

**EXECUTIVE COMMITTEE BRIEFING BOOK  
2020 RESERVOIR FISHERIES HABITAT PARTNERSHIP**



**EC Virtual Meeting  
Due to COVID-19 concerns  
7 October 2020**

Join Zoom Meeting

[https://us02web.zoom.us/j/82997495356?  
pwd=bUN4Q3pvUnVKT05wVIJ4dXFFbng1Zz09](https://us02web.zoom.us/j/82997495356?pwd=bUN4Q3pvUnVKT05wVIJ4dXFFbng1Zz09)

Meeting ID: 829 9749 5356

Passcode: 733938

**Friday, October 4**

1200-1210	Welcome/Introductions
1210-1220	Approval of Minutes/Financial Statement <sup>1</sup> (Pages 2-9)
1220-1230	2020 Coordinator Work Plan Accomplishments (Pages 10-12)
1230-1245	2021 Work Plan (Pages 13)
1245-1300	Project Updates (Pages 14)
1300-1430	FY2021 Project Selection <sup>1</sup> (Pages 15-27)
1430-1500	Changes to NFHP Administration-Karin Eldridge/Doug Nygren <b>FOR MEETING</b>
1500-1515	FOR Membership Update (Page 27)
1515-1530	FY2021 Budget <sup>1</sup> (Page 28)
1530-1600	Outreach discussion

**Proxies**

Doug Nygren for Gary Martel (NEAFWA)

Dave Terre for Ken Kurzawski (AFS)

Don Wiley for Craig Walker (WAFWA)

Lynde Dodd for Jeremy Crossland (USACE)

<sup>1</sup>Action Items

## **Reservoir Fisheries Habitat Partnership**

### **Annual Meeting Minutes (October 4, 2019), Hollywood Casino, Kansas City, Kansas**

**(Minutes are intended to complement reports in the 2019 Briefing Book  
(appended to this report))**

- Meeting called to order by RFHP Coordinator, Jeff Boxrucker at 1300 CST.
- Call for Proxies:
  - Doug Nygren for Gary Martel (NEAFWA)
  - Dave Terre for Ken Kurzawski (AFS)
  - Don Wiley for Craig Walker (WAFWA)
  - Lynde Dodd for Jeremy Crossland (USACE)
- Executive Committee (EC) members present: Doug Nygren, Dave Terre, Brad Tribby, Reed Green, Jeff Lucero, Reed Green, Kevin Pope and Gene Gilliland, ; 12 Board members present (including proxies); quorum established.
- Welcome and Introductions of attendees:
  - Jeff Lucero, US Bureau of Reclamation (EC)
  - Dave Terre, Texas Parks and Wildlife, SEAFWA (EC)
  - Gene Gilliland, B.A.S.S. (EC)
  - Doug Nygren, Kansas Department of Wildlife Parks and Tourism, MFWFA and NFHP Board(EC) (Proxy for Gary Martel)
  - Brad Tribby, BLM (EC)
  - Reed Green, NALMS (EC)
  - Kevin Pope , USGS (EC)
  - Reed Green, NALMS (EC)
  - Don Wiley, Utah Division of Wildlife, W Working Group (Proxy for Craig Walker)
  - Mark Porath, Nebraska Game and Parks Commission, MW Working Group
  - Jeff Boxrucker, RFHP Coordinator
  - Ben Page, PA Fish and Boat Commission, NE Working Group
  - Mark Fowlkes, NC Wildlife Resources Commission, SE Working Group
  - Sandra Clark-Kolaks, Indiana DNR, MW Working Group
  - Rebecca Krogman, IA DNR, MW Working Group
  - Jeremy Shifflet, KY Dept. of Fish & Wildlife, SE Working Group
  - Joseph Zimmerman, KY Dept. of Fish & Wildlife
  - Pat Sollberger, NV Dept. of Wildlife, W Working Group
  - Michael Homer, TX Parks and Wildlife, SE Working Group
  - Karin Eldridge, FWS
  - Kent Sorenson, Utah Division of Wildlife
  - Natalie Boren, Utah Division of Wildlife
  - Jeff Conley, KS Wildlife Parks & Tourism

### **Old Business:**

- Meeting minutes from 2018 Annual Meeting minutes (Atens, TX) were provided to Executive Committee and Working Group members prior to the meeting.
  - Motion to accept minutes by Terre; Second by Tribby. Motion passed unanimously.
- Financial Report given by Boxrucker, details in Briefing Book.
  - Motion to accept by Pope; Second by Krogman. Motion passed unanimously.

EC welcomed Lynde Dodd (USACE) and Michael Homer (TPWD) to the SE Working Group

### **Accomplishments under FY2019 Work Plan**

- See report in Briefing Book

### **FY2019 Work Plan**

- See report in Briefing Book
  - Sandy-Clark Kolaks suggested that a 2-page color with pictures Annual Report would be valuable as an outreach tool; concurrence was expressed by those in attendance;
    - Coordinator stated that he would provide a draft to EC and WG members of the 2019 Annual Report for review
    - Work Plan edited to reflect above.

### **Project Updates**

- See Briefing Book
- FWS Allocation for RFHP was a level 2 for FY2019
  - Lack of climate change consideration in project-selection criteria stated as reason for Level 2
    - Reed Green volunteered to provide additional information on reservoir effects on climate change for FY2020 Allocation Report

### **Project Selection (Proposals in Briefing Book)**

- 13 proposals submitted for FY2020 funding
  - Total funding request: \$289,790; Total project costs: \$1,317,456
- Boxrucker recommended funding Proposals ranked 1 - 4 for \$150,000 total and to fully fund FOR Operations at \$85,000. Krogman/Gilliland; passed unanimously
- EC voted to restrict funding to projects that have previously been funded at the 2017 Annual Meeting; system was approved to deduct 25 points for funded projects that were resubmitted within 3 fiscal years
  - 2 projects ranked in the top 4 were deducted 25 points (Shelbyville-ranked 2; Carlyle-ranked 3)
- Discussion followed on how to further address funding resubmitted proposals

- Several ideas discussed; motion (Krogman/Gilliland) was made to fund projects at 100% of request on first proposal submission; 50% on second submission; 25% on third submission; motion passed 6/5
- Discussion on partner-funding period in proposal; suggested that only partner funds attributed to the project timeline be counted (as opposed to previously funded projects on impoundment)
- Coordinator suggested that the Working Groups get together on a conference call to discuss changes to the FY2021 RFP and project scoring

### **Small Projects Grant**

- 7 grant proposals received
- Discussion followed re: the need to develop scoring criteria given that increased number of proposals is expected in coming years
- Coordinator recommended that all 4 Small Grant Proposals be accepted
  - Discussion followed and motion made to fund 5 small project grants (Pope/Terre); Passed unanimously
    - Friends of Barren River Lake
    - Tri-County Bass Anglers
    - Friends of Lake Livingston
    - Lake Fork Sportsman's Association
    - City of Cherryvale

### **Mossback Grant**

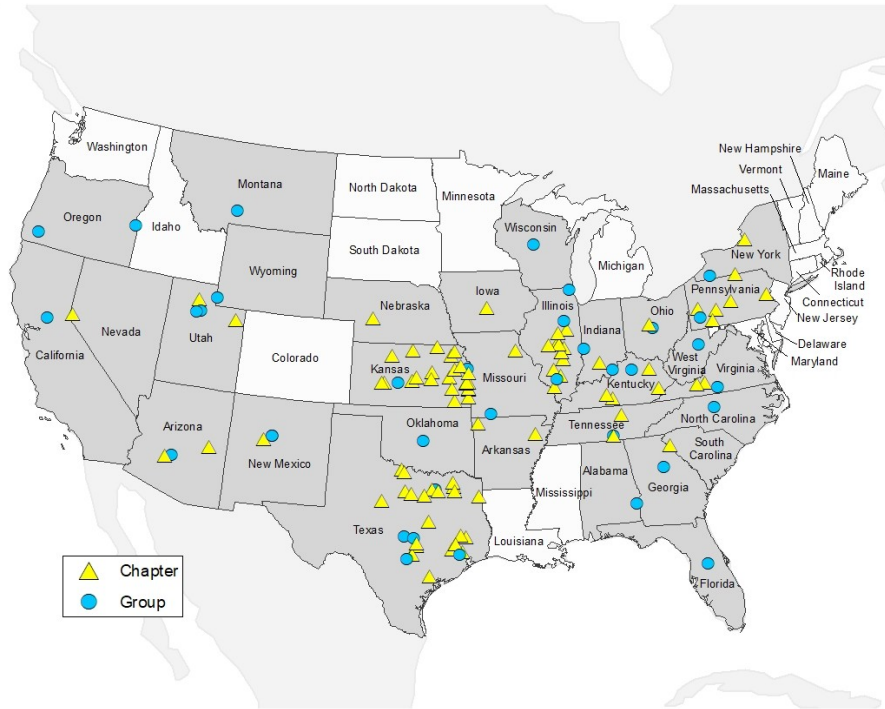
- Mossback agreed to fund 3-\$1000 product grants for FY2019
  - 8 applications received
  - Discussion followed and motion made to fund VA B.A.S.S. Nation, Ft. Worth Fly Fishers, and Friends of Horse Thief Reservoir (Pope/Terre); Passed unanimously

### **FOR Updates: These updates constituted the FOR Executive Committee Meeting (called to order at 1500; members present were Dave Terre, Gene Gilliland, Rebecca Krogman, Doug Nygren)**

- Boxrucker provided update on FOR progress. Seventeen new FOR Chapters and five Group Member joined in 2019
  - 21 Kansas Community Fishing Program members added (not included in above counts; KWPT paid membership for first year)
  - As of September 30, 2019, FOR has 64 Chapter and 36 Group Members (100 total in 30 states)
    - Texas-26 members
    - Illinois-14 members
    - Pennsylvania-7 members
    - B.A.S.S. Nation-18 State Conservation Affiliates
- Grant programs are the single most effective recruiting tool
  - Numerous organizations have joined in the past few years to either get bonus points for the large grant program (FWS-funded) or to become eligible for the FOR Small Grants Program and the Mossback Grant



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- very positive feedback on content and applicability
- Welcome message was given by Brad Loveless (Secretary, Kansas Wildlife Parks and Tourism)
- Representatives from 5 Kansas Community Fishing Program municipalities were in attendance
- An open discussion on potential effects of microplastics resulting from artificial fish habitat structures was held
  - Concerns were noted but no definitive science was available
  - Agreed to continue to follow the issue in the scientific literature and work with the Southern Division American Fisheries Society Reservoir Committee to keep members apprised of the latest developments/information
- The Technical Program was highlighted by a presentation by Dr. Andrew Norris from the Queensland (Australia) Department of Agriculture and Fisheries
  - Dr. Norris attended the 2015 RFHP Annual Meeting in Ogden, UT and made site visits to several states (PA, MO, TX, NE) to learn of aquatic habitat programs in the U.S.
  - Dr. Norris reported on advances in the Queensland habitat programs over the past 4 years

- Technical presentations (15) covered projects several statewide habitat programs (NC, IN, TX), 3 presentations on watershed programs and how they relate to reservoir water quality (AR and KS)
  - The program is appended to these minutes
  - Annual Meeting Sponsors:
    - Kansas Wildlife Parks & Tourism (\$3000)
    - B.A.S.S. Conservation (\$500)

### **2020 Annual Meeting**

- Site will be in the MWAFFWA region; Shelbyville, IL suggested
  - Coordinator work with Local Arrangements Committee to secure venue

**Meeting adjourned at 1800**



## Financial Report

(1 Oct 2019- 30 Sept 2020)

**Friends of Reservoirs (Bank of America)**

Beginning Balance (1 October 2020)

**\$ 32,267.09**

<u>Deposits</u>	
Grants	<b>\$ 1,238,118.00</b>
RFHP Operations	83,118.00
Sunoco (Raystown Lake)	1,115,00.00
FOR membership	<b>\$ 742.40</b>
Sponsorship (B.A.S.S. (2019 Annual Meeting))	<b>\$ 500.00</b>
Meeting Registration	<b>\$ 2,007.50</b>
2019 Annual Meeting	807.50
SDAFS Workshop	1,200.00
Grant Application Fee (\$25/Small Grant & Mossback)	<b>\$ 246.05</b>
Donations	<b>\$ 1,208.57</b>
Amazon Smile	40.89
Robert Dudgeon	58.38
Gary Martel	100.00
Rebecca Krogman	74.30
Pro Lake Management	200.00
Network for Good (off Facebook)	735.00
<b>TOTAL</b>	<b>\$1,242,822.52</b>
<u>Expenses</u>	
Coordinator Salary	<b>\$ 55,000.00</b>
Bank Fees	<b>\$ 12.00</b>
Facebook Fundraising	<b>\$ 447.49</b>
Travel	<b>\$ 6,663.46</b>
Postage	<b>\$ 9.75</b>
2018 Tax Return	<b>\$ 275.00</b>
Website	<b>\$ 2,083.25</b>
2019 Meeting Expense	<b>\$ 6,052.37</b>
Grant Distribution	<b>\$ 66,888.44</b>
2018 Small Projects Grants	5,000.00
Sunoco Grant	61,888.44
Office Expense	<b>\$ 807.84</b>
Legal (CMP; 501(c)(3) renewal)	<b>\$ 266.36</b>
<b>TOTAL</b>	<b>\$ 138,505.96</b>
<b>Ending Balance (30 September 2020)</b>	<b>\$ 1,136,583.65</b>



ANNUAL MEETING INCOME/EXPENSE-2019

Hollywood Casino, Kansas City, Kansas

Income

Donations	\$	
B.A.S.S.		500.00
KWPT		3,0000
Registration	\$	2,807.50
<b>Total Income</b>	<b>\$</b>	<b>6,307.50</b>

Expenses

Food/Breaks	\$	5,475.39
Copies	\$	381.50
Speaker Travel		\$
Holiday Inn (Rooms)	\$	4,282.14
Awards	\$	153.25
<b>Total Expenses</b>	<b>\$</b>	<b>10,292.28</b>

**Net** **\$** **3,984.78**

## RESERVOIR FISHERIES HABITAT COORDINATOR FY2020 Work Plan

- Develop FY2019 Annual Report; provide draft for review
  - Upon establishment of template work on reports from previous years
  - 2019 Annual Report completed and posted on website
  - 10-year summary of RFHP activities completed and posted on website
- Work with Communication Committee to promote/market FOR/RFHP
  - Attend scientific meetings
    - Southern Division of AFS
      - Habitat Restoration Workshop at SDAFS
        - 25 attendees
      - Attended Reservoir Committee meeting
        - Discussed Position Statement on Microplastics
        - RC drafted Statement and circulated for review
      - Presented FOR partnership opportunities at Reservoir session
    - AFS (Columbus, OH)
      - Changed to virtual meeting due to COVID-19 concerns
      - Coordinator presented Stanley A. Moberly Award for Outstanding Contributions in Fish Habitat Conservation
  - Add content to website and expand available features
    - Membership and Project pages updated
    - Multiple “News” posts
  - Expand social media presence
    - Several fundraising activities posted via Facebook
      - Expenses=\$447.49; Income=\$735.00; Net=\$287.51
      - Project-related efforts yielded results
- Solicit projects for funding
  - Refine project selection criteria (as needed)
    - Modify online submission and review on website (as needed)
    - RFP and online submission and scoring forms were modified as per suggestions from the Working Groups
      - SMART objectives were included in RFP and scoring on objective quality was modified as per meeting SMART objectives
  - Distribute RFP (late May)
    - Proposal deadline (15 August)
      - RFP was announced in late April
      - 12 large grant proposals were received

- Climate assessment proposal from MS State was received
      - Assessment was solicited to meet NFHP/FWS requirements
    - 3 Mossback and 5 Small Grant proposals received
      - Application fees received from all project leaders
    - Distribute project proposals to Regional Working Groups for scoring
      - Scoring and ranking was completed
    - Summarize projects and scores for 2020 RFHP Annual Meeting
      - Rankings included in Briefing Book
    - Provide information to FWS
      - Lists of FY2020 projects sent to FWS for inclusion in FIS
  - Ensure timely reporting and accounting of funded projects
    - Reporting saw some hiccups with conversion to the GrantSolutions system but all was worked out to all parties satisfaction
  - Work with project partners and FWS to submit project compliance documents
    - Coordinator drafted the bulk of the Compliance Documents (minus the Section 7, NEPA Exclusion, and SHPO) and sent to Project Leaders for review and processing
  - Submitted 3 applications for Bass Pro Shops/NFHP Small Grant program
    - Elephant Butte (NM), Easter (IA), Shelbyville (IL)
      - Elephant Butte was selected (1 of 3) and funded for \$15,000
  - Funding for Raystown (PA) project received (\$1,115,000)
    - Mitigation funds for pipeline spill (bentonite) beneath Raystown
    - FOR to receive \$34,649.45 for administering project (3%)
  - Update RFHP and NFHP Project Databases
    - Project data through FY2018 is entered and entering FY2019 projects is ongoing
- Liaise with other NFHP Partnerships
    - Advance goals of NFHP
      - Attend NFHP Board Meetings (either in person or via webinar)
        - All NFHP meetings have been virtual
        - Fall NFHP Board meeting and FHP Workshop scheduled for October 19-22
          - Coordinator serves on FHP Workshop planning team
      - Serve on Partnership Committee
        - Coordinator participated in all Partnership Committee conference calls
    - Continue efforts to partner with USACE on Sustainable Rivers Program

- No activity
  - Worked with OH River FHP and local partners to draft a proposal to improve water quality on Harsha Reservoir in SW Ohio.
- Serve as Business Manager for RFHP
  - Work with Executive Committee to:
    - Establish budget for operations of RFHP (excluding project funding)
    - Produce financial report for annual meeting
    - Compile income/expense statement and provide to accountant for completion of FOR tax return
  - Continue bi-monthly Executive Committee conference calls
    - Calls held in Feb, April, June and August
  - Complete FWS Allocation packet
    - FHP Allocation Report was completed and submitted by deadline
    - RFHP received a “3” ranking for the first time; \$273,405 total funding; \$75,000 for Operations and \$198,405 for projects
      - Funded 7 projects
        - Barkley (KY-USACE)
        - Shelbyville (IL-USACE)
        - Carlyle (IL-USACE)
        - Carlsbad (NM-Sun Country Outdoors)
        - Mark Twain (MO-USACE)
        - Coleman (TX-TPWD)
        - J. Strom Thurmond (GA/SC-USACE)
      - Entered FY2020 Operations Grant into GrantSolutions-grant period Jan 1, 2021 to December 31, 2021 (project approved and funds allocated)
  - Work with local arrangements to schedule/arrange accommodations for RFHP meetings
    - Produce and distribute minutes of Annual Meeting
      - Minutes drafted and distributed to EC and WGs for review and edits; none received
- 2020 meeting in Midwest (Iowa?)
  - Meeting was scheduled for 2-4 October 2020 in Shelbyville, IL and the USACE office
    - Accommodations were arranged and schedule was drafted
      - “In-Face” meeting was canceled due to COVID-19 and virtual EC meeting to be held on October 7

## **RESERVOIR FISHERIES HABITAT COORDINATOR FY2021 Work Plan**

- Develop FY2020 Annual Report; provide draft for review
  - Upon establishment of template work on reports from previous years
- Work with Communication Committee to promote/market FOR/RFHP
  - Attend scientific meetings
    - Southern Division of AFS
    - Midwest Fish and Wildlife Conference
      - Conduct habitat restoration workshop
    - AFS (Baltimore, MD)
  - Add content to website and expand available features;
  - Expand social media presence
- Solicit projects for funding
  - Refine project selection criteria (as needed)
    - Modify online submission and review on website (as needed)
  - Distribute RFP (late April)
    - Proposal deadline (15 August)
    - Distribute project proposals to Regional Working Groups for scoring
    - Summarize projects and scores for 2020 RFHP Annual Meeting
    - Provide information to FWS
  - Ensure timely reporting and accounting of funded projects
  - Work with project partners and FWS to submit project compliance documents
  - Update RFHP and NFHP Project Databases
- Liaise with other NFHP Partnerships
  - Advance goals of NFHP
    - Attend NFHP Board Meetings (either in person or via webinar)
    - Serve on Partnership Committee
- Serve as Business Manager for RFHP
  - Work with Executive Committee to:
    - Establish budget for operations of RFHP (excluding project funding)
    - Produce financial report for annual meeting
    - Compile income/expense statement and provide to accountant for completion of FOR tax return
  - Continue bi-monthly Executive Committee conference calls
  - Complete FWS Allocation packet
  - Work with local arrangements to schedule/arrange accommodations for RFHP meetings
    - Produce and distribute minutes of Annual Meeting
- 2021 meeting in Midwest (Shelbyville, IL)

## PROJECT UPDATES:

### **2019**

*Control Hydrilla and enhance aquatic habitat in Harris Lake, North Carolina*

Funding received

*Nolin River Lake Habitat Improvement Project*

Funding received

*Lewisville Lake Fisheries Restoration*

Funding received

*Buckeye Lake Fish Habitat Partnership*

Project canceled due to partner inability to provide compliance documents by needed deadlines; funds were transferred to another project within OH (project within the Harsha Lake watershed)

*Reservoir Fisheries Habitat Partnership Coordination and Operational Support*

Project approved: start date-11/1/2019; end date-10/31/2020

Modified FY2019 Operations Grant (reduce funding to \$75,000) and extend grant period to Dec 31, 2020 to reflect reduced expenditures due to COVID-19 (reduced travel schedule and canceled Annual Meeting)

### **2020**

*Reservoir Fisheries Habitat Partnership Coordination and Operational Support*

Project approved and funds allocated; waiting until end of FY2019 Operations Grant (Dec 31, 2020) to begin spending funds

*Lake Barkley Habitat Improvement Project*

Interagency Agreement processed; waiting for funds to be distributed to USACE project office

*Lake Shelbyville Fish Habitat Development and Restoration Project*

Interagency Agreement processed; waiting for funds to be distributed to USACE project office

*Coles Creek (Lake Carlyle) Habitat Improvement Project*

Interagency Agreement processed; waiting for funds to be distributed to USACE project office

*Carlsbad Fisheries Revival -submitted by Sun Country Outdoors*

Project documents entered into GrantSolutions; project approved pending submission of Section 7, NEPA Exclusion and SHPO

*Mark Twain Lake Shoreline Fishing Development Project, Missouri*

Interagency Agreement processed; waiting for funds to be distributed to USACE project office

*Lake Coleman Habitat Renovation*

Project documents entered into GrantSolutions; project approved pending submission of Section 7, NEPA Exclusion and SHPO

*J. Strom Thurmond Lake Shoreline and Deepwater Habitat Enhancement*

Interagency Agreement processed; waiting for funds to be distributed to USACE project office



## RESERVOIR FISHERIES HABITAT PARTNERSHIP Project Proposal Summary-FY2021

### Vulnerability of Reservoir Fish Habitats to Climate Change-submitted by Mississippi State University

This is a solicited proposal as part of a Science and Data Committee effort to meet assessment requirements set by both the National Fish Habitat Partnership and the Fish and Wildlife Service. This will be a 4-year effort conducted by a Ph.D. candidate. The proposal will be a series of one-year projects with discrete objectives and deliverables. The proposal is a follow-up to the "Reservoir Fish Habitats: A Toolkit for Coping with Climate Change" Chapter of the BMP manual.

Vulnerability may be defined here as the extent to which a reservoir is susceptible to, or unable to cope with, adverse effects of climate change, including climate shifts, variability, and extremes. An index of vulnerability is a quantitative indicator of the relative vulnerability of a system and may often be easier for managers to interpret and may be more useful in identifying reservoirs at risk. Because time, funding, and personnel are limited, it is critical for managers to direct resources towards reservoirs where the investment has the greatest likelihood of maintaining desired outputs at the least cost. Determining which reservoirs are most vulnerable enables managers to set priorities for management. Highly vulnerable habitats are likely to experience greater impacts whereas habitats with low vulnerability will be less affected or may even benefit from climate change. Distinctions between reservoirs can be made based on a variety of factors estimated to be impacted by climate change or based on characteristics of reservoirs that influence their resilience to climate change. Overall objectives of the 4-year model development are:

- (1) construct a methodological framework for evaluating potential effects of climate change on reservoirs as fish habitats.
- (2) apply methodology to assess vulnerability of large U.S. reservoirs.
- (3) explore patterns of vulnerability scores and vulnerability aspects.

**Objective 1:** There has not been a standard approach to assessment of fish habitat vulnerability to climate change. Because of this limitation, we intend to apply two methods to double our chances of successfully developing an effective index of reservoir habitat vulnerability. Method 1 will take a correlative approach in which quantitative correlative models are built to relate observed habitat characteristics to current climate. Once adequate models have been built, they will be applied to climate projections to infer potential climate-induced habitat changes. We propose to develop a correlative model by using existing databases descriptive of reservoir fish habitat condition and characteristics across the U.S. and connecting these habitat databases to a database of predictions of future climate change. The habitat condition database consists of twelve habitat constructs developed from >50 habitat variables. The constructs reflect habitat ailments such as point source pollution, nonpoint source pollution, excessive nutrients, algae blooms, siltation, limited nutrients, mudflats and shallowness, limited connectivity to adjacent habitats, limited littoral structure, nuisance species, anomalous water regimes, and large water level fluctuations. The reservoir characteristics database consists of 62 variables that describe and quantify each reservoir (e.g., year constructed, average depth, catchment land use. The climate



database consists of temperature and precipitation averages from recent history (1970–2000) and projections under several representative concentration pathway (RCP) emission scenarios in the 21st century.

Method 2 will be based on expert opinion. This method will involve expert elicitation to estimate the general vulnerability of reservoirs relying on key habitat characteristics.

This approach will fill the need for broad and relatively quick evaluation of the vulnerability of multiple reservoirs and habitats.

**Objective 2:** We will use models with satisfactory performance developed with methods 1 and 2 to estimate, under future climate predictions, scores for each of the 12 habitat impairment constructs and for each reservoir in our database. Vulnerability will be assessed by combining (e.g., by subtraction, as a ratio, or other) current reservoir habitat impairment scores and predicted change to scores (i.e., increase or decrease in impairment for each of the 12 constructs) under future climate. A composite vulnerability index can then be derived from the combination (e.g., summation) of individual habitat construct vulnerability scores. If appropriate, constructs may be assigned different weights depending on the strength of the correlation with climate variables or based on expert opinion.

The vulnerability index can be used to assess individual or multiple reservoirs.

The index score for a single reservoir provides a quantitative measure of the vulnerability of a reservoir relative to other reservoirs or relative to the span of the index scale. More than one index score may also be calculated for the same reservoir across different climate projections, to assess a range of vulnerability relative to different climate models. We will also investigate if a vulnerability index may be estimated for distinct locations (e.g., embayments, main channel) of the same reservoir.

**Objective 3:** Patterns of vulnerability likely exist over multiple reservoirs. Managerially relevant classes may be assembled relative to reservoir geography, altitude, purpose (e.g., flood control, hydropower, irrigation), size, fish assemblages (e.g., warmwater, coolwater, coldwater), basin, and others. Overall scores, for example, can be used to rank vulnerability for a class of reservoirs, or across geographical regions. Such group scoring can aid in prioritization, selecting targets for management actions, and broadscale planning for climate change.

Furthermore, the separable scores associated with each of the 12 constructs can highlight the relative contribution of the various pieces of the vulnerability index. By highlighting specific aspects of concern, construct scores suggest effective themes to target for management actions either by directing management towards an expected source of vulnerability or by identifying common areas of vulnerability for a reservoir class or geographic region.

#### **Year 1 Deliverables:**

1. We will informally survey state and federal agencies nationwide to determine if they have developed their own methods for scoring vulnerability of aquatic habitats to climate change
2. Compile existing databases relevant to developing an index of reservoir habitat vulnerability. These likely include the habitat impairment database developed for RFHP by Krogman and Miranda, the reservoir morphology database developed for RFHP by Rodgers, the National Lake Assessment databases developed by USEPA, and other relevant databases descriptive of reservoir habitat characteristics

3. We will also obtain data on past climate conditions (1970-2000) from a database available from <https://www.worldclim.org/data/worldclim21.html> and projected climate conditions by year 2050 and 2100 available from <https://www.worldclim.org/data/cmip6/cmip6climate.html#>.
4. We will compile and rate the utility of correlative models applicable to relate past climate conditions to reservoir habitat characteristics, explore outputs from models, and explore predictions for habitat changes over the rest of the century
5. We will begin developing the survey tool described under Method 2
6. Develop a progress report. We will solicit additional partners (USACE, BOR) to offset costs to RFHP for future segments.

**Funds requested: \$47,500; total cost: \$55,500; total score: ; rank: 1**

**Williamsburg Off-Channel Wetland-submitted by Clermont County Soil and Water Conservation District (FOR Partner)**

Soil erosion and nutrient runoff from poor land use practices and unrestricted agricultural fertilizer applications threatened streams across Ohio, including the EFLMR watershed and Harsha Lake. Ohio EPA's recent assessment of the EFLMR identified segments of the main stem and major tributaries as impaired due to nutrient enrichment, sediment runoff and poor habitat (Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries, 2012: Clermont SWCD is working with the Village of Williamsburg, Clermont OEQ, U.S. Fish & Wildlife Service (USFWS), the Ohio Dept. of Natural Resources (ODNR) and U.S. EPA's Office of Research & Development (EPA-ORD) to construct and monitor an off-channel wetland system (~6-10 acre floodplain wetland complex) at a site located on the East Fork of the Little Miami River (EFLMR) to improve connectivity between the river and floodplain. , estimates from the U.S. EPA-ORD watershed modeling indicate row-crops contribute approximately 70% of the nitrogen and phosphorus flushing into East Fork streams in the upper watershed above Harsha Lake. Excess nutrients fuel Harmful Algal Blooms (HABs) which have been increasing in frequency and intensity in William H. Harsha Lake since 2008. Harsha Lake is a drinking water source for +100,000 residents and serves as a \$1.6 million regional hub for outdoor recreation. HABs have led to increased water treatment costs, public health advisories, beach closures and event cancellations. Wetlands, referred to as the "kidneys of the landscape," not only provide critical habitat for fish and wildlife, but also absorb excess water and filter out pollutants. The project site is located within the Temperate Plains region where nutrients and siltation have been identified as leading sources of water quality impairment. Economic and watershed modeling done by U.S. EPA-ORD identified constructed wetlands as an efficient and cost-effective practice for reducing nutrient and sediment pollution in the upper watershed, above Harsha Lake. Excavation of the 3-acre reservoir and riparian zone will be done to maximize volume capacity within the system, with a goal of achieving 1.5 days of residence time to provide water quality treatment. Benches will be created within the reservoir to create a meandering path for water flow and also to enhance fish and wildlife habitat. Additional excavation will occur within the floodplain (~1-3 ft.) to maximize the river to wetland connection for events above baseflow conditions. This design will ensure the wetland complex will not take

away baseflow from the EFLMR. The project footprint, including the excavation of the reservoir and riparian zone, is approximately 6-10 acres, depending on the final design. Water quality monitoring is a significant component of this project. A key outcome of this work will be an assessment of the nutrient removal efficiency of the constructed wetland. Clermont OEQ works regularly with regional partners to manage a robust water quality sampling program for the EFLMR watershed, including an agricultural wetland demonstration project, funded through a Conservation Innovation Grant (CIG) (2012). The wetland was designed as a linear submerged vegetative bed with capacity to treat sediment and nutrient runoff from 80 acres of surrounding row-crop fields. Clermont OEQ's water quality analysis of the CIG project site has shown an approximate 30% removal efficiency for sediment and nutrient removal. Due to the proximity of the Williamsburg project site to the EFLMR and opportunities to improve storage capacity with additional excavation, project partners estimate a 40-50% reduction in the nutrient and sediment loading entering the system.

**Funds requested: \$40,000; total cost: \$519,900; total score: 285; rank: 2**

**Farms and Fish: utilizing water-saving technology to improve sport fish habitat, water quality, climate adaptation, and economic opportunity for Island Park Reservoir and the Henry's Fork of the Snake River, Idaho-submitted by Henry's Fork Foundation (FOR Partners)\***

This proposal is aimed at developing BMPs for maximizing fisheries potential while meeting irrigation needs in a coldwater, western reservoir. Excessive annual drawdowns negatively affect water quality and fish habitat in Island Park Reservoir, Fremont County, Idaho, in the Western Mountain ecoregion which is managed by the US Bureau of Reclamation to meet downstream irrigation water needs. Extreme water level fluctuations reduce deep-water thermal refugia for coldwater species such as kokanee salmon and rainbow trout, likely decoupling nutrient cycling between Island Park Reservoir and its tributaries via migratory fish that rely on deep-water refugia, and accelerate reservoir "aging" via increased sedimentation and eutrophication. Island Park Reservoir and its tributaries are a popular recreational angling location, especially for families, helping make the Henry's Fork the most popular fishery in Fremont County and supporting a local fishing-based economy worth around \$30 million. The fishery has declined since the 1980s when Idaho Department of Fish and Game (IDFG) data indicates it was a fishery of significant state interest and likely greater economic impact due to good catches of large rainbow trout, cutthroat trout, and kokanee salmon. Management priorities are restoring the fishery to its former status as well as reducing uncertainty as increased temperatures and drought frequency create concomitant increased need for water, increasing the likelihood of excessive drawdown. The project goal is to increase fish habitat and improve water quality through a unique mechanism: utilizing small-scale, on-farm collaborative programs to increase precision of irrigation management, thereby reducing the need for irrigation water delivery and resultant drawdown at Island Park Reservoir. The HFF aims to protect the fishery and aesthetic qualities of Island Park Reservoir by utilizing a portfolio of data-driven, collaborative conservation projects to reduce annual drawdown to no more than 60,000 acre-feet out

of 135,000 acre feet, a number shown to be beneficial to downstream water quality and fisheries. We will next assess the efficacy of irrigation efficiency and precision management projects as a best management practice for improving fish refuge habitat in Island Park Reservoir during stressful thermal and oxygen conditions in the summer. Initial data indicate fish populations are affected by reservoir drawdown which also affects thermal and oxygen refugia. Our first monitoring goal will be to understand how thermal and oxygen refugia within the reservoir react to drawdown and assess the effect of refuge habitat availability on fish populations. Next, we will assess the relative role of the cool, spring-fed Henry's Fork of the Snake River upstream of Island Park Reservoir ("Upper Henry's Fork") in provisioning thermal and oxygen refuge habitat within the river/reservoir system, and whether or not there are linkages between reservoir drawdown and refuge habitat quantity and quality in the Upper Henry's Fork . In the river, we think fish habitat selection is driven by bioenergetics, namely that fish select habitat that provides the most food per unit energy expenditure. Therefore, fish habitat will be more abundant if there is more food available. More food is available if there are more nutrients. More nutrients could be delivered to the river by the spawning migrations of reservoir fish, especially kokanee salmon, upstream. Therefore, the role of the Upper Henry's Fork in refuge habitat provision may be controlled by drawdown in Island Park Reservoir. In short, the Farms and Fish component of the project leads to lower drawdown, and the ecological monitoring component of the project quantifies the fisheries link between the river and the reservoir and refines reservoir management objectives.

**Funds requested: \$40,000; total cost: \$179,457; total score: 275; rank: 3**

**Fish Habitat Enhancement Project on Beaver Lake and Tributary Clifty Creek, Arkansas -submitted by Beaver Watershed Alliance (FOR Partner)**

Beaver Lake is a 28,000-acre lake located on the upper White River in Northwest Arkansas. The lake functions as a source of flood control, recreational activity, hydroelectric power generation and is used as a source water drinking supply for over 500,000 people including the surrounding cities of Fayetteville, Springdale, Lowell, Bentonville, Eureka Springs, Harrison and Rogers. Studies by the U.S. Army Corp of Engineers indicate that 4.2 million people utilize the recreational facilities on Beaver Lake annually for recreational activities such as fishing, boating, skiing and camping. Using figures from the Rogers Chamber of Commerce, these activities generate approximately \$128 million in local revenue and help support the local economy of Northwest Arkansas. The fertility of Beaver Lake varies from being extremely fertile in the upper reaches of the tributary arms to being relatively infertile in the lower areas around the dam. This fertility gradient is a function of the high retention time (1.5 year's average) of water in the reservoir working in combination with varying inflows of nutrients and sediment into the reservoir. Project partners are working in collaboration to achieve three main goals: 1) A Stream Channel and Riparian Stabilization Project will implement best management practices to achieve nutrient and sediment reductions, and will be installed along Clifty Creek, a tributary of War Eagle Creek, and within close proximity of Beaver Lake; 2) The Cedar Tree Habitat Project will remove invasive cedar trees along Beaver Lake shorelines and relocate them within lake areas

to improve fish habitat and angler engagement; 3) Education and outreach efforts will provide education, outreach and surveys to stakeholders and partners to increase awareness, provide replicable models for additional projects and evaluate success. A Stream Channel and Riparian Stabilization Project will implement best management practices to achieve nutrient and sediment reductions, and will be installed along Clifty Creek, a tributary of War Eagle Creek, and within close proximity of Beaver Lake. The Cedar Tree Habitat Project will remove invasive cedar trees along Beaver Lake shorelines and relocate them within lake areas to improve fish habitat and angler engagement. Education and outreach efforts will provide education, outreach and surveys to stakeholders and partners to increase awareness, provide replicable models for additional projects and evaluate success. According to the Beaver Lake Watershed Protection Strategy (Strategy), future annual sediment loading is estimated to increase 21 percent or almost 50,000 tons per year. Without additional protective measures, stream channel erosion is estimated to contribute most (approximately 60 percent) of the sediment load to Beaver Lake. While the decrease in areas categorized as agriculture, pasture, and forest will reduce sediment loading by around 18,400 tons/year from those sources, channel erosion and land developed as low density residential tracts are estimated to increase sediment contributions by approximately 28,850 and 36,700 tons/year, respectively. By 2055, the total phosphorus in the lake is expected to increase by approximately 24,000 pounds per year. As with sediment, the Beaver Lake and War Eagle Creek subwatersheds are predicted to be the largest sources of phosphorus to the lake. The War Eagle Creek subwatershed is predicted to deliver the largest nitrogen load under both existing and future scenarios. War Eagle Creek is also listed by the Arkansas Division of Environmental Quality as an impaired stream due to increased siltation and nutrients. The proposed project will work with landowners on Big Clifty Creek (a tributary to War Eagle Creek) to restore 300 linear feet of eroded stream banks to reduce sediment and nutrient loading into War Eagle Creek and Beaver Lake. Funds from NFHP will go directly to material for bank stabilization on Clifty Creek utilizing 800 tons of large rock to stabilize stream channel flow and reduce sediments into Beaver Lake and its watershed. Contract services will also include riparian enhancement along the stream restoration, approximately 6 acres revegetated with native plants of the Ozarks. Arkansas Game and Fish Commission will achieve goals of the Invasive Red Cedar Tree Habitat Project by conducting a large scale fish habitat project over a two week period from December 2021 to March 2022. The project will incorporate at least 30 employees and 8 barges/boats to place 110 new fish habitat sites in Beaver Lake. Staff will utilize invasive red cedar trees from USACE property to place brush in upper, middle and lower sections of Beaver Lake. At least six large trees will be deployed per site.

**Funds requested: \$40,000; total cost: \$154,072; total score: 268; rank: 4**

**Somerset Lake Habitat Improvement Project-submitted by Somerset Lake Action Committee (FOR Partner)\***

Somerset Lake is a 253-acre impoundment owned by the Commonwealth of Pennsylvania. It is managed by the Fish and Boat Commission for public fishing and recreation. Somerset Lake has been a staple of area recreation for the past for sixty

years. In 2012 water was discovered in the breast of the dam, which led to it being listed as a high hazard. The future of the lake was uncertain until the community stepped in to support the Somerset Lake Action Committee raising \$100,000. The state dedicated 7 million dollars to fund the dam repair. The lake was drained in October 2017 with dam repairs slated for summer 2020. After the lake was drained the shoreline was exposed which allowed for further erosion and sedimentation. This had a significant impact on the outdoor experience for residents in a town without a park. S.L.A.C. currently is engaged in a long-term lease for a nature park on site from PFBC, which is currently undergoing trail construction. To date the Somerset lake action committee has conducted numerous improvement projects around the lake which include trail building, parking lot, and boat launch improvements at a total cost of \$45,000. SLAC constructed a pavilion for community use at the north boat launch at a cost of \$11,000, with metal plastic coated picnic tables (\$1604). SLAC installed new signage for the nature park (\$2000) and placed numerous bear proof trash cans around the lake (\$3950) and was donated a \$15,000 aluminum floating dock. Restoration of the 253-acre reservoir would positively benefit the establishment of a new fishery and would increase the outdoor experience. Agricultural in the watershed is a major contributor to sedimentation and high turbidity. The lake lacks littoral structure which has contributed to shoreline erosion. The shallow nature of the basin provides little deep-water refuge. By excavating eroded banks, peninsulas will be formed introducing pockets of deep and shallow water. Structure will be placed around the excavated areas provide need cover. The project will be excavating approximately 600,000 square feet of substrate. Approximately 4,000 feet of riparian area will be stabilized. This work is made possible by the fact that the lake basin will be easily accessible by heavy equipment. Project funds will be used to excavate the lake basin to create forebays to reduce sediment inputs and purchase materials for, construct and place approximately 2,000 nesting, nursery, refuge, spawning, and habitat structures will be installed.

**Funds requested: \$40,000; total cost: \$168,876; total score: 243; rank: 5**

### **C Cordell Hull Lake Land Access and Fisheries Habitat Improvement - Defeated Creek Recreation Area, TN-submitted by USACE (FOR Partner)**

Cordell Hull Lake is in the heart of Tennessee located on river mile 313 on the Cumberland River. The construction and impoundment of the lake was completed in 1973 with hydropower, navigation, and recreation as the top missions. The cool water the lake receives upstream is ideal for walleye, sauger, and stripers on the main channel while bass, crappie, catfish, and sunfish thrive in the shallow warmer bank areas. Cordell Hull Lake has gained fishing popularity amongst striper anglers after the Tennessee state record was caught in year 2000. Even though the communities adjacent to the lake are small, striper fishing is the lifeline to the lodging industry in Gordonsville, Carthage, Granville, and Gainesboro. The two counties Cordell Hull Lake lies within have been heavily suppressed for the last twenty years due to easy accessibility to more populated areas such as Nashville. The high traffic volume that our lake brings in has contributed to the continuing success of small businesses in the area. Cordell Hull is a run-of-the-river impoundment and most of the recreational use is land-based making access sites paramount to a high-quality recreational experience. This 16-acre area where this proposal will take place would implement improved visitor

access, bank stabilization, and fish habitat is located at the mecca of our land-based visitation. Cordell Hull Lake receives approximately 700,000 visitors a year and Defeated Creek Recreation Area alone receives 20% of it. The fishing pier access and trail would improve land-based fishing opportunities for the public on federal land while honing into Defeated Creek's popularity.

The objectives of this proposed project are: 1) Create an ADA accessible fishing platform to allow all guests to the lake to have a safe and high-quality bank fishing experience. 2) Perform shoreline stabilization work to decrease eroding shoreline, improve water quality for fish communities, and reduce siltation. 3) Install proven and experimental fish attractors and fish habitat structures to improve quantity and quality of fish populations to the area.

**Funds requested: \$21,300; total cost: \$42,279; total score: 228; rank: 6**

### **Canyon Lake Habitat Enhancement Plan-submitted by: Arizona Game and Fish Department (FOR Partner)**

Canyon Lake is located on the Tonto National Forest (TNF) and has a surface area of 950 acres at full pool consisting of 526 littoral zone surface acres. The reservoir has an average depth of 130 feet and is at an elevation of 1,660 feet. At full pool, the impoundment is 10 miles long and the shoreline extends 28 miles. It is located 51 miles east of Phoenix along the Apache Trail. The lake was formed in 1925 as a result of the construction of Mormon Flat Dam on the Salt River. The reservoir is the third and smallest reservoir in a chain of four hydropower/irrigation storage reservoirs which are impounded on the Salt River. Water level fluctuations rarely exceed an average of 8 vertical feet annually and 3-4 feet daily depending on hydro pump-back storage operations. A large number of Arizona's man-made lakes are 50 to 100 years old and are experiencing a decline in the quality and quantity of fish habitat. As reservoirs age, primary and secondary productivity decline and complex physical habitat structures (i.e. submerged trees, brush) deteriorate resulting in little to no cover and marginal spawning habitat for important recreational fisheries. Additionally, constant water level fluctuation in reservoirs prevents establishment of shoreline aquatic vegetation. Conversely, occasional water level fluctuation can provide additional fish habitat by submerging established terrestrial vegetation. Many of Arizona's reservoirs experience constant water level fluctuation due to drought conditions and water management. We propose to conduct a habitat enhancement project at Canyon Lake to sustain a quality bass fishery and maintain forage fish populations. Our objectives are consistent with the Canyon Lake Fisheries Management Plan (2019b) are:

- To increase fish cover/protection, and/or congregating/fish attractor habitat by approximately 20 acres.
- To increase primary productivity by increasing surface area for periphyton growth and production.
- Contribute to the maintenance of angler satisfaction at or above 80% as identified in the Canyon Lake Fisheries Management Plan 2020-2030.
- Congregate Largemouth Bass near structural habitat and contribute to angler catch rates that exceed the Lake Management Plan goals of 0.25 fish per hour.

We propose adding two types of habitat enhancement structures, Georgia cubes and donated Christmas trees, into Canyon Lake in 2020-2021. We plan on installing roughly

400 Georgia Cubes. The number of Christmas tree's will be determined by the number available after Christmas. Eight locations comprised of 20 acres are proposed for enhancement in 2020-2021. Future habitat enhancement efforts will be undertaken in response to lessons learned, lake levels, and through adaptive management. Eight sites were identified using the Helix 7 Side Scan Sonar. Habitat Specialists used the sonar to determine depth of placement of the structures and used a rangefinder to determine distance from shore

**Funds requested: \$15,000; total cost: \$49,000; total score: 212; rank:**

**Mark Twain Lake Fisheries Habitat Development Project, Missouri -submitted by USACE (FOR Partner)\***

Clarence Cannon Dam was developed on the Salt River system, approximately 63 miles upstream from its confluence with the Mississippi River. The public lands and waters of Mark Twain Lake occupies 54,741 acres within Ralls and Monroe County, Missouri. At normal pool, the reservoir provides 18,600 acres of warm water fisheries habitat. The associated watershed of Mark Twain Lake is comprised of 2,318 square miles of lands primarily in agricultural production. Instead of clearing the entire basin, standing timber was retained in the tributaries and associated flood plains to provide aquatic structure. The resulting management strategy created an environment that supported a strong, sustainable and vibrant fishery that has been enjoyed by anglers since 1984. The reservoir, though, has progressed through the natural maturation process associated with man-made impoundments. The standing timber is deteriorating, and the underwater structure it creates is diminishing. This project proposes the installation of artificial structural components at five locations to restore approximately 15 acres of underwater fisheries habitat. The artificial structure will be constructed of materials that will provide long-term durability, capable of withstanding the stresses of submerged and dry environments and designed to reduce snagging of traditional fishing tackle and equipment. The structures will be placed at differing elevations in the basin of reservoir in a pattern to provide for stability and integrity of development. Furthermore, this project proposes the development of direct shoreline access to the restoration site which will appeal to a broad demographic spectrum, including families, youth, senior citizens, and novice anglers. Though designed and placed as a shoreline fishing resource, the developed sites will still be accessible to anglers conveying by boat. The artificial structures proposed for development of this habitat restoration project will include the following:

a. Mark Twain Lake Cubes – 150 “MTL Cubes” will be constructed for placement at the restoration sites. Each cube will measure 5 feet height, 4 feet in width, and 4 feet in breadth.

b. Spider Blocks – 400 Spider Blocks will be constructed for placement at the restoration sites. A standard 9” x 9” x 15”, dual cavity concrete block serves as the foundation of the feature. Concrete is placed in the cavities to secure ½ inch flexible irrigation tube serving as habitat structure.

In May 2020, a consortium of resource professionals, tournament fisherman, recreational anglers, and community members was formed to develop a long-term fisheries habitat development plan for Mark Twain Lake. The members assessed current lake conditions, existing habitat structure, capabilities of independent entities,



available resources, existing facilities, and the alignment of long-term goals. Subsequent communication and collaboration yielded an initial five-year management plan to establish artificial fisheries habitat at areas deemed imperative for implementation.

**Funds requested: \$20,000; total cost: \$65,120; total score: 211; rank: 8**

**Coletto Creek Reservoir Habitat Restoration Project Phase II – Native Vegetation-submitted by Guadalupe-Blanco River Authority (FOR Partner)\***

Coletto Creek reservoir is a 3,100-surface acre impoundment located 13 miles southwest of Victoria, Texas. Coletto Creek was first impounded in 1980 to provide cooling water to an adjacent coal-fired power plant and recreational use opportunities. Reservoir habitat consists primarily of a diverse mix of deep creek channels, shelves, humps, and shallow flats that provide good cover for game fish. The substrate consists of clays, deep loams and small rocks. The littoral zone contains flooded timber stands, flooded terrestrial vegetation and seasonally abundant water hyacinth. The fishery is known for prolific largemouth bass, crappie and catfish and a modest white bass population. Available littoral habitat in the reservoir has changed significantly within the last five years. The region experienced a drought of record from October of 2010 till the end of 2014, which desiccated many of the plants along the shoreline. In March of 2015, a 9,110 cubic feet per second (cfs) flood event washed a large plume of sediment into the reservoir from the drought-stricken uplands. A prolonged period of water turbidity prevented sunlight penetration and inhibited the photosynthesis driven growth of submerged vegetation during the spring growing season. In addition to substantial reductions in critical fisheries habitat, native vegetation loss may also be responsible for a degradation in water quality. The 2020 Texas Commission on Environmental Quality (TCEQ) Integrated Report on Water Quality identified a concern for chlorophyll-a concentrations exceeding the nutrient screening criteria. The observed increase in eutrophication is likely related to algal uptake of nitrogen and phosphorus that would previously have been utilized by submerged vegetation. Water clarity has also anecdotally degraded and recreational day use passes for the park have decreased by 21% from 2016 to 2020 as angler perceptions of fishery quality have declined. This project is part of a GBRA coordinated partnership between TPWD, the Coletto Bassmasters Friends of Reservoir (FOR) chapter, Texas B.A.S.S. Nation and the Coletto Creek Power Plant to make long term habitat and water quality enhancements to Coletto Creek Reservoir. In February of 2020, Phase I of the Coletto Creek Reservoir habitat restoration project was completed. Phase I was executed as employees and volunteers from the aforementioned organizations collaborated to build and install approximately 100 “Georgia” and “Mossback” artificial habitat structures around banks, open water areas, and deeper channels to enhance structural habitat conditions of the lake. The overarching intent of this project proposal is to continue to restore, improve, and increase the fisheries habitat of Coletto Creek Reservoir by reintroducing and reestablishing native aquatic vegetation along its shorelines. Program partners will design and construct a cultivation nursery for native aquatic plants and plant founder colonies of native plants in at least 100 planting locations and 700 square foot of shoreline in the Coletto Creek Reservoir.

**Funds requested: \$30,000; total cost: \$94,353; total score: 201; rank: 9**  
**Structural habitat enhancement at Lake Eufaula, OK-submitted USACE**

Eufaula was impounded in 1964 and is the largest reservoir in Oklahoma by surface area (106,000 acres). Eufaula impoundments three major rivers (North Canadian, South Canadian and Deep Fork) plus a number of smaller creeks. Sedimentation has been a major impairment and woody structure has degraded due to the normal aging process. The proposal intends to augment the structural habitat by building and placing 100 spider blocks.

**Funds requested: \$12,000; total cost: \$27,500; total score: 177; rank: 10**

**Arrowhead Habitat Structures/East Bank Park-submitted by USACE (For Partner)**

Walter F. George Reservoir is located on the southern reaches of the Chattahoochee River on the AL/GA state line. It serves for navigation, hydropower, flood control, streamflow regulation, outdoor recreation, and fish and wildlife conservation. The reservoir dam construction was started in 1955 and brought to full pool in 1963. Over the years the structural lakebed habitat has diminished, and cedar trees amongst other types of structures have been taking the place of those structures. The proposal includes 14 arrowhead fish habitat structures placed within the waters of East Bank Park. There would be a total of 800 linear feet, 2.15 acres of impacted area, and 252 cubic yards of habitat created. The arrowhead fish habitat structures designed by Arizona Game and Fish are comprised of three cubical PVC pipes oriented in an arrowhead/triangle shape. Brush piles are placed inside the cubes and then anchored to the lakebed with concrete blocks. Mesh safety fencing is placed around the PVC pipe cubes to contain the brush piles (cedar brush) and to provide shade and cover for fish.

**Funds requested: \$6,000; total cost: \$16,420; total score: 176; rank: 11**

**Restore Patoka-submitted by Tri County Bass Anglers (FOR Partner)\***

Patoka Lake is a 8,800-acre U.S. Army Corps of Engineers (COE) flood control impoundment located approximately 22 mi east of Jasper, Indiana (Dubois County). The lake and adjacent land is co-managed by the COE and Indiana DNR Division of Parks. Fluctuating water levels, shoreline composed of rock debris and clay and steep littoral grade adversely affects the presence of submerged aquatic vegetation, shoreline vegetation (trees and shrubs) and woody debris. This lack of littoral zone habitat has had an adverse effect on reproduction and cover for fishes of the Centrarchidae family. A habitat enhancement plan was created by Indiana DNR and partners that outlined timeline, budget, types of structures to be used, and placement locations. An agency meeting and partner meetings were held to discuss specific location placements and logistics. The proposed plan calls for around 20 Pennsylvania porcupine junior cribs, 60 Pennsylvania porcupine cribs, 220 pallet structures, 60 Pennsylvania Black Bass nesting structures and 40 Hoosier cubes (modified Georgia cubes) to be placed in the reservoir at depths 5-16 ft (summer pool). This project will enhance approximately 33 acres of aquatic habitat. IDNR and partners began work in 2019 to construct and deploy structures. So far 218 Indiana pallet structures, 18 Hoosier cubes (PVC cubes), and 250

trees have been felled. A volunteer build day was held in 2019 and to date over 150 volunteer hours have been donated to the project. Past flooding at the reservoir has killed many trees around the shoreline which are now being felled for fish structure. The Tri-County Bass Anglers will use the \$15000 grant to purchase materials to for between 100 to 150 Hoosier Cubes, stock bass and help build a handicap dock.

**Funds requested: \$15,000; total cost: \$28,800; total score: 169; rank: 12**

**Total RFHP funds requested: \$326,800**

**Total Project Costs: \$1,401,277**

## Small Projects

### **Cambria County Conservation District-Glendale Lake, PA**

The Cambria County Conservation district is looking to complete additional habitat improvement structures at Glendale Lake, Cambria County. We will be working alongside the Department of Conservation of Natural Resources (DCNR), Pennsylvania Fish and Boat Commission (PFBC), Friends of Prince Gallitzen State Park, and multiple local Bass Clubs. The main objective is to prevent shoreline erosion by installing PFBC shoreline stone framed deflectors. This plan will also build submerged fish habitat improvement structures, riparian Plantings, and felled shoreline trees. This project funding will help us leverage additional funding to complete these large-scale improvements

### **Cambria County Conservation District-Wilmore Lake, PA**

The Cambria County Conservation District would like to partner with the Pennsylvania Fish and Boat Commission to construct artificial habitat improvement projects at the lake. The objective is to restart the annual habitat project which will provide artificial habitat structures to the lake. These structures will provide critical habitat at the lake which will help improve local fish population

### **Tri County Bass Anglers-Patoka Lake, IN**

A habitat enhancement plan was created by Indiana DNR and partners that outlined timeline, budget, types of structures to be used, and placement locations. An agency meeting and partner meetings were held to discuss specific location placements and logistics. The proposed plan calls for around 20 Pennsylvania porcupine junior cribs, 60 Pennsylvania porcupine cribs, 220 pallet structures, 60 Pennsylvania Black Bass nesting structures and 40 Hoosier cubes (modified Georgia cubes) to be placed in the reservoir at depths 5-16 ft (summer pool). This project will enhance approximately 33 acres of aquatic habitat. IDNR and partners began work in 2019 to construct and deploy structures. So far 218 Indiana pallet structures, 18 Hoosier cubes (PVC cubes), and 250 trees have been felled. A volunteer build day was held in 2019 and to date over 150 volunteer hours have been donated to the project. Past flooding at the reservoir has killed many trees around the shoreline which are now being felled for fish structure. The Tri-County Bass Anglers will use the \$1000 grant to purchase materials to for between 15 to 20 Hoosier Cubes.

### **Friends of Lake Livingston-TX**

Funds will be used to augment partner funding to advance the overall habitat improvement efforts on Lake Livingston, including riparian plantings, native vegetation restoration and "Georgia Cube" construction and placement.

### **Ft. Worth Flyfishers-Ray Roberts,TX**

Nature of the project: Native plant establishment is often done by constructing small cages around plants introduced in shallow water to prevent herbivory; in reservoirs, however most of those fail due to fluctuating lake levels. There has reportedly been some short-term success with a simple design, attaching root-bound Illinois pondweed

growing in small buckets to existing no-wake buoys. These can best be described as “aquatic hanging baskets”. This grant will allow the Fort Worth Fly Fishers Organization and Texas Parks and Wildlife biologists to enhance and upscale this idea with larger buoys that will support 165lbs and 4 such buckets of plants each. When completed this project idea can be shared with others to help support multiple different species at any reservoir. These aquatic plant baskets will be placed in key areas designated by Texas Parks and Wildlife Department fisheries biologists to complement existing habitat restoration projects at this reservoir. In addition, they will be closely monitored, and findings documented to see how they improve the quality of the fishery, providing new information for further development in future conservation initiatives. This project is innovative, using primarily "green" and sustainable products, and has a high probability of an incredibly positive outcome.

### **Midweek Bass Anglers-Saguaro Lake, AZ**

Christmas trees are donated to the Arizona Game and Fish Department that would have ended up in the landfill. The grant would be used to purchase rope and cinder blocks to bundle and weigh down the trees. We plan on having several weekend volunteer builds and installs throughout January. Trees are bundled on the shoreline and then distributed out to the lake using pontoon boats. The Arizona Game and Fish Department will be coordinating the project with local angler groups, youth angler groups, boy scouts and the general public. This project aligns with the AZGFD lake management plan and The Aquatic Habitat Program has completed site selection.

### **Mossback**

#### **Friends for Youghiogheny River Lake, PA**

Youghiogheny River Lake currently contains about 30 Mossback Fish Habitat structures that were installed in winter of 2019. The Mossback fish habitat we plan to purchase with this grant money will be placed in groups along the deeper areas of the lake. The current fish habitat resides in the shallow portions of the lake. The product has had nothing but positive feedback from fisherman. We will be working in conjunction with the Pa Fish and Boat Commission, Fish and Wildlife Service, Yough Walleye Association, and the Rangers at Yough Lake (USACE) to locate the best possible locations to place the fish habitat and then place them when they arrive. Every year the lake takes Christmas tree donations to provide fish habitat using pine trees attached to cinder blocks, however, over time they decompose leaving a multitude of cinder blocks laying on the bottom of the lake. We also have many other forms of fish habitat which includes large wooden posts sticking into the lakebed, tire structures to make use of old tires, and cutting dangerous trees near the water's edge for fish habitat. We want to start placing materials in the lake that are more environmentally friendly, sustainable, and will not cause damage to boats. USACE will price match the cost we put into it with people and purchasing additional resources from your company. For example, with this grant we intend to purchase the essential deep-water bundle and the USACE plan to purchase the same bundle with lake funds to match our supportive efforts.

### **Friends of Lake Livingston, TX**

Due to a previous grant from Mossback in 2018, the project introduced 3 Trophy Reef's into the lake. Further, with input from FOR during the last national FOR meeting, and TPWD, the Friends of Lake Livingston project added construction of Georgia Cubes in 2019 for the very first time. 7 Georgia Cubes were built by our high school volunteers and introduced at two sites in the lake in early 2020. GPS coordinates for all sites were placed on the TPWD website for Lake Livingston. Feedback from the local community has been strong both with publication and promotion of the initial Mossback Trophy Reef's and the Georgia Cubes. Articles were placed in both of our newsletters and in the Polk County Enterprise newspaper in Livingston, TX. Our Texas Parks & Wildlife advisor has strongly encouraged expansion of the artificial reef component of the project noting it has immediate near-term benefits affecting fish habitat. Reef/Fish Habitat construction and introduction supplements the aquatic plant introduction component of the project. It also provides an additional way to illustrate required fish habitat as part of the ecology education given at the local high schools. Texas Parks & Wildlife is directly involved with the Friends of Lake Livingston project. They publish GPS coordinates for all introduced reefs on their TPWD website for Lake Livingston. Both TPWD and the Trinity River Authority coordinate the site selection. The Friends of Lake Livingston volunteer team coordinates planning, construction of both Mossback Reef's and Georgia Cubes and participates with TPWD and TRA when the habitats are put into the lake.

### **Tri County Bass Anglers-Patoka Lake, IN**

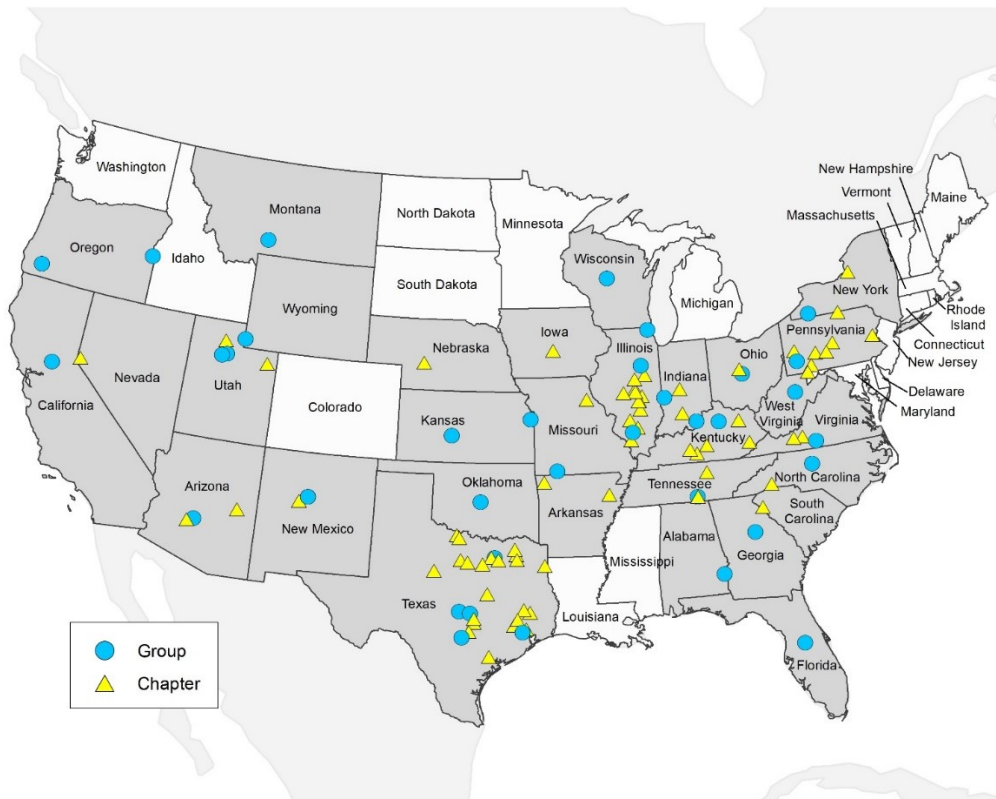
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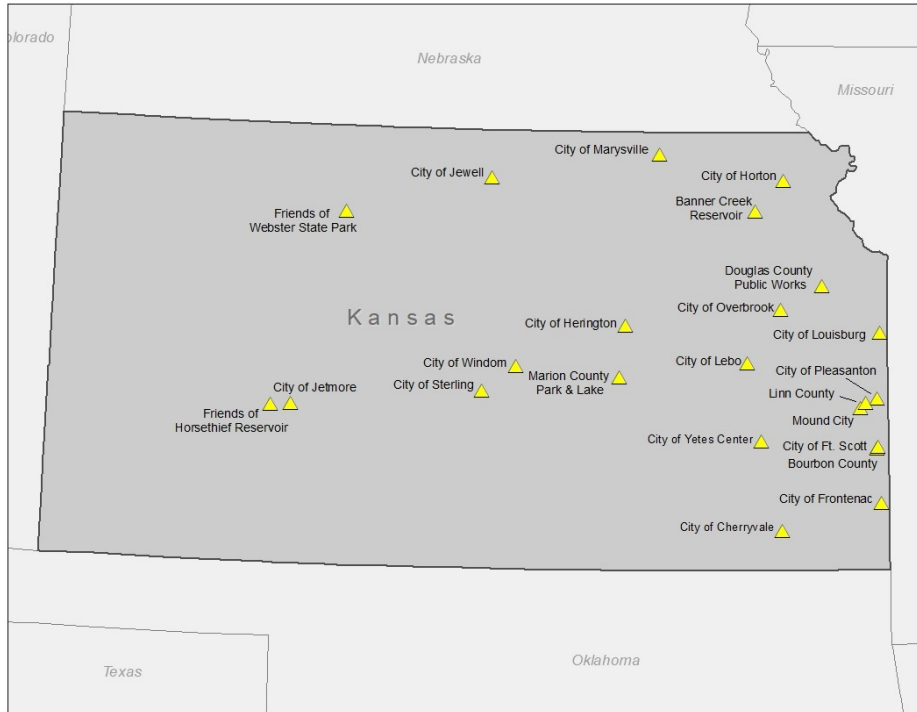
## **End of RFHP Business Meeting and Start of Friends of Reservoirs**

### **Friends of Reservoirs Membership Update**

- Chapter (71) and Group (38) membership totals 109 in 31 states
  - Texas-27

- Illinois-14
- Pennsylvania-9
- B.A.S.S. State Conservation Affiliates-18
- Chapters (7) and Group (2) members added in FY2020
- 21 Kansas Community Fishing Program members added (not included in above counts (KWPT paid membership for first year)
- Project grant applications single most reason for added membership
- Friends of Reservoirs awarded \$15,000 grant from Bass Pro Shops/National Fish Habitat Partnership to continue work on Elephant Butte (Sun Country Outdoors)
  - FOR submitted 3 additional grant proposals (Shelbyville, Easter, Patoka)
  - Total of 3 grants awarded (Fishers and Farmers FHP and Pacific Marine and Estuaries FHP)





**Reservoir Fisheries Habitat Partnership-Budget (2020-2021)**

**Beginning Balance of FOR Account** **\$ 1,136,583.65**

**2020-2021 Income (projected)**

- FY2020 FWS Project Award Operations (expected 1/21) \$ 75,000
- Annual Meeting Registration \$ 2,000
- Raystown Grant (3% banking fee) \$ 34,649
- Small Grant/Mossback Application Fee \$ 200
- FOR memberships \$ 200
- Sponsorships \$ 1,000
- Donations \$ 500
- TOTAL** **\$ 113,549**

**2020-2021 Expenses (projected)**

- Coordinator Salary \$ 60,000
- Travel \$ 8,800
  - SDAFS (\$1500)
  - MWFWC (\$1000)
    - Workshop speaker travel (\$2000)
  - AFS (\$2,000)
  - Mileage (\$1,000)
  - Travel payments to members for Annual Meeting (\$1,300)
- Tax Return \$ 275
- CT Corp (501 c 3 registration) \$ 275
- Annual Meeting (Workshop Travel/FOR rooms/Meals) \$ 5,000



○ Office Expense	\$ 750
○ Small Projects Grants	\$ 5,000
○ Website	\$ 2,000
○ Outreach (unspecified)	\$ 5,000
○ Raystown Grant expenses (estimate)	\$500,000
<b>TOTAL</b>	<b>\$587,100</b>
<b>INCOME-EXPENSES</b>	<b>\$473,551</b>
 <b>Ending Balance</b>	 <b>\$663,032.65</b>