To: Jennifer Ryan, Grants Administrator, USFWS

From: Joseph W. Love, Program Manager, MDDNR

Date: December 31, 2023

RE: Interim Report for Grant Agreement Award F20AP12062

Dear Ms. Ryan:

Thank you for assisting us with achieving objectives for our funded proposal submitted in response to Funding Opportunity Number F20AS00034 to the U.S. Fish and Wildlife Service CFDA Program 15.608. Please find below: 1) our interim comparison of actual accomplishments with proposed goals and objectives of the award, and 2) a description of reasons why established goals were not met during this reporting period.

Title: MD Aquatic Invasive Species Management Plan Implementation

Project Dates: 07/07/2021 - 12/31/2024

Accomplishments

Objective 1: To train staff in inspecting and decontaminating boats prior to launch into state waters.

Status: This objective was not achieved due to a change in departmental staff. A scope of work change was reviewed and approved by USFWS on April 12, 2023.

REVISED *Objective 1*: *To examine prey preferences of blue catfish from Nanticoke River and identify important prey items that could require actions aimed at conservation*.

Status: This objective has been achieved. A tournament held by Salisbury University resulted in over 1,000 pounds of blue catfish and snakeheads being harvested. The samples of blue catfish did not represent sufficient sample sizes for all size ranges of interest. As a result, boat electrofishing was used to supplement the sample size numbers for those size ranges. In total, 45 blue catfish were processed and shipped for analysis of isotope signatures in tissue data (Total Length = 127 millimeters to 1,055 millimeters, with up to 5 specimens for each 10 millimeter size group). We also submitted tissues for three northern snakeheads and five seeds from arrow arum to obtain their isotopic signatures for our analysis; these species have been found in the stomachs of blue catfish and isotopic signatures were lacking. All laboratory tests have been completed. Researchers discovered high level of piscivory for blue catfish, elevating their trophic status and disputing earlier work indicating lower trophic level status. In fact, blue catfish occupied a trophic level similar to that of northern snakehead. Results suggest a similar level of piscivory between species as adults, though snakeheads tended to reflect a generalist carnivore and blue catfish, a generalist omnivore.

Objective 2. To supply materials (iPads, uniforms, signage, key chains) needed to expand an existing launch steward program to high priority, state owned boat ramps in Maryland.

Status: This objective was not achieved due to a change in departmental staff. A scope of work change was reviewed and approved by USFWS on November 21, 2022.

REVISED *Objective 2*: *Determine if eDNA monitoring detects Alabama Bass in three non-tidal water bodies of Maryland by collecting and processing up to 60 water samples for eDNA of Alabama Bass.*

Status: This objective has been partially achieved. Water samples have been collected and filtered from 11 non-tidal freshwater streams of upper Potomac River. These samples have been sent to Jonah Ventures, Inc., with whom the Maryland Department of Natural Resources (MDDNR) entered into a contract to process the samples. Detection results are expected by spring 2024. Twenty water samples each will be collected from Conowingo Reservoir and Deep Creek Lake during the spring of 2024.

Objective 3. To complete year two of pathway analysis in the live bait trade by incorporating critical control points and initiating management actions to minimize further species introductions via this pathway.

Status: This objective has been mostly achieved. The live bait industry is one of many vectors for species introduction. The Maryland Department of Natural Resources' Resource Assessment Service has completed a draft report summarizing the results of surveys of Maryland retail and wholesale live bait dealers conducted in late 2022/early 2023. The report summarizes the live bait types sold in Maryland, the sources used by retail bait shops, relative popularity of the various bait types, and provides recommendations the state could take to limit introductions of potential aquatic invasive species through the live bait pathway. A portion of the report's executive summary is included below.

A survey of in-state, live bait vendors as well as their wholesale suppliers both in and out of Maryland was conducted to gauge the risk of invasive species introduction in Maryland through the live bait trade. Survey questions targeted types of bait sold, bait origins, nontarget species encountered with bait, and live bait handling protocols. Twenty-four Maryland vendors and six in- or out-of-state wholesalers responded to the survey. Key findings are noted below.

- No respondent reported selling live crayfish at either the local vendor or wholesale level.
- Certain non-native species, such as Goldfish, Fathead Minnow, and Canadian nightcrawlers continue to be actively targeted and sold as live bait.
- Around 75% of Maryland vendors indicated their willingness to participate in angler education efforts to increase proper handling and disposal of live bait.
- In addition to non-native species, there is evidence of vendors importing native species or illegally collecting them from Maryland's non-tidal waters to be sold as live bait.

- While retailers generally reported either consistent or increased trends in sales, along with consistent diversity of available bait, the number of bait dealers in Maryland appears to be declining.

Objective 4. To create a digital FEMA Incident Command System Rapid Response Plan with current tables that identify contacts for agencies or units involved with the Rapid Response Plan; generate contact information for contacts and adopt a training platform for units and agencies that are responsible for implementing the Rapid Response Plan.

Status: This objective has been achieved. A subscription to PDF Escape was purchased for one year. The FEMA document Incident Command System Rapid Response Plan was edited and refined for State use, then digitized as a fillable *.pdf. Additionally, Google Forms were created for three of the most useful forms: Incident Briefing Report; Incident Status Summary; and Activity Log. The digitized fillable *.pdf that includes links to Google Forms was uploaded to the department's invasive species webpage during spring 2021.

https://dnr.maryland.gov/fisheries/Pages/nuisance_species.aspx

Objective 5. To use genetic testing and determine if invasive hybrids exist for Myriophyllum in Deep Creek Lake, Lake Habeeb, and Herrington Manor Lake.

Status: This objective has been achieved. Plant samples were collected from Herrington Manor Lake and Deep Creek Lake during the fall 2021. Samples were dried and pressed and have been shipped for analysis to Montana State University where Dr. Ryan Thum will oversee the genetic analysis of the samples to accurately determine *Myriophyllum* species and if hybridization is present in those samples. A contract or service purchase order was generated in 2023 to allow invoicing for compensating laboratory analysis.

Hybridization was not present in these samples. The laboratory at Montana State University performed a genotype level analysis on all samples. All of the processed samples were the same strain of the widespread Eurasian variety, E_MISGP_734. This variety is highly sensitive to herbicides fluridone and 2,4-D.

Milfoil Mapper
https://thumlab-msu-watermilfoilapp.shinyapps.io/milfoil_app/

Objective 6. To create a framework for issuing small grants to local communities or individuals to remove aquatic invasive species.

Status: This objective has been achieved. There were 26 proposed projects submitted through the department's solicitation webpage. Of these, only 10 could be funded, though all showed merit. These 10 included commercial watermen, university faculty, non-profit organizations, indigenous tribes, and local communities (Figures 1 and 2). These projects were aimed at controlling invasive species such as *Phragmites*, water chestnut, and invasive fishes. However some projects did include marketing aimed at long-term prevention of introducing invasive species. Projects were vetted internally by the department's Invasive Species Matrix Team and then with US Fish and Wildlife

Service (see Amendment for May 17, 2022). Once approved via grant amendment, principal investigators were notified in May 2022 on the status of their application. Successful applicants were provided the process for reimbursement that had been developed internally by fiscal officers within the department's Fishing and Boating Services.

Projects were carried out between June and December, with invoicing completed in November and online submission of reports due in December.

Figure 1. One small grant funded project included the removal of invasive *Phragmites* (above, left most photo) without using chemicals (above, middle photo) by a team of community volunteers (above, right most photo). Another small grants' recipient, a faculty member from Salisbury University developed a fishing tournament for invasive species (right photo). Individual fish were processed during the tournament to provide data for the faculty member's research into the impacts of invasive fishes in ecosystems of the eastern shore of Maryland. The photo below depicts a family of watermen, with a younger one in training, who secured some funds to help catch invasive blue catfish from Patuxent River and donate them to local community organizations.

Figure 2. Small grants recipients included Through Piscataway Eyes, a Piscataway Conoy Tribe that assisted in removing snakeheads and blue catfish from tributary streams to Potomac River.

Project Accomplishments

- Project: To remove isolated patches of *Phragmites australis* from Parkers Creek marsh

Autumn Phillips-Lewis
Target Species: Common reed
Project Period: 6/27/2022 - 9/26/2022
Harvested: 20,000 square feet treated

The grant program was easy to apply for and easy to navigate throughout the grant term. Joe was great to work with and made everything go smoothly. This grant program greatly increased the size of the area where phragmites is established in Parkers Creek. Thank you for your support!

- Project: To increase harvest levels of blue catfish and northern snakehead using nets and bows and arrows, respectively.

Jason Williams
Target Species: Northern snakehead
Project Period: 6/1/2022 - 11/1/2022
Harvested: 68 snakeheads harvested
Based on observations, the number of snakeheads in the Lower Patuxent River is on the rise. Using the ARCGIS map, access sites were identified that would provide the best opportunities to interact with snakeheads. These sites included St. Thomas Creek, Island Creek, the headwaters of St. Leonard Creek at Parran Road, Quaker's Swamp, and John's Creek; the headwaters of Helen's Creek at Mill Bridge Road; headwaters of St. John's Creek and Mill Creek; and Hominy Creek. Permission was granted from the Cove Point Natural Heritage Trust to access Helen's Creek through the Cove Point Natural Heritage Trust. The use of a canoe was instrumental in accessing these remote spots. The majority of snakehead harvested during this project were roe bearing. Invasive species grants should seek invasive species tournaments to support.

Geoff Weichert
Targeted Species: Blue catfish, Northern snakehead
Project Period: 8/1/2022 - 11/23/2022
Harvested: 16 Blue Cat, 23 Snakehead harvested
Our hunting and fishing club of 200 plus members fished for almost 4 months, in that four months we had 4 anglers turn in 5 fish each and 7 members turn in 1 each for a total of 39 invasive fishes removed from the Middle River, and surrounding waters.

William L. Rice Sr.
Targeted Species: Blue catfish
Project Period: 7/15/2022 - 10/31/2022
Harvested: 11,500 pounds harvested
Given to needy families and also fertilizer. Would be helpful to sell part of the catch because the grant does not cover the expenses fully.

William Rice Jr.
Targeted Species: Blue catfish, Flathead catfish
Project Period: 7/20/2022 - 11/23/2022
Harvested: Blue cats 4,780 lbs. flathead cats 680 lbs.

Chief Jesse Swann, Jr.
Targeted Species: Blue catfish, Northern snakehead
Project Period: 6/1/2022 - 11/30/2022
Harvested: Catfish = 515 lbs., snakeheads = 380 lbs.
All fish were donated to low-income Piscataway elders. We engaged approximately 20 Indian youth through this project, teaching angling, conservation, and life skills. Although the amount of invasive species removed was less than expected due to the fact that we were not able to acquire a second boat and there was a resurgence of Covid in recent months, this project was invaluable to our community. Thank you so much for the opportunity.

- Project: To host invasive species fishing tournament to remove invasive fishes

Beth Brewster
Targeted Species: Blue catfish
Project Period: 11/5/2022 - 11/6/2022
Harvested: 193 blue catfish
17 boats and 70 anglers for the tournament. For the festival we had 14 kids enter the youth fishing derby. Families in the community took the fish home. Dr brews man from Salisbury u was there doing testing. It was a great day. WBOC covered the story. I thought the process of applying was user friendly and not cumbersome.

- Project: To remove water chestnut from Sassafras River

Zack Kelleher
Target Species: Water chestnut
Project Period: 6/1/2022 - 11/30/2022
Harvested: 2,000 pounds of *Trapa natans* was removed from the Sassafras River this season.

This project was very successful this year and made a significant impact on the health of the Sassafras River. The previous two seasons have been significantly limited due to pandemic effects, so this year was especially important for reengaging volunteers and organizing more harvesting events. Each year we harvest less and less Trapa as our volunteer efforts maintain a constant pressure on the population in the river and gradually reduce the amount of this invasive species. By having this skiff, we will be able to significantly increase our monitoring and removal efforts and get volunteers out to the harvesting sites in a much timelier manner.

This program was great and made a big difference in our work in a very timely manner. Rather than having to wait several months to hear back or submit a massive grant proposal, this program made it possible for us to do our work in a more efficient and timely manner. The reporting was straightforward and concise, and much easier than most other grant programs. This was helpful, not only for experienced grant writers like the staff at ShoreRivers, but also would be great for lower-capacity organizations or organizations who are less familiar with grant writing.

Objective 7. To measure current exploitation and encourage exploitation of northern snakehead to 20% - 30% of the population in Blackwater River drainage.

Status: In collaboration with U.S. Fish and Wildlife Service, 500 tags from Floy have been ordered, purchased, and received. A sampling strategy was developed for the Blackwater River. However, after multiple attempts aimed at capturing sufficient snakeheads using the available netting options, it was determined that the ecosystem could not be sampled in a way that would yield the numbers of fish needed for the project. As such, a change in Scope of Work was submitted and approved by USFWS on November 21, 2022. The purchased tags were repurposed for another project aimed at harvesting snakeheads using a parallel rewarding system (F22AC00554).

The department created creel card boxes that were established at the three locations where the fishery is accessed at Blackwater River (Figure 3). Creel cards were created and printed, then displayed at creel card boxes from March and through September. Boxes were monitored monthly to remove completed cards. Anglers also had the option to submit reports directly to a Google Form via an advertised QR code or website hyperlink (https://forms.gle/t33c9YBFsih9pfLb6). Cards requested that anglers report the number of snakeheads caught and harvested, as well as their opinion on the best tactic to encourage harvest statewide (Figure 4).

Figure 3. Boxes were placed in the Blackwater River drainage (2023) for the purpose of collecting information about fishing.

Figure 4. Creel card printed for each of three boxes displayed in the Blackwater River drainage in 2023 for the purpose of collecting information on fishing for northern snakeheads (*Channa argus*).

As an incentive for participation, entrants were entered into a raffle drawing. This type of incentive has been used successfully by the Department of Natural Resources to solicit participation in their Volunteer Angler Surveys. The prizes included thermoses and small coolers. These prizes were mailed to randomly chosen participants in November 2023.

The department received 57 responses from anglers. Of those, 54 reported fishing for northern snakeheads and 40 reportedly caught northern snakeheads. There were 310 hours reportedly spent fishing and 293 hours of directed fishing for northern snakeheads. A total of 106 northern snakeheads had been caught and only 10 reportedly released; therefore, 90.6 percent had been harvested. The catch rate (catch per hour) averaged across reports was 0.31 or approximately 1 fish per three hours of fishing. These catch rates are greater than those estimated for Potomac River, where an established population exists, though the proportion of harvested fish is similarly high between both fisheries.

The department requested feedback on the best idea to encourage harvest of four choices (Figure 5). The two most frequently chosen ideas were: a cookbook of recipes (n = 21) and state supported fishing derbies (n = 22). The remaining two ideas were: incentives for commercial sale (n = 9) and filet demonstrations (n = 5).

People may not be able, or willing to harvest or keep a snakehead. Please mark the best idea to encourage harvest in the fishery.

57 responses

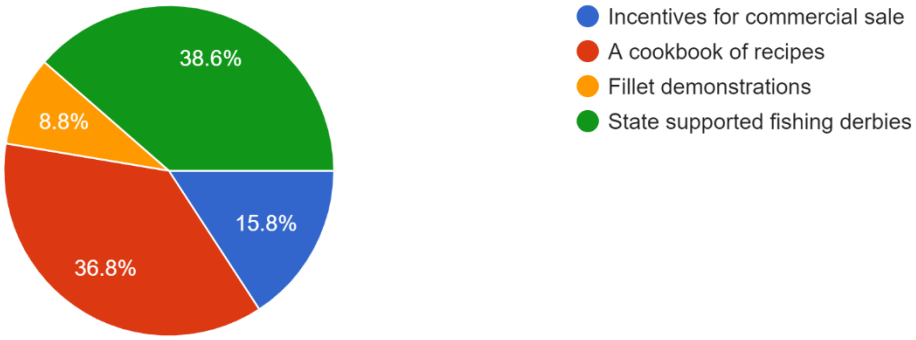

Figure 5. Results from a survey request answered by 57 anglers who fished the Blackwater River drainage. The request encouraged anglers to select one of four choices that would encourage harvest in the fishery.

In the future, this work should expand to other fisheries to help estimate catch rates and gauge temperament in the fishery. Department initiatives to encourage harvest rather than catch-and-release and support fishing derbies seem to have been successful.

Reasons Objectives were not Met

Objective 1. This objective was not achieved due to a change in departmental staff. A scope of work change was reviewed and approved by USFWS.

REVISED Objective 1. This objective has been achieved.

Objective 2. This objective was not achieved due to a change in departmental staff. A scope of work change was reviewed and approved by USFWS.

REVISED Objective 2. This objective has been partially achieved. Samples have been collected from water bodies and the procurement paperwork has been completed to have the samples processed by Jonah Ventures, Inc. Samples have been shipped to Jonah Ventures, Inc. Results are pending laboratory analysis.

Objective 3. This objective has been mostly achieved; reallocated funding to this objective will enable Resource Assessment Service to conduct a survey of Mid-Atlantic Natural Resource agencies in early 2024 to better understand state regulations addressing the import, sale, and harvest of live bait and to identify inconsistencies in bait regulations that may impact prevention of AIS in shared waterbodies. Resource Assessment Service also intends to complete outreach to Maryland retail bait shops to further the 'Do Not Dump Your Bait' messaging to anglers.

Objective 4. This objective has been achieved.

Objective 5. The objective has been achieved.

Objective 6. This objective has been achieved.

Objective 7. This objective has been achieved.