DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO ATTENTION OF:
Regional Planning and Environmental Division North
Environmental Compliance Section (CEMVP-PD-C)

30 June 2020

Reply to:

Regional Planning and Environmental Division North
Environmental Compliance Section (PD-C)

Dear Sir or Madam:

The St. Louis District of the U.S. Army Corps of Engineers (USACE) has prepared a draft Environmental Assessment (EA) with unsigned Finding of No Significant Impact (FONSI) to evaluate the potential impacts associated with the Proposed Action involving erosion protection of an island containing culturally sensitive material which becomes exposed during low water within the South Fork Branch of Mark Twain Lake in Monroe County, Missouri.

Under the National Environmental Policy Act of 1969, as amended, the St. Louis District is distributing this letter to notify concerned agencies, interest groups, and individuals of the Proposed Action and to solicit comments from those persons or entities who may be interested in or affected by the project. The FONSI is unsigned and will only be signed after comments received as a result of this public review have been considered. The electronic version of the draft EA and unsigned FONSI are available on the USACE St. Louis District website at:

https://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/DraftEAMTLSouthForkIslandErosionProtection.pdf

The purpose of the Proposed Action is to implement a permanent protection strategy that would shield culturally sensitive material on an eroding island from further exposure and disturbance. The Proposed Action is needed because wind and boat induced wave action and fluctuating lake levels act to increase the erosional process and cause disturbance. Additionally, the island has been at least minimally exposed every year since inundation, leading to further loss of island material with each event. The Proposed Action Area includes all proposed work areas such as the existing access road, the new stone haul road and staging areas, as well as the area of protection on and around the eroding island. The FONSI summarizes the anticipated effects of the action on the environment, and is unsigned. The FONSI will be signed into effect only after comments received as a result of this public review have been carefully considered. A signed FONSI is required before implementation of the action can occur.

Please provide any comments you may have regarding this project. For questions or comments, please contact: Dr. Teri Allen of the Environmental Compliance Section, **telephone** 314-331-8084, or **e-mail** at Teri.C.Allen@usace.army.mil. Written comments may be sent to the address below, ATTN:

Environmental and Planning Section (PD-C, Allen). **In order to have your comments considered prior to a final decision being made, please ensure that your comments are *received* by this office by close of business on Thursday, 30 July 2020.**

Address:
U.S. Army Corps of Engineers
Regional Planning and Environmental Division North
ATTN: Dr. Teri Allen
Environmental Compliance Section (CEMVP-PD-C)
1222 Spruce Street
St. Louis, Missouri 63103-2833

Sincerely,

Brian L. Johnson
Chief, Environmental Compliance Branch

DRAFT ENVIRONMENTAL ASSESSMENT
WITH
FINDING OF NO SIGNIFICANT IMPACT

Mark Twain Lake South Fork Island Erosion Protection Project
Monroe County, Missouri

June 2020

US Army Corps of Engineers ®
St. Louis District

U.S. Army Corps of Engineers, St. Louis District
Regional Planning and Environmental Division North
Environmental Compliance Section
CEMVP-PD-C
1222 Spruce Street
St. Louis, Missouri 63103-2833

Table of Contents

1 INTRODUCTION

The St. Louis District of the U.S. Army Corps of Engineers (USACE) has prepared this Environmental Assessment (EA) to evaluate the potential impacts associated with the Proposed Action involving erosion protection of an island containing culturally sensitive material which becomes exposed during low water within the South Fork Branch of Mark Twain Lake; as well as construction of a haul road and staging areas on Mark Twain Lake property. The Proposed Action Area is located in Monroe County, Missouri.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations §1500-1508, as reflected in the USACE Engineering Regulation 200-2-2. Impacts on relevant environmental resources are discussed in this EA and summarized in the Finding of No Significant Impact (FONSI).

1.1 Project Location

Clarence Cannon Dam and Mark Twain Lake are located on the Salt River in northeastern Missouri, generally in Monroe and Ralls Counties. The main dam site is located in Ralls County at mile 63.0 on the Salt River, approximately 12 miles southeast of Monroe City, Missouri. The Mark Twain Lake Watershed is comprised of 2,318 square miles with an additional 29 square miles draining into the re-regulation pool (Figure 1). The North Fork of the Salt River is the major drainage channel, draining 626 square miles and is 88.0 miles in length. The Middle Fork, Elk Fork and South Fork of the Salt River are the other major tributaries to Mark Twain Lake. The Middle Fork drains 356 square miles and is 65.4 miles in length. The Elk Fork drains 262 square miles and is 34.8 miles in length. The South Fork drains 298 square miles and is 38.0 miles in length. Many smaller streams also enter the reservoir above the main dam site creating a very irregular shoreline of approximately 285 miles. Mark Twain Lake covers approximately 18,600 acres at normal summer pool elevation (606 ft NGVD). The Lake's missions include flood risk management, hydropower, water supply, environmental stewardship, recreation, and incidental navigation. The Proposed Action Area is located in the South Fork Branch of Mark Twain Lake, on the southern portion of the Lake approximately 8 miles west of Perry, MO (Figure 2).

1.2 Purpose and Need of the Proposed Action

The purpose of the Proposed Action is to implement a permanent protection strategy that would shield the culturally sensitive material on the eroding island from further exposure and disturbance. The Proposed Action is needed because wind and boat induced wave action and fluctuating lake levels act to increase the erosional process and cause disturbance. Additionally, the island has been at least minimally exposed every year since inundation, leading to further loss of island material with each event. The Proposed Action Area includes all proposed work areas such as the existing access road, the new stone haul road and staging areas, as well as the area of protection on and around the eroding island.

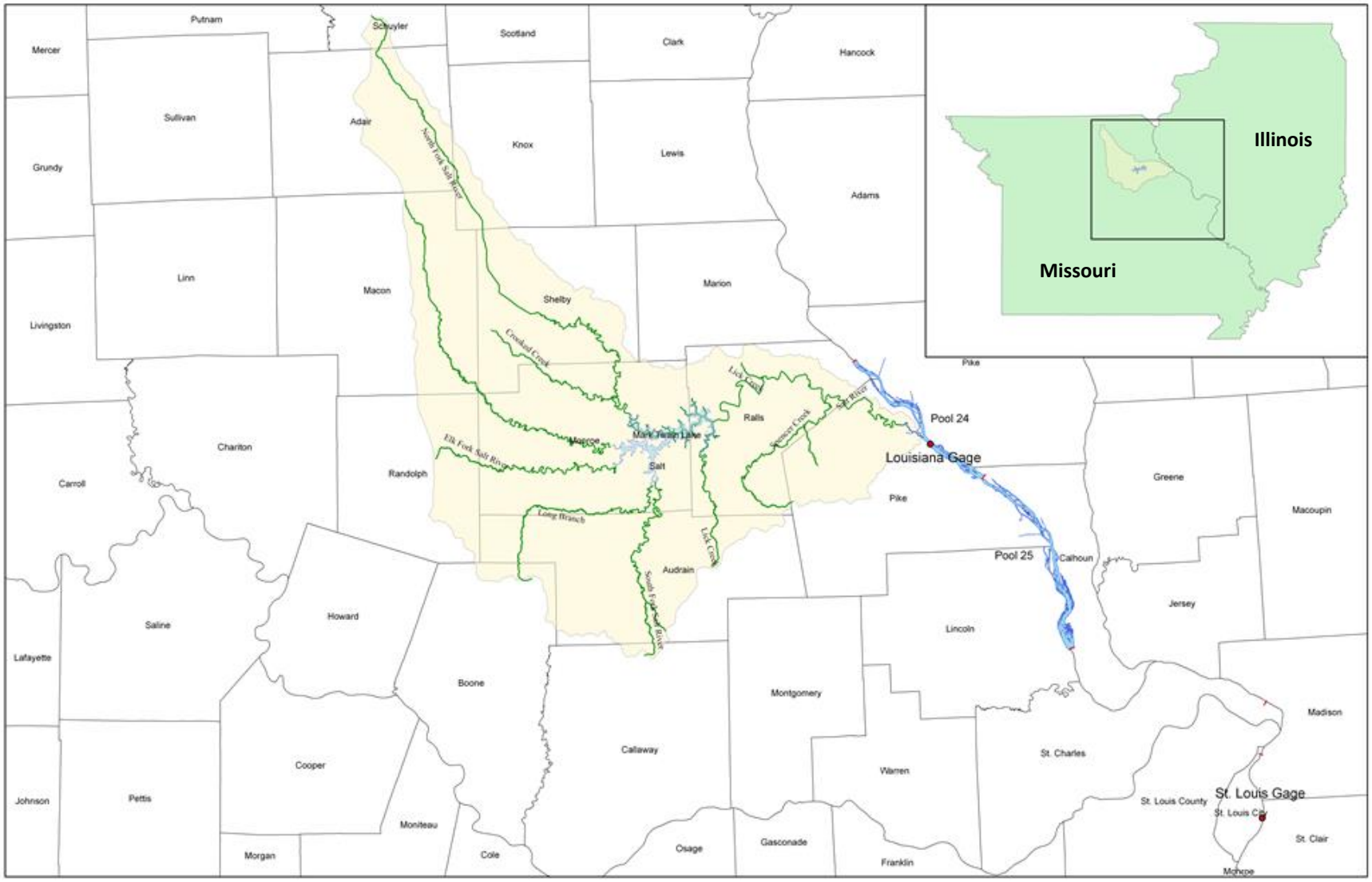

Figure 1. Illustration of the Mark Twain Lake Watershed, and the location of Mark Twain Lake in Monroe and Ralls Counties, Missouri.

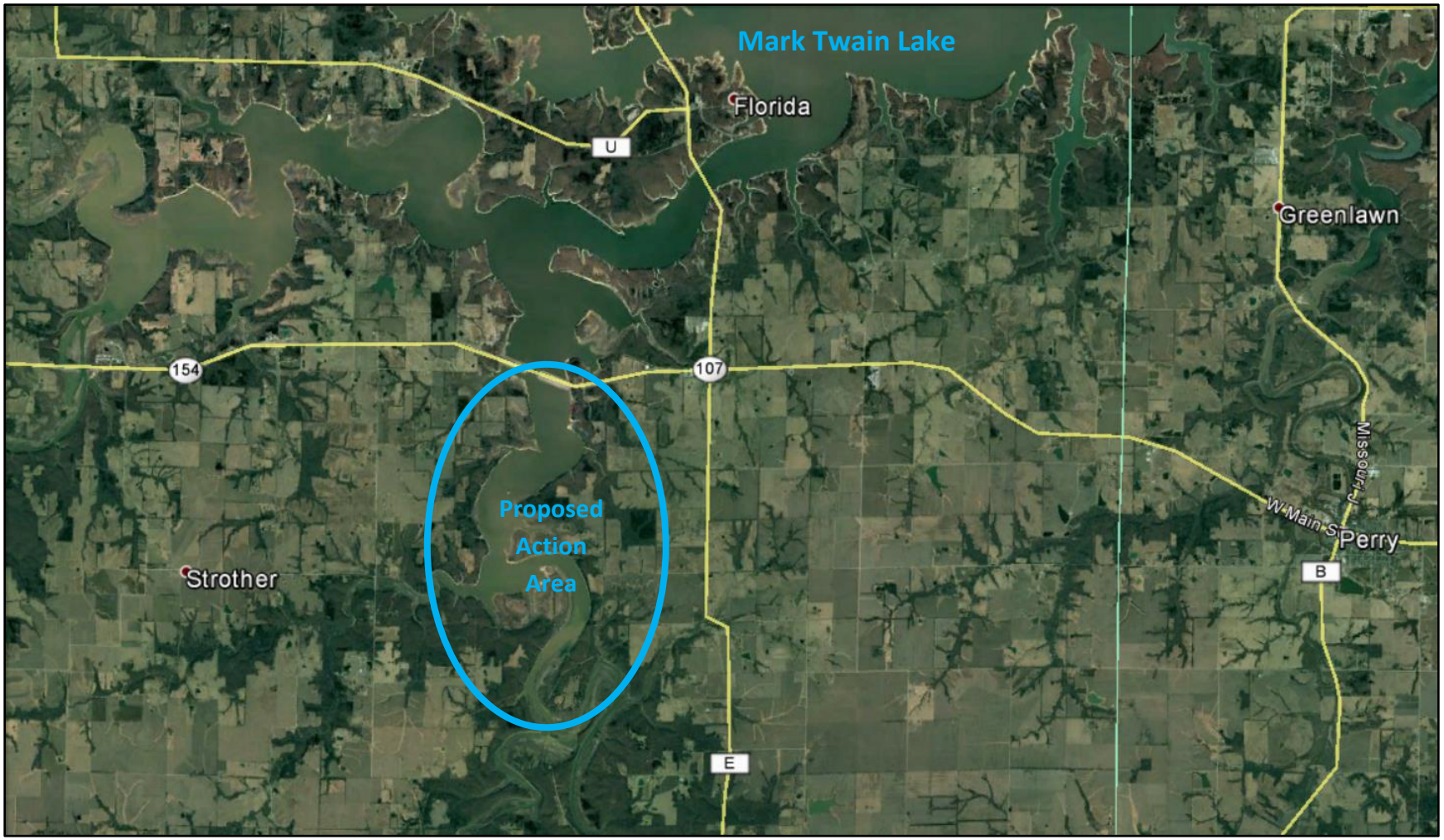

Figure 2. Approximate location of the Proposed Action Area located within the South Fork of Mark Twain Lake in Monroe County, Missouri.

1.3 Authority

Mark Twain Lake was authorized by the Flood Control Act of 1938 and modified by the Flood Control Act of 1962 based on the Chief of Engineer's recommendations presented in House Document No. 507, Eighty-seventh Congress, 2nd Session. The authorized purposes of the project include flood control in the lower Salt and Mississippi Rivers, hydroelectric power generation, water supply, fish and wildlife conservation, recreation, and incidental benefits to navigation.

2 ALTERNATIVES CONSIDERED

This section of the EA describes the alternatives considered, and compares the alternatives in terms of their potential effects on the quality of the human environment (natural/physical, social, cultural, economic) and their achievement of project objectives.

2.1 Alternative 1 – Concrete Cloth/Blanket Over the Island Site

Under Alternative 1 – Concrete Cloth/Blanket over the Island Site, a thin concrete cloth/blanket consisting of flexible, cement impregnated geocomposite material that hardens when hydrated, would be rolled over the island site and anchored in place. Before hydration, the cloth conforms to the contours of the underlying sub grade. Once hydrated, the cloth forms into a thin, durable, waterproof concrete layer that protects the subgrade from erosion and/or scour. This alternative would require the excavation of a trench around the island perimeter and potential placement of riprap along the perimeter. All material would be brought to the island by floating plant.

2.2 Alternative 2 – Concrete Grout Fillable Mattress Over the Island Site

Under Alternative 2 – Concrete Grout Fillable Mattress over the Island Site, revetment mattresses consisting of erosion-resistant concrete linings made from durable, permeable fabric forms would be anchored in place and filled with high-strength grout to protect the site from additional erosion. Grouted-in-place fabric forms adapt to uneven contours, curves, and subgrades as they are filled. This alternative could potentially require riprap around perimeter of blankets or mattresses to prevent erosion. The installation would require a haul road and/or floating plant to furnish grout within proximity to the site to pump into the fillable fabric forms.

2.3 Alternative 3 – Aggregate and Riprap Over the Island Site

Under Alternative 3 – Aggregate and Riprap over the Island Site , a uniform 6-12-inch thick layer of 3-inch riprap bedding would be placed over the island site, and capped with a layer of 650 lb. top size riprap stone approximately 3-foot thick. The installation would require construction of a stone access road to haul stone, staging and stone loading areas, as well as positioning of a floating plant within proximity to the island site to place the stone.

2.4 Alternative 4 – No Action Alternative (Future without Proposed Action)

NEPA requires that a "No Action" Alternative be addressed to provide a baseline or reference against which to describe environmental effects of the Proposed Action alternative(s). The "No Action" alternative assumes that the Proposed Action would not be realized. Under this scenario, the USACE would continue to perform its monitoring activities on USACE property, but no new federal action regarding island erosion protection in the Proposed Action Area would be taken in the foreseeable future.

2.5 Evaluation and Comparison of Alternatives

Table 1 summarizes the features and impacts of the alternatives considered. Considerations for site protection alternative selection included:

- Avoiding or minimizing any cultural or biological impacts
- Maximizing the effectiveness and permanence of the erosion control method
- Estimated construction and Operation and Maintenance (O&M) Costs
- Effectiveness, Efficiency, Completeness, Acceptability

Table 1. Evaluation and Comparison of Alternatives: Cultural Impacts, Biological Impacts, Estimated Permanence of Erosion Control Method, and Estimated Construction and Maintenance Costs.

Alternatives	Cultural and Tribal Impacts (Acceptability)	Biological Impacts (Acceptability)	Estimated Permanence for this Application (Effectiveness; Completeness)	Estimated Construction Cost	Estimated Annual O&M Cost	Total Estimated Construction and O&M Cost over 50 Year Project Life* (Efficiency)	Further Evaluation
Alternative 1 – Concrete Cloth/Blanket	High Tribal opposition	Smothers benthic invertebrates	< 25 Years	$3,900,000	$15,000	$4,650,000	No
Alternative 2 – Concrete Grout Fillable Mattress	High Tribal opposition	Smothers benthic invertebrates; tree removal	≤ 50 Years	$3,500,000	$500	$3,525,000	No
Alternative 3 – Aggregate and Riprap	Low Tribal opposition	Smothers benthic invertebrates; tree removal	> 50 years	$4,000,000	$500	$4,025,000	Yes
Alternative 4 – No Action	High Tribal opposition	Continued island erosion	0	$0	$5000	$250,000	Yes

*This does not include cost of engineering design.

2.6 Alternatives Considered but Eliminated from Further Evaluation

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Possible reasons to eliminate a suggested alternative from detailed study include failure to adequately meet the purpose and need, illegality, technologically infeasible, does not avoid significant environmental (physical, cultural, social, biological) impacts, cannot be implemented, or remote or speculative.

Alternative 1 – Concrete Cloth/Blanket, and Alternative 2 – Concrete Grout Fillable Mattress, were investigated but were eliminated from detailed study due to:

- Alternatives were likely to result in significant impacts to culturally sensitive materials due to the installation of anchoring systems to hold the protection material in place, island grading, and the need to dig a trench around the site perimeter. Further disturbance of culturally sensitive material was opposed by Native American tribes.
- The Purpose and Need of the project to provide long-lasting protection to the site was not met.
- Material, O&M, and engineering costs for each of the Alternatives was estimated to equal or exceed that of Alternative 3 – Aggregate and Riprap.

2.7 Alternatives Carried Forward for Additional Evaluation

Alternative 3 – Aggregate and Riprap over the Island Site, and Alternative 4 – No Action (Future without Proposed Action) were carried forward for detailed evaluation.

2.8 Tentatively Selected Plan

Based on the evaluation and comparison of Alternatives in Chapters 3 and 4, the Tentatively Selected Plan for the Proposed Action is Alternative 3 - Aggregate and Riprap over the Island Site. The proposed construction method for the stone haul road, staging areas, and protection of the culturally sensitive material on the eroding island are described below.

2.8.1 Access Roads and Staging Areas

South Fork Recreation Area Access Road – Hauling and transport of stone materials during construction would occur between HWY 154 and the shoreline of Mark Twain Lake. A portion of an existing paved roadway approximately 850 linear feet from point of entry off of HWY 154 would lead to an upper stone access road to be constructed through a forested area. An 18-inch diameter by 40-foot long corrugated metal pipe culvert would be installed along the South Fork paved roadway ditch line under the proposed stone access road connection to ensure continuous drainage along the ditch line. Upon completion of hauling operations and demobilization of equipment associated with floating plant operations, degradation of the paved roadway would be evaluated by USACE, and the contractor would be responsible for repairing the roadway to the satisfaction of USACE. Repairs may include but are not limited to the following activities: replacement of two 18 inch diameter culverts located under the paved

roadway; roadway repairs including milling and removal of road surface, sub-base, and turf shoulders; and installation of aggregate sub-base and pavement to original width, and installation of 1 foot wide aggregate shoulders on each side of the road (Figure 3).

Stone Access Road – An access road, approximately 1200 feet in length, would need to be developed to provide access from the South Fork Recreation Area Access Road to the shoreline. The road would pass through an upland immature hardwood oak/hickory forest. A corridor of 50-100 feet in width was surveyed for cultural and environmental resources (Figure 3). Trees removal would be limited to a 50-foot corridor centered on the proposed centerline of the stone access road within the surveyed area. The stone access road would not exceed 20 feet in width and would be constructed of aggregate of a thickness required to ensure a stable surface for hauling and transport of stone materials during construction of access roads and floating plant operations. It is anticipated that two or three corrugated metal culverts would need to be installed to accommodate positive drainage under the road surface. The road would be maintained by grading as required to ensure transportation of stone hauling is not hindered. The Stone Access Road would remain in place upon completion of the proposed project, and an access gate would be installed near the transition of the Stone Access Road to the South Fork Recreation Area paved access road.

Upper Staging Area – The area proposed to be used as an upper storage area is a former farmstead, characterized as a late succession open land, and is approximately 1.8 acres in size. The area was surveyed for cultural and environmental resources. The proposed Upper Staging Area Access Road would run through the Upper Staging Area, and it is anticipated that vegetative removal and site grading would be necessary to accommodate the storage and maintenance of equipment and materials, the operation of heavy equipment, and truck maneuverability. Within the limits of the Upper Staging Area, installation of aggregate of a thickness required to ensure stability of equipment, would occur (Figure 3).

Lower Staging Area – The Lower Staging Area would be constructed just above elevation 606 National Geodetic Vertical Datum (NGVD), which is the ordinary high water elevation of Mark Twain Lake, and would be approximately 1.6 acres in size. This area would have stone placed along 400-feet of shoreline as an operational area to ensure stability of equipment and for the transfer and loading of stone materials onto the floating plant for transfer to the island. If water levels remain too low during the construction period then USACE would determine if it is necessary to place rock below the 606 NGVD elevation. Placement of stone for any purpose would not be permitted below an elevation of 601 NGVD. The approximate location of the proposed Lower Staging Area is shown in Figure 3. Upon completion of loading operations, all stone platforms would be graded out to provide for a uniform thickness of shoreline stone protection within the Lower Staging Area construction limits.

2.8.2 Floating Plant

A Floating Plant would be utilized for the placement of the stone onto the island site and would be provided by a contractor who would be required to transport it to Mark Twain Lake and assembling it onsite. The Contractor would utilize the South Fork Recreation Area boat ramp for launching of the floating plant. All equipment would be loaded on the floating plant from the Lower Staging Area as shown

in Figure 3. The floating plant utilized for placement of island stone protection would not be permitted to set spuds or utilize anchoring systems on the island within the 602 FT NGVD perimeter of the island. All spuds would be set, placed, or installed lower than the 602 FT NGVD perimeter of the island to avoid impacting culturally sensitive material (Figure 4). Additionally, material barges transporting stone should be tied off to equipment barges supporting cranes or excavators that are spudded and utilized for placement of stone; thereby limiting the use of spuds and anchors required. Furthermore, due to culturally sensitive aspects of this project, the amount of spudding and/or the frequency of re-spudding would be minimized to the extent practicable. GPS coordinates of all locations in which spuds are placed and penetrate the lake bed would be recorded.

2.8.3 Island Site Protection

Placement of stone protection over the eroding island site would be installed in layers as follows: a 6 to 12-inches thick protection layer comprised of 3-inch riprap bedding would be uniformly deposited across the surface area of the island at 602 FT NGVD and above. The bedding riprap would then be topped with a 3-foot thick layer of 650 lb top size riprap. All stone would be placed via clamshell or excavator. Excavator buckets or clamshells would be lowered to a height of no more than 3-feet above the placement location prior to releasing stone to prevent damage to culturally sensitive material. Stone protection installation would not be allowed by means of dragging or pushing from the floating plant. The approximate island surface area to receive stone protection is two (2) acres. The highest point on island is approximately 606.5 FT NGVD (Figure 4).

The optimal lake elevation to allow contractors to install stone via floating plant would be at lake elevations ranging between 608 to 615 NGVD. Since the Mark Twain Lake is a hydropower Lake, the lake elevations would require coordination with USACE Water Control and the Southwestern Power Administration (SWPA). The schedule for accomplishing the work would be dependent on the capability to achieve required lake elevations allowing access by the floating plant to the island site. Placement of stone protection on the island is anticipated to take approximately 90 calendar days.

Figure 3. Illustration of Areas Surveyed for Cultural and Environmental Resources for the Proposed Access Roads, Staging Areas, and Floating Plant Launch Area at South Fork Branch of Mark Twain Lake. Areas within the surveyed locations have the potential to be disturbed by construction activities.

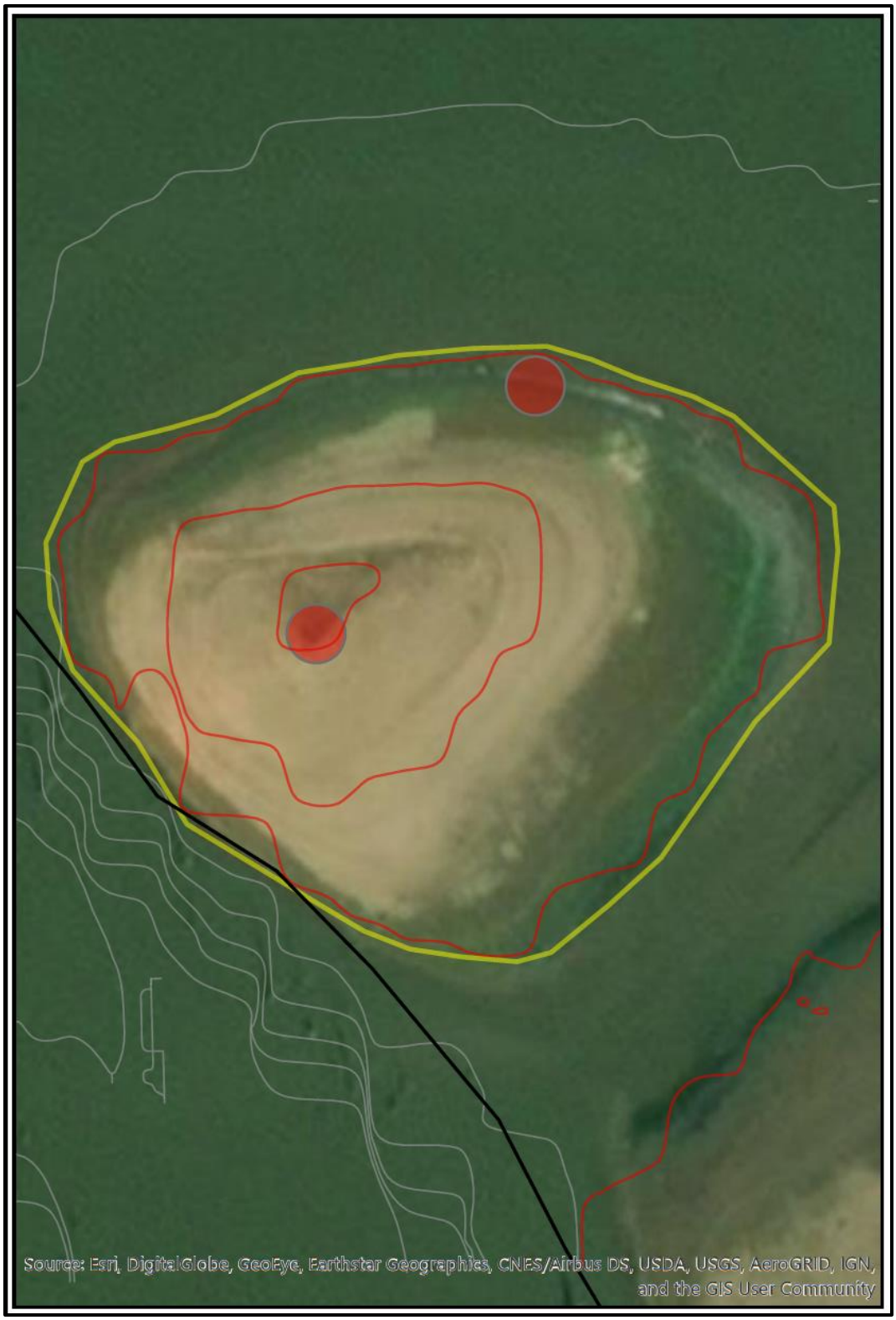

Figure 4. Illustration of island site showing area of protection encircled by yellow line. Red contour lines indicate elevations at 602 FT NGVD and above.

3 DESCRIPTION OF THE EXISTING ENVIRONMENT

This section describes the relevant existing biological, physical, economic, and social conditions in the Proposed Action Area, which are referred to under the NEPA process as the Affected Environment. The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

Numerous site visits were conducted between 2017 and 2020 in order to examine cultural and environmental resources and determine potential impacts that may result from the Proposed Action.

3.1 Topography, Geology, and Soils

The Mark Twain Lake watershed is a gently undulating plain in the upstream portion and it becomes more rolling and hilly in the downstream reaches. High rock bluffs border the streams at various locations. The river valleys are characterized by fairly narrow, tortuous courses interspersed by areas of widened bottomlands.

The topography at Mark Twain Lake reaches a maximum elevation of about 780 feet NGVD in the southwestern portion of the project to a minimum of approximately 520 feet NGVD along the main stream of the Salt River. The North Fork, Middle Fork, Elk Fork and South Fork are the main tributaries of the Salt River within the project boundaries and have a maximum elevation of 675 feet NGVD in the western part of the project. The sides of the major valleys are dissected by short tributaries whose gradients extend from the flat uplands to the valley bottoms. The divides between these tributaries form a continuous belt of hills along either side of the major valleys. The land adjoining the lake boundaries is relatively flat farmland.

The predominant geologic structure controlling the local dip of rock strata at the project is the Lincoln Fold, a complex plunging asymmetrical anticline located in northeast Missouri. The project area is located in the Dissected Till Plains Section of the Central Lowlands Physiographic Province. The geologic formations occurring at the surface within the project area include Paleozoic sedimentary rocks (primarily limestone and shale) Pleistocene glacial drift, and recent alluvium. The area is characterized by low to moderate relief in the uplands with locally high relief (up to 200 feet) occurring in the bluffs along the Salt River and its tributaries. Some karst features are present in the project area, most notably, solution cavities in the limestone bluffs.

The geologic formations' stratigraphy in the area consists essentially of nearly flat-lying sedimentary strata of Mississippian and Pennsylvanian formations on the uplands. These in turn, are overlain by Pleistocene deposits of glacial till, residuum, or on the floodplains, by recent alluvium. Frequently observed formations found in differing regions of the project include the Hannibal Formation, Chouteau Formation, Burlington-Keokuk formation, Warsaw Formation, Pennsylvanian Age Strata, and Pleistocene and Recent Deposits.

Soil surveys have been prepared by the United States Department of Agriculture – Natural Resources Conservation Service (NRCS) for the counties encompassing Mark Twain Lake (Ralls and Monroe counties, Missouri). Engineering as well as other land use interpretations for each soil unit encountered in the respective counties are included in these soil surveys. The predominant soil units within the project area are the Armstrong-Leonard Association and the Goss-Gorin-Lindley Association. The soils of the area present several problems. They are erosive particularly when the shoreline of the lake is subjected to periods of high water combined with windy conditions; bank erosion and caving can occur. Many of the soil deposits are in an area of glacial origin, and include rocks and boulders of large to moderate size at or immediately beneath the ground surface. These conditions can complicate foundation and utility trench design and placement.

Soils in the proposed project area primarily (61.8%) silt-loam, with slopes less than 10%. Approximately 20.1% of the area is Goss gravelly silt loam, with 20-30% slopes. An additional 6.6% of the area is Ranacker-Rock outcrop complex, with 20-40% slopes (Figure 5).

Map Unit Legend

Monroe County, Missouri (MO137)

Monroe County, Missouri (MO137)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
50008	Keswick silt loam, 5 to 9 percent slopes, eroded	12.6	27.9%
50020	Calwoods silt loam, 2 to 5 percent slopes	5.3	11.8%
50049	Ranacker-Rock outcrop complex, 20 to 40 percent slopes, very stony	3.0	6.6%
60006	Marion silt loam, 2 to 5 percent slopes	10.0	22.1%
60113	Goss gravelly silt loam, 20 to 30 percent slopes	9.1	20.1%
99001	Water	3.7	8.2%
99007	Arents, earthen dam	1.5	3.3%
Totals for Area of Interest		**45.3**	**100.0%**

Figure 5. Soils Map in the Area of Proposed Access Roads, Staging Areas, and Floating Plant Launch Area at South Fork Branch of Mark Twain Lake.

3.2 Aesthetics

The site of the Clarence Cannon Dam is on the Salt River in northeastern Missouri, 63 river miles west of the Mississippi River. Mark Twain Lake is principally located in Ralls and Monroe counties, Missouri, and at normal pool extends 34 miles upstream on the North Fork of the Salt River, which is the main stem. The highest altitudes in the project area are on the flat upland divides, which reach a maximum altitude of about 780 feet. The local relief is about 100 feet along the major tributaries and increases to about 200 feet along the main stem. The sides of the major valleys are dissected by short tributaries whose gradients extend from the flat upland to the valley bottoms; and the divides between these tributaries form a continuous belt of hills along either side of the major valleys. The Salt River and its major tributaries flow through meandering valleys bordered by steep rocky walls.

3.3 Noise

The area in the vicinity of the proposed project includes recreation, transportation, and agricultural zones. Agricultural and open space areas typically have noise levels in the range of 34-70 decibels (dB; a measure of loudness) depending on their proximity to transportation arteries (Figure 6). Noise associated with major transportation arteries such as highways, railroads, airports etc., would be greater than those in rural areas. Recreation-related noise, traffic, and agriculture, such as that created by vehicles, machinery, and recreationists, are the main sources of noise within the study area.

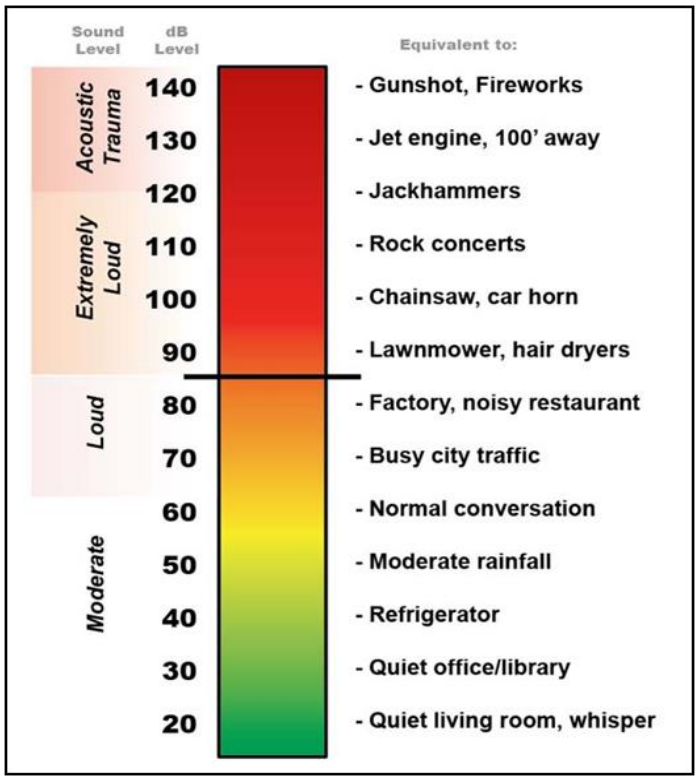

Figure 6. Examples of the sound level and decibel (dB) level of various sources.

3.4 Air Quality

The Clean Air Act of 1963 requires the U.S. Environmental Protection Agency (USEPA) to designate National Ambient Air Quality Standards (NAAQS). The USEPA has identified standards for six criteria pollutants: ozone, particulate matter (PM_{10} = less than 10 microns; and $PM_{2.5}$ = less than 2.5 microns in diameter), sulfur dioxide, lead, carbon monoxide, and nitrogen dioxide. Monroe County, MO is currently in attainment for all six EPA air quality standards (USEPA 2020; https://www3.epa.gov/airquality/greenbook/anayo_mo.html).

3.5 Water Quality

Mark Twain Lake's watershed covers 2300 square miles, with just over half of that covered by row crop agriculture. Grassland and prairie cover a quarter of the land in the watershed. These land uses are typical of northern Missouri, where the soils are deep and fertile.

Water quality sampling is conducted with a watershed approach to establish trend analysis and maintain water quality at or above state and federal regulations. Water quality monitoring is conducted to assure safe conditions for human recreation, wildlife, and aquatic life as maintained and managed within the lake system. The sampling and analysis which are conducted at the Mark Twain Lake sites reflect the minimal set of parameters needed to analyze the current status of water quality for the Mark Twain Lake system.

In 2019, a total of four water quality sampling events were conducted during the recreational season at Mark Twain Lake. Water samples were taken at four lake sites, four tributaries, and two discharge sites (main dam and re-regulation dam). As with all of the St. Louis District lakes, levels of phosphates were above 0.05 mg/L due to the agricultural land usage surrounding the projects. Total Suspended Solids levels were above the State standards of 116 mg/l for streams and 12 mg/l for lakes. *E. coli* levels at the marinas exceeded Missouri state standards in May and October. Iron and manganese standards were high during each sampling event above and below the main dam as well as below the re-regulation dam. The herbicide, atrazine, was recorded above the state standard once in the South Fork Salt River in May. Mark Twain Lake generates electricity and has a re-regulation pool immediately downstream of the main lake dam. During the summer when the lake stratifies this design can magnify low dissolved oxygen levels, especially during hot air and low water flow conditions. In fiscal year 2019, dissolved oxygen concentrations were below the state standard many times. This is monitored daily and a work group consisting of USACE, state, and power authorities meet weekly during the recreation season to discuss and implement the best management policies for water conditions versus power demand.

A review of historical water quality data gathered by the St. Louis District U.S. Army Corps of Engineers reveals minor concerns for the South Fork Salt River segment between state highways D and 107. Of all the collected historical data dating back to the 1970s, there were minor exceedances over the state water quality criteria of the following parameters: Atrazine, total phosphorus, total suspended solids, and dissolved oxygen.

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. According to the 2020 303(d) List of Impaired Waters for Clean Water Commission approval, the following parameters are listed as impairments: the South Fork of the Salt River is impaired due to dissolved oxygen as a result of the Mexico Waste Water Treatment Plant, and pH as a result of non-point sources; Mark Twain Lake is listed as impaired due to mercury in fish tissue as a result of atmospheric deposition; the Salt River downstream of Clarence Cannon Dam and Re-regulation Dam is impaired due to dissolved oxygen as a result of each dam; and the Salt River further downstream of the Re-regulation Dam in Ralls county is impaired due to mercury in fish tissue as a result of atmospheric deposition.

3.6 Hydropower

Hydropower is an authorized purpose of Mark Twain Lake and Clarence Cannon Dam, and provides peaking power to the regional market of the Southwestern Power Administration (SWPA), the power marketing administration that delivers power from USACE hydropower plants to power cooperatives and municipalities within the southwestern region of Missouri, Arkansas, Kansas, Oklahoma, Louisiana, and Texas. The Clarence Cannon Dam contains a hydroelectric power plant, approximately 223 feet in length, within the concrete portion of the dam located immediately north of the spillway. The hydroelectric power plant, which is powered by falling water, is capable of producing up to 58,000 kilowatts of power, or enough to supply a town of 20,000 people. The tremendous force of the water sets the turbine blades in motion which turns the shafts connecting each turbine to a generator. The power plant contains a Kaplan 27,000-KW turbine generator and a Francis 31,000-KW pump turbine generator. When both units are operating at capacity, as much as 5,400,000 gallons of water pass through the turbines each minute. The invert elevation of the intake structure is 520.0 feet NGVD. The invert elevation of the outlet structure is 483.0 feet NGVD. A re-regulation dam, located 9.5 miles downstream from the main dam, creates a storage pool that helps improve water quality and assists with wetland management.

3.7 Recreation

There are a variety of outdoor recreation areas and facilities managed by the U.S. Army Corps of Engineers located at Mark Twain Lake, including a visitor center, three campgrounds, two group camping areas, nine picnic facilities, 6 major and 19 secondary boat launching areas, six nature trails, two marinas, an archery range, a shooting range, disc golf, and two beaches. Additionally, the Mark Twain State Park offers recreational opportunities for public use. Hunting and fishing opportunities are available on all Corps of Engineers lands and waters except where restricted and posted due to recreational development or safety. The outdoor recreation opportunities provided at Mark Twain are designed to support a wide range of recreational activities and interests. The most common activities engaged in are fishing, boating, water-skiing, sailing, camping, picnicking, swimming and hunting. Additional activities include bike riding, kayaking, canoeing, hiking/walking for pleasure and fitness, sight-seeing, and wildlife viewing/nature photography.

The Proposed Action Area is located within the South Fork Recreation Area, which is a 176 acre multi-use recreation area located at the northeastern point of the South Fork of the Salt River as it joins the main body of the lake. Facilities located here include a four-lane boat launching ramp, two courtesy loading docks, a vault toilet, and a 120 car-trailer and 15-car spaces parking lot. Currently, one picnic site is available for public use. Within the Proposed Action Area, recreation currently consists primarily of boating, water-skiing, fishing, sight-seeing, wildlife viewing, and nature photography.

3.8 Traffic and Roadways

Access to Mark Twain Lake is facilitated by network of U.S. Highways, State Highways and county roads located primarily in Monroe and Ralls counties, Missouri. Mark Twain Lake is served on the north by U.S. Highway 24, and on the south by State Highway 154. State Highway 107 bisects the project area from north to south, and provides a major reservoir crossing near Florida, Missouri. State Highway J crosses the main dam, and is the primary north-south transportation corridor on the eastern side of the lake. (Figure 7).

Figure 7. Major roadways leading to the Proposed Action Area at Mark Twain Lake.

3.9 Hazardous, Toxic, and Radioactive Waste (HTRW)

A site visit was conducted on March 5 2020 by the St. Louis District Environmental Quality Section. Interviews were conducted with Mark Twain Lake project staff and photographs were taken. The site visit and interviews of the proposed construction of the haul road and staging area near the South Fork Recreation Area did not reveal any HTRW concerns. Additionally, the chances of encountering HTRW during the proposed actions to protect the island is very low. In the event that HTRW material is discovered that may be hazardous to human health during construction operations, that portion of work would stop and the USACE Environmental Quality Section would be contacted immediately to perform a re-evaluation of the environmental conditions.

3.10 Socio-Economics and Demographics

Natural and recreational resources at Mark Twain Lake provide ample social, economic and environmental benefits for both visitors and the local economy. Having local recreation options close to the reservoir promotes economic investment, environmental awareness, and social well-being to local residents and visitors by providing jobs, education, solitude, and exercise opportunities. Recreation at Mark Twain Lake is also an economic engine for local business, communities and the region. The lake area has many businesses including a water park, winery, campgrounds, restaurants, hotels, resorts, antique shops, specialty shops, hardware stores, realtors, grocery stores and much more. The lake area is bordered by three charming towns, Monroe City, Paris and Perry. These communities have adapted to the lake and offer many services and specialty shops (Mark Twain Lake Chamber of Commerce 2020). The largest industries in Monroe County, Missouri are manufacturing (791 people), health care and social assistance (634 people), and retail trade (458 people). The highest paying industries are utilities ($46,875); finance and insurance, real estate, rental and leasing ($42,917); and finance and insurance ($40,833) (USACE 2019).

Table 2 presents essential demographic and economic information for the Monroe County, Missouri (https://www.census.gov/quickfacts/monroecountymissouri). QuickFacts data are derived from: Population Estimates, American Community Survey, Census of Population and Housing, Current Population Survey, Small Area Health Insurance Estimates, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Non-employer Statistics, Economic Census, Survey of Business Owners, Building Permits.

Table 2. Essential demographic and economic information for Monroe County, Missouri.

Socio-Economics	Monroe County, Missouri
Population Size (as of 1 July 2019)	8,644
Median Age of Population (years)	39.0
Number of Households (2014-2018)	3632
Average Household Size (2014-2018)	2.34
Median Household Income (2014-2018; 2018 dollars)	$43,973
Median Value of Owner-Occupied Housing	$101,000
Persons Below Poverty Level	13.6%
Racial Demographics (%)	**Monroe County, Missouri**
White	94.2%
Black or African American	2.8%
American Indian and Alaska Native	0.6%
Asian	0.4%
Native Hawaiian & other Pacific Islander	0.0%
Two or More Races	2.0%
Hispanic	1.7%
Minority Population	5.8%

3.11 Environmental Justice

Environmental justice refers to fair treatment of all races, cultures and income levels with respect to development, implementation and enforcement of environmental laws, policies and actions. Environmental justice analysis was developed following the requirements of:

- Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations," 1994)
- "Department of Defense's Strategy on Environmental Justice" (March 24, 1995).

The purpose of environmental justice analysis is to identify and address, as appropriate, human health or environmental effects of the proposed action on minority and low income populations. Following the above directives, the methodology to accomplish this includes identifying minority and low-income populations within the study area by demographic analysis. Data from QuickFacts (https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml) and the U.S. Environmental Protection Agency (USEPA) Environmental Justice Screening and Mapping Tool (EJSCREEN; Version 2019) were utilized for this analysis. The minority population is approximately 5.8% for Monroe County, Missouri, and 2.0% in the vicinity of the Proposed Project Area. The poverty level is approximately 13.6% for Monroe County, Missouri, and 15.0% in the vicinity of the Proposed Project Area (Figures 8-9).

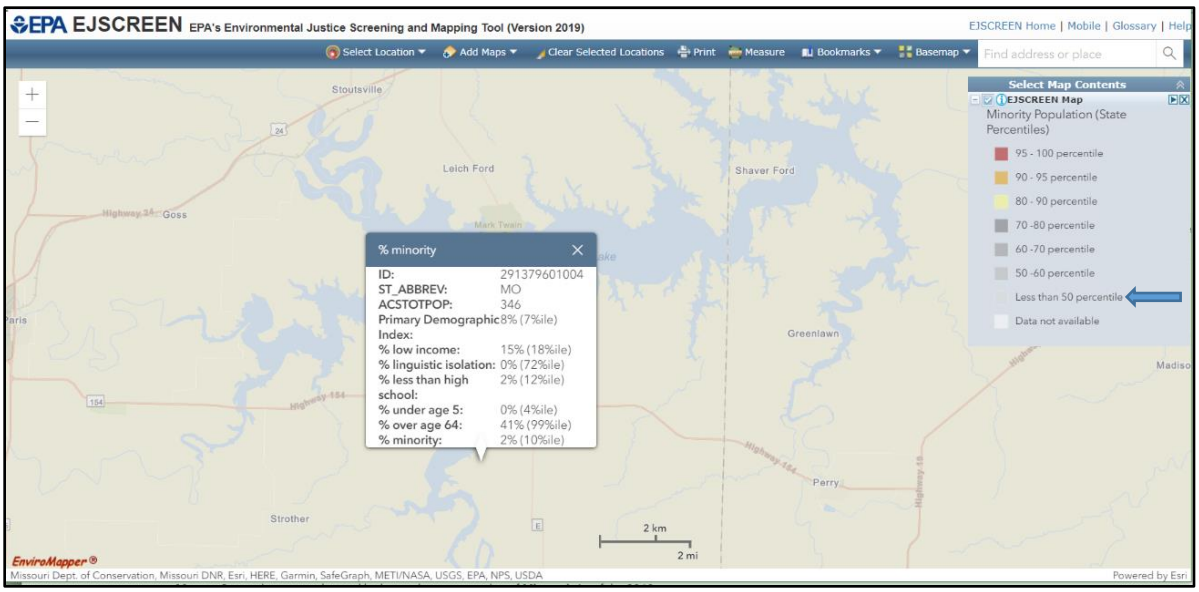

Figure 8. Minority population of the Proposed Action Area compared to Missouri percentiles.

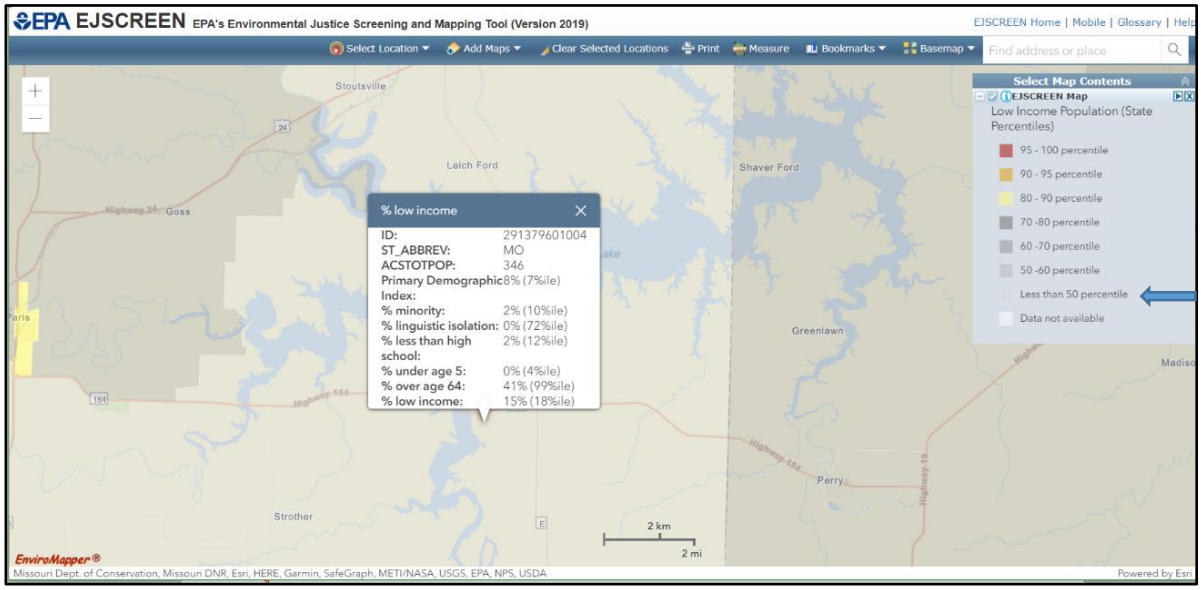

Figure 9. Low income population of the Proposed Action Area compared to Missouri.

3.12 Land Cover

The primary land cover in the proposed haul road and staging area is forest and shrub and herb vegetation, fragmented by areas of development (existing roads) and agricultural vegetation. (Figure 10). The proposed stone access road would pass through an upland immature hardwood oak/hickory forest. The area proposed to be used as an upper storage area is a former farmstead, characterized as a late succession open land. The island is unvegetated unless it becomes exposed long enough during the growing season for herbaceous vegetation to become established.

Figure 10. U.S. Geological Service land cover for the Proposed Action Area.

3.13 Prime and Unique Farmland

In order to protect farmland from increasing urban sprawl, Congress passed the Agriculture and Food Act of 1981 (PL 97-98), which contained the Farmland Protection Policy Act (FPPA). This Act is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. The Act also focuses on areas of prime farmland, which is identified by the United States Department of Agriculture Natural Resources Conservation Service (NRCS). For the purpose of the Farmland Protection Policy Act, farmland includes prime farmland, unique farmland, and land of statewide or local importance.

Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. Activities not subject to FPPA include projects on land used for water storage, and public lands previously converted to non-agricultural use. Within the vicinity of the Proposed Action Area, there is no prime farmland.

3.14 Vegetation and Wildlife Resources

Prior to construction of the lake, about half of the present fee-owned project land was forested. The majority of this land was located above the lake pool elevation. The white oak-black oak-northern red oak (Forest Cover Type No. 52) is the most common association on upland sites. The white oak association

(Forest Cover Type No. 53) also occurs frequently. Shagbark hickory comprises a substantial stocking on most upland sites. Dominant trees include white oak, northern red oak, and black oak. Hickory (*Carya* spp.), and ash (*Fraxinus* spp.) usually occupy the co-dominant or intermediate class. Sugar maple, elm, black cherry, red bud, flowering dogwood, and serviceberry are the predominant understory species. Understory shrub species include fragrant sumac, corralberry, greenbriar, and various forms of shade tolerant grasses.

The proposed upper and lower haul road areas are characterized as upland immature oak/hickory forest, while the upper staging area is characterized as an upland late succession open land. Vegetation surveys revealed primarily 4”-10” black oak (*Quercus velutina*), 4”-10” shingle oak (*Quercus imbricaria*), 6”-12” black walnut (*Juglans nigra*), 2”-10” elm (*Ulmus* spp.), and 4”-14” honey locust (*Gleditsia triocanthos*) within these areas. The lower staging area and the island are unvegetated.

The Mark Twain Lake property supports numerous species of wildlife including: white-tailed deer, turkey, rabbits, squirrels, opossums, raccoons, beavers, foxes, coyotes, bobcats, various amphibians, reptiles, nesting and migratory birds, and small rodents.

Although the project is located in the Mississippi Flyway, the major flights of waterfowl normally pass down the Mississippi to the east and the Grand River to the west. However, the lake does support a viable population of waterfowl. Additionally, migrating waterfowl, shore birds, and wading birds also use the shoreline located near the South Fork Recreation Area. Many migratory song birds, owls, and hawks are known to use the Mark Twain Lake area. Nest boxes provide nesting spaces for wood ducks, purple martins, house wrens, tree swallows, bluebirds, bats, and squirrels. The wildlife management and environmental stewardship activities conducted on the Mark Twain Lake Project lands in general have created an exceptional, well diversified ecological setting that has benefitted and attracted a wide variety of wildlife species.

3.15 Aquatic Resources

At approximately 18,600 acres and a shoreline length of approximately 285 miles at the pool level of 606 feet NGVD, Mark Twain Lake is the largest reservoir in north Missouri. The average depth of the pool at 606 feet NGVD is 29 feet. The South Fork of the lake drains 298 square miles, is 38.0 miles in length, has an average gradient of 7.2 feet per mile and has a maximum elevation of 880 feet. Clarence Cannon Dam, which holds back the Salt River to form the reservoir, was authorized by Congress in 1962. The lake filled in 1984.

The North Fork of the Salt River is the major drainage channel, draining 626 square miles (27% of the drainage area). The North Fork is 88.0 miles in length, has an average gradient of 4.5 feet per mile and has a maximum elevation of approximately 1,000 feet. The Middle Fork, Elk Fork and South Fork of the Salt River are the other major tributaries to Mark Twain Lake. The Middle Fork drains 356 square miles (15%), is 65.4 miles in length, has an average gradient of 5.1 feet per mile and has a maximum elevation of approximately 940 feet. The Elk Fork drains 262 square miles (11%), is 34.8 miles in length, has an

average gradient of 7.9 feet per mile and has a maximum elevation of approximately 880 feet. The South Fork drains 298 square miles (13%), is 38.0 miles in length, has an average gradient of 7.2 feet per mile and has a maximum elevation of 880 feet. Combined, the North Fork, Middle Fork, Elk Fork and South Fork drain a total of 1,542 square miles, which is 66% of the Mark Twain Lake watershed.

The impoundment of the Salt River caused a decrease in lotic (river, stream, or fast-water) adapted fish species, and an increase in lentic (lake or slow-water) adapted fish species. Species found in the lake pool include the following: black bass, white bass, black crappie, white crappie, bluegill, green sunfish, channel catfish, blue catfish, flathead catfish, walleye, and several species of minnows including common carp, several species of suckers, gars, freshwater drum, and gizzard shad. The tailwater downstream of the re-regulation dam yields sizable concentrations of crappie, white bass, channel catfish, flathead catfish and walleye. The waters of the lake and tailwater also have diverse forms of phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles and mollusks.

3.16 Wetlands and Waters of the U.S.

According to the USFWS National Wetland Inventory map (USFWS 2020), there are no terrestrial wetlands within the proposed access area. The site is considered to be upland, defined by the hydrology, soils, and vegetation. The upland site does not receive periodic inundation or saturation by surface or groundwater during the growing season. Mark Twain Lake is considered a jurisdictional Waters of the U.S.

3.17 Cultural Resources

The proposed haul roads and staging areas were within the limits of three archaeological sites (23MN373, 23MN521, and 23MN526) identified during the 1975 field season of the Clarence Cannon Reservoir Archaeological Survey. No determination of eligibility to the National Register of Historic Places (NRHP) were made at the time of their initial identification. An archaeological survey of the proposed haul roads and staging areas was conducted by St. Louis District archaeologists on 19 February 2020. The survey found no evidence that sites 23MN373 and 23MN521 were within the Proposed Project Area. Site 23MN526 was re-identified, but determined to be disturbed and not eligible to the NRHP.

The proposed area of protection is located within site 23MN271 at Mark Twain Lake in Monroe County, Missouri. The site was originally identified in 1959 by Henning and Pangborn who referred to it as a village refuse site. In March of 1976, archaeologists Dave Teter revisited it for the Clarence Cannon Reservoir Archaeological Survey and mapped the site. In December of 1976, archaeologists Rose Shinn conducted another survey for the Clarence Cannon Reservoir and expanded the site dimensions. Both Teter and Shinn determined that site 23MN271 was endangered by the construction of Clarence Cannon Reservoir but did not recommend further testing. The site was determined eligible to the NRHP as part of an overall Clarence Cannon archaeological district; however, that district was never nominated and it is not presently listed on the NRHP.

Pursuant to Section 106 of the National Historic Preservation Act (as amended), a letter requesting concurrence with the determination of no adverse effect for the haul roads and laydown areas was sent

to the Missouri State Historic Preservation Office (MO SHPO) on 6 March 2020. Concurrence by MO SHPO was given in a letter dated 7 April 2020. In the unlikely event that cultural materials are encountered during project activities, all construction should be halted and MO SHPO notified immediately.

The MO SHPO was contacted by phone on 7 May 2020 to discuss the potential impact to site 23MN271 caused by placing the aggregate and riprap onto the site and the temporary spudding into the site by the floating plant. On 5 June 2020, the MO SHPO verbally concurred with the District that the site protection is not an adverse effect to a historic property if the District stipulates that contractors are not allowed to spud in the 2-acre area with culturally sensitive material, spudding is confined to the least amount possible while maintaining safety standards, and GPS coordinates are taken of the spud locations. A letter was mailed to the MO SHPO on 12 June 2020 to request concurrence on the project.

3.18 Tribal Coordination

The St. Louis District first initiated consultation with 28 Indian tribes on 26 July 2017. Responses requesting consultation were received from the following tribes via letter or telephone: Absentee-Shawnee (August 2017), Osage Nation (August 2017), Sac and Fox Tribe of Mississippi in Iowa (August 2017), and Delaware Nation (September 2017). Telephonic, electronic mail, and in-person meetings have occurred with these four tribes since the initial coordination to discuss site protection methods. In January 2020, the Sac and Fox Nation of Oklahoma requested consultation. During subsequent consultation under Section 106 of NHPA, and scoping under the National Environmental Policy Act (NEPA) (letter sent 06 March 2020), the Shawnee Tribe requested consultation in April 2020. On 2 June 2020, the St. Louis District held a webinar with the tribes requesting consultation to discuss the proposed site protection plan. Of the six consulting tribes, the Delaware Nation of Oklahoma, the Osage Nation, and the Sac and Fox Nation of Oklahoma participated in the webinar. The requirement to use spudding for the floating plant safety and stability was discussed. Spudding is the least destructive stabilizing system available for the floating plants, with an approximate 45 cm diameter pole(s) typically dropping 3-5 feet into the sediment. During the webinar discussion, the Osage Nation suggested an underwater archaeological survey post-construction, and the Delaware Nation stated an appreciation of the Osage's concerns and supports the proposed survey. A copy of the webinar minutes and slides were electronically sent and mailed to the six consulting Indian tribes on 3 June 2020. At this time, none of the tribes consulted offered objections to the Proposed Action on South Fork Island within Mark Twain Lake, Monroe County, MO.

3.19 Bald Eagles

On August 9, 2007 the bald eagle (*Haliaeetus leucocephalus*) was removed from the federal list of threatened and endangered species. However, the species remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The BGEPA prohibits unregulated take of bald eagles, including disturbance. The U.S. Fish and Wildlife Service developed the National Bald Eagle Management Guidelines (USFWS 2007) to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute disturbance.

On two occasions during early 2020, USACE biologists conducted field investigations and surveys of the Proposed Project Area to determine the presence of bald eagle nests/nesting. No bald eagles or nests were observed. The nearest known bald eagle nest is located approximately 1.6 miles north of the Highway 154 Bridge. The nest is located on the south side of the Florida peninsula within Mark Twain State Park (MDC, Matt Vitello, pers. comm.).

3.20 State Listed Species

A Missouri Department of Conservation Natural heritage review as conducted by USACE on 6 February 2020, resulting in a Natural Heritage Review Level Three Report. In an e-mail dated 3 March 2020, The Missouri Department of Conservation lists the following species listed as threatened or endangered by the state of Missouri as potentially occurring in the vicinity of the Proposed Action Area: Bald Eagle (*Haliaeetus leucocephalus*; state rank S3: vulnerable), and wartyback mussels (*Cyclonaias nodulata*, state rank S3: vulnerable). The bald eagle is discussed in Section 3.11.1 above. The nearest occurrence of wartyback mussels is upstream in the Middle Fork arm, approximately 3.5 miles by flow path from the Highway 154 Bridge.

3.21 Federally Listed Species

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, an official list of species and critical habitat was acquired from the USFWS IPaC website (USFWS 2019) (https://ecos.fws.gov/ipac/) on 6 February 2020 (Consultation Code: 03E14000-2020-SLI-1196, Event Code: 03E14000-2020-E-03000) for the Mark Twain Lake South Fork Island Erosion Protection project area (Table 3). An updated list was obtained on 12 June 2020 (Consultation Code: 03E14000-2020-SLI-1196 Event Code: 03E14000-2020-E-06302). There are no critical habitats within the proposed project area. Habitat requirements and impacts of the proposed federal action are discussed for each species in Section 4.21.

Table 3. Federally listed threatened and endangered species potentially occurring within the Proposed Project Area.

Species	Federal Status	Habitat
Gray Bat (*Myotis grisescens*)	Endangered	Caves, mines.
Indiana bat (*Myotis sodalis)*	Endangered	Caves, mines (winter hibernacula); trees (summer roosting); and small stream corridors with well-developed riparian woods; upland forests (foraging).
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	Caves, mines; rivers and reservoirs adjacent to forests.

4 ANTICIPATED ENVIRONMENTAL IMPACTS

This section evaluates and discusses the potential impacts (environmental consequences) for each resource topic discussed in Chapter 3 that could be impacted, directly or indirectly, by the no-action alternative and the Tentatively Selected Plan. Direct impacts are those that would take place at the same time and place (40 CFR §1508.8(a)) as the action under consideration. Indirect impacts are those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). The depth of analysis corresponds to the scope and magnitude of the potential environmental impact.

4.1 Topography, Geology, and Soils

4.1.1 No Action Alternative

No protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance of sensitive material. Reduction in island height and acreage may occur without protection.

4.1.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Construction of a haul road and staging areas, as well as installation of riprap on the island, would result in a very slight elevational increase along the new haul roadway route, and the island would be elevated by approximately 4-5 feet. Thus, only nominal changes to the overall topography would occur. No changes to geology or soils are anticipated.

4.2 Aesthetics

4.2.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. The resulting erosion and dispersal of materials would be considered aesthetically unpleasing to many people.

4.2.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Aesthetic impacts due to construction activities in the vicinity of the Proposed Action would be temporary. Necessary tree removal was conducted during a period of low visitor use (prior to 1 April 2020 after consultation with the U.S. Fish and Wildlife Service). With the exception of the intersection of the stone road and the existing South Fork Recreation Area roadway, the location of the haul road and staging areas would be largely blocked from view by surrounding vegetation. However, an access gate would be installed upon completion of the project near the transition of the stone access road to the South Fork Recreation Area paved access road.

The stone bench along the shoreline required for loading stone onto the floating plant for transport to the island site would be visible from the opposite shoreline and the South Fork of the Lake. Upon completion of loading operations all stone benches would be graded out to provide for a uniform thickness of shoreline stone protection within the lower staging area and extension construction limits. Since the stone would be obtained from a local quarry, the material would blend in with the surrounding environment. Stone placed over the island would only be visible when the island is exposed. Thus, no adverse long term aesthetic impacts are anticipated.

4.3 Noise

4.3.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to the noise level in the area are anticipated.

4.3.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Noise due to construction activities in the vicinity of the Proposed Action Areas would be temporary. Access road and staging area construction would occur prior to the site protection activity. Floating plant operations are anticipated to occur over a 60-90 day time frame; however, this is dependent on weather, lake, and site conditions. After construction is complete, the overall noise level in the vicinity of the Proposed Action would remain unchanged relative to the level which existed prior to the proposed South Fork Island Erosion Protection project. Common sources of noise would include construction, transportation, recreation, residential, and agricultural activities.

4.4 Air Quality

4.4.1 No Action Alternative

Under the No Action Alternative, implementation of a protection strategy that would protect the culturally sensitive material on the eroding island from further exposure and disturbance would not occur. Wind and boat induced wave action and fluctuating lake levels act would continue to increase the erosional process and cause disturbance. Culturally sensitive material on the island would remain unprotected and would continue to be exposed and disturbed. No changes to air quality in the area are anticipated to occur.

4.4.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Emissions from construction and floating plant equipment, burning of vegetation, as well as fugitive dust would be generated during the proposed construction activities. Contractors would be required to adhere to best Management Practices (BMPs) to reduce impacts to air quality. However, no adverse long-term air quality impacts are anticipated to occur in the region as a result of the Proposed Action.

4.5 Water Quality

4.5.1 No Action Alternative

Under the No Action Alternative, implementation of a protection strategy that would protect the culturally sensitive material on the eroding island from further exposure and disturbance would not occur. Wind and boat induced wave action and fluctuating lake levels act would continue to increase the erosional process and cause disturbance. Culturally sensitive material on the island would remain unprotected and would continue to be exposed and disturbed. No changes to existing water quality in the area are anticipated to occur.

4.5.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

No changes to water quality are anticipated in the vicinity of the proposed haul road and staging areas. Any potential effects to storm water shall be addressed according to state requirements under the St. Louis District Corps of Engineers storm water permit as required by the contract specifications. The contractor would be required to follow best management practices to minimize the effects of storm water runoff on the water quality of the immediate area generated by the construction of the haul road and staging areas. As the placement of rock over the island is meant to be for the protection and preservation of the island, any suspension of solids from the agitation of dropping rock onto the island surface would be minimal and temporary. Benefits of the island site project include water quality improvements through reduced erosion and enhanced aquatic habitat.

4.6 Hydropower

4.6.1 No Action Alternative

No protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No impacts to hydropower activities would occur.

4.6.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

The optimal lake elevation to allow contractors to install stone via floating plant, would be at lake elevations ranging between 608 to 615 NGVD. Since the Mark Twain Lake is a hydropower lake, the lake elevations would require coordination with USACE Water Control and the Southwestern Power Administration. The timeframe for accomplishing the work would be dependent on the capability to achieve required lake elevations allowing access by the floating plant to the lower staging area and island site.

4.7 Recreation

4.7.1 No Action Alternative

No protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No impacts to recreational activities would occur.

4.7.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

The Proposed Action Area is located within the South Fork Recreation Area. The contractor would be permitted to utilize a portion of the existing paved roadway section for hauling and transport of stone materials during construction of access roads and floating plant operations. During contractor hauling operations, the South Fork Recreation Area would remain open to the public for recreational usage, however traffic slowdowns and deteriorating road conditions may occur. The boat ramp would be closed to the public only during launching and removal of the floating plant. The haul road and staging area construction site would be off-limits to all recreationists. The direct work zone adjoining the rock placement area would be off-limits to boating traffic in order to ensure boater safety. The construction area established at the island site would be designated as a no boat/no entry zone during the performance of work. No visitors of recreationists would be permitted to enter the established zone. It is anticipated that a navigational area will be designated outside this zone, permitting passage of vessels, and retaining the availability of the remainder of South Fork branch. Additionally, the South Fork Recreation Area roadway would be closed to the public for approximately 14 days during final rehabilitation and repairs.

4.8 Traffic and Roadways

4.8.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to traffic or roadways would occur within the Proposed Action Area.

4.8.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

The Proposed Action Area is located within the South Fork Recreation Area. The contractor would be permitted to utilize a portion of the existing paved roadway section for hauling and transport of stone materials during construction of access roads and floating plant operations. During hauling operations, the South Fork Recreation Area would remain open to the public for recreational usage, however, the contractor would be required to provide traffic control and signal personnel during hauling operations at the transition from the paved roadway section to the stone access road to ensure safety of the public.

During hauling and floating plant operations, the contractor would be required to maintain stability of the South Fork Recreation Area Paved Access Road if degradation begins to occur which may affect vehicular

access and safety. All maintenance activities would be supported by traffic control signal personnel to ensure safety to the public.

Upon completion of hauling operations and demobilization of equipment associated with floating plant operations, degradation of the paved roadway would be evaluated by USACE. The contractor would be responsible for repairing the roadway to the satisfaction of USACE, which may include but may not be limited to replacement of two 18 inch diameter culverts located under the paved roadway; roadway repairs to include the removal and replacement of the existing sub-base, installation of pavement, and turfing. The South Fork Recreation Area would be closed to the public for approximately 14 days during final rehabilitation and repairs. During launching and removal of floating plant the boat ramp would be closed to the public.

4.9 Hazardous, Toxic, and Radioactive Waste (HTRW)

4.9.1 No Action Alternative

Under the No Action Alternative, implementation of a protection strategy that would protect the culturally sensitive material on the eroding island from further exposure and disturbance would not occur. Wind and boat induced wave action and fluctuating lake levels act would continue to increase the erosional process and cause disturbance. Culturally sensitive material on the island would remain unprotected and would continue to be exposed and disturbed. No changes to the HTRW status in the area would occur.

4.9.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Under the Aggregate and Riprap Alternative, the likelihood of hazardous substances adversely affecting the Proposed Project Area due to the proposed construction activities is very low. A site visit was conducted on 5 March 2020 by the St. Louis District Environmental Quality Section. Interviews were conducted with Mark Twain Lake project staff and photographs were taken. The site visit and interviews of the proposed construction of the haul road and staging area near the South Fork Recreation Area did not reveal any HTRW concerns. Additionally, the chances of encountering HTRW during the proposed actions to protect the island is very low. The St. Louis District Environmental Quality Section would be contacted immediately if suspected HTRW material was encountered at any point during construction.

4.10 Socio-Economics and Demographics

4.10.1 No Action Alternative

No protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. This is not anticipated to alter socioeconomics or demographics of the surrounding area.

4.10.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Access to recreational areas within the South Fork Recreation Area would be slowed during stone hauling operations, and the access road would be closed to the public during rehabilitation and repairs of the roadway. The South Fork boat ramp would be closed for certain actions during the project, but alternate access sites are available in proximity to the area. Some visitors may avoid the area for recreational purposes, which may have a minor short-term economic impact on local business. No impacts to demographics of the surrounding area are anticipated.

4.11 Environmental Justice

4.11.1 No Action Alternative

No protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. Executive Order 12898 directs each Federal Agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations," including tribal populations. No unfair treatment based on race, culture or income levels would result.

4.11.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Under the Aggregate and Riprap Alternative, no minority or low-income populations would experience disproportionately high and adverse human health or environmental effects as a result of the Proposed Action. Conversely, the proposed island site protection would result in benefits to the consulting Indian tribes through the protection of culturally sensitive material.

4.12 Land Cover

4.12.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to the land cover of the area are anticipated.

4.12.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Under the Aggregate and Riprap Alternative, approximately 4.4 acres of upland forest habitat is located within the proposed construction area for the haul roads and staging areas on USACE property and has the potential to be disturbed. Approximately 0.6 acres would be permanently maintain as a gravel access road. This would allow shoreline access in the event that maintenance of the protective stone layer is needed in the future. Approximately 1.5 acres of the Upper Staging Area would be would be allowed to revegetate naturally, and would be managed as a small open-land component or semi-glade habitat

within an upland forest environment after project completion. Thus, permanent land cover impacts are minor and occur entirely within the boundaries of the Mark Twain Lake property.

4.13 Prime and Unique Farmland

4.13.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to prime or unique farmland would occur.

4.13.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

No prime or unique farmland has been identified in the Proposed Action Area. Thus, no impacts to prime or unique farmland subject to the Farmland Protection Policy Act would be impacted by the Proposed Action.

4.14 Vegetation and Wildlife Resources

4.14.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to vegetation or wildlife resources are anticipated.

4.14.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

The proposed upper and lower haul road areas are characterized as upland immature oak/hickory forest, while the upper staging area is characterized as an upland late succession open land. Vegetation surveys revealed primarily 4”-10” black oak (*Quercus velutina*), 4”-10” shingle oak (*Quercus imbricaria*), 6”-12” black walnut (*Juglans nigra*), 2”-10” elm (*Ulmus* spp.), and 4”-14” honey locust (*Gleditsia triocanthos*) within these areas. The lower staging area and the island are unvegetated.

Under the Aggregate and Riprap Alternative, up to 4.4 acres of upland forest habitat located within the proposed construction area for the haul roads and staging areas on USACE property and has the potential to be disturbed (Figure 3). Tree and vegetation removal would be required in order to install the access road and staging areas. Mobile wildlife would likely relocate during construction activities. After construction, areas would be allowed to revegetate naturally, with the exception of approximately 0.6 acres, which would be permanently maintain as a gravel access road to the shoreline. Additionally, approximately 1.5 acres of the Upper Staging Area would be would be managed as a small open-land component or semi-glade habitat within an upland forest environment after project completion. This would create a unique habitat feature and result in increased habitat diversity in the area. Structurally heterogeneous forests are favored by many wildlife species (Tews et al. 2004) because they provide

multiple characteristics, such as regenerating, mature, and senescent trees. These characteristics provide wildlife habitat for reproductive purposes, foraging, and escape cover (Twedt and Wilson, 2007, Greenberg et al., 2011). Additionally, Ketzler et al 2018, found that including large canopy gaps in forest structure benefits bats by providing uninhibited flight space for foraging. Thus, impacts to terrestrial resources and wildlife are anticipated to be minimal, and may be beneficial for multiple species.

4.15 Aquatic Resources

4.15.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No changes to aquatic resources are anticipated.

4.15.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Sediment at the island site likely harbors oligochaetes (worms), chironomids (nonbiting midges), caddisflies, turbellaria (free-living flatworms), and other macroinvertebrates and their larvae. The proposed rock placing activity would smother some of these organisms. After construction, a diverse community of macroinvertebrates would quickly colonize the rock surfaces, and surrounding areas. No mussel beds are known to exist within the construction work area. The nearest known mussel beds are located upstream in the Middle Fork arm, approximately 3.5 miles by flow path from the Highway 154 Bridge. However, any mussels that did happen to occupy the proposed island site protection area could be smothered during project implementation, as would other benthic invertebrates. The proposed rock placement may have temporary, minor effects on plankton communities in the immediate vicinity of the work area due to expected temporary increases in suspended sediment levels. This would cease after project completion. Fishes would be expected to temporarily avoid the area during rock placement activities. However, greater utilization of the location by fishes is expected after implementation due to enhanced habitat diversity. Structural features, such as rock piles, are important in helping to maintain diverse, healthy lake ecosystems and in sustaining gamefish and non-gamefish populations. Structure provides places for food organisms to live and grow, shades organisms from the hot summer sun, provides nesting and spawning habitat, and allows fishes to hide from predators (IL EPA 2004). Overall, minor long-term beneficial impacts to aquatic resources are anticipated.

Prior to transporting barges, tugs, boats, trailers, or other equipment used for the proposed work, the contractor would be required to remove vegetation and clean all equipment thoroughly with hard spray (power wash) with HOT (140 degrees Fahrenheit) water, e.g. at a truck wash facility to avoid transporting the exotic zebra mussel into the Lake. All bilge water, ballast water, cooling water, and reservoirs holding water must be treated with a 200-ppm chlorine bleach solution for at least 10 minutes and appropriately rinsed prior to transport to the Lake. A qualified Missouri Department of Conservation (MDC) staff member would thoroughly inspect all equipment for the presence of adult zebra mussels prior to being launched. Vessels and equipment would also be inspected upon removal from any body of water; cleaning

hulls, anchors, moorings, trailers, etc. of all mud, vegetation, and any zebra mussels. This practice would assist in preventing the spread of invasive aquatic species between bodies of water.

4.16 Wetlands

4.16.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. No impacts to wetlands or jurisdictional Waters of the U.S. would occur.

4.16.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

At this time there will be no impacts to jurisdictional Waters of the U.S. associated within the areas of haul roads and staging areas. For the island protection rock placement, USACE has verified that the project complies with Nationwide Permit (NWP) 13 for Bank Stabilization and NWP 27 for Aquatic Habitat Restoration, Enhancement, and Establishment Activities. USACE does not permit itself when completing Civil Works projects, but does utilize existing general permits for various projects. Nationwide Permit NWP 27 is applicable because the work involves rehabilitation of the island's historical footprint as well as protecting signification cultural resources on Federal Lands. The project also complies with the Nationwide Permit 13 conditions for the proposed stone stabilization work; however, the project required pre-construction notification since it exceeds 500-feet and an average of one cubic yard per running foot. A pre-construction notification has been sent out to the interested State and Federal Agencies for review. Regarding the State of Missouri's Clean Water Act Section 401 Water Quality Certification, the Missouri Department of Natural Resources has waived General Condition 10 for Nationwide Permit 13 regarding the impact limit related to linear footage of stabilization. Therefore, the project would comply with the State of Missouri's Section 401 Water Quality Certification. Additionally, there would be no permanent loss of aquatic resources due to the project impacts and no compensatory mitigation would be required.

4.17 Cultural Resources

4.17.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance to culturally sensitive material.

4.17.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

The Proposed Action for the haul roads and staging areas was coordinated with the Missouri State Historic Preservation Office (MO SHPO) on 6 March 2020. Concurrence by the MO SHPO was provided in a letter dated 7 April 2020. The SHPO stated that "Based on this review it is evident that a thorough and adequate cultural resources survey has been conducted of the project area. We concur with your recommendation

that there will be no historic properties affected, and therefore we have no objections to the initiation of project activities". In the event that cultural materials are encountered during project activities, all construction would halted until the newly discovered site is evaluated, and the MO SHPO would be contacted as soon as possible in order to determine the appropriate course of action.

The Proposed Action of placing aggregate and riprap over 2-acres and spudding into site 23MN271 was coordinated with MO SHPO on 12 June 2020.

4.18 Tribal Coordination

4.18.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance to sensitive cultural and tribal materials.

4.18.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

Under the Aggregate and Riprap Alternative, the erosion process caused by wind and boat induced wave action and fluctuating lake levels would be greatly reduced. In order to prevent damage to culturally sensitive material, a 6 to 12-inch thick layer of 3-inch riprap bedding would be uniformly deposited across the surface area of the island at 602 FT NGVD and above. This material would act as a stabilizing feature, and would also help to distribute the weight of the 650 lb top size riprap during placement. Additionally, excavator buckets or clamshells would be lowered to a height of no more than 3-feet above the placement location prior to releasing stone material in order to further diminish compressive forces. This proposed protection method is anticipated to safeguard the culturally sensitive material indefinitely, without the need for island grading, or the use of invasive anchoring systems within the two-acre island site which may result in disturbance to, or destruction of, culturally sensitive material. Thus, minimal to no impacts to culturally sensitive materials are anticipated.

4.19 Bald Eagles

4.19.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance. The nearest known Bald Eagle nest is located approximately 1.6 miles north of the Hwy 154 bridge. The nest is located on the south side of the Florida peninsula.

4.19.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

As no Bald Eagle nests are located within 660' of any Proposed Action Areas, no adverse impacts to Bald Eagles or their nests are anticipated as a result of the Proposed Action.

4.20 State Listed Species

4.20.1 No Action Alternative

Under the No Action Alternative, no protection strategy would be constructed to protect the culturally sensitive material on the eroding island from further exposure and disturbance. Wind and boat induced wave action and fluctuating lake levels would continue to increase the erosional process and cause disturbance to sensitive cultural and tribal materials. The Missouri Department of Conservation stated that bald eagles and wartyback mussels are located in the vicinity of the Proposed Action. The nearest known Bald Eagle nest is located approximately 1.6 miles north of the Hwy 154 bridge; the nearest mussel bed is located upstream in the Middle Fork arm, approximately 3.5 miles by flow path from the Highway 154 Bridge. Thus, no impacts to state listed species are anticipated.

4.20.2 Tentatively Selected Plan (Aggregate and Riprap Over the Island Site - Alternative 3)

No Bald Eagle nests are located within 660' of any Proposed Action Areas. No mussel beds are known to be located in the proposed construction areas. Increase in suspended sediments are anticipated to be localized and minimal. Thus, no adverse impacts to Thus, no impacts to state listed species are anticipated.

4.21 Federally Listed Species Biological Assessment

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, an official list of species and critical habitat potentially occurring in the vicinity of the proposed project was acquired from the USFWS Information for Planning and Conservation (IPaC) website at (https://ecos.fws.gov/ipac) on 06 February 2020 (Table 3). Habitat requirements and impacts of the federal action are discussed for each listed species.

4.21.1 Gray Bat

The Gray Bat is a species that has a limited range in limestone karst areas of the southeastern United States, including several Illinois and Missouri counties. Gray Bats typically roost in caves year-round. During winter, Gray Bats hibernate in deep, vertical caves, and during summer, Gray Bats generally roost in various caves, but have been documented roosting under bridges and in other structures. Gray Bats forage on a variety of night-flying aquatic and terrestrial insects along rivers, lakes, and creeks.

Gray Bats are endangered largely because of their habitat of living in large numbers in only a few caves; thus making the species vulnerable to human disturbance and habitat loss or modification. Disturbance of Gray Bats in their caves during their hibernation, can cause them to use their energy reserves and could lead to starvation. Disturbances to their caves during their nursing season (June and July) can frighten females causing them to drop non-volant pups to their death in panic to flee from the intruder. Additionally, many important caves that have been historically used by Gray Bats have been inundated by reservoirs. The commercialization of caves, and alterations of the air flow, temperature, humidity, and amount of light can make the cave unsuitable habitat for Gray Bats and drive bats away.

The fatal bat disease, white-nose syndrome (WNS), has not yet been documented to adversely affect the Gray Bat. However, because of Gray Bats are cave obligates, and considering how WNS has decimated other cave-dwelling bat species, WNS could be another significant threat to the Gray Bat. Suitable Gray Bat foraging habitat may be located in the riparian areas in and adjacent to the South Fork area of Mark Twain Lake.

4.21.2 Indiana Bat

The endangered Indiana Bat has been noted as occurring in several Illinois and Missouri counties. Indiana Bats are considered to potentially occur in any area with forested habitat. Indiana Bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula includes caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or in cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females.

Indiana bat summer habitat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches DBH that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet of other forested/wooded habitat. Trees with less than 5 inches DBH that have exfoliating bark, cracks, crevices, and/or hollows may have some potential to be male Indiana bat summer roosting habitat. However, early-successional, even-aged stands of trees less than 5 inches DBH is not typically considered to be suitable roosting habitat. However, early successional habitat with small diameter trees may be used as foraging habitat by Indiana bats.

During the summer, Indiana Bats frequent the corridors of small streams with well-developed riparian woods, as well as mature bottomland and upland forests. They forage for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age and sex and ranges up to 81 acres (33 ha). Suitable Indiana Bat summer and foraging habitat may be located in the forested areas in and adjacent to the South Fork area of Mark Twain Lake.

Disturbance and vandalism, improper cave gates and structures, natural hazards such as flooding or freezing, microclimate changes, land use changes in maternity range, and chemical contamination are the leading causes of population decline in the Indiana bat (USFWS 2000, 2004).

4.21.3 Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is a federally threatened bat species. The northern long-eared bat is sparsely found across much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia.

Northern long-eared bats spend winter hibernating in large caves and mines. Summer habitat for the northern long-eared bat includes a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches DBH that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. The northern long-eared bat has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. Northern long-eared bats typically occupy their summer habitat from mid-May through mid-August each year and the species may arrive or leave some time before or after this period.

Forest fragmentation, logging and forest conversion are major threats to the species. One of the primary threats to the northern long-eared bat is the fungal disease, white-nose syndrome, which has killed an estimated 5.5 million cave-hibernating bats in the Northeast, Southeast, Midwest and Canada. Suitable northern long-eared bat summer and foraging habitat may be located in the forested areas in and adjacent to the South Fork area of Mark Twain Lake.

4.21.4 Biological Assessment Section 7 Determinations and Coordination

The IPaC listed Gray Bats, Indiana Bats, and Northern Long-eared Bats as potentially occurring in the Proposed Action Area. There are no critical habitats within the Proposed Action Area under the jurisdiction of the USFWS Missouri Ecological Services Field Office, Columbia, Missouri. The Proposed Action Area is located in Missouri Bat Zone 1. Additionally, according to the MO_2019_Cave_Density_24_000_Quad, no caves are located in the Proposed Action Area. A site visit was conducted on Monday, 10 February 2020, by USACE Biologist Dr. Teri Allen. The survey covered approximately 40 acres within several areas being studied by engineers as potential haul road and staging area locations. In subsequent discussions with USACE bat specialist Ben McGuire, as well as evaluation of over 90 photographs taken by Dr. Allen during the site visit, the Proposed Action Area for the haul road

and staging areas was not found to be "good" quality for bat roosting habitat, although some potential bat roost trees were present.

An e-mail with supporting documentation was sent to the USFWS on 13 February 2020, and the proposed action was further discussed between the USACE and the USFWS by phone. Based on site specific information and the facts that proposed clearing would involve less than 10 acres of forested habitat located within 1000 feet of other forest or woodland habitat during the winter hibernation period (1 November – 31 March) without affecting caves or mines where bats are known to hibernate, USACE determined that the proposed project "*may affect, but is not likely to adversely affect the Gray Bat, the Indiana Bat, and the Northern Long-eared Bat*". In an e-mail dated 14 February 2020, the USFWS concurred with the determinations made by the USACE. In addition, the e-mail also stated that "the Service will not require additional surveys or the completion of a BA. Further, because of the time sensitive nature of this request and the worthy nature of the project, we will not recommend mitigation at this juncture. Please ensure that all tree clearing is completed by March 31st, 2020". The Service also recommend that to the extent possible, the project component preserve as many live and dead standing trees as possible. USACE complied with all USFWS directives.

5 Summary of Environmental Effects of Proposed Action

Table 4 lists anticipated environmental effects of the proposed South Fork Island Erosion Protection Project at Mark Twain Lake.

Table 4. Environmental Effects of Proposed Action.

Environmental Factor or Resource	Alternatives	
	Alternative 3 - Aggregate and Riprap Over the Island Site	**Alternative 4 - No Action Alternative**
Topography, Geology, and Soils	O	O
Aesthetics	O	O
Noise	a, ST	O
Air Quality	a, ST	O
Water Quality	a, ST	a
Hydropower	O	O
Recreation	a, ST	O
Traffic and Roadways	a, ST	O
Hazardous, Toxic, and Radioactive Waste	O	O
Socio-Economics and Demographics	B	O
Environmental Justice	B	A
Land Cover	a	O
Prime and Unique Farmland	O	O

Vegetation and Wildlife Resources	a, ST➔ B	O
Aquatic Resources	a, ST ➔ B	O
Wetlands and Waters of the U.S.	O	O
Cultural Resources	B	A
Tribal Coordination	B	A
Bald Eagles	O	O
State Listed Species	O	O
Federally Listed Species	a	O

O = no anticipated impact, A = adverse impact, a = small adverse impact, B = beneficial impact, b = small beneficial impact, ST = short term impact.

6 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Climate change is a fundamental environmental issue, and is a particularly complex challenge given its global nature and inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Climate change science is evolving, and is only briefly summarized here. In 1970, the level of atmospheric carbon dioxide was estimated at 325 parts per million (ppm) (CEQ 1970). Since 1970, the concentration of atmospheric carbon dioxide has increased at a rate of about 1.6 ppm per year (1970-2012) to approximately 396 ppm in December 2014 (current globally averaged value). Based on the United States Global Change Research Program as well as other scientific records, it is now well established that rising global atmospheric greenhouse gas emission concentrations are significantly affecting the Earth's climate (USACE 2015).

Figure 11. Water Resources Region 07: Upper Mississippi Region Boundary.et al., 2013).

The approach at USACE is to consider the questions in need of climate change information at the geospatial scale where the driving climate

models retain the climate change signal. At present, USACE judges that the regional, sub-continental climate signals projected by the driving climate models are coherent and useful at the scale of the 2-digit HUC (Water Resources Region) (Figure 11).

Within Water Resources Region 07, the general consensus in the recent literature points toward moderate increases in temperature and precipitation, and streamflow in the Upper Mississippi Region over the past century. In some studies, and some locations, statistically significant trends have been quantified. In other studies and locales within the Upper Mississippi Region, apparent trends are merely observed graphically but not statistically quantified. There has also been some evidence presented of increased frequency in the occurrence of extreme storm events (Villarini et al., 2013). Lastly, a transition point in climate data trends, where rates of increase changed significantly, was identified by multiple authors at approximately 1970 (USACE 2015).

There is strong consensus in the literature that air temperatures will increase in the study region, and throughout the country, over the next century. The studies reviewed here generally agree on an increase in mean annual air temperature of approximately 2 to 6 ºC (3.6 to 10.8 ºF) by the latter half of the 21st century in the Upper Mississippi Region. Reasonable consensus is also seen in the literature with respect to projected increases in extreme temperature events, including more frequent, longer, and more intense summer heat waves in the long term future compared to the recent past (USACE 2015).

Projections of precipitation found in a majority of the studies forecast an increase in annual precipitation and in the frequency of large storm events. However, there is some evidence presented that the northern portion of the Upper Mississippi Region will experience a slight decrease in annual precipitation. Additionally, seasonal deviations from the general projection patter have been presented, with some studies indicating a potential for drier summers. Lastly, despite projected precipitation increases, droughts are also projected to increase in the basin as a result of increased temperature and ET rates (USACE 2015).

A clear consensus is lacking in the hydrologic projection literature. Projections generated by coupling Global Climate Models (GCMs) with macro scale hydrologic models in some cases indicate a reduction in future streamflow but in other cases indicate a potential increase in streamflow. Of the limited number of studies reviewed here, more results point toward the latter than the former, particularly during the critical summer months (USACE 2015).

The trends and literary consensus of observed and projected primary variables noted above have been summarized for reference and comparison in the following figure (Figure 12) (USACE 2015).

The CEQ has issued draft guidance on how Federal agencies should consider the effects of greenhouse gas emissions and climate change in their evaluation of all proposed Federal actions. A Federal agency must (1) address the potential effects of a proposed action on climate as indicated by its greenhouse gas emissions; and (2) must discuss the implications of climate change for the environmental effects of a Recommended Plan. In terms of the Proposed Project Area, existing greenhouse gas emissions would be

temporary, short term, and primarily related to the emissions from gas and diesel fuel construction machinery. The amount of greenhouse gas emissions from construction activities is considered to be negligible due to the limited duration. Post-construction it is expected that greenhouse gas emissions would return to pre-construction levels in the Proposed Project Area. It is anticipated that the Proposed Action would have no significant effect on climate change resulting from greenhouse gas emissions.

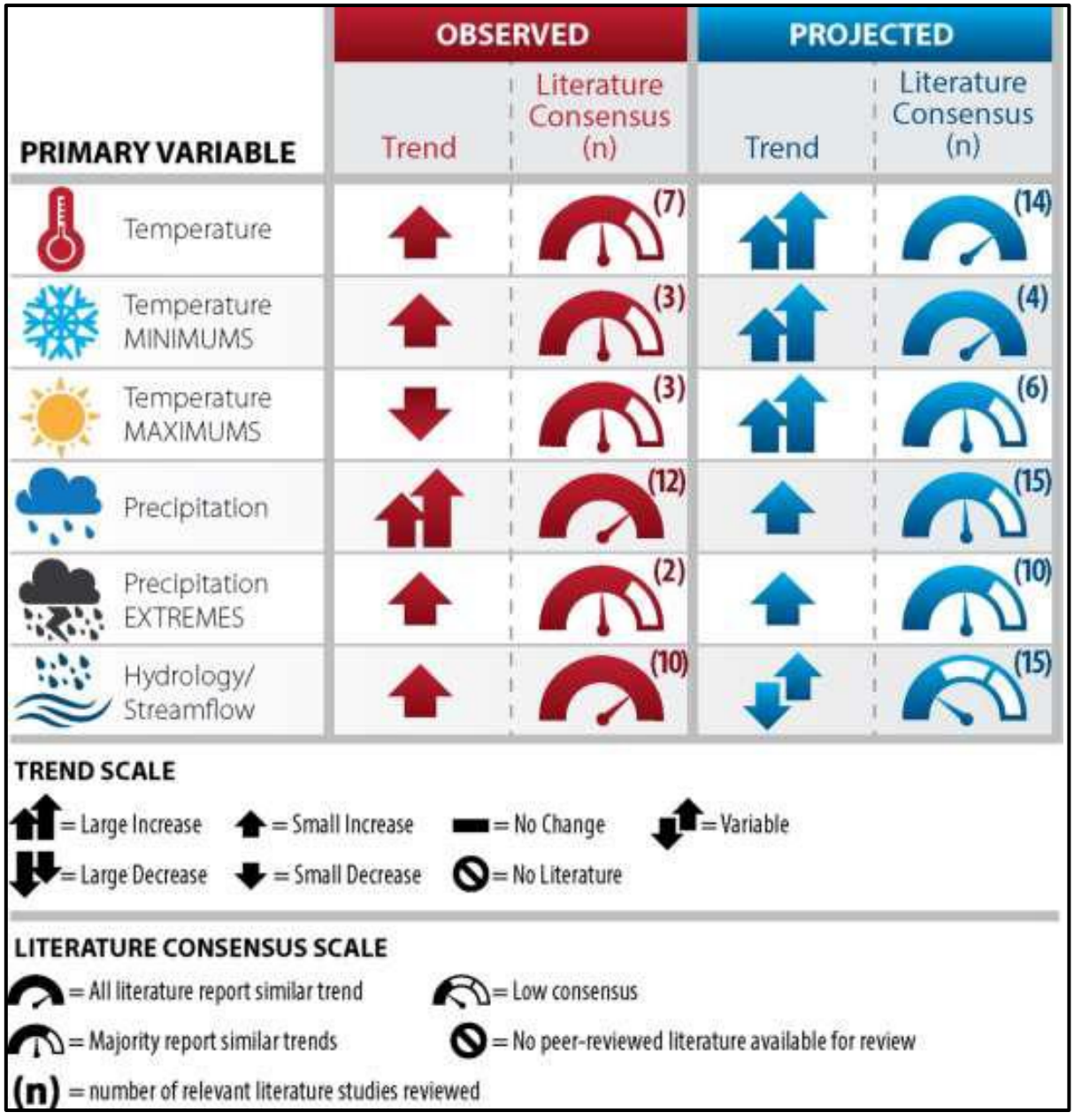

Figure 12. Summary matrix of observed and projected climate trends and literary consensus.

7 CUMULATIVE IMPACTS

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR Section 1508.7). Cumulative effects are defined as, "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Cumulative impacts are studied to enable the public, decision-makers, and project proponents to consider the "big picture" effects of a project on the community and the environment. In a broad sense, all impacts on affected resources are probably cumulative; however, the role of the analyst is to narrow the focus of the cumulative effects analysis to important issues of national, regional, or local significance (CEQ, 1997).

The Council on Environmental Quality (CEQ) issued a manual entitled "Considering Cumulative Effects Under the National Environmental Policy Act" (1997). This manual presents an 11 step procedure for addressing cumulative impact analysis. The cumulative effects analysis for the Proposed Action followed these 11 steps, shown in Table 5. The following subsections address scoping, the affected environment, and environmental consequences of the Proposed Action.

Table 5. CEQ's 11 step approach for assessing cumulative impacts.

CEQ's 11-Step Approach for Assessing Cumulative Impacts	
Component	**Steps**
Scoping	1. Identify resources
	2. Define the study area for each resource
	3. Define time frame for analysis
	4. Identify other actions affecting the resources
Describing the Affected Environment	5. Characterize resource in terms of its response to change and capacity to withstand stress
	6. Characterize stresses in relation to thresholds
	7. Define baseline conditions
Determining the Environmental Consequences	8. Identify cause-and-effect relationships
	9. Determine magnitude and significance of cumulative effects
	10. Assess the need for mitigation of significant cumulative effects
	11. Monitor and adapt management accordingly

Scoping – Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impacts of activities in and around Mark Twain Lake. Much of the pre-settlement landscape

of the Salt River basin was prairie, however western settlers quickly converted most of the land to agriculture. This prairie, once covered with massive expanses of native blue stem grass and roaming grounds for bison, elk and other wildlife, rapidly diminished with onset of row cropping and livestock grazing in the early 1800's. Narrow, ridge prairies were also found throughout the basin in upland areas between stream valleys, and wet, bottom-land prairies occurred on most floodplains. Wooded areas were usually limited to steeper hills and along streams. Currently, nearly 70% of the basin in used in some form of agriculture and nearly half of the land is cultivated for crops. Mineral resources contributed significantly to the economic development of the basin, included coal, sand and gravel, limestone, shale, and fire clay, but agriculture formed and continues to be the economic base of the basin (Dames and Todd, undated).

The most significant past action was the construction and development of Mark Twain Lake and Clarence Cannon Dam which began in 1970 and was completed in 1983. The dam impounds the upper Salt River about 63 miles upstream from its confluence with the Mississippi River. Approximately 165 miles of the river and its tributaries were inundated, and approximately 18,800 acres of various habitat types were lost as a consequence. Currently, the lake is surrounded by a thin band of degraded grasslands, wetlands, and upland and bottomland forest. Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative effects of activities in and around Mark Twain Lake. Past Actions include the construction and operation of the reservoir, management of the recreation sites surrounding the reservoir, and development of residential, commercial, and service industries throughout the area, in addition to the regional agricultural development. All of these actions and developments have had varying levels of impacts on the physical and natural resources in the region. The development for human use of Mark Twain Lake in the form of campgrounds and associated buildings, boat ramps, playgrounds, parking lots and the road network have had direct and indirect effects on local natural resources. For example, cumulative effects could relate to salts or chemicals used on local roads or within campgrounds or chemicals used in agriculture that leach to the Mark Twain area. Many of these developments have had beneficial impacts on the region's socioeconomic resources. In addition, many of the historic adverse impacts associated with development and urbanization such as wildlife habitat losses, changes in drainage patterns, and air and water pollution have been offset throughout the years by the resource stewardship efforts of the Corp, MDNR, MDC, and other management partners on the Mark Twain Lake project area. These efforts include conservation of unique ecological or cultural areas, park development, and outreach and education.

Describing the Affected Environment – Existing and future actions contribute to the adverse and beneficial cumulative impacts in and around the reservoir. As above, existing and future actions primarily include the operation and maintenance of the Mark Twain Lake management areas. The Mark Twain Lake Master Plan (updated 2015) is the strategic land use management document that guides the comprehensive management and development of all recreational, natural, and cultural resources located on fee and easement lands and waters at Mark Twain. In the case of the Proposed South Fork Island Erosion Protection project, adverse impacts are primarily associated with tree clearing required for construction of the stone haul road and staging areas. Conservation measures in the form of tree clearing restriction dates would be implemented to protect federally listed bat species. Beneficial impacts for culturally

sensitive material would accrue from the permanent protection provided by placing riprap over the two-acre site. No further road development is anticipated within the South Fork Recreation Area.

Determining the Environmental Consequences – Within the Mark Twain Project Area, adverse impacts are generally offset through resource stewardship efforts such as old field warm season grass management, and execution of upland forest ecosystem management plans. The programmatic approach to project management allows for future development plans and mitigation responses to be adapted to address actions that may involve adverse consequences such as the tree removal required for this haul road construction. This approach allows the USACE and other management partners at Mark Twain to continue to reduce the contribution of its activities to regional detrimental cumulative impacts to the environment and/or threatened or endangered species, through proactive actions and adaptive resource management strategies.

8 PERMITS

The Corps has verified that the project complies with Nationwide Permit (NWP) 13 for Bank Stabilization and NWP 27 for Aquatic Habitat Restoration, Enhancement, and Establishment Activities. The Corps does not permit itself when completing Civil Works projects, but the work must comply with existing general permits for various projects. Nationwide Permit NWP 27 is applicable because the work involves rehabilitation of the island's historical footprint as well as protecting signification cultural resources on Federal Lands. The project also complies with the Nationwide Permit 13 conditions for the proposed stone stabilization work; however, the project requires pre-construction notification (PCN) to State and Federal regulatory agencies since it exceeds 500-feet and an average of one cubic yard per running foot. A PCN (MVS-2020-189) was issued by the USACE Regulatory Branch on 28 May 2020 for a 15-day comment period. The Missouri Department of Natural Resources' (MDNR) Water Protection Program reviewed the PCN and stated that the department does not object to the issuance of a waiver due to the ecological and cultural resource benefits of the project and the level of detail provided in the PCN. Additionally, the Department concurs compensatory mitigation should not be required. Furthermore, MDNR stated that if all Missouri Clean Water Act Section 401 Water Quality Certification (WQC) 2017 General and Specific Conditions are met, with the exception of Condition 10, an individual WQC would not be required due to the benefits of the proposed project. No other agencies commented on the PCN.

9 RELATIONSHIP OF PLAN TO ENVIRONMENTAL REQUIREMENTS

The relationship of the Recommended Plan (Alternative 3 - Aggregate and Riprap Over the Island Site) to environmental requirements, environmental acts, and/or executive orders is shown in Table 6.

Table 6. Federal Policy Compliance Status.

Federal Policy	Compliance Status
National Environmental Policy Act, 42 USC 4321-4347	Partial[1]
Water Resources Development Acts of 1986, 1990, 2000 and 2007	Full
Migratory Bird Treaty Act of 1918, 16 USC 703-712	Full
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	Full
Resource Conservation and Recovery Act, 42 USC 6901-6987	Full
Farmland Protection Policy Act, 7 USC 4201-4208	Full
Endangered Species Act, 16 USC 1531-1543	Full
National Historic Preservation Act, 16 USC 470 et seq.	Partial[2]
Noise Control Act, 42 USC 7591-7642	Full
Clean Air Act, 42 USC 7401-7542	Full
Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities (EO 11282 as amended by EOs 11288 and 11507)	Full
Protection and Enhancement of the Cultural Environment (EO 11593)	Partial[2]
Floodplain Management (EO 11988 as amended by EO 12148)	Full
Protection of Wetlands (EO 11990 as amended by EO 12608)	Full
Protection and Enhancement of Environmental Quality (EO 11991)	Full
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	Full
Protection of Migratory Birds (EO 13186)	Full
Bald and Golden Eagle Protection Act, 42 USC 4151-4157	Full
Clean Water Act, 33 USC 1251-1375	Partial[2]
Rivers and Harbors Act, 33 USC 401-413	Full
Fish and Wildlife Coordination Act, 16 USC 661-666c	Partial[1]

[1] Full compliance after submission for public comments and signing of FONSI

[2] Required permits, coordination will be sought during document review

10 COORDINATION, PUBLIC VIEWS, AND RESPONSES

Notification of this Draft Environmental Assessment and unsigned Finding of No Significant Impact has been sent to the interested officials, agencies, organizations, and individuals listed below for review and comment (Table 7). Additionally, an electronic copy is available on the U.S. Army Corps of Engineers St. Louis District's website during the public review period at:

https://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/DraftEAMTLSouthForkIslandErosionProtection.pdf

Please note that the Finding of No Significant Impact is unsigned. These documents are to be signed into effect only after having carefully considered comments received as a result of the public review.

To assure compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable environmental laws and regulations, coordination with these agencies will continue as required throughout the planning and construction phases of the proposed South Fork Island Erosion Protection.

Table 7. Notification of availability of a draft Environmental Assessment and unsigned Finding of No Significant Impact has been sent to the following entities.

Federal Officials	
U.S. Senator Roy Blunt (MO) 260 Russell Senate Office Building Washington, DC 20510	U.S. Senator Joshua Hawley (MO) 212 Russell Senate Office Building Washington, D.C. 20510
U.S. Representative Sam Graves (MO District 6) 6079 County Road 425 P.O. Box 364 Hannibal, MO 63401	U.S. Representative Sam Graves (MO District 6) 1135 Longworth HOB Washington, DC 20515
State of Missouri Officials	
State Representative Jim Hansen MO House District 040 201 West Capitol Avenue Room 111 Jefferson City MO 65101	Representative Louis Riggs, District 005 Missouri House of Representatives 201 West Capitol Avenue Room 115-F Jefferson City, Missouri 65101
Senator Cindy O'Laughlin 201 West Capitol Avenue Room 226 Jefferson City, Missouri 65101	State Senator Jeanie Riddle Senate District 10 201 W Capitol Ave., Rm. 321 Jefferson City, Missouri 65101
Local Officials	
Mike Minor Monroe County Presiding Commissioner 300 N. Main Street Paris, Missouri 65275	Wiley Hibbard Ralls County Presiding Commissioner 311 S. Main Street New London, Missouri 63459

Federal Agencies	
John S Weber Deputy Project Leader U.S. Fish and Wildlife Service Missouri Field Office U.S. Fish & Wildlife Service 101 Park DeVille Dr., Suite A Columbia, MO 65203	James B. Gulliford, Regional Administrator US EPA, Region 7 (MO) 11201 Renner Blvd. Lenexa, KS 66219
State of Missouri Agencies	
Matt Vitello, P.E. Policy Coordinator Missouri Department of Conservation PO Box 180 Jefferson City, MO 65102	Missouri Department of Conservation Hannibal Conservation Office 8965 US-36, No. 1 Hannibal, Missouri 63401
Mark Twain State Park Missouri Department of Natural Resources 37352 Shrine Road Florida, Missouri 65283	Missouri State Highway Patrol, Troop B Water Patrol Division 308 Pine Crest Drive Macon, Missouri 63552
Local Information Providers	
Lake Gazette 304 S. Main St. Monroe City, MO 63456	Hannibal Courier Post 200 North 3rd Street Hannibal, Missouri 63401
Monroe County Appeal 230 N. Main St. Paris, Missouri 65275	Paris Public Library 101 North Main Street Paris, Missouri 65275
Monroe City Public Library 220 North Main Street Monroe City, Missouri 63456	
Local Chambers of Commerce	
Mark Twain Regional Council of Governments Mark Twain Lake Chamber of Commerce 42494 Delaware Lane Perry, Missouri 63462	Paris Area Chamber of Commerce 208 N. Main Street Paris, Missouri 65275
Environmental Groups	
The Nature Conservancy Missouri Field Office 2816 Sutton Blvd #2 St. Louis, MO 63143	Sierra Club, Osage Group 4804 Shale Oaks Drive Columbia, MO 65203
Native American Tribes	
Absentee-Shawnee Tribe of Indian of Oklahoma Governor John Johnson	Caddo Nation of Oklahoma Chairman Tamara Francis-Fourkiller
Citizen Potawatomi Nation, Oklahoma Chairman John Barrett	Delaware Nation, Oklahoma President Deborah Dotson

Delaware Tribe of Indians Chief Chester Brooks	Eastern Shawnee Tribe of Oklahoma Chief Glenna J. Wallace
Forest County Potawatomi Community, Wisconsin Chairman Ned Daniels	Hannahville Indian Community, Michigan Chairman Kenneth Meshigaud
Ho-Chunk Nation of Wisconsin President Marlon WhiteEagle	Iowa Tribe of Kansas and Nebraska Chairman Tim Rhodd
Iowa Tribe of Oklahoma Chairman Edward B. Kent, Jr.	Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas Chairman Lester Randall
Kickapoo Tribe of Oklahoma Chairman David Pacheco	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan Chairman Bob Peters
Miami Tribe of Oklahoma Chief Douglas Lankford	Nottawaseppi Huron Band of the Potawatomi, Michigan Chairman Jamie Stuck
Peoria Tribe of Indians of Oklahoma Chief Craig Harper	Pokagon Band of Potawatomi Indians, Michigan and Indiana Chairman Matt Wesaw
Prairie Band Potawatomi Nation Chairman Joseph Rupnick	Sac & Fox Nation of Missouri in Kansas and Nebraska Chairperson Tiauna Carnes
Sac & Fox Nation, Oklahoma Principal Chief Justin F. Woods	Sac & Fox Tribe of the Mississippi in Iowa Chairman Troy Wanatee
Shawnee Tribe Chairman Benjamin J. Barnes	The Osage Nation Principal Chief Geoffrey Standing Bear
The Quapaw Tribe of Indians Chairman John Berrey	United Keetoowah Band of Cherokee of Oklahoma Chief Joe Bunch
Absentee-Shawnee Tribe of Indians of Oklahoma Ms. Devon Frazier	Caddo Nation of Oklahoma Mr. Phil Cross
Citizen Potawatomi Nation, Oklahoma Ms. Kelli Mosteller	Delaware Nation, Oklahoma Ms. Erin Paden
Delaware Tribe of Indians Dr. Brice Obermeyer	Eastern Shawnee Tribe of Oklahoma Mr. Brett Barnes
Forest County Potawatomi Community, Wisconsin Mr. Michael LaRonge	Hannahville Indian Community, Michigan Mr. Earl Meshigaud
Ho-Chunk Nation of Wisconsin Mr. William Quackenbush	Iowa Tribe of Kansas and Nebraska Mr. Lance Foster
Iowa Tribe of Oklahoma Dr. Robert Fields	Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas Mr. Fred Thomas

Kickapoo Tribe of Oklahoma Mr. Kent Collier Historic Preservation Office	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan Mr. Lakota Pochedley Tribal Historic Preservation Officer
Miami Tribe of Oklahoma Ms. Diane Hunter Tribal Historic Preservation Officer	Nottawaseppi Huron Band of the Potawatomi, Michigan Mr. Douglas R. Taylor Tribal Historic Preservation Officer
Peoria Tribe of Indians of Oklahoma Mr. Logan Pappenfort Historic Preservation Office	Pokagon Band of Potawatomi Indians, Michigan and Indiana Mr. Matthew Bussler Tribal Historic Preservation Officer
Prairie Band Potawatomi Nation The Historic Preservation Office Tribal Council Member	Sac & Fox Nation of Missouri in Kansas and Nebraska Ms. Lisa Montgomery Environmental Protection Agency Director
Sac & Fox Nation, Oklahoma Mr. Chris Boyd NAGPRA/Historic Preservation Office	Sac & Fox Tribe of the Mississippi in Iowa Mr. Johnathan Buffalo Historic Preservation Office
Shawnee Tribe Ms. Tonya Tipton Historic Preservation Office	The Osage Nation Dr. Andrea Hunter Historic Preservation Office
The Quapaw Tribe of Indians Mr. Everett Bandy Tribal Historic Preservation Officer	United Keetoowah Band of Cherokee of Oklahoma Ms. Whitney Warrior Tribal Historic Preservation Officer
Other Entities	
Southwestern Power Administration Attn: Tyler Gipson 1 W 3rd St, Suite 1600 Tulsa, OK 74103	

11 LIST OF PREPARERS

Teri Allen, Ph.D.; Chief, Environmental Compliance Section; Aquatic Ecologist, USACE District
Lonnie Forrest, Natural Resource Specialist, Mark Twain Lake
Benjamin Greeling, Environmental Specialist, USACE District
Meredith Hawkins Trautt, M.S., RPA; Archaeologist and Tribal Liaison Assistant, USACE District
Christopher Koenig, M.A., RPA; Supervisory Archaeologist and Tribal Liaison, USACE District
Ben McGuire; Wildlife Biologist, USACE District
Allen Mehrer, Environmental Stewardship Program Leader, Mark Twain Lake
Adam Ramseyer, Project Manager, USACE District
Tyson Zobrist; Regulatory Project Manager, USACE District

12 LITERATURE CITED

Council on Environmental Policy (CEQ). 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Washington, DC. January.

Dames, HR, and BT Todd. Undated. Salt River Watershed Inventory and Assessment Document. Missouri Department of Conservation, Kirksville, MO; 64pp.

Greenberg, CH, RW Perry, CA Harper, DJ Levey, and JM McCord. 2011. The role of young, recently disturbed upland hardwood forest as high quality food patches. In: Greenberg, C.H., Collins, B.S., Thompson, F.R. (Eds.), Sustaining Young Forest Communities, Ecology and Management of Early Successional Habitats in the Central Hardwood Region, USA. Managing Forest Ecosystems 21. Springer Netherlands, Dordrecht, pp. 121-141.

Illinois Environmental Protection Agency. 2004. Artificial Structures for Fish Cover. Lake Notes, January 2004. http://www.epa.state.il.us/water/conservation/lake-notes/fish-cover.pdf

Ketzler, LP, CE comer, and DJ Twedt. 2018. Bat community response to silvicultural treatments in bottomland hardwood forests managed for wildlife in the Mississippi Alluvial Valley. Forest Ecology and Management 417:40-48.

Mark Twain Lake Chamber of Commerce. Website accessed 11 June 2020. (http://www.visitmarktwainlake.org/).

Missouri Department of Natural Resources (MDNR). 2020. 2020 Section 303(d) Listed Waters, (sorted by name) (Accessed: 01 May 2020).

Tews, J, U Brose, V Grinun, K Tielborger, MC Wichmann, M Schwager, and F Jeltsch. 2004. Animal species diversity driven by habitat heterogeneity/diversity: the importance of keystone structures. Journal of Biogeography 31: 79-92. http://dx.doi.org/10.1046/j. 0305-0270.2003.00994.x.

Twedt, DJ, and RR Wilson. 2007. Management of bottomland hardwood forests for birds. Proceedings of 2007 Louisiana Natural Resources Symposium. Louisiana State University AgCenter, Baton Rouge, Louisiana, USA, pp. 49-64.

U.S. Army Corps of Engineers (USACE). 2015. Recent U.S. Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions – Water Resources Region 07, Upper Mississippi. Civil Works Technical Report, CWTS-2015-13, USACE, Washington, D.C. http://www.corpsclimate.us/docs/rccvarreports/USACE_REGION_07_Climate_Change_Report_CWTS-2015-13_Lo.pdf

U.S. Environmental Protection Agency (USEPA). 2020. The Green Book Missouri Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Available at https://www3.epa.gov/airquality/greenbook/anayo_mo.html (Accessed: 15 May 2020).

U.S. Fish and Wildlife Service (USFWS). 2000. Biological Opinion for the Operation and Maintenance of the 9-Foot Navigation Channel on the Upper Mississippi River System, May 15, 2000.

U.S. Fish and Wildlife Service (USFWS). 2004. Final Biological Opinion for the Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study, August 2004.

U.S. Fish and Wildlife Service (USFWS). 2007. National Bald Eagle Management Guidelines.

U.S. Fish and Wildlife Service (USFWS). 2020. Wetlands Mapper. https://www.fws.gov/wetlands/data/Mapper.html (Accessed 27 April 2020).

U.S. Fish and Wildlife Service (USFWS). 2020. Information for Planning and Conservation (IPaC). https://ecos.fws.gov/ipac/ (Accessed 06 February 2020).

Villarini G, JA Smith, GA Vecchi GA. 2013. Changing Frequency of Heavy Rainfall over the Central United States. Journal of Climate 26:351-357.

FINDING OF NO SIGNIFICANT IMPACT

Mark Twain Lake South Fork Island Erosion Protection Project
Monroe County, Missouri

1. In accordance with the National Environmental Policy Act, I have reviewed and evaluated the documents concerning the proposed South Fork Island Erosion Protection Project at the South Fork Branch of Mark Twain Lake.

2. An island in the South Fork Branch of Mark Twain Lake is experiencing erosion due to wind and boat induced wave action and fluctuating lake levels, leading to exposure and disturbance of culturally sensitive material. The island has been at least minimally exposed every year since inundation, leading to further loss of island material with each event. USACE is proposing to implement a permanent protection strategy. The Tentatively Selected Plan would involve placing a uniform 6-12-inch thick layer of 3-inch riprap bedding over the island site, and capped it with a layer of 650 lb. top size riprap stone approximately 3-foot thick. Construction of a stone access road, approximately 1200-ft in length and 20-ft wide through an upland forested area would be needed to haul stone and equipment to the shoreline. Additionally, staging and stone loading areas would be constructed along the access road, and a floating plant would be used to transport material and equipment from the shoreline to the island site where protective stone placement would occur. The USACE has prepared this document in compliance with the National Environmental Policy Act and other relevant federal and state laws and regulations. This Environmental Assessment describes and analyzes the direct, indirect, and cumulative effects for the South Fork Island Erosion Protection Project at the South Fork Branch of Mark Twain Lake.

3. As part of this evaluation, I have considered:

    a. Existing Resources and Future without the Proposed Action - No Action Alternative.

    b. Impacts to Existing and Future Resources under Alternative 3 – Aggregate and Riprap Over the Island Site.

4. The possible consequences of these alternatives have been studied for physical, environmental, cultural, social and economic effects. Significant factors evaluated as part of my review include:

    a. The Proposed Action would meet the need for a permanent protection strategy that shields the culturally sensitive material on the eroding island from further exposure and disturbance.

    b. The Proposed Action would result in beneficial impacts to cultural and tribal resources.

    c. The Proposed Action would not adversely impact the physical environment (e.g., topography; geology; soils; prime and unique farmland).

    d. No significant impacts to the physical environment are anticipated, including land cover; water quality; air quality; or traffic and roadways).

e. The project would not adversely impact the socioeconomic environment (e.g., hydropower, aesthetics, noise, recreation; or demographics).

f. No significant impacts are anticipated to biological resources, including wetlands, bottomland hardwood forests, aquatic resources, or wildlife resources.

g. No disproportionately high and adverse human health or environmental impacts on minority populations or low-income populations would occur (environmental justice).

h. There are no significant hazardous or toxic waste (HTRW) issues anticipated.

i. The proposed work would have no effect upon significant known historic properties or archaeological resources.

j. No adverse impacts to federally threatened or endangered species are anticipated with implementation of the following Protective Measure listed in the EA:

- All required tree clearing activities shall take place between 1 October and 31 March in order to avoid impacts to Gray, Indiana, and Northern Long-eared Bats.

k. No significant climate change impacts are anticipated.

l. No significant cumulative impacts are anticipated.

5. Based on the disclosure of the Proposed Action's impacts contained within the Environmental Assessment, no significant impacts to the environment are anticipated. The Proposed Action has been coordinated with the appropriate resource agencies, and there are no significant unresolved issues. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with the South Fork Island Erosion Protection Project at the South Fork Branch of Mark Twain Lake as identified in this Environmental Assessment.

_____ _____

Date

Kevin Golinghorst
Colonel, U.S. Army
District Engineer