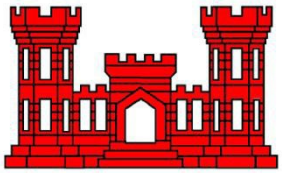
Mississippi Valley Division,
Regional Planning and Environment Division South

Yazoo Backwater Area Water Management Project

APPENDIX F-1 - Cultural Resources

November 2024

Appendix F-1
Cultural Resources



U.S. Army Corps of Engineers

CULTURAL RESOURCES DISCUSSION

The consideration of impacts to historic and cultural resources is mandated as part of the NEPA, which calls for the evaluation of a broad range of historic and cultural resources, including sites of religious and cultural importance to federally-recognized Tribal governments. While the National Historic Preservation Act (NHPA) specifically focuses more narrowly on historic properties. Cultural resources include historic properties, archeological resources, and Native American resources, including sacred sites and traditional cultural properties. They are a broad pattern of material and non- material sites or objects that represent contemporary, historic, and pre-historic human life ways or practices. Common cultural resource sites include prehistoric Native American archeological sites, historic archeological sites, shipwrecks, and structures such as bridges and buildings. Historic properties have a narrower meaning and are defined in § 101(a)(1)(A) of the NHPA; they include districts, sites (archaeological and religious/cultural), buildings, structures, and objects that are listed in or determined eligible for listing in the National Register of Historic Places (NRHP). Historic properties are identified by qualified agency representatives in consultation with the State Historic Preservation Officer (SHPO), Tribes, and other consulting parties.

USACE staff conducted a literature and records review of the National Register of Historic Places (NRHP) database, the Mississippi Department of Archives and History (MDAH), online Mississippi Historic Resources Inventory Historic Resources Inventory Map (MDAH Website), historic aerial photography, historic map research, and a review of cultural resources survey reports between March and April of 2024 to collect data pertaining to cultural resources identified within the Yazoo Study Area as well as within and adjacent to the proposed borrow area, pump, and supplemental low flow groundwater well locations (Cultural Appendix Figures 1 and 2; Tables 1-4). Research focused on previously conducted cultural resources inventories in the vicinity of the project area, archeological sites, and cemeteries located within the project area and recorded standing structures and NHRP properties situated within the Yazoo Study Area as well as within or adjacent to the above listed areas. Records were examined generally in a 1-mile radius of the proposed borrow area, pump, and supplemental low flow groundwater well locations. Results of this cultural resources assessment were extensive due to the large geographic area. A summary of the report findings is contained in this Cultural Resources Appendix. In summary, approximately 1,252 cultural resources were identified in the Yazoo Study Area, with an additional 179 cultural resources identified within a 1-mile radius of the proposed borrow area, pump, and supplemental low flow groundwater well locations (see Cultural Appendix Table 4. These resources were identified and recorded primarily in association with Section 106 compliance studies or private and avocational efforts).

According to records on file at the MDAH, of the 792 archaeological resources within the study area, approximately 46.4% (n=368) were noted as ineligible for listing to the National Register, 35.9% (n=284) were noted as undetermined for National Register listing, and 17.7% (n=140) were noted as listed or eligible for listing to the National Register (see

Cultural Appendix Figures 1 & 2; Tables 1 & 2). Of the 119 archaeological resources identified within a 1-mile radius of the proposed borrow area, pump, and supplemental low flow groundwater well locations, 39.5% (n=47) noted as ineligible for listing to the National Register, 37.8 % (n=45) were noted as listed/eligible for listing to the National Register, and 22.7% (n=27) were noted as undetermined for National Register listing (see Cultural Appendix Tables 1-3).

Table 1. Known archaeological resources within the Yazoo Study Area.

County	Total No. Sites	Eligible Sites	NRHP-Listed Sites
Humphreys	129	26	3
Issaquena	126	29	3
Sharkey	192	39	5
Warren	13	2	0
Washington	232	24	1
Yazoo	100	6	2
TOTALS	792	126	14
County	Unevaluated Sites	Ineligible Sites	Sites below 90-Ft. Elevation
Humphreys	55	45	0
Issaquena	41	53	5
Sharkey	40	108	2
Warren	5	6	0
Washington	102	105	1
Yazoo	41	51	1
TOTALS	284	368	9

Table 2. Known archaeological resources within and adjacent to the proposed borrow area, pump, and supplemental low flow groundwater wells.

County	Total No. Sites	Eligible Sites	NRHP-Listed Sites
Bolivar	62	24	0
Coahoma	21	10	1
Issaquena	1	1	0
Warren	11	3	1
Washington	24	4	1
TOTALS	119	42	3
County	Unevaluated Sites	Ineligible Sites	Sites below 90-Ft. Elevation
Bolivar	10	28	0
Coahoma	6	4	0
Issaquena	0	0	0
Warren	7	0	0
Washington	4	15	0
TOTALS	27	47	0

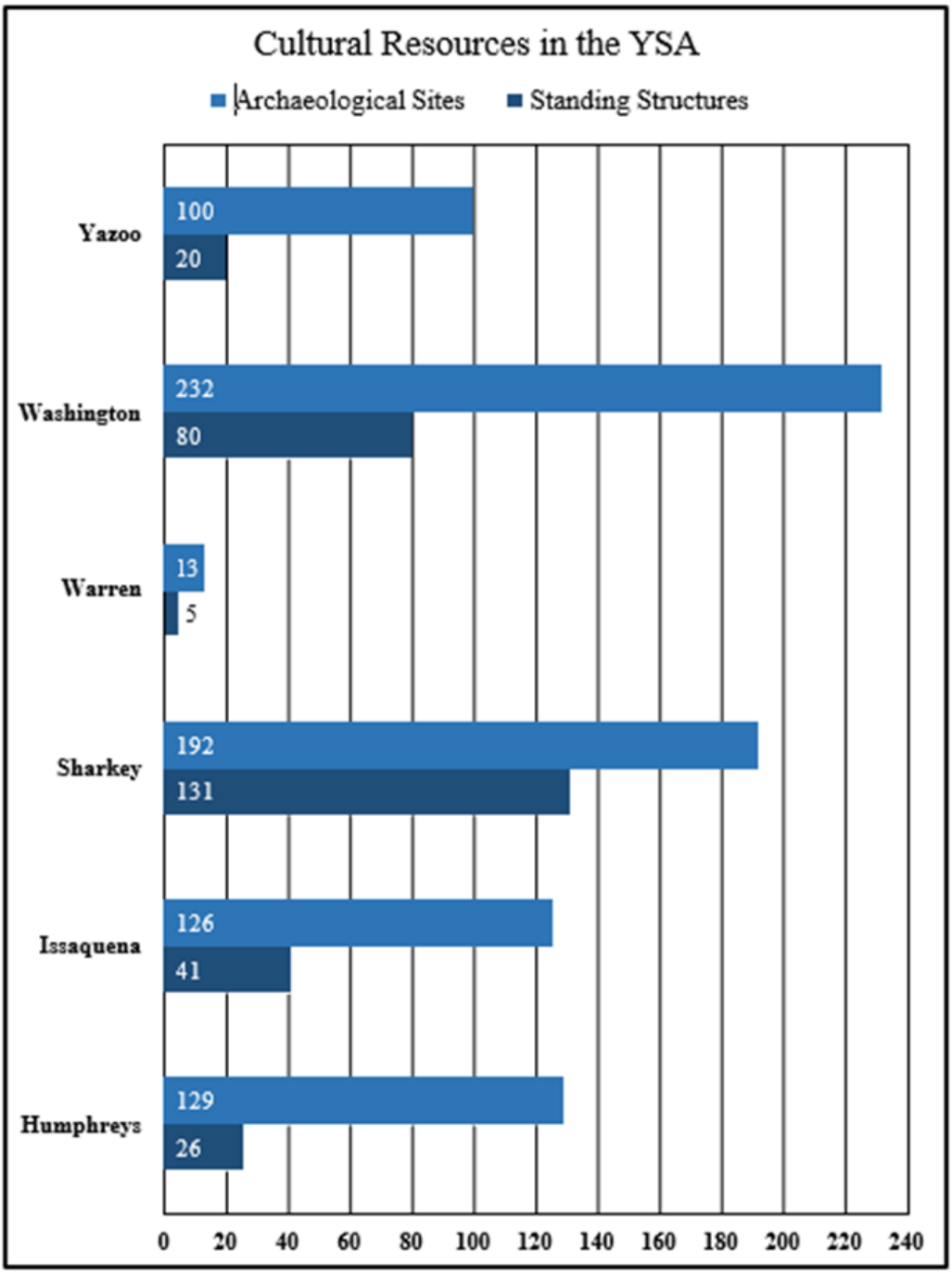


Figure 1. Cultural Resources in the YSA.

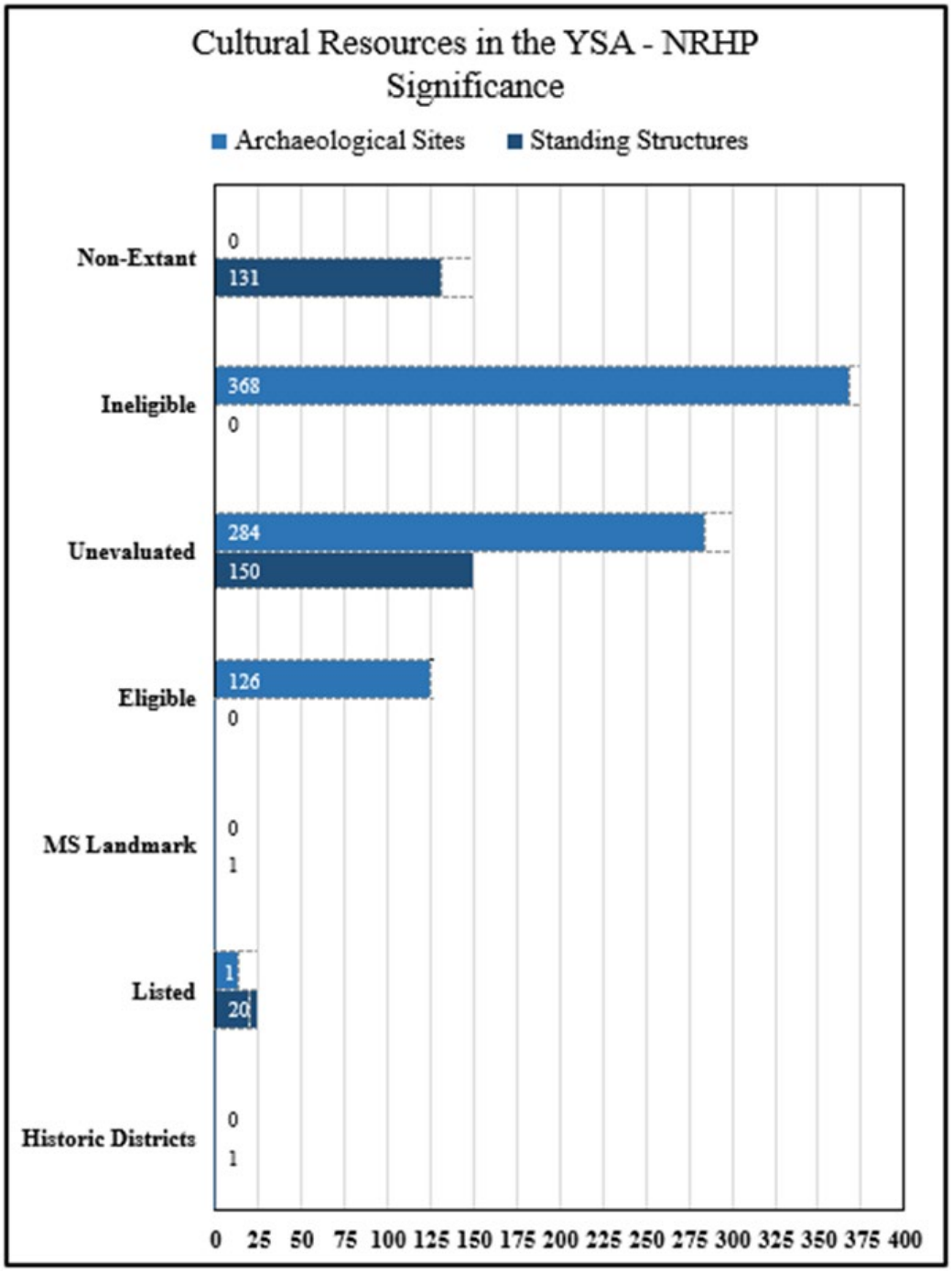


Figure 2. Cultural Resources in the YSA by NRHP Significance.

Table 3. Known standing structures within the Yazoo Study Area.

County		Historic Districts	NRHP-Listed Sites	Mississippi Landmarks
Humphreys		0	0	0
Issaquena		0	2	0
Sharkey		0	1	1
Warren		0	0	0
Washington		1	17	0
Yazoo		0	0	0
TOTALS		1	20	1
County		Unevaluated Properties	Non-Extant	Total No. Properties
Humphreys		13	13	26
Issaquena		28	11	41
Sharkey		82	47	131
Warren		1	4	5
Washington		13	49	80
Yazoo		13	7	20
TOTALS		150	131	303

Table 4. Known standing structures within and adjacent to the proposed borrow area, pump, and supplemental low flow groundwater wells.

County	Historic Districts	NRHP-Listed Sites	Mississippi Landmarks
Bolivar	0	1	0
Coahoma	0	1	0
Issaquena	0	0	0
Warren	0	2	0
Washington	0	1	0
TOTALS	0	5	0

County	Unevaluated Properties	Non-Extant	Total No. Properties
Bolivar	19	6	26
Coahoma	2	8	11
Issaquena	0	0	0
Warren	4	3	9
Washington	12	1	14
TOTALS	37	18	60

Furthermore, of the 303 historic properties within the study area, 49.5% (n=150) were noted as undetermined for National Register listing, 43.3% (n=131) were noted as no longer extant, 6.6% (n=20) were noted as listed or eligible for listing to the National Register, 0.3% (n=1) was noted as a designated Mississippi Landmark, and 0.3% (n=1) were noted as an existing Historic District (see Cultural Appendix Table 3). Of the 60 historic properties identified within a 1-mile radius of the proposed borrow area, pump, and supplemental low flow groundwater well locations, 61.7% (n=37) were noted as undetermined for National Register listing, 30% (n=18) were noted as no longer extant, and 8.3% (n=5) were noted as listed or eligible for listing to the National Register (see Cultural Appendix Figure 1 & 2; Table 4).

These resources span the full range of occupation of the Yazoo Basin and are composed of buildings, structures, sites, Mississippi Landmarks, National Historic Landmarks, and a single historic district. They include pre-contact and contact period Native American mound sites, cemeteries related primarily to plantation development or historic church yards, historic archaeological sites, and several prominent national historic landmarks, namely Lake George/Holly Bluff and Fort St. Pierre sites in Yazoo County and Winterville Mounds in Washington County, Mississippi. There are 332 such resources within the Yazoo Study Area and near project locations in Washington County, 319 in Sharkey County, 168 in Issaquena County, 155 in Humphreys County, 120 in Yazoo County, 88 in Bolivar County, 38 in Warren County, and 32 in Coahoma County (see Cultural Appendix Figures 1 & 2; Tables 1-4). To have a context to evaluate the significance of the resources and to appreciate the frequency of some types of cultural resources, a concise summary of the cultural history of the central and Yazoo Basin is presented below.

Central and Lower Mississippi Valley Cultural History

Cultural and historic resources are past and present expressions of human activity across the landscape. What follows is a description of the various cultural periods derived primarily from comprehensive state plans prepared by the region's various SHPO and academic communities. Material cultures of the east and west became distinct early in North American prehistory, represented by the pan-continental Clovis culture (circa 9500-9000 B.C.), characterized by semi-nomadic hunters following large game animals across a landscape consisting of a series of interwoven, braided streams, within which were small prairies. As the climate warmed to one more characteristic of today's climate around 8000 B.C., the region's indigenous populations became increasingly more sedentary and socially and culturally complex, as expressed in food production and storage, material culture/technology, cultural features, and architecture. Across the Mississippi River Valley, this transformation from "simple" to "complex" societies took place over the next eight to ten thousand years and has been subdivided into different periods based upon various technological, social, subsistence, and settlement criteria: the Archaic (circa 8000 – 1000/500 B.C.), Woodland (1000/500 B.C. – A.D. 900/1000), and Mississippian (A.D. 900/1000 – 1500/1550) (Cultural Appendix Table 5).

Table 5. Cultural timeline of the Yazoo Study Area.

Historic	Modern Era (post A.D. 1941) Pre World War II (A.D. 1900-1941) Reconstruction and Recovery (A.D. 1865-1900) Civil War (A.D. 1861-1865) Antebellum (A.D. 1818-1860) Colonial Territorial (A.D. 1680-18117)	
	Protohistoric (A.D. 1550-1680)	*Plaquemine (A.D. 1200-1700)*
Prehistoric	Mississippian (A.D. 1000-1550)	*Plaquemine (A.D. 1200-1700)*
	Late Woodland (A.D. 500-1000)	*Miller III Culture (A.D. 700-1100)* *Coles Creek Culture (A.D. 600-1050)* *Plum Bayou Culture (A.D. 600-1000)* *Troyville Culture (AD. 490-1100)* *Baytown Culture (A.D. 300-700)* *Miller II Culture (A.D. 300-700)*
	Middle Woodland (100 B.C.- A.D. 400/450)	*Miller I Culture (A.C. 100 B.C. -A.D. 200)* *Marksville Culture (200 B.C. -A.D. 400)*
	Early Woodland (500-0 B.C.)	*Tchefuncte Culture (600-200 B.C.)*
	Late Archaic (200-500 B.C.)	*Poverty Point Culture (1730-1250 B.C.)* *Jaketown Culture (1800-1000 B.C.)*
	Middle Archaic (6000-2000 B.C.) Early Archaic (8000-6000 B.C.)	
	Paleoindian (10,000-8000 B.C.)	

The trend toward greater regional specialization and adaptation initiated during the Archaic period continued and resulted in distinct cultural adaptations expressed as individual cultures. Significant and influential cultural traditions that merit special mention during the last 4,000 years of prehistory include the production of ceramic vessels (Early Woodland [800/500 B.C. – 0 B.C.]), widespread use of the bow-and- arrow (Late Woodland [A.D. 400-1000]), and the following traditions: Poverty Point (Late Archaic [1730 – 1250 B.C.]), Hopewell (Middle Woodland [100 B.C. – A.D. 500]), and Cahokia (Mississippian [A.D. 1000 – 1300]). Poverty Point (which spanned much of the Lower Mississippi Valley, to include parts of Louisiana, Mississippi, and Arkansas) and Hopewellian ways of life (which spanned most of the eastern and mid- western United States) are distinguished by sites containing substantial amounts of tools and ornaments made from nonlocal lithic sources received by peoples living in the major trading and manufacturing areas, who then converted the materials into products and exported them through local and regional exchange networks.

After circa A.D. 1000, the many regional cultural traditions coalesced into a single community heralding the redefinition of society (Mississippian period), which was characterized by an increase in population, larger, fortified towns, flat-topped, pyramidal earthen mounds, large ceremonial centers and more highly stylistic shell- tempered pottery spread out of the site now known as Cahokia, the largest Mississippian site in North America, located near St. Louis, Missouri. From there, these characteristics spread in all directions along the river systems to much of the Southeast, Midwest, and Midsouth regions, though there remained some regional variants that did not subscribe to Cahokian lifeways.

The DeSoto Entrada of 1540-1541 represents the first appearance of Europeans in the assessment area, but this intrusion was not followed by later explorers moving along the Mississippi River until A.D. 1673 and after. This limbo period is commonly referred to as Post-Contact/Protohistoric period. Social and political instability follows the initial encounter with Europeans, spreading undocumented epidemics among the indigenous populations and prompting the mass movement and migration of many native groups, often into areas that were not previously occupied or vacated by decimated and now transitory native populations. The upheaval in native communities may have been exacerbated by changing climatic conditions across the eastern United States that were consistently cooler with inconsistent rainfall patterns that affected settlement patterns and food availability between A.D. 1300 and 1850.

During the period of European Colonization, roughly A.D. 1680 to 1763, the assessment areas remained home to many native groups while European powers pursued control of the Mississippi River. In the beginning of the period, the entirety of the assessment areas was claimed as a portion of New France, a vast area centered on the Saint Lawrence and Mississippi Rivers, Great Lakes, and other major tributary rivers explored and claimed by France. After a series of conflicts during the mid-1700s, the assessment area transitioned to British or Spanish control following the French and Indian War (1763), before ultimately passing to the United States in the 1783 Treaty of Paris and the Louisiana Purchase (1803). While initially concentrated along the major waterways and slow in its spread, European settlement following the French and Indian War rapidly intensified, particularly in the Lower Mississippi River Valley (LMRV), bringing with it expansion of public infrastructure, establishment of more communities, development of industry and a regional economic system that included the use of major rivers to transport goods, establish a national banking system, and ship supplies and goods to an ever-increasing network of regional markets. Further expansion occurred after the Louisiana Purchase in 1803, and with it, industrial improvements, including the crystallization of sugar, the cotton gin, and the steam engine that helped spur the growth and diversification of the region’s economy and demographics through the establishment and growth of sugar and cotton plantations, which created intensive labor demands of large numbers of enslaved peoples.

Indigenous groups suffered drastic decreases in population and territory during the 1700s and early-1800s as they adjusted to increasingly complex commercial, political, and social interactions with first the French and Spanish, then the British, and ultimately the Americans. Native population losses resulted in fewer villages through time, native economies grew increasingly dependent on trade, raiding livestock, hunting and fishing, and in some cases

employment on ranches and farms owned by peoples of European descent. There was a general trend away from traditional farming practices and lifeways. Relations remained tense between the settlers and the native inhabitants, prompting many eastern groups to seek new lands to the South and West, some even crossing the Mississippi River. Demands by the rapidly growing settler population for the removal of these indigenous groups resulted in the drafting and signing of several treaties, primarily during the first three decades of the 1800s, culminating in the constriction and eventual loss of ancestral lands and relocation of most native groups west of the Mississippi River, freeing these lands for U.S. settlement.

The Civil War (1861-1865) radically transformed many segments of the multi-ethnic social, economic, and political structure, leading to new shifts in settlement and commercial production, such as timber harvesting and the oil industry, as evidenced through examination of historic cartography (United States Geological Survey [USGS] quadrangle maps, military maps, Government Land Office plats, county and parish soils surveys, transportation atlases, etc.). Most of these trends continued to develop during the late A.D. 1800s through the 1900s, greatly altering earlier configurations of settlements, industries, economies, and natural landscape features with accompanying overland infrastructure growth and connectivity.

While agriculture industrialized along the Mississippi River, the “Great Flood of 1927” inundated over 26,000 square miles of land across the alluvial valley. In response, Congress directed the USACE to develop a flood damage reduction system intended to prevent such massive flooding. The current series of proposed work items are phases of the MR&T Project authorized by Congress in the Flood Control Act of 1928. The decision to construct this civil works project has shaped the physical and economic environment of the LMRV from the 1930s to the present. With the intensification of agriculture, the development of extractive industries, and the co-location of refining facilities along the banks of the river, small-scale land use by individual farmers or traditional use by Native American peoples has become infeasible. Human occupation, mostly of European or African extraction, nucleated around industry and large-scale framing. Native Americans, who had not already been removed in the 1800s, were concentrated on comparatively small reservations on the margins of the fertile lands of the alluvial valley. The current land-use patterns were set in place. As in all previous periods, the Mississippi River played a central role in shaping the habitation of the landscape.

Cultural Analysis

Data pertaining to cultural resources identified within the Yazoo Study Area as well as within and adjacent to the proposed borrow area, pump, and supplemental low flow groundwater well locations, should they be a part of the project, was incorporated into a GIS platform in order to analyze the spatial distribution of cultural resources against plotted flood spatial coverage layers associated with the various alternatives: Alternatives 1 [No Action]; 2 (90.0 ft during crop season [16Mar-15Oct] and up to 93.0 ft during non-crop season [16Oct-15Mar]); 3 (90.0 ft during crop season [25Mar-15Oct] and up to 93.0 ft during non-crop season [16Oct-24Mar]); Alternative 4: Non-Structural 100-year frequency flood event [99.1 feet]; and

(Cultural Appendix Figures 3-5; Tables 6 and 7). Below are brief discussions of the analyses of these frequency events.

For the purposes of this analysis, cultural resources refer to both above (standing structures) and below ground (archaeological) resources as distributed across the entirety of the study area. For a resource to be counted within the extent or reach of these modeled flood events, it must either be fully located (directly impacted) or partially located (within 200-feet of the limits) (indirectly impacted) of the plotted layer. These resources have been inventoried by geographical location, each enumerated by a unique trinomial designation that corresponds to its county (archaeological) or county and nearest adjacent community (standing structures). As such, it is expected those counties accounting for the larger amounts of acreage within the study area will possess the higher counts, namely Issaquena and Sharkey counties. Additionally, the southern half of the study area exhibits greater and more consistent evidence of flooding impacts in all the flood frequency events, undoubtedly a result of the proximity of the Mississippi River and its confluence with the Yazoo River. Additionally, this analysis utilizes known data, which has been sporadically and inconsistently collected from across the study area.

Alternative 1: No Action Alternative

Physical impacts from flooding are numerous and impact cultural resources to varying degrees depending on the type of resource. For archaeological sites, this includes but is not limited to the following: direct physical damage from floating materials; destruction/loss of artifacts during flooding; soil destabilization/ shifting (ground heave, landslide, etc.); damage to unexcavated artifacts and site integrity from direct force of water; and erosion to site deposits from overflow and development of new flood channels over the site surface. Impacts to historic properties include but are not limited structural collapse from moving force of floodwaters; sewage backup and overflow leading to saturation, and related flooding contamination and damage; loss of structural integrity from hydrostatic force of standing water; and damage to utilities. These impacts would continue, likely at an ever-increasing rate given the growing intensity and frequency of natural (i.e. weather) and human-induced events (i.e. development). Post-flood conditions also have the potential to result in impacts to cultural resources beyond the direct effects of flooding and the movement of water. All types of cultural resource, known and unknown/unrecorded, would be subject to damage inflicted from post-flood clean up and construction needed to access and remove flood debris directly from or adjacent to a resource area. Post-flood potential for displacement and relocation of deposits/elements/materials ultimately results in the loss of integrity or a misrepresentation of the cultural history of a given area, both of which affect research potential. For historic properties, these post-flood impacts could also include the following: increased risk of rot, fungal/insect attack, mold and mildew from prolonged exposure to standing water; swelling/distortion of wooden building materials and architecture features; spalling, weathering of wood, brick, and stone materials during drying; and corrosion of external masonry and metal architectural elements/features. Flood waters, especially combined with torrential rain, can have catastrophic effects on buildings, infrastructure, businesses, and families. Exposure (animal, insect, vegetation), humidity, and moisture, humidity result in changes to accessibility and visibility. In fact, the entirety of the cultural

landscape has the potential to be impacted in the long- and short-term historic agricultural landscape.

Additionally, as precipitation rates increase and extensive flooding becomes more frequent and pervasive, there are long-terms, cumulative impacts to cultural resources. Some include the following: increased pressure to relocate or elevate structures, and/or surrounding structures (may also be pre-flood)' wash out or damage to roads, trails, and landscape features leading to and servicing cultural resources, namely National Historic Landmarks and Mississippi Landmarks, leading to additional long- term maintenance needs and corporation with state and federal transportation agencies; decline/disappearance of important vegetation species, other species favored; and loss of cultural landscape features. Ultimately, without enacting any of the proposed features, the above conditions will persist and continue to pose greater impacts to cultural resources in proportion to the escalating intensity and frequency of flood episodes.

Alternatives 2 (90.0 ft during crop season [16Mar-15Oct] and up to 93.0 ft during non- crop season [16Oct-15Mar]); voluntary property acquisition of structures up to 90' elevation and voluntary acquisition up to 93' elevation) and 3 (90.0 ft during crop season [25Mar-15Oct] and up to 93.0 ft during non-crop season [16Oct-24Mar]); voluntary property acquisition of structures up to 90' elevation and voluntary acquisition up to 93' elevation). The pump station is proposed as a means to reduce flooding in the YSA when the Mississippi River is high without draining the entire region. As such, the pump is designed to operate at specific and annual/seasonal ranges in concert with the prescribed 2-year and 5-year flood events. While there were several Register-eligible and significant cultural resources within this 1.6-kilometer (1- mile) search radius, none were located within 300 meters (984 feet [0.19 miles]) of the above listed locations. Intensive cultural resource survey will be conducted over these locations and their Area of Potential Effect to identify all cultural resources. Survey methods will include remote-sensing technologies, e.g., satellite and low aerial imagery, as well as conventional ground-truthing methods, e.g., surface reconnaissance, systematic and judgmental shovel testing and dry-screening, soil coring, etc.

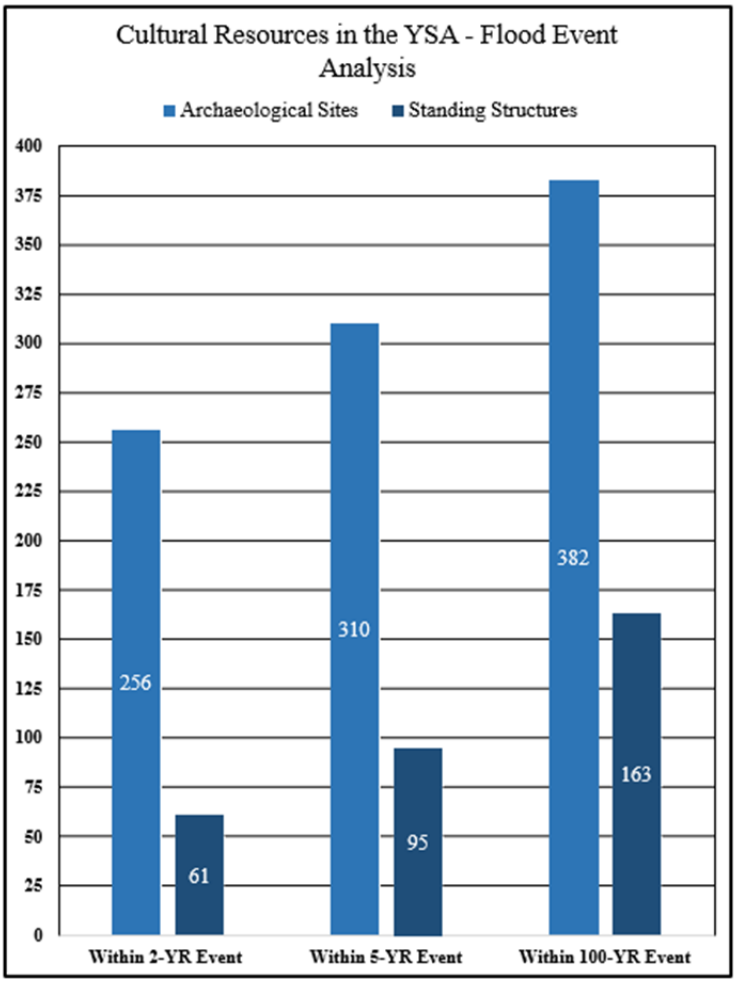


Figure 3. Cultural Resources in the YSA - Flood Event Analysis.

Post-flood impacts remain a source of serious damage to cultural resources despite the reduction in coverage and intensity of the episodic flooding resulting from Alternative 2 (see Morgan et al. 2016). Additional consideration must be taken for the long-term operation, maintenance, and access of these work areas as well as impacts resulting from repair, replacement, relocation, or expansion activities, activities that extend well into the foreseeable future. Other indirect impact considerations include short-term effects associated with construction activities, including ground disturbance required to construct the various project components such as access roads, utility installation. Construction activities could create noise and vibration that would affect archaeological resources and stockpiling construction materials and equipment could cause short term visual effects.

Following completion of the Section 106 process, should any cultural resources be discovered during project implementation, work shall cease in that area until an archeologist can assess the situation and initiate proper consultation under provisions outlined under Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S. Code 470). Efforts will be taken to either preserve the significant resources in place or mitigate appropriately for any adverse effects created by the undertaking. The regulations of the

CEQ, governing implementation of the procedural provisions of the NEPA, direct agencies preparing environmental assessments to consider whether the action they are reviewing is related to other actions with … cumulatively significant impact. (40 CFR 1508.27(b)(7)). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impacts of post-flood impacts to cultural resources are difficult to assess and consider; however, there are long-term impacts that can be foreseen and most therefore be discussed.

2-Year Flood Event (90.0 feet)

According to the flood extent GIS data, some 61 standing structures and 256 archaeological resources and have been identified across the study area in association with this flood event (see Cultural Appendix Figures 3-5; Tables 6 & 7). The proposed well sites were excluded from this analysis given their much higher elevations (an average elevation in excess of 100 feet). Analysis focused on the principal study area in greater proximity to the proposed borrow area and pump site locations. These numbers represent the fewest number of cultural resources impacted by these modeled flood events. Implementing the structural feature of the project with water levels managed at the 90' elevation (crop season), the distribution of those 256 archaeological resources falling or below this elevation are as follows: Sharkey (n=79 [31 percent] and Washington (n=59 [23 percent]) Counties, respectively, together representing a combined 54 percent [n=138] of the total. The remainder consist of approximately 21 percent (n=54) from Yazoo County, 15 percent (n=37) from Humphreys County, 8 percent (n=21) from Issaquena County, and 2 percent [n=6] from Warren County (see Cultural Appendix Figure 3; Table 6). These 256 archaeological resources represent nearly a third (32 percent) of the total archaeological inventory for the YSA, so the majority (n=536 [68 percent]) of archaeological resources lie above the impact zone of this flood event, meaning the potential effects and impacts from flooding would be lessened or minimized with project implementation under this operational condition.

Table 6. Archaeological resources within the 2-Year (at/below 90-ft elevation), 5-Year (at/below 93-ft. elevation) and 100-Year (at/below 99-ft elevation) Flood Events.

County	Within 2-YR Event	Within 5-YR Event	Within 100-YR Event	Average Elevation
Humphreys	37	41	50	104.9
Issaquena	21	25	36	98.8
Sharkey	79	85	107	99.0
Warren	6	8	11	95.5
Washington	59	79	80	107.5
Yazoo	54	72	98	96.4
TOTALS	256	310	382	100.3

Comparisons of these numbers against the archaeological totals in the YSA indicate that slightly over half of the total number of archaeological resources inventoried in the Yazoo County portion of the YSA (n=54 [54 percent]) are impacted by the 2-year flood event. Slightly smaller proportions of archaeological resources were impacted by the 2-year flood event for Warren (n=6 [46 percent]) and Sharkey (n=79 [41 percent]) Counties. The remainder consist of significantly smaller numbers for Humphreys (n=37 [29 percent]), Washington (n=59 [25 percent]) and Issaquena (n=21 [17 percent]) Counties, respectively (see Cultural Appendix Figure 4; Table 6). The spatial distribution of these numbers indicates archaeological resources across the central, east-central, and south/southeastern portions of the YSA are the most impacted, followed by the northeastern and northwestern, and lastly the west-central portions.

Within this set of 256 archaeological resources, the breakdown of NHRP eligibility significance determinations are as follows: Ineligible (n=128 [50%]), Unevaluated/unknown (n=86 [34%]), Eligible (n=37 [14%]), and Register-Listed (n=5 [2%]). Not surprisingly, most of the archaeological resources within the study area are of either Ineligible or Unevaluated/unknown eligibility (n=214 [84%]), with an expected small number of significant resources (Eligible and Register-Listed [n=42 {16%}]). Most of the Unevaluated/unknown (n=71 [83%]) and Ineligible (n=98 [77%]) archaeological resources were noted in the Sharkey, Washington, and Yazoo county portions of the study area; conversely, most of the Eligible (n=21 [57%]) and Register-Listed (n=3 [60%]) archaeological resources in the study area were noted in Issaquena and Sharkey counties (see Cultural Appendix Figure 5; Table 7). Some 536 archaeological resources lie above this elevation reach, meaning that potential flood impacts would be lessened/minimized with project implementation under this operational condition. Comparisons by county are as follows: Issaquena County (n=105 [83 percent]), Washington County (n=173 [75 percent]), Humphreys County (n=92 [71 percent]), Sharkey County (n=113 [59 percent]), Warren County (n=7 least impacted, followed by the central).

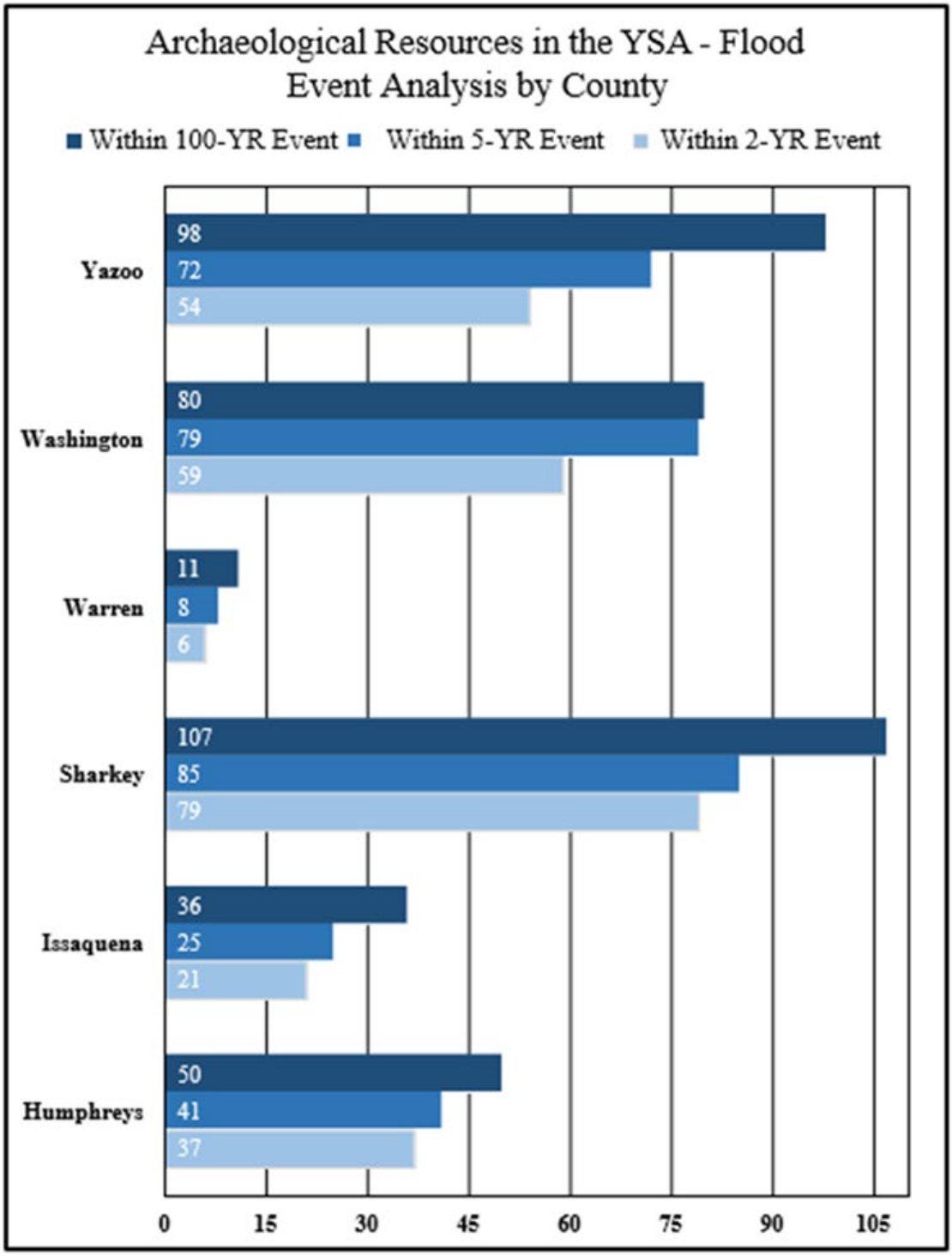


Figure 4. Archaeological Resources in the YSA - Floodplain Analysis by County

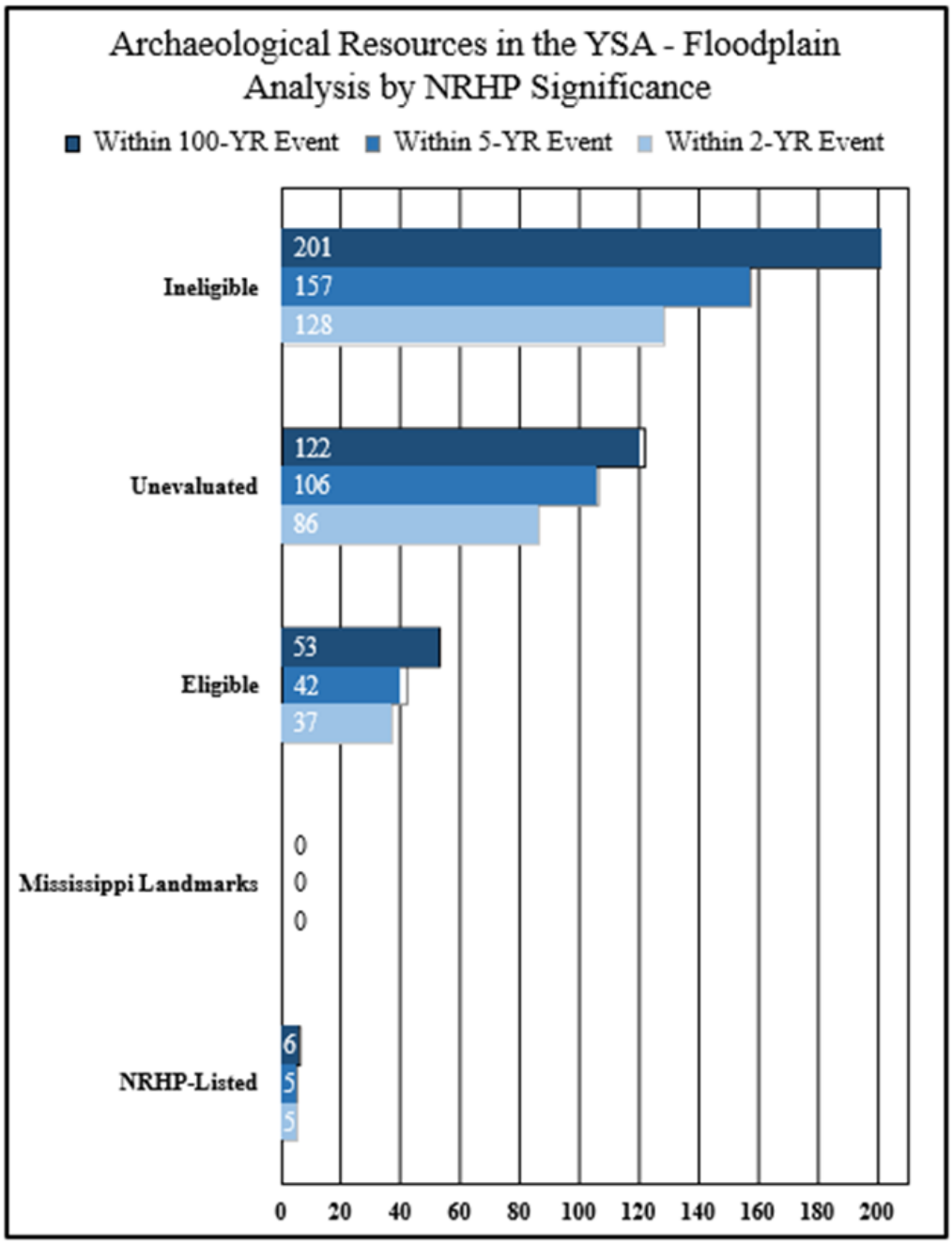


Figure 5. Archaeological Resources in the YSA - Floodplain Analysis by NRHP Significance.

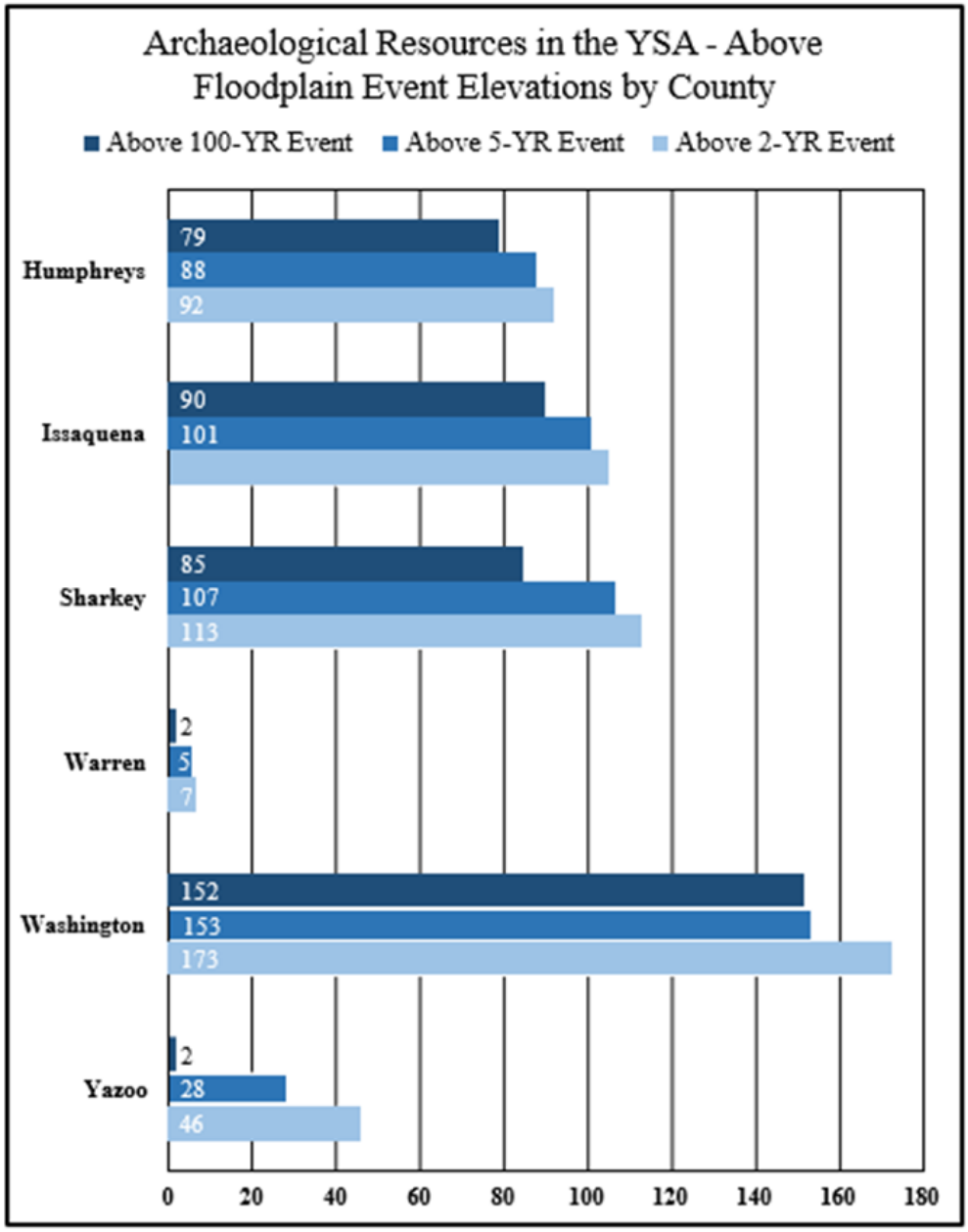


Figure 6. Archaeological Resources in the YSA - Above Floodplain Event Elevations by County.

Table 7. Archaeological resources within the 2-Year Flood Event (at/below 90-ft. elevation) by NRHP eligibility categories.

County	Ineligible Sites	Eligible Sites	NRHP-Listed Sites
Humphreys	25	9	0
Issaquena	4	11	0
Sharkey	53	10	3
Warren	1	2	0
Washington	24	5	0
Yazoo	21	3	2
TOTALS	128	37	5

County	Unevaluated Sites	Mississippi Landmarks	Total No. Sites
Humphreys	6	0	37
Issaquena	6	0	21
Sharkey	13	0	79
Warren	3	0	6
Washington	30	0	59
Yazoo	28	0	54
TOTALS	86	0	256

Conversely, many of the standing structures impacted by this same flood event were noted in the Sharkey County (n=56 [92%]) portion of the study area, which is somewhat misleading given that nearly all of the inventoried standing structures are/were found in the community of Rolling Fork, site of a devastating tornado in March of 2023 (see Cultural Appendix Figure 3 and Table 8). Aside from those structures inventoried in the community of Rolling Fork, the remaining 8% are spread between three of the other five counties (Yazoo [5%; n=3]; Issaquena [1.5%; n=1]; and Washington [1.5%; n=5]) (Cultural Appendix Table 9).

Table 8. Standing structures within the 2-Year (at/below 90-ft elevation), 5-Year (at/below 93-ft. elevation) and 100-Year (at/below 99-ft elevation) Flood Events.

County	Within 2-YR Event	Within 5-YR Event	Within 100-YR Event
Humphreys	0	2	4
Issaquena	1	2	9
Sharkey	56	81	129
Warren	0	1	5
Washington	1	2	5
Yazoo	3	7	11
TOTALS	61	95	163

Overall comparisons the above totals against the total number of inventoried standing structures similarly reveal the Sharkey County portion of study area (43%, n=56) being disproportionally impacted by the 2-year flood event, again, an admittedly skewed sample given the inventory of structures impacted by the March 2023 tornado event. Small sample size accounts for the representation from Yazoo County (15%, n=3). Only single structures were noted in both the Issaquena and Washington county portions of the study area, representing 2% or less of the total study area assemblages (see Cultural Appendix Table 9). Considering the size and extent of the study area, these numbers represent small quantities compared to the total number of inventoried standing structures. Within this number, 22 are non-extant, meaning no longer standing, so that the number of historic structures that would qualify for voluntary acquisition equal 39 (see Cultural Appendix Figures 2 & 7; Table 8).

Within this set of 61 standing structures, the breakdown of NHRP eligibility significance determinations are as follows: Unevaluated/unknown (n=38 [62%]), Non-Extant (n=22 [36%]), and Mississippi Landmarks (n=1 [2%]). Not surprisingly, the majority of standing structures in the study area are of either Unevaluated/unknown eligibility or no longer standing [Non-Extant] (n=60 [98%]) (Cultural Appendix Figure 8; Table 9). Given the disproportional numbers of structures inventoried in Sharkey County, it comes as no surprise that nearly all the above structures are found in Sharkey County (see Cultural Appendix Figure 8; Table 9).

Table 9. Standing structures resources within the 2-Year Flood Event (at/below 90-ft. elevation) by NRHP eligibility categories.

County	Historic Districts	NRHP-Listed Sites	Mississippi Landmarks
Humphreys	0	0	0
Issaquena	0	0	0
Sharkey	0	0	1
Warren	0	0	0
Washington	0	0	0
Yazoo	0	0	0
TOTALS	0	0	1
County	Unevaluated Properties	Non-Extant	Total No. Properties
Humphreys	0	0	0
Issaquena	1	0	1
Sharkey	34	21	56
Warren	0	0	0
Washington	1	0	1
Yazoo	2	1	3
TOTALS	38	22	61

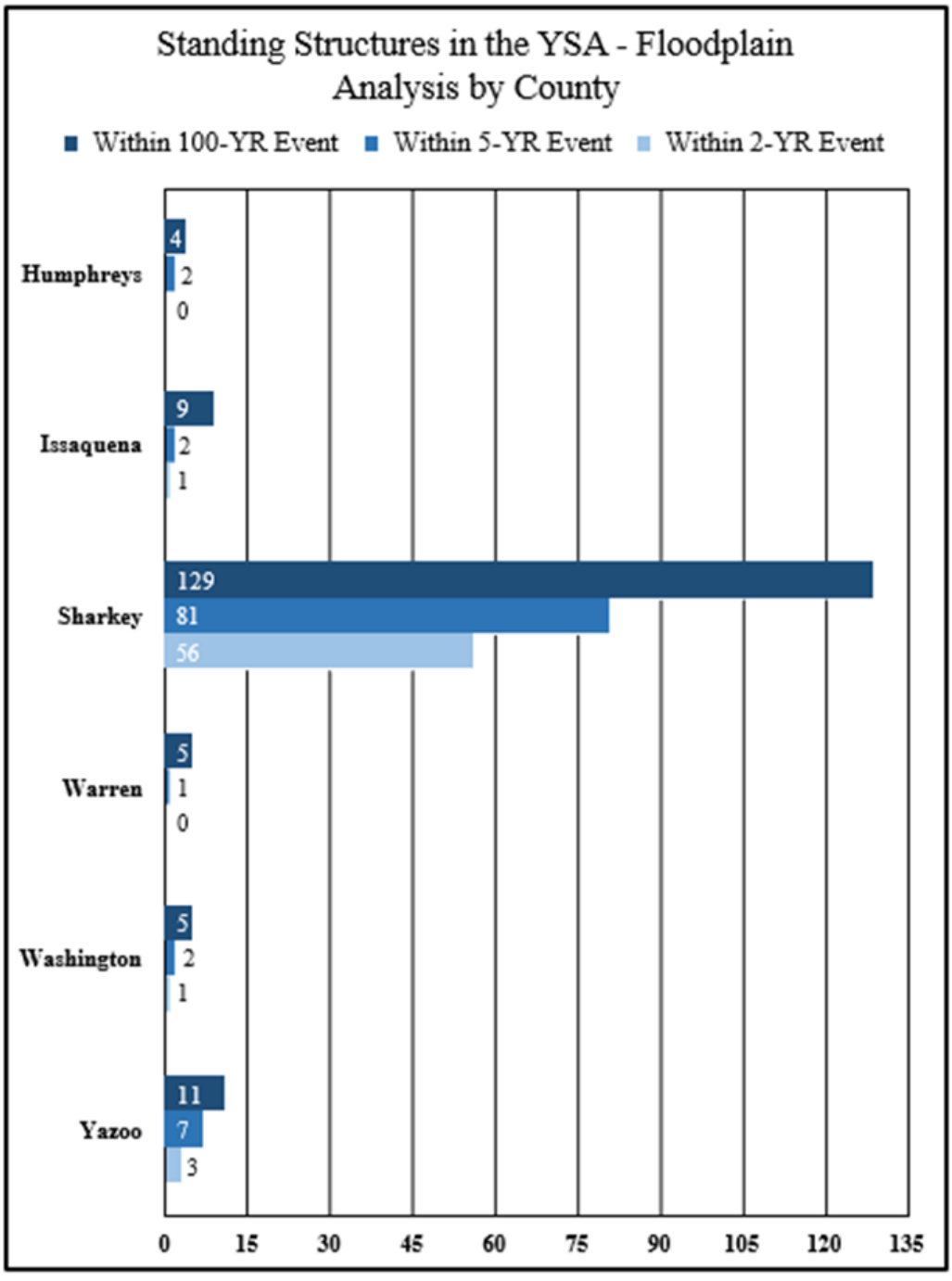


Figure 7. Standing Structures in the YSA - Floodplain Analysis by County.

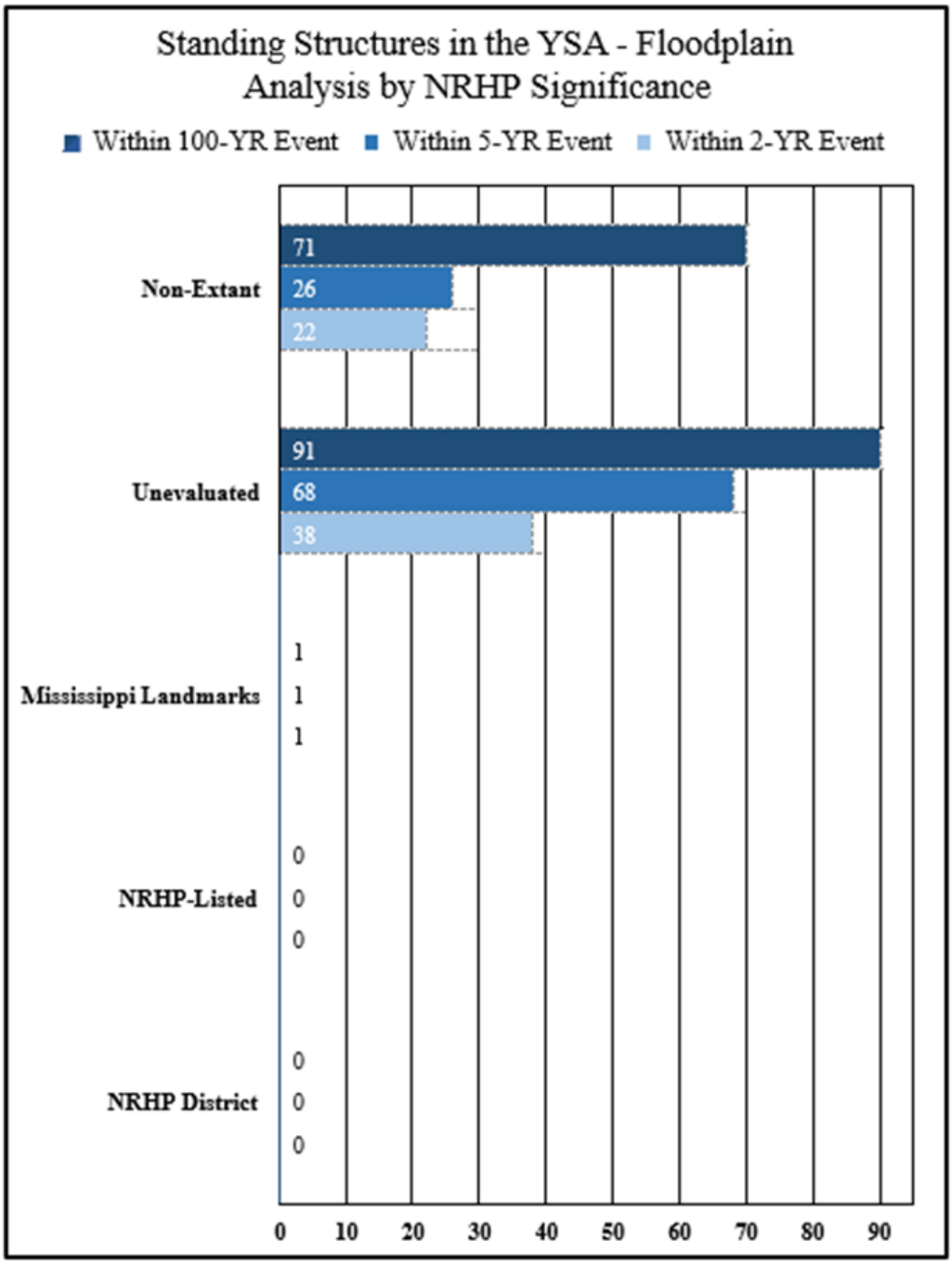


Figure 8. Standing Structures in the YSA - Floodplain Analysis by NRHP Significance

Implementing the structural feature of the project with water levels managed at the 90' elevation (crop season), the distribution of standing structures falling at or below this elevation are as follows: Sharkey County (n=56 [92 percent]), which is somewhat misleading given that nearly all of the inventoried standing structures are/were found in the community of Rolling Fork and inventoried in response to a devastating tornado in March of 2023. The remaining 8 percent are spread between three of the other five counties (Yazoo [5 percent; n=3]; Issaquena [1.5 percent; n=1]; and Washington [1.5 percent; n=5]) (Cultural Appendix Figure 9). These 61 standing structures represent only a fifth (20 percent) of the total standing structures inventory for the YSA, so the large majority (n=242 [80 percent]) of standing structures lie above the elevation reach of this flood event, meaning that potential flood impacts would be lessened or minimized to these standing structures with project implementation under this operational condition (see Cultural Appendix Figure 9). These numbers indicate some degree of disproportional impacts to cultural resources, with a greater percentage of standing structures above the potential impact zone (80 percent) compared to archaeological resources (68 percent), though it should be cautioned that this difference may be a product of sample sizes recorded in the YSA (303 total standing structures compared to 792 archaeological resources).

5-Year Flood Event (93.0 feet)

According to the flood extent GIS data, some 95 standing structures and 310 archaeological resources have been identified across the study area in association with this flood event. Analysis focused on the principal study area in greater proximity to the proposed borrow area and pump site locations. Unsurprisingly, as flood extents increase, the number of overall resources impacted across all analytical categories also increases, in roughly the same proportions.

The distribution of archaeological resources associated with this flood event are nearly identical in quantity and spatial distribution compared to the preceding 2-year event. Single digit increases in overall numbers are observed in four of the six counties (Sharkey County [up 6], Humphreys and Issaquena Counties [up 4 each], and Warren County [up 2]). The only significant increases were observed in Washington County (up 20) and Yazoo County (up 18) (see Cultural Appendix Figure 4; Table 6). The increase from 256 to 310 archaeological resources indicates a slight increase from 32 to 39 percent of the total archaeological inventory for the YSA, so a slightly smaller majority (n=482 [61 percent]) of archaeological resources lie above the impact zone of this flood event and with lessened or minimized potential for effects or impacts with project implementation under this operational condition.

Within this set of 310 archaeological resources, the breakdown of NHRP eligibility significance determinations are as follows: Ineligible (n=157 [51%]), Unevaluated/unknown (n=106 [33%]), Eligible (n=42 [14%]), and Register-Listed (n=5 [2%]) (see Cultural Appendix Figure 5; Table 10). Not surprisingly, most of the archaeological resources are of either Ineligible or Unevaluated/unknown eligibility

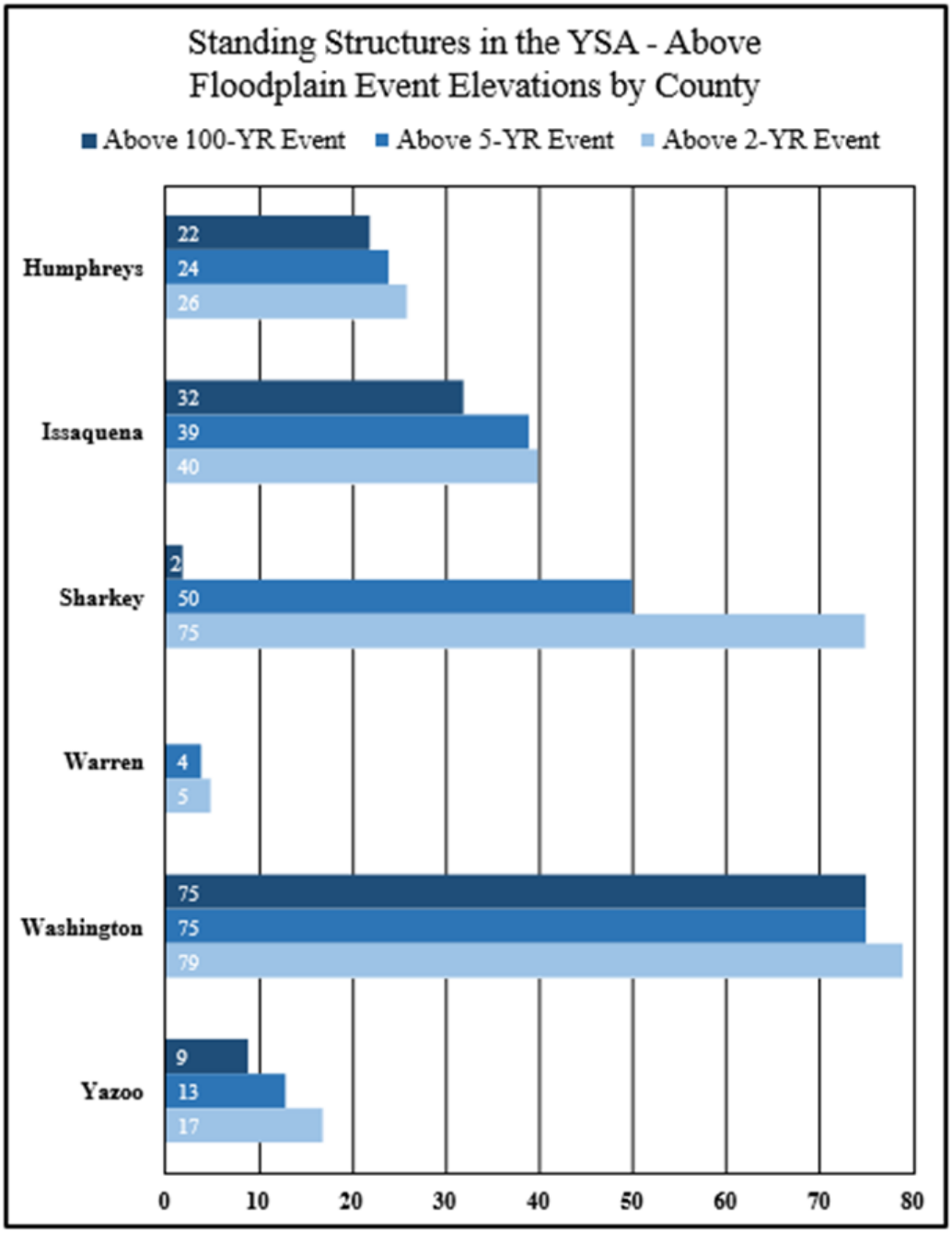


Figure 9. Standing Structures in the YSA - Above Floodplain Event Elevations by County.

(n=263 [84%]), with an expected small number of significant resources (Eligible and Register-Listed [n=47 {16%}]). Most of the Unevaluated/unknown (n=86 [81%]) and Ineligible (n=120 [76%]) archaeological resources were noted in the Sharkey, Washington, and Yazoo County portions of the study area; conversely, most of the Eligible (n=23 [55%]) and

Register-Listed (n=3 [60%]) resources were noted in Issaquena and Sharkey counties (see Cultural Appendix Figure 5; Table 10).

Some 482 archaeological resources lie above this elevation reach, meaning that flood impacts would be lessened or minimized to these archaeological resources with project implementation under this operational condition. Comparisons by county are as follows: Issaquena County (n=101 [80 percent]), Yazoo County (n=72 [72 percent]), Humphreys County (n=88 [68 percent]), Washington County (n=153 [66 percent]), Warren County (n=8 [62 percent]), and Sharkey County (n=107 [56 percent]), and respectively. The spatial distribution of these numbers indicates archaeological resources across the northern and western portions remain the least impacted, with a shift to also include the southeastern, and southwestern portions of the YSA at the same relative level. The central and southcentral portions continue to be slightly more susceptible to impacts (see Cultural Appendix Figure 6).

Table 10. Archaeological resources within the 5-Year Flood Event (at/below 93-ft. elevation) by NRHP eligibility categories.

County	Ineligible Sites	Eligible Sites	NRHP-Listed Sites
Humphreys	25	7	0
Issaquena	6	11	0
Sharkey	56	12	3
Warren	3	2	0
Washington	32	7	0
Yazoo	35	3	2
TOTALS	157	42	5
County	Unevaluated Sites	Mississippi Landmarks	Total No. Sites
Humphreys	9	0	41
Issaquena	8	0	25
Sharkey	14	0	85
Warren	3	0	8
Washington	40	0	79
Yazoo	32	0	72
TOTALS	106	0	310

The distribution of standing structures associated with this flood event are similar in quantity and spatial distribution though not to degree as observed with archaeological resources

when compared to the preceding 2-year event data. Single digit increases in overall numbers are observed in four of the six counties (Yazoo County [up 4],

Humphreys County [up 2], Warren and Washington Counties [up 1 each], and Issaquena County [unchanged]). The only significant increase was observed in Sharkey County (up 25) (see Cultural Appendix 8). The increase from 61 to 95 standing structures indicates a moderate increase from 20 to 31 percent of the total standing structure inventory for the YSA. Though still presenting a minority of the total in the YSA, it represents a significant increase from preceding numbers and a larger increase compared that observed with archaeological resources. This leaves an appreciably smaller majority (n=208 [69 percent]) of standing structures lying above the impact zone of this flood event with project implementation under this operational condition.

Overall comparisons of the above totals against overall study area totals similarly note the Sharkey County portion of study area (63%, n=81) again disproportionally impacted by the 5-year flood event, as the same structures impacted by the 2-year event are also impacted by the 5-year event along with additional structures. Small sample size accounts for the representation from the Yazoo County portion of the study area (35%, n=7), though the total is more than double from that of the 2-year event total. In fact, the total number of structures tallied in the study area nearly double for all the counties (see Cultural Appendix Table 8). Considering the size and extent of the study area, these numbers still represent fairly small quantities.

Table 11. Standing structures resources within the 5-Year Flood Event (at/below 93-ft. elevation) by NRHP eligibility categories.

County	Historic Districts	NRHP-Listed Sites	Mississippi Landmarks
Humphreys	0	0	0
Issaquena	0	0	0
Sharkey	0	0	1
Warren	0	0	0
Washington	0	0	0
Yazoo	0	0	0
TOTALS	0	0	1
County	Unevaluated Properties	Non-Extant	Total No. Properties
Humphreys	2	0	2
Issaquena	2	0	2
Sharkey	56	24	81
Warren	1	0	1
Washington	2	0	2

Yazoo	5	2	7
TOTALS	68	26	95

Within this set of 95 standing structures, the breakdown of NHRP eligibility significance determinations are as follows: Unevaluated/unknown (n=68 [72%]), Non-Extant (n=26 [27%]), and Mississippi Landmarks (n=1 [1%]). Not surprisingly, the majority of standing structures in the study area are either of Unevaluated/unknown eligibility or no longer standing [Non-Extant] (n=60 [98%]) (Cultural Appendix Table 11). Given the disproportional numbers of structures inventoried in the study area portion of Sharkey County, it is not surprising that the Sharkey County portion represents the majority (see Cultural Appendix Table 11). Within this number, 26 are non-extant, meaning no longer standing, so that the number of historic structures that would qualify for voluntary acquisition equal 69 (see Cultural Appendix Figure 8; Table 11).

Implementing the structural feature of the project with water levels managed at the 93' elevation (non-crop season), the distribution of standing structures falling or below this elevation are as follows Sharkey County (n=81 [82 percent]), Yazoo County (n=7 [8 percent]), Humphreys, Issaquena, and Washington Counties (n=2 [2 percent] each), and Warren County (n=1 [1 percent]) (see Table 5-4). Discounting the 26 non-extant structures, the number of historic structures that would qualify for voluntary acquisition equals 69, nearly double the number stated for voluntary acquisition at the 90' elevation (Cultural Appendix Figure 9). These numbers still reflect some degree of disproportional impacts to cultural resources, though the gap between the two has shrunk considerably, standing structures still represent the cultural resources type with the greater of impacts: the percentage of standing structures above the potential impact zone equals 69 percent, while the percentage of archaeological resources equals 61 percent (see Cultural Appendix Figure 9).

Alternatives 2 and 3 - Features (Borrow Area, Pump Site, and Supplemental Wells). The pump station is proposed as a means to reduce flooding in the Yazoo Study Area when the Mississippi River is high without draining the entire region. As such, the pump is designed to operate at specific and annual/seasonal ranges in concert with the prescribed 2-year and 5-year flood events and associated date ranges for crop and non-crop seasons. While there were several Register-eligible and significant cultural resources within this 1.6-kilometer (1-mile) search radius, none were located within 300 meters (984 feet [0.19 miles]) of the above listed locations. Intensive cultural resource survey will be conducted over these locations and their Area of Potential Effect to identify all cultural resources. Survey methods will include remote-sensing technologies, e.g., satellite and low aerial imagery, as well as conventional ground- truthing methods, e.g., surface reconnaissance, systematic and judgmental shovel testing and dry- screening, soil coring, etc.

Post-flood impacts remain a source of serious damage to cultural resources despite the reduction in coverage and intensity of the episodic flooding resulting from the proposed undertaking (see Morgan et al. 2016). Additional consideration must be taken for the long-term operation, maintenance, and access of these work areas as well as impacts resulting from repair, replacement, relocation, or expansion activities, activities that extend well into

the foreseeable future. Other indirect impact considerations include short-term effects associated with construction activities, including ground disturbance required to construct the various project components such as access roads, utility installation. Construction activities could create noise and vibration that would affect archaeological resources and stockpiling construction materials and equipment could cause short term visual effects.

Following completion of the Section 106 process, should any cultural resources be discovered during implementation of the proposed undertaking, work shall cease in that area until an archeologist can assess the situation and initiate proper consultation under provisions outlined under Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S. Code 470). Efforts will be taken to either preserve the significant resources in place or mitigate appropriately for any adverse effects created by the undertaking. The regulations of the CEQ, governing implementation of the procedural provisions of the NEPA, direct agencies preparing environmental assessments to consider whether the action they're reviewing is related to other actions with … cumulatively significant impact. (40 CFR 1508.27(b)(7)). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impacts of post-flood impacts to cultural resources are difficult to assess and consider; however, there are long-term impacts that can be foreseen and most therefore be discussed.

Alternative 4: Nonstructural (100-Year Flood Event [99.1 ft.])

According to the flood extent GIS data, some 382 archaeological resources and 163 standing structures have been identified across the study area in association with this flood event. Unsurprisingly, the patterned increase in the overall number of resources impacted is observed across all analytical categories; as the flood extent increased in extent, so does the number of impacted resources. This pattern reflects observed and measured conditions uninfluenced by any proposed project.

The distribution of archaeological resources associated with this flood event very similar in quantity and spatial distribution compared to the preceding 2-year and 5- year events despite the increase in overall totals. Double digit increases in overall numbers were observed in three of the six counties (Yazoo County [up 26], Sharkey County [up 22], and Issaquena County [up 11]), with single digit increases in the other three counties (Humphreys County [up 9], Warren County [up 3], and Washington County [up 1]). Significant increases were observed in Sharkey, Yazoo, and Issaquena Counties (see Cultural Appendix Figure 4; Table 6). The increase from 310 to 382 archaeological resources indicates a significant increase from 39 to 48 percent of the total archaeological inventory for the YSA, so only a slight majority (n=410 [52 percent]) of archaeological resources lie above the impact zone of this flood.

As the above numbers attest, the 100-year flood event data suggests a significant rise in the risk to known standing structures as compared to previous flood events (see Cultural Appendix Figures 4 & 5; Table 6). Again, most of the inventoried structures impacted by this event are in the Sharkey County (n=129 [79%]) portion of the study area, with those in Yazoo (n=11 [7%]) and Issaquena (n=9 [6%] counties accounting for the next largest areas

impacted. What follows are very small numbers (3% or less) for the remainder of the impacted study area: (Warren & Washington counties [3% each] and Humphreys County [2%] n=5).

Some 410 archaeological resources lie above this elevation reach. Comparisons by county are as follows: Yazoo County (n=98 [98 percent]), Warren County (n=11 [85 percent], Issaquena County (n=90 [71 percent]), Washington County (n=152 [66

percent]), Humphreys County (n=79 [61 percent]), and Sharkey County (n=85 [44 percent]), and respectively. The spatial distribution of these numbers indicates archaeological resources across the eastern and southeastern portions remain the least impacted, followed by a shift to the western and northern portions of the YSA. The central portion continues to be most susceptible to impacts (see Cultural Appendix Figure 6). Furthermore, this flood event represents the most extensive and pervasive of the studied flood events, meaning that compared to the 2- and 5-year flood events, the 100-year flood event is the most potentially damaging to all matter of cultural resources (see Table 5-3) (see Appendix F-1 – Cultural Resources, Figures 1 and 3, Tables 6 and 12 for more discussion).

Table 12. Archaeological resources within the 100-Year Flood Event (at/below 99.1-ft. elevation) by NRHP eligibility categories.

County	Ineligible Sites	Eligible Sites	NRHP-Listed Sites
Humphreys	32	7	0
Issaquena	9	16	1
Sharkey	64	18	3
Warren	6	2	0
Washington	32	7	0
Yazoo	58	3	2
TOTALS	201	53	6

County	Unevaluated Sites	Mississippi Landmarks	Total No. Sites
Humphreys	11	0	50
Issaquena	10	0	36
Sharkey	22	0	107
Warren	6	0	11
Washington	41	0	80
Yazoo	35	0	98
TOTALS	122	0	382

Comparative analysis of the overall study area totals reflects disproportional impacts to select portions of the study area, with all the inventoried standing structures for Sharkey (n=129) and Warren (n=5) counties impacted by the 100-year event. Numbers for nearly all the remaining counties exhibit at or over 50% increases in affected resources compared to the 2- and 5-year events data. The breakdown is as follows: Yazoo County (n=11 [55%]), Issaquena County (n=9 [22%]), Humphreys County (n=4 [15%]), and Washington (n=11 [8%]). This data indicates that the 100-year flood event represents a much more consistently impactful and extensive layer in the number of [54 percent]), and Yazoo County (n=46 [46 percent]), respectively. The spatial distribution of these numbers indicates archaeological resources across the northern and western portions of the YSA are the least susceptible to impacts, followed by the central, east-central and southern portions (Cultural Appendix Figure 6). resources impacted by this event (see Cultural Appendix Tables 7 and 12). Within this number,

71 are non-extant, meaning no longer standing, so that the number of historic structures that would qualify for voluntary acquisition equal 94 (see Cultural Appendix, Figure 2; and Table 13).

Within this set of 163 standing structures, the breakdown of NHRP eligibility significance determinations are as follows: Unevaluated/unknown (n=93 [56%]), Non- Extant (n=71 [43%]), and Mississippi Landmarks (n=1 [1%]) (Cultural Appendix Table 13). Not surprisingly, the majority of standing structures are of either of Unevaluated/unknown eligibility or are no longer standing [Non-Extant] (n=164 [99%]). Given the disproportional numbers of structures inventoried in Sharkey County, it again comes as no surprise that nearly all the above structures are found in Sharkey County (see Cultural Appendix Figure 8; Table 13).

The overwhelming majority of inventoried structures are noted in Sharkey County (n=129 [79 percent]), with Yazoo (n=11 [7 percent]) and Issaquena (n=9 [6 percent]) Counties accounting for the next largest areas of impact. What follows are very small numbers (3 percent or less) for the remainder of the impacted study area: Warren & Washington Counties (3 percent each) and Humphreys County (2 percent) (see Table 5-4). The increase from 95 to 163 standing structures indicates a considerably significant increase from 31 to 54 percent of the total standing structure inventory for the YSA, leaving a minority (n=140 [46 percent]) of standing structures lying above the impact zone of this flood. Discounting the 71 non-extant structures, the number of historic structures that would qualify for voluntary acquisition equals 92, 23 more structures than identified for voluntary acquisition nearly double the number stated for voluntary acquisition at the 93' elevation. These numbers still reflect some degree of disproportional impacts to cultural resources, though the gap between the two has shifted: the percentage of standing structures above the potential impact zone equals 46 percent, while the percentage of archaeological resources equals 52 percent, representing a transition to archaeological resources as the cultural resources type with the greater number of impacts (see Cultural Appendix Figure 9).

Table 13. Standing structures resources within the 100-Year Flood Event (at/below 99.1-ft. elevation) by NRHP eligibility categories.

County	Historic Districts	NRHP-Listed Sites	Mississippi Landmarks
Humphreys	0	0	0
Issaquena	0	0	0
Sharkey	0	0	1
Warren	0	0	0
Washington	0	0	0
Yazoo	0	0	0
TOTALS	0	0	1

County	Unevaluated Properties	Non-Extant	Total No. Properties
Humphreys	2	2	4
Issaquena	5	4	9
Sharkey	70	58	129
Warren	4	1	5
Washington	3	2	5
Yazoo	7	4	11
TOTALS	91	71	163

References and Resources

King, Thomas F. 2013. *Cultural Resource Laws and Practice*. Rowman & Littlefield Publishers, Inc., New York, New York.

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