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INTERIM PERFORMANCE REPORT

FEDERAL AID GRANT NO. F10AF00135 (T-54-R-1)

SURVEY AND STATUS OF MUSSELS AND MUSSEL HABITAT IN THE POTEAU RIVER IN SOUTHEASTERN OKLAHOMA

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

July 1, 2010 through June 30, 2011

Interim Performance Report

State: Oklahoma **Grant Number:** F10AF00135 (T-54-R-1)

Grant Program: State Wildlife Grant

Grant Name: Survey and Status of Mussels and Mussel Habitat in the Poteau River in Southeastern Oklahoma

Grant Period: 1 July, 2010 – 30 June, 2011

I. Abstract:

Many projects and activities in the State of Oklahoma require additional information regarding resulting negative effects on fish and wildlife resources including species of greatest conservation need. Other activities have caused injury to such species and warrant investigation into the cause of the injury or have been established as superfund sites and/or undergoing the Natural Resource Damage Assessment and Restoration (NRDAR) process. The Oklahoma Department of Wildlife Conservation (ODWC) has the authority under state and federal statues to make recommendations concerning these impacts on the environment; proceed with investigations that could affect threatened and endangered species, species of special concern, and species of greatest conservation need; and proceed with NRDAR activities. Over the past year, the ODWC has made recommendations and provided comments based on research and careful consideration of each project. The ODWC has also participated in a plethora of activities involving working groups, trustee councils, tri-state partnerships and general investigations. Although most of the projects with which we are concerned involve recent activities or acute events, some activities have resulted in long term, possibly irreversible environmental damages. Through our response, both reactive and proactive opportunities exist for representing fish and wildlife conservation concerns. Either action is necessary to avoid or minimize the need for extensive mitigation, recovery, remediation and restoration efforts.

II. Project Objective:

1. To conduct an intensive one-year survey of the freshwater mussel species in the Poteau River.
2. To systematically survey fish assemblages to determine health of the Poteau river and presence of larval mussel hosts.
3. To determine the baseline concentration of dissolved oxygen, pH, temperature, and conductivity both in Wister Reservoir and in the Poteau River below Wister Dam.

4. To determine the concentration of ammonia, organic nitrogen, nitrite, nitrate, orthophosphate, and total phosphorus in water samples from Wister Lake and the Poteau River.
5. To determine the sediment concentrations of total organic carbon and total metals including mercury, arsenic.

III. Methods

Mussel surveys will be conducted in sites determined to be suitable mussel habitat, from the upstream border with Wister Lake Dam to the downstream crossing of Highway 112 (approximately 27 km) and will utilize timed snorkeling and scuba searches as described by Vaughn (1998) and USFWS (2005). Once located, mussels will be carefully removed from the substrate, sorted, and measured to the nearest 0.01 mm maximum length using digital calipers. All individuals collected will be identified to species using keys by Oesch (1995) and Mather (2005). Mussels will then be carefully returned to the river by placing them anterior end down into the substrate. Photo documentation of live mussels and relic shell material will be collected as voucher specimens. At each mussel sampling site, general habitat evaluations will also be conducted following the rapid bioassessment protocols described by Barbour et al. (1999). Basic water chemistry data (temperature, dissolved oxygen, pH, conductivity, alkalinity and hardness) will also be collected at each sampling site. Fish will also be sampled at mussel sampling sites. A variety of gears, including boat and backpack electrofishing and seines, will be utilized to ensure optimal discovery of the extant species richness. Sampling trips will be conducted in summer and fall of 2010 and the numbers of each species according to each gear type and sampling date and location will be documented. All sampling locations and their corresponding fish and mussel community data will be georeferenced with global positioning system (GPS) receivers.

To assess water quality parameters, will be install, operate and maintain 2 sondes for one year. The sondes will have Optical DO, pH, conductivity & temperature sensors. Additionally, water quality parameters (DO, pH, conductivity, salinity, and temperature) will be measured at sites where mussels are collected using a handheld YSI 85 multiprobe. The sondes will be calibrated prior to installation, a calibration check will be performed upon retrieval and all data will be downloaded and provided in MS Excel format.

Finally, sediment chemistry will be collected using a stainless steel Ekman dredge sampler (6 x 6 x 6 inches), targeting no more than the approximate top 10 cm of sediment. Five samples will be collected in Wister Lake and two samples will be collected from the Poteau. At each sampling station, the sampler will be deployed, gently extracted from the sediment, and slowly and carefully raised through the water column to minimize sample disruption during retrieval. Once the sampler has been retrieved from the water and secured on the deck of the boat (in a stainless steel tray), the screen doors will be opened and any excess water that is retained on the sediment surface will be siphoned off. Any grab samples that are not intact following retrieval (i.e., low volume, partially washed out, incomplete closure of sampler) will be discarded.

The top-layer sediment sample will be obtained by removing approximately 300 mL of sediment from one side of the sampler, taking care to remove only about the top 10 cm of material. This material will be transferred into a stainless steel sample collection container using a stainless steel spoon. This material will then be homogenized and used to fill a 4 oz. glass jar. This sample will be stored at 4°C until analysis.

IV. Results:

Work completed under Approach Components 1

During August of 2010, a survey of mussels was conducted in the Poteau River from Wister Dam downstream to Hwy 59. Mussel identified and enumerated for 6 locations. Individual mussels were released immediately prior to identification. Additionally, relic shells were collected from each site and will be identified and enumerated. Data will be formally analyzed at the end of the project and provided in the final report.

Work completed under Approach Component 2:

As a component of the sampling methods, for each site (6 total) where mussels were surveyed, fish species were also surveyed. Fish were identified and enumerated for each survey location and released on site. Data will be formally analyzed at the end of the project and provided in the final report.

Work completed under Approach Component 3:

At each mussel survey location, basic water quality parameters (dissolved oxygen, pH, conductivity, salinity, temperature) were collected using handheld probes. Additionally, starting on 26, October 2010, ODWC staff worked with Water Monitoring Solutions (Consultant) in placing two YSI 6920v2 sondes in the study area, (Table 2). One sonde was suspended from a marked buoy within Wister reservoir. The second sonde was placed in the Poteau River, suspended within a PVC pipe fixed to the shoreline approximately 1.8 miles below Wister Dam. The sondes record data at 30 minute intervals. Since their deployment, the units have been monitored on a monthly basis. Data was downloaded from the units, calibrations and calibration logs maintained, and regular maintenance has been conducted as needed/required. During the 28, March 2011 scheduled maintenance, it was discovered that the sonde recording data in the reservoir was no longer attached to its cable. Further investigation led us to believe that the lock that secured the unit to the cable had not been properly secured or the lock had malfunctioned in the environment. On 25, April 2011, Water Monitoring Solutions loaned another YSI 6920v2 to continue collecting data until the missing sonde could be found. After several attempts spanning three months, the missing sonde was retrieved on 27, June 2011. It was found 30 feet northeast of the buoy anchor. The sonde housing protected the sonde from any damage and fouling. ODWC staff provided the sonde to the consultant for data extraction. It was determined the batteries

running the equipment were still active and the unit continued to record data the entire time of its absence. Post calibration and data review shows that the data is valid; therefore there should be no lapse in data during the time it was detached. Data will be closely looked at for any indication that it should be removed for quality assurance. Furthermore, it was determined that the unit likely became detached at approximately 1200 hours 9, March 2011.

All data is being compiled upon delivery from consultant, but no detailed analysis has been formally prepared at this time. Initial review of the data shows pH values as low as 2.93 in February and as high as 8.21 in March at the river station. There are also indications that dissolved oxygen readings in the river for the month of June are flawed. Releases during this period had a negative effect on the tube allowing debris to accumulate around the probe. Initial reservoir data also shows fluctuations in pH values, but with few large spikes. Most noticeable is the downward trend of pH values as spring progressed into summer. Data will be formally analyzed at the end of the project and provided in the final report.

Work completed under Approach Component 4 and 5:

ODWC staff collected sediment samples from 7 locations within Wister Lake and the Poteau River. Samples were taken to the Oklahoma Department of Environmental Quality diagnostic lab in Oklahoma City, (Table 2). Sediments were analyzed for arsenic, mercury, total nitrogen, nitrate-nitrites, and phosphorus.

IV. Discussion:

ODWC staff has surveyed several locations along the Poteau River for both fish and mussel to assess the status of the mussel and fish community with the river between Wister Dam and the highway 54 bridge. Additionally, water quality analysis has been taken in situ during biological sampling as well as conducted over the last year to determine the environmental quality of the river. Sediment samples were collected and analyzed from within he reservoir to determine if possible degradation in water quality with in the river could be attributed to suspended sediment removed from the reservoir floor and washed downstream. The longer term data (1 year) from the sonds are being analyzed to help establish and identify water quality trends within the reservoir and the effects these trends have on water quality within the river. Analysis has begun and is ongoing for both the biological and the water quality data collected. However, final analysis has not been completed as of the end of the grant segment.

Table 1: Activity Log for Sonde Monitoring

Date	Location	Activity
10-26-10	Reservoir	Deployed YSI 6920 V2 sonde measuring dissolved oxygen, pH, temperature and conductivity in Wister Reservoir outside of Quarry Island cove. The sonde is suspended from a buoy approximately two to three feet above the bottom of the reservoir.
10-26-10	River	Deployed YSI 6920 V2 sonde measuring dissolved oxygen, pH, temperature and conductivity in the Poteau River approximately 1.8 miles below Wister Dam. An attempt to deploy the sonde from the railroad bridge at this location failed, so it was deployed from the bank using PVC pipe, cable, t-posts and existing trees.
11-22-10	Reservoir, River	Sonde data downloaded, sondes calibrated
12-20-10	Reservoir, River	Sonde data downloaded, sondes calibrated
01-21-11	Reservoir, River	Sonde data downloaded, sondes calibrated, DO wipers changed, installed new batteries
2-28-11	Reservoir, River	Sonde data downloaded, sondes calibrated, DO wipers changed
3-28-11	Reservoir	Sonde was missing. It was determined that the padlock was not likely secure and the sonde had become detached from the cable.
3-28-11	River	Sonde data downloaded, sonde calibrated, DO wiper changed, time advanced one hour for daylight savings time.
4-1-11	Reservoir	An attempt to retrieve lost sonde via free diving failed.
4-5-11	Reservoir	An attempt to locate lost sonde via SCUBA equipment failed.
4-25-11	Reservoir	Consultant installed another sonde (also a YSI 6920 V2) until lost sonde could be found. The suspension cable was lengthened to maintain depth.
4-25-11	River	Sonde data downloaded, sonde calibrated, DO wiper changed. It was observed that the probe guard had leaves and debris at the bottom of the guard, although none appeared to be on the probes themselves.
5-23-11	Reservoir	Sonde data downloaded, sonde calibrated, DO wiper changed.
5-23-11	River	Sonde data downloaded, sonde calibrated, DO wiper changed. New batteries installed; adjusted time by three minutes forward
6-27-11	Higgins office	Constructed equipment to locate lost sonde
6-27-11	River	Sonde data downloaded, sondes calibrated. Probe guard was full of debris, DO data not valid after 5-31-11. Sensors were cleaned and replaced DO wiper pad. Cleaned and raised sonde tube (It had moved down and was close to the bottom of channel, filling tube of debris).
6-27-11	Reservoir	Sonde data downloaded, sonde calibrated, DO wiper changed
6-28-11	Reservoir	An attempt to retrieve lost sonde via SCUBA equipment was successful in locating sonde 30ft northeast of the buoy anchor.
7-25-11	Reservoir	Suspension cable was replaced with a 6ft cable. Recovered sonde was re-deployed after cleaning, calibration. DO wiper and batteries changed.
7-25-11	River	Sonde data downloaded, sonde calibrated, DO wiper changed. Pipe was raised on the t-post in the river.

Table 2: Sediment Analysis (values in mg/kg)

Sample	Arsenic	Mercury	Nitrogen, Total	Notrogen, Kjeldahl	Nitrate-Nitrite	Phosphorus
1	12	<.025	942	942	<1	308
2	4.9	<.026	531	531	<1	178
3	2	<.027	283	283	<1	92
4	11.6	<.028	864	864	<1	313
5	10.2	<.029	685	685	<1	357
6	9.3	<.030	673	673	<1	219
7	8.1	<.031	683	683	<1	208

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Approved by: _____ Date: 12/5/11

Fisheries Division Administration
Oklahoma Department of Wildlife Conservation

_____ Date: 12-15-2011

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