

WETLANDS/BIOLOGICAL TECHNICAL REPORT

PASCAGOULA RIVER DROUGHT RESILIENCY PROJECT



PREPARED FOR:

**GEORGE COUNTY, MISSISSIPPI BOARD OF SUPERVISORS,
&**

PAT HARRISON WATERWAY DISTRICT

PREPARED AND SUBMITTED BY:

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Acronyms/Abbreviations

BLH	Bottomland Hardwood
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
EA	Environmental Assessment
ESA	Endangered Species Act
EO	Executive Order
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
GIS	Geographical Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic
HUC	Hydrologic Unit Code
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OBL	Obligate
SPF	Slash Pine Flatwood
SSSF	Small Stream Swamp Forest
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UPL	Upland
WET	Wetland

1.0 BACKGROUND

The Pat Harrison Waterway District and the George County Board of Supervisors contracted with the Pickering Firm, Inc. (PFI) to prepare and submit a Clean Water Act § 404 Application and supporting Environmental Assessment (EA) of a study area in portions of south George and north Jackson Counties of Mississippi. The study area totals approximately 2,867 acres of land associated with the drought resiliency project's two proposed lake footprints. The project area is located about 15 miles south of Lucedale in George County, Mississippi. The approximate center of the Lower Lake footprint is at: latitude 30° 44' 05.90" north and longitude 88° 34' 13.06" west. The approximate center of the Upper Lake footprint is: latitude 30° 46' 37.72" north and longitude 88° 32' 16.66" west. A United States Geological Survey (USGS) Quadrangle location map depicting both lake footprints and surrounding areas is included in Figure 1. A corresponding overview aerial photograph depicting the two lake footprint boundaries (study area) is included as Figure 2. This wetland and biological technical report was prepared to identify and document potential impacts that the development of the two proposed drought resiliency lakes may have on any federally-listed species and jurisdictional waters.

1.1 Jurisdictional Waters of the U.S.

Pickering evaluated the study area for the occurrence of wetlands (EO 11990) which included a delineation of potential jurisdictional waters (i.e. "waters of the United States) within the study area. Jurisdictional waters refer to those areas under the jurisdiction of the United States Army Corps of Engineers (COE). The Clean Water Act § 404 gives the COE authority to regulate discharges of fill and/or dredge material into "waters of the United States". Jurisdictional waters may include, but are not limited to lakes; rivers; ponds; wetlands; and perennial, intermittent, and ephemeral stream channels.

To evaluate the presence/absence of potential jurisdictional wetlands adequately and accurately, a routine wetland delineation was performed following the procedures set forth in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)*. Other "waters of the U.S." were identified based on the presence/absence of an observable ordinary high water mark in accordance with the definitions found at 33 *CFR* 328, and *Regulatory Guidance Letter No. 05-05*.

The evaluation of the study area was initiated using an offsite determination of potential jurisdictional areas utilizing published literature and related information such as the United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps Geographical Information System (GIS) data, USGS topographic maps, soils information, and aerial photography. This information was supplemented with a series of field visits to the study area from March - December of 2014. The field visits included observations of site conditions for positive identification of wetlands using three criteria: hydric soils, wetland hydrology, and hydrophytic vegetation. The field visits also included observation of adjacent upland buffers, surrounding land use, and wildlife utilization.

1.2 Threatened and Endangered Species

Threatened and endangered species are protected pursuant to the *Endangered Species Act* of 1973 (ESA) which is administered in accordance with 50 CFR 402 by the USFWS. Pickering conducted a preliminary evaluation of the onsite ecological communities within the study area to determine the potential for the presence of federal and state protected species. The evaluation was initiated with an offsite evaluation of state and federally-listed species known to occur in George and Jackson Counties and a literature search of the preferred habitats associated with those species. Other published literature and related information such as USGS topographic quadrangle maps, NWI maps, soils information, and satellite imagery were used to describe ecological communities and assist in establishing habitat suitability. The field visits included observations of the site conditions for the determination of potential presence/absence of habitat suitable for federal and state listed species and visible signs of species occurrence within the study area. This evaluation was conducted in concurrence with the delineation of jurisdictional waters from March - December of 2014.

2.0 SITE DESCRIPTION

The study area is situated within the Southern Pine Hills ecoregion of the East Gulf Coastal Plain physiographic region and consists of two proposed drought resiliency lake footprints. The upper lake footprint is approximately 1,715 acres in size and located entirely in George County. The lower lake footprint is approximately 1,152 acres and located primarily in George County with a small portion extending into Jackson County. The study area is located in the Pascagoula River watershed (HUC 03170006). There are five local and primary watersheds found within the study area boundaries. These local watersheds (perennial streams) include: Big Cedar Creek, Little Cedar Creek, Cowerts Branch, Betsy Branch, and Lyons Creek. Multiple intermittent and ephemeral streams were observed in association with these watersheds. The riparian buffers associated with the streams observed onsite consist primarily of Bayhead Drains and Bottomland Hardwood wetland habitats.

The site topography is typical of the region and is characterized by broad, rounded ridges dissected by valleys. The predominant source of hydrology is groundwater in the form of hillside seeps or springs. Precipitation is often their secondary source of water. The springs are the likely hydrologic source for the small headwater tributaries and wetlands observed in the study area.

The onsite ecological communities were reviewed and classified using Mississippi's *Comprehensive Wildlife Conservation Strategy*. According to Pickering's review, the study area consists of three distinct ecological communities including Pine Plantation, Bottomland Hardwoods, and Small Stream Swamp Forest. The upland community is primarily comprised of Pine Plantation with few residential properties scattered throughout. Open area land use classifications include small wildlife food plots and pastures. Numerous food plots and recreational hunting stands are located throughout the

study area. The potential jurisdictional wetland areas are associated with the Bottomland Hardwood and Small Stream Swamp Forests. The ecological boundaries were delineated using onsite observations and photointerpretation of available aerial photography.

In addition to classifying the ecological community, which relies more on vegetation, we have classified the onsite wetlands by Hydrogeomorphic (HGM) characteristics. The HGM classification takes a more holistic approach at assessing the wetlands onsite. Based on Pickering's review within the study area, the majority of the wetlands fall into the Headwater Slope wetlands classification which are typically found in association with low-order streams and their headwaters. The predominant source of water observed in Headwater Slope wetlands is groundwater discharge with high seasonal variability. Headwater Slope wetlands can occur on slight to steep slopes as well as flat landscapes if groundwater discharge is a dominant source to the wetland surface. Headwater Slope wetlands are often referred to as Bayhead wetlands. Photographs of the study area are provided in **Appendix A**.

3.0 WATERS OF THE U.S. FINDINGS

During field visits from March - December of 2014, Natural Resource Scientists from Pickering conducted a jurisdictional waters determination within the study area. Potential jurisdictional areas were mapped utilizing TopCon and Garmin Global Positioning Systems (GPS). Acreage and linear feet were obtained by exporting the GPS unit data points into ARC View software. Digital photographs were taken at observation points and data plots to document site conditions. Information was recorded from multiple data points across the study area. The locations of the data points were selected to provide a thorough representation of the study area and distinguish uplands from wetlands. At each data point, a test pit was dug to observe and record soil profiles and characteristics. Vegetative communities, dominant species of flora, and hydrologic indicators were also observed and recorded. The potential jurisdictional waters identified within the study area are depicted on **Figures 3-6**. The NWI maps of the study area are included as **Figures 7-8**. The COE wetland determination data forms associated with field data collection are also provided in **Appendix B**.

3.1 Soils

Soil samples were obtained by excavating an approximate 12 to 18 inch soil pit. Soil color was recorded by matching soil samples to color chips contained in a Munsell 7 Soil Chart. Hydric soil criteria were met when soil samples indicated a matrix chroma of 2 or less in mottled soils, a matrix chroma of 1 or less in unmottled soils, or exhibited hydric soil indicators. Maps depicting the underlying soils of the study area are included in **Figures 9-10**.

According to the *Soil Survey of George County and Soil Survey of Jackson County* (<http://websoilsurvey.nrcs.usda.gov/app/>) the study area is predominantly underlain with Dorovan and Johnson soils. The Dorovan-Johnston association are considered very poorly drained, very strongly acid, organic soils. Generally, field observations confirmed these

soil types. Soil profiles generally had an O horizon of color of hue 10 YR 2/1 from zero to sixteen inches. The Dorovan-Johnston association in addition to additional hydric soil series, associations and their properties are described in **Table 1**.

Table 1. Dominant Hydric Soils

Soil Series	Description	Locations	Slopes
Dorovan-Johnson muck	Very poorly drained	Depressions and Floodplains	None
Atmore fine sandy loam	Poorly drained	Depressions	0-2 %
Basin fine sandy loam	Somewhat poorly drained	Depressions	0-2 %
Susquehanna complex	Somewhat poorly drained	Depressions	2-17 %

3.2 Vegetation

Dominant vegetation species accounting for greater than 20% of vegetation present in each data plot were recorded for each of the following vertical strata: tree canopy or individual tree; sapling or shrub layer; herbaceous layer; and woody vine layer. Percent cover for each dominant species was determined by ocular estimation. Plant communities met hydrophytic vegetation criteria if greater than 50% of the dominant species from all strata were classified as obligate (OBL), facultative-wet (FACW), or facultative (FAC) species (USFWS 1988; NRCS 2008). The classification of the wetland types encountered within the study area are categorized as Bayhead Drains and Bottomland Hardwood habitats.

The forested wetland vegetative community contains a variety of dominant species. The canopy species include: slash pine (*Pinus elliottii*), sweetbay magnolia (*Magnolia virginiana*), red bay (*Persea palustris*), Atlantic white cedar (*Chamaecyparis thyoides*), titi (*Cyrilla racemiflora*), red maple (*Acer rubrum*), pond cypress (*Taxodium ascendens*), and swamp tupelo (*Nyssa sylvatica*). Florida anise-tree (*Illicium floridanum*), inkberry (*Ilex glabra*), gallberry (*Ilex coriacea*), wax myrtle (*Myrica cerifera*), dwarf palmetto (*Sabal minor*), switchcane (*Arundinaria gigantea*) and fetterbush (*Lyonia lucida*) dominate the subcanopy. Netted chain fern (*Woodwardia areolata*), royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomeum*), pale pitcher plant (*Sarracenia alata*), erect spade leaf (*Centella erecta*), foxtail clubmoss (*Lycopodiella alopecuroides*), lizard's-tail (*Saururus cernuus*) and golden club (*Orontium aquaticum*) dominated the herbaceous stratum. The dominant woody vine stratum consists of primarily laurel greenbriar (*Smilax laurifolia*) and blackberry (*Rubus argutus*).

The upland vegetative community contains forests dominated by planted pine with mixed hardwoods throughout. The overstory in the upland areas consists of longleaf pine (*Pinus palustris*), slash pine, loblolly pine (*Pinus taeda*), turkey oak (*Quercus laevis*), blackjack oak (*Quercus marilandica*), sweetgum (*Liquidambar styraciflua*), southern magnolia (*Magnolia grandifolia*) and water oak (*Quercus nigra*). The understory upland shrubs

consist of eastern baccharis (*Baccharis halimifolia*), wax myrtle, yaupon (*Ilex vomitoria*), gallberry, American beautyberry (*Callicarpa americana*), and saw palmetto (*Serenoa repens*). The herbaceous and woody-vine strata consists of wiregrass (*Aristida stricta*), bluestem (*Andropogon* spp.), muscadine (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), crossvine (*Bignonia capreolata*), and blackberry (*Rubus argutus*).

3.3 Hydrology

Hydrology criteria were assessed based on observation of primary and secondary field indicators. The hydrology criteria were met if one primary field indicator was observed or at least two secondary indicators were observed.

All potential wetlands mapped contained at least one primary indicator (surface water, drift lines, water-stained leaves, aquatic fauna, algal mats, sediment deposits, thin muck surface, and saturated in upper 12-inches) or two secondary indicators (drainage patterns, moss trim lines, saturation visible on aerial photography, and sparsely vegetated concave surface). Non-wet areas lacked primary hydrological indicators or contained only one secondary indicator.

The two proposed lakes would have direct impacts to jurisdictional wetlands and waters of the U.S. A summary of wetlands and waters of the U.S. impacts to both the upper and lower lakes is presented in **Tables 2-6**.

Table 2. Upper Lake Wetland Impacts

Feature	Size (acres)	Feature	Size (acres)
Forested Wetland 1	19.987	Forested Wetland 49	0.199
Forested Wetland 2	10.716	Forested Wetland 50	35.632
Forested Wetland 3	0.461	Forested Wetland 51	0.145
Forested Wetland 4	0.886	Forested Wetland 52	6.724
Forested Wetland 5	2.991	Forested Wetland 53	1.64
Forested Wetland 6	5.074	Forested Wetland 54	2.622
Forested Wetland 7	4.649	Forested Wetland 55	29.885
Forested Wetland 8	0.242	Forested Wetland 56	4.277
Forested Wetland 9	0.407	Forested Wetland 57	1.498
Forested Wetland 10	7.022	Forested Wetland 58	13.559
Forested Wetland 11	1.159	Forested Wetland 59	4.744
Forested Wetland 12	0.011	Forested Wetland 60	6.221
Forested Wetland 13	1.641	Forested Wetland 61	0.043
Forested Wetland 14	0.256	Forested Wetland 62	1.058
Forested Wetland 15	0.642	Forested Wetland 63	10.819

Forested Wetland 16	2.026	Forested Wetland 64	0.163
Forested Wetland 17	3.075	Forested Wetland 65	38.395
Forested Wetland 18	1.24	Forested Wetland 66	13.416
Forested Wetland 19	1.109	Forested Wetland 67	13.539
Forested Wetland 20	0.816	Forested Wetland 68	3.366
Forested Wetland 21	9.421	Forested Wetland 69	24.748
Forested Wetland 22	0.25	Forested Wetland 64	0.163
Forested Wetland 23	0.368	Forested Wetland 70	16.498
Forested Wetland 24	6.945	Forested Wetland 71	9.83
Forested Wetland 25	2.227	Forested Wetland 72	7.913
Forested Wetland 26	0.683	Forested Wetland 73	23.946
Forested Wetland 27	5.823	Forested Wetland 74	19.785
Forested Wetland 28	0.052	Forested Wetland 75	0.061
Forested Wetland 29	0.001	Forested Wetland 76	6.586
Forested Wetland 30	0.272	Forested Wetland 77	1.292
Forested Wetland 31	5.378	Forested Wetland 78	11.379
Forested Wetland 32	0.159	Forested Wetland 79	1.235
Forested Wetland 33	1.861	Forested Wetland 80	0.154
Forested Wetland 34	13.62	Forested Wetland 81	8.999
Forested Wetland 35	11.806	Forested Wetland 82	1.008
Forested Wetland 36	0.536	Forested Wetland 83	11.657
Forested Wetland 37	2.077	Forested Wetland 84	4.544
Forested Wetland 38	1.686	Forested Wetland 85	2.656
Forested Wetland 39	1.567	Forested Wetland 86	2.283
Forested Wetland 40	0.257	Forested Wetland 87	8.488
Forested Wetland 41	1.122	Forested Wetland 88	0.562
Forested Wetland 42	6.384	Forested Wetland 89	0.031
Forested Wetland 43	1.459	Forested Wetland 90	0.382
Forested Wetland 44	3.785	Forested Wetland 91	0.35
Forested Wetland 45	3.366	Forested Wetland 92	0.161
Forested Wetland 46	0.855	Scrub-Shrub Wetland 93	14.652
Forested Wetland 47	0.006	Scrub-Shrub Wetland 94	1.147
Forested Wetland 48	0.026		
		Forested Total	498.895
		Scrub-Shrub Total	15.799

Table 3. Lower Lake Wetland Impacts

Feature	Size (acres)	Feature	Size (acres)
Forested Wetland 1	0.007	Forested Wetland 52	5.379
Forested Wetland 2	16.941	Forested Wetland 53	38.978
Forested Wetland 3	6.671	Forested Wetland 54	0.531
Forested Wetland 4	41.068	Forested Wetland 55	0.006
Forested Wetland 5	1.566	Forested Wetland 56	0.003
Forested Wetland 6	1.445	Forested Wetland 57	1.554
Forested Wetland 7	5.905	Forested Wetland 58	0.529
Forested Wetland 8	29.013	Forested Wetland 59	15.723
Forested Wetland 9	1.117	Forested Wetland 60	1.836
Forested Wetland 10	2.048	Forested Wetland 61	0.369
Forested Wetland 11	0.345	Forested Wetland 62	13.973
Forested Wetland 12	1.594	Forested Wetland 63	0.004
Forested Wetland 13	0.087	Forested Wetland 64	1.422
Forested Wetland 14	0.685	Forested Wetland 65	12.888
Forested Wetland 15	1.923	Forested Wetland 66	13.939
Forested Wetland 16	2.163	Forested Wetland 67	0.246
Forested Wetland 17	0.918	Forested Wetland 68	42.197
Forested Wetland 18	0.253	Forested Wetland 69	0.086
Forested Wetland 19	0.068	Forested Wetland 70	12.053
Forested Wetland 20	0.382	Forested Wetland 71	4.903
Forested Wetland 21	2.09	Forested Wetland 72	15.087
Forested Wetland 22	35.345	Forested Wetland 73	42.49
Forested Wetland 23	0.031	Forested Wetland 74	96.203
Forested Wetland 24	0.007	Forested Wetland 75	8.645
Forested Wetland 25	0.008	Forested Wetland 76	6.125
Forested Wetland 26	0.04	Forested Wetland 77	8.24
Forested Wetland 27	0.206	Forested Wetland 78	2.277
Forested Wetland 28	0.459	Forested Wetland 79	5.251
Forested Wetland 29	5.318	Forested Wetland 80	0.34
Forested Wetland 30	0.001	Forested Wetland 81	0.192
Forested Wetland 31	0.047	Forested Wetland 82	38.992
Forested Wetland 32	0.49	Forested Wetland 83	0.364
Forested Wetland 33	0.109	Forested Wetland 84	0.085

Forested Wetland 34	1.08	Forested Wetland 85	0.669
Forested Wetland 35	3.273	Forested Wetland 86	0.168
Forested Wetland 36	17.979	Scrub-Shrub Wetland 87	0.909
Forested Wetland 37	3.451	Scrub-Shrub Wetland 88	0.005
Forested Wetland 38	3.199	Scrub-Shrub Wetland 89	0.751
Forested Wetland 39	1.15	Scrub-Shrub Wetland 90	5.289
Forested Wetland 40	0.03	Scrub-Shrub Wetland 91	1.013
Forested Wetland 41	0.46	Scrub-Shrub Wetland 92	19.058
Forested Wetland 42	0.037	Scrub-Shrub Wetland 93	6.761
Forested Wetland 43	40.987	Scrub-Shrub Wetland 94	0.042
Forested Wetland 44	0.004	Herbaceous Wetland 95	8.811
Forested Wetland 45	2.077	Herbaceous Wetland 96	0.621
Forested Wetland 46	0.288	Herbaceous Wetland 97	0.224
Forested Wetland 47	1.694	Herbaceous Wetland 98	0.237
Forested Wetland 48	2.297	Herbaceous Wetland 99	8.811
Forested Wetland 49	2.462	Herbaceous Wetland 100	0.237
Forested Wetland 50	2.107	Herbaceous Wetland 101	0.237
Forested Wetland 51	1.325		
		Forested Total	633.997
		Scrub-Shrub Total	33.828
		Herbaceous Total	19.178

Table 4. Upper Lake Stream Impacts

Feature	Length (linear feet)	Feature	Length (linear feet)
Intermittent Stream 1	8,579.802	Ephemeral Stream 25	459.681
Intermittent Stream 2	514.045	Ephemeral Stream 26	490.215
Intermittent Stream 3	12,462.434	Ephemeral Stream 27	465.173
Intermittent Stream 4	4,320.318	Ephemeral Stream 28	737.904
Intermittent Stream 5	2,102.555	Ephemeral Stream 29	758.378
Intermittent Stream 6	1,848.841	Ephemeral Stream 30	528.776
Intermittent Stream 7	4,838.585	Ephemeral Stream 31	658.503
Intermittent Stream 8	6,700.913	Ephemeral Stream 32	840.067
Intermittent Stream 9	7,528.971	Ephemeral Stream 33	575.997
Intermittent Stream 10	2.885.21	Ephemeral Stream 34	594.616

Intermittent Stream 11	1996.872	Ephemeral Stream 35	467.689
Intermittent Stream 12	2,330.355	Ephemeral Stream 36	362.101
Intermittent Stream 13	1,664.268	Ephemeral Stream 37	613.187
Intermittent Stream 14	704.863	Ephemeral Stream 38	727.961
Intermittent Stream 15	524.819	Ephemeral Stream 39	281.308
Intermittent Stream 16	496.078	Ephemeral Stream 40	489.431
Ephemeral Stream 17	614.32	Ephemeral Stream 41	962.173
Ephemeral Stream 18	621.748	Ephemeral Stream 42	1,078.621
Ephemeral Stream 19	495.56	Ephemeral Stream 43	1,213.868
Ephemeral Stream 20	702.67	Ephemeral Stream 44	775.309
Ephemeral Stream 21	550.133	Ephemeral Stream 45	1,004.132
Ephemeral Stream 22	494.773	Ephemeral Stream 46	502.941
Ephemeral Stream 23	531.219	Ephemeral Stream 47	561.986
Ephemeral Stream 24	359.519	Ephemeral Stream 48	4,707.415
		Perennial Stream 49	39,363.558
		Intermittent Total	59,002.85
		Ephemeral Total	24,227.38
		Perennial Total	39,363.56

Table. 5 Lower Lake Stream Impacts

Feature	Length (linear feet)	Feature	Length (linear feet)
Intermittent Stream 1	959.965	Ephemeral Stream 24	1,228.477
Intermittent Stream 2	3,557.53	Ephemeral Stream 25	251.784
Intermittent Stream 3	2,179.039	Ephemeral Stream 26	289.749
Intermittent Stream 4	694.266	Ephemeral Stream 27	517.426
Intermittent Stream 5	1,056.867	Ephemeral Stream 28	276.075
Intermittent Stream 6	2,269.335	Ephemeral Stream 29	814.731
Intermittent Stream 7	764.202	Ephemeral Stream 30	469.454
Intermittent Stream 8	1,597.057	Ephemeral Stream 31	621.105
Intermittent Stream 9	1,261.686	Ephemeral Stream 32	196.089
Intermittent Stream 10	1,732.719	Ephemeral Stream 33	482.244
Intermittent Stream 11	2,091.199	Ephemeral Stream 34	598.318
Intermittent Stream 12	1,918.775	Ephemeral Stream 35	536.22
Intermittent Stream 13	1,484.043	Ephemeral Stream 36	204.249
Intermittent Stream 14	1,049.758	Ephemeral Stream 37	251.869

Intermittent Stream 15	252.608	Ephemeral Stream 38	114.579
Intermittent Stream 16	1,322.439	Ephemeral Stream 39	211.549
Ephemeral Stream 17	1,029.414	Ephemeral Stream 40	870.585
Ephemeral Stream 18	1,152.39	Ephemeral Stream 41	451.527
Ephemeral Stream 19	1,360.489	Ephemeral Stream 42	273.176
Ephemeral Stream 20	1,059.451	Perennial Stream 43	32,218.190
Ephemeral Stream 21	40.877	Perennial Stream 44	12,710.211
Ephemeral Stream 22	873.79	Perennial Stream 45	13,299.747
Ephemeral Stream 23	545.503		
		Intermittent Total	22,869.87
		Ephemeral Total	14,721.12
		Perennial Total	59,321.85

Table 6. Upper Lake Open Water Impacts

Feature	Type	Surface Area (acres)
Open Water A	Pond	2.719
Open Water B	Pond	12.028
Open Water C	Pond	3.629
Open Water D	Pond	2.208
Open Water E	Pond	0.354
		Total = 20.938

Table 7. Lower Lake Open Water Impacts

Feature	Type	Surface Area (acres)
Open Water A	Pond	0.375
Open Water B	Pond	0.194
Open Water C	Pond	0.937
Open Water D	Pond	0.137
Open Water E	Pond	2.192
		Total = 3.84

4.0 THREATENED AND ENDANGERED SPECIES FINDINGS

Concurrent with the “waters of the U.S.” jurisdictional determination, Pickering conducted a threatened and endangered species survey of the study area. The survey consisted of a literature review and an onsite investigation to assess the potential for occurrences of federally listed species. The following is a list of species known to occur in George and Jackson Counties of Mississippi.

Species	Listed Category	Habitat	Potential for Occurrence
Alabama red-bellied turtle (<i>Pseudemys alabamensis</i>)	Endangered	Typically inhabit broad, vegetated expanses of shallow water 1-2 meters in depth in backwater areas of bays and in and along rivers	Low
Black pinesnake (<i>Pituophis melanoleucus lodingi</i>) ssp.	Candidate	Upland, sandy areas with long-leaf pine overstory, a fire suppressed midstory, and dense herbaceous cover	Moderate
Dusky gopher frog (<i>Rana sevosa</i>)	Endangered	Upland, sandy areas covered with long-leaf pine forest; and isolated temporary, wetland breeding sites within the forest landscape, usually in association with gopher tortoise.	Low
Gopher tortoise (<i>Gopherus polyphemus</i>)	Threatened	Well drained sandy soils associated with pine overstory and open understory with grass and forb groundcover.	Observed
Green sea turtle (<i>Chelonia mydas</i>)	Threatened	Primarily use ocean beaches for nesting, convergence zones in the open ocean and benthic feeding grounds in coastal areas.	Unlikely
Gulf sturgeon (<i>Acipenser oxyrichus desotoi</i>)	Threatened	Inland habitat during the warmer months includes rivers and moderate currents and sand and rocky bottoms.	Low
Kemp’s ridley sea turtle (<i>Lepidochelys kempii</i>)	Endangered	Usually found in the Gulf of Mexico. Post pelagic stages are found dwelling over crab-rich sandy or muddy bottoms. Juveniles frequent bays, coastal lagoons, and river mouths.	Unlikely

Leatherback sea turtle (<i>Dermochelys comacea</i>)	Endangered	Use ocean beaches for nesting, open ocean and benthic feeding grounds in coastal areas.	Unlikely
Louisiana black bear (<i>Ursus americanus luteolus</i>)	Threatened	Large, remote tracts of land providing food, water, and denning sites.	Low
Louisiana quillwort (<i>Isoetes louisianensis</i>)	Endangered	Sand and gravel bars on small to medium-sized streams.	Moderate
Loggerhead turtle (<i>Caretta caretta</i>)	Threatened	Nests on beaches and occasionally on estuarine shorelines with suitable sand.	Unlikely
Mississippi sandhill crane (<i>Grus Canadensis pulla</i>)	Endangered	Inhabits coastal pine savannahs as well as associated bayhead swamps.	Low
Pearl darter (<i>Percina aurora</i>)	Candidate	Known to occur in rapids or riffles over gravel or bedrock in slow or moderate currents.	Low
Piping plover (<i>Charadrius melodus</i>)	Threatened	Nest along sandy beaches in sparsely vegetated areas slightly raised in elevation. Primarily coastal in the winter preferring expansive mud flats in close proximity to a sandy beach.	Low
Red Knot (<i>Calidris canutus rufa</i>)	Proposed Threatened	Known to forage along sandy beaches, tidal mud flats, reefs, and other sites protected from high tide.	Low
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Endangered	Open pine woodlands and savannahs with large mature pines for nesting	Low
West Indian manatee (<i>Trichechus manatus</i>)	Endangered	Utilize freshwater, brackish, and marine habitats.	Unlikely
Yellow-blotched map turtle (<i>Graptemys flavimaculata</i>)	Threatened	Inhabits river stretches with moderate currents, abundant basking sites, and sand bars.	Low

The onsite survey of the potentially suitable habitats was conducted to determine the presence/absence of any federally-listed species. Species of most concern during our survey were the gopher tortoise (*Gopherus polyphemus*), black pinesnake (*Pituophis melanoleucus* spp. *lodingi*), yellow-blotched map turtle (*Graptemys flavimaculata*), and Louisiana quillwort (*Isoetes louisianensis*).

Pickering's assessment of portions of the study area for the "threatened" gopher tortoise occurrences included an assessment of the possible suitable habitat located onsite. This includes the upland ecological communities of the Pine Plantation. The natural longleaf pine community and its associated biological diversity represent optimal forest habitat for the gopher tortoise (USFWS, 1990). This community occurred in pure stands, constantly trending toward small even-aged groups of a few hundred square feet (Chapman 1909). The USFWS maintains a list of soils determined to be suitable soils for the potential occurrences of gopher tortoises. The list is divided into three categories of soils based on gopher tortoise preference including priority, suitable, and marginal soils. Multiple preferred soil types were identified within the study area and are depicted on **Figure 11**.

Pickering's findings indicate the Pine Plantation areas occurring within the upper lake footprint have been managed for long-leaf pine forest. Evidence of prescribed burning was observed in uplands adjacent to the study area boundaries. Portions of the areas were surveyed and individual species of gopher tortoise including their burrows were identified. The burrows were documented and recorded using GPS equipment and are depicted on **Figure 12**.

The black pinesnake is listed as a "candidate" species that prefers upland areas with well-drained sandy soils in areas of long-leaf pine and hardwood tree species. Its range is approximate to that of the gopher tortoise. "Candidates" are those species currently under review for possible addition to the federal listing of threatened and endangered species. No individuals or sign of the black pinesnake was observed during this assessment.

The "threatened" yellow-blotched map turtle is found in the Chickasawhay, Leaf, and Pascagoula Rivers. Members of the genus *Graptemys* are highly aquatic turtles that often inhabit rivers with moderate flow rates, high density of deadwood snags (Lindeman 1998, 1999), and width enough to provide an open canopy to allow ample opportunities for aerial basking. (Selman and Qualls, 2009) Pickering's assessment revealed a low potential for occurrence due to the lack of sand bars and basking sites observed along the streams within the study area. No individuals or sign of the yellow-blotched map turtle was observed during this assessment.

Pickering's assessment of portions of the study area for the "endangered" Louisiana quillwort consisted of reviews of suitable habitat including sandy areas in or near stream channels found within the review area. Though suitable habitat was observed, no Louisiana quillwort populations were identified during this assessment.

5.0 CONCLUSIONS

The jurisdictional delineation of "waters of the U.S." revealed 1,201.697 acres of potential jurisdictional wetlands, 219,506.63 combined linear feet of ephemeral, intermittent, and perennial stream channels, and 24.77 acres of open water. These potentially jurisdictional

features were observed within the Small Stream Swamp Forests, Bottomland Hardwood, and Slash Pine Flatwood habitats on the lake footprints.

Eighteen federally protected or candidate species are known to occur within George County and/or Jackson County of Mississippi. Of those eighteen protected and candidate species, the gopher tortoise was observed.

6.0 LIMITATIONS

It should be noted that potential wetland/non-wetland mosaics were encountered within portions of the lower lake footprint. These mosaics are located in the large floodplain area of Big Cedar Creek. The area was observed with numerous swales and depressions with slight changes in elevation over short distances. According to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)*; the delineation procedure for these mosaic features involves establishing and measuring transects or point-intercept sampling at fixed intervals along transects across the area. These procedures can be extremely time consuming. Given the magnitude of the study area and the time frame in which to complete the work, Pickering utilized an abundance of available data such as soils maps, NWI maps, GIS tools, and topographic maps in conjunction with typical on-site investigation procedures to delineate these features.

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