habitat Partnership and Friends of Reservoirs would like to welcome you to our 6th Annual Meeting in Ogden, UT. Reservoir fisheries habitat issues in the west are arguably some of the most challenging that face fisheries managers across the country. No single component of fish habitat is more vital than water. Recent drought and climate change predictions point to a worsening of the current status of water resources in the west. Water issues and the conflicts among users often play out in the national media. It is vital that professional water managers, water users, fisheries professionals and concerned citizens work together to resolve conflicts when they arise and reach compromises that best meet the needs of all concerned. Friends of Reservoirs strives to communicate the issues to its partners and the public and offer a forum for those discussions. Our meetings are transitioning from focusing on the “business end” of the partnership to more of a discussion forum/celebration of where we have been and where we need to go. We plan to increasingly focus these meetings on our partners and invite local fisheries resource users in efforts to spread our message and learn from those involved in local fisheries habitat issues.

The highlights of the technical portion of the program include a presentation on a Reservoir Partnership-funded project to compile reservoir fisheries habitat restoration Best Management Practices. We strive to provide technical assistance to both professional and lay groups that are tackling challenging habitat restoration efforts. This catalogue of BMPs should be available online in the next year. In keeping with the local/regional focus of our meeting several presentations specific to issues in Utah are on the agenda. We have presentations from New Mexico and Texas that focus on managing fisheries habitat in the face of drought and challenging water management regimes. There is no better reservoir shallow-water fish habitat than native vegetation. Not surprisingly, these types of projects are funded annually through the Reservoir Partnership grant program. We have several talks on the agenda highlighting the use of native aquatic vegetation in a reservoir habitat management program.

One of the real exciting portions of the agenda this year is that, for the first time, we have international speakers from Australia and Brazil. These scientists have come to share their experiences and learn from ours. As I mentioned earlier, fish habitat restoration is a collaborative effort and it is gratifying to see that we can reach across borders.

In my nearly 40 years as a reservoir fisheries biologist, I have attended countless scientific meetings and have learned that the real value of attending these conferences is learning through the informal discussions with colleagues outside the formal presentations. Our hosts in Utah have provided ample such opportunities. We have breaks scheduled for discussions with colleagues and vendors, a banquet complete with raffles and team building exercises that we hope all will take full advantage of. I look forward to learning from all in attendance and extend a hardy **WELCOME TO UTAH!!!!**

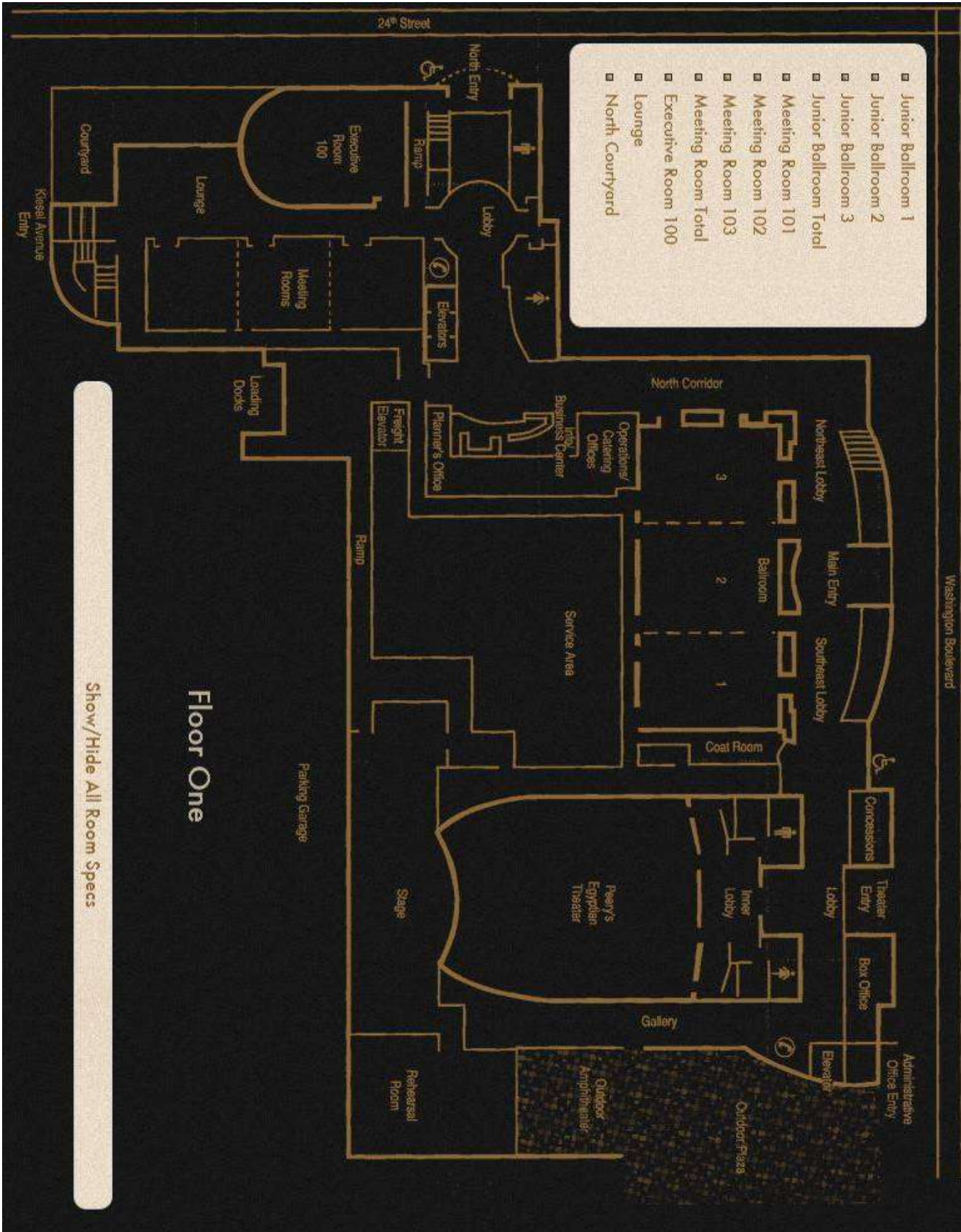
Ogden Eccles Conference Center (OECC)

Proximity to Hotel



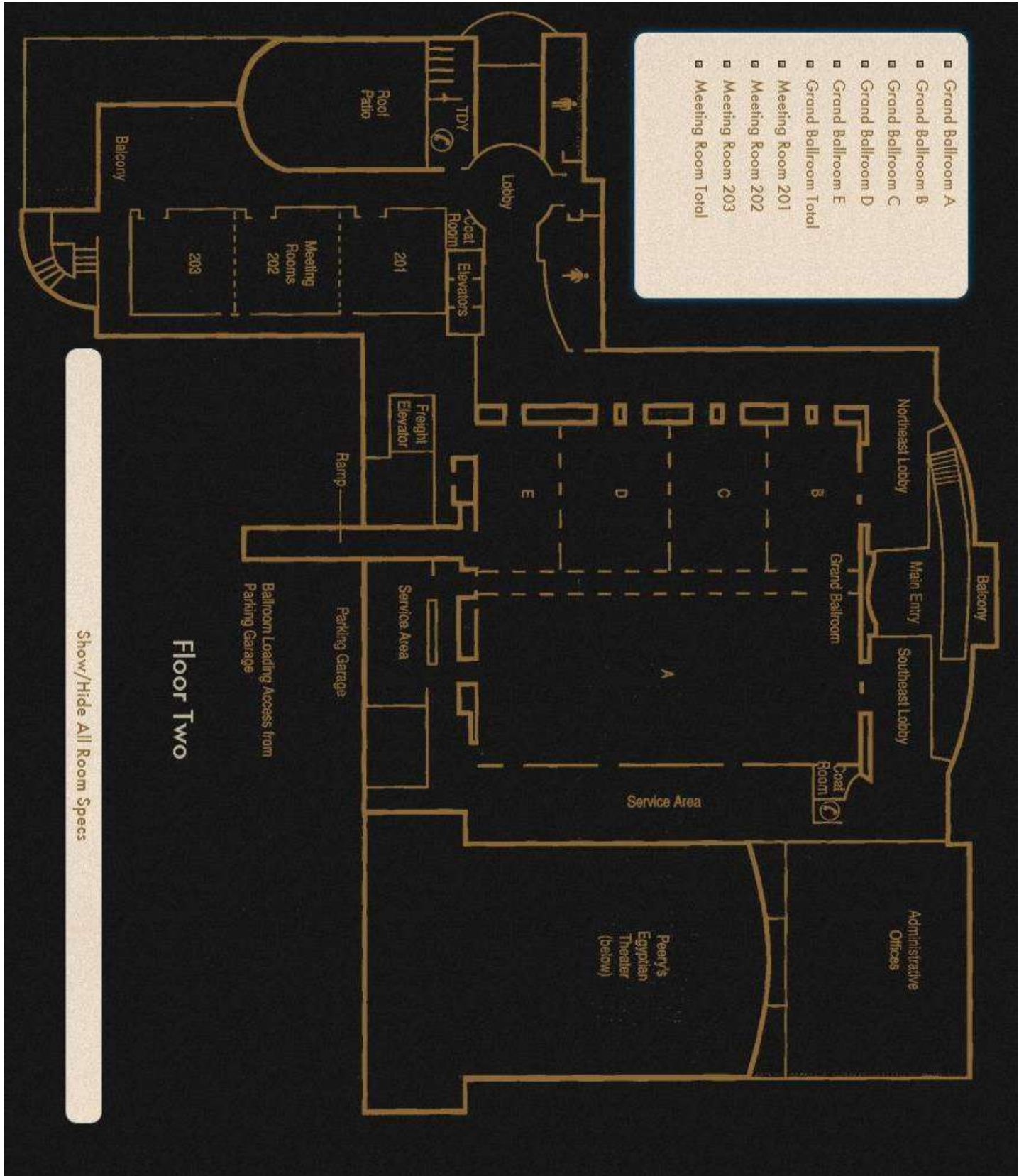
Ogden Eccles Conference Center (OECC)

Floor Plan (First Floor)



Ogden Eccles Conference Center (OECC)

Floor Plan (Second Floor)



2015 Reservoir Fisheries Habitat Partnership
“Rejuvenating Reservoir”

Ogden Eccles Conference Center (OECC)
 November 5 -8, 2015
 Ogden, Utah



AGENDA

THURSDAY, NOVEMBER 5th

Time	Event	Location
8:00am-5:00pm	Exhibitor Load-in	Northeast and Southeast Lobby OECC

FRIDAY, NOVEMBER 6th

Time	Event	Location
7:00am-8:00am	BREAKFAST (on your own)	Hilton Garden Inn
8:00am-5:00pm	Registration Table/Information Booth	Washington Street Main Entry OECC
8:00am-8:30am	Welcome (<i>Mayor Mike Caldwell or proxy - Ogden City</i>)	Ballroom 1 - 3 OECC
8:30am-10:10am	Partnering and Planning	Ballroom 1 - 3 OECC
8:30am-8:50am	<ul style="list-style-type: none"> • <i>Partnering to Improve Fisheries Habitat in Reservoirs Across the Nation (Jeff Boxrucker – RFHP Chair)</i> 	
9:00am-9:30am	<ul style="list-style-type: none"> • <i>Best Management Practices for Enhancing Fish Habitat In Reservoirs (Steve Miranda - Mississippi State University)</i> 	
9:40am-10:00am	<ul style="list-style-type: none"> • <i>(Jeremy Shiflet - Kentucky Department of Fish and Wildlife Resources)</i> 	
10:10am-10:40am	BREAK WITH EXHIBITORS	Northeast and Southeast Lobby OECC
10:40am-12:20pm	Maximizing Potential	Ballroom 1 - 3 OECC
10:40am-1:10am	<ul style="list-style-type: none"> • <i>Untapped Potential: Impoundment Fisheries Management in Australia (Andrew Norris – Department of Agriculture & Fisheries, Queensland Australia)</i> 	
11:20am-1:40am	<ul style="list-style-type: none"> • <i>Comparison of Natural Brush and Synthetic (Plastic) Fish Attractors in Florida Lakes and Reservoirs (Dustin Everitt - Florida Fish and Wildlife Conservation Commission)</i> 	
11:50am-2:10pm	<ul style="list-style-type: none"> • <i>(Mark Fowlkes - North Carolina Wildlife Resources Commission)</i> 	

FRIDAY, NOVEMBER 6th (continued)

12:20pm-1:30pm	LUNCH (provided)	Meeting Rooms 101 - 103 OECC
1:30pm-3:00pm 1:30pm-1:50pm 2:00pm-2:20am 2:30pm-2:50pm	Restoration in Utah <ul style="list-style-type: none"> <i>Burgeoning Utah Habitat Work (Chris Penne – Utah Division of Wildlife Resources)</i> <i>Boater Infrastructure Providing Fish Habitat (Craig Walker – Utah Division of Wildlife Resources)</i> <i>Water Quality and Reservoir Fisheries (Kari Lundeen – Utah Division of Water Quality)</i> 	Ballroom 1 - 3 OECC
3:00pm-3:30pm	COFFEE WITH EXHIBITORS	Northeast and Southeast Lobby OECC
3:30pm-4:00pm 3:30pm-4:00pm 4:10pm-4:40pm	Reservoir Aging and Assessment <ul style="list-style-type: none"> <i>Development of the Reservoir Morphological Database (Kirk Rodgers – U.S. Geological Survey)</i> <i>Fish in Paleochannels of the Lower Mississippi River Alluvial Valley (Steve Miranda – Mississippi State University)</i> 	Ballroom 1 - 3 OECC
4:50pm onward	EXPLORE OGDEN AND DINNER ON YOUR OWN	

SATURDAY, NOVEMBER 7th

7:00am-8:00am	BREAKFAST (on your own)	Hilton Garden Inn
8:00am-5:00pm	Registration Table/Information Booth	Washington Street Main Entry OECC
8:00am-10:20am 8:00am-8:30am 8:40am-9:10am 9:20am-9:50am 10:00am-0:20am	Reestablishing Aquatic Vegetation <ul style="list-style-type: none"> <i>Establishing Aquatic Plants in Reservoirs: Why and How (Richard Ott – Texas Parks and Wildlife)</i> <i>Enhancing Structure and Function of the Shoreline Zonet at Elephant Butte Reservoir. Kala Scarafjotti - Ruidoso High School, New Mexico)</i> <i>Preparing for Planting in Utah Reservoirs (Eric Wagner – Utah Division of Wildlife Resources)</i> <i>Reestablishing Native Vegetation in Lake Livingston, Texas through Partnerships (Tom McDonough – Lake Livingston Friends of Reservoirs)</i> 	Ballroom 1 - 3 OECC
10:30am-11:00am	BREAK WITH EXHIBITORS	Northeast and Southeast Lobby OECC
11:00am-1:00pm 11:00am-1:30am 11:40am-2:00pm	Case Studies and the Future of Monitoring <ul style="list-style-type: none"> <i>Fish Habitat Improvement Projects at Nessmuk and Glade Run Lakes (Ben Page – Pennsylvania Fish and Boat Commission)</i> <i>From Farmland to Fishery: Creating Fish and Wildlife Habitat at a new Florida Reservoir (Dustin Everitt - Florida Fish and Wildlife Conservation Commission)</i> 	Ballroom 1 - 3 OECC

SATURDAY, NOVEMBER 7th (continued)

12:10pm-12:30pm 12:10pm-2:30pm 12:40pm-1:00pm	Case Studies and the Future of Monitoring (continued) <ul style="list-style-type: none"> <i>The Death and Holistic Revitalization of a Reservoir, the Case of Lake Wichita, Texas (Tom Lang – Texas Parks and Wildlife)</i> <i>Reservoir Rehabilitation Tactics: Lessons learned from the Nebraska Aquatic Habitat Program (Mark Porath - Nebraska Game and Parks Commission)</i> 	Ballroom 1 - 3 OECC
1:10pm-2:30pm	LUNCH (on your own)	Downtown Ogden
2:30pm-5:00pm	Annual Business Meeting (for state representatives only)	Ballroom 1 - 3 OECC
2:30pm-5:00pm	FREE TIME (for those not attending the annual business meeting)	Downtown Ogden
2:30pm-5:00pm	EXHIBITOR BREAKDOWN	Northeast and Southeast Lobby OECC
5:00pm-6:00pm	FREE TIME (all attendees)	
6:00pm-9:00pm	BANQUET	Meeting Rooms 101 - 103 OECC

SUNDAY, NOVEMBER 8th

6:30am-2:00pm	Team Building Events (box lunches provided at departure)	Departure from Kiesel Avenue Loading Docks
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Business Meeting Agenda



Ogden Eccles Conference Center
Ogden, UT
November 7, 2015

<u>Saturday, November 7</u>	
2:30-2:45	Welcome/Introductions
2:45-3:00	Report on FOR Partner Workshop
3:00-3:15	*Approval of Minutes/Financial Statement
3:15-3:30	*MSCGs Update
3:30-4:00	*Communication/Marketing Plan/Website update
4:00-4:15	*Coordinator Work Plan/2015 Budget
4:15-4:30	2014-2015 Project Updates
4:30-5:00	*2015 Project Selection

*Briefing Book

Proxies

Call-In Number: 877-820-7831

Pass Code: 413778#

Team building



Arguably, some of the most innovative and important natural resource management ideas of the 20th and 21st century have been conceived during fishing and hunting excursions. Keeping up with tradition, this year's Reservoir Fisheries Habitat Partnership meeting features a variety of unique team building activities slated for the final day of our meeting. Utah Division of Wildlife Resources personnel and local partners plan to provide meeting participants with an opportunity to interact informally while participating in some world-class angling and hunting opportunities catering to a variety of tastes.



Fishing at Pineview Reservoir will give anglers an opportunity to catch yellow perch, black crappie, smallmouth bass, largemouth bass and, of course, an opportunity to tie into a record tiger muskie.



Waterfowl hunting on the Great Salt Lake is possibly some of the best bird hunting you will ever experience in one of the most unique settings on the planet.



Stream anglers will really enjoy fly or lure **fishing on the Weber River** for beautiful native Bonneville cutthroat and brown trout in this mountain setting.



Pheasant hunting near the Great Salt Lake will provide upland hunters with ample early season shooting on public ground.

2015 Banquet Raffle

The Utah Chapter of American Fisheries Society would like to thank all of the individuals, companies, and organizations for their generous contributions to this year's fundraising raffle.

This year's raffle includes the following items plus much, much more!

Contributor

Flaming Gorge Resorts

Savage Arms

Brock Richardson

Browning

Item

1-day Green River guided float fishing trip for two

.308 rifle with scope

10 Signed Prints

Knife and Display Case

2015 Raffle Pricing			
General Raffle	Card Drawing#1 .308 rifle	Card Drawing #2 Browning Knife	Card Drawing #3 Green River float trip
\$2 for 1 Ticket	\$30 for 1 Card	\$10 for 1 Card	\$30 for 1 Card
\$5 for 3 Tickets	\$80 for 3 Cards	\$40 for 5 Cards	\$100 for 5 Cards

2015 RFHP Abstracts

Partnering to Improve Fisheries Habitat in Reservoirs across the Nation

Presenting Author: Jeff Boxrucker – Reservoir Fisheries Habitat Partnership, jboxrucker@sbcglobal.net

Abstract

The task of restoring habitat in the nation's reservoirs is a multijurisdictional challenge and cost prohibitive for a federal and/or state agency to accomplish without partnering with other public and private organizations or individuals. The Reservoir Fisheries Habitat Partnership (RFHP) recognizes that reservoir fisheries habitat impairments are often extensions of poor land-use practices in the respective watersheds. RFHP works to bring agencies and local organizations and individuals together to address habitat impairments at the local scale. RFHP and the Friends of Reservoirs Foundation have a membership and grant program that encourages local groups to work with state fisheries biologists to ensure that projects enhance fisheries management plans. RFHP has conducted a habitat impairment assessment of reservoirs nationwide to help prioritize activities. Funded projects have focused on native vegetation restoration, structure addition and shoreline stabilization. Future projects look to partner with organizations to address watershed impairments to improve water quality and habitat in downstream impoundments.

Reestablishing Native Vegetation in Lake Livingston, TX through Partnerships.

Presenting Author: Tom McDonough, Lake Livingston Friends of Reservoirs and Texas Black Bass Unlimited.

Abstract

Lake Livingston, an 85,000-acre east Texas impoundment, like many reservoirs has experienced degraded littoral habitat due to reservoir aging processes. Lake Livingston Friends of Reservoirs was established in 2013 to create partnerships with the objective of restoring native aquatic plants (water willow) to provide nursery habitat and stabilize eroding shorelines. Partnerships were established with the appropriate management agencies [Texas Parks and Wildlife (TPWD) and Trinity River Authority], local municipal and county governments, civic and conservation organizations and six Independent School Districts. Culture and planting of the founder colonies are being conducted per TPWD BMPs. Local school districts construct the nursery cells, culture the plants, and participate in the planting process. Student participation promotes an understanding of ecosystem processes and provides an “ownership” in the ecosystem health of their local reservoir. Currently, 18 growing cells have been constructed with plans for 25-30 cells to be operational in 2016. A grant from the Reservoir Fisheries Habitat Partnership provided initial funding for the project and local fundraising is expected to maintain and expand efforts over the next 10 years. This project was recognized as part of the National Fish Habitat Partnership’s Ten Waters to Watch program in 2015.

From Farmland to Fishery: Creating Fish and Wildlife Habitat at a New Florida Reservoir

Contributing Authors: Dustin Everitt, Marty Hale, and Steve Kramer

Presenting Author: Dustin Everitt – Florida Fish & Wildlife Conservation Commission, dustin.everitt@myfwc.com

Abstract

Fellsmere Water Management Area (FWMA) is a 10,000-acre parcel of land owned by the St. Johns River Water Management District (District) in Indian River County, Florida. As part of the restoration of the Upper St. Johns River floodplain, the District is converting FWMA from agricultural lands into a water storage area. Agricultural practices (cattle, sod, citrus, and watercress) have created large blocks of flat topography and monotypic vegetation within FWMA. The construction of FWMA provides the Florida Fish and Wildlife Conservation Commission (Commission) the opportunity to create and sustain a high quality sport-fishery and an important eco-tourism resource. Due to the homogenous nature of FWMA habitat, the Commission and the District began enhancement activities in March 2012 which will increase the diversity of structure and cover types available to largemouth bass and other fish and wildlife species once the reservoir is flooded (2016). Underwater shelves, holes, islands and ridges were constructed and over 15,000 trees were planted in a 2000-acre areas that were previously monotypic cattle pastures and sod fields. We will discuss the potential benefits of pre-flood enhancement and its possible contribution to fish and wildlife abundance, recreational usage, and economic benefits.

Comparison of Natural Brush and Synthetic (Plastic) Fish Attractors in Florida Lakes and Reservoirs

Contributing Authors: Brandon Thompson, Steve Kramer, Dustin Everitt, and Marty Hale

Presenting Author: Dustin Everitt – Florida Fish & Wildlife Conservation Commission, dustin.everitt@myfwc.com

Abstract

Installing natural brush fish attractors in freshwater lakes and reservoirs is a common management strategy used by fish and wildlife agencies to concentrate fish and increase angler catch rates. In Florida, warm productive water quickly breaks down natural brush and frequent refurbishing or replacement of woody structure is necessary to maintain high angler catch rates. Mossback® plastic fish attractors have recently become commercially available and appear to have similar habitat complexity as natural brush with the added benefit of longevity. In this study, our objectives were to determine the effectiveness of each fish attractor treatment (density and material type) by quantifying relative abundance and angler catch rates of Largemouth Bass (*Micropterus salmoides*). We deployed natural and synthetic fish attractors in Lake Griffin and Stick Marsh Reservoir and collected monthly electrofishing samples and weekly hook-and-line sampling data to compare how material type and density concentrate fish and influence angler catch rates, respectively. We found similar relative abundance of Largemouth Bass between natural brush and plastic attractors. However, in the weekly hook-and-line sampling, biologists caught more bass while fishing plastic attractors in 17 of the 24 trips. The data indicates that plastic and brush concentrates similar numbers of fish, but Largemouth Bass may be more vulnerable to angling on plastic attractors. Synthetic fish attractors may be a long-term and useful tool for fisheries managers looking to supplement declining/degraded habitat in reservoirs and lakes where natural brush quickly decomposes.

Evaluating Fish Habitat Enhancement Projects in North Carolina Piedmont Reservoirs

Contributing Authors: Mark D. Fowlkes, Jessica R. Baumann, N. Corey Oakley, and Brian J. McRae

Presenting Author: Mark Fowlkes– North Carolina Wildlife Resources Commission, mark.fowlkes@ncwildlife.org

Abstract

The North Carolina Wildlife Resources Commission uses natural and artificial structure, establishes native aquatic vegetation, and stabilizes shorelines to enhance fish habitat in reservoirs. These enhancements meet a variety of different objectives including creating spawning and nursery habitat to increase recruitment, improving feeding opportunities for both predator and prey species, concentrating fish to increase angling success, improving water quality, and helping reduce shoreline erosion. The Commission has initiated three studies to determine if three common habitat enhancement techniques meet management objectives. In one study, the Commission evaluated the effectiveness of four different types of fish attractors to concentrate fish in North Carolina Piedmont reservoirs over a three year period. Overall results indicate that all fish attractors held significantly ($\alpha=0.05$) more fish than a control area that was devoid of structure. Further, in year three of the study, it was found that a structure made of corrugated pipe held significantly more fish than a structure made from barrels and a structure that is commercially available and that all artificial structures held more fish as compared to an attractor made from trees. In a separate study, a five year project was developed to evaluate the establishment and expansion of four native plant species, softstem bulrush *Schoenoplectus tabernaemontani*, Pickerelweed *Pontederia cordata*, Arrowhead *Sagittaria latifolia* and eelgrass *Vallisneria Americana*. Preliminary results suggest that softstem bulrush and Pickerelweed are fairly easy to establish; however, eelgrass is extremely vulnerable to herbaceous predators and difficult to expand beyond protective cages. The final study is set to begin in 2016 and will evaluate a shoreline stabilization project. Fish abundance, shoreline stability, and vegetation survivorship will be monitored to help determine the success of the project. These studies help validate the effectiveness of the different projects and help guide fisheries managers on future management decisions.

The Death and Holistic Revitalization of a Reservoir, the Case of Lake Wichita, Texas

Presenting Author: Tom Lang–Texas Parks and Wildlife Department, tom.lang@tpwd.texas.gov

Abstract

Built in 1901, Lake Wichita in Wichita Falls, Texas is the third oldest lake in the State. Known as the “Gem of North Texas,” it has served the region as a recreation destination, as a social mecca, as a driving economic force, as a home for the wise-use and conservation of fish and wildlife resources and as a foundation for community growth by serving as a drinking water source. At 114, Lake Wichita is beyond its expected 100-year life span. The natural reservoir aging-process (among other issues) has led to its present state where it is no longer able to provide significant social, economic, ecological, or recreational benefits to the community. Lake Wichita has been plagued by Golden Alga fish kills and in recent years a drought of record has nearly completely dried up the 1,200-acre reservoir, leaving the lake void of any fisheries resource. With these issues and an average depth of 4.5 feet at conservation pool Lake Wichita was essentially dead. In May 2013, the City of Wichita Falls established a Lake Wichita Study Committee to make recommendations to the City Council. As a result, the Lake Wichita Revitalization Project has been established with several key project partners; City of Wichita Falls, City of Lakeside City, Texas Parks and Wildlife Department, Wichita Falls Area Community Foundation, and the Lake Wichita Chapter of Friends of Reservoirs. Together these organizations have led a grass roots effort that has been growing in political, financial, and public support for a holistic plan to revitalize the lake. Partners and the public have varied interests but all have agreed that without rebuilding the lake of sufficient quality to support a fisheries resource, no other desires for amenities at the lake matter. This project includes a dry excavation of 7-million cubic yards of sediment, bathymetric construction that minimizes evaporation during drought, watershed restoration, placement of a plethora of fish habitat, fish restocking, fishing access, commercial development, recreational amenities, and wildlife viewing. This presentation will review the grass roots process that is leading to the success of this holistic and integrated lake revitalization that has turned a regional fisheries challenge of drought into an opportunity to breathe life back into one of our Nation’s oldest reservoirs.

Water quality and reservoir fisheries

Presenting Author: Kari Lundeen, Utah Division of Water Quality, klundeen@utah.gov

Abstract

East Canyon Reservoir's cold water fishery has been assessed as impaired on Utah's 303(d) list due to low dissolved oxygen, high total phosphorus, and high surface water temperatures. An initial total maximum daily load (TMDL) study was completed in 2000, and significant reductions in phosphorus loading have been accomplished through projects totaling over \$6 million. The TMDL was revised in 2010 and included a new approach: the Division of Water Quality and the Division of Wildlife Resources worked closely to develop criteria that would support a lens of suitable fish habitat during reservoir stratification. To meet this target, phosphorus inputs to the watershed will be reduced by 22% through a variety of point and non-point source projects. Our most recent water quality data indicates that East Canyon Reservoir is achieving the 2-m fish habitat target. This approach has also been utilized in the 2014 TMDL for Rockport and Echo Reservoirs.

Best Management Practices for Enhancing Fish Habitat in Reservoirs

Presenting Author: Steve Miranda – U.S. Geological Survey, smiranda@usgs.gov

Abstract

Using as a starting point a recently completed habitat impairment survey conducted by the Reservoir Fisheries Habitat Partnership, we are identifying Best Management Practices (BMPs) for a broad range of impairment factors. Some of these include sedimentation, water clarity, water quality, eutrophication, water regime, catchment disturbances, and others. Within each of these major factors there are multiple impairments that need addressing. Suitable BMPs are being compiled from state and federal agency manuals, handbooks, journal articles, websites, and policy statements. Information will be made available as a BMP manual available online and as a hard copy downloadable from the Reservoir Fisheries Habitat Partnership website. The BMPs are intended to provide direction on *what to do* and local direction will provide direction on *how to do it*. Thus, whereas detail guidance and monitoring procedures will be developed, the guidance will not attempt to directly address every local situation. Instead, the goal is to provide a standard set of core BMPs broadly applicable at the national level, and when appropriate, fine-tuned to the.

Fish in paleochannels of the Lower Mississippi River alluvial valley

Presenting Author: Steve Miranda – U.S. Geological Survey, smiranda@usgs.gov

Abstract

Studies of the fluvial geomorphology of the alluvial valley of the Lower Mississippi River have revealed a fascinating history. A prominent occupant of the valley was the Ohio River, estimated to have flowed some 25,000 years ago over western Tennessee and Mississippi to join the Mississippi River 750-800 km south of its present confluence at Cairo, Illinois. Over time, shifts in the Mississippi and Ohio rivers towards their contemporary positions have left a legacy of abandoned channels expected to support unique fish assemblages. Relative to newer channels abandoned in the immediate present by contemporary rivers, prehistoric channels exhibited harsher environmental conditions characteristic of hypereutrophic lakes, and supported fish assemblages represented mostly by highly tolerant fish species. The changes observed in these paleochannels are not unlike those expected in aging reservoirs.

Untapped potential: Impoundment fisheries management in Australia

Presenting Author: Andrew Norris – Department of Agriculture & Fisheries, Queensland, Australia
andrew.norris@daf.qld.gov.au

Abstract

Research and knowledge on structural enhancement in impoundments to improve fisheries is in its infancy in Australia. Collating overseas knowledge about the cost : benefits of what works and what doesn't will save years of research, replication of failed ideas and substantial investment. Employing best practice from overseas has potential for significant improvements in fish abundance, productivity, fish size, and angler catch and satisfaction. Many Australian impoundment fisheries are in decline as they age, but the situation can be remedied with active intervention now. Improving impoundment fisheries will help protect wild river and estuary fish stocks from over-exploitation by providing alternative sources of fish for anglers purely seeking a feed. Re-invigorating and enhancing impoundment fisheries will also increase fishing opportunities and generate economic benefits to regional communities that rely heavily on impoundment fisheries for tourism. A survey of Australian fisheries researchers, managers and anglers identified a broad spread of knowledge gaps. The top research priorities identified included better understanding of whether habitat enhancement aggregates fish or whether it boosts productivity, cost : benefit analysis of habitat enhancement, how to deal with fluctuating water levels, how much habitat is needed, and how to effectively monitor the fish response to habitat enhancement.

Establishing aquatic plants in reservoirs: why and how

Presenting Author: Richard Ott – Texas Parks and Wildlife Department, Richard.Ott@tpwd.texas.gov

Abstract

The role of plants in aquatic systems is significant. Aquatic plants provide valuable fish and wildlife habitat, serve as a food source for waterfowl and other aquatic wildlife, improve water clarity and quality, reduce rates of shoreline erosion and sediment re-suspension, and help prevent the spread of nuisance exotic plants. Typically, three different situations occur in large multipurpose reservoirs: 1) low abundance of vegetation, 2) low species diversity, or 3) remediation following control of nuisance exotic plant species such as hydrilla (*Hydrilla verticillata*). Because reservoir hydrodynamics, herbivore populations, and seed bank are vastly different from natural lakes, techniques have been developed to improve the chances of success in aquatic plant introduction programs in reservoirs.

In this presentation, I submit an approach for accelerating community succession using native aquatic plant founder colonies. By ensuring that propagules, such as seed or plant fragments, are present in sufficient numbers when conditions are suitable for natural establishment, the time required for vegetative colonization to occur is shortened. Recommendations for production of suitable propagules include their growth requirements, operation of production facilities, and selection of different propagule types by species. Recommendations for establishment of these propagules in reservoir ecosystems includes site selection, season of establishment, planting techniques, defining individual phases of an establishment project and monitoring and adaptive management after species are introduced.

Example schematics, material selection, and placement of protective exclosures necessary for initial establishment are discussed. Growth requirements and individual autecology for submersed, floating-leaved, and emergent species found to work best in the full range of environmental conditions present in Texas' reservoirs are provided.

Fish Habitat Improvement Projects at Nessmuk and Glade Run Lakes

Presenting Author: Benjamin S. Page – Pennsylvania Fish & Boat Commission, bepage@state.pa.us

Abstract

The Pennsylvania Fish & Boat Commission (PFBC) has partnered with the Reservoir Fisheries Habitat Partnership and local conservation groups to complete “Large Scale” fish habitat projects at two PFBC-owned lakes. Both Nessmuk and Glade Run Lakes were determined to have “High Hazard” dams in 2012. Both are currently drawn down with dam reconstruction under way. The drawn down lakes have given the PFBC a unique opportunity to place large amounts of rock and wood on the lake bottom with heavy machinery. The rock and wood structures are aimed at provided various cover types for several species that will be stocked when the lakes are refilled in 2016-2017.

Shoreline habitat improvements at Rockport Reservoir, Utah

Presenting Author: Chris Penne, Utah Division of Wildlife Resources, chrispenne@utah.gov

Abstract

Rockport Reservoir is an impoundment on the Weber River in northern Utah located close to population centers around Salt Lake City. Water is stored in the reservoir for irrigation purposes and flood control. A state park is located at the reservoir and provides camping, boating and fishing opportunities. The fishery at Rockport is considered two-tiered and is composed primarily of rainbow trout, brown trout, smallmouth bass, and yellow perch. The reservoir experiences annual water level fluctuations of around 30 feet and generally lacks habitat complexity for fish in its littoral zone. This is thought to result in low survival of juvenile fish and poor recruitment to the sport fishery. In 2013, a partnership between the Utah Division of Wildlife Resources, Utah State Parks, and a local Friends of Reservoirs Group worked to create four large stands downed trees along the reservoir shoreline. The downed trees were meant to mimic natural processes in a typical lake system when trees and brush fall into the water. More stands of downed trees were created in 2015 and a third year of shoreline work is slated to be completed in 2016. While modest in scale and scope, this type of habitat work has not been undertaken in Utah reservoirs in some years and marks the beginning of a new approach reservoir habitat work for the state.

Reservoir Rehabilitation Tactics: Lessons learned from the Nebraska Aquatic Habitat Program

Presenting Author: Mark Porath, Nebraska Game and Parks Commission, mark.porath@nebraska.gov

Abstract

The large number of impoundments constructed over a half century ago, now present us with many challenges on how to address the impacts of time and declining aquatic habitat conditions on these aging reservoirs. Important as recreational opportunities and local economic drivers, reservoirs in Nebraska support over 80% of annual angling hours. Not surprisingly, Nebraska anglers were instrumental in supporting the establishment of an Aquatic Habitat Program with a license fee increase. Since 1997, Nebraska’s Aquatic Habitat Program has worked with over 60 funding partners to rehabilitate 35 reservoirs (four in progress) at a cost of over \$54,000,000 dollars. Addressing impairments caused by sedimentation, nutrients, shoreline erosion, and out-of-balance fish communities has helped us develop a number of successful tactics to bring “New Life to Aging Waters”.

Development of the Reservoir Morphological Database

Presenting Author: Kirk Rodgers, U.S. Geological Survey, krodgers@usgs.gov

Abstract

Several databases of national scale were compiled to develop a database of reservoir morphological parameters including, but not limited to shoreline development index, index of basin permanence, and development of volume based on established morphometric formulas. The new reservoir morphological database (RMD) contains physical, chemical and morphological characteristics of major reservoirs with surface area greater than or equal to 250 acres (100 hectares); smaller lakes (< 250 acres) were excluded from this study. The use of geographical information systems (GIS), Microsoft Access and the statistical package JMP 10 aided in the RMD development. The RMD contains approximately 3,800 publicly accessible reservoirs from the U.S. Army Corps of Engineers National Inventory of Dams (NID) joined with waterbodies from the USGS National Hydrography Dataset (NHD). Once the NID and the NHD were combined, they were intersected with the USGS Enhanced Riverreach File (ERF1_2). The intersecting of the ERF1_2 with the combined NID-NHD database enabled the connection of the USGS Spatially Referenced Regressions on Watershed attributes model and the completion of the RMD. The RMD will assist natural resource managers in assessing reservoir characteristics in the continental United States.

Enhancing structure and function of the shoreline zone at Elephant Butte Reservoir, New Mexico

Contributing Authors: Earl Conway and Kala Scarafiotti

Presenting Author: Kala Scarafiotti – Ruidoso High School, New Mexico, scarafiotti@ruidososchools.org

Abstract

The Southwest Adapt-a-Cove project at Elephant Butte Reservoir in south-central New Mexico plans to demonstrate that it is possible to cost effectively mimic the “New Lake Effect” and increase the carrying capacity of the reservoir by restoring sacrificial native vegetation to the shorelines during summer lake draw downs. If successful, the project may lead to methods to vastly improve fish recruitment and growth in many western reservoirs. Over 100 native plants have been evaluated for their potential application in the project. Many are very difficult to start in the harsh conditions. Two years of research, field observations and lab experiments are beginning to shape the strategy that will be attempted in 2016 to encourage thousands of volunteers to “chase the shoreline” with innovative seeding and planting techniques. Some of the trial successes and failures will be presented along with the story of three high school students that won recognition for their unique approach to the problem. A remarkable discovery during a recent field survey may also have revealed one “silver bullet” plant (Gooding willow) that could change Elephant Butte reservoir forever.

Fish habitat improvement in Kentucky: go big

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Abstract

There are 20 reservoirs contained partially or entirely within Kentucky operated by the US Army Corps of Engineers (ACOE), the Tennessee Valley Authority, or Kentucky Utilities that have fisheries managed by the Kentucky Department of Fish and Wildlife Resources (KDFWR). These reservoirs range in size from 132 to 64,750 ha. The primary purpose of 19 of 20 reservoirs is flood control with each reservoir experiencing some amount of winter draw down in anticipation of spring rain. Depending on watershed size and expected inflow the draw downs range from 1.5 to 10 meters and usually begin in October of each year. Annual draw downs leave varying amounts of shoreline exposed for six to eight months of the year. This yearly exposure limits the establishment of aquatic vegetation, accelerates the rate of decay for coarse woody debris, and results in high levels of sediment transport within and into the reservoir. Aging reservoirs and annual draw downs have led to severely diminished littoral habitat. Historically, KDFWR's response has been the small scale addition of habitat in the form of in-lake fish attractors. Kentucky's reservoirs are vastly different from the eastern to western end of the state making for many unique habitat improvement opportunities and limited standardization. The type of habitat and method of deployment is chosen by the local fisheries biologist while acting within the guidelines established by the lake operator. Eighteen of 20 reservoirs are operated by the US Army Corps of Engineers with each lake having a different lake manager and operating within three different districts (Huntington, Louisville, and Nashville). The type and amount of habitat material permitted by each ACOE lake manager varies, with some being less restrictive than others. Since 2008 KDFWR biologists have been organizing larger scale projects in addition to regular smaller scale activities. Large scale projects include fisheries, wildlife, and law enforcement staffs, Lake Operator staff, and groups of volunteers who gather to deploy a large number of habitat structures over a one to three day period. Additionally, KDFWR has begun soliciting information from local anglers and guides regarding type, placement, and effectiveness of different habitat structures. This has led to increased awareness, appreciation, and utilization of Department placed fish habitat structures. The effectiveness of different habitat types used throughout the state has yet to be fully evaluated. KDFWR is working to expand the habitat program to include Best Management Practices in the watersheds, more public input and involvement, and in-lake fish habitat that fosters long term solutions versus short term fixes.

Effect of overwinter hydration, temperature, photoperiod, water depth, and scarification on seed germination of twelve aquatic and wetland plant species

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Abstract

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. A second germination experiment tested seed age (amount of time in cold, wet storage), temperature, and photoperiod for *Schoenoplectus acutus*, *S. americanus*, *Juncus encifolius*, *J. tenuis*, *J. balticus*, *J. torreyi*, *Polygonum amphibium*, *P. pennsylvanicum*, and *Eleocharis palustris*. Seed ages of 0 (Fall 2014), 2 (Winter), 7 (Spring), and 13 months (Fall 2015) were tested. Fluctuating temperature treatments for the *Juncus* species were 32-38 C (12 or 14 h photoperiod) or 15-27 C (12 h only). For the two *Schoenoplectus* species, 32-38 C and 40-46 C were evaluated at photoperiods of 12, 14, and 24 h. The effect of water depth (0 vs 4 cm) was also tested for *S. acutus* only. For the two *Polygonum* species and the *E. palustris*, fluctuating temperatures of 6-10 C and 15-20 C were evaluated at a 14 h photoperiod. Chemical pre-treatment of seeds was an additional treatment (0.05% bleach for 4 d vs. untreated). The highest germination for *P. pennsylvanicum* was 15-20 C after bleach pre-treatment. *P. amphibium* and *E. palustris* had $\leq 2\%$ germination in all treatments. For the *Schoenoplectus* species, the highest germination was at 32-38 C in 4 cm (31.0-41.3%) and was not significantly affected by photoperiod treatment. *Juncus* species were not significantly affected by photoperiod, but were affected by age. Optimal temperatures were 15-27 C for *J. balticus* (69.5% germination), *J. encifolius* (73.2%), *J. tenuis* (58.4%), and *J. torreyi* (54.1%). 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.

Boating infrastructure providing fish habitat

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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.