ERRATA

The original Appendix F-3 (Wetlands), had an error while formatting. Table 53 was cropped during the formatting process and is not represented in its entirety. The updated Appendix F-3 has the entire table Table 53. It is complete and provided for inclusion in this Appendix.

Mississippi Valley Division,
Regional Planning and Environment Division South

Yazoo Backwater Area Water Management Project

APPENDIX F-3 - Wetlands

November 2024

Appendix F-3

Wetlands

U.S. Army Corps of Engineers

Executive Summary

The following reports assessment data for wetland resources in the study area associated with a proposed Water Management Plan evaluated by the US Army Corps of Engineers (USACE) Vicksburg District. The assessment was conducted using a certified model, the Regional Guidebook for Applying the Hydrogeomorphic (HGM) Approach to Assessing Wetland Functions of Selected Regional Wetland Subclasses, Yazoo Basin, Lower Mississippi River Alluvial Valley. The condition of jurisdictional wetlands identified at the pump station were assessed, along with the condition of a proposed borrow area composed of agricultural lands which were assumed to be jurisdictional wetlands for the purpose of this report.

Collectively, the pump station and borrow area comprise the direct impact area for the wetlands assessment, as these areas are expected to be converted from wetlands to non-wetlands as the result of implementation of the Water Management Plan. Additionally, changes in wetland hydroperiods induced by implementation of the proposed Water Management Plan were evaluated to quantify potential impacts to wetlands within all forested and agricultural areas subject to floodwater inundation below an elevation of 93 feet, an area which encompasses the entirety of the 5-year floodplain (i.e., indirect impact area). Some areas within the indirect impact area are anticipated to experience decreased flood hydroperiods (i.e., fewer days of inundation), but are not likely to be converted from wetlands to non-wetlands. Anticipated decreases in flood inundation and associated reductions for wetland functions are considered within this HGM analysis.

SECTION 1

Purpose

The purpose of this appendix is to document wetland conditions within the 5-year floodplain of the Yazoo Study Area that are subject to riverine flooding. The assessment includes 1) data on

current wetland functional capacities under a No Action Alternative (Alternative 1), 2) anticipated conditions under Alternative 2 and Alternative 3 outlined in the proposed Water Management Plan, and 3) reports the amount of mitigation required to offset estimated impacts to wetland resources following project implementation.

SECTION 2

Background

Wetlands are defined as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (Environmental Laboratory 1987).

The subsections below describe the general characteristics of wetlands within the study area (2.1), evaluate the major sources of wetland hydrology in the region (2.2), discuss advances in assessing wetland functions specifically designed for application in the region (2.3), and present data from previously constructed mitigation projects in the area in support of future mitigation efforts (2.4).

2.1 WETLAND CHARACTERISTICS IN THE STUDY AREA

The following provides an overview of the wetland characteristics and conditions within the study area, focusing on the dominant vegetative communities, soil characteristics, and hydrology of the system. This approach aligns with the guidance in USACE (2010) and elsewhere that utilizes three factors (hydrophytic vegetation, hydric soils, and wetland hydrology) to identify and characterize wetlands.

Hydrophytic vegetation has been defined as the community of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence (Environmental Laboratory 1987). The climax wetland vegetation communities within the study area are composed of forested ecosystems adapted to soil saturation and flood inundation. Historic logging activities, implementation of flood risk reduction projects, the conversion of forested lands to agriculture, and reforestation efforts have altered species composition in the region. The shift in land cover and land use patterns also resulted in a patchwork of successional forests ranging from early stage (e.g., <10-year-old) to mature (>80-year-old) forest stands (Smith and Klimas 2002). However, a predominance of hydrophytic vegetation species persists in forested wetlands within the study area (Berkowitz 2019). Data collected during the preparation of this report reflect the conditions observed in much of the region, providing data from 43 forested study plots in mature forest stands.

Dominant tree species determined using the 50/20 rule described in USACE (2010) included (in order of abundance): *Celtis laevigata* (Sugarberry), *Quercus lyrata* (Overcup Oak), *Fraxinus pennsylvanica* (Green Ash), *Liquidambar styraciflua* (Sweetgum), *Quercus texana* (Nuttall Oak), *Quercus phellos* (Willow Oak), *Carya illinoinensis* (Pecan), *Acer negundo* (Boxelder), *Ulmus Americana* (American Elm), and *Populus deltoides* (Eastern Cottonwood). More frequently inundated areas and depressional features also exhibit *Taxodium distichum* (Bald-Cypress), and *Nyssa aquatica* (Water Tupelo) as dominant hydrophytic vegetation community components. Smith and Klimas (2002) provide additional information about the wetland plant communities in the Yazoo Basin with regard to landform, disturbance, and other factors.

Hydric soils are defined as soils “formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). The parent material deposits on which hydric soils within the study area form are generally composed of alluvium derived from the Mississippi River and its tributaries. These soils represent pedogenically young features characterized by high productivity for forest growth. Agricultural productivity is also high if appropriate drainage can be implemented, and many soils in the area are somewhat poorly to poorly drained, exhibit slopes <2%, and are characterized by seasonal high-water tables in their unaltered states. In general, soils in the region exhibit medium to fine soil textures, with fine fractions (including shrink swell clays) commonly dominating backswamp, oxbow lake, and other depressional landscape components. Coarser soil materials may be encountered on natural levee and abandoned point bar deposits, but soil textures become finer with increasing distance from major water courses. Accumulations of organic matter also occur at or near the soil surface in areas subject to prolonged periods of surface inundation and the chemical reduction and translocation of iron in many surfaces and subsoils results in the development of depleted and/or gleyed matrixes in soils exposed to high water tables, flooding, or ponding.

Common soil series within the forested wetlands within the study area include Sharkey clay (Very-fine, smectitic, thermic Chromic Epiaquerts), Alligator clay (Very-fine, smectitic, thermic Chromic Dystraquerts), Dowling clay (Very-fine, smectitic, nonacid, thermic Vertic Endoaquepts), Forestdale silty clay loam (Fine, smectitic, thermic Typic Endoaqualfs) and related series (Soil Survey Staff 2017). Field indicators of hydric soils have been documented

within the study area, including the commonly observed indicators Depleted Matrix, Depleted Below Dark Surface, Redox Depressions, and Stratified Layers (USDA-NRCS 2018).

Hydric soils provide a valuable tool to identify appropriate areas to implement wetland mitigation projects, because hydric soils have been shown to persist following alteration of hydrophytic vegetation communities and wetland hydrology. As a result, the abundance of hydric soils in the study areas provides extensive opportunities to implement wetland mitigation and restoration projects and data available from previous research in the region helps to document the success of completed mitigation projects established on hydric soils in the region (Berkowitz 2019).

The USACE wetland delineation manual defines wetland hydrology as areas that are inundated or saturated to the surface continuously for at least 5.0% of the growing season in most years (50% probability of recurrence) (Environmental Laboratory 1987). Wetland hydrology has been further operationally defined using the technical standard described in USACE (2005) as occurring in those areas that are “inundated (flooded or ponded) or the water table is ≤12 inches below the soil surface for ≥14 consecutive days during the growing season at a minimum frequency of 5 years in 10 (≥50% probability)”. This wetland hydrology threshold aligns with the recommendations of the National Research Council (1995), who stated that “data now available indicate that reasonable hydrologic thresholds would include a depth to water table of <1 foot (30 centimeter) for a continuous period of at least 14 days during the growing season, with a mean interannual frequency of 1 out of 2 years.” The 14-day threshold for wetland hydrology is also consistent with the approaches to identifying hydric soils and documenting the onset of anaerobic conditions for the purpose of developing field indicators of hydric soils (Berkowitz et al., 2020). The 14-day threshold is also indirectly considered a sufficient duration to influence the distribution of vegetation species based upon differences in their capacity to tolerate growth in saturated soils subject to anaerobic conditions.

At the field scale, wetland hydrology in the study area has been documented through the observation of wetland hydrology field indicators, analysis of stream gauge data, and evaluation of water table monitoring data (Berkowitz et al. 2020). Field indicators of wetland hydrology commonly observed in the study area include Surface Water, High Water Table, Saturation, Sediment Deposits, Drift Deposits, Water Marks, Algal Mat or Crust, Water-Stained Leaves, Oxidized Rhizospheres Along Living Roots, Surface Soil Cracks, Sparsely Vegetated Concave Surface, Drainage Patterns, Moss Trim Lines, Geomorphic Position, the FAC Neutral Test, and Crawfish Burrows (USACE 2010).

The documentation of wetland hydrology often requires an analysis of the growing season (USACE 2010). The USACE (2010) recommends growing season be evaluated using observations of (1) above-ground growth and development of vascular plants, and/or (2) soil temperatures exceeding 5 °C indicating ongoing soil microbial activity. Both of these approaches have been documented in the study area. Within the study area, wetland hydrology and soil temperatures above 5 °C have been documented throughout the entire year. For example, daily soil temperatures measured at 121 locations in the study area indicate that 119 locations remained above 5 °C (average minimum observed temperature of 9.93 °C) throughout the years during 2021-2023. Two study locations exhibited soil temperatures <5 °C during very short periods (portions of 8 and 9 days respectively), however temperatures never remained below the 5 °C threshold for more than 12 hours. Additionally, many herbaceous and deciduous wetland plants display evidence of continued growth and (in some cases) reproduction throughout the winter. This notably includes species of interest such as Pondberry (*Lindera melissifolia*), which flowers during the winter. As a result, for the purposes of this assessment, the study area is assumed to experience a year-round growing season based upon the observed lifecycle of wetland plants and the continuous activity of soil microbes. Additional details related to the hydrology of the study area, and information about the models used to determine the extent of the 5-year floodplain evaluated during the wetland assessment are provided in Appendix G - Engineering of this DEIS (unpublished data, 2024).

2.2 WETLAND HYDROLOGY AND HYDROPATTERNS WITHIN THE STUDY AREA

Wetland hydrology within the study areas is of particular interest in the current analysis as the proposed Water Management Plan has the capacity to alter the extent and timing of flood inundation in the study area. Historically, prolonged, and extensive inundation occurred in the Yazoo Basin following precipitation during the winter wet season (Smith and Klimas 2002). Localized flooding occurred as precipitation and runoff from the surrounding landscape (mostly the hills on the eastern edge of the basin) discharged into the tributary network of the Yazoo River, which provides the only natural drainage feature to the Mississippi River at the southern end of the basin. Additionally, large flood events associated with the Mississippi River and tributary system inundated most of the Yazoo Basin in some years (Moore 1972).

The modern levee system limits overbank flooding from the Mississippi River but does not eliminate the influence of the river on wetland hydrology within the basin. For example, the major flood of 1973 affected approximately 40 percent of the Yazoo Basin; subsequent analysis indicated that in the absence of the levee system nearly the entire basin would have become inundated (USACE 1973). While the implementation of flood risk reduction measures has decreased flood frequency and duration in portions of the Yazoo Basin, development of the Mississippi River levee system in conjunction with incomplete flood risk reduction projects in the southern portion of the Yazoo Basin has increased wetland hydrology duration in some wetlands during some years (Smith and Klimas 2002), As a result of these landscape scale manipulations, the wetland hydropatterns observed in the study area do not reflect historic conditions or natural patterns of wetland hydrology observed in other systems subject to unimpeded overbank and backwater flood events. Wetland hydropattern integrate the timing, duration, and distribution of wetland water levels, which incorporates the duration and frequency of water level perturbations.

Many forested wetlands associated with the Mississippi River and its tributaries, including those within the study area, experience a combination of local precipitation and backwater flooding as major hydrologic influences (Smith and Klimas 2002). Backwater flooding describes inundation resulting from impeded drainage, usually due to high flood stages in downstream waterways that inhibits drainage within adjacent tributaries. Impeded drainage leads to increasing water tables and surface inundation on the landscape.

In the study area, additional flooding results from water being held behind levees and water control structures associated with flood risk reduction projects. The development of water control structures, levees, and other features in the study area have had significant effects on forested wetland hydropatterns. Available data suggests that the area experiences less large-scale overbank flooding than was present under historic conditions (Smith and Klimas 2002), however periodic large-scale flooding continues to occur in the study area in part maintaining the wetlands and wetlands functions therein. For example, over 550,000 acres of land was flooded for over six months in the study area during 2019. The flooding was induced by extremely high local precipitation (over 200% above average) coupled with high river levels in the Mississippi River that persisted for >150 days which precluded downstream drainage and necessitated closure of multiple water control structures (NOAA 2020)

Historical hydrological patterns for bottomland hardwood forested wetland types (see, e.g., Wharton et al. 1982) and the water balance in the study area (Figure 2) suggest that the water table increases in response to winter precipitation and limited evapotranspiration, with supplemental winter and spring flooding occurring in some areas through May. Water tables generally decrease during summer and fall in response to lower precipitation and increased evapotranspiration, with important exceptions during localized precipitation events (Wharton et al. 1982). The water balance (lower panel) corresponds to the theoretical water table fluctuations in the upper panels, with water surpluses occurring during the winter months, coinciding with the water table increases through May. The subsequent declines in precipitation and accelerating evapotranspiration during summer lead to soil moisture loss and moisture deficits, resulting in lower water tables. Later in the year, cooler temperatures reduce evapotranspiration rates, which, combined with localized precipitation, can result in increases to soil moisture compared to summer and early fall. The timing of wetland hydrology and duration of flooding events has been affected by the creation and management of flood control levees and structures. Under the current hydrological regime, well-data from samples in the 2010-2011 water year within the YSA indicate precipitation and flooding both contribute to wetland hydrology, with varying degrees of relative importance both across samples and through time (Berkowitz et al., 2020). In 12 samples monitored over 3-8 years, days of wetland hydrology exceeded the estimated flood inundation duration of the sites based on the hydrologic modeling, regardless of flood duration interval (Table 1; Figure 4; Berkowitz et al., 2020). For example, areas estimated to flood less than 7 days based on inundation model results exhibited an average of 88 days of wetland hydrology over an eight-year period; study locations estimated to have 7–14-day flood inundation exhibited an average of 151 days of wetland hydrology; and areas with modeled flood inundation durations >14 days exhibited an average wetland hydrology period of 172 days (Table 1). While the data above were not randomly sampled across the study area and thus cannot be assumed as wholly representative of the area, they do suggest that precipitation plays an important role in wetland hydrology, and some areas would retain wetland characteristics regardless of (or in addition to) backwater flooding-related hydrological events.

Anticipated decreases in flood inundation and associated reductions for wetland functions are considered within the HGM approach. Further proposed efforts to relate well-derived data to larger patterns of inundation and how they relate to future monitoring plans are described in Appendix K.

2.3 WETLAND FUNCTIONS AND FUNCTIONAL ASSESSMENT IN THE STUDY AREA

Wetlands provide a variety of functions (e.g., water storage, floral and faunal habitat) and values (e.g., flood risk reduction, recreation) within the Yazoo Basin (Smith and Klimas 2002).

However, historic landscape alteration resulted in significant declines in forested wetland acreage within the study area and the broader lower Mississippi River alluvial valley resulting in losses of wetland functional capacities in the region (King et al. 2006). Wetland disturbances emerge from a combination of factors including conversion of forested wetlands to agriculture, implementation of drainage networks, and alteration of hydrology at large spatial scales within the study area through the development of levees and other flood risk reduction features (Smith and Klimas 2002).

Recent efforts to assess and restore wetlands resulted in the development of novel technical approaches to quantitatively evaluate wetland functional capacity. The current report applies those methodologies to assess potential impacts to wetland resources associated with the proposed Water Management Plan. In particular, the HGM approach has proven effective for assessing wetland functions in the Yazoo Basin in addition to other areas, and published research recognizes HGM as the best available methodology to conduct wetland assessments across broad spatial scales (Cole 2006). The HGM methodology was also developed to determine project impacts and mitigation requirements in the context of the Clean Water Act making it an ideal tool to conduct the wetland assessment (Smith et al. 2013).

Smith and Klimas (2002) developed a regional HGM guidebook specifically for the Yazoo Basin, providing a data-driven and regionalized methodology to assess wetland functions within the study area. Berkowitz and White (2013) validated a subset of the relationships developed by Smith and Klimas, demonstrating the utility of the HGM tool using direct measures of wetland function and supporting the application of the HGM approach within the study area for quantifying wetland functions and determining mitigation requirements. Additionally, Berkowitz (2019) evaluated wetland functions across a restoration chronosequence using the HGM method, including study locations in the Yazoo Basin, providing additional support for the method by documenting the ability of the approach to detect changes in wetland functions as forest succession occurs (Figure 5). That study highlighted the capacity of wetland mitigation sites in the Yazoo Basin to potentially offset wetland impacts from previously constructed flood risk reduction projects by documenting the increase in wetland functions with increasing mitigation forest stand age.

2.4 PREVIOUSLY COMPLETED MITIGATION IN THE YAZOO BASIN

The following presents data gathered during execution of a monitoring program at existing mitigation sites in the Yazoo Basin in order to provide context for the determination of compensatory mitigation requirements in the current analysis. The monitoring program encompasses a >11,800-hectare (>29,000 acre) area and includes 606 HGM study plots, representing one of the largest wetland restoration datasets in the lower Mississippi River valley and the nation (Berkowitz 2019). The availability of data from the Yazoo Basin, collected at repeated intervals across a chronosequence spanning >20 years provides a unique resource for evaluating wetland conditions and mitigation project success. Available data provides evidence that mitigation in the Yazoo Basin can provide effective offsets for impacts to wetland resources. The data derived from Berkowitz (2019) is also utilized to estimate the performance of mitigation wetlands and calculate the mitigation requirements outlined in subsequent sections of this appendix.

The USACE wetland restoration initiative in the Yazoo Basin began in 1990, representing some of the oldest large- scale reforested wetland tracts in the region, with periodic additional land acquisition occurring over time (Table 2). The periodicity of afforestation provides a mechanism for examining restoration success across a chronosequence exhibiting wetland functions under various conditions as forest succession occurs. This restoration chronosequence enables analyses of mitigation success and informs expected performance of future mitigation activities in the region.

Researchers have documented substantial increases in tree diameter, initiation of canopy closure, and other factors related to forest succession across the restoration chronosequence (Berkowitz 2019). For example, the HGM assessment technique evaluates trees with a diameter at breast height (DBH) ≥10 centimeters and this diameter threshold was first encountered at a subset of 10-year stands, with significant increases documented in 13–20-year-old stands, and further improvements at the 20- 25-year post restoration increment following a linear increase in diameter over the restoration chronosequence (Figure 6).

Tree density data displayed similar results, with significant incremental increases in tree density occurring within the restoration sites after 13 years, followed by further significant increases at 20- and 25-year time intervals. Because the HGM approach focuses on trees with DBH ≥10 centimeter and includes smaller tress in shrub-sapling density measurements, observed increases in tree density represent a combination of 1) incorporation of planted trees entering the 10 centimeter size class and 2) recruitment of naturally regenerated trees into restored areas over time.

Woody debris biomass inputs were expected to increase in response to higher basal area and tree density values, which provide additional sources of woody debris (e.g., loss of branches during storms and self-pruning). Monitoring results indicate significant linear increases in woody debris across the restoration chronosequence. Further additions of woody debris biomass are anticipated as stand development continues into the stem exclusion phase of forest succession. Ground vegetation cover follows anticipated patterns following restoration. First, vegetation coverage increases with the cessation of agricultural activities (e.g., plowing, crop removal); then ground vegetation cover decreases as transient species are recruited to taller strata and canopy cover approaches closure, reducing the quantity and quality of available light supporting herbaceous plant growth. Shrub-sapling density data displayed similar patterns, with initial increases followed by sharp declines as restoration site succession progresses. Soil horizon development increased over the restoration chronosequence, with significant differences in O- horizon thickness detected 25 years post restoration. Examining the entire restoration chronosequence dataset, the wetland assessment variables evaluated generally displayed expected responses to restoration, with assessment metrics following anticipated patterns.

The following examines changes in wetland functions across the restoration chronosequence and provides a discussion of the drivers behind functional increases. The detain floodwater function displayed significant increases across the restoration chronosequence, most notably within the 20- and 25-year age classes (Figure 7). The increases in functional scores result from improvements in ground vegetation, shrub-sapling density, and tree density assessment variable metric scores. The functional outcomes are anticipated to increase further as these variables, which provide physical obstructions within the wetland that decrease overland flow velocity, continue to develop over time. Additional improvements in the detain floodwater function are expected to result from the incorporation of the log biomass variable as forest succession progresses, since the absence of downed logs at most restoration sites decreases floodwater detention functional scores by as much as 25% within the current 25-year dataset.

The detention of precipitation function represents a largely physical process chiefly occurring via micro-depressional storage, infiltration and retention by organic material and soils (Smith and Klimas 2002). As a result, the detain precipitation function has the potential to yield functional benefits immediately after restoration occurs, without the necessity for tree maturation to occur as required for several other functions including fish and wildlife habitat maintenance. The detain precipitation function showed significant increases after 10 years across the restoration chronosequence, followed by small improvements throughout the remainder of the 25-year dataset. Further improvements in the detain precipitation functions are anticipated as additional organic matter accumulates in surface soil horizons and increases in surface roughness (i.e., microtopography) occur via tree throw, bioturbation, and other mechanisms.

Notably, a subset (13%) of the 606 restoration sample sites examined exhibited precipitation detention functional score >0.80 functional capacity index, yielding results comparable to conditions observed at mature wetland forests (average of 0.81 ±0.02 functional capacity index). These high-scoring detain precipitation function sites encompassed the entire range of the restoration chronosequence (i.e., 5-25 years) demonstrating the capacity of mitigation projects

Scores steadily increase with the onset of tree establishment, with significant functional increases occurring after 10, 13, and 25 years after restoration (Berkowitz 2019). The incorporation of snags and log biomass along with additional tree growth will drive further functional increases as forest succession proceeds.

As noted above, additional increases in wetland functional scores are anticipated in the future. In some cases, specific wetland functional increase thresholds can be identified and related to changes in mitigation site conditions. For example, the lack of snags in early- and middle-aged mitigation sites constrains wetland functional capacity scores by 12.5%. Many of the variables associated with the HGM approach will show continued improvements as forest succession proceeds. For example, variables related to forest structure (e.g., tree diameter, tree density, sapling-shrub density) will continue to develop. Improvements in carbon accumulation will increase the level of wetland functions through recruitment of woody debris, soil organic matter, and ground vegetation cover. The incorporation of snags and logs (which are both currently absent from most existing mitigation sites) will further drive functional score increases.

In summary, previous studies demonstrate that existing mitigation locations both 1) display improved wetland assessment variable scores and 2) exhibit increases in wetland functions over time and are furthermore 3) anticipated to experience additional functional increases in the future. As forest succession proceeds, wetland mitigation sites will continue to approach the level of wetland functions observed in mature forested wetlands. These results also indicate that future mitigation efforts may successfully offset impacts associated with the development of additional civil works projects in the Yazoo Basin. More importantly, the available data can be used to estimate the performance of mitigation lands within the region using a data-driven methodology.

The following subsections describe the methodology used to conduct the wetlands assessment. First, a description of the approach utilized to determine the land cover classifications and the extent of wetlands within the project area is provided (3.1). Second, the method used to apply the HGM approach and conduct the wetlands assessment is presented (3.2). Third, the determination of mitigation requirements is described (3.3). All evaluations were conducted to encapsulate a 50-year period of analysis.

The approach to land cover classification and the determination of the potential wetland extent in the study area used the approached outlined below. The study area includes all areas below the 93-foot elevation contour encompassing the entirety of the 5-year floodplain as defined by the USACE Vicksburg District and described elsewhere in the FSEIS. Land cover classification was determined using 2022 United Stated Department of

Agriculture, National Agricultural Statistics Service (NASS) Cropscape 2022 data layers. An analysis of rainfall normality during the period when NASS data were collected was conducted to ensure that potential wetland areas were not misclassified as open water landcover features due to wetter than normal conditions. The analysis indicates that only one month (August 2022) of the nine months from which NASS data were derived was wetter than normal based on a WETS analysis examining 24 years of weather data. Other months were within the normal range (4 months) or displayed lower than normal precipitation (4 months). This suggests that higher than normal precipitation did not contribute to error within the wetlands assessment.

The land cover data included the following designations: Background, Corn, Cotton, Rice, Soybeans, Winter Wheat, Double Crop Winter Wheat/Soybeans, Other Hay/Non Alfalfa, Sod/Grass Seed, Fallow/Idle Cropland, Pecans, Aquaculture, Open Water, Developed/Open Space, Developed/Low Intensity, Developed/Med Intensity, Developed/High Intensity, Barren, Deciduous Forest, Evergreen Forest, Mixed Forest, Shrubland, Grassland/Pasture, Woody Wetlands, and Herbaceous Wetlands. Land cover classes were aggregated into the following cover classifications to facilitate the assessment: 1) mature forested wetlands, 2) agricultural croplands, and 3) non- wetland areas. This approach differs from the analysis presented in the 2007 FSEIS, which differentiated between Mature Forest, Middle Aged Forest, Early Aged Forest, Recently Logged, Agricultural, and Other areas. The following categories of NASS data were used to aggregate the data layers:

The mature forested wetland cover type included all forested areas regardless of type or successional stage and all unmanaged lands that would have the potential to develop into mature forests during the period of analysis. This includes the following land classifications: Deciduous Forest, Evergreen Forest, Mixed Forest, Woody Wetlands, Herbaceous Wetlands, Unclassed, Fallow/Idle Cropland, Pecans, Barren, Shrubland, and Grassland/Pasture. The assumption that all of these areas are mature forests accounts for the potential for early successional stage forests to mature during the period of analysis, providing the highest possible forested wetland functional scores across the study area. Further, because mature forested wetlands receive the highest scores with the HGM assessment approach this also represents the most conservative possible approach for evaluating potential impacts to wetland resources. For example, the average Functional Capacity Index (FCI) score in mature forests is 0.83, while the average FCI in early aged forests is only 0.47. As a result, the assumption that all non-agricultural wetlands in the study area are mature forests yields a substantial increase in wetland functional capacity scores compared with approaches that consider other forest successional stages.

The agricultural cropland cover type incorporated all areas under row crop production and recently fallowed fields including the following cover classes: Corn, Cotton, Rice, Sorghum, Soybeans, Sunflower, Peanuts, Winter Wheat, Double Crop Winter Wheat/Soybeans, Millet, Other Hay/Non-Alfalfa, and Double Crop Soybean/Oats. The wetlands assessment assumes that all lands currently under active agricultural production will remain managed and be maintained in an un-forested condition throughout the period of analysis.

The non-wetland land cover class included all areas designated as open water or aquaculture as well as the various categories of developed lands. The non-wetland land cover categories include the following classifications: Aquaculture, Surface water, Developed/ROW, Developed/low intensity, Developed/med intensity, and Developed/high intensity.

Notably, the identification and delineation of wetlands within the project area was a major focus of the 2007 FSEIS, and extensive work was conducted by multiple federal agencies in order to estimate the distribution of wetlands within the project area. For the purposes of the current assessment, the extent of jurisdictional wetlands within the direct impact area (i.e., the physical footprint of the pump station) were determined by the USACE Vicksburg District Regulatory Branch. The procedures applied included both a wetland delineation and preliminary jurisdictional determination. The results of that determination include the acreage of jurisdictional forested and agricultural wetlands that were subsequently included in the assessment of wetland resources within the direct impact area.

Additionally, the proposed borrow area, occupying agricultural lands within the direct impact area, was assumed to be a jurisdictional wetland for the purposes of this assessment.

The extent of wetlands within the indirect impact area (i.e., areas subject to potential shifts in flood inundation period under the proposed Water Management Plan) within the study were considered wetlands if they 1) occurred below the elevation of 93 feet, which incorporates the entirety of the 5-year floodplain, and 2) exhibited any modeled period of flood inundation at intervals of 5 years or less, and 3) were classified as any of the forested wetland or agricultural cropland aggregated cover types described above. Information on the extent of areas within the 93-foot elevation contour and 5-year floodplain were provided by the USACE Vicksburg District Engineering and Construction Division. The approach considers all open water and developed areas within the defined study area to have wetland assessment score of zero, because they fail to meet the wetland criteria used for wetland identification and do not provide wetland functions.

This methodology represents a conservative approach to determine indirect impacts because many forested, agriculture, pasture, and other areas within the study would not meet the hydrophytic vegetation, hydric soils, and/or wetland hydrology criteria outlined in Environmental Laboratory (1987) and the delineation procedures detailed in USACE (2010). Additionally, this approach incorporates all forested and agricultural lands below the elevation of 93 feet, which encompasses the entirety of the 5-year floodplain, including any geographically isolated wetlands, areas meeting the definition of prior converted croplands, areas that experience hydroperiods shorter than the 14 consecutive day duration required to document the presence of wetland hydrology (USACE 2005), and other areas that would otherwise be excluded from consideration during a traditional wetland delineation and functional assessment approach.

The presence of non-wetlands within the study area was reported in the 2007 FSEIS when a number of areas occurring within the ≥5.0% flood duration intervals were determined to be non- wetlands using traditional wetland delineation techniques (e.g., field indicators of hydric soils, hydrophytic vegetation, and wetland hydrology). For example, data collected in the study within areas exhibiting ≥5.0% flood duration zones reported that five of the 52 data points (9.6%) examined were determined to be non-wetlands.

Notably, the approach described above that includes areas occurring below the ≥5.0% flood duration interval and the evaluation of the entirety of the 5-year floodplain in the current report is a significant shift from both the 2007 FSEIS and the 2020 FSEIS. The current approach is designed to address prior criticism of the 2007 and 2020 wetland assessments and provide the most defensible and conservative estimate possible of potential impacts to wetland resources resulting from implementation of the proposed Water Management Plan.

2.5 APPLICATION OF THE HGM WETLAND FUNCTIONAL ASSESSMENT

The following focuses on the application of the HGM assessment and the methods utilized to determine the potential impacts to wetland resources. The HGM method selected for the wetlands assessment applies the methodology described by Smith and Klimas (2002) in the Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Selected Regional Wetland Subclasses, Yazoo Basin, Lower Mississippi River Alluvial Valley. Additionally, the wetland assessment includes the modifications outlined by Smith and Lin (2007) in Yazoo Backwater Project: Assessing Impacts to Wetland Functions and Recovery of Wetland Functions in Restoration Areas. The modifications were developed to incorporate flood duration data into the assessment approach, which was not available at the time Smith and Klimas (2002) was published. Both methods have been certified for use by the USACE National Ecosystem Restoration Planning Center of Expertise.

This methodology was selected because it 1) was developed within the Yazoo Basin and incorporated data collected within the study area, 2) provides for analysis of both the No Action Alternative and Action Alternatives using quantitative measures of wetland functions, 3) allows for analysis over the 50-year period of analysis, and 4) supports the determination of mitigation requirements. Additionally, the HGM approach was developed in adherence with the Guidelines for Developing Guidebooks (Smith et al. 2013) and Berkowitz et al. (2023) which incorporate elements to ensure technical quality of the method including: clearly defined objectives and outputs; geographical area of application; input from an interagency assessment team; scaling of assessment models based upon data collected at reference standard locations; development and testing of a written protocol; wetland classification; rapid application; calibration and metric scaling using reference data; application of numerical data; verification and field testing of the assessment; and external peer review.

The HGM model developed for application in the study addresses a number of wetland subclasses. For the purpose of the current assessment, all lands classified as wetlands (as described above) are assumed to be within the Riverine Backwater subclass. This selection was made because 1) the wetlands examined occur within the 5-year flood frequency interval, 2) the Riverine Backwater subclass encompasses the full suite of wetland functions described in Smith and Klimas (2002), and 3) utilizing a singular methodology provides consistency and continuity across impact, mitigation, monitoring, and adaptive management project phases.

The HGM models incorporate 19 variables (Table 3) collected using a combination of on-site and off-site approaches (Figure 8). Data for each HGM variable was collected at 43 mature study locations within the study area. Variable metric data was transformed into variable subindex scores ranging from 0.0 to 1.0, and wetland functional capacity index (FCI) scores were calculated using empirical equations (Table 4). The FCI scores are then converted to Functional Capacity Units (FCUs) by accounting for the spatial extent of each land cover types described above within the study area (Smith et al. 2013).

The resultant FCI scores were compared with those derived from 39 mature forest locations sampled during the development of the 2007 FSEIS. It was determined that despite being very similar overall, the values collected in support of the current assessment yielded slightly lower FCI scores than reported in the 2007 FSEIS (average FCI difference <0.09). As a result, the FCI scores reported in the 2007 FSEIS were selected to conduct the current analysis. This approach represents the most conservative approach possible, since it applied the higher set of scores available across the available datasets to determine baseline conditions.

Average Annual Functional Capacity Units (AAFCUs) are then evaluated over a 50-year period of analysis under the No Action Alternative and the two Alternatives to determine mitigation requirements using Equations [1] and [2]. The sum of all functional scores approach was selected to determine impacts and mitigation requirements based on recommendations of Smith et al. (2013).

The conditions in mature forested wetlands and agricultural croplands in the study area are considered stable for purposes of the wetlands assessment, as evidenced by the lack of significant differences between the results presented in the 2007 FSEIS and those observed

during the collection of field data in 2020. For example, mature forested wetlands generally receive high variable subindex score (>0.9) for the variables most likely to change over time including tree basal area and tree density. As a result, the FCI scores for the No Action Alternative are not adjusted over the 50-year period of analysis.

The analysis of direct project impacts first determined the AAFCUs associated with the jurisdictional forested and agricultural wetlands within the physical project footprint (i.e., pump station) and the entirety of the proposed borrow area under the No Action Alternative. For the purpose of the assessment, the direct impact area was assumed to occur in the 2-year floodplain and >12.5% flood duration interval, which yields the highest HGM results within the dataset.

The baseline AAFCUs are then generated for the direct impact area. Under the proposed Water Management Plan, all wetland functions within the direct impact area are reduced to zero. The difference between the baseline AAFCUs under the No Action Alternatives and the two Action Alternatives represents the direct impacts of the project. Within the direct impact there is no difference between Alternative 2 and Alternative 3 because they utilize the same project footprint.

The analysis of indirect impacts first determines the AAFCUs associated with the forested and agricultural wetlands as defined above within the remainder of the study area under the No Action Alternative. This includes the incorporation of flood duration and frequency data provided by the USACE Vicksburg District Engineering and Construction Division. The estimated duration of flooding was derived using the Flood Event Simulation Model (FESM) (Johnson, 2016), which reports the following flood duration intervals within the two year floodplain: 0.0% of the year (no flooding), <2.5% of the year (corresponding to <9 days), 2.5- 5% (9-17 days), 5-7.5% (18-26 days), 7.5-10% (27-36 days), 10-12.5% (37-45 days), and >12.5% (≥46 days). When flood duration intervals yielded a fraction of a day, the interval categories were rounded to the closest full day. For example, the <2.5% interval corresponds with exactly <9.125 days, which is reported here as <9 days. Additionally, the modeling generates data regarding forested wetlands and agricultural areas within the 3, 4 and 5-year floodplains, all of which experience flood durations for <2.5% of the year-round growing season. All HGM calculations utilized the mid-point of each flood duration range, for example an estimated flood duration of 6.25% of the year-round growing season was applied to all land cover classes within the 5-7.5% flood duration interval. Notably, the FESM model provides data on flood inundation, and does not directly account for soil saturation. However, the selected approach accounts for any impacts to wetlands associated with reductions in saturation by assuming that areas subject to as little as one day of inundation are wetlands despite the fact that 14 consecutive days of wetland hydrology are required to meet the Technical Standard for Wetland Hydrology as described in USACE (2005). Further, the proposed monitoring and adaptive management plan include the assessment of subsurface water levels. As a result, any unanticipated impacts to wetlands resulting from reduced saturation can be assessed and appropriately addressed using a data-driven approach in cooperation with all partner agencies.

The estimated duration of flooding associated with each land cover type was determined under the No Action Alternative and both Alternative 2 and 3 in the proposed Water Management Plan. This allowed for analysis of changes in HGM FCI values and supported the calculation of indirect impacts to wetland functions.

The AAFCUs are then generated for the No Action Alternative, Alternative 2, and Alternative 3, under which a subset of the wetlands will undergo shifts in the duration or frequency of flood water inundation and an associated change in wetland function. The difference between the AAFCUs under the No Action and the Action Alternatives represents the estimated indirect impacts of the project.

2.6 DETERMINING MITIGATION REQUIREMENTS

Mitigation requirements were determined for the study area based upon both direct (pump station and borrow area) and indirect impacts (anticipated changes in flood duration and frequency). In order to compensate for potential decreases in wetland functional capacity, a mitigation plan will be instituted. Mitigation within the region consists of re-establishing forested wetlands on agricultural lands with hydric soils. These efforts have proven successful for offsetting unavoidable impact to wetland resources, and published research tracks the trajectory of habitat, hydrology, and biogeochemical functional improvements within the established USACE mitigation lands (Berkowitz 2019). The current report assumes that similar mitigation approaches and success trajectories will be applied for the projects described herein. Additional information on the mitigation plan is provided in the Mitigation and the Monitoring and Adaptive Management Plan Appendices of this document.

Mitigation projects reclaim forested wetlands previously converted to agriculture, many of which exhibited marginal production due to seasonal high-water tables and/or the need for extensive drainage. Mitigation activities include planting desirable forested wetland tree species, selected for their capacity to thrive on hydric soils and subject to wetland hydrology. Characteristic species utilized for mitigation include *Quercus phellos* (Willow Oak), *Quercus texana* (Nuttall Oak), *Quercus lyrata* (Overcup Oak), *Carya aquatica* (Water Hickory), and other flood-tolerant hydrophytes associated with high wetland habitat values (Smith and Klimas 2002). Afforestation typically occurs via row planting at typical seedling spacings of three to four meters.

Data from existing USACE mitigation lands, information within the HGM guidebook, and previously published literature were used to determine FCI values at target years 0, 5, 10, 20, 35, and 50 (Tables 5-21). Specifically, for each HGM variable the available data from existing mitigation sites was applied for target years 0-20 based on the information presented in Berkowitz (2019). Estimated HGM variable input data trajectories from Smith and Klimas (2002) were used to generate the inputs for target years 35 and 50. The resultant subindex scores were used to calculate the FCI values at each target year (Table 22). The AAFCUs generated by 1.0 acre of mitigation lands across the period of analysis were interpolated between target years using equations [1] and [2] (Table 23). The AAFCUs for each function are summed to yield the total AAFCUs provided by 1.0 acre of mitigation land during the 50-year period of analysis. The target year analysis indicates that 1.0 acre of mitigation is required to offset a 4.78 decrease in AAFCUs (Table 24). As a result, a project impact of -478 AAFCUs would require establishment of 100 acers of compensatory mitigation.

$$Culuative\ FCUs =$$

$$\sum (Target\ year_2 - Target\ year_1) \left\{ \frac{[Area_1 FCI_1 + Area_2 FCI_2]}{3} + \frac{[Area_2 FCI_1 + Area_1 FCI_2]}{6} \right\} \quad [1]$$

$$AAFCUS = \frac{\sum (All\ FCUs\ between\ \ all\ target\ \ years)}{50} \quad [2]$$

SECTION 3

Results

3.1 NO ACTION ALTERNATIVE

The direct impact area encompasses 528.2 acres, including 215 acres associated with a borrow area and 313.2 acres occupying the pump station location and surrounding infrastructure. A total of 216.6 acres of jurisdictional wetlands were identified by the USACE Vicksburg District within the footprint of the pump plant (Figure 9). The remainder of the area was composed of open water, non-wetlands, and developed landcover types. As noted above, the proposed borrow area is located on 215 acres of agricultural which were assumed to be wetlands for the purposes of this assessment (Table 25).

The HGM variable metric inputs, variable subindex scores and FCI values for the wetlands in the direct impact area are displayed in Tables 26-27. Note the non-agricultural wetlands in the direct impact area exhibit high levels of wetland function capacity (average FCI value = 0.84) due to the assumption that they are composed of mature forests or would reach maturity during the period of analysis. The agricultural wetlands in the direct impact area display lower FCI values (average = 0.25) due to the absence of a tree strata, desirable vegetation species, ongoing agricultural activities, and conditions associated with the accumulation of organic biomass (e.g., woody debris, logs). The wetlands in the direct impact area collectively yield 1884 FCUs.

Because the conditions within mature forests (e.g., VTBA, VTCOMP already receive the maximum variables subindex scores) and active agricultural areas are not anticipated to undergo a change in land use over the period of analysis, wetlands in the direct impact area provide 1884 AAFCUs (Table 28).A total of approximately 351,205 acres are located in the area below the 93-foot elevation contour, encompassing the entire 5-year floodplain and representing the indirect impact area. This area includes an estimated 225,113 acres of potential forested wetlands and 104,674 acres of agricultural lands being evaluated in the wetlands assessment. The area also includes 21,418 acres of non-wetlands (e.g., developed lands, open water) that are not included in the wetlands assessment. The distribution of potential wetland areas is provided in Table 29 organized by land cover class (forested or agricultural), flood duration interval, and flood frequency.

The HGM variable inputs and variable subindex scores for each flood inundation interval are depicted in Tables 30-47, including all flood duration (<2.5% to >12.5% of the year-round growing season) and frequency intervals (1 and 2-year, 3-year, 4-year, and 5-year floodplains). The 1-year and 2-year floodplain data is aggregated because all areas below the 2-year floodplain elevation receive the maximum HGM flood frequency variable subindex score of 1.0.

The HGM wetland functional capacity scores for wetlands in the indirect impact area are summarized in Table 48, documenting the high level of functions provided by the mature forests (average FCI = 0.77) in the study area and the decreased levels of functions provided by agricultural areas (average FCI = 0.22). Because the wetland functional capacities in the study area are not anticipated to change over the period of analysis, the AAFCUs present under the No Action Alternative is determined by multiplying the FCI scores for each flood frequency and duration interval by the spatial extent of each land cover type (i.e., forested, or agricultural).

Existing conditions in the indirect impact area provide a total of 1,529,098 AAFCUs across the entire 5-year floodplain, including 1,370,641 AAFCUs and 158,457 AAFCUs from forested and agricultural areas respectively (Tables 49-50). In total, existing conditions provide 1,530,982 AAFCUs across both direct and indirect impact areas as summarized in Table 51.

3.2 PROPOSED WATER MANAGEMENT PLAN

Implementation of both Alternatives 2 and 3 will result in a decrease of wetland functions within the direct impact area as construction activities convert the wetlands present under the No Action Alternative to other land cover types, resulting in a loss of 1,884 AAFCUs (Table 52).

Implementation of the proposed Water Management Plan is not expected to alter the flood inundation duration of the majority of the five-year floodplain evaluated in the indirect impact area (Table 53). Under Alternative 2, a total of 236,913 acres (72%) of the 329,787 acres assessed as potential wetlands are not anticipated to undergo a change in flood inundation interval. Alternative 3 displays as similar results with 240,380 acres (73%) of the potential wetlands in the assessment area would not undergo a change in hydroperiod. The remaining acreage (~25% of the study area) is anticipated to exhibit a shift in flood inundation duration or frequency. As noted elsewhere, the change in flood inundation periods is not anticipated to result in the shift of wetland habitats to non-wetland habitats. This results from several factors including, 1) the proposed Water Management Plan is designed to allow flooding to extend across the entire 5-year floodplain during the non-crop season, 2) the role that precipitation plays in supporting wetland hydrology in the study area, and 3) the fact the inundation model used (i.e., FESM) to conduct the study do not account for local precipitation, soil saturation, and other drivers of wetland hydrology (e.g., low permeability clay soils that restrict drainage) which will persist following project implementation.

However, the alteration of flood inundation patterns has the capacity to decrease wetland functions as outlined below. The majority of lands that are estimated to experience a change (77% in Alternative 2 and 83% in Alternative 3) are expected to shift from one flood interval to the adjacent interval (Table 53). For example, most wetland areas shift from a higher flood duration interval (e.g., inundated 10-12.5% of the year-round growing season) to next lower interval (e.g., the 7.5-10% interval). The remaining areas will exhibit larger shifts in inundation duration and frequency (23%and 17% under Alternatives 2 and 3 respectively).

In order to quantify changes in wetland functions, the differences in FCI scores between flood duration intervals was determined and the change in AAFCUs was calculated as presented in Tables 54-90. Results indicate that a decrease of 34,687 and 25,470 AAFCUs will occur under Alternative 2 and Alternative 3 across the indirect impact area with implementation of the proposed Water Management Plan (Table 91).

In total, the direct and indirect impacts of the Proposed Plan will result in a loss of 36,570 AAFCUs under Alternative 2 and 27,354 AAFCUs under Alternative 3 (Table 92). This represents a 2.4% and 1.8% decrease in the AAFCUs provided in the basin under Alternatives 2 and 3 respectively when compared to the No Action Alternative. Under both Action Alternatives >97% of the AAFCUs within the study area will be retained under the proposed plan and compensatory mitigation would be required to offset the 1.8-2.4% decrease in wetland function.

3.3 COMPENSATORY MITIGATION REQUIREMENTS

Compensatory mitigation would offset the estimated 1.8-2.4% impacts to wetland resources outlined above (i.e., net change of -36,570 AAFCUs under Alternative 2 and -27,354 AAFCUs under Alternative 3; Table 91).

Mitigation will be accomplished through reforestation of agricultural lands exhibiting hydric soils, as described in the Mitigation plan; additionally, a detailed Monitoring and Adaptive Management plan can be found in another section of this document to address any short falls in the recovery of AAFCUs during mitigation and identify opportunities to improve the wetland functions provided at mitigation sites.

In order to determine the mitigation requirements HGM assessment variable metrics, variable subindex scores and FCIs have been developed across the period of analysis as presented in Tables 5-21. Additionally, the performance of mitigation areas has been estimated over the 50-year period of analysis, including the number of AAFCUs generated at each target year (Table 22). Those analyses demonstrate that 1.0 acre of mitigation land is required to offset an impact of -4.78 AAFCUs (Table 24). As a result, a total of 7,650 acres and 5,722 acres of mitigation is required under Alternatives 2 and 3 respectively to offset the wetland impacts associated with the implementation of the proposed plan (Tables 93-94). This includes 394 acres of mitigation associated with direct project impacts under both alternatives, 7,256 acres to offset indirect impacts under Alternative 2, and 5,328 acres of mitigation to offset indirect impacts under Alternative 3 (Tables 95-98).

Table 99 provides a comparison of the results presented herein with the findings of the 2007 and 2020 FSEIS reports. The Table supports an analysis comparing expected outcomes across five alternatives including: the 2007 FSEIS Alternative 5 (preferred alternative; pump on elevation of 87 feet), the 2007 FSEIS Alternative 7 (lowest wetland impact alternative including a pump; pump on elevation of 91 feet), the 2020 Action Alternative (pump on elevation of 87 feet), and the Alternatives 2 and 3 described in the current report. The comparisons examine areas below the 2-year floodplain, because that information is available for all three datasets (2007, 2020, and current). Note that the extent of potential areas occurring within the 2-year floodplain differs across datasets as the result of different periods of record and changes in hydrologic modeling, however the analysis provides valuable insight into the relative effect that the proposed plans would have on wetland resources (See Engineering Appendix). Examining the data, fewer acres of potential wetlands would experience a shift in inundation duration or frequency under the current proposed plan than under the 2007 Alternative 5. Additionally, the Alternatives described in the current analysis would induce a significantly lower shift in patterns of wetland hydrology than any of other Alternatives evaluated in 2007 or 2020. As a percent of the 2-year floodplain area, the current Alternatives (15% of areas would shift) would have substantially lower impacts than the 2007 Alternative 5 (41%), 2007 Alternative 7 (19%), and the 2020 Action Alternative (31%).

An additional comparison evaluated anticipated changes in wetland functional capacity across these Alternatives. For direct impacts, the 2007 Alternatives have the lowest impact of wetland functions (decrease of 240 AAFCUs), followed by the 2020 Action Alternative (-444 AAFCUs), and the current Alternatives 2 and 3 (-1884 AAFCUs). The reason that the direct project impacts are higher under the current plan because of expansion of the pump plant relative to the previous analyses. Within the indirect impact area comparisons require an examination of the available data, which is limited to those areas within the 2-year floodplain exhibiting inundation durations >5% of the year-round growing season. This provides the best available apples to apples comparisons between the various datasets, as data encompassing the entirely of the 2-year floodplain or areas within the 3-year, 4-year, or 5-year floodplains are not available for the 2007 Alternatives.

Using this approach, the Alternatives 2 and 3 described herein would have substantially less impacts to wetland resources in the indirect impact area (-1,978 and -1,881 AAFCUS respectively) than the 2007 Alternative 5 (-14,188 AAFCUs), 2007 Alternative 7 (-3,949), or the 2020 Action Alternative (-11,054). The lower degree of wetland impacts associated with the current Alternatives hold true when examining the total impacts examined in the comparison. Within the available dataset, implementation of Alternative 2 described herein would reduce total impacts by 73% compared with 2007 Alternative 5, 7.8% compared with 2007 Alternative 7, and 66% compared with the 2020 Action Alternative. Implementation of Alternative 3 described herein would reduce total impacts by 74% compared with 2007 Alternative 5, 10% compared with 2007 Alternative 7, and 67% compared with the 2020 Action Alternative. While direct comparisons between plans throughout the 5-year floodplain are not possible. This data indicates that the current alternatives will result in substantially fewer impacts to wetlands than any of the previously selected Alternatives. Comparing the mitigation requirements between the current Alternatives and previous plans further supports this conclusion, with the current alternatives requiring significantly fewer acres of mitigation to offset impacts to wetland resources.

SECTION 4

Summary

This wetland assessment applies the latest information about wetland hydrology, ecological function, and forested wetland restoration available within the study area. The approach outlined above is based on multiple peer-reviewed publications, resulting in the most data-driven assessment possible. Additionally, the analysis makes a number of assumptions that ensure the assessment of wetland resources is conservative, including the following: 1) all forested and agricultural lands within the 5-year floodplain are wetlands; 2) all forested areas in the indirect impact portion of the study area are mature forests; and 3) that all of these areas in the indirect impact area would be considered jurisdictional wetlands. Further, the development of mitigation wetland performance estimates over the period of analysis was based on available data from established mitigation areas in the Yazoo Basin, incorporating information that was previously unavailable and ensuring that impacts to wetland resources can be restored.

Results indicate that implementation of Alternatives 2 and 3 will impact the level of wetland functions, resulting in a decrease of 36,570 and 27,353 AAFCUs respectively. This represents a 2.4% and 1.8% decrease in the AAFCUs provided in the basin under Alternatives 2 and 3 respectively when compared to the No Action Alternative. Under both Action Alternatives >97.6% of the AAFCUs within the study area will be retained under the proposed plan. The impacts will require the establishment of 7,650 acres of wetland mitigation for Alternative 2 and 5,722 acres of mitigation for Alternative 3. Notably, based on comparisons conducted using the available data, the current Alternatives are anticipated to have substantially fewer impacts to wetlands than Alternatives evaluated in either 2007 or 2020.

Figures:

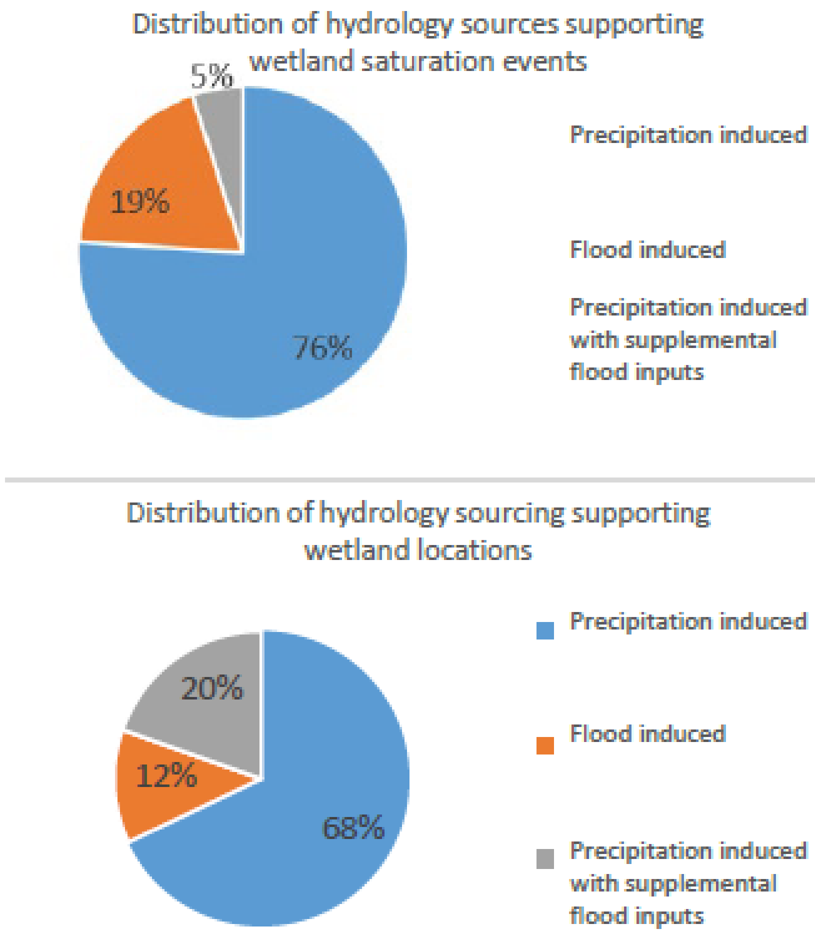

Figure 1. Distribution of hydrologic sources between precipitation, flooding, and precipitation followed by supplemental flooding displayed for wetland hydrology events (n = 95; top panel) and individual wetland locations (n = 56; bottom panel.) Note that the majority of wetland hydrology events and locations were dominated by precipitation-driven hydrology sources (adapted from Berkowitz et al 2020).

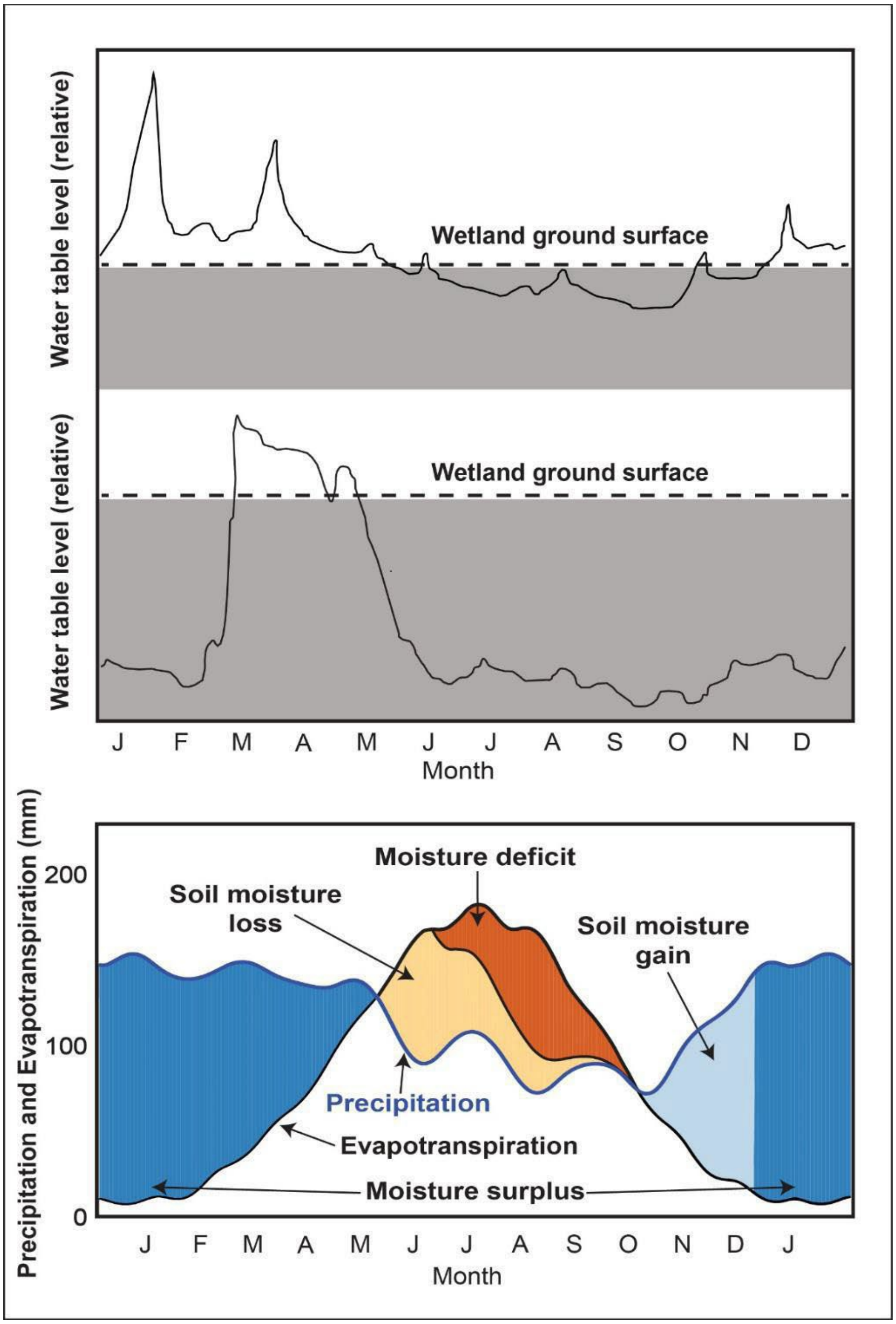

Figure 2. The theoretical hydropatterns for an alluvial swamp forest and hardwood wetland forest (upper panels; adapted from Mitsch and Gosselink 2015). The water balance (lower panel; adapted from data available in Matsuura et al. 2009) corresponds to the theoretical water table fluctuations in the upper panels.

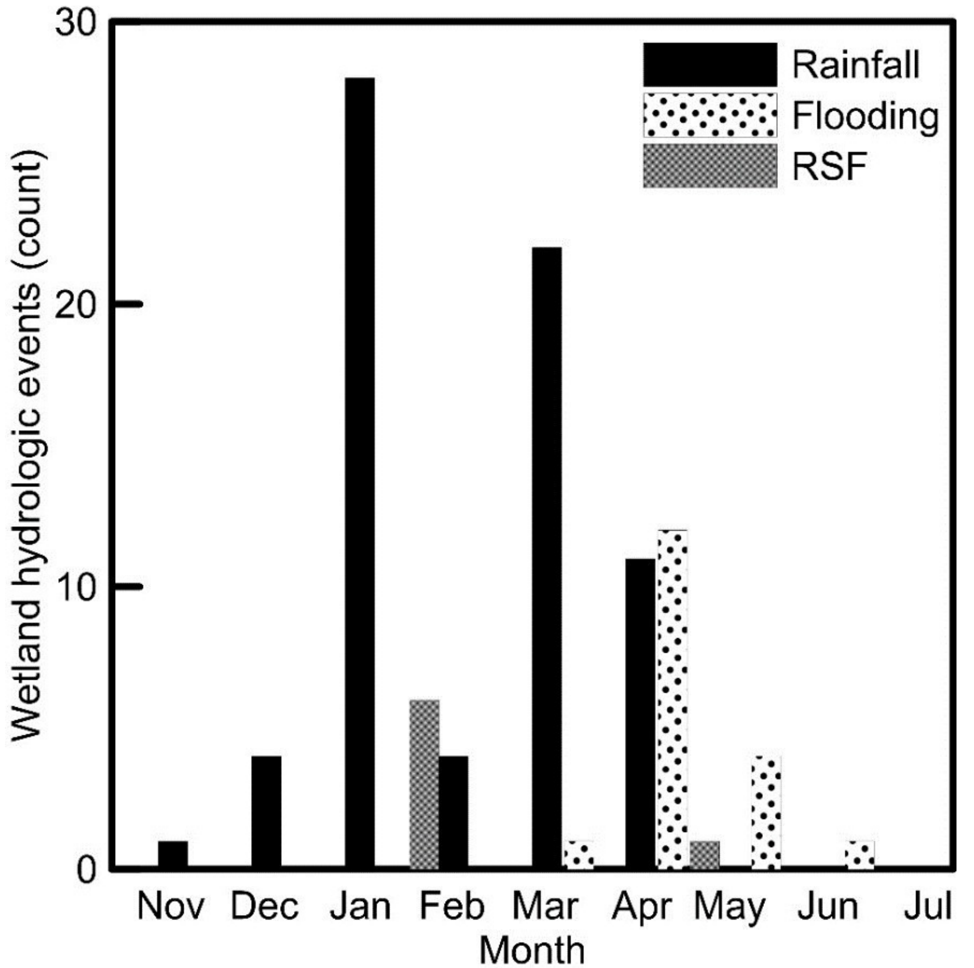

Figure 3. Distribution of wetland hydrology event timing and water source. Note that most precipitation (rainfall) driven events dominate the system and began during the winter, while flood-derived events occur during spring and summer. RSF = rainfall followed by supplemental flooding (Berkowitz et al., 2020).

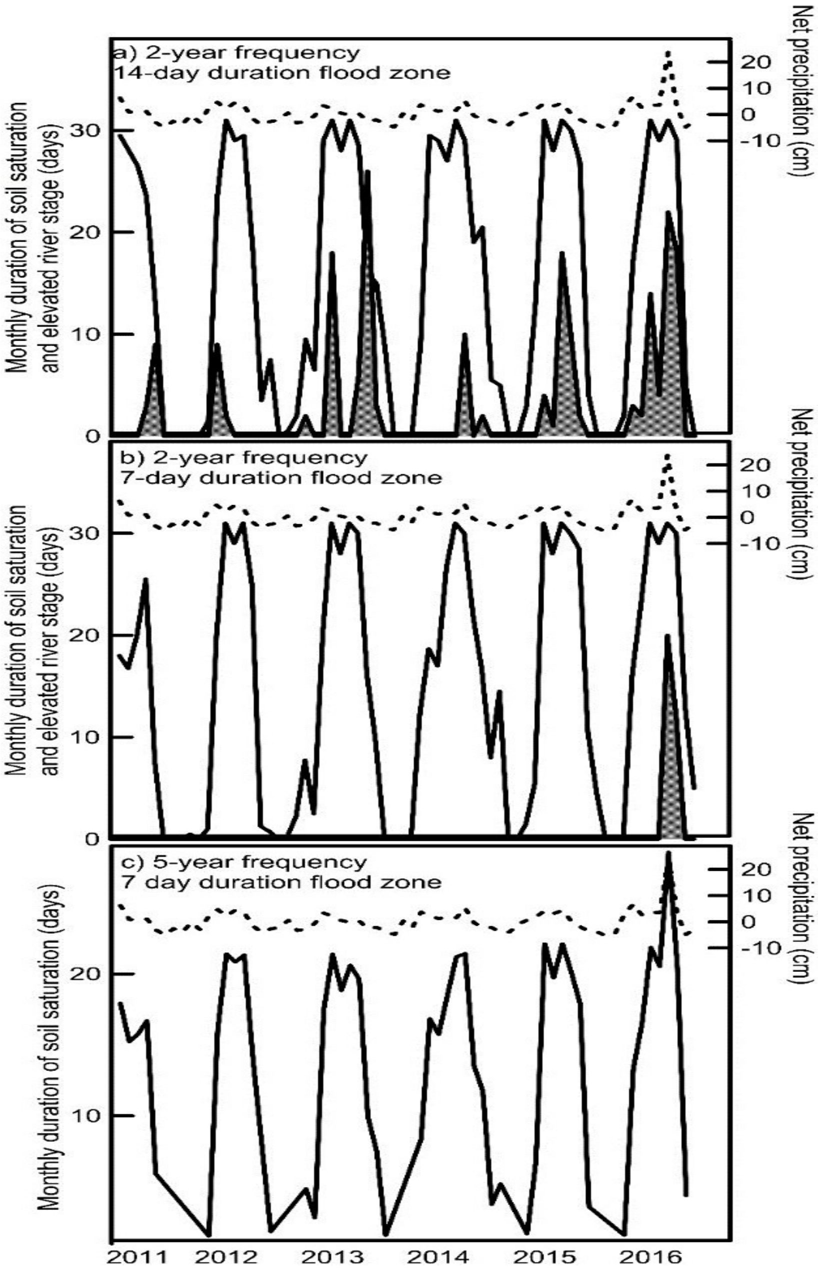

Figure 4. Long-term average monthly duration of wetland hydrology within ≤30 cm of the soil surface (solid line) and elevated river stage (shaded area) across three mapped flood frequency and duration zones including locations within the a) 2-year frequency, 14-day duration flood zone; b) 2-year frequency, 7-day duration flood zone; and c) 5-year frequency, 7-day duration flood zone (no flooding observed during the monitoring period). Note that the period of wetland hydrology exceeds the period of elevated river stage in all cases, indicating that precipitation is a major wetland water source in the study area. Net precipitation is also displayed, highlighting the relationship between observed wetland hydropatterns and the seasonal water balance (broken line). Adapted from Berkowitz et al (2020).

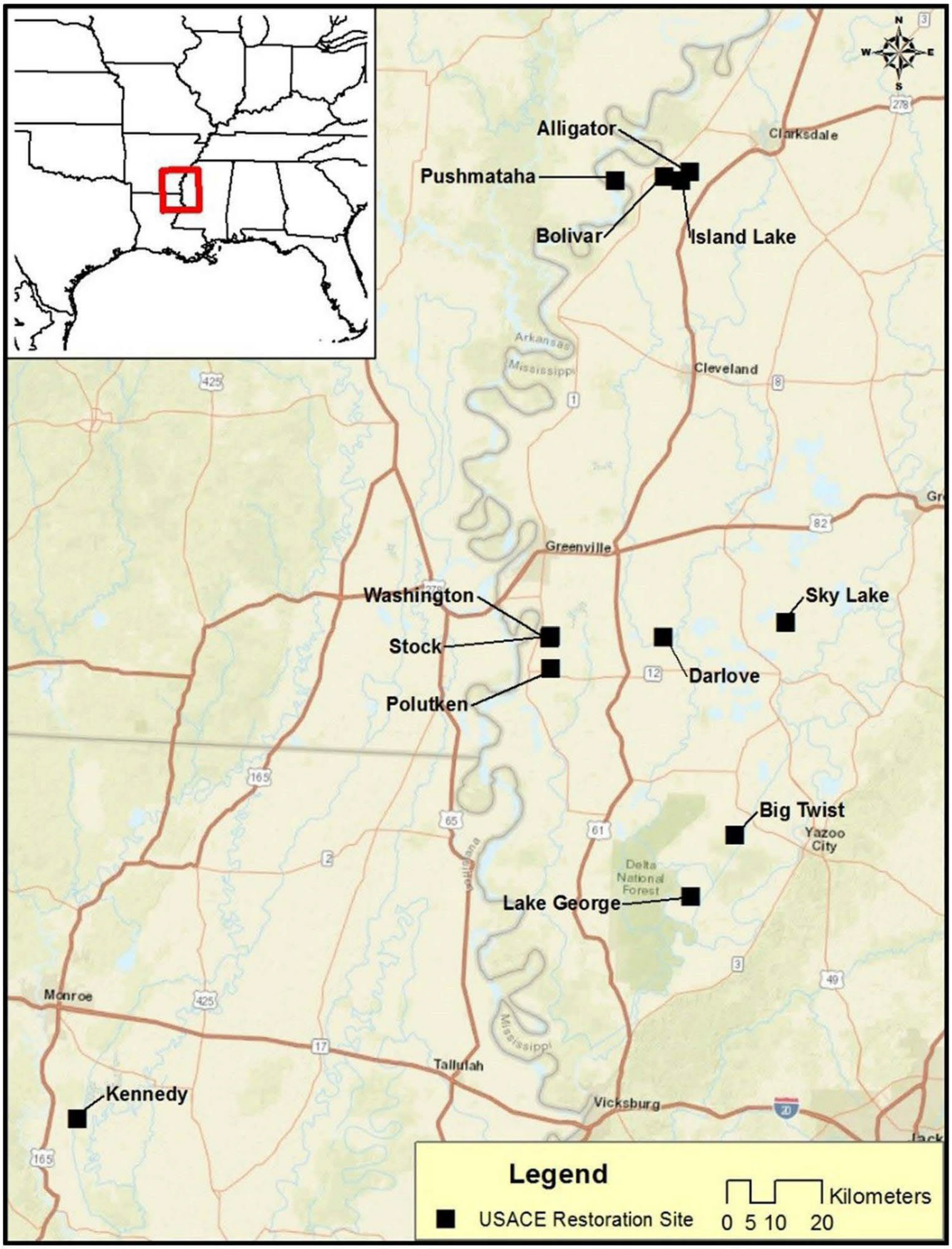

Figure 5. Location of established mitigation areas in the region.

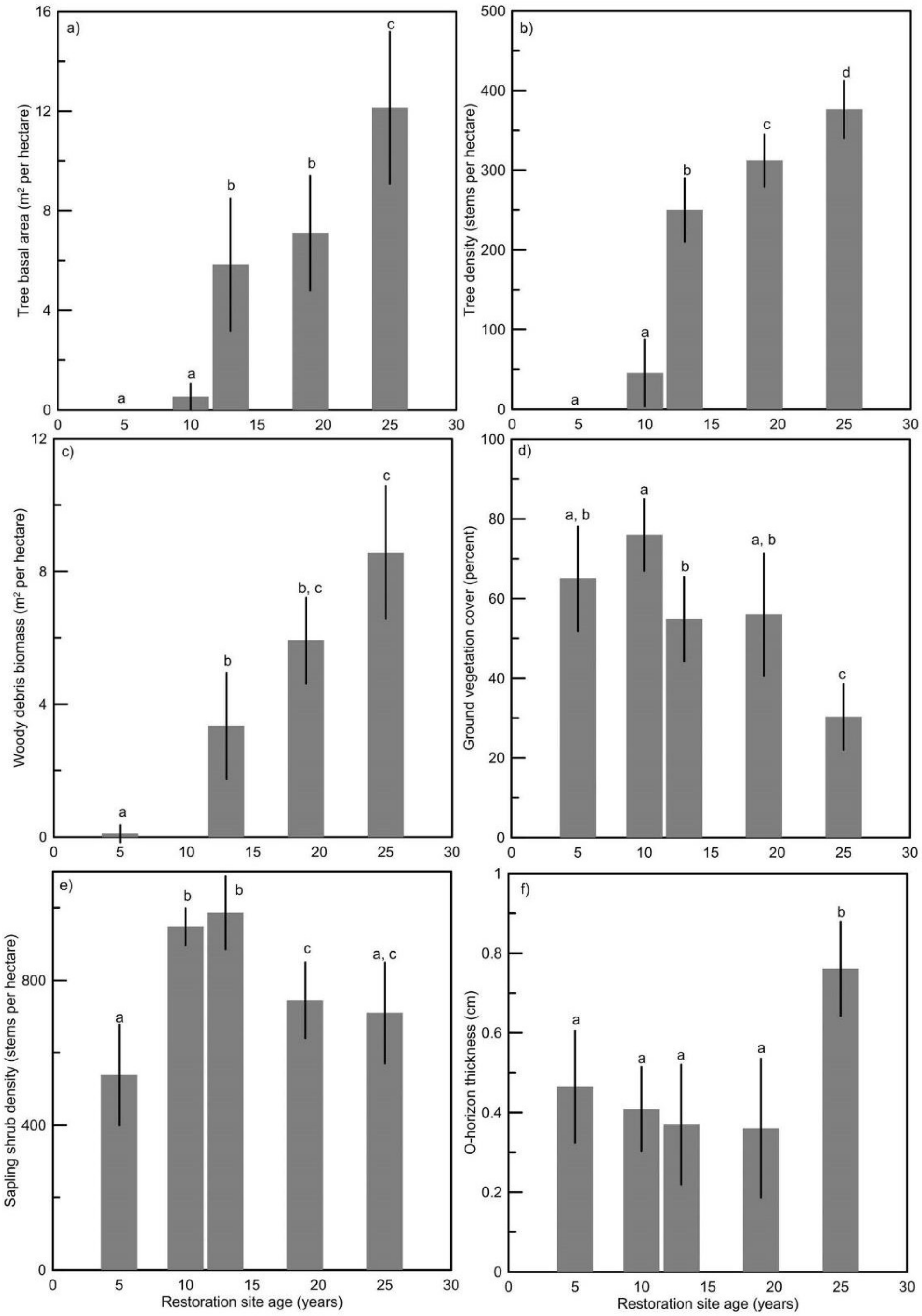

Figure 6. Changes in HGM variable scores over time. Lower case letter indicates significant differences (Berkowitz 2019).

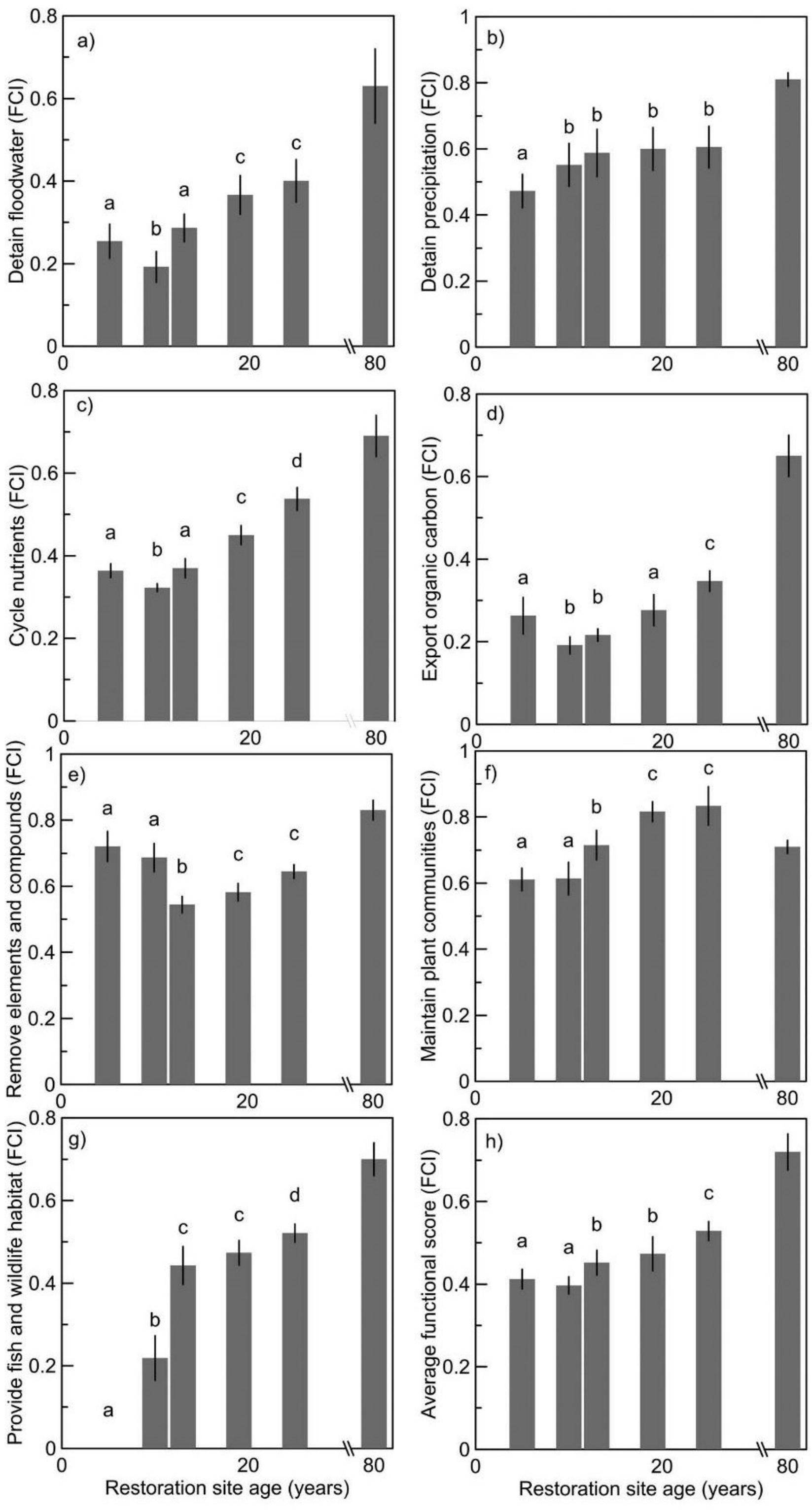

Figure 7. Observed increases in wetland functions over time. Lower case letter indicates statistically significant differences (Berkowitz 2019).

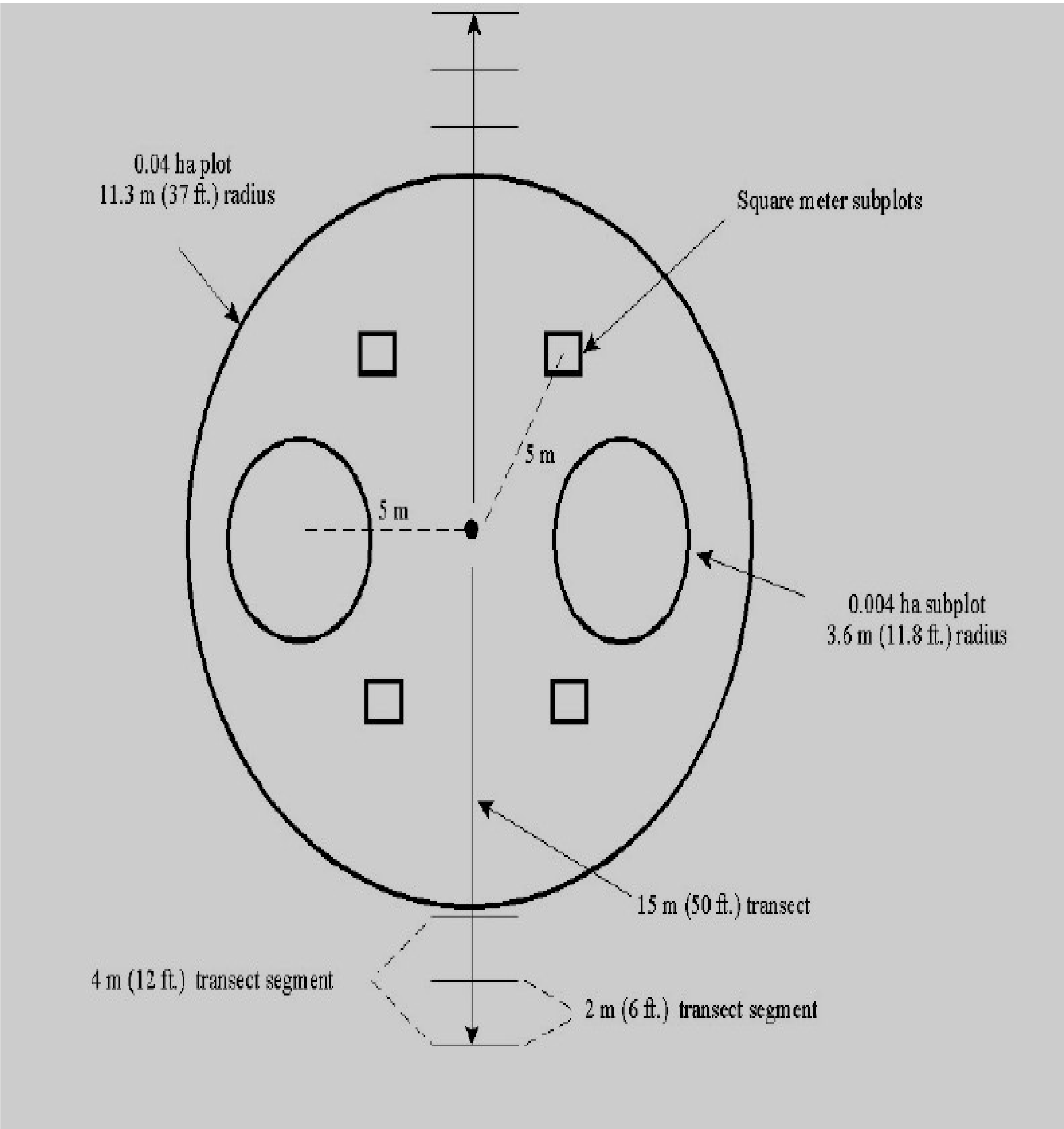

Figure 8 Plot design used for the collection of on-site variables (Smith and Klimas 2002).

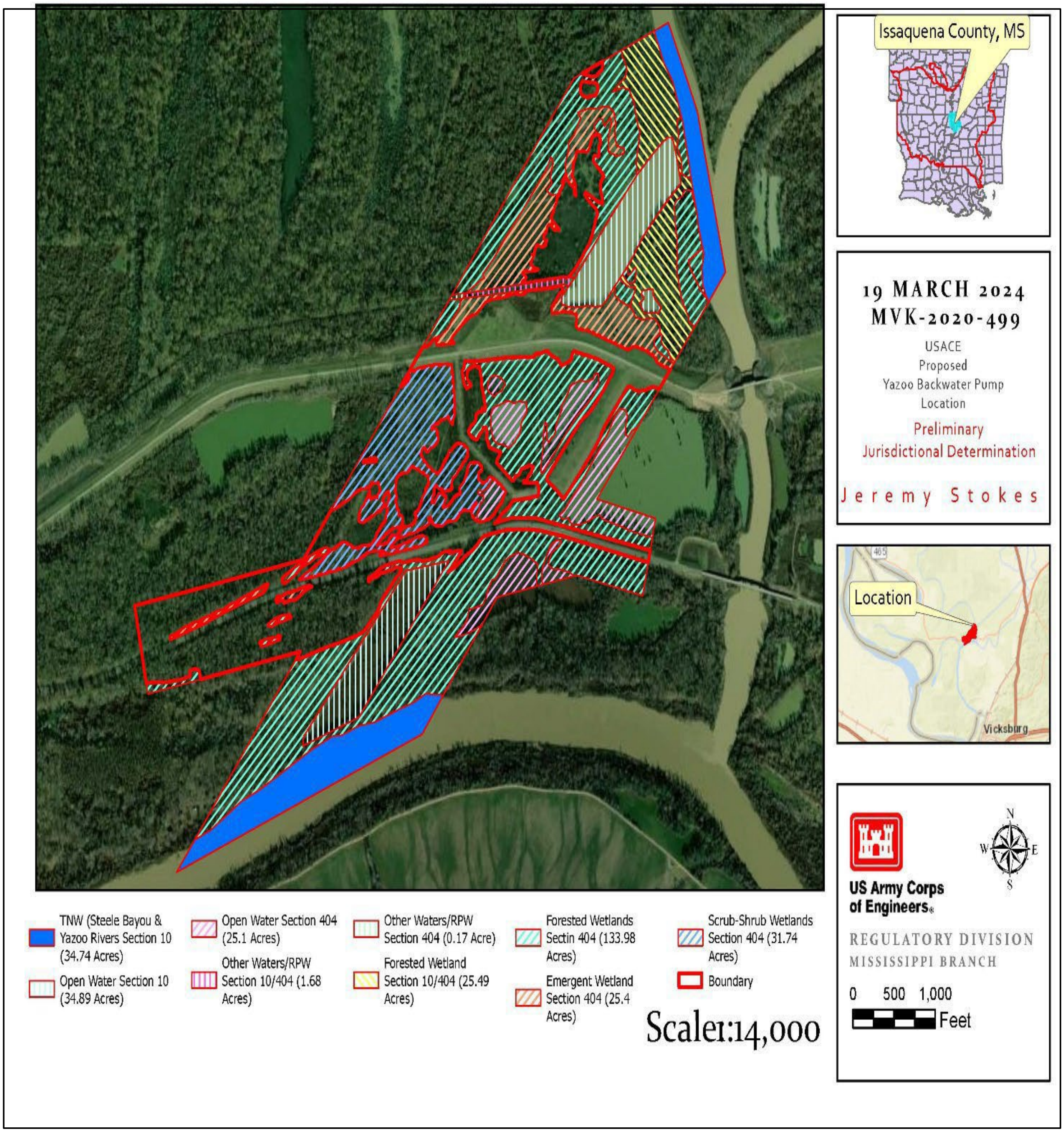

Figure 9 Location map identifying the extent of jurisdictional wetlands at the pump plant location.

TABLES:

Table 1. Long-term water table monitoring results from 12 wetland locations.

Data includes modeled flood frequency, duration, and the observed annual period of wetland hydrology within ≤30 cm of the soil surface. Note that wetland hydrology was observed at all sites at >50% frequency and the period of high-water table surpassed the modeled flood duration in all cases.

Sample location	Modeled flood frequency (years)	Modeled flood duration (days)	Annual period of observed wetland hydrology (days)								Average annual hydroperiod (days)
			2011	2012	2013	2014	2015	2016	2017	2018	
N	2	>14	159	192	238	179					192
P	2	>14	132	141	155	164	194	125			152
S	2	7-14	156	152	167						158
L	2	7-14	41	133	128	153	179	136			128
H	2	7-14	160	182	231	221	226	157	180		194
J	2	7-14	81	136	150	123					123
R	2	<7	94	90	165	120	126	127	89	101	114
U	2	<7	61	25	76	23	78	81			57
D	2	<7	6	26	158	89	144	124			91
Y	5	<7	109	138	132	37	203	123			124
B	5	<7	6	10	126	69	136	107			76
A	5	<7	0	0	126	51	109	97			64

Table 2 Summary of established USACE mitigation chronosequence (Berkowitz 2019).			
Study location	Size (hectares)	Restoration Age class	Sample plots
Alligator	1,013	13	84
Big Twist	2,692	20	69
Bolivar	344	5	37
Darlove	229	20	29
Island Lake	217	10	21
Kennedy	1,213	5	60
Lake George	3,402	25	124
Polutken	125	20	17
Pushmataha	874	10	40
Sky Lake	1,268	13	65
Stock	330	13	36
Washington	141	13	24
Total	11,847		606

Table 3 Summary of HGM assessment variables, description, and sampling technique applied in the study. Adapted from Smith and Klimas (2002) and Smith and Lin (2007). DBH = Diameter at breast height.

Wetland assessment variable	Description	Sampling technique (units)
1. Wetland tract (VTRACT)	Size of contiguous wetland area	Measured using GIS (ha)
2. Core area (VCORE)	Portion of wetland within 100m buffer	Measured using GIS (ha)
3. Habitat connectivity (VCONNECT)	Proportion of the wetland perimeter connected to suitable forested habitat	Measured using GIS (%)
4. Flood frequency (VFREQ)	Flood frequency within the 5-year floodplain	Mapped/modeled flood frequency return interval (years)
5. Flood duration (VDUR)	Flood duration interval	Mapped/modeled flood duration interval (% of growing season)
6. Soil integrity (VSOIL)	Proportion of the wetland exhibiting altered soils from recent activity	Onsite and GIS assessment of soil disturbance, excavation, fill (%)
7. Cation exchange capacity (VCEC)	Change in CEC as indicated by the change in clay soil content	Difference in CEC from soil disturbance, excavation, fill (%)
8. Micro-depressional ponding (VPOND)	Areas exhibiting small topographic depressions and vernal pool features	Visual estimate of areas capable of ponding water (%)
9. Tree basal area (VTBA)	Basal area of all trees ≥10 cm DBH	Measured using calipers within a 0.04 ha plot (m^2/ha)
10. Tree density (VTDEN)	Density of all trees ≥10 cm DBH	Count of trees within a 0.04 ha plot (stems/ha)
11. Ground vegetation cover (VGVC)	Abundance of ground vegetation cover	Visual estimate of herbaceous and woody vegetation ≤ 1.4 m within 1 m^2 subplots (%)
12. Snags (VSNAG)	Density of snags ≥10 cm DBH	Count of trees within a 0.04 ha plot (stems/ha)
13. Vegetation composition (VCOMP)	Species composition of the tallest stratum	Floristic quality of dominant species (USACE 2010) (weighted average)
14. Tree composition (VTCOMP)	Tree species composition of the canopy	Floristic quality of dominant species (USACE 2010) (weighted average)
15. Woody debris biomass (VWD)	Abundance of woody debris biomass	Measurement of woody debris biomass along transects (m^3/ha)
16. Log biomass (VLOG)	Abundance of log biomass	Measurement of log biomass along transects (m^3/ha)
17. Shrub sapling density (VSSD)	Abundance of woody stems <10 cm (4 in.) DBH and >1.2 m in height	Count of stems in 0.004 ha subplots (stems/ha)
18. A horizon biomass (VAHOR)	Represents total mass of organic matter in the A soil horizon	Measurement of the A horizon thickness in 1 m^2 subplots (cm)
19. O horizon biomass (VOHOR)	Thickness of the soil layer dominated by organic matter	Measurement of the O horizon thickness in 1 m^2 subplots (cm)

Table 4 Wetland functions assessed at each site using the HGM approach. Adapted from Smith and Klimas (2002) and Smith and Lin (2007).

1. Detain Floodwater - Ability to store, convey, and slow floodwaters	$= V_{FREQ} \times \left[\frac{(V_{LOG} + V_{GVC} + V_{SSD} + V_{TDEN})}{4}\right]$
2. Detain Precipitation - Capacity to prevent or slow runoff to streams	$= \frac{(V_{POND} + V_{OHOR})}{2}$
3. Cycle Nutrients - Ability to convert nutrients between organic and inorganic pools	$= \left[\frac{\left(\frac{V_{TBA} + V_{SSD} + V_{GVC}}{3}\right) + \left(\frac{V_{AHOR} + V_{OHOR} + V_{WD} + V_{SNAG}}{4}\right)}{2}\right]$
4. Export Organic Carbon - Capacity to export dissolved organic carbon downstream	$= \left\{\frac{[(V_{DUR} \times 2) + V_{FREQ}]}{3}\right\} \times \left[\frac{\left[\frac{(V_{OHOR} + V_{WD} + V_{SNAG})}{3}\right] + \left[\frac{(V_{TBA} + V_{SSD} + V_{GVC})}{3}\right]}{2}\right]$
5. Physical Removal of Elements and Compounds - Capacity to remove elements and compounds through settling	$= \left\{\frac{[(V_{DUR} \times 2) + V_{FREQ}]}{3}\right\} \times V_{POND}$
6. Biological Removal of Elements and Compounds - Capacity to remove elements and compounds by biological processes	$= \left\{\frac{[(V_{DUR} \times 2) + V_{FREQ}]}{3}\right\} \times \left[\frac{\left[\frac{(V_{OHOR} + V_{WD} + V_{SNAG})}{3}\right] + \left[\frac{(V_{TBA} + V_{SSD} + V_{GVC})}{3}\right]}{2}\right]$
7. Maintain plant communities - Capacity to develop and maintain characteristic plant communities	$= \langle\left\{\frac{\left[\frac{(V_{TBA} + V_{TDEN})}{2} + V_{COMP}\right]}{2}\right\} \times \left[\frac{(V_{SOIL} + V_{POND})}{2}\right]\rangle^{1/2}$
8. Provide fish and wildlife habitat - Ability to support fish and wildlife species during some portion of their life cycle.	$= \left\{\left[\frac{(V_{FREQ} + V_{POND})}{2}\right] + \left[\frac{(V_{COMP} + V_{SNAG} + V_{TBA})}{3}\right] + \left[\frac{(V_{LOG} + V_{OHOR})}{2}\right] + \left[\frac{(V_{TRACT} + V_{CONNECT} + V_{CORE})}{3}\right]\right\}^{1/4}$

Table 5 Mitigation variable inputs, subindex scores, and rationale across target years - VTRACT

VTRACT	Target year	Metric value	Subindex	Rationale/source
	0	987	0.33	Average tract size (hectares) observed in completed mitigation sites
	5	987	0.33	
	10	987	0.33	
	20	987	0.33	
	35	987	0.33	
	50	987	0.33	

Table 6 Mitigation variable inputs, subindex scores, and rationale across target years - VCORE

VCORE	Target year	Metric value	Subindex	Rationale/source
	0	49	1	Minimum core area (%) observed in completed mitigation sites
	5	49	1	
	10	49	1	
	20	49	1	
	35	49	1	
	50	49	1	

Table 7 Mitigation variable inputs, subindex scores, and rationale across target years - VCONNECT

VCONNECT	Target year	Metric value	Subindex	Rationale/source
	0	50	1	Average connectivity (%) observed in completed mitigation sites
	5	50	1	
	10	50	1	
	20	50	1	
	35	50	1	
	50	50	1	

Table 8 Mitigation variable inputs, subindex scores, and rationale across target years - V_{FREQ}				
V_{FREQ}	Target year	Metric value	Subindex	Rationale/source
	0	4	0.67	Minimum flood frequency (years) observed in completed mitigation sites
	5	4	0.67	
	10	4	0.67	
	20	4	0.67	
	35	4	0.67	
	50	4	0.67	

Table 9 Mitigation variable inputs, subindex scores, and rationale across target years – V_{DUR}				
V_{DUR}	Target year	Metric value	Subindex	Rationale/source
	0	5	0.5	Mitigation sites will display a minimum hydroperiod of 5% of the growing season
	10	5	0.5	
	20	5	0.5	
	35	5	0.5	
	50	5	0.5	

Table 10 Mitigation variable inputs, subindex scores, and rationale across target years - V_{SOIL} and V_{CEC}				
V_{SOIL} and V_{CEC}	Target year	Metric value	Subindex	Rationale/source
	0	50	0.5	Soil disturbance (%) is not observed in completed mitigation sites. However, agricultural activities (i.e., furrows) are evident for 0-10 years, then dissipate
	5	50	0.5	
	10	50	0.5	
	20	0	1	
	35	0	1	
	50	0	1	

Table 11 Mitigation variable inputs, subindex scores, and rationale across target years - VPOND

VPOND	Target year	Metric value	Subindex	Rationale/source
	0	45	0.7	Average micro depressional ponding (%) in completed mitigation sites
	5	45	0.7	
	10	45	0.7	
	20	45	0.7	
	35	45	0.7	
	50	45	0.7	

Table 12 Mitigation variable inputs, subindex scores, and rationale across target years - VTBA

VTBA	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Average tree basal area (m3/ha) in completed mitigation sites, (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0	0	
	10	3	0.16	
	20	10	0.48	
	35	25	1	
	50	30	1	

Table 13 Mitigation variable inputs, subindex scores, and rationale across target years – VTDEN

VTDEN	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Average tree density (stems/ha) in completed mitigation sites, (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0	0	
	10	147	0.59	
	20	344	1	
	35	725	0.69	
	50	650	0.88	

Table 14 Mitigation variable inputs, subindex scores, and rationale across target years - VGVC				
VGVC	Target year	Metric value	Subindex	Rationale/source
	0	0	0.5	Average ground vegetation cover (%) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	65	1	
	10	65	1	
	20	51	1	
	35	43	1	
	50	30	1	

Table 15 Mitigation variable inputs, subindex scores, and rationale across target years - VSNAG				
VSNAG	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Average snag density (stems/ha) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0	0	
	10	1	0.07	
	20	1	0.07	
	35	33	1	
	50	28	1	

Table 16 Mitigation variable inputs, subindex scores, and rationale across target years - V_{COMP} and V_{TCOMP}				
V_{COMP} and V_{TCOMP}	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Vegetation composition observed at established mitigation sites (weighted average). Results from selective planting
	5	89	0.89	
	10	93	0.93	
	20	87	0.87	
	35	93	0.93	
	50	93	0.93	

Table 17 Mitigation variable inputs, subindex scores, and rationale across target years - VWD				
VWD	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Woody debris biomass (m^3/ha) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0	0	
	10	6	0.03	
	20	27	0.11	
	35	38	0.15	
	50	48	0.19	

Table 18 Mitigation variable inputs, subindex scores, and rationale across target years - VLOG				
VLOG	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Log biomass (m3/ha) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0	0	
	10	5	0.19	
	20	17	0.68	
	35	29	1	
	50	40	1	

Table 19 Mitigation variable inputs, subindex scores, and rationale across target years - VSSD				
VSSD	Target year	Metric value	Subindex	Rationale/source
	0	0	0	Shrub sapling density (stems/ha) (%) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	538	0.36	
	10	966	0.64	
	20	727	0.48	
	35	4000	1	
	50	2500	1	

Table 20 Mitigation variable inputs, subindex scores, and rationale across target years - V_{AHOR}				
V_{AHOR}	Target year	Metric value	Subindex	Rationale/source
	0	5	1	A horizon thickness (cm) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	1	0.83	
	10	1	0.85	
	20	1	0.85	
	35	3	1	
	50	3	1	

Table 21 Mitigation variable inputs, subindex scores, and rationale across target years - V_{OHOR}				
V_{OHOR}	Target year	Metric value	Subindex	Rationale/source
	0	0	0.5	O horizon thickness (cm) observed in completed mitigation sites (0-20 years). Values for >20 years predicted by Smith and Klimas (2002)
	5	0.46	0.62	
	10	0.38	0.6	
	20	0.56	0.64	
	35	2	1	
	50	2	1	

Table 22 HGM functional capacity indexes across target years at mitigation sites

Function	Target year	FCI	Function	Target year	FCI
Detain Floodwater	0	0.08	Cycle Nutrients	0	0.27
	5	0.23		5	0.41
	10	0.40		10	0.49
	20	0.53		20	0.54
	35	0.61		35	0.89
	50	0.65		50	0.90
Detain Precipitation	0	0.75	Biological Removal of Elements and Compounds	0	0.09
	5	0.81		5	0.18
	10	0.80		10	0.23
	20	0.82		20	0.26
	35	1.00		35	0.48
	50	1.00		50	0.48
Export Organic Carbon	0	0.09	Physical Removal of Elements and Compounds	0	0.56
	5	0.18		5	0.56
	10	0.23		10	0.56
	20	0.26		20	0.56
	35	0.48		35	0.56
	50	0.48		50	0.56
Maintain Plant Communities	0	0.00	Provide Wildlife Habitat	0	0.00
	5	0.58		5	0.48
	10	0.70		10	0.54
	20	0.90		20	0.65
	35	0.94		35	0.86
	50	0.97		50	0.86

Table 23 Determination of AAFCUs across target years for each wetland function at mitigation sites									
Target Year	FCI	Acres	FCU	FCU btw yrs	Target Year	FCI	Acres	FCU	FCU btw yrs
Detain Floodwater					Physical Removal of Elements/Compounds				
0	0.08	1	0.08		0	0.56	1	0.56	
5	0.23	1	0.23	0.77	5	0.56	1	0.56	2.78
10	0.4	1	0.4	1.57	10	0.56	1	0.56	2.78
20	0.53	1	0.53	4.66	20	0.56	1	0.56	5.56
35	0.61	1	0.61	8.57	35	0.56	1	0.56	8.33
50	0.65	1	0.65	9.45	50	0.56	1	0.56	8.33
Sum over 50 years				25.03	Sum over 50 years				27.78
AAFCU				0.5	AAFCU				0.56
Detain Precipitation					Biological Removal of Elements/Compounds				
0	0.75	1	0.75		0	0.09	1	0.09	
5	0.81	1	0.81	3.89	5	0.18	1	0.18	0.69
10	0.8	1	0.8	4.01	10	0.23	1	0.23	1.03
20	0.82	1	0.82	8.09	20	0.26	1	0.26	2.44
35	1	1	1	13.65	35	0.48	1	0.48	5.51
50	1	1	1	15	50	0.48	1	0.48	7.18
Sum over 50 years				44.64	Sum over 50 years				16.85
AAFCU				0.89	AAFCU				0.34
Cycle Nutrients					Maintain Plant Communities				
0	0.27	1	0.27		0	0	1	0	
5	0.41	1	0.41	1.69	5	0.58	1	0.58	1.44
10	0.49	1	0.49	2.25	10	0.7	1	0.7	3.19
20	0.54	1	0.54	5.14	20	0.88	1	0.88	7.91
35	0.89	1	0.89	10.72	35	0.94	1	0.94	13.69
50	0.9	1	0.9	13.45	50	0.97	1	0.97	14.31
Sum over 50 years				33.25	Sum over 50 years				40.54
AAFCU				0.66	AAFCU				0.81
Export Organic Carbon					Provide Wildlife Habitat				
0	0.09	1	0.09		0	0	1	0	
5	0.18	1	0.18	0.69	5	0.48	1	0.48	1.19
10	0.23	1	0.23	1.03	10	0.54	1	0.54	2.54
20	0.26	1	0.26	2.44	20	0.64	1	0.64	5.9
35	0.48	1	0.48	5.51	35	0.86	1	0.86	11.26
50	0.48	1	0.48	7.18	50	0.86	1	0.86	12.90
Sum over 50 years				16.85	Sum over 50 years				33.79
AAFCU				0.34	AAFCU				0.68

Table 24 Summary of AAFCUs generated at mitigation sites across the period of analysis	
Function	AAFCU
Detain Floodwater	0.5
Detain Precipitation	0.89
Cycle Nutrients	0.66
Export Organic Carbon	0.34
Physical Removal of Elements and Compounds	0.56
Biological Removal of Elements and Compounds	0.34
Maintain Plant Communities	0.81
Provide Wildlife Habitat	0.68
Total AAFCUs generated by 1.0 acres of mitigation land	4.78

Table 25 Distribution of wetlands and non-wetlands within the direct impact area				
Location	Land cover classification			
	Forested	Agricultural	Non-wetlands & non-jurisdictional areas	Total
Borrow area	0	215	0	215
Pump station	217	0	97	313
Total	217	215	97	528

Table 26 HGM variable metric inputs and variable subindex scores for areas in the direct impact area

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. *VTRACT*	3,000	1.00	3,000	1.00
2. *VCORE*	50.00	1.00	50.00	1.00
3. *VCONNECT*	50.00	1.00	50.00	1.00
4. *VFREQ*	2.00	1.00	2.00	1.00
5. *VPOND*	31.08	0.78	25.00	0.63
6. *VSOIL*	0.00	1.00	50.00	0.50
7. *VCEC*	0.00	1.00	50.00	0.50
8. *VTBA*	27.98	1.00	0.00	0.00
9. *VTDEN*	339.00	1.00	0.00	0.00
10. *VSNAG*	46.63	1.00	0.00	0.00
11. *VTCOMP*	93.00	0.93	0.00	0.00
12. *VCOMP*	93.00	0.93	0.00	0.00
13. *VWD*	206.14	0.82	0.00	0.00
14. *VLOG*	67.23	1.00	0.00	0.00
15. *VSSD*	1,388	0.93	0.00	0.00
16. *VGVC*	14.18	1.00	25.00	1.00
17. *VOHOR*	1.51	0.88	0.00	0.50
18. *VAHOR*	5.00	1.00	10.00	0.50
19. *VDUR*	12.50	0.69	12.50	0.69

Table 27 HGM functional scores for areas within the direct impact area		
	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.74	0.20
Physical Removal of Elements and Compounds	0.62	0.49
Biological Removal of Elements and Compounds	0.74	0.20
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.93	0.00

Table 28 Determination of AAFCUs across land cover classifications within the direct impact area under the No Action Alternative

	Mature Forest					
	Borrow Area			Pump station		
Function	FCI	Acres	AAFCU	Acres	AAFCU	Total AAFCUs
Detain Floodwater	0.98		0	217	213	213
Detain Precipitation	0.83		0	217	179	179
Cycle Nutrients	0.95		0	217	206	206
Export Organic Carbon	0.74		0	217	161	161
Physical Removal of Elements and Compounds	0.62		0	217	133	133
Biological Removal of Elements and Compounds	0.74		0	217	161	161
Maintain Plant Communities	0.93		0	217	201	201
Provide Wildlife Habitat	0.93		0	217	202	202
	Agricultural					
	Borrow Area			Pump station		
Function	FCI	Acres	AAFCU	Acres	AAFCU	Total AAFCUs
Detain Floodwater	0.25	215	54		0	54
Detain Precipitation	0.56	215	121		0	121
Cycle Nutrients	0.29	215	63		0	63
Export Organic Carbon	0.20	215	43		0	43
Physical Removal of Elements and Compounds	0.49	215	106		0	106
Biological Removal of Elements and Compounds	0.20	215	43		0	43
Maintain Plant Communities	0.00	215	0		0	0
Provide Wildlife Habitat	0.00	215	0		0	0
Total AAFCUs			429		1455	1884

Table 29 Distribution of potential wetland land cover classes, flood duration and frequency intervals within the indirect impact area under the No Action Alternative

		Land cover classification		
Flood frequency interval	Duration interval	Forested wetlands	Agricultural croplands	Total
2-year	<2.5%	29,128	26,044	55,172
2-year	2.5-5%	26,141	10,818	36,959
2-year	5-7.5%	27,390	5,008	32,398
2-year	7.5-10%	41,718	4,728	46,446
2-year	10-12.5%	23,817	1,690	25,507
2-year	>12.5%	33,514	1,252	34,765
3-year	<2.5%	20,012	21,647	41,659
4-year	<2.5%	9,038	10,866	19,904
5-year	<2.5%	14,355	22,621	36,976
Total potential wetland area		225,113	104,674	329,787
Non-wetland areas	Various			21,417
Total assessment area				351,204

Table 30 HGM variable metric inputs and variable subindex scores for the 2-year floodplain 0.0-2.5% flood duration interval in the indirect impact area				
	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	1.25	0.13	1.25	0.13

Table 31 HGM functional scores for areas for the 2-year floodplain 0.0-2.5% flood duration interval in the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.39	0.10
Physical Removal of Elements and Compounds	0.32	0.26
Biological Removal of Elements and Compounds	0.39	0.10
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.87	0.00

Table 32 HGM variable metric inputs and variable subindex scores for the 2-year floodplain 2.5-5.0% flood duration interval in the indirect impact area

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	3.75	0.38	3.75	0.38

Table 33 HGM functional scores for the 2-year floodplain 2.5-5.0% flood duration interval in the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.55	0.15
Physical Removal of Elements and Compounds	0.45	0.36
Biological Removal of Elements and Compounds	0.55	0.15
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.90	0.00

Table 34 HGM variable metric inputs and variable subindex scores for the 2-year floodplain 5.0-7.5% flood duration interval in the indirect impact area

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50

19. V_{DUR}	6.25	0.53	6.25	0.53

Table 35 HGM functional scores for the 2-year floodplain 5.0-7.5% flood duration interval in the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.64	0.17
Physical Removal of Elements and Compounds	0.53	0.43
Biological Removal of Elements and Compounds	0.64	0.17
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.92	0.00

Table 36 HGM variable metric inputs and variable subindex scores for the 2-year floodplain 7.5-10% flood duration interval in the indirect impact area

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00

14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	8.75	0.59	8.75	0.59

Table 37 HGM functional scores for the 2-year floodplain 7.5-10% flood duration interval in the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.68	0.18
Physical Removal of Elements and Compounds	0.57	0.46
Biological Removal of Elements and Compounds	0.68	0.18
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.92	0.00

Table 38 HGM variable metric inputs and variable subindex scores for the 2-year floodplain 10-12.5% flood duration interval in the indirect impact area				
	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	11.2	0.66	11.25	0.66

Table 39 HGM functional scores for areas for the 2-year floodplain 10-12.5% flood duration interval in the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.72	0.19
Physical Removal of Elements and Compounds	0.60	0.48
Biological Removal of Elements and Compounds	0.72	0.19
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.93	0.00

Table 40 HGM variable metric inputs and variable subindex scores for the 2-year floodplain > 12.5% flood duration interval in the indirect impact area

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3,000	1.00	3,000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	2.00	1.00	2.00	1.00
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00

13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1,389	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	12.50	0.69	12.50	0.69

Table 41 HGM functional scores for the 2-year floodplain >12.5% flood duration interval of the indirect impact area

	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.98	0.25
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.74	0.20
Physical Removal of Elements and Compounds	0.62	0.49
Biological Removal of Elements and Compounds	0.74	0.20
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.93	0.00

Table 42 HGM variable metric inputs and variable subindex scores for areas in the 3-year floodplain				
	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3000	1.00	3000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	3.00	0.83	3.00	0.83
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1388.92	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	1.25	0.13	1.25	0.13

Table 43 HGM functional scores for areas within the 3-year floodplain		
	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.82	0.21
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.34	0.09
Physical Removal of Elements and Compounds	0.28	0.23
Biological Removal of Elements and Compounds	0.34	0.09
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.85	0.00

Table 44 HGM variable metric inputs and variable subindex scores for areas in the 4-year floodplain				
	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. *VTRACT*	3000	1.00	3000	1.00
2. *VCORE*	50.00	1.00	50.00	1.00
3. *VCONNECT*	50.00	1.00	50.00	1.00
4. *VFREQ*	4.00	0.67	4.00	0.67
5. *VPOND*	31.08	0.78	25.00	0.63
6. *VSOIL*	0.00	1.00	50.00	0.50
7. *VCEC*	0.00	1.00	50.00	0.50
8. *VTBA*	27.98	1.00	0.00	0.00
9. *VTDEN*	339.00	1.00	0.00	0.00
10. *VSNAG*	46.63	1.00	0.00	0.00
11. VTCOMP	93.00	0.93	0.00	0.00
12. VCOMP	93.00	0.93	0.00	0.00
13. *VWD*	206.14	0.82	0.00	0.00
14. *VLOG*	67.23	1.00	0.00	0.00
15. *VSSD*	1388.92	0.93	0.00	0.00
16. *VGVC*	14.18	1.00	25.00	1.00
17. *VOHOR*	1.51	0.88	0.00	0.50
18. *VAHOR*	5.00	1.00	10.00	0.50
19. *VDUR*	1.25	0.13	1.25	0.13

Table 45 HGM functional scores for areas within the 4-year floodplain		
	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.65	0.17
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.29	0.08
Physical Removal of Elements and Compounds	0.24	0.19
Biological Removal of Elements and Compounds	0.29	0.08
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.83	0.00

Table 46 HGM variable metric inputs and variable subindex scores for areas in the 5-year floodplain

	Land cover classification			
	Mature Forest		Agricultural	
Variable	Metric Value	Subindex	Metric Value	Subindex
1. V_{TRACT}	3000	1.00	3000	1.00
2. V_{CORE}	50.00	1.00	50.00	1.00
3. $V_{CONNECT}$	50.00	1.00	50.00	1.00
4. V_{FREQ}	5.00	0.50	5.00	0.50
5. V_{POND}	31.08	0.78	25.00	0.63
6. V_{SOIL}	0.00	1.00	50.00	0.50
7. V_{CEC}	0.00	1.00	50.00	0.50
8. V_{TBA}	27.98	1.00	0.00	0.00
9. V_{TDEN}	339.00	1.00	0.00	0.00
10. V_{SNAG}	46.63	1.00	0.00	0.00
11. V_{TCOMP}	93.00	0.93	0.00	0.00
12. V_{COMP}	93.00	0.93	0.00	0.00
13. V_{WD}	206.14	0.82	0.00	0.00
14. V_{LOG}	67.23	1.00	0.00	0.00
15. V_{SSD}	1388.92	0.93	0.00	0.00
16. V_{GVC}	14.18	1.00	25.00	1.00
17. V_{OHOR}	1.51	0.88	0.00	0.50
18. V_{AHOR}	5.00	1.00	10.00	0.50
19. V_{DUR}	1.25	0.13	1.25	0.13

Table 47 HGM functional scores for areas within the 5-year floodplain		
	Land cover classification	
Function	Mature Forest	Agricultural
Detain Floodwater	0.49	0.12
Detain Precipitation	0.83	0.56
Cycle Nutrients	0.95	0.29
Export Organic Carbon	0.23	0.06
Physical Removal of Elements and Compounds	0.19	0.16
Biological Removal of Elements and Compounds	0.23	0.06
Maintain Plant Communities	0.93	0.00
Provide Wildlife Habitat	0.81	0.00

Table 48 Summary of FCI values within the indirect impact area under the No Action Alternative			
	Mature Forest		
Function	Mean	Minimum	Maximum
Detain Floodwater	0.87	0.49	0.98
Detain Precipitation	0.83	0.83	0.83
Cycle Nutrients	0.95	0.95	0.95
Export Organic Carbon	0.48	0.23	0.74
Physical Removal of Elements and Compounds	0.40	0.19	0.62
Biological Removal of Elements and Compounds	0.48	0.23	0.74
Maintain Plant Communities	0.93	0.93	0.93
Provide Wildlife Habitat	0.88	0.81	0.93
	Agricultural		
Detain Floodwater	0.22	0.12	0.25
Detain Precipitation	0.56	0.56	0.56
Cycle Nutrients	0.29	0.29	0.29
Export Organic Carbon	0.13	0.06	0.20
Physical Removal of Elements and Compounds	0.32	0.16	0.49
Biological Removal of Elements and Compounds	0.13	0.06	0.20
Maintain Plant Communities	0.00	0.00	0.00
Provide Wildlife Habitat	0.00	0.00	0.00

Table 49 Determination of AAFCUs in the indirect impact area across land cover classifications, flood duration interval, and flood frequency under the No Action Alternative (MF = Mature Forest; AG = Agricultural)

Function	FCI		Extent (acres)		AAFCU	
	MF	AG	MF	AG	MF	AG
2-year floodplain, <2.5% duration interval						
Detain Floodwater	0.98	0.25	29,128	26,044	28,581	6,511
Detain Precipitation	0.83	0.56	29,128	26,044	24,100	14,650
Cycle Nutrients	0.95	0.29	29,128	26,044	27,680	7,596
Export Organic Carbon	0.39	0.10	29,128	26,044	11,382	2,713
Physical Removal of Elements and Compounds	0.32	0.26	29,128	26,044	9,431	6,782
Biological Removal of Elements and Compounds	0.39	0.10	29,128	26,044	11,382	2,713
Maintain Plant Communities	0.93	0.00	29,128	26,044	26,972	0
Provide Wildlife Habitat	0.87	0.00	29,128	26,044	25,434	0
Total					164,964	40,964
2-year floodplain, 2.5-5% duration interval						
Detain Floodwater	0.98	0.25	26,141	10,818	25,651	2,704
Detain Precipitation	0.83	0.56	26,141	10,818	21,629	6,085
Cycle Nutrients	0.95	0.29	26,141	10,818	24,842	3,155
Export Organic Carbon	0.47	0.12	26,141	10,818	12,259	1,352
Physical Removal of Elements and Compounds	0.39	0.31	26,141	10,818	10,157	3,381
Biological Removal of Elements and Compounds	0.47	0.12	26,141	10,818	12,259	1,352
Maintain Plant Communities	0.93	0.00	26,141	10,818	24,207	0
Provide Wildlife Habitat	0.89	0.00	26,141	10,818	23,193	0
Total					154,195	18,030

2-year floodplain, 5-7.5% duration interval						
Detain Floodwater	0.98	0.25	27,390	5,008	26,876	1,252
Detain Precipitation	0.83	0.56	27,390	5,008	22,663	2,817
Cycle Nutrients	0.95	0.29	27,390	5,008	26,029	1,461
Export Organic Carbon	0.64	0.17	27,390	5,008	17,661	861
Physical Removal of Elements and Compounds	0.53	0.43	27,390	5,008	14,633	2,152
Biological Removal of Elements and Compounds	0.64	0.17	27,390	5,008	17,661	861
Maintain Plant Communities	0.93	0.00	27,390	5,008	25,363	0
Provide Wildlife Habitat	0.92	0.00	27,390	5,008	25,103	0
Total					175,987	9,402
2-year floodplain, 7.5-10% duration interval						
Detain Floodwater	0.98	0.25	41,718	4,728	40,934	1,182
Detain Precipitation	0.83	0.56	41,718	4,728	34,517	2,660
Cycle Nutrients	0.95	0.29	41,718	4,728	39,644	1,379
Export Organic Carbon	0.68	0.18	41,718	4,728	28,529	862
Physical Removal of Elements and Compounds	0.57	0.46	41,718	4,728	23,638	2,155
Biological Removal of Elements and Compounds	0.68	0.18	41,718	4,728	28,529	862
Maintain Plant Communities	0.93	0.00	41,718	4,728	38,630	0
Provide Wildlife Habitat	0.92	0.00	41,718	4,728	38,490	0
Total					272,911	9,099
2-year floodplain, 10-12.5% duration interval						
Detain Floodwater	0.98	0.25	23,817	1,690	23,370	423
Detain Precipitation	0.83	0.56	23,817	1,690	19,706	951
Cycle Nutrients	0.95	0.29	23,817	1,690	22,633	493
Export Organic Carbon	0.72	0.19	23,817	1,690	17,218	326

Physical Removal of Elements and Compounds	0.60	0.48	23,817	1,690	14,266	814
Biological Removal of Elements and Compounds	0.72	0.19	23,817	1,690	17,218	326
Maintain Plant Communities	0.93	0.00	23,817	1,690	22,054	0
Provide Wildlife Habitat	0.93	0.00	23,817	1,690	22,118	0
Total					158,583	3,332
2-year floodplain, >12.5% duration interval						
Detain Floodwater	0.98	0.25	33,514	1,252	32,884	313
Detain Precipitation	0.83	0.56	33,514	1,252	27,729	704
Cycle Nutrients	0.95	0.29	33,514	1,252	31,848	365
Export Organic Carbon	0.74	0.20	33,514	1,252	24,883	248
Physical Removal of Elements and Compounds	0.62	0.49	33,514	1,252	20,617	619
Biological Removal of Elements and Compounds	0.74	0.20	33,514	1,252	24,883	248
Maintain Plant Communities	0.93	0.00	33,514	1,252	31,033	0
Provide Wildlife Habitat	0.93	0.00	33,514	1,252	31,222	0
Total					225,100	2,497
3-year floodplain, <2.5% duration interval						
Detain Floodwater	0.82	0.21	20,012	21,647	16,363	4,510
Detain Precipitation	0.83	0.56	20,012	21,647	16,558	12,176
Cycle Nutrients	0.95	0.29	20,012	21,647	19,017	6,314
Export Organic Carbon	0.34	0.09	20,012	21,647	6,777	1,954
Physical Removal of Elements and Compounds	0.28	0.23	20,012	21,647	5,615	4,885
Biological Removal of Elements and Compounds	0.34	0.09	20,012	21,647	6,777	1,954
Maintain Plant Communities	0.93	0.00	20,012	21,647	18,531	0
Provide Wildlife Habitat	0.85	0.00	20,012	21,647	17,078	0

Total					106,718	31,794
4-year floodplain, <2.5% duration interval						
Detain Floodwater	0.65	0.17	9,038	10,866	5,912	1,811
Detain Precipitation	0.83	0.56	9,038	10,866	7,478	6,112
Cycle Nutrients	0.95	0.29	9,038	10,866	8,589	3,169
Export Organic Carbon	0.29	0.08	9,038	10,866	2,590	830
Physical Removal of Elements and Compounds	0.24	0.19	9,038	10,866	2,146	2,075
Biological Removal of Elements and Compounds	0.29	0.08	9,038	10,866	2,590	830
Maintain Plant Communities	0.93	0.00	9,038	10,866	8,369	0
Provide Wildlife Habitat	0.83	0.00	9,038	10,866	7,521	0
Total					45,195	14,828
5-year floodplain, <2.5% duration interval						
Detain Floodwater	0.49	0.12	14,355	22,621	7,043	2,827
Detain Precipitation	0.83	0.56	14,355	22,621	11,877	12,724
Cycle Nutrients	0.95	0.29	14,355	22,621	13,641	6,598
Export Organic Carbon	0.23	0.06	14,355	22,621	3,366	1,414
Physical Removal of Elements and Compounds	0.19	0.16	14,355	22,621	2,789	3,534
Biological Removal of Elements and Compounds	0.23	0.06	14,355	22,621	3,366	1,414
Maintain Plant Communities	0.93	0.00	14,355	22,621	13,293	0
Provide Wildlife Habitat	0.81	0.00	14,355	22,621	11,615	0
Total					66,988	28,512
Grand total			225,113	104,674	1,370,641	158,457

Table 50 Summary of AAFCUs within the Yazoo Study Area in direct impact area under the No Action Alternative

Function	Mature Forest	Agricultural	Total
Detain Floodwater	207,614	21,532	229,147
Detain Precipitation	186,258	58,879	245,137
Cycle Nutrients	213,922	30,530	244,452
Export Organic Carbon	124,666	10,559	135,225
Physical Removal of Elements and Compounds	103,292	26,397	129,689
Biological Removal of Elements and Compounds	124,666	10,559	135,225
Maintain Plant Communities	208,451	0	208,451
Provide Wildlife Habitat	201,774	0	201,774
Total	1,370,641	158,457	1,529,098

Table 51 Summary of AAFCUs provided in the direct and indirect impact areas under the No Action Alternative

Impact Area	Mature Forest	Agricultural	Total
Direct	1,455	429	1,884
Indirect	1,370,641	158,457	1,529,098
Total	1,372,096	158,886	1,530,982

Table 52 Change in AAFCUs across land cover classifications within the direct impact area under the Action Alternatives

	Mature Forest					
	No Action Alternative			Action Alternatives		
Function	FCI	Acres	AAFCU	Acres	AAFCU	Change in AAFCU
Detain Floodwater	0.98	217	213	0	0	-213
Detain Precipitation	0.83	217	179	0	0	-179
Cycle Nutrients	0.95	217	206	0	0	-206
Export Organic Carbon	0.74	217	161	0	0	-161
Physical Removal of Elements and Compounds	0.62	217	133	0	0	-133
Biological Removal of Elements and Compounds	0.74	217	161	0	0	-161
Maintain Plant Communities	0.93	217	201	0	0	-201
Provide Wildlife Habitat	0.93	217	202	0	0	-202
	Agricultural					
	No Action Alternative			Action Alternative		
Detain Floodwater	0.25	215	54	0	0	-54
Detain Precipitation	0.56	215	121	0	0	-121
Cycle Nutrients	0.29	215	63	0	0	-63
Export Organic Carbon	0.20	215	43	0	0	-43
Physical Removal of Elements and Compounds	0.49	215	106	0	0	-106
Biological Removal of Elements and Compounds	0.20	215	43	0	0	-43
Maintain Plant Communities	0.00	215	0	0	0	0
Provide Wildlife Habitat	0.00	215	0	0	0	0
Total			1,884		0	-1,884

Table 53 Projected changes in flood frequency and duration across wetland land cover classes in the indirect impact area under the Action Alternatives							
Flood frequency and duration interval (% of growing season)		Extent (acres)			Extent (acres)		
		Alternative 3			Alternative 2		
No Action Alternative	Action Alternative	Mature Forest	Agricultural	Total	Mature Forest	Agricultural	Total
No change in flood duration							
2-year, <2.5%	2-year, <2.5%	19,678	20,435	40,113	21,739	16,507	38,246
2-year, 2.5-5%	2-year, 2.5-5%	22,679	8,907	31,587	22,666	8,913	31,580
2-year, 5-7.5%	2-year, 5-7.5%	24,315	4,081	28,396	24,343	4,092	28,436
2-year, 7.5-10%	2-year, 7.5-10%	37,355	3,799	41,155	37,327	3,810	41,137
2-year, 10-12.5%	2-year, 10-12.5%	20,893	1,477	22,370	21,665	1,502	23,167
2-year, >12.5%	2-year, >12.5%	32,114	1,151	33,265	32,148	1,154	33,302
3-year, <2.5%	3-year, <2.5%	6,707	11,247	17,954	5,493	10,678	16,170
4-year, <2.5%	4-year, <2.5%	1,959	4,149	6,108	2,110	4,623	6,734
5-year, <2.5%	5-year, <2.5%	4,138	11,828	15,966	7,990	13,619	21,609
Total		169,839	67,074	236,913	175,482	64,899	240,380
Change in flood frequency or duration							
2-year, <2.5%	3-year, <2.5%	7,749	4,767	12,515	5,792	8,774	14,566
2-year, <2.5%	4-year, <2.5%	935	552	1,487	941	542	1,483
2-year, <2.5%	5-year, <2.5%	632	264	896	490	211	701
2-year, <2.5%	>5-year, <2.5%	25	17	42	25	0	25
2-year, <2.5%	2-year, 2.5-5%	109	9	118	142	10	152
2-year, 2.5-5%	2-year, <2.5%	3,340	1,904	5,243	3,318	1,894	5,212
2-year, 2.5-5%	3-year, <2.5%	4	1	5	3	1	4
2-year, 2.5-5%	4-year, <2.5%	0	0	0	3	0	4
2-year, 2.5-5%	5-year, <2.5%	0	1	1	2	5	7
2-year, 2.5-5%	>5-year, <2.5%	0	0	0	17	2	19
2-year, 2.5-5%	2-year, 5-7.5%	119	4	123	132	3	135
2-year, 5-7.5%	2-year, <2.5%	36	14	51	28	14	43
2-year, 5-7.5%	2-year, 2.5-5%	2,990	907	3,897	2,966	894	3,861
2-year, 5-7.5%	3-year, <2.5%	0	2	2	0	2	2
2-year, 5-7.5%	4-year, <2.5%	0	1	1	0	1	1
2-year, 5-7.5%	2-year, 7.5-10%	49	3	51	52	4	56
2-year, 7.5-10%	2-year, 2.5-5%	10	0	10	23	3	26
2-year, 7.5-10%	2-year, 5-7.5%	4,285	925	5,210	4,300	915	5,215
2-year, 7.5-10%	2-year, 10-12.5%	67	3	70	68	0	68
2-year, 10-12.5%	2-year, 5-7.5%	0	0	0	13	1	14

2-year, >12.5%	2-year, 7.5-10%	10	0	11	10	0	11
2-year, >12.5%	2-year, 10-12.5%	1,389	101	1,490	1,355	98	1,453
3-year, <2.5%	4-year, <2.5%	4,675	4,169	8,844	4,616	4,384	9,000
3-year, <2.5%	5-year, <2.5%	5,035	3,536	8,571	6,942	5,153	12,095
3-year, <2.5%	>5-year, <2.5%	3,031	2,487	5,518	586	373	959
3-year, <2.5%	2-year, <2.5%	564	208	773	2,375	1,060	3,435
3-year, <2.5%	2-year, 2.5-5%	0	0	0	0	0	0
4-year, <2.5%	5-year, <2.5%	4,698	4,007	8,706	6,350	5,606	11,956
4-year, <2.5%	>5-year, <2.5%	2,358	2,704	5,062	524	487	1,011
4-year, <2.5%	2-year, <2.5%	10	0	11	0	0	0
4-year, <2.5%	3-year, <2.5%	4	5	9	8	5	13
5-year, <2.5%	>5-year, <2.5%	10,165	10,759	20,924	6,357	8,983	15,340
5-year, <2.5%	2-year, <2.5%	50	18	68	0	0	0
5-year, <2.5%	3-year, <2.5%	0	9	9	6	9	16
5-year, <2.5%	4-year, <2.5%	2	8	9	2	10	12
Total		55,266	37,600	92,867	49,585	39,631	89,216
Grand total		225,105	104,674	329,780	225,067	104,530	329,597

Table 54 Change in AAFCUs for areas shifting from the 2-year, <2.5% flood interval to the 3-year, <2.5% flood interval under the Action Alternatives

Function	2-year, <2.5%	3-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.82	-0.16	5,792	-947	7,749	-1,267
Detain Precipitation	0.83	0.83	0.00	5,792	0	7,749	0
Cycle Nutrients	0.95	0.95	0.00	5,792	0	7,749	0
Export Organic Carbon	0.39	0.34	-0.05	5,792	-302	7,749	-404
Physical Removal of Elements and Compounds	0.32	0.28	-0.04	5,792	-250	7,749	-335
Biological Removal of Elements and Compounds	0.39	0.34	-0.05	5,792	-302	7,749	-404
Maintain Plant Communities	0.93	0.93	0.00	5,792	0	7,749	0
Provide Wildlife Habitat	0.87	0.85	-0.02	5,792	-115	7,749	-153
Agricultural							
Detain Floodwater	0.25	0.21	-0.04	8,774	-366	4,767	-199
Detain Precipitation	0.56	0.56	0.00	8,774	0	4,767	0
Cycle Nutrients	0.29	0.29	0.00	8,774	0	4,767	0
Export Organic Carbon	0.10	0.09	-0.01	8,774	-122	4,767	-66
Physical Removal of Elements and Compounds	0.26	0.23	-0.03	8,774	-305	4,767	-166
Biological Removal of Elements and Compounds	0.10	0.09	-0.01	8,774	-122	4,767	-66
Maintain Plant Communities	0.00	0.00	0.00	8,774	0	4,767	0
Provide Wildlife Habitat	0.00	0.00	0.00	8,774	0	4,767	0
Total				14,566	-2,829	12,515	-3,059

Table 55 Change in AAFCUs for areas shifting from the 2-year, <2.5% flood interval to the 4-year, <2.5% flood interval under the Action Alternatives

Function	2-year, <2.5%	4-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.65	-0.33	941	-308	935	-306
Detain Precipitation	0.83	0.83	0.00	941	0	935	0
Cycle Nutrients	0.95	0.95	0.00	941	0	935	0
Export Organic Carbon	0.39	0.29	-0.10	941	-98	935	-97
Physical Removal of Elements and Compounds	0.32	0.24	-0.09	941	-81	935	-81
Biological Removal of Elements and Compounds	0.39	0.29	-0.10	941	-98	935	-97
Maintain Plant Communities	0.93	0.93	0.00	941	0	935	0
Provide Wildlife Habitat	0.87	0.83	-0.04	941	-39	935	-38
Agricultural							
Detain Floodwater	0.25	0.17	-0.08	542	-45	552	-46
Detain Precipitation	0.56	0.56	0.00	542	0	552	0
Cycle Nutrients	0.29	0.29	0.00	542	0	552	0
Export Organic Carbon	0.10	0.08	-0.03	542	-15	552	-15
Physical Removal of Elements and Compounds	0.26	0.19	-0.07	542	-38	552	-38
Biological Removal of Elements and Compounds	0.10	0.08	-0.03	542	-15	552	-15
Maintain Plant Communities	0.00	0.00	0.00	542	0	552	0
Provide Wildlife Habitat	0.00	0.00	0.00	542	0	552	0
Total				1,483	-737	1,487	-735

Table 56 Change in AAFCUs for areas shifting from the 2-year, <2.5% flood interval to the 5-year, <2.5% flood interval under the Action Alternatives

Function	2-year, <2.5%	5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.49	-0.49	490	-240	632	-310
Detain Precipitation	0.83	0.83	0.00	490	0	632	0
Cycle Nutrients	0.95	0.95	0.00	490	0	632	0
Export Organic Carbon	0.39	0.23	-0.16	490	-77	632	-99
Physical Removal of Elements and Compounds	0.32	0.19	-0.13	490	-63	632	-82
Biological Removal of Elements and Compounds	0.39	0.23	-0.16	490	-77	632	-99
Maintain Plant Communities	0.93	0.93	0.00	490	0	632	0
Provide Wildlife Habitat	0.87	0.81	-0.06	490	-31	632	-41
Agricultural							
Detain Floodwater	0.25	0.12	-0.12	211	-26	264	-33
Detain Precipitation	0.56	0.56	0.00	211	0	264	0
Cycle Nutrients	0.29	0.29	0.00	211	0	264	0
Export Organic Carbon	0.10	0.06	-0.04	211	-9	264	-11
Physical Removal of Elements and Compounds	0.26	0.16	-0.10	211	-22	264	-27
Biological Removal of Elements and Compounds	0.10	0.06	-0.04	211	-9	264	-11
Maintain Plant Communities	0.00	0.00	0.00	211	0	264	0
Provide Wildlife Habitat	0.00	0.00	0.00	211	0	264	0
Total				701	-554	896	-713

Table 57 Change in AAFCUs for areas shifting from the 2-year, <2.5% flood interval to the >5-year, <2.5% flood interval under the Action Alternatives							
Function	2-year, <2.5%	>5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.33	-0.65	25	-16	25	-16
Detain Precipitation	0.83	0.61	-0.22	25	-5	25	-6
Cycle Nutrients	0.95	0.95	0.00	25	0	25	0
Export Organic Carbon	0.39	0.18	-0.21	25	-5	25	-5
Physical Removal of Elements and Compounds	0.32	0.06	-0.26	25	-6	25	-6
Biological Removal of Elements and Compounds	0.39	0.18	-0.21	25	-5	25	-5
Maintain Plant Communities	0.93	0.80	-0.12	25	-3	25	-3
Provide Wildlife Habitat	0.87	0.70	-0.17	25	-4	25	-4
Agricultural							
Detain Floodwater	0.25	0.08	-0.17	0	0	17	-3
Detain Precipitation	0.56	0.56	0.00	0	0	17	0
Cycle Nutrients	0.29	0.29	0.00	0	0	17	0
Export Organic Carbon	0.10	0.05	-0.06	0	0	17	-1
Physical Removal of Elements and Compounds	0.26	0.12	-0.14	0	0	17	-2
Biological Removal of Elements and Compounds	0.10	0.05	-0.06	0	0	17	-1
Maintain Plant Communities	0.00	0.00	0.00	0	0	17	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	17	0
Total				25	-46	42	-53

Table 58 Change in AAFCUs for areas shifting from the 2-year, <2.5% flood interval to the 2-year, 2.5-5% flood interval under the Action Alternatives

Function	2-year, <2.5%	2-year, 2.5-5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	142	0	109	0
Detain Precipitation	0.83	0.83	0.00	142	0	109	0
Cycle Nutrients	0.95	0.95	0.00	142	0	109	0
Export Organic Carbon	0.39	0.55	0.16	142	22	109	17
Physical Removal of Elements and Compounds	0.32	0.45	0.13	142	18	109	14
Biological Removal of Elements and Compounds	0.39	0.55	0.16	142	22	109	17
Maintain Plant Communities	0.93	0.93	0.00	142	0	109	0
Provide Wildlife Habitat	0.87	0.90	0.03	142	4	109	3
Agricultural							
Detain Floodwater	0.25	0.25	0.00	10	0	9	0
Detain Precipitation	0.56	0.56	0.00	10	0	9	0
Cycle Nutrients	0.29	0.29	0.00	10	0	9	0
Export Organic Carbon	0.10	0.15	0.04	10	0	9	0
Physical Removal of Elements and Compounds	0.26	0.36	0.10	10	1	9	1
Biological Removal of Elements and Compounds	0.10	0.15	0.04	10	0	9	0
Maintain Plant Communities	0.00	0.00	0.00	10	0	9	0
Provide Wildlife Habitat	0.00	0.00	0.00	10	0	9	0
Total				152	68	118	53

Table 59 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the 2-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	2-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	3,318	0	3,340	0
Detain Precipitation	0.83	0.83	0.00	3,318	0	3,340	0
Cycle Nutrients	0.95	0.95	0.00	3,318	0	3,340	0
Export Organic Carbon	0.55	0.39	-0.16	3,318	-519	3,340	-522
Physical Removal of Elements and Compounds	0.45	0.32	-0.13	3,318	-430	3,340	-433
Biological Removal of Elements and Compounds	0.55	0.39	-0.16	3,318	-519	3,340	-522
Maintain Plant Communities	0.93	0.93	0.00	3,318	0	3,340	0
Provide Wildlife Habitat	0.90	0.87	-0.03	3,318	-91	3,340	-91
Agricultural							
Detain Floodwater	0.25	0.25	0.00	1,894	0	1,904	0
Detain Precipitation	0.56	0.56	0.00	1,894	0	1,904	0
Cycle Nutrients	0.29	0.29	0.00	1,894	0	1,904	0
Export Organic Carbon	0.15	0.10	-0.04	1,894	-79	1,904	-79
Physical Removal of Elements and Compounds	0.36	0.26	-0.10	1,894	-197	1,904	-198
Biological Removal of Elements and Compounds	0.15	0.10	-0.04	1,894	-79	1,904	-79
Maintain Plant Communities	0.00	0.00	0.00	1,894	0	1,904	0
Provide Wildlife Habitat	0.00	0.00	0.00	1,894	0	1,904	0
Total				5,212	-1,913	5,243	-1,925

Table 60 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the 3-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	3-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.82	-0.16	3	0	4	-1
Detain Precipitation	0.83	0.83	0.00	3	0	4	0
Cycle Nutrients	0.95	0.95	0.00	3	0	4	0
Export Organic Carbon	0.55	0.34	-0.21	3	-1	4	-1
Physical Removal of Elements and Compounds	0.45	0.28	-0.17	3	0	4	-1
Biological Removal of Elements and Compounds	0.55	0.34	-0.21	3	-1	4	-1
Maintain Plant Communities	0.93	0.93	0.00	3	0	4	0
Provide Wildlife Habitat	0.90	0.85	-0.05	3	0	4	0
Agricultural							
Detain Floodwater	0.25	0.21	-0.04	1	0	1	0
Detain Precipitation	0.56	0.56	0.00	1	0	1	0
Cycle Nutrients	0.29	0.29	0.00	1	0	1	0
Export Organic Carbon	0.15	0.09	-0.06	1	0	1	0
Physical Removal of Elements and Compounds	0.36	0.23	-0.14	1	0	1	0
Biological Removal of Elements and Compounds	0.15	0.09	-0.06	1	0	1	0
Maintain Plant Communities	0.00	0.00	0.00	1	0	1	0
Provide Wildlife Habitat	0.00	0.00	0.00	1	0	1	0
Total				4	-3	5	-3

Table 61 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the 4-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	4-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.65	-0.33	3	-1	0	0
Detain Precipitation	0.83	0.83	0.00	3	0	0	0
Cycle Nutrients	0.95	0.95	0.00	3	0	0	0
Export Organic Carbon	0.55	0.29	-0.26	3	-1	0	0
Physical Removal of Elements and Compounds	0.45	0.24	-0.22	3	-1	0	0
Biological Removal of Elements and Compounds	0.55	0.29	-0.26	3	-1	0	0
Maintain Plant Communities	0.93	0.93	0.00	3	0	0	0
Provide Wildlife Habitat	0.90	0.83	-0.07	3	0	0	0
Agricultural							
Detain Floodwater	0.25	0.17	-0.08	0	0	0	0
Detain Precipitation	0.56	0.56	0.00	0	0	0	0
Cycle Nutrients	0.29	0.29	0.00	0	0	0	0
Export Organic Carbon	0.15	0.08	-0.07	0	0	0	0
Physical Removal of Elements and Compounds	0.36	0.19	-0.17	0	0	0	0
Biological Removal of Elements and Compounds	0.15	0.08	-0.07	0	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	0	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	0	0
Total				4	-4	0	0

Table 62 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the 5-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.49	-0.49	2	-1	0	0
Detain Precipitation	0.83	0.83	0.00	2	0	0	0
Cycle Nutrients	0.95	0.95	0.00	2	0	0	0
Export Organic Carbon	0.55	0.23	-0.31	2	-1	0	0
Physical Removal of Elements and Compounds	0.45	0.19	-0.26	2	-1	0	0
Biological Removal of Elements and Compounds	0.55	0.23	-0.31	2	-1	0	0
Maintain Plant Communities	0.93	0.93	0.00	2	0	0	0
Provide Wildlife Habitat	0.90	0.81	-0.09	2	0	0	0
Agricultural							
Detain Floodwater	0.25	0.12	-0.12	5	-1	1	0
Detain Precipitation	0.56	0.56	0.00	5	0	1	0
Cycle Nutrients	0.29	0.29	0.00	5	0	1	0
Export Organic Carbon	0.15	0.06	-0.08	5	0	1	0
Physical Removal of Elements and Compounds	0.36	0.16	-0.21	5	-1	1	0
Biological Removal of Elements and Compounds	0.15	0.06	-0.08	5	0	1	0
Maintain Plant Communities	0.00	0.00	0.00	5	0	1	0
Provide Wildlife Habitat	0.00	0.00	0.00	5	0	1	0
Total				7	-6	1	-1

Table 63 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the >5-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	>5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.33	-0.65	17	-11	0	0
Detain Precipitation	0.83	0.61	-0.22	17	-4	0	0
Cycle Nutrients	0.95	0.95	0.00	17	0	0	0
Export Organic Carbon	0.55	0.18	-0.36	17	-6	0	0
Physical Removal of Elements and Compounds	0.45	0.06	-0.39	17	-7	0	0
Biological Removal of Elements and Compounds	0.55	0.18	-0.36	17	-6	0	0
Maintain Plant Communities	0.93	0.80	-0.12	17	-2	0	0
Provide Wildlife Habitat	0.90	0.70	-0.20	17	-3	0	0
Agricultural							
Detain Floodwater	0.25	0.08	-0.17	2	0	0	0
Detain Precipitation	0.56	0.56	0.00	2	0	0	0
Cycle Nutrients	0.29	0.29	0.00	2	0	0	0
Export Organic Carbon	0.15	0.05	-0.10	2	0	0	0
Physical Removal of Elements and Compounds	0.36	0.12	-0.24	2	0	0	0
Biological Removal of Elements and Compounds	0.15	0.05	-0.10	2	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	2	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	2	0	0	0
Total				2	-41	0	0

Table 64 Change in AAFCUs for areas shifting from the 2-year, 2.5-5% flood interval to the 2-year, 5-7.5% flood interval under the Action Alternatives

Function	2-year, 2.5-5%	2-year, 5-7.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	132	0	119	0
Detain Precipitation	0.83	0.83	0.00	132	0	119	0
Cycle Nutrients	0.95	0.95	0.00	132	0	119	0
Export Organic Carbon	0.55	0.64	0.10	132	13	119	12
Physical Removal of Elements and Compounds	0.45	0.53	0.08	132	11	119	10
Biological Removal of Elements and Compounds	0.55	0.64	0.10	132	13	119	12
Maintain Plant Communities	0.93	0.93	0.00	132	0	119	0
Provide Wildlife Habitat	0.90	0.92	0.02	132	2	119	2
Agricultural							
Detain Floodwater	0.25	0.25	0.00	3	0	4	0
Detain Precipitation	0.56	0.56	0.00	3	0	4	0
Cycle Nutrients	0.29	0.29	0.00	3	0	4	0
Export Organic Carbon	0.15	0.17	0.03	3	0	4	0
Physical Removal of Elements and Compounds	0.36	0.43	0.07	3	0	4	0
Biological Removal of Elements and Compounds	0.15	0.17	0.03	3	0	4	0
Maintain Plant Communities	0.00	0.00	0.00	3	0	4	0
Provide Wildlife Habitat	0.00	0.00	0.00	3	0	4	0
Total				135	39	123	35

Table 65 Change in AAFCUs for areas shifting from the 2-year, 5-7.5% flood interval to the 2-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 5-7.5%	2-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	28	0	36	0
Detain Precipitation	0.83	0.83	0.00	28	0	36	0
Cycle Nutrients	0.95	0.95	0.00	28	0	36	0
Export Organic Carbon	0.64	0.39	-0.25	28	-7	36	-9
Physical Removal of Elements and Compounds	0.53	0.32	-0.21	28	-6	36	-8
Biological Removal of Elements and Compounds	0.64	0.39	-0.25	28	-7	36	-9
Maintain Plant Communities	0.93	0.93	0.00	28	0	36	0
Provide Wildlife Habitat	0.92	0.87	-0.04	28	-1	36	-2
Agricultural							
Detain Floodwater	0.25	0.25	0.00	14	0	14	0
Detain Precipitation	0.56	0.56	0.00	14	0	14	0
Cycle Nutrients	0.29	0.29	0.00	14	0	14	0
Export Organic Carbon	0.17	0.10	-0.07	14	-1	14	-1
Physical Removal of Elements and Compounds	0.43	0.26	-0.17	14	-2	14	-2
Biological Removal of Elements and Compounds	0.17	0.10	-0.07	14	-1	14	-1
Maintain Plant Communities	0.00	0.00	0.00	14	0	14	0
Provide Wildlife Habitat	0.00	0.00	0.00	14	0	14	0
Total				43	-26	51	-32

Table 66 Change in AAFCUs for areas shifting from the 2-year, 5-7.5% flood interval to the 2-year, 2.5-5% flood interval under the Action Alternatives

Function	2-year, 5-7.5%	2-year, 2.5-5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	2,966	0	2,990	0
Detain Precipitation	0.83	0.83	0.00	2,966	0	2,990	0
Cycle Nutrients	0.95	0.95	0.00	2,966	0	2,990	0
Export Organic Carbon	0.64	0.55	-0.10	2,966	-290	2,990	-292
Physical Removal of Elements and Compounds	0.53	0.45	-0.08	2,966	-240	2,990	-242
Biological Removal of Elements and Compounds	0.64	0.55	-0.10	2,966	-290	2,990	-292
Maintain Plant Communities	0.93	0.93	0.00	2,966	0	2,990	0
Provide Wildlife Habitat	0.92	0.90	-0.02	2,966	-47	2,990	-48
Agricultural							
Detain Floodwater	0.25	0.25	0.00	894	0	907	0
Detain Precipitation	0.56	0.56	0.00	894	0	907	0
Cycle Nutrients	0.29	0.29	0.00	894	0	907	0
Export Organic Carbon	0.17	0.15	-0.03	894	-23	907	-24
Physical Removal of Elements and Compounds	0.43	0.36	-0.07	894	-58	907	-59
Biological Removal of Elements and Compounds	0.17	0.15	-0.03	894	-23	907	-24
Maintain Plant Communities	0.00	0.00	0.00	894	0	907	0
Provide Wildlife Habitat	0.00	0.00	0.00	894	0	907	0
Total				3,861	-972	3,897	-980

Table 67 Change in AAFCUs for areas shifting from the 2-year, 5-7.5% flood interval to the 3-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 5-7.5%	3-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.82	-0.16	0	0	0	0
Detain Precipitation	0.83	0.83	0.00	0	0	0	0
Cycle Nutrients	0.95	0.95	0.00	0	0	0	0
Export Organic Carbon	0.64	0.34	-0.31	0	0	0	0
Physical Removal of Elements and Compounds	0.53	0.28	-0.25	0	0	0	0
Biological Removal of Elements and Compounds	0.64	0.34	-0.31	0	0	0	0
Maintain Plant Communities	0.93	0.93	0.00	0	0	0	0
Provide Wildlife Habitat	0.92	0.85	-0.06	0	0	0	0
Agricultural							
Detain Floodwater	0.25	0.21	-0.04	2	0	2	0
Detain Precipitation	0.56	0.56	0.00	2	0	2	0
Cycle Nutrients	0.29	0.29	0.00	2	0	2	0
Export Organic Carbon	0.17	0.09	-0.08	2	0	2	0
Physical Removal of Elements and Compounds	0.43	0.23	-0.20	2	0	2	0
Biological Removal of Elements and Compounds	0.17	0.09	-0.08	2	0	2	0
Maintain Plant Communities	0.00	0.00	0.00	2	0	2	0
Provide Wildlife Habitat	0.00	0.00	0.00	2	0	2	0
Total				2	-1	2	-1

Table 68 Change in AAFCUs for areas shifting from the 2-year, 5-7.5% flood interval to the 4-year, <2.5% flood interval under the Action Alternatives

Function	2-year, 5-7.5%	4-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.65	-0.33	0	0	0	0
Detain Precipitation	0.83	0.83	0.00	0	0	0	0
Cycle Nutrients	0.95	0.95	0.00	0	0	0	0
Export Organic Carbon	0.64	0.29	-0.36	0	0	0	0
Physical Removal of Elements and Compounds	0.53	0.24	-0.30	0	0	0	0
Biological Removal of Elements and Compounds	0.64	0.29	-0.36	0	0	0	0
Maintain Plant Communities	0.93	0.93	0.00	0	0	0	0
Provide Wildlife Habitat	0.92	0.83	-0.08	0	0	0	0
Agricultural							
Detain Floodwater	0.25	0.17	-0.08	1	0	1	0
Detain Precipitation	0.56	0.56	0.00	1	0	1	0
Cycle Nutrients	0.29	0.29	0.00	1	0	1	0
Export Organic Carbon	0.17	0.08	-0.10	1	0	1	0
Physical Removal of Elements and Compounds	0.43	0.19	-0.24	1	0	1	0
Biological Removal of Elements and Compounds	0.17	0.08	-0.10	1	0	1	0
Maintain Plant Communities	0.00	0.00	0.00	1	0	1	0
Provide Wildlife Habitat	0.00	0.00	0.00	1	0	1	0
Total				1	0	1	0

Table 69 Change in AAFCUs for areas shifting from the 2-year, 5-7.5% flood interval to the 2-year, 7.5-10% flood interval under the Action Alternatives

Function	2-year, 5-7.5%	2-year, 7.5-10%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	52	0	49	0
Detain Precipitation	0.83	0.83	0.00	52	0	49	0
Cycle Nutrients	0.95	0.95	0.00	52	0	49	0
Export Organic Carbon	0.64	0.68	0.04	52	2	49	2
Physical Removal of Elements and Compounds	0.53	0.57	0.03	52	2	49	2
Biological Removal of Elements and Compounds	0.64	0.68	0.04	52	2	49	2
Maintain Plant Communities	0.93	0.93	0.00	52	0	49	0
Provide Wildlife Habitat	0.92	0.92	0.01	52	0	49	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	4	0	3	0
Detain Precipitation	0.56	0.56	0.00	4	0	3	0
Cycle Nutrients	0.29	0.29	0.00	4	0	3	0
Export Organic Carbon	0.17	0.18	0.01	4	0	3	0
Physical Removal of Elements and Compounds	0.43	0.46	0.03	4	0	3	0
Biological Removal of Elements and Compounds	0.17	0.18	0.01	4	0	3	0
Maintain Plant Communities	0.00	0.00	0.00	4	0	3	0
Provide Wildlife Habitat	0.00	0.00	0.00	4	0	3	0
Total				56	6	51	6

Table 70 Change in AAFCUs for areas shifting from the 2-year, 7.5-10% flood interval to the 2-year, 2.5-5% flood interval under the Action Alternatives

Function	2-year, 7.5-10%	2-year, 2.5-5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	23	0	10	0
Detain Precipitation	0.83	0.83	0.00	23	0	10	0
Cycle Nutrients	0.95	0.95	0.00	23	0	10	0
Export Organic Carbon	0.68	0.55	-0.14	23	-3	10	-1
Physical Removal of Elements and Compounds	0.57	0.45	-0.11	23	-3	10	-1
Biological Removal of Elements and Compounds	0.68	0.55	-0.14	23	-3	10	-1
Maintain Plant Communities	0.93	0.93	0.00	23	0	10	0
Provide Wildlife Habitat	0.92	0.90	-0.02	23	-1	10	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	3	0	0	0
Detain Precipitation	0.56	0.56	0.00	3	0	0	0
Cycle Nutrients	0.29	0.29	0.00	3	0	0	0
Export Organic Carbon	0.18	0.15	-0.04	3	0	0	0
Physical Removal of Elements and Compounds	0.46	0.36	-0.09	3	0	0	0
Biological Removal of Elements and Compounds	0.18	0.15	-0.04	3	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	3	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	3	0	0	0
Total				26	-10	10	-4

Table 71 Change in AAFCUs for areas shifting from the 2-year, 7.5-10% flood interval to the 2-year, 5-7.5% flood interval under the Action Alternatives

Function	2-year, 7.5-10%	2-year, 5-7.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	4,300	0	4,285	0
Detain Precipitation	0.83	0.83	0.00	4,300	0	4,285	0
Cycle Nutrients	0.95	0.95	0.00	4,300	0	4,285	0
Export Organic Carbon	0.68	0.64	-0.04	4,300	-168	4,285	-167
Physical Removal of Elements and Compounds	0.57	0.53	-0.03	4,300	-139	4,285	-139
Biological Removal of Elements and Compounds	0.68	0.64	-0.04	4,300	-168	4,285	-167
Maintain Plant Communities	0.93	0.93	0.00	4,300	0	4,285	0
Provide Wildlife Habitat	0.92	0.92	-0.01	4,300	-26	4,285	-26
Agricultural							
Detain Floodwater	0.25	0.25	0.00	915	0	925	0
Detain Precipitation	0.56	0.56	0.00	915	0	925	0
Cycle Nutrients	0.29	0.29	0.00	915	0	925	0
Export Organic Carbon	0.18	0.17	-0.01	915	-10	925	-10
Physical Removal of Elements and Compounds	0.46	0.43	-0.03	915	-24	925	-24
Biological Removal of Elements and Compounds	0.18	0.17	-0.01	915	-10	925	-10
Maintain Plant Communities	0.00	0.00	0.00	915	0	925	0
Provide Wildlife Habitat	0.00	0.00	0.00	915	0	925	0
Total				5,215	-545	5,210	-543

Table 72 Change in AAFCUs for areas shifting from the 2-year, 7.5-10% flood interval to the 2-year, 10-12.5% flood interval under the Action Alternatives							
Function	2-year, 7.5-10%	2-year, 10-12.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	68	0	67	0
Detain Precipitation	0.83	0.83	0.00	68	0	67	0
Cycle Nutrients	0.95	0.95	0.00	68	0	67	0
Export Organic Carbon	0.68	0.72	0.04	68	3	67	3
Physical Removal of Elements and Compounds	0.57	0.60	0.03	68	2	67	2
Biological Removal of Elements and Compounds	0.68	0.72	0.04	68	3	67	3
Maintain Plant Communities	0.93	0.93	0.00	68	0	67	0
Provide Wildlife Habitat	0.92	0.93	0.01	68	0	67	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	0	0	3	0
Detain Precipitation	0.56	0.56	0.00	0	0	3	0
Cycle Nutrients	0.29	0.29	0.00	0	0	3	0
Export Organic Carbon	0.18	0.19	0.01	0	0	3	0
Physical Removal of Elements and Compounds	0.46	0.48	0.03	0	0	3	0
Biological Removal of Elements and Compounds	0.18	0.19	0.01	0	0	3	0
Maintain Plant Communities	0.00	0.00	0.00	0	0	3	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	3	0
Total				68	8	70	8

Table 73 Change in AAFCUs for areas shifting from the 2-year, 10-12.5% flood interval to the 2-year, 5-7.5% flood interval under the Action Alternatives

Function	2-year, 10-12.5%	2-year, 5-7.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	13	0	0	0
Detain Precipitation	0.83	0.83	0.00	13	0	0	0
Cycle Nutrients	0.95	0.95	0.00	13	0	0	0
Export Organic Carbon	0.72	0.64	-0.08	13	-1	0	0
Physical Removal of Elements and Compounds	0.60	0.53	-0.06	13	-1	0	0
Biological Removal of Elements and Compounds	0.72	0.64	-0.08	13	-1	0	0
Maintain Plant Communities	0.93	0.93	0.00	13	0	0	0
Provide Wildlife Habitat	0.93	0.92	-0.01	13	0	0	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	1	0	0	0
Detain Precipitation	0.56	0.56	0.00	1	0	0	0
Cycle Nutrients	0.29	0.29	0.00	1	0	0	0
Export Organic Carbon	0.19	0.17	-0.02	1	0	0	0
Physical Removal of Elements and Compounds	0.48	0.43	-0.05	1	0	0	0
Biological Removal of Elements and Compounds	0.19	0.17	-0.02	1	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	1	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	1	0	0	0
Total				14	-3	0	0

Table 74 Change in AAFCUs for areas shifting from the 2-year, 10-12.5% flood interval to the 2-year, 7.5-10% flood interval under the Action Alternatives

Function	2-year, 10-12.5%	2-year, 7.5-10%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	2,122	0	2894.85	0
Detain Precipitation	0.83	0.83	0.00	2,122	0	2894.85	0
Cycle Nutrients	0.95	0.95	0.00	2,122	0	2894.85	0
Export Organic Carbon	0.72	0.68	-0.04	2,122	-83	2894.85	-113
Physical Removal of Elements and Compounds	0.60	0.57	-0.03	2,122	-69	2894.85	-94
Biological Removal of Elements and Compounds	0.72	0.68	-0.04	2,122	-83	2894.85	-113
Maintain Plant Communities	0.93	0.93	0.00	2,122	0	2894.85	0
Provide Wildlife Habitat	0.93	0.92	-0.01	2,122	-13	2894.85	-17
Agricultural							
Detain Floodwater	0.25	0.25	0.00	185	0	212.605	0
Detain Precipitation	0.56	0.56	0.00	185	0	212.605	0
Cycle Nutrients	0.29	0.29	0.00	185	0	212.605	0
Export Organic Carbon	0.19	0.18	-0.01	185	-2	212.605	-2
Physical Removal of Elements and Compounds	0.48	0.46	-0.03	185	-5	212.605	-6
Biological Removal of Elements and Compounds	0.19	0.18	-0.01	185	-2	212.605	-2
Maintain Plant Communities	0.00	0.00	0.00	185	0	212.605	0
Provide Wildlife Habitat	0.00	0.00	0.00	185	0	212.605	0
Total				2,308	-256	3,107	-347

Table 75 Change in AAFCUs for areas shifting from the 2-year, 10-12.5% flood interval to the 2-year, >12.5% flood interval under the Action Alternatives

Function	2-year, 10-12.5%	2-year, >12.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	16	0	28	0
Detain Precipitation	0.83	0.83	0.00	16	0	28	0
Cycle Nutrients	0.95	0.95	0.00	16	0	28	0
Export Organic Carbon	0.72	0.74	0.02	16	0	28	1
Physical Removal of Elements and Compounds	0.60	0.62	0.02	16	0	28	0
Biological Removal of Elements and Compounds	0.72	0.74	0.02	16	0	28	1
Maintain Plant Communities	0.93	0.93	0.00	16	0	28	0
Provide Wildlife Habitat	0.93	0.93	0.00	16	0	28	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	2	0	1	0
Detain Precipitation	0.56	0.56	0.00	2	0	1	0
Cycle Nutrients	0.29	0.29	0.00	2	0	1	0
Export Organic Carbon	0.19	0.20	0.01	2	0	1	0
Physical Removal of Elements and Compounds	0.48	0.49	0.01	2	0	1	0
Biological Removal of Elements and Compounds	0.19	0.20	0.01	2	0	1	0
Maintain Plant Communities	0.00	0.00	0.00	2	0	1	0
Provide Wildlife Habitat	0.00	0.00	0.00	2	0	1	0
Total				19	1	29	2

Table 76 Change in AAFCUs for areas shifting from the 2-year, >12.5% flood interval to the 2-year, 7.5-10% flood interval under the Action Alternatives

Function	2-year, >12.5%	2-year, 7.5-10%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	10	0	10	0
Detain Precipitation	0.83	0.83	0.00	10	0	10	0
Cycle Nutrients	0.95	0.95	0.00	10	0	10	0
Export Organic Carbon	0.74	0.68	-0.06	10	-1	10	-1
Physical Removal of Elements and Compounds	0.62	0.57	-0.05	10	-1	10	-1
Biological Removal of Elements and Compounds	0.74	0.68	-0.06	10	-1	10	-1
Maintain Plant Communities	0.93	0.93	0.00	10	0	10	0
Provide Wildlife Habitat	0.93	0.92	-0.01	10	0	10	0
Agricultural							
Detain Floodwater	0.25	0.25	0.00	0	0	0	0
Detain Precipitation	0.56	0.56	0.00	0	0	0	0
Cycle Nutrients	0.29	0.29	0.00	0	0	0	0
Export Organic Carbon	0.20	0.18	-0.02	0	0	0	0
Physical Removal of Elements and Compounds	0.49	0.46	-0.04	0	0	0	0
Biological Removal of Elements and Compounds	0.20	0.18	-0.02	0	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	0	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	0	0
Total				11	-2	11	-2

Table 77 Change in AAFCUs for areas shifting from the 2-year, >12.5% flood interval to the 2-year, 10-12.5% flood interval under the Action Alternatives							
Function	2-year, >12.5%	2-year, 10-12.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.98	0.98	0.00	1,355	0	1,389	0
Detain Precipitation	0.83	0.83	0.00	1,355	0	1,389	0
Cycle Nutrients	0.95	0.95	0.00	1,355	0	1,389	0
Export Organic Carbon	0.74	0.72	-0.02	1,355	-26	1,389	-27
Physical Removal of Elements and Compounds	0.62	0.60	-0.02	1,355	-22	1,389	-22
Biological Removal of Elements and Compounds	0.74	0.72	-0.02	1,355	-26	1,389	-27
Maintain Plant Communities	0.93	0.93	0.00	1,355	0	1,389	0
Provide Wildlife Habitat	0.93	0.93	0.00	1,355	-4	1,389	-4
Agricultural							
Detain Floodwater	0.25	0.25	0.00	98	0	101	0
Detain Precipitation	0.56	0.56	0.00	98	0	101	0
Cycle Nutrients	0.29	0.29	0.00	98	0	101	0
Export Organic Carbon	0.20	0.19	-0.01	98	-1	101	-1
Physical Removal of Elements and Compounds	0.49	0.48	-0.01	98	-1	101	-1
Biological Removal of Elements and Compounds	0.20	0.19	-0.01	98	-1	101	-1
Maintain Plant Communities	0.00	0.00	0.00	98	0	101	0
Provide Wildlife Habitat	0.00	0.00	0.00	98	0	101	0
Total				1,453	-81	1,490	-83

Table 78 Change in AAFCUs for areas shifting from the 3-year, <2.5% flood interval to the 4-year, <2.5% flood interval under the Action Alternatives

Function	3-year, <2.5%	4-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.82	0.65	-0.16	4,616	-755	4,675	-764
Detain Precipitation	0.83	0.83	0.00	4,616	0	4,675	0
Cycle Nutrients	0.95	0.95	0.00	4,616	0	4,675	0
Export Organic Carbon	0.34	0.29	-0.05	4,616	-241	4,675	-244
Physical Removal of Elements and Compounds	0.28	0.24	-0.04	4,616	-199	4,675	-202
Biological Removal of Elements and Compounds	0.34	0.29	-0.05	4,616	-241	4,675	-244
Maintain Plant Communities	0.93	0.93	0.00	4,616	0	4,675	0
Provide Wildlife Habitat	0.85	0.83	-0.02	4,616	-98	4,675	-99
Agricultural							
Detain Floodwater	0.21	0.17	-0.04	4,384	-183	4,169	-174
Detain Precipitation	0.56	0.56	0.00	4,384	0	4,169	0
Cycle Nutrients	0.29	0.29	0.00	4,384	0	4,169	0
Export Organic Carbon	0.09	0.08	-0.01	4,384	-61	4,169	-58
Physical Removal of Elements and Compounds	0.23	0.19	-0.03	4,384	-152	4,169	-145
Biological Removal of Elements and Compounds	0.09	0.08	-0.01	4,384	-61	4,169	-58
Maintain Plant Communities	0.00	0.00	0.00	4,384	0	4,169	0
Provide Wildlife Habitat	0.00	0.00	0.00	4,384	0	4,169	0
Total				9,000	-1,990	8,844	-1,987

Table 79 Change in AAFCUs for areas shifting from the 3-year, <2.5% flood interval to the 5-year, <2.5% flood interval under the Action Alternatives

Function	3-year, <2.5%	5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.82	0.49	-0.33	6,942	-2,271	5,035	-1,647
Detain Precipitation	0.83	0.83	0.00	6,942	0	5,035	0
Cycle Nutrients	0.95	0.95	0.00	6,942	0	5,035	0
Export Organic Carbon	0.34	0.23	-0.10	6,942	-723	5,035	-525
Physical Removal of Elements and Compounds	0.28	0.19	-0.09	6,942	-599	5,035	-435
Biological Removal of Elements and Compounds	0.34	0.23	-0.10	6,942	-723	5,035	-525
Maintain Plant Communities	0.93	0.93	0.00	6,942	0	5,035	0
Provide Wildlife Habitat	0.85	0.81	-0.04	6,942	-308	5,035	-223
Agricultural							
Detain Floodwater	0.21	0.12	-0.08	5,153	-429	3,536	-295
Detain Precipitation	0.56	0.56	0.00	5,153	0	3,536	0
Cycle Nutrients	0.29	0.29	0.00	5,153	0	3,536	0
Export Organic Carbon	0.09	0.06	-0.03	5,153	-143	3,536	-98
Physical Removal of Elements and Compounds	0.23	0.16	-0.07	5,153	-358	3,536	-246
Biological Removal of Elements and Compounds	0.09	0.06	-0.03	5,153	-143	3,536	-98
Maintain Plant Communities	0.00	0.00	0.00	5,153	0	3,536	0
Provide Wildlife Habitat	0.00	0.00	0.00	5,153	0	3,536	0
Total				12,095	-5,698	8,571	-4,091

Table 80 Change in AAFCUs for areas shifting from the 3-year, <2.5% flood interval to the >5-year, <2.5% flood interval under the Action Alternatives

Function	3-year, <2.5%	>5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.82	0.33	-0.49	586	-287	3,031	-1,488
Detain Precipitation	0.83	0.61	-0.22	586	-130	3,031	-673
Cycle Nutrients	0.95	0.95	0.00	586	0	3,031	0
Export Organic Carbon	0.34	0.18	-0.16	586	-92	3,031	-474
Physical Removal of Elements and Compounds	0.28	0.06	-0.22	586	-126	3,031	-654
Biological Removal of Elements and Compounds	0.34	0.18	-0.16	586	-92	3,031	-474
Maintain Plant Communities	0.93	0.80	-0.12	586	-73	3,031	-376
Provide Wildlife Habitat	0.85	0.70	-0.15	586	-89	3,031	-461
Agricultural							
Detain Floodwater	0.21	0.08	-0.13	373	-47	2,487	-311
Detain Precipitation	0.56	0.56	0.00	373	0	2,487	0
Cycle Nutrients	0.29	0.29	0.00	373	0	2,487	0
Export Organic Carbon	0.09	0.05	-0.04	373	-16	2,487	-104
Physical Removal of Elements and Compounds	0.23	0.12	-0.10	373	-39	2,487	-259
Biological Removal of Elements and Compounds	0.09	0.05	-0.04	373	-16	2,487	-104
Maintain Plant Communities	0.00	0.00	0.00	373	0	2,487	0
Provide Wildlife Habitat	0.00	0.00	0.00	373	0	2,487	0
Total				959	-1,005	5,518	-5,379

Table 81 Change in AAFCUs for areas shifting from the 3-year, <2.5% flood interval to the 2-year, <2.5% flood interval under the Action Alternatives

Function	3-year, <2.5%	2-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.82	0.98	0.16	2,375	388	564	92
Detain Precipitation	0.83	0.83	0.00	2,375	0	564	0
Cycle Nutrients	0.95	0.95	0.00	2,375	0	564	0
Export Organic Carbon	0.34	0.39	0.05	2,375	124	564	29
Physical Removal of Elements and Compounds	0.28	0.32	0.04	2,375	103	564	24
Biological Removal of Elements and Compounds	0.34	0.39	0.05	2,375	124	564	29
Maintain Plant Communities	0.93	0.93	0.00	2,375	0	564	0
Provide Wildlife Habitat	0.85	0.87	0.02	2,375	47	564	11
Agricultural							
Detain Floodwater	0.21	0.25	0.04	1,060	44	208	9
Detain Precipitation	0.56	0.56	0.00	1,060	0	208	0
Cycle Nutrients	0.29	0.29	0.00	1,060	0	208	0
Export Organic Carbon	0.09	0.10	0.01	1,060	15	208	3
Physical Removal of Elements and Compounds	0.23	0.26	0.03	1,060	37	208	7
Biological Removal of Elements and Compounds	0.09	0.10	0.01	1,060	15	208	3
Maintain Plant Communities	0.00	0.00	0.00	1,060	0	208	0
Provide Wildlife Habitat	0.00	0.00	0.00	1,060	0	208	0
Total				3,435	896	773	208

Table 82 Change in AAFCUs for areas shifting from the 3-year, <2.5% flood interval to the 2-year, 2.5-5% flood interval under the Action Alternatives

Function	3-year, <2.5%	2-year, 2.5-5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.82	0.98	0.16	0	0	0	0
Detain Precipitation	0.83	0.83	0.00	0	0	0	0
Cycle Nutrients	0.95	0.95	0.00	0	0	0	0
Export Organic Carbon	0.34	0.55	0.21	0	0	0	0
Physical Removal of Elements and Compounds	0.28	0.45	0.17	0	0	0	0
Biological Removal of Elements and Compounds	0.34	0.55	0.21	0	0	0	0
Maintain Plant Communities	0.93	0.93	0.00	0	0	0	0
Provide Wildlife Habitat	0.85	0.90	0.05	0	0	0	0
Agricultural							
Detain Floodwater	0.21	0.25	0.04	0	0	0	0
Detain Precipitation	0.56	0.56	0.00	0	0	0	0
Cycle Nutrients	0.29	0.29	0.00	0	0	0	0
Export Organic Carbon	0.09	0.15	0.06	0	0	0	0
Physical Removal of Elements and Compounds	0.23	0.36	0.14	0	0	0	0
Biological Removal of Elements and Compounds	0.09	0.15	0.06	0	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	0	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	0	0
Total				0	0	0	0

Table 83 Change in AAFCUs for areas shifting from the 4-year, <2.5% flood interval to the 5-year, <2.5% flood interval under the Action Alternatives

Function	4-year, <2.5%	5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.65	0.49	-0.16	6,350	-1,039	4,698	-768
Detain Precipitation	0.83	0.83	0.00	6,350	0	4,698	0
Cycle Nutrients	0.95	0.95	0.00	6,350	0	4,698	0
Export Organic Carbon	0.29	0.23	-0.05	6,350	-331	4,698	-245
Physical Removal of Elements and Compounds	0.24	0.19	-0.04	6,350	-274	4,698	-203
Biological Removal of Elements and Compounds	0.29	0.23	-0.05	6,350	-331	4,698	-245
Maintain Plant Communities	0.93	0.93	0.00	6,350	0	4,698	0
Provide Wildlife Habitat	0.83	0.81	-0.02	6,350	-146	4,698	-108
Agricultural							
Detain Floodwater	0.17	0.12	-0.04	5,606	-234	4,007	-167
Detain Precipitation	0.56	0.56	0.00	5,606	0	4,007	0
Cycle Nutrients	0.29	0.29	0.00	5,606	0	4,007	0
Export Organic Carbon	0.08	0.06	-0.01	5,606	-78	4,007	-56
Physical Removal of Elements and Compounds	0.19	0.16	-0.03	5,606	-195	4,007	-139
Biological Removal of Elements and Compounds	0.08	0.06	-0.01	5,606	-78	4,007	-56
Maintain Plant Communities	0.00	0.00	0.00	5,606	0	4,007	0
Provide Wildlife Habitat	0.00	0.00	0.00	5,606	0	4,007	0
Total				11,956	-2,705	8,706	-1,986

Table 84 Change in AAFCUs for areas shifting from the 4-year, <2.5% flood interval to the >5-year, <2.5% flood interval under the Action Alternatives

Function	4-year, <2.5%	>5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.65	0.33	-0.33	524	-171	2,358	-772
Detain Precipitation	0.83	0.61	-0.22	524	-116	2,358	-524
Cycle Nutrients	0.95	0.95	0.00	524	0	2,358	0
Export Organic Carbon	0.29	0.18	-0.10	524	-55	2,358	-246
Physical Removal of Elements and Compounds	0.24	0.06	-0.17	524	-90	2,358	-407
Biological Removal of Elements and Compounds	0.29	0.18	-0.10	524	-55	2,358	-246
Maintain Plant Communities	0.93	0.80	-0.12	524	-65	2,358	-292
Provide Wildlife Habitat	0.83	0.70	-0.13	524	-69	2,358	-309
Agricultural							
Detain Floodwater	0.17	0.08	-0.08	487	-41	2,704	-226
Detain Precipitation	0.56	0.56	0.00	487	0	2,704	0
Cycle Nutrients	0.29	0.29	0.00	487	0	2,704	0
Export Organic Carbon	0.08	0.05	-0.03	487	-14	2,704	-75
Physical Removal of Elements and Compounds	0.19	0.12	-0.07	487	-34	2,704	-188
Biological Removal of Elements and Compounds	0.08	0.05	-0.03	487	-14	2,704	-75
Maintain Plant Communities	0.00	0.00	0.00	487	0	2,704	0
Provide Wildlife Habitat	0.00	0.00	0.00	487	0	2,704	0
Total				1,011	-722	5,062	-3,360

Table 85 Change in AAFCUs for areas shifting from the 4-year, <2.5% flood interval to the 2-year, <2.5% flood interval under the Action Alternatives

Function	4-year, <2.5%	2-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.65	0.98	0.33	0	0	10	3
Detain Precipitation	0.83	0.83	0.00	0	0	10	0
Cycle Nutrients	0.95	0.95	0.00	0	0	10	0
Export Organic Carbon	0.29	0.39	0.10	0	0	10	1
Physical Removal of Elements and Compounds	0.24	0.32	0.09	0	0	10	1
Biological Removal of Elements and Compounds	0.29	0.39	0.10	0	0	10	1
Maintain Plant Communities	0.93	0.93	0.00	0	0	10	0
Provide Wildlife Habitat	0.83	0.87	0.04	0	0	10	0
Agricultural							
Detain Floodwater	0.17	0.25	0.08	0	0	0	0
Detain Precipitation	0.56	0.56	0.00	0	0	0	0
Cycle Nutrients	0.29	0.29	0.00	0	0	0	0
Export Organic Carbon	0.08	0.10	0.03	0	0	0	0
Physical Removal of Elements and Compounds	0.19	0.26	0.07	0	0	0	0
Biological Removal of Elements and Compounds	0.08	0.10	0.03	0	0	0	0
Maintain Plant Communities	0.00	0.00	0.00	0	0	0	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	0	0
Total				0	0	11	7

Table 86 Change in AAFCUs for areas shifting from the 4-year, <2.5% flood interval to the 3-year, <2.5% flood interval under the Action Alternatives

Function	4-year, <2.5%	3-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.65	0.82	0.16	8	1	4	1
Detain Precipitation	0.83	0.83	0.00	8	0	4	0
Cycle Nutrients	0.95	0.95	0.00	8	0	4	0
Export Organic Carbon	0.29	0.34	0.05	8	0	4	0
Physical Removal of Elements and Compounds	0.24	0.28	0.04	8	0	4	0
Biological Removal of Elements and Compounds	0.29	0.34	0.05	8	0	4	0
Maintain Plant Communities	0.93	0.93	0.00	8	0	4	0
Provide Wildlife Habitat	0.83	0.85	0.02	8	0	4	0
Agricultural							
Detain Floodwater	0.17	0.21	0.04	5	0	5	0
Detain Precipitation	0.56	0.56	0.00	5	0	5	0
Cycle Nutrients	0.29	0.29	0.00	5	0	5	0
Export Organic Carbon	0.08	0.09	0.01	5	0	5	0
Physical Removal of Elements and Compounds	0.19	0.23	0.03	5	0	5	0
Biological Removal of Elements and Compounds	0.08	0.09	0.01	5	0	5	0
Maintain Plant Communities	0.00	0.00	0.00	5	0	5	0
Provide Wildlife Habitat	0.00	0.00	0.00	5	0	5	0
Total				13	3	9	2

Table 87 Change in AAFCUs for areas shifting from the 5-year, <2.5% flood interval to the >5-year, <2.5% flood interval under the Action Alternatives

Function	5-year, <2.5%	>5-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.49	0.33	-0.16	6,357	-1,041	10,165	-1,665
Detain Precipitation	0.83	0.61	-0.22	6,357	-1,411	10,165	-2,257
Cycle Nutrients	0.95	0.95	0.00	6,357	0	10,165	0
Export Organic Carbon	0.23	0.18	-0.05	6,357	-332	10,165	-531
Physical Removal of Elements and Compounds	0.19	0.06	-0.13	6,357	-823	10,165	-1,317
Biological Removal of Elements and Compounds	0.23	0.18	-0.05	6,357	-332	10,165	-531
Maintain Plant Communities	0.93	0.80	-0.12	6,357	-788	10,165	-1,261
Provide Wildlife Habitat	0.81	0.70	-0.11	6,357	-686	10,165	-1,097
Agricultural							
Detain Floodwater	0.12	0.08	-0.04	8,983	-375	10,759	-449
Detain Precipitation	0.56	0.56	0.00	8,983	0	10,759	0
Cycle Nutrients	0.29	0.29	0.00	8,983	0	10,759	0
Export Organic Carbon	0.06	0.05	-0.01	8,983	-125	10,759	-150
Physical Removal of Elements and Compounds	0.16	0.12	-0.03	8,983	-312	10,759	-374
Biological Removal of Elements and Compounds	0.06	0.05	-0.01	8,983	-125	10,759	-150
Maintain Plant Communities	0.00	0.00	0.00	8,983	0	10,759	0
Provide Wildlife Habitat	0.00	0.00	0.00	8,983	0	10,759	0
Total				15,340	-6,351	20,924	-9,781

Table 88 Change in AAFCUs for areas shifting from the 5-year, <2.5% flood interval to the 2-year, <2.5% flood interval under the Action Alternatives

Function	5-year, <2.5%	2-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.49	0.98	0.49	0	0	50	25
Detain Precipitation	0.83	0.83	0.00	0	0	50	0
Cycle Nutrients	0.95	0.95	0.00	0	0	50	0
Export Organic Carbon	0.23	0.39	0.16	0	0	50	8
Physical Removal of Elements and Compounds	0.19	0.32	0.13	0	0	50	7
Biological Removal of Elements and Compounds	0.23	0.39	0.16	0	0	50	8
Maintain Plant Communities	0.93	0.93	0.00	0	0	50	0
Provide Wildlife Habitat	0.81	0.87	0.06	0	0	50	3
Agricultural							
Detain Floodwater	0.12	0.25	0.12	0	0	18	2
Detain Precipitation	0.56	0.56	0.00	0	0	18	0
Cycle Nutrients	0.29	0.29	0.00	0	0	18	0
Export Organic Carbon	0.06	0.10	0.04	0	0	18	1
Physical Removal of Elements and Compounds	0.16	0.26	0.10	0	0	18	2
Biological Removal of Elements and Compounds	0.06	0.10	0.04	0	0	18	1
Maintain Plant Communities	0.00	0.00	0.00	0	0	18	0
Provide Wildlife Habitat	0.00	0.00	0.00	0	0	18	0
Total				0	0	68	56

Table 89 Change in AAFCUs for areas shifting from the 5-year, <2.5% flood interval to the 3-year, <2.5% flood interval under the Action Alternatives

Function	5-year, <2.5%	3-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.49	0.82	0.33	6	2	0	0
Detain Precipitation	0.83	0.83	0.00	6	0	0	0
Cycle Nutrients	0.95	0.95	0.00	6	0	0	0
Export Organic Carbon	0.23	0.34	0.10	6	1	0	0
Physical Removal of Elements and Compounds	0.19	0.28	0.09	6	1	0	0
Biological Removal of Elements and Compounds	0.23	0.34	0.10	6	1	0	0
Maintain Plant Communities	0.93	0.93	0.00	6	0	0	0
Provide Wildlife Habitat	0.81	0.85	0.04	6	0	0	0
Agricultural							
Detain Floodwater	0.12	0.21	0.08	9	1	9	1
Detain Precipitation	0.56	0.56	0.00	9	0	9	0
Cycle Nutrients	0.29	0.29	0.00	9	0	9	0
Export Organic Carbon	0.06	0.09	0.03	9	0	9	0
Physical Removal of Elements and Compounds	0.16	0.23	0.07	9	1	9	1
Biological Removal of Elements and Compounds	0.06	0.09	0.03	9	0	9	0
Maintain Plant Communities	0.00	0.00	0.00	9	0	9	0
Provide Wildlife Habitat	0.00	0.00	0.00	9	0	9	0
Total				16	6	9	2

Table 90 Change in AAFCUs for areas shifting from the 5-year, <2.5% flood interval to the 4-year, <2.5% flood interval under the Action Alternatives							
Function	5-year, <2.5%	4-year, <2.5%	Change in FCI	Extent (acres)	Change in AAFCU	Extent (acres)	Change in AAFCU
	FCI	FCI		Alternative 3		Alternative 2	
Mature Forest							
Detain Floodwater	0.49	0.65	0.16	2	0	2	0
Detain Precipitation	0.83	0.83	0.00	2	0	2	0
Cycle Nutrients	0.95	0.95	0.00	2	0	2	0
Export Organic Carbon	0.23	0.29	0.05	2	0	2	0
Physical Removal of Elements and Compounds	0.19	0.24	0.04	2	0	2	0
Biological Removal of Elements and Compounds	0.23	0.29	0.05	2	0	2	0
Maintain Plant Communities	0.93	0.93	0.00	2	0	2	0
Provide Wildlife Habitat	0.81	0.83	0.02	2	0	2	0
Agricultural							
Detain Floodwater	0.12	0.17	0.04	10	0	8	0
Detain Precipitation	0.56	0.56	0.00	10	0	8	0
Cycle Nutrients	0.29	0.29	0.00	10	0	8	0
Export Organic Carbon	0.06	0.08	0.01	10	0	8	0
Physical Removal of Elements and Compounds	0.16	0.19	0.03	10	0	8	0
Biological Removal of Elements and Compounds	0.06	0.08	0.01	10	0	8	0
Maintain Plant Communities	0.00	0.00	0.00	10	0	8	0
Provide Wildlife Habitat	0.00	0.00	0.00	10	0	8	0
Total				12	2	9	1

Table 91 Summary of projected changes in AAFCUs across flood frequency and duration intervals and wetland land cover classes in the indirect impact area under the Action Alternatives

Flood frequency and duration interval		AAFCUs			AAFCUs		
		Alternative 3			Alternative 2		
No Action Alternative	Action Alternative	Mature Forest	Agricultural	Total	Mature Forest	Agricultural	Total
2-year, <2.5%	3-year, <2.5%	-1915	-914	-2829	-2563	-497	-3059
2-year, <2.5%	4-year, <2.5%	-624	-113	-737	-620	-115	-735
2-year, <2.5%	5-year, <2.5%	-488	-66	-554	-630	-82	-713
2-year, <2.5%	>5-year, <2.5%	-46	0	-46	-46	-7	-53
2-year, <2.5%	2-year, 2.5-5%	67	2	68	51	2	53
2-year, 2.5-5%	2-year, <2.5%	-1558	-355	-1913	-1568	-357	-1925
2-year, 2.5-5%	3-year, <2.5%	-2	0	-3	-3	0	-3
2-year, 2.5-5%	4-year, <2.5%	-4	0	-4	0	0	0
2-year, 2.5-5%	5-year, <2.5%	-3	-2	-6	0	-1	-1
2-year, 2.5-5%	>5-year, <2.5%	-40	-1	-41	0	0	0
2-year, 2.5-5%	2-year, 5-7.5%	38	0	39	35	1	35
2-year, 5-7.5%	2-year, <2.5%	-22	-4	-26	-28	-4	-32
2-year, 5-7.5%	2-year, 2.5-5%	-867	-105	-972	-874	-106	-980
2-year, 5-7.5%	3-year, <2.5%	0	-1	-1	0	-1	-1
2-year, 5-7.5%	4-year, <2.5%	0	0	0	0	0	0
2-year, 5-7.5%	2-year, 7.5-10%	6	0	6	6	0	6
2-year, 7.5-10%	2-year, 2.5-5%	-9	0	-10	-4	0	-4
2-year, 7.5-10%	2-year, 5-7.5%	-502	-43	-545	-500	-43	-543
2-year, 7.5-10%	2-year, 10-12.5%	8	0	8	8	0	8
2-year, 10-12.5%	2-year, 5-7.5%	-3	0	-3	0	0	0
2-year, 10-12.5%	2-year, 7.5-10%	-247	-9	-256	-337	-10	-347
2-year, 10-12.5%	2-year, >12.5%	1	0	1	2	0	2
2-year, >12.5%	2-year, 7.5-10%	-2	0	-2	-2	0	-2
2-year, >12.5%	2-year, 10-12.5%	-79	-2	-81	-81	-2	-83
3-year, <2.5%	4-year, <2.5%	-1534	-457	-1990	-1553	-434	-1987
3-year, <2.5%	5-year, <2.5%	-4625	-1074	-5698	-3354	-737	-4091
3-year, <2.5%	>5-year, <2.5%	-889	-117	-1005	-4601	-778	-5379
3-year, <2.5%	2-year, <2.5%	785	110	896	187	22	208
3-year, <2.5%	2-year, 2.5-5%	0	0	0	0	0	0
4-year, <2.5%	5-year, <2.5%	-2121	-584	-2705	-1569	-417	-1986
4-year, <2.5%	>5-year, <2.5%	-621	-102	-722	-2796	-564	-3360
4-year, <2.5%	2-year, <2.5%	0	0	0	7	0	7
4-year, <2.5%	3-year, <2.5%	3	1	3	1	1	2
5-year, <2.5%	>5-year, <2.5%	-5414	-937	-6351	-8658	-1123	-9781
5-year, <2.5%	2-year, <2.5%	0	0	0	50	6	56

5-year, <2.5%	3-year, <2.5%	4	2	6	0	2	2
5-year, <2.5%	4-year, <2.5%	1	1	2	1	1	1
Total		-20,700	-4,770	-25,470	-29,441	-5,246	-34,687

Table 92 Summary of land cover classes and AAFCUs changes under the No Action and the Action Alternatives

Direct impacts										
Land cover	No Action Alternative		Alternative 3		Change		Alternative 2		Change	
	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU
Mature Forests	217	1,455	0	0	-217	-1,455	0	0	-217	-1,455
Agri-cultural	215	429	0	0	-215	-429	0	0	-215	-429
Subtotal	432	1,884	0	0	-432	-1,884	0	0	-432	-1,884

Indirect impacts										
Land cover	No Action Alternative		Alternative 3		Change		Alternative 2		Change	
	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU
Mature Forests	225,113	1,370,641	225,113	1,349,941	0	-20,700	225,113	1,341,200	0	-29,441
Agri- cultural	104,674	158,457	104,674	153,687	0	-4,770	104,674	153,211	0	-5,246
Subtotal	329,787	1,529,098	329,787	1,503,628	0	-25,470	329,787	1,494,411	0	-34,687
Total impacts										
Land cover	No Action Alternative		Alternative 3		Change		Alternative 2		Change	
	AAFCU	Acers	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU	Acres	AAFCU
Mature Forests	225,330	1,372,096	225,113	1,349,941	-217	-22,155	225,113	1,341,200	-217	-30,896
Agri-cultural	104,889	158,886	104,674	153,687	-215	-5,199	104,674	153,211	-215	-5,675
Total	330,218	1,530,982	329,787	1,503,628	-432	-27,354	329,787	1,494,411	-432	-36,570

Table 93 Determination of compensatory mitigation required to offset both direct and indirect impacts under Alternative 3

Target Year	FCI	Acres	FCU	FCU between years	Target Year	FCI	Acres	FCU	FCU between years
				Detain Floodwater					Physical Removal of Elements and Compounds
0	0.08	5,722	458		0	0.56	5,722	3,204	
5	0.23	5,722	1,316	4,435	5	0.56	5,722	3,204	16,022
10	0.4	5,722	2,289	9,012	10	0.56	5,722	3,204	16,022
20	0.53	5,722	3,033	26,607	20	0.56	5,722	3,204	32,043
35	0.61	5,722	3,490	48,923	35	0.56	5,722	3,204	48,065
50	0.65	5,722	3,719	54,073	50	0.56	5,722	3,204	48,065
			Sum over 50 years	143,050				Sum over 50 years	160,216
			AAFCU	2,861				AAFCU	3,204
				Detain Precipitation					Biological Removal of Elements and Compounds
0	0.75	5,722	4,292		0	0.09	5,722	515	
5	0.81	5,722	4,635	22,316	5	0.18	5,722	1,030	3,862
10	0.8	5,722	4,578	23,031	10	0.23	5,722	1,316	5,865
20	0.82	5,722	4,692	46,348	20	0.26	5,722	1,488	14,019
35	1	5,722	5,722	78,105	35	0.48	5,722	2,747	31,757
50	1	5,722	5,722	85,830	50	0.48	5,722	2,747	41,198
			Sum over 50 years	255,630				Sum over 50 years	96,702
			AAFCU	5,113				AAFCU	1,934
				Cycle Nutrients					Maintain Plant Communities
0	0.27	5,722	1,545		0	0	5,722	0	
5	0.41	5,722	2,346	9,727	5	0.58	5,722	3,319	8,297
10	0.49	5,722	2,804	12,875	10	0.7	5,722	4,005	18,310
20	0.54	5,722	3,090	29,468	20	0.88	5,722	5,035	45,204
35	0.89	5,722	5,093	61,368	35	0.94	5,722	5,379	78,105
50	0.9	5,722	5,150	76,818	50	0.97	5,722	5,550	81,968
			Sum over 50 years	190,257				Sum over 50 years	231,884
			AAFCU	3,805				AAFCU	4,638
				Export Organic Carbon					Provide Wildlife Habitat
0	0.09	5,722	515		0	0	5,722	0	
5	0.18	5,722	1,030	3,862	5	0.48	5,722	2,747	6,866
10	0.23	5,722	1,316	5,865	10	0.54	5,722	3,090	14,591
20	0.26	5,722	1,488	14,019	20	0.64	5,722	3,662	33,760
35	0.48	5,722	2,747	31,757	35	0.86	5,722	4,921	64,373
50	0.48	5,722	2,747	41,198	50	0.86	5,722	4,921	73,814
			Sum over 50 years	96,702				Sum over 50 years	193,404
			AAFCU	1,934				AAFCU	3,868
								Total AAFCUs generated by 5,722 acres of mitigation	27,357

Table 94 Determination of compensatory mitigation required to offset both direct and indirect impacts under Alternative 2

Target Year	FCI	Acres	FCU	FCU between years	Target Year	FCI	Acres	FCU	FCU between years
Detain Floodwater					Physical Removal of Elements and Compounds				
0	0.08	7,650	612		0	0.56	7,650	4,284	
5	0.23	7,650	1,760	5,929	5	0.56	7,650	4,284	21,420
10	0.4	7,650	3,060	12,049	10	0.56	7,650	4,284	21,420
20	0.53	7,650	4,055	35,573	20	0.56	7,650	4,284	42,840
35	0.61	7,650	4,667	65,408	35	0.56	7,650	4,284	64,260
50	0.65	7,650	4,973	72,293	50	0.56	7,650	4,284	64,260
Sum over 50 years				191,250	Sum over 50 years				214,200
AAFCU				3,825	AAFCU				4,284
Detain Precipitation					Biological Removal of Elements and Compounds				
0	0.75	7,650	5,738		0	0.09	7,650	689	
5	0.81	7,650	6,197	29,835	5	0.18	7,650	1,377	5,164
10	0.8	7,650	6,120	30,791	10	0.23	7,650	1,760	7,841
20	0.82	7,650	6,273	61,965	20	0.26	7,650	1,989	18,743
35	1	7,650	7,650	104,423	35	0.48	7,650	3,672	42,458
50	1	7,650	7,650	114,750	50	0.48	7,650	3,672	55,080
Sum over 50 years				341,764	Sum over 50 years				129,285
AAFCU				6,835	AAFCU				2,586
Cycle Nutrients					Maintain Plant Communities				
0	0.27	7,650	2,066		0	0	7,650	0	
5	0.41	7,650	3,137	13,005	5	0.58	7,650	4,437	11,093
10	0.49	7,650	3,749	17,213	10	0.7	7,650	5,355	24,480
20	0.54	7,650	4,131	39,398	20	0.88	7,650	6,732	60,435
35	0.89	7,650	6,809	82,046	35	0.94	7,650	7,191	104,423
50	0.9	7,650	6,885	102,701	50	0.97	7,650	7,421	109,586
Sum over 50 years				254,363	Sum over 50 years				310,016
AAFCU				5,087	AAFCU				6,200
Export Organic Carbon					Provide Wildlife Habitat				
0	0.09	7,650	689		0	0	7,650	0	
5	0.18	7,650	1,377	5,164	5	0.48	7,650	3,672	9,180
10	0.23	7,650	1,760	7,841	10	0.54	7,650	4,131	19,508
20	0.26	7,650	1,989	18,743	20	0.64	7,650	4,896	45,135
35	0.48	7,650	3,672	42,458	35	0.86	7,650	6,579	86,063
50	0.48	7,650	3,672	55,080	50	0.86	7,650	6,579	98,685
Sum over 50 years				129,285	Sum over 50 years				258,570
AAFCU				2,586	AAFCU				5,171
Total AAFCUs generated by 7,650 acres of mitigation									36,575

Table 95 Determination of compensatory mitigation required to offset direct impacts under Alternatives 2 and 3

Target Year	FCI	Acres	FCU	FCU between years	Target Year	FCI	Acres	FCU	FCU between years
Detain Floodwater					Physical Removal of Elements and Compounds				
0	0.08	394	32		0	0.56	394	221	
5	0.23	394	91	305	5	0.56	394	221	1,103
10	0.4	394	158	621	10	0.56	394	221	1,103
20	0.53	394	209	1,832	20	0.56	394	221	2,206
35	0.61	394	240	3,369	35	0.56	394	221	3,310
50	0.65	394	256	3,723	50	0.56	394	221	3,310
Sum over 50 years				9,850	Sum over 50 years				11,032
AAFCU				197	AAFCU				221
Detain Precipitation					Biological Removal of Elements and Compounds				
0	0.75	394	296		0	0.09	394	35	
5	0.81	394	319	1,537	5	0.18	394	71	266
10	0.8	394	315	1,586	10	0.23	394	91	404
20	0.82	394	323	3,191	20	0.26	394	102	965
35	1	394	394	5,378	35	0.48	394	189	2,187
50	1	394	394	5,910	50	0.48	394	189	2,837
Sum over 50 years				17,602	Sum over 50 years				6,659
AAFCU				352	AAFCU				133
Cycle Nutrients					Maintain Plant Communities				
0	0.27	394	106		0	0	394	0	
5	0.41	394	162	670	5	0.58	394	229	571
10	0.49	394	193	887	10	0.7	394	276	1,261
20	0.54	394	213	2,029	20	0.88	394	347	3,113
35	0.89	394	351	4,226	35	0.94	394	370	5,378
50	0.9	394	355	5,289	50	0.97	394	382	5,644
Sum over 50 years				13,101	Sum over 50 years				15,967
AAFCU				262	AAFCU				319
Export Organic Carbon					Provide Wildlife Habitat				
0	0.09	394	35		0	0	394	0	
5	0.18	394	71	266	5	0.48	394	189	473
10	0.23	394	91	404	10	0.54	394	213	1,005
20	0.26	394	102	965	20	0.64	394	252	2,325
35	0.48	394	189	2,187	35	0.86	394	339	4,433
50	0.48	394	189	2,837	50	0.86	394	339	5,083
Sum over 50 years				6,659	Sum over 50 years				13,317
AAFCU				133	AAFCU				266
Total AAFCUs generated by 394 acres of mitigation									1,884

Table 96 Determination of compensatory mitigation required to offset indirect impacts under Alternative 3

Target Year	FCI	Acres	FCU	FCU between years	Target Year	FCI	Acres	FCU	FCU between years
Detain Floodwater					Physical Removal of Elements and Compounds				
	0.08	5,328	426		0	0.56	5,328	2,984	
5	0.23	5,328	1,225	4,129	5	0.56	5,328	2,984	14,918
10	0.4	5,328	2,131	8,392	10	0.56	5,328	2,984	14,918
20	0.53	5,328	2,824	24,775	20	0.56	5,328	2,984	29,837
35	0.61	5,328	3,250	45,554	35	0.56	5,328	2,984	44,755
50	0.65	5,328	3,463	50,350	50	0.56	5,328	2,984	44,755
Sum over 50 years				133,200	Sum over 50 years				149,184
AAFCU				2,664	AAFCU				2,984
Detain Precipitation					Biological Removal of Elements and Compounds				
0	0.75	5,328	3,996		0	0.09	5,328	480	
5	0.81	5,328	4,316	20,779	5	0.18	5,328	959	3,596
10	0.8	5,328	4,262	21,445	10	0.23	5,328	1,225	5,461
20	0.82	5,328	4,369	43,157	20	0.26	5,328	1,385	13,054
35	1	5,328	5,328	72,727	35	0.48	5,328	2,557	29,570
50	1	5,328	5,328	79,920	50	0.48	5,328	2,557	38,362
Sum over 50 years				238,028	Sum over 50 years				90,043
AAFCU				4,761	AAFCU				1,801
Cycle Nutrients					Maintain Plant Communities				
0	0.27	5,328	1,439		0	0	5,328	0	
5	0.41	5,328	2,184	9,058	5	0.58	5,328	3,090	7,726
10	0.49	5,328	2,611	11,988	10	0.7	5,328	3,730	17,050
20	0.54	5,328	2,877	27,439	20	0.88	5,328	4,689	42,091
35	0.89	5,328	4,742	57,143	35	0.94	5,328	5,008	72,727
50	0.9	5,328	4,795	71,528	50	0.97	5,328	5,168	76,324
Sum over 50 years				177,156	Sum over 50 years				215,917
AAFCU				3,543	AAFCU				4,318
Export Organic Carbon					Provide Wildlife Habitat				
0	0.09	5,328	480		0	0	5,328	0	
5	0.18	5,328	959	3,596	5	0.48	5,328	2,557	6,394
10	0.23	5,328	1,225	5,461	10	0.54	5,328	2,877	13,586
20	0.26	5,328	1,385	13,054	20	0.64	5,328	3,410	31,435
35	0.48	5,328	2,557	29,570	35	0.86	5,328	4,582	59,940
50	0.48	5,328	2,557	38,362	50	0.86	5,328	4,582	68,731
Sum over 50 years				90,043	Sum over 50 years				180,086
AAFCU				1,801	AAFCU				3,602
Total AAFCUs generated by 5,328 acres of mitigation									25,473

Table 97 Determination of compensatory mitigation required to offset indirect impacts under Alternative 2									
Target Year	FCI	Acres	FCU	FCU between years	Target Year	FCI	Acres	FCU	FCU between years
Detain Floodwater					Physical Removal of Elements and Compounds				
0	0.08	7,256	580		0	0.56	7,256	4,063	
5	0.23	7,256	1,669	5,623	5	0.56	7,256	4,063	20,317
10	0.4	7,256	2,902	11,428	10	0.56	7,256	4,063	20,317
20	0.53	7,256	3,846	33,740	20	0.56	7,256	4,063	40,634
35	0.61	7,256	4,426	62,039	35	0.56	7,256	4,063	60,950
50	0.65	7,256	4,716	68,569	50	0.56	7,256	4,063	60,950
Sum over 50 years				181,400	Sum over 50 years				203,168
AAFCU				3,628	AAFCU				4,063
Detain Precipitation					Biological Removal of Elements and Compounds				
0	0.75	7,256	5,442		0	0.09	7,256	653	
5	0.81	7,256	5,877	28,298	5	0.18	7,256	1,306	4,898
10	0.8	7,256	5,805	29,205	10	0.23	7,256	1,669	7,437
20	0.82	7,256	5,950	58,774	20	0.26	7,256	1,887	17,777
35	1	7,256	7,256	99,044	35	0.48	7,256	3,483	40,271
50	1	7,256	7,256	108,840	50	0.48	7,256	3,483	52,243
Sum over 50 years				324,162	Sum over 50 years				122,626
AAFCU				6,483	AAFCU				2,453
Cycle Nutrients					Maintain Plant Communities				
0	0.27	7,256	1,959		0	0	7,256	0	
5	0.41	7,256	2,975	12,335	5	0.58	7,256	4,208	10,521
10	0.49	7,256	3,555	16,326	10	0.7	7,256	5,079	23,219
20	0.54	7,256	3,918	37,368	20	0.88	7,256	6,385	57,322
35	0.89	7,256	6,458	77,821	35	0.94	7,256	6,821	99,044
50	0.9	7,256	6,530	97,412	50	0.97	7,256	7,038	103,942
Sum over 50 years				241,262	Sum over 50 years				294,049
AAFCU				4,825	AAFCU				5,881
Export Organic Carbon					Provide Wildlife Habitat				
0	0.09	7,256	653		0	0	7,256	0	
5	0.18	7,256	1,306	4,898	5	0.48	7,256	3,483	8,707
10	0.23	7,256	1,669	7,437	10	0.54	7,256	3,918	18,503
20	0.26	7,256	1,887	17,777	20	0.64	7,256	4,644	42,810
35	0.48	7,256	3,483	40,271	35	0.86	7,256	6,240	81,630
50	0.48	7,256	3,483	52,243	50	0.86	7,256	6,240	93,602
Sum over 50 years				122,626	Sum over 50 years				245,253
AAFCU				2,453	AAFCU				4,905
Total AAFCUs generated by 7,256 acres of mitigation									34,691

Table 98 Summary of impacts and mitigation requirements						
	Alternative 3			Alternative 2		
	Mature forest	Agricultural	Total	Mature forest	Agricultural	Total
Direct impact area						
Reduction in AAFCUs	-1,455	-429	-1,884	-1,455	-429	-1,884
Mitigation required	304	90	394	304	90	394
Indirect impact area						
Reduction in AAFCUs	-20,700	-4,769	-25,470	-29,440	-5,245	-34,686
Mitigation required	4,331	998	5,328	6,159	1,097	7,256
Direct and indirect impact areas						
Reduction in AAFCUs	-22,155	-5,198	-27,353	-30,895	-5,674	-36,570
Mitigation required	4,635	1,087	5,722	6,463	1,187	7,650

Table 99 Comparison of project outcomes between Alternatives (Alt) evaluated in 2007, 2020, and the current report

Year of wetland assessment	2007	2007	2020	Current report	Current report
Parameter	ative 5	ative 7	Action Alternative	Alternative 3	Alternative 2
[1]Potential wetland areas in the 2-year floodplain (ac)	228,817	228,817	199,766	231,247	231,247
[2]Areas with a duration shift (ac)	94,801	43,510	61,896	34,379	34,361
[3]Areas with a duration shift (%)	41	19	31	15	15
[4]Direct impact (reduction in AAFCUs)	-240	-240	-450	-1,884	-1,884
[5]Indirect impacts (reduction in AAFCUs)	-14,188	-3,949	-11,054	-1,881	-1,978
[6]Total impact (reduction in AAFCUs)	-14,428	-4,189	-11,504	-3,765	-3,862
[7]Mitigation requirement (ac)	3,018	876	2,407	788	808

[1]These acreages represent the total area assessed for wetland impacts. Relative to the 2007 report, the 2020 assessment area decreased due to the application of an updated period of record and a more accurate digital elevation model. The assessment area evaluated in the current report was determined using the Hydrologic Engineering Center's River Analysis System, further adjusting the extent of the assessment area. Note that the current project results in less impacts to wetlands despite assessing a larger area than evaluated during 2007 or 2020.

[2]These acreages represent the total area that is anticipated to change duration intervals within the 2-year floodplain. For example, area that are currently in the 5% inundation duration interval may shift to the 2.5% inundation duration intervals the result of project implementation. Note that the current project results in fewer changes to wetland hydrology within the 2-year floodplain than all alternatives evaluated in 2007 and 2020.

[3]These values reflect the percentage of the 2-year floodplain that would undergo a shift in flood duration. For example, under the current plan, 15% of the 2-year floodplain would exhibit an altered duration as the result of project implementation. Note that the current project results changes wetland hydrology across a smaller percentage or the 2-year floodpl
ain than all alternatives evaluated in 2007 and 2020.

[4]The current plan occupies a larger physical footprint (i.e., pump plant and borrow areas) than the 2007 or 2020 plans. This results in a larger direct impact than previous assessments.

[5]Values reflect impacts within the 2-year floodplain, >5% flood duration intervals because that is the only data available from the 2007 report to support a direct comparison. Note that the current plan results in fewer impacts to wetland functions than all alternatives evaluated in 2007 and 2020.

[6]These values reflect the sum of direct and indirect impacts.

[7]Mitigation requirements are based on the delivery of 4.78 AAFCUs generated per acre as described in the current report and in the 2020 assessment. This value was used to adjust the 2007 mitigation requirements in support of a direct comparison across all assessments. Note that the current plan requires less mitigation for impacts occurring within the 2-year floodplain than all alternatives evaluated in 2007 and 2020.

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