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Castile Creek Wetland & Stream Mitigation Bank

Baseline Conditions Assessment

Prepared for
Swallow Tail, LLC

September 2014

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TABLE OF CONTENTS

I. INTRODUCTION 1

II. PROJECT LOCATION AND LANDSCAPE SETTING.....1

III. HYDROLOGY.....5

IV. SOILS.....8

V. PLANT COMMUNITIES.....11

VI. WETLANDS.....14

VII. STREAMS 25

VIII. SUMMARY 33

IX. REFERENCES.....34

APPENDICES

Appendix A: Historical Topographic Maps and Aerial Photographs

Appendix B: Photographic Documentation

Appendix C: Ohio Rapid Assessment Method for Wetlands User's Manual & Scoring Forms

Appendix D: Ohio Rapid Assessment Method for Wetlands Completed Forms

I. INTRODUCTION

Swallow Tail, LLC (the Sponsor) is proposing to establish and operate the approximately 299.80-acre Castile Creek Wetland and Stream Mitigation Bank (the Bank) in Buchanan County, Missouri. The improvements to wetland and stream habitats and their buffers on this site are proposed to be used as compensatory mitigation for unavoidable impacts to those aquatic resources as determined by the U.S. Army Corps of Engineers Kansas City District (the Corps) as part of the Clean Water Act Section 404 and 401 permitting process in consultation with the Interagency Review Team.

The purpose of this report is to describe the baseline conditions of the existing pre-mitigation habitats throughout the Bank. This information will eventually be compared to the proposed post-mitigation conditions as part of the calculations of the wetland and stream credit amounts that will be provided to Swallow Tail, LLC to sell or otherwise transfer to Section 404 and 401 permit applicants in order to satisfy the applicants' compensatory mitigation requirements in accordance with the Final Mitigation Banking Instrument for the Bank which will be prepared at a later date.

II. PROJECT LOCATION AND LANDSCAPE SETTING

The Bank is located in southeastern Buchanan County, Missouri at the confluence of Castile Creek and the Platte River. This position is roughly equidistant between the cities of Kansas City, Missouri and St. Joseph. Missouri Highway 116 bisects the Bank 7.7 miles east of Interstate 29/U.S. Highway 71 and 5.7 miles west of U.S. Highway 169, approximately 5.7 miles southwest of the town of Gower, Missouri, as shown in Figure 1 (ESRI, 2014a).

The approximate center of the site is at 39.552889° North, 94.667056° West. Figure 2 shows an aerial photograph of the Bank along with its proposed boundaries (ESRI, 2014). The Bank abuts Missouri Highway 116 and Castile Creek to the north, Castile Creek and adjacent agricultural lands to the east, and the Platte River to the south and west. To aid in the depiction of this large mitigation bank, the site is described in this report as existing in three sections: a Northern Section located north of Highway 116, a Southwestern Section located south of Highway 116 and west of the easternmost levee south of Highway 116, and a Southeastern Section also south of Highway 116 but east of the easternmost levee south of Highway 116. Figure 1 shows the locations of these Sections. The notable distinctions between the Southwestern and Southeastern Sections are that the Southwestern Section is largely contained within a levee system and drains to the Platte River while the Southeastern Section is not protected by levees and drains to Castile Creek with the minor exception of the immediate Platte River riparian buffer as

shown in Figure 4. Historical topographic maps and aerial photographs are included in Appendix A and photographic documentation of the site is provided in Appendix B.

Figure 1. Bank Location

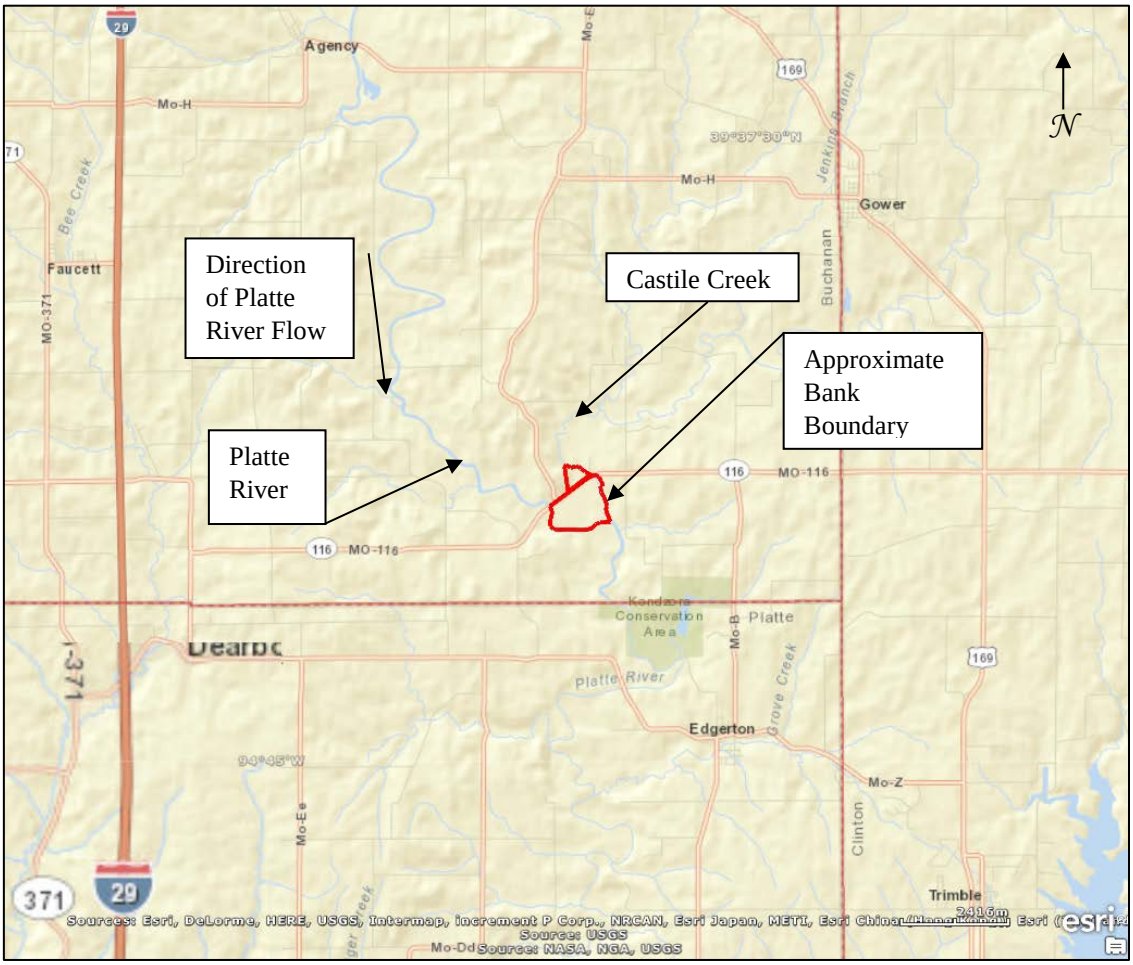
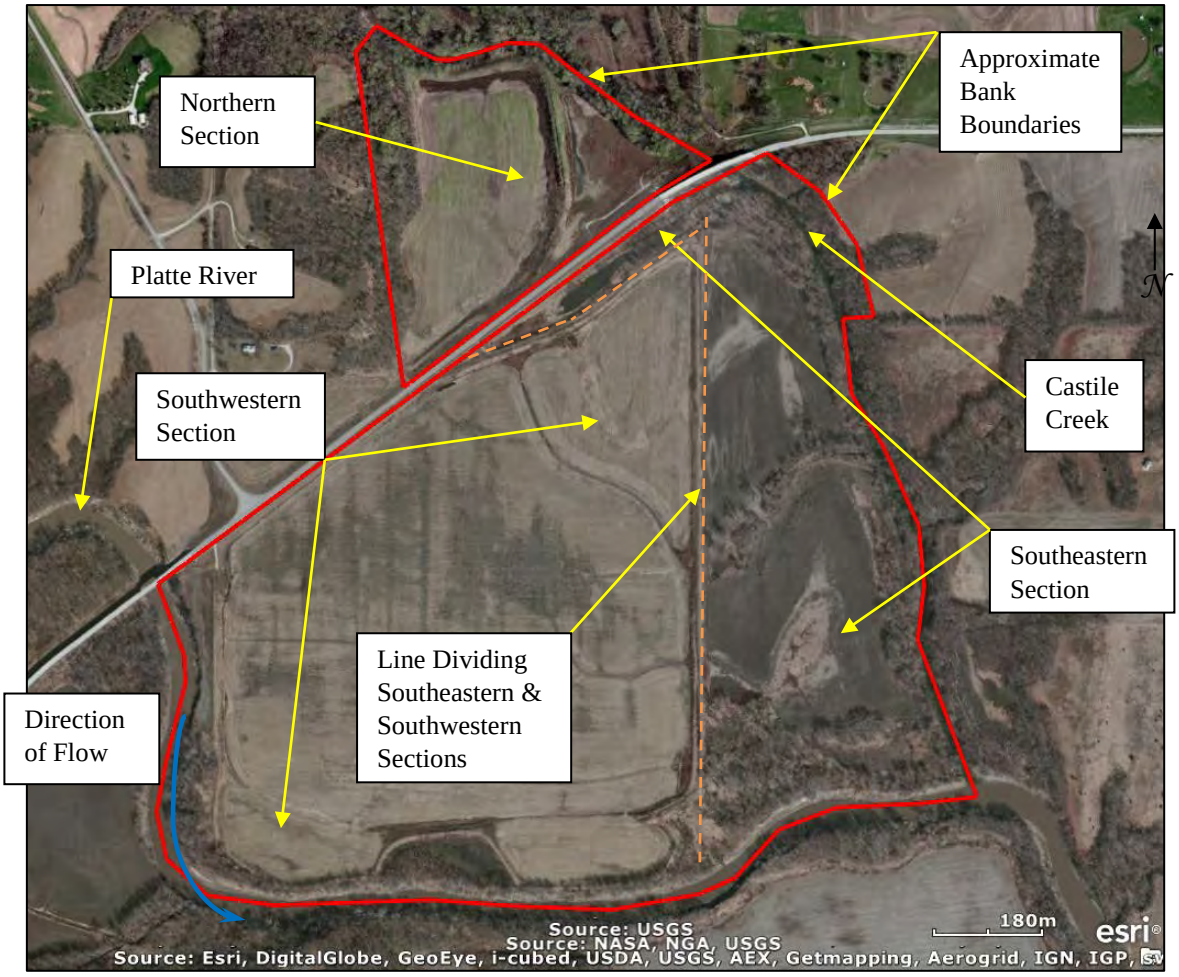


Figure 2. Aerial Photograph with Section Descriptions



The Bank is located in the Western Corn Belt Plains Level III Ecoregion which encompasses much of Iowa, northwestern Missouri and the area surrounding the Missouri River from Kansas City to mid-Missouri. This area has soils consisting of glacial till and loess and was historically dominated by tallgrass prairie but has now been mostly converted to row crop agriculture. The portion of the Western Corn Belt Plains in Missouri is bordered by the Central Irregular Plains which encompasses both north-central Missouri and west-central Missouri (*i.e.*, the Osage Plains). In comparison to the Central Irregular Plains, the Western Corn Belt Plains has less topographic variation, thicker loess deposits and less forested land cover (Chapman *et al.*, 2002).

At a more precise level of ecological classification, the Bank is within the Rolling Loess Prairies Level IV Ecoregion. The Rolling Loess Prairies are characterized by windblown soil deposits on low hills and upland plains with natural pre-settlement vegetation consisting of tallgrass prairies interspersed with oak-hickory forests although this area

has now been highly altered by widespread agriculture. The loess deposits in this area are thinner than in the adjacent Missouri Alluvial Plain, a large flat floodplain area located to the west that features similar pre-settlement vegetation. In the vicinity of the Bank the Loess Flats and Till Plains Level IV Ecoregion is located not far to the east, with the border between that ecoregion and the Rolling Loess Prairies approximating the Buchanan County/Clinton County boundary. Part of the Central Irregular Plains, the Loess Flats and Till Plains is described as a flat to moderately hilly area with fertile loess deposits with wetlands and woody vegetation concentrated along the streams. Historically this area was also dominated by prairie, but today it is mostly row crop fields and pastures (Chapman *et al.*, 2002).

The most accurate U.S. Geological Survey topographic map (Figure 3) shows that the majority of the Bank lies in the shared alluvial plain of the Platte River and Castile Creek (U.S. Geological Survey, 1961). Please note that the 2012 U.S. Geological Survey topographic map included in Appendix A is not accurate in how it portrays the levees on the Bank. The western portion of the Northern Section of the property and the area of the Bank east of Castile Creek are low hills draining to Castile Creek. Historical aerial photos included in Appendix A show levees existing from at least 1947 onward, with a realignment of the levee on the Platte River on the southern border of the property occurring sometime between 1980 and 1996.

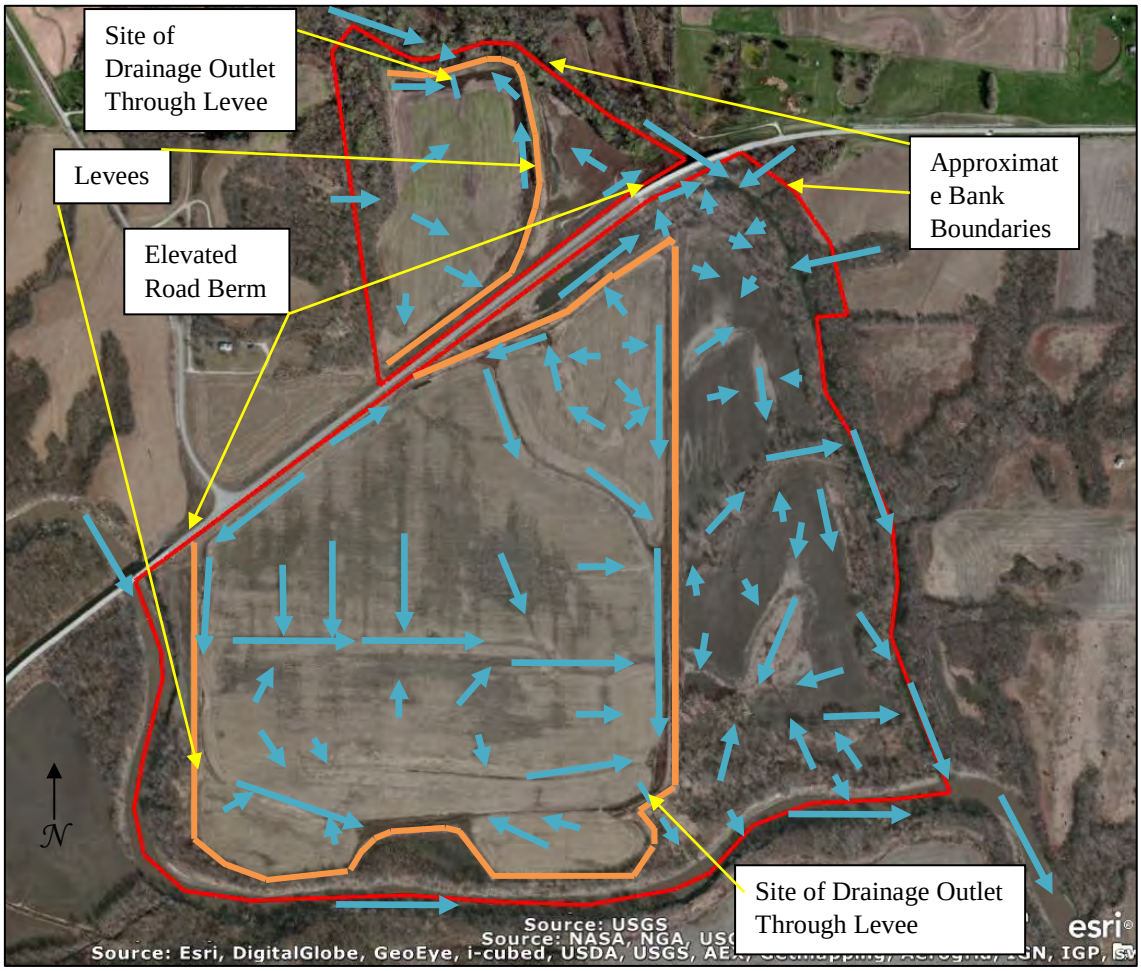
Figure 3. 2011 U.S. Geological Survey Topographic Map

III. HYDROLOGY

Buchanan County, Missouri, where the Bank is located, receives an average total annual precipitation of 38.76 inches (USDA-NASS, 2007). In addition to direct precipitation, surface water inputs are an important part of the site hydrology. Concentrated surface water flows enter the Bank through the Platte River and Castile Creek as well as from several of the small tributaries of Castile Creek (Intermittent #1 and Ephemeral #1) as shown in Figure 8. Several other small streams originate onsite, including Ephemeral streams #2, #3, #4, #5, #6, #7, #8, and #9 which collect water from overland flow in the floodplain areas and from wetlands on the site.

There are numerous vegetated and farmed wetlands on the site as could be expected from the Bank's location in an alluvial plain of a large river and a significant tributary. Many of these wetlands are located in small depressions and as areas collecting and holding water amidst the Bank's existing row crop agricultural fields. These depressions collect local sheet flows and either hold surface water or retain soil saturation for significant portions of the growing season. There has been considerable past agricultural earthwork which helped to drain crop fields in order to improve crop productivity. This has likely reduced the duration of surface water influence in the bottomland areas that comprise the Bank when compared to the pre-agricultural state of the site. There are wetlands outside the crop fields, notably Wetlands #6, #14, #16, #18, #21, and #34 which are less disturbed and partially or fully forested. These wetlands are described in additional detail later in this document. Figure 4 shows a general depiction of the primary surface flow patterns across the Bank with larger arrows indicating areas of concentrated hydrologic flows and smaller arrows representing typical sheet flow directions.

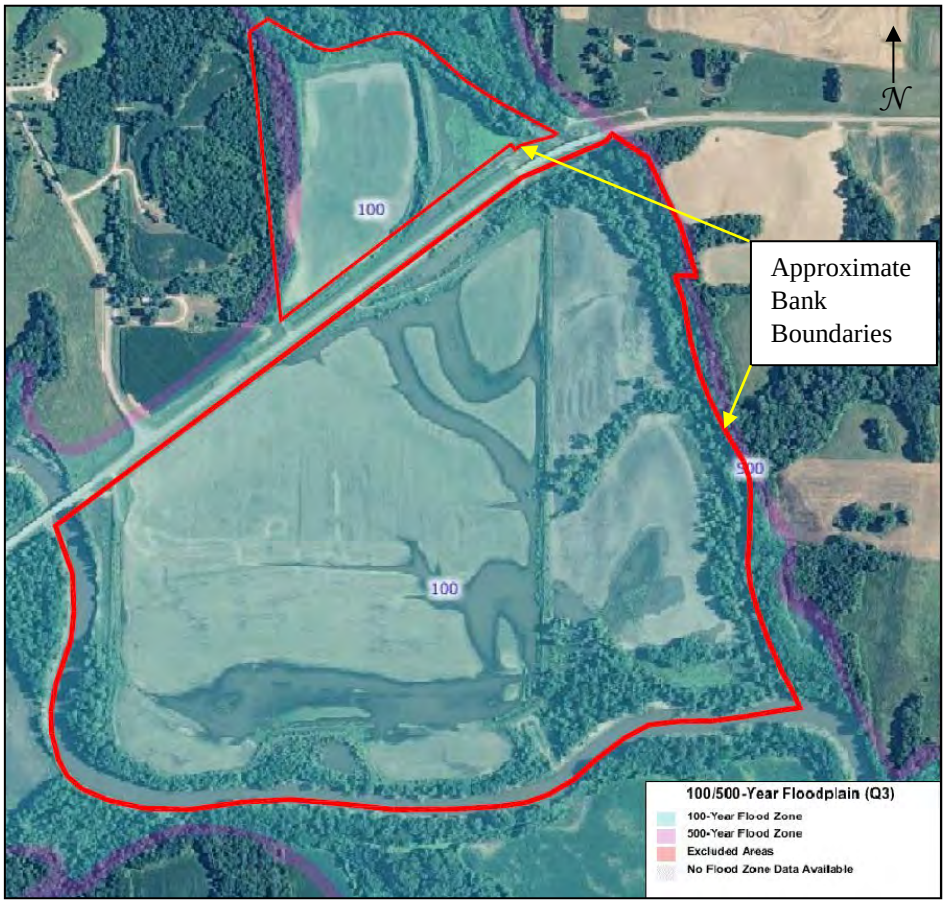
Figure 4. Baseline Conditions Surface Water Flow Paths



Several significant modifications have been made to the natural pre-settlement hydrology of the site. Most notably, as shown in Figure 4, levees ranging from eight to twelve feet in height were constructed on the site to prevent floodwaters from the Platte River and Castile Creek from reaching most of the agricultural fields. This severed the connection between floodwaters and any wetlands existing within the levees and also cut off the upper reaches of the historical ephemeral streams that existed in the fields north and south of Highway 116 from their downstream drainages. North of Highway 116 a small diversion berm was built to keep the flow of Ephemeral #1 and the sheet flow from the surrounding hillside off of the adjacent fields (please refer to Figure 8). This activity resulted in the creation of Wetland #1 as a storage location for most of the diverted hydrology. In addition, the topography of the fields has since been modified to facilitate drainage away from the fields, an activity that likely significantly altered the hydrology of any wetlands existing at the time, resulting in the current situation with wetlands within the levees existing either within drainageways or adjacent to the levees.

The bottomland portions of the site are occasionally subjected to flood flows from the Platte River and Castile Creek with the exception of the areas protected by levees. Figure 5 shows the Federal Emergency Management Agency (FEMA) 100-year (1% annual chance) floodplain limits on the site (NFIP, 1978). The FEMA flood insurance study for Buchanan County gives flood profiles for Castile Creek and the Platte River which indicate that the elevation of the 10% annual chance (ten-year) flood is approximately 816 feet between Highway 116 and the confluence of Castile Creek with the Platte River. This is just below the top elevation of the levees which ranges from 817 to 820. In comparison, the higher locations in the agricultural fields within the levees south of Highway 116 are around elevation 810 and the top of bank of Castile Creek has an elevation of approximately 812 feet. The 1% annual chance flood elevation over the same area is approximately 821 feet which would likely overtop the levees (Center for Applied Research and Environmental Systems, 2014). The standing water frequently observed on the site and the Bank's location low in the landscape indicates the site could potentially be affected by a shallow water table during parts of the year.

Figure 5. FEMA 1% & 0.2% Annual Chance Floodplain Map

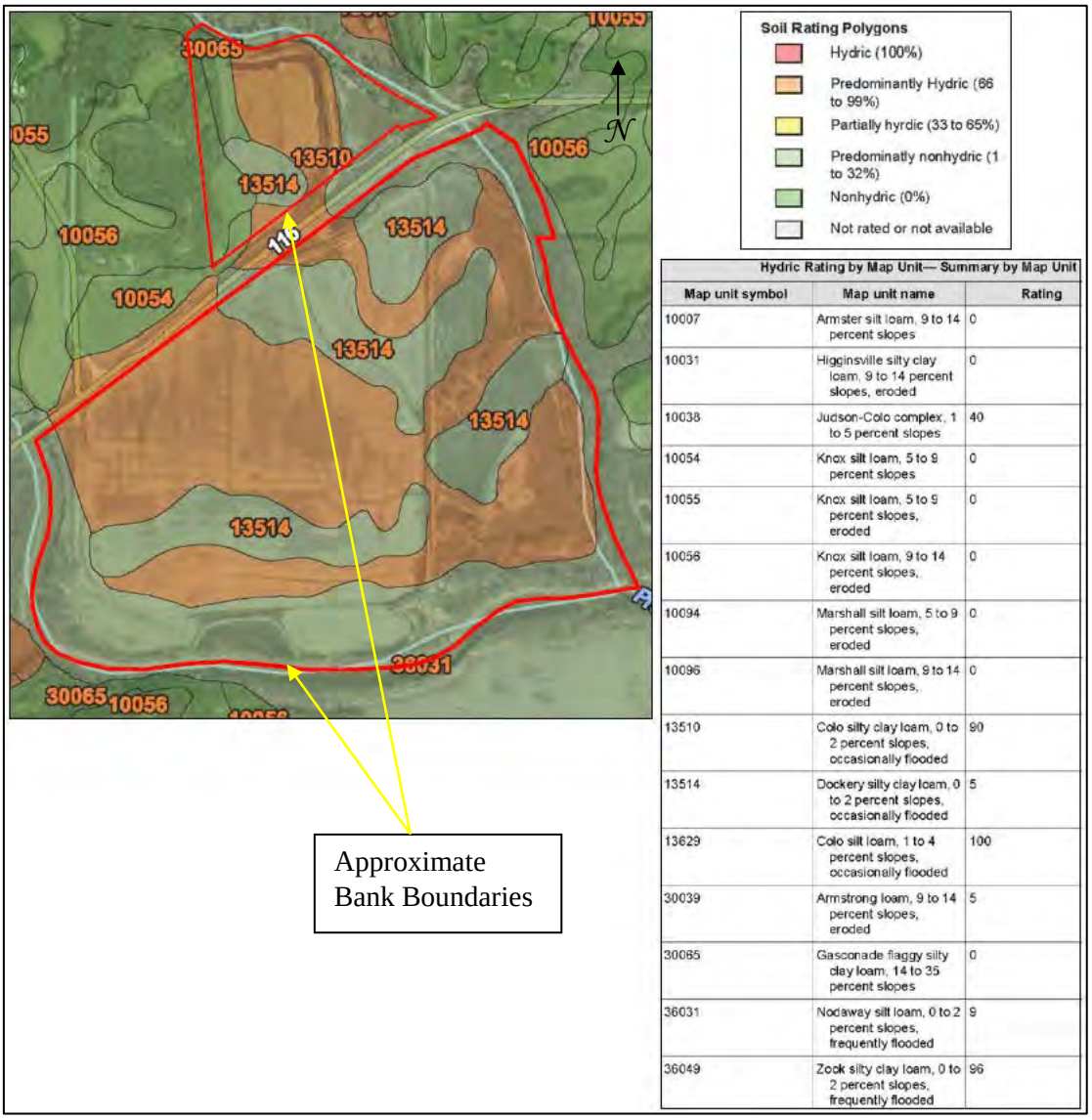


IV. SOILS

Wetlands are characterized in part by the presence of hydric soils which develop as a result of an area being saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions near the surface (USDA Soil Conservation Service, 1994). There are several soil characteristics which contribute to the likelihood of adequate conditions for wetland establishment and hydrophytic plant development. These include drainage class, particulate content, slope and the frequency of flooding. For example, unvegetated areas with mapped hydric soils characterized by high clay content and a poorly drained drainage class are ideal locations for wetland mitigation projects. Soil requirements for riparian buffer restoration are far less stringent as all that is necessary is the ability to support wooded or prairie conditions which is not a concern in this region.

According to the National Cooperative Soil Survey's Web Soil Survey and as included as Figure 6 (Soil Survey Staff, 2014), the soil series mapped within the Bank boundaries include Knox silt loam, Nodaway silt loam, Gasconade flaggy silty clay loam, Colo silty clay loam and Dockery silty clay loam.

Figure 6. Soil Survey Map with Mapped Hydric Soil Ratings



Hydric Rating by Map Unit— Summary by Map Unit

Map unit symbol	Map unit name	Rating
10007	Armster silt loam, 9 to 14 percent slopes	0
10031	Higginsville silty clay loam, 9 to 14 percent slopes, eroded	0
10038	Judson-Colo complex, 1 to 5 percent slopes	40
10054	Knox silt loam, 5 to 9 percent slopes	0
10055	Knox silt loam, 5 to 9 percent slopes, eroded	0
10056	Knox silt loam, 9 to 14 percent slopes, eroded	0
10094	Marshall silt loam, 5 to 9 percent slopes, eroded	0
10096	Marshall silt loam, 9 to 14 percent slopes, eroded	0
13510	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	90
13514	Dockery silty clay loam, 0 to 2 percent slopes, occasionally flooded	5
13629	Colo silt loam, 1 to 4 percent slopes, occasionally flooded	100
30039	Armstrong loam, 9 to 14 percent slopes, eroded	5
30065	Gasconade flaggy silty clay loam, 14 to 35 percent slopes	0
36031	Nodaway silt loam, 0 to 2 percent slopes, frequently flooded	9
36049	Zook silty clay loam, 0 to 2 percent slopes, frequently flooded	96

The soils of the far western area of the Northern Section of the Bank are Knox silt loam, 5 to 9 percent slopes and Knox silt loam, 9 to 14 percent slopes, eroded. Soils of the Knox series were formed in loess and are deep and well drained. Knox series soils are found on slopes ranging from 2 to 35 percent on strongly dissected hills and bluffs along the alluvial plains of the Missouri River and its tributaries. The permeability of Knox soil is moderate and its water capacity is high. Knox soils are the namesake of the Knox Association of soils which are moderately sloping to very steep, well drained soils formed in a thick layer of loess on uplands. The Knox Association, which makes up 24 percent of Buchanan County, is 81 percent Knox and similar soils (Lockridge, 1989; National Cooperative Soil Survey, 2008). In areas of the site mapped as Knox series, soil samples collected by Terra Technologies had a silt loam or silty clay loam texture and hydric soils in this area exhibited a redox dark surface indicator.

The Nodaway silt loam, 0 to 2 percent slopes, frequently flooded soil type is found on the Bank directly adjacent to Castile Creek and the Platte River. These soils are alluvial in nature, deep, moderately well drained and moderately permeable. The Nodaway soils have low slopes of 0 to 5 percent and are found on floodplains, alluvial fans and drainages (Lockridge, 1989; National Cooperative Soil Survey, 2006). Soil samples collected on the site in areas mapped as Nodaway had a silt loam or silty clay loam texture and had redox dark surface hydric soil indicator in wetland areas.

Gasconade flaggy silty clay loam, 14 to 35 percent slopes, extends from the far northern tip of the Bank adjacent to Castile Creek and down the forested slope into the crop field in the Northern Section of the Bank. Gasconade soils are formed in limestone bedrock residuum and have thin clayey layers with coarse fragments from the limestone bedrock. These soils are shallow, somewhat excessively drained and moderately slowly permeable. Gasconade soils exist on slopes ranging from 2 to 50 percent and are part of the Knox Association, commonly found adjacent to and below Knox soils (Lockridge, 1989; National Cooperative Soil Survey, 2004).

The soil of large portions of the crop fields on the site, both within the levee on the Platte River and in the fields along Castile Creek north and south of State Highway 116, are mapped as Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded. Colo series soils are formed in silty alluvium. They are deep, poorly drained and moderately permeable. The Colo soils are on slopes of 0 to 5 percent and are found on floodplains, alluvial fans, stream terraces and drainageways. Colo soils are part of the Colo-Nodaway-Zook Association, an association of nearly level, poorly drained to moderately well drained soils formed in alluvium on flood plains. This association, of which 48 percent are Colo soils and 16 percent are Nodaway soils, makes up 13 percent of Buchanan County (Lockridge, 1989; National Cooperative Soil Survey, 2006a). Soil samples from areas of the site mapped as Colo soils were silt loam or silty clay loam in texture and had the hydric soil indicator redox dark surface in wetland areas.

Other significant portions of the lowland crop fields, including some of the lowest areas of the site, are mapped as Dockery silty clay loam, 0 to 2 percent slopes, occasionally flooded. Dockery soils are formed in silty alluvium. These soils are deep, somewhat poorly drained and moderately or moderately slowly permeable. The Dockery series soils are on 0 to 5 percent slopes and are found on floodplains. Dockery soils are a minor component of the Colo-Nodaway-Zook association (Lockridge, 1989; National Cooperative Soil Survey, 2000). Samples of soil taken from areas of the Bank mapped as Dockery series had silty clay loam texture and wetland areas exhibited the redox dark surface hydric soil indicator.

Colo silty clay loam is rated predominantly hydric. Dockery silty clay loam and Nodaway silt loam are rated predominantly nonhydric. Knox silt loam and Gasconade flaggy silty clay loam are rated nonhydric (Soil Survey Staff, 2014). Colo and Gasconade soils are mollisols, which developed in areas historically dominated by grasslands. Knox soils are alfisols, a soil order formed under forested conditions. Dockery and Nodaway soils are entisols, an order of soils that does not show any profile development, usually caused by recent sediment deposition or frequent flooding or saturation (Soil Survey Staff, 2014; Soil Survey Staff, 1999).

Based on their soil textures, hydric ratings and soil orders, it is expected that the Colo, Dockery and Nodaway series soils on the site are able to maintain saturation or inundation long enough to support wetland conditions when they are subjected to sufficient hydrologic inputs. The position of these soils within the shared floodplain of the Platte River and Castile Creek will likely deliver ample water for areas with Colo, Nodaway and Dockery series soil to support the development of wetland conditions. The Sponsor's previous experience with Colo series soils and other soils of the Colo-Nodaway-Zook association at other approved and proposed wetland and stream mitigation banks leads to the conclusion that areas of the Bank with Colo, Nodaway and Dockery soils will support the development of wetland conditions.

V. PLANT COMMUNITIES

Information on the baseline pre-mitigation vegetation present within the Bank was collected during multiple site visits in early March 2014 as well as on April 23, 2014. This information was used to categorize the existing vegetation into eight roughly defined plant communities with approximate limits as shown in Figure 7. The defined plant communities on the Bank are Row Crop Agricultural Field, Managed Grassland (Levees), Farmed Wetland, Emergent Wetland, Scrub-Shrub Wetland, Forested Wetland, Riverfront Forest, and Degraded Mesic Limestone/Dolomite Forest. The dominant and common plant species in each community are described below in Table 1. While plant communities that have been significantly altered from their natural state are described in somewhat general terms, the nomenclature of intact or relatively intact natural ecosystems follows that used in *The Terrestrial Natural Communities of Missouri* which was developed by the U.S. Forest Service, Missouri Department of Natural Resources, Missouri Department of Conservation and others to categorize and describe the vegetative communities throughout the state (Nelson, 2005). Farmed wetlands were considered as separate plant communities from the adjacent upland fields because the difference in hydrology between upland and wetland agricultural areas indicates that if left undisturbed these areas would support dissimilar plant communities.

The riparian forests within the Bank were classified as Riverfront Forest. The forest on the western slope of the Northern Section of the Bank generally matched the description of Mesic Limestone/Dolomite Forest, especially because of the presence of Chinkapin oaks (*Quercus muehlenbergii*) which is indicative of moderately basic soils resulting from a prevalence of limestone or dolomite near the surface. The absence of observations of some of the tree species expected to be dominant in this forest type (*e.g.*, northern red oak [*Quercus rubra*], sugar maple [*Acer saccharum*], American basswood [*Tilia americana*], white ash [*Fraxinus americana*], bitternut hickory [*Carya cordiformis*] and shagbark hickory [*Carya ovata*]), is indicative of the degraded nature of these forest areas.

Figure 7. Existing Plant Communities

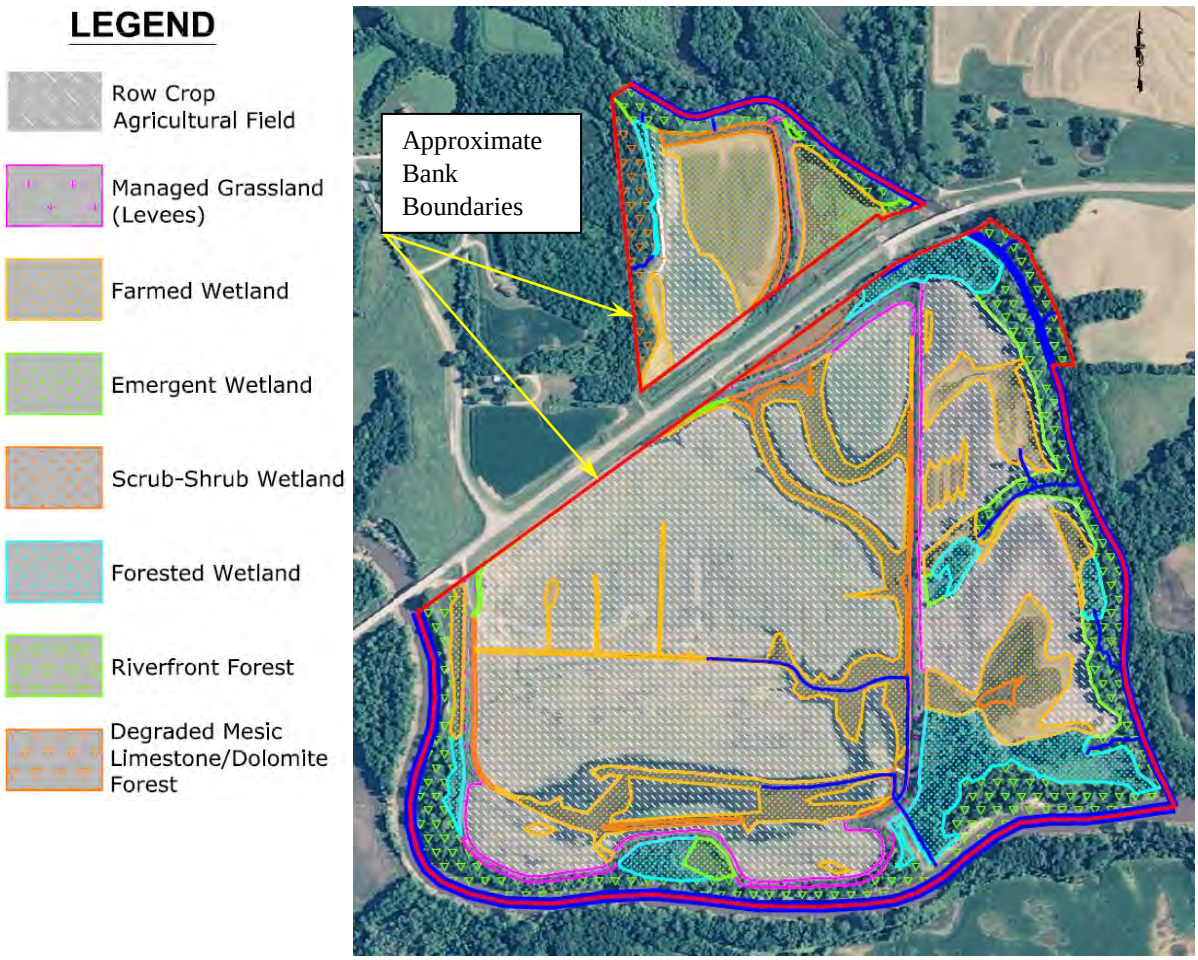


Table 1. Baseline Plant Community Descriptions

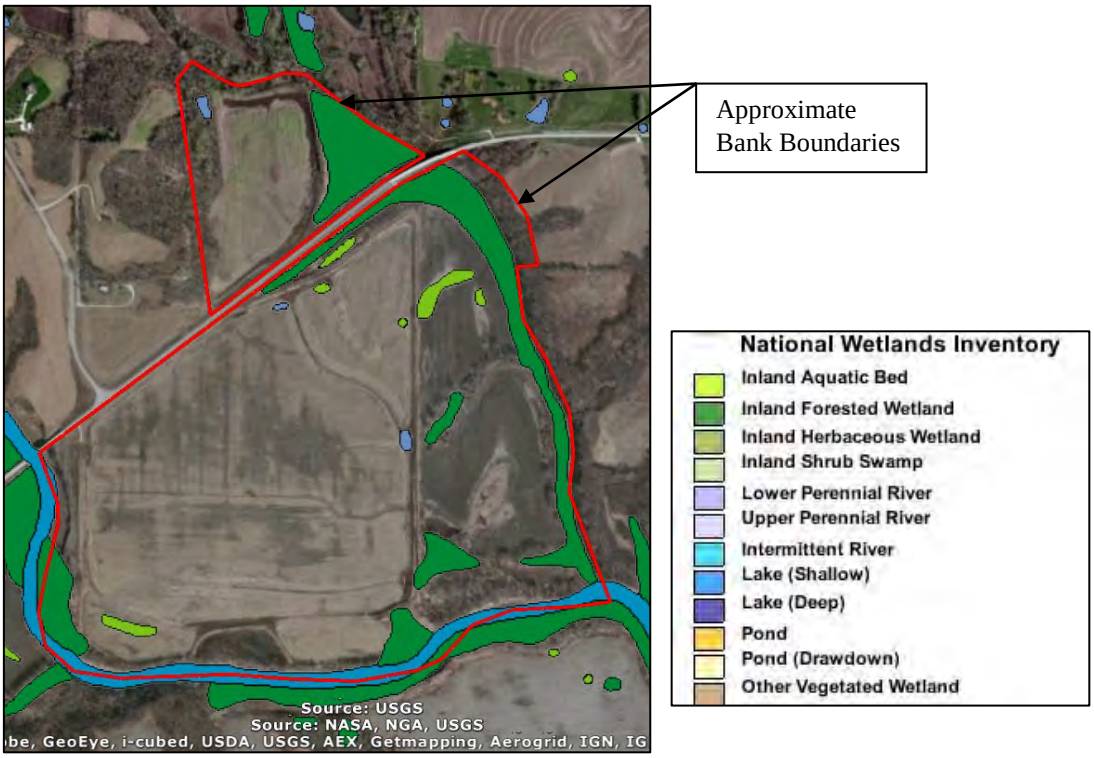
Plant Community Name	Dominant Species	Common Species
Row Crop Agricultural Field	Agricultural commodity species	None
Managed Grassland (Levees)	Smooth Brome (*Bromus inermis*)	Early successional species
Farmed Wetland	Agricultural commodity species	None
Emergent Wetland	Fall panicgrass (*Panicum dichotomiflorum*) Giant ragweed (*Ambrosia trifida*) Chufa sedge (*Cyperus esculentus*) Barnyard grass (*Echinochloa crus-galli*) White heath aster (*Symphyotrichum ericoides*)	Rough cocklebur (*Xanthium strumarium*) Waterhemp (*Amaranthus tuberculatus*) Curlytop knotweed (*Persicaria lapathifolia*) Fox sedge (*Carex vulpinoidea*)
Scrub-Shrub Wetland	Black willow (*Salix nigra*) Reed canary grass (*Phalaris arundinacea*) Waterhemp (*Amaranthus tuberculatus*)	Chufa sedge (*Cyperus esculentus*) Smooth Brome (*Bromus inermis*) Cattail (*Typha angustifolia*)
Forested Wetland	Silver maple (*Acer saccharinum*) American elm (*Ulmus americana*) Virginia wildrye (*Elymus virginicus*) Reed canary grass (*Phalaris arundinacea*)	Black willow (*Salix nigra*) Buttonbush (*Cephalanthus occidentalis*) Woodsedge (*Carex blanda*)
Riverfront Forest	Silver maple (*Acer saccharinum*) American elm (*Ulmus americana*) Sycamore (*Platanus occidentalis*) Black elder (*Sambucus nigra*) Virginia wildrye (*Elymus virginicus*) Giant ragweed (*Ambrosia trifida*) Reed canary grass (*Phalaris arundinacea*)	Cottonwood (*Populus deltoides*) Boxelder (*Acer negundo*) Hackberry (*Celtis occidentalis*) Mulberry (*Morus rubra*) Roughleaf dogwood (*Cornus drumondii*) Wingstem (*Verbesina alternifolia*) Woodsedge (*Carex blanda*)
Degraded Mesic Limestone/Dolomite Forest	Shingle oak (*Quercus imbricaria*) American elm (*Ulmus americana*) *Chinkapin oak (Quercus muehlenbergii)* Coralberry (*Symphoricarpos orbiculatus*) Virginia wildrye (*Elymus virginicus*)	Sycamore (*Platanus occidentalis*) Hackberry (*Celtis occidentalis*) Honey locust (*Gleditsia triacanthos*) Woodsedge (*Carex blanda*) Pennsylvania sedge (*Carex pennsylvanica*)

VI. WETLANDS

On several days in early March 2014 as well as on June 18 and August 28, 2014, Terra Technologies completed site inspections to identify, delineate and map the locations of wetlands, waterways and other water bodies and to otherwise document existing site conditions. The observations made during these site visits were summarized in a Wetland Delineation and Jurisdictional Assessment report that has been submitted to the Corps. No Approved Jurisdictional Determination for the Bank has been issued by the Corps as of the writing of this report. Wetland delineations were performed according to the methods described in the Corps' *Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* (U.S. Army Corps of Engineers, 2010). The presence of wetlands was ascertained by the observation of all three delineative criteria: 1) a predominance of hydrophytic (water-loving) plant species, 2) hydric soil indicators and 3) wetland hydrology indicators. As shown below in Figure 8, a total of 33 wetlands totaling 79.03 acres were delineated within the proposed Bank. The streams present within the site are shown separately in Figure 10. Baseline information for each wetland area is included below.

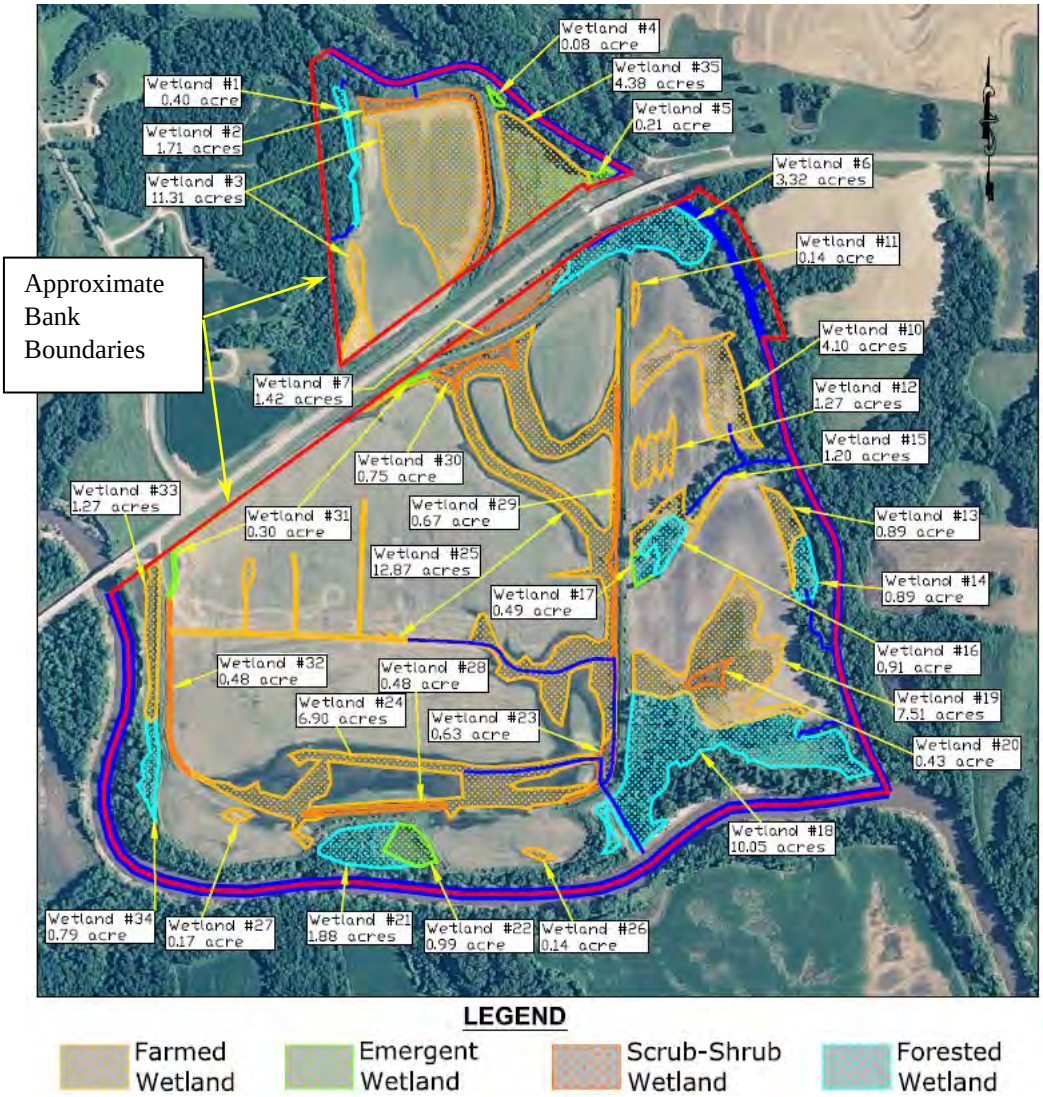
The U.S. Fish & Wildlife Service's National Wetlands Inventory described several wetlands and ponds existing within the Bank. Figure 9 shows the National Wetlands Inventory map of the site (U.S. Fish & Wildlife Service, n.d.). Along the west bank of Castile Creek and in areas on the bank of the Platte River and the row-crop fields is the wetland type palustrine forested broad-leaved deciduous temporary flooded (PFO1A). This mapped wetland type corresponds approximately to all or part of the areas of Wetlands #5, #6, #7, #14, #17, #16, #18, #34, and #35 and the Riverine Forest of the left descending bank of Castile Creek. There are wetlands of other types on the Bank listed in the National Wetlands Inventory and they are (listed with fully or partially coincident wetlands from the Wetland Delineation and Jurisdictional Assessment report): palustrine unconsolidated bottom semipermanently flooded dike/impounded (PUBFh) (Wetlands #25 and 30), palustrine scrub-shrub broad-leaved deciduous seasonally flooded partially drained/ditched (PSS1Cd) (Wetlands #15 and 16), palustrine emergent temporary flooded partially drained/ditched (PEMAd) (Wetland #10), palustrine emergent seasonally flooded excavated (PEMCx) (Wetlands #25 and 30), palustrine unconsolidated bottom semipermanently flooded excavated (PUBFx) (Wetlands #25 and 30), palustrine scrub-shrub broad-leaved deciduous temporary flooded (PSS1A) (Wetland #18), palustrine emergent temporary flooded (PEMA) (Wetland #27).

Figure 9. National Wetlands Inventory Map



The site boundary used for the Wetland Delineation and Jurisdictional Assessment was the boundary of all contiguous properties owned by the Flick Family Irrevocable Trust in this location, whereas the proposed Bank boundary excludes easement areas surrounding Highway 116 as well as upland areas of the property east of Castile Creek that have little mitigation value. Consequently, Wetlands #8 and #9, which were included in the Wetland Delineation and Jurisdictional Assessment report and which are in close proximity to Highway 116, are excluded from the Bank. Additionally, the acreages of wetlands adjacent to Highway 116 within the Bank are less than the respective acreages listed in the Wetland Delineation and Jurisdictional Assessment report because portions of these wetlands are within the excluded easement areas. The wetland acreages listed in this report and shown in Figure 8 are those that will be within the proposed Bank boundary.

Figure 8. Existing Wetland Boundaries



In addition to the field observations regarding the vegetation, soils and hydrology of each of the existing wetlands within the Bank, the general ecological quality of each wetland area was also assessed. This was done using the Ohio Rapid Assessment Method for Wetlands v. 5.0 (ORAM) (Mack, 2001). This method quantifies the quality of each wetland or group of wetlands on a scale from 0 to 100 based on the wetland size; upland buffers and surrounding land use; hydrology; habitat alteration and development; special wetland communities; and vegetation, habitat interspersion and microtopography. The guidance document for ORAM calls for wetlands smaller than one acre, in close proximity to each other, and separated from one another by only narrow areas of non-wetland to be scored as a single wetland complex. In consequence, the following wetlands were treated as a complex or patchwork and scored together by ORAM: Wetlands #2 and #3; #4, # 5, # 6, # 7, and #35; #13 and #14; #15, #16, and #17; #18, #19, and #20; #21 and #22; #23, #24, #25, #27, #28, #29, #30, #31, and #32; and #33 and #34.

The ORAM user manual is included as Appendix C and the completed ORAM worksheets for each wetland area within the Bank are presented in Appendix D. The scoring thresholds for each level of quality are included below in Table 2. These values are based on those used in Ohio, but in order to simplify the results the number of quality levels was decreased. Specifically, multiple gray areas between the main scoring levels were eliminated following a methodology described in the Tennessee Valley Authority's version of ORAM (*i.e.*, scoring gray areas are merged into the higher of the two categories) (Tennessee Valley Authority, n.d.).

Table 2. Scoring Breakpoints for Ohio Rapid Assessment Method Categories

General Description	Score Range
Low Quality (Small, relatively hydrologically isolated, often with low quality vegetative community)	0 - 29.9
Medium Quality (Moderate habitat, hydrological or recreational functions)	30 – 59.9
High Quality (Superior habitat, hydrological or recreational functions, may provide habitat for endangered or threatened species and may be of scarce distribution [*e.g.*, fens, mature forested wetlands])	60 – 100

Wetland #1 is an approximately 0.40-acre palustrine forested wetland located at the foot of the forested slope in the far northwest portion of the site, downstream of Ephemeral #1 which is one of the main sources of its hydrology. It is a constructed depression at the base of the hill where the water diverted from of Ephemeral #1 is contained rather than allowing it to flow across the adjacent farm field. The position of this wetland at a low point at the base of a hill makes it probable that shallow groundwater inputs contribute to the wetland hydrology of this area. Wetland #1 is dominated by American elm (*Ulmus americana*), Virginia wild rye (*Elymus virginicus*) and wood sedge (*Carex blanda*). The ORAM score of this wetland was 42, indicating that this wetland is on the lower end of the medium quality spectrum. The primary factors leading to this designation were its relatively small size, history of manipulation, moderate buffers and fair-level habitat development.

Wetland #2 is an approximately 1.71-acre palustrine scrub-shrub wetland located in the Northern Section of the site. This wetland is situated along the low elevation areas on the interior of a levee separating most of the Northern Section from Castile Creek. Wetland #2 shares its southern and western borders with Wetland #3, a farmed wetland located at

a slightly higher elevation. Wetland #2 receives hydrology as sheet flow from the surrounding lands. It is dominated by reed canary grass (*Phalaris arundinacea*) and black willow (*Salix nigra*).

Wetland #3 is an approximately 11.31-acre farmed wetland located in the Northern Section of the site in the agricultural field and borders Wetland #2 to the north and east. This wetland lacks native vegetation and receives water as sheet flow from the surrounding lands. It is hydrologically connected to Wetland #2 but is periodically saturated which allows for farming while Wetland #2 is inundated on a frequent basis and likely has a far longer period of soil saturation, factors that prevent cultivation.

For the purposes of ORAM analysis, Wetlands #2 and #3 exist as a wetland complex that receives one combined score. These wetlands received an ORAM score of 25, which corresponds to a designation of Low Quality. The primary factors limiting the ecological function of this wetland complex were the lack of buffers from a row crop field and roadway on two sides, low to absent habitat development and common substrate and habitat disruptions from farming.

Wetland #4 is an approximately 0.08-acre palustrine emergent wetland located in the northern portion of the site along Castile Creek. The wetland receives water as sheet flow and likely from groundwater from the surrounding lands and from Castile Creek when it overtops its banks. It is dominated by barnyard grass (*Echinochloa crus-galli*).

The portion of Wetland #5 within the Bank is an approximately 0.21-acre palustrine emergent wetland located in the southeast corner of the Northern Section of the site. The greater delineated wetland extends along Castile Creek under the Highway 116 bridge and abuts Wetland #6. The wetland receives water as sheet flow and potentially groundwater from the surrounding lands as well as floodwaters from Castile Creek. It is dominated by zigzag grass (*Panicum dichotomiflorum*) and reed canary grass.

Wetland #6 is an approximately 3.32-acre palustrine forested wetland located in the northern portion of the Southeastern Section of the Bank, along Castile Creek and sharing its northern border with Wetland #5. The wetland receives water as sheet flow from the surrounding lands and from Castile Creek when it overtops its banks. It is dominated by black willow, silver maple (*Acer saccharinum*), reed canary grass, and Frank's sedge (*Carex frankii*).

Wetland #7 is an approximately 1.42-acre palustrine scrub-shrub wetland located between Highway 116 and the levee to the south in the very northwestern part of the Southeastern Section of the Bank. The wetland receives water as sheet flow from the

surrounding lands, from Castile Creek when it overtops its banks and concentrated flows from the pipe outlet into the western portion of the wetland which drains the Highway 116 right-of-way. It is dominated by black willow and water hemp (*Amaranthus tuberculatus*).

Wetlands #4, #5, #6, #7, and #35 are in close proximity to each other and form a complex which received a combined ORAM score of 41.5. This score indicated the wetland is of Medium Quality due to the moderate combined size of this wetland complex, recovered status from past disturbances in part of the complex, size of buffers, nearby intensive land use, the relatively low degree of habitat development and sparse but present invasive species cover.

Wetland #8 (0.03 acre) and Wetland #9 (0.16 acre) are very small wetlands located within the easements surrounding Highway 116. As stated earlier, they were delineated in the Wetland Delineation and Jurisdictional Assessment report but are outside the proposed Bank boundary.

Wetland #10 is an approximately 4.10-acre farmed wetland located in the Southeastern Section of the Bank. This wetland receives water as sheet flow from the surrounding land and Castile Creek when it overtops its banks. It drains to Castile Creek through Ephemeral #5 and then Ephemeral #4. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks native vegetation. Wetland #10 scored 20 points using ORAM, placing it in the Low Quality level. This score was merited because there is no buffer between this wetland and the surrounding row crop farm field and because farming has continuously disturbed the substrate and prevented the development of a plant community.

Wetland #11 is an approximately 0.14-acre depressional farmed wetland located on the Southeastern Section of the Bank. This wetland receives water as sheet flow from the surrounding lands. It has been significantly and repeatedly disturbed by agricultural row crop production and therefore lacks native vegetation. Using ORAM, Wetland #11 scored 17 points, a Low Quality score, because of its small size, hydrologic isolation, lack of buffers from the surrounding row crop field and levee and because farming has disturbed the substrate and prevented the development of a plant community.

Wetland #12 is an approximately 1.27-acre farmed wetland located on the Southeastern Section of the Bank. This depressional wetland receives water as sheet flow from the surrounding lands. It has been significantly disturbed by agricultural row crop production and therefore lacks native vegetation. Wetland #12 scored 18 (indicating a

Low Quality wetland) using ORAM because the wetland is lacking a buffer and because farming has disturbed the substrate and habitat development of the wetland.

Wetland #13 is an approximately 0.89-acre farmed wetland located on the Southeastern Section of the Bank adjacent to the Castile Creek riparian corridor. Wetland #13 shares its southern border with Wetland #14. This depressional wetland receives water as sheet flow from the surrounding lands and Castile Creek when it overtops its banks. This wetland has been significantly disturbed by agricultural row crop production and largely lacks native vegetation.

Wetland #14 is an approximately 0.89-acre palustrine forested wetland located in the southeastern portion of the site along Castile Creek. It is bordered to the north by Wetland #13 and contributes water to Ephemeral #6. The wetland receives water as sheet flow from the surrounding lands and from Castile Creek when it overtops its banks. It is dominated by black willow, silver maple, Frank's sedge and swamp smartweed (*Persicaria hydropiperoides*).

The Wetland #13 and 14 complex collectively scored 38 points utilizing ORAM. This places the wetlands in the lower end of Medium Quality. This score was due to the substrate and habitat disturbance from farming and the limited degree of habitat development.

Wetland #15 is an approximately 1.20-acre farmed wetland located in the Southeastern Section of the Bank near to the Castile Creek riparian buffer and connected to Ephemeral #4. Wetland #15 borders Wetlands #16 and #17 and likely receives some level of hydrology from this adjacency. In addition, Wetland #15 receives water as sheet flow from the surrounding lands and from Castile Creek when it overtops its banks. This wetland has been significantly disturbed by agricultural row crop production and largely lacks native vegetation.

Wetland #16 is an approximately 0.91-acre palustrine forested wetland located in the center of the Southeastern Section of the site, to the east of the levee. Wetland #16 is bordered by Wetland #15 and Wetland #17. The wetland receives water as sheet flow from the surrounding lands and from Castile Creek when it overtops its banks. It is dominated by silver maple saplings and trees.

Wetland #17 is an approximately 0.49-acre palustrine emergent wetland located in the east central portion of the site. It is an intermittently inundated pond bottom dominated by barnyard grass situated adjacent to Wetlands #15 and #16. The wetland receives water as sheet flow from the surrounding lands and from Castile Creek when it overtops

its banks. In addition, this wetland along with Wetlands #15 and #16 are in the former path of a much longer ephemeral stream whose path was interrupted by the creation of the adjacent levee and from the associated agricultural earthwork.

Because of their close proximity and hydrologic association, Wetland #15, #16 and #17 form a wetland complex that was scored as one unit using ORAM. A score of 29 indicates that this wetland complex is at the high end of the Low Quality range. This score was largely due to the lack of buffers on the row crop field side of the complex and the disturbance and limits on habitat development caused by farming.

Wetland #18 is an approximately 10.05-acre palustrine forested wetland located in a depressional area north of the Platte River in the southeastern portion of the site. This wetland receives water as sheet flow from the surrounding lands and from the Platte River when it overtops its banks. It is dominated by silver maple, sycamore (*Platanus occidentalis*), American elm, button bush (*Cephalanthus occidentalis*), reed canary grass, zigzag grass, giant ragweed (*Ambrosia trifida*) and Virginia wild rye.

Wetland #19 is an approximately 7.51-acre farmed wetland located on the southern agricultural field in the Southeastern Section of the Bank. Wetland #19 surrounds Wetland #20 and borders Wetland #18. This wetland receives water as sheet flow from the surrounding lands. This wetland has been significantly disturbed by agricultural row crop production and largely lacks native vegetation.

Wetland #20 is an approximately 0.43-acre palustrine scrub-shrub wetland located in the southern agricultural field east of the levee in the Southwestern Section of the Bank and is surrounded by Wetland #19. This depressional wetland receives water as sheet flow from the surrounding lands, being lower than the surrounding Wetland #19, and from Castile Creek when it overtops its banks. It is dominated by black willow.

Wetlands #18, #19 and #20 form a complex that was scored as one unit using ORAM. The ORAM score these wetlands earned was 37 which indicates that these wetlands are on the lower end of Medium Quality. This score is largely influenced by the lack of buffers on many sides of the complex, the disturbance and limits on habitat development caused by farming and the large amount of invasive species cover.

Wetland #21 is an approximately 1.88-acre depressional palustrine forested wetland located in the southern portion of the site. This wetland is outside the perimeter of the levee in the Southwestern Section of the Bank and adjacent to the Platte River in a shared depression with Wetland #22. Dominated by black willow and reed canary grass, this

wetland receives water from precipitation and from floodwaters from the Platte River and potentially from groundwater.

Wetland #22 is an approximately 0.99-acre depressional palustrine emergent wetland located in the southern portion of the site adjacent to Wetland #21. This wetland is also outside the perimeter of the levee on the Southwestern Section of the Bank and adjacent to the Platte River. The wetland receives water from precipitation and from the Platte River when it overtops its banks. It is dominated by dock leaf smart weed (*Persicaria lapathifolia*).

Wetlands #21 and 22 were scored together with ORAM and received a score of 36.5 points which corresponds to the lower end of Medium Quality. This rating was due to the limited buffer provided by the levee on three sides, limited habitat development and cover with an invasive species.

Wetland #23 is an approximately 0.63-acre palustrine scrub-shrub wetland located along the west side of the levee at the edge of the agricultural field in the Southwestern Section of the Bank. This wetland is within the levees, but in a location that does not drain well enough to have been farmed regularly. Consequently, native vegetation has been able to proliferate, particularly black willow. The wetland receives water as sheet flow from the surrounding lands and from Ephemeral Streams #15, #16 and #17 and contains the outflow pipe that drains water from inside the levees to the Platte River.

Wetland #24 is an approximately 6.90-acre depressional farmed wetland located within the levee surrounding the agricultural field on the south side of the agricultural field in the Southwestern Section of the Bank. This wetland is in a low area that likely remains wet for a sufficient time in the spring for wetland conditions to develop, but does not remain wet long enough to prevent the wetland from being farmed. Wetland #24 receives water as sheet flow from the surrounding lands and from Ephemeral #9. It drains toward Wetland #23. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks persistent vegetation.

Wetland #25 is an approximately 12.87-acre depressional farmed wetland located within the levee surrounding the agricultural field on the southeast side of the Southwestern Section of the Bank. Like the other farmed wetlands in this area of the Bank, this wetland exists in low areas that likely remain wet enough in the spring time for wetland conditions to develop, but do not remain wet long enough to prevent the wetland from being farmed. Wetland #25 is a sprawling system of narrow drainage paths and other associated low-lying areas. It receives water as sheet flow from the surrounding lands and from Ephemerals #15 and 16, which run through the wetland and provides runoff to

Wetland #23. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks persistent vegetation.

Wetlands #23, #24 and #25 form a wetland complex along with Wetlands #27, #28, #29, #30, #31 and #32 and were scored as one unit using ORAM. The ORAM score for this complex is discussed after the description of Wetland #32.

Wetland #26 is an approximately 0.14-acre farmed wetland located within the levee surrounding the agricultural field on the southeast side of the Southwestern Section of the Bank. Like the other depressional farmed wetlands in this area of the Bank, this wetland is in a low area that remains wet enough in the spring for wetland conditions to develop, but does not remain wet long enough to prevent the wetland from being farmed. Wetland #26 receives water as sheet flow from the surrounding lands. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks native vegetation. Wetland #26 scored 18 on the ORAM scale, which ranks it as a Low Quality wetland. This score for Wetland #26 was predominately influenced by the wetland's small and isolated nature, the lack of buffers provided by surrounding agricultural field on three sides, and the disturbance of substrate and natural communities caused by farming.

Wetland #27 is an approximately 0.17-acre depressional farmed wetland located within the levee surrounding the agricultural field in the southwest part of the Southwestern Section of the Bank. The landscape setting, hydrology and habitat of Wetland #27 are essentially equivalent to the conditions within Wetland #26.

Wetland #28 is an approximately 0.48-acre palustrine scrub-shrub wetland located south of farmed Wetland #24 and north of the levee surrounding the agricultural field in the Southwestern Section of the Bank. The wetland receives water as sheet flow from the surrounding lands and is significantly lower in elevation than the surrounding farmed wetland which has allowed woody vegetation to become established, particularly black willow.

Wetland #29 is an approximately 0.67-acre palustrine scrub-shrub wetland located east of Wetland #25 and west of the levee around the Southwestern Section of the Bank. Similar to Wetland #28, this wetland exists as a linear low spot adjacent to a levee. It receives water in concentrated flows from the surrounding lands as well as from Ephemerals #15 and #16. This wetland is within the levees, but in a location that does not drain well enough to have been farmed regularly. Consequently, native vegetation has been able to proliferate. It is dominated by black willow.

Wetland #30 is an approximately 0.75-acre palustrine scrub-shrub wetland located south of the levee and north of Wetland #25, near the access road from Highway 116 on the Southwestern Section of the Bank. The wetland receives water as sheet flow from the surrounding lands. This wetland is within the levees, but in a location that is of relatively low elevation and does not drain well enough to have been farmed regularly. Consequently, black willow has been able to become established as the dominant species in the wetland.

Wetland #31 is an approximately 0.89-acre palustrine emergent wetland, with 0.30 acre located within the Bank, located just south of Highway 116 where the highway berm functions as a portion of the levee system around the Southwestern Section of the Bank. This wetland is within the levees and appears to be an agricultural drainage swale that drains the row crop field to the south as well as sheet flow off of Highway 116 to the north. It is dominated by, dock leaf smartweed, water hemp and mild water pepper (*Persicaria hydropiper*).

Wetland #32 is an approximately 0.48-acre palustrine scrub-shrub wetland located adjacent to the levee along the west side of the Southwestern Section of the Bank. The wetland receives water as sheet flow from the surrounding lands and from the agricultural swale to the north (Wetland #31). This wetland is within the levees but in a location that does not drain well enough to have been farmed regularly. Consequently, native vegetation has been able to proliferate. It is dominated by black willow, reed canary grass and narrow leaf cattail (*Typha angustifolia*).

Wetlands #27, #28, #29, #30, #31 and #32 are connected to and form a wetland complex with Wetlands #23, #24 and #25 and all of these wetlands were scored as one unit using ORAM. The ORAM score for this complex is 24 points which indicates the low quality of this group of wetlands. Despite being a complex of wetlands over 20 acres in size, the lack of buffers from agricultural fields, the high intensity of the surrounding land use and the disturbance of substrate and habitat from farming limited these wetlands' score.

Wetland #33 is an approximately 1.27-acre farmed wetland located west of the levee running along the west side of the Southwestern Section of the Bank. The wetland receives water as sheet flow from the surrounding lands and from floodwaters from the Platte River. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks native vegetation.

Wetland #34 is an approximately 0.79-acre palustrine forested wetland located in the southwestern portion of the site to the west of the levee. This wetland is outside of the adjacent levee system and is located immediately to the south of farmed Wetland #33.

The wetland receives water as sheet flow from the surrounding lands and from the Platte River when it overtops its banks. It is dominated by silver maple, elderberry (*Sambucus nigra*) and Virginia wild rye.

Wetlands #33 and 34 are connected and are scored as a wetland complex using ORAM. These wetlands earned a score of 35.5, which is in the low end of the Medium Quality tier. The forested nature of Wetland #34 and the buffer along the Platte River to the south and west of the wetlands increases the score. However, the lack of buffers from the levee to the east and from Highway 116 to the north and the substrate and habitat disturbance from farming in Wetland #33 limit the ORAM score for Wetlands #33 and 34.

Wetland #35 is an approximately 4.38-acre farmed wetland on the east side of the Northern Section of the Bank. The wetland receives water as sheet flow from the surrounding lands from Castile Creek when it overtops it banks. This wetland has been significantly disturbed by agricultural row crop production and therefore lacks native vegetation. Wetland #35 abuts Wetland #5, forming a complex with Wetlands #4, #5, #6, and #7. These wetlands were scored together using ORAM and the score for the complex is reported above after the descriptions for Wetlands #5-7.

VII. STREAMS

The main parameters that can influence the form and character of a stream include geology and watershed landforms, soil types, weather, plant forms, watershed hydrology, hydraulics, the amount of impermeable surfaces in the drainage area and the amount of sediment in runoff. These factors determine how stable a stream channel is and how quickly it evolves over time to respond to any changes in its watershed.

In any given location the form of a stream channel is based upon the stream's ability to move sediment which occurs primarily through the processes of erosion and deposition. When the rate of erosion equals the rate of deposition at any point, a stream is considered to be stable at that location. In this idealized example some erosion occurs but not more than can be replaced by sedimentation. However, stating that a stream is geomorphically stable does not mean that the stream alignment is fixed in perpetuity. Stream alignment and cross section changes do occur in a geomorphically stable stream but only over long spans of time. As a result, stable streams do move and meander, but over the course of decades and centuries as opposed to months and years.

This dynamic equilibrium is tipped out of balance when there is a substantial change in one or more of the previously stated watershed or stream channel parameters. When this

occurs, either erosion or deposition will become the dominant process at a given location and the channel form will be unstable as the stream transitions to a new form that best matches the altered watershed or channel conditions.

Stream alignment is generally evaluated using characteristics such as sinuosity, slope, width to depth ratio and entrenchment. Some geomorphically unstable streams have a bankfull capacity insufficient to convey the 1-year to 2-year storm events while others have a channel cross section too large to allow storm flows slightly greater than bankfull flows to flood outside the stream banks. A stream under either of these conditions is in the process of changing its form in order to regain the balance between erosion and deposition that will result in a stable cross section and alignment. Eventually this stream will transition to a form with a bankfull capacity sufficient to convey the channel-forming flows, which are the 1-year to 2-year storm events.

Human activity is the most significant factor that triggers morphological changes in both urban and rural stream environments. Urbanization creates more drastic changes in watershed hydrology than rural land use alteration does due to the increase in impermeable surfaces associated with land development. The change from permeable to impermeable land cover drastically decreases the amount of water that normally percolates into the soil while simultaneously increasing the amount of surface water runoff that quickly flows into the nearest stream system. As a result, urbanized stream systems have to carry a larger amount of storm flow for a shorter duration than was the case historically. Additionally, the amount of base flow during the drier times of year is reduced because of the decrease in percolation. While not as severe, agricultural conversion of natural landscapes can lead to many of the same changes in watershed hydrology that affect stream channel form and function, especially when forested land is converted to crop production. Other common agricultural activities that affect stream health include the reduction in riparian buffer width, levee creation, stream channelization and the pollution of stream flows from eroded sediments, fertilizers, herbicides and pesticides.

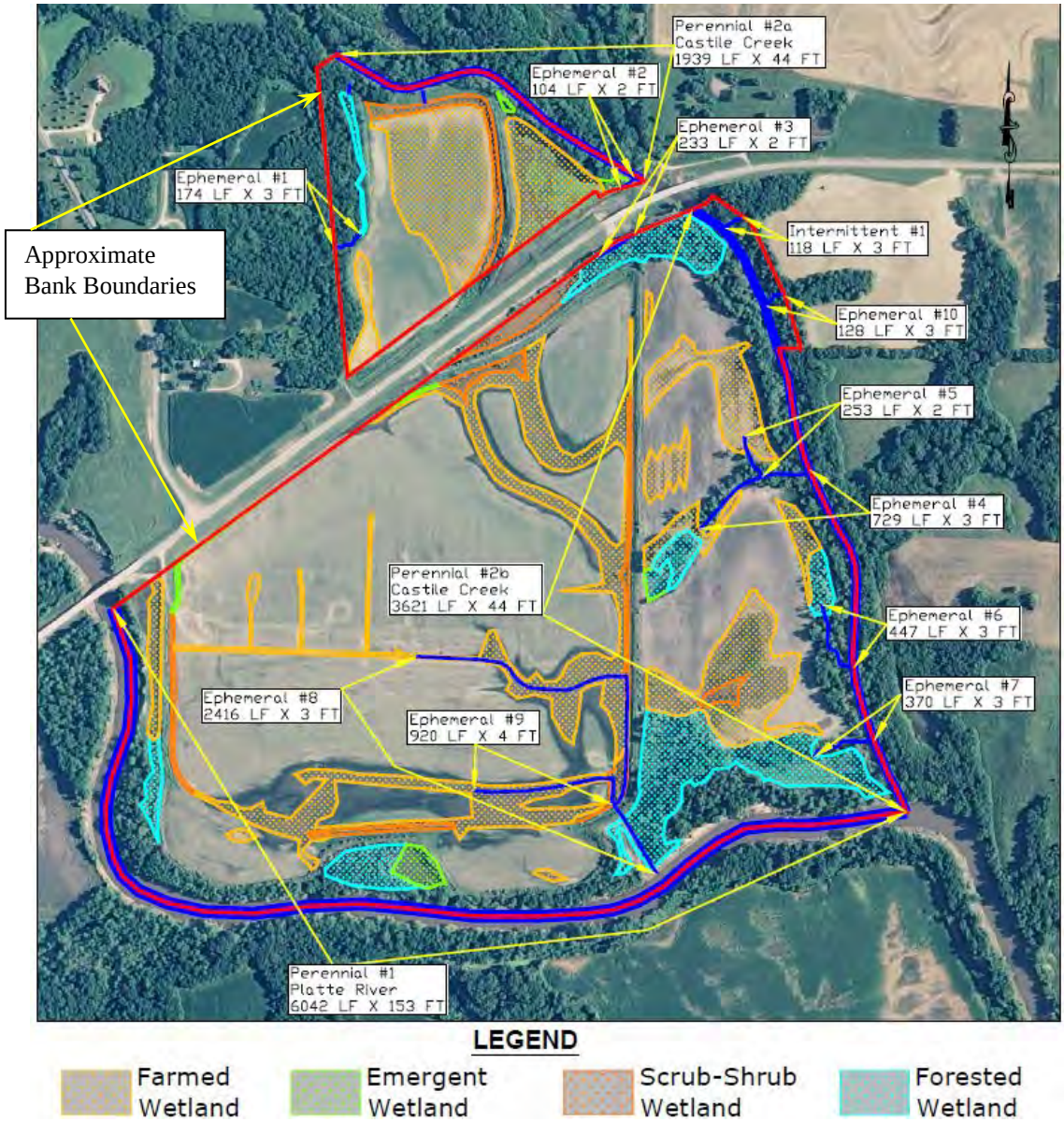
Three types of stream flow regimes are commonly encountered: ephemeral, intermittent and perennial. Ephemeral channels carry flow for short durations after rain and snowmelt events and are typically void of pools. Ephemeral channels can contain temporary pools but do not receive the ground water necessary in order to maintain pool presence. Intermittent channels receive ground water inputs in addition to overland runoff. Additionally, they carry flow for intermediate or seasonal durations and often contain pools. Pool formation is supported from the transport of ground water to the pools between periods of precipitation. Perennial channels represent higher order streams that carry flow more or less permanently and are observed to maintain constant pooling.

Perennial channels are often associated with the inflow of one or more consistent ground water sources and are typically fed by ephemeral and intermittent channels.

Information about the location, limits and nature of any onsite streams was collected during field visits by Terra Technologies on March 10, 11, 13, and 14 as well as on June 18 and August 28, 2014. The stream assessments were conducted through the inspection and characterization of channel characteristics, including a defined bed and bank and the presence of an ordinary high water mark (OHWM). Upon verification of an OHWM, physical attributes were measured and observed to determine channel width and depth and the extent of stream flow.

There were twelve streams identified within the Bank: two perennial waterways (the Platte River and Castile Creek), Intermittent #1 and ephemeral streams #1 through #10. As with the wetlands near Highway 116, in this report the stream lengths have been altered from those listed in the Wetland Delineation and Jurisdictional Assessment report to reflect the proposed Bank boundary. The streams are depicted in Figure 10 and a discussion of each stream is included below.

Figure 10. Existing Stream Limits



The Platte River (Perennial #1) originates in Iowa and generally flows to the southeast through northwestern Missouri until its confluence with the Missouri River near Kansas City. It is the largest river within its 8-digit Hydrologic Unit Code. The most recent U.S. Geological Survey topographical map represents the Platte River as a double blue line, indicating a perennial river (U.S. Geological Survey, 2012; U.S. Geological Survey, 2005). It has an OHWM that averages about 150 feet in width and banks that average 20 feet tall and 215 feet wide. The substrate predominantly consists of sand with sporadic patches of gravel, boulders and silt. The Platte River at the location of the Bank is significantly incised with eroded outer bends. As mentioned earlier, much of the

historical Platte River floodplain area within the Bank has been separated from this river by levee construction. The Platte River flows for approximately 6,042 lineal feet within the Bank and has a substantial drainage area. Within the Bank the Platte River is bordered by a Riverfront Forest natural plant community dominated by silver maple, American elm, elderberry, and Virginia wild rye. Surface water from the Platte River flows offsite in a southeasterly direction then generally travels to the southwest approximately 50 river miles and into the Missouri River.

Historical topographic maps and aerial photos included in Appendix A show no significant alteration in the course of the Platte River adjacent to the Bank since 1925, although the river and stream alignments on the 1925 topographic map do not appear to be highly accurate. The levees around the Bank are not shown on the 1925 topographic map but are visible in the 1947 aerial photograph. At some time between the 1980 and the 1996 aerial photographs, the levee on the south side of the site along the Platte River was reconstructed from its relatively straight alignment to a more curved path farther to the south, capturing more land within the levee and making that land available for crop production.

The 1925 topographic map also shows two meanders on the Platte River south of the Bank, between the Bank and Kendzora Conservation Area. In the 1951 topographic map (shown as Figure 2 in Appendix A), the southern meander has been abandoned through a cutoff channel and subsequent topographic maps show that between 1961 and 2012 a cutoff channel forced the Platte River to abandon the more sinuous path of the northern meander and take its current alignment (U.S Geological Survey, 2012; 1961; 1951; 1925). This channelization immediately downstream of the Bank, along with other similar channelization efforts elsewhere on the Platte River, likely contributed to the change in the energy and sediment balance of the Platte River and is potentially a causal factor in the bank erosion and downcutting observed at the Bank location.

Castile Creek (Perennial #2) originates northeast of the Bank and generally flows to the southwest. It has an OHWM that averages 44 feet in width and banks that average 20 feet tall and 105 feet wide. The substrate predominantly consists of sediment, gravel and cobble. Castile Creek extends at stream centerline approximately 5,560 lineal feet within the Bank and has a drainage area of approximately 172 square miles. Castile Creek is bordered by a Riverfront Forest natural plant community dominated by silver maple, sycamore, American elm, elderberry and Virginia wild rye. Surface water from Castile Creek flows generally to the south and into the Platte River.

Intermittent #1 is a stream that originates northeast of the Bank and generally flows to the southwest and into Castile Creek on its left descending bank. This stream was

determined to be intermittent in nature because of the presence of riffle pool complexes and, most importantly, observations of ground water feeding the stream during a time when surface water runoff was absent. It has an OHWM that averages three feet in width and banks that average six feet tall and fifteen feet wide. The substrate predominantly consists of sediment, gravel and bedrock. Intermittent #1 has a drainage area of approximately 24 acres and extends at stream centerline approximately 118 lineal feet within the Bank. Within the Bank, the stream is surrounded by a riparian buffer dominated by honey locust (*Gleditsia triacanthos*), hackberry (*Celtis occidentalis*), walnut (*Juglans nigra*), white oak (*Quercus alba*), red oak, coralberry (*Symphoricarpos orbiculatus*), Virginia wild rye and wood sedge.

Ephemeral #1 originates west of the Bank and generally flows to the northeast onto the Bank in the forested western portion of the Northern Section. The original likely path of this stream within the floodplain was destroyed through earthwork to create the agricultural field in the Northern Section and by the creation of the adjacent levee. As is commonly done with streams of this size, a small diversion berm was created at the edge of the row crop field to keep the stream's flows out of the field to eliminate unwanted soil saturation and to maximize the plantable acreage in the field. As a result, the hydrology within Ephemeral #1 was diverted to the north into the depression that contains Wetland #1. In all likelihood, this depression was created to function as a retention basin as part of the previously described earthwork. Ephemeral #1 has an OHWM that averages three feet in width and banks that average two feet tall and five feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 174 lineal feet within the subject area and has a drainage area of approximately 14 acres. Within the Bank, the stream is surrounded by a riparian buffer dominated by white oak, shingle oak (*Quercus imbricaria*), honey locust, cedar (*Juniperus virginiana*), hackberry, American elm, coralberry, rough leaf dogwood (*Cornus drummondii*), Virginia wild rye and wood sedge.

Ephemeral #2 originates in the southeastern part of the Northern Section of the Bank and generally flows to the northeast and into Castile Creek from the right descending bank. It has an OHWM that averages two feet in width and banks that average two feet tall and three feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 104 lineal feet within the subject area and has a drainage area of roughly seven acres. This stream is surrounded by Wetland #5, a riparian buffer dominated by black willow, reed canary grass, and giant ragweed.

Ephemeral #3 is a stream that originates in the northern portion of the Southeastern Section and generally flows to the northeast and into Castile Creek. It collects water from Highway 116 and from the adjacent Wetlands #5, #6 and #7. Ephemeral #3 has an

OHWM that averages two feet in width and banks that average four feet tall and six feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 233 lineal feet within the subject area and has a drainage area of approximately 28 acres. Within the Bank, the stream is surrounded by a riparian buffer dominated by black willow, silver maple, reed canary grass and Frank's sedge.

Ephemeral #4 is a stream that originates in the center of the Southeastern Section of the Bank and generally flows to the northeast and into Castile Creek from the right descending bank. This stream receives hydrology from Wetlands #15, #16 and #17. Before the agricultural conversion of the Bank and the creation of the levees south of Highway 116, Ephemeral #4 extended farther to the west than its current upstream terminus in a wetland basin. The historical evidence of this can be seen in the aerial photograph from 1947 as shown in Figure 5 in Appendix A. The photo depicts a distinct line of the historic stream channel which is interrupted by the levee. This corresponds to the present-day alignments of Ephemeral #4 and Wetlands #15, #16, #17 east of levee and an arm of Wetland #25 west of the levee which meet perfectly at opposing sides of the levee. Ephemeral #4 has an OHWM that averages three feet in width and banks that average five feet tall and nine feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 729 lineal feet within the subject area and has a drainage area of approximately 24 acres. This stream is surrounded by a riparian buffer similar to that of Castile Creek.

Ephemeral #5 originates on the south side of farmed Wetland #10 in the central portion of the Southeastern Section of the Bank and generally flows to the southeast and into Ephemeral #4. Ephemeral #5 has an OHWM that averages two feet in width and banks that average three feet tall and four feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 253 lineal feet within the subject area and has a drainage area of approximately nine acres. This stream is surrounded by a riparian buffer similar to that of Perennial #2, with the addition of cocklebur (*Xanthium strumarium*) and dock leaf smart weed in its upstream unforested portion.

Ephemeral #6 is a stream that originates on the east side of the Southeastern Section of the Bank. It receives hydrology form Wetlands #13 and #14 and generally flows to the southeast into Castile Creek from the right descending bank. It has an OHWM that averages three feet in width and banks that average two feet tall and four feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 447 lineal feet within the subject area and has a drainage area of approximately seven acres. The nature of the riparian buffer is similar to that of Castile Creek.

Ephemeral #7 originates from Wetland #18 in the Southeastern Section of the Bank and generally flows to the east and into Castile Creek from the right descending bank. Its drainage area of approximately 19 acres, which includes Wetlands #18, #19 and #20, provides sufficient hydrology to maintain a stream channel. Ephemeral #7 has an OHWM that averages three feet in width and banks that average three feet tall and four feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 370 lineal feet within the Bank. The stream is surrounded by a riparian buffer similar to that of Castile Creek. Similar to Ephemeral #4, this stream historically extended to the west far beyond its current limit. The original clearing of the land, agricultural earthwork and the creation of the levees south of Highway 116 disrupted the upstream limits of this stream and its tributary and separated the upstream limit of the historical path of Ephemeral #7 and its tributary from the downstream portion of Ephemeral #7. The historical evidence of this can be seen in aerial photographs from 1947 and 1960 as shown in Figures 5 and 7 in Appendix A. These photographs show distinct lines of Ephemeral #8 and Ephemeral #9 continuing east of the levee and converging Wetland #18 to form Ephemeral #7.

Ephemeral #8 originates in the center of the row crop fields in the Southwestern Section of the Bank and generally flows to the southeast. The historical flow path towards Ephemeral #7 is blocked by the levee and consequently Ephemeral #8 flows directly south along the levee and into a drain pipe at the southeast corner of the agricultural field in the Southwestern Section which carries the water under the levee and into the Platte River. Ephemeral #8 has an OHWM that averages three feet in width and banks that average three feet tall and eight feet wide. The substrate predominantly consists of sediment. It extends at stream centerline approximately 2,416 lineal feet within the subject area and has a drainage area of approximately 105 acres. The stream generally has no riparian corridor as it is primarily within an agricultural row crop field.

Ephemeral #9 is generally similar to Ephemeral #8 in that it is an ephemeral stream within the levee system south of Highway 116 that functions primarily as a drainage system for the large surrounding row crop field. It flows to the east, then south until disrupted from its original path towards Ephemeral #7 by the levee system at the southeast corner of the Southwestern Section of the site. When the flow of Ephemeral #9 reaches the levee it merges with Ephemeral #8 and flows through the drainage pipe in the southeastern corner of the levees into the Platte River. Ephemeral #9 has an OHWM that averages four feet in width and banks that average three feet tall and eight feet wide. It extends at stream centerline approximately 920 lineal feet within the subject area and has a drainage area of approximately 61 acres. The substrate predominantly consists of sediment and lacks a riparian buffer because it is surrounded by the agricultural row crop field.

Ephemeral #10 is a stream that originates in the eastern part of the Southeastern Section of the Bank and generally flows to the southwest and into Castile Creek from the left descending bank. It has an OHWM that averages three feet in width and banks that average nine feet tall and fifteen feet wide. The substrate predominantly consists of sediment, gravel, cobble and some bedrock. It extends at stream centerline approximately 128 lineal feet within the subject area and has a drainage area of approximately 10 acres. Within the assessed site, the stream is surrounded by a riparian buffer similar to that of Intermittent #1 with the addition of sycamore.

VIII. SUMMARY

This roughly 299.80-acre proposed Castile Creek Wetland and Stream Mitigation Bank is located in southeast Buchanan County, Missouri at the confluence of Castile Creek with the Platte River on the large shared alluvial plain of these two watercourses. Ecologically, the Bank would have been dominated by riparian forests and floodplain wetlands in the wide expanses of bottomlands on the site with some upland prairies and forested riparian buffers on rolling loess hills. Currently, the area surrounding the Bank is a rural landscape with land use consisting of crop fields, pastures, woodlots and dispersed home sites.

The entirety of the bottomland portions of the bank are within the 100-year floodplain and FEMA flood water surface elevation profiles indicate a 10% annual chance (ten year) flood would result in approximately four feet of water on parts of the site if the levees were not present. These levees were constructed to protect the agricultural row crop fields from flooding. By doing so, the levees have severed more than 170 acres of former floodplain within the Bank from the Platte River and Castile Creek, a change with significant effects on the energy dynamics and ecosystem health within those waterways. Agricultural earthwork has also modified the way in which the landscape collects, moves and holds surface water.

The soils on the lowland areas of the Bank are Colo silty clay loam, Dockery silty clay loam and Nodaway silt loam, all of which are capable of retaining water long enough for wetland conditions to develop. These three soils are part of the Colo-Nodaway-Zook association and the Sponsor's previous experience with soils of this association at other wetland and stream mitigation banks supports the premise that these soils will support wetlands. The hydrology and soils of this Bank site are thus deemed amenable to stream and wetland mitigation activities.

Similar to the hydrologic nature of the site, the plant communities on the Bank have been dramatically altered from their natural state by agriculture. Native plant communities are absent from most of the site although remnant Riverfront Forest, and Degraded Mesic Limestone/Dolomite Forest and degraded wetland communities still exist. Instead of the natural habitats that existed before agricultural conversion, most of the Bank lands currently exist as agricultural fields dominated by row crops and levees dominated by early successional plant species.

There are 33 wetlands totaling 79.03 acres delineated within the Bank although this has been yet to be confirmed by a Corps' Jurisdictional Determination. Assessing the ecological quality of these wetlands using the Ohio Rapid Assessment Method (ORAM), none were determined to be of greater quality than the middle to lower end of the medium quality range and the majority were categorized as being of low quality. However, all wetlands are able to be rehabilitated or enhanced through improvements to their hydrology, vegetation, buffers and their hydrologic connectivity to surrounding wetlands and streams.

The Bank contains 12 waterways including the Platte River, Castile Creek, one intermittent stream, and 10 ephemeral streams. The Platte River is incised and is experiencing moderate bank erosion along an outer bend within the Bank. Castile Creek is incised with bank erosion and there are large downed trees within the channel. The riparian buffers are generally narrow, averaging less than 100 feet. Additionally, several of the ephemeral streams within the site have been altered to either remove them from their former path to allow for more agricultural production (Ephemeral #1) or to separate them from their upstream or downstream segments via levee construction and then modified through earthwork (Ephemerals #4, #8, and #9).

Despite the generally degraded nature of the upland, wetland and stream habitats on the site, none of the impairments are so severe that they cannot be reversed or at least substantially improved. The quality of the soils, sufficient hydrology that flows across the site, remnant natural plant communities and existing wetland and stream resources all indicate that this site has substantial capacity for successful restoration of aquatic ecosystem functions through future mitigation activities. These improvements will allow the Bank to protect and improve the aquatic habitats and ecosystem functions at this important location on the shared Platte River and Castile Creek floodplain.

IX. REFERENCES

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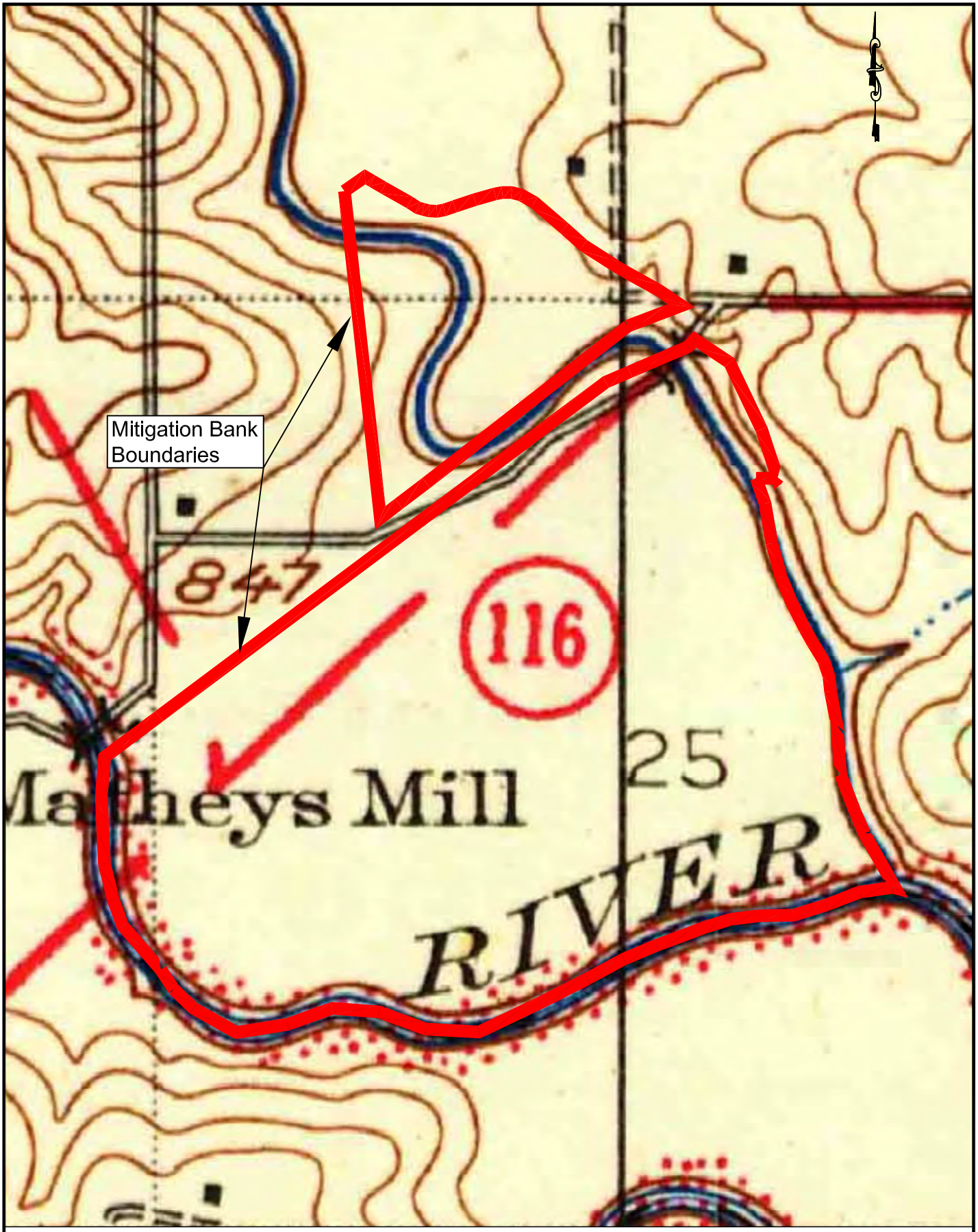
APPENDIX A

HISTORICAL TOPOGRAPHIC MAPS & AERIAL PHOTOGRAPHS



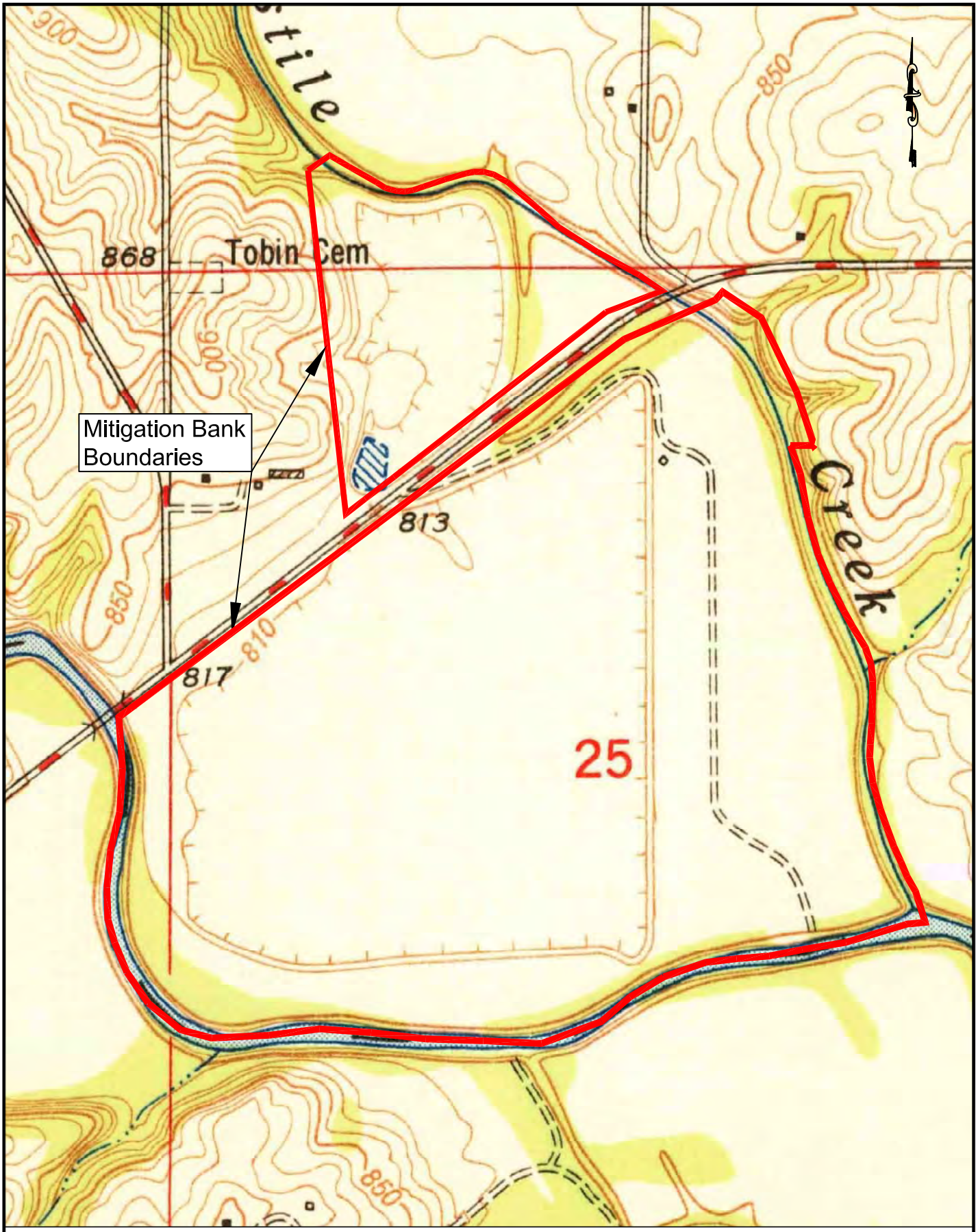
Revisions		
No.	Description	Date

Terra Technologies
1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1925 USGS
Topographic Map

DRAWING	DATE
FIG 1	JUN 2014



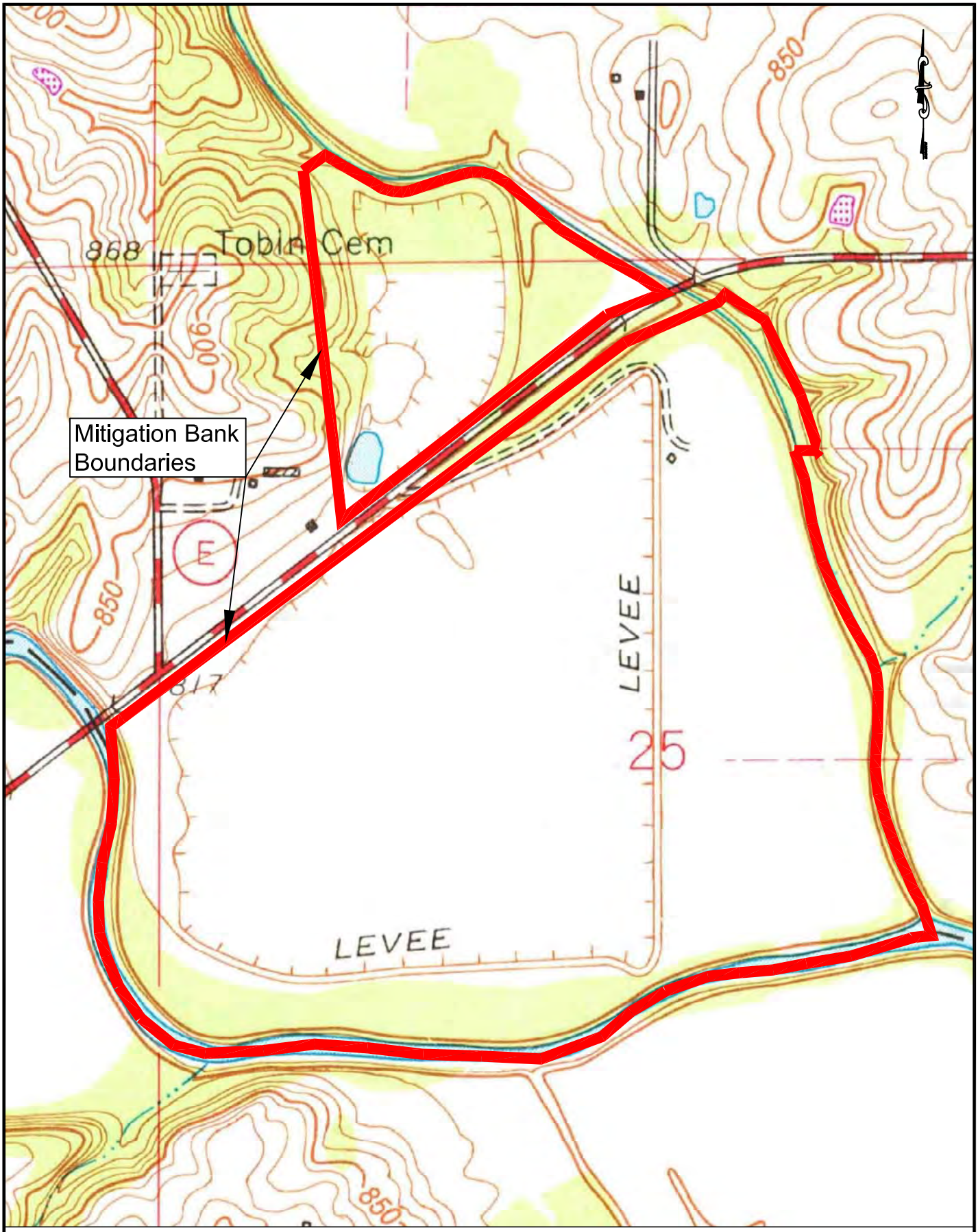
Revisions		
No.	Description	Date

Terra Technologies
1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1951 USGS
Topographic Map

DRAWING	DATE
FIG 2	JUN 2014



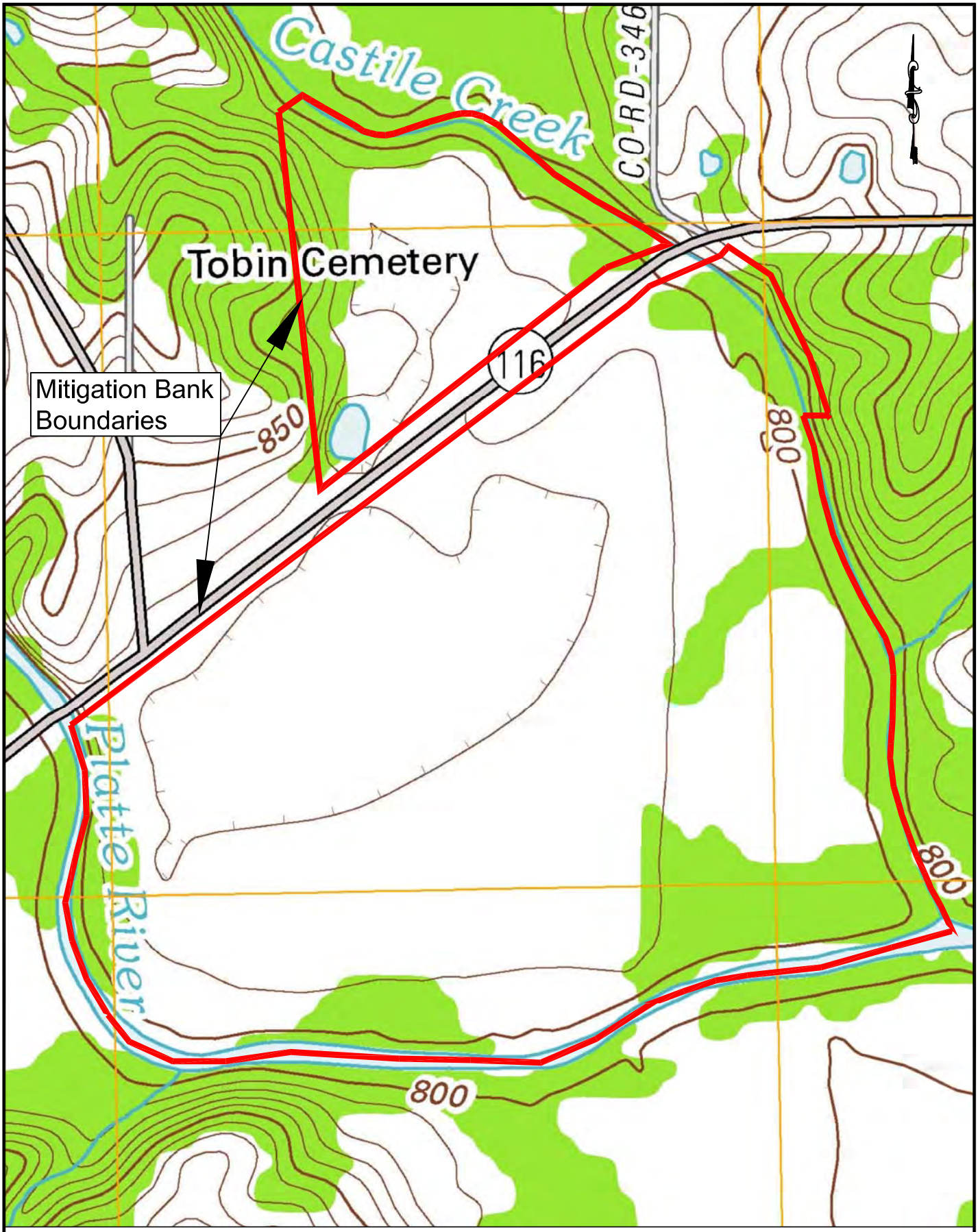
Revisions		
No.	Description	Date

Terra Technologies
1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1961 USGS
Topographic Map

DRAWING	DATE
FIG 3	JUN 2014



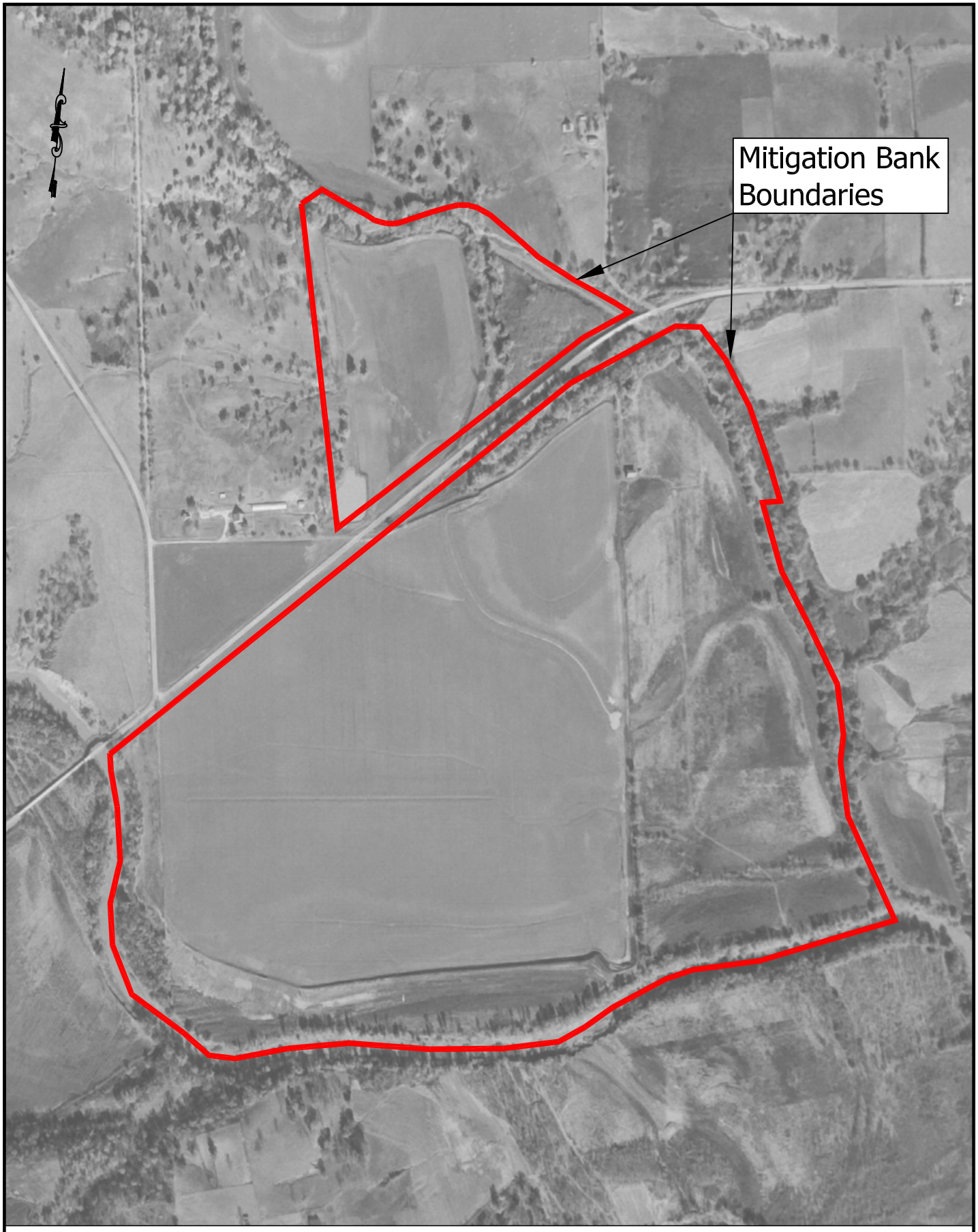
Revisions		
No.	Description	Date

Terra Technologies
1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

2012 USGS
Topographic Map

DRAWING	DATE
FIG 4	JUN 2014



Revisions		
No.	Description	Date

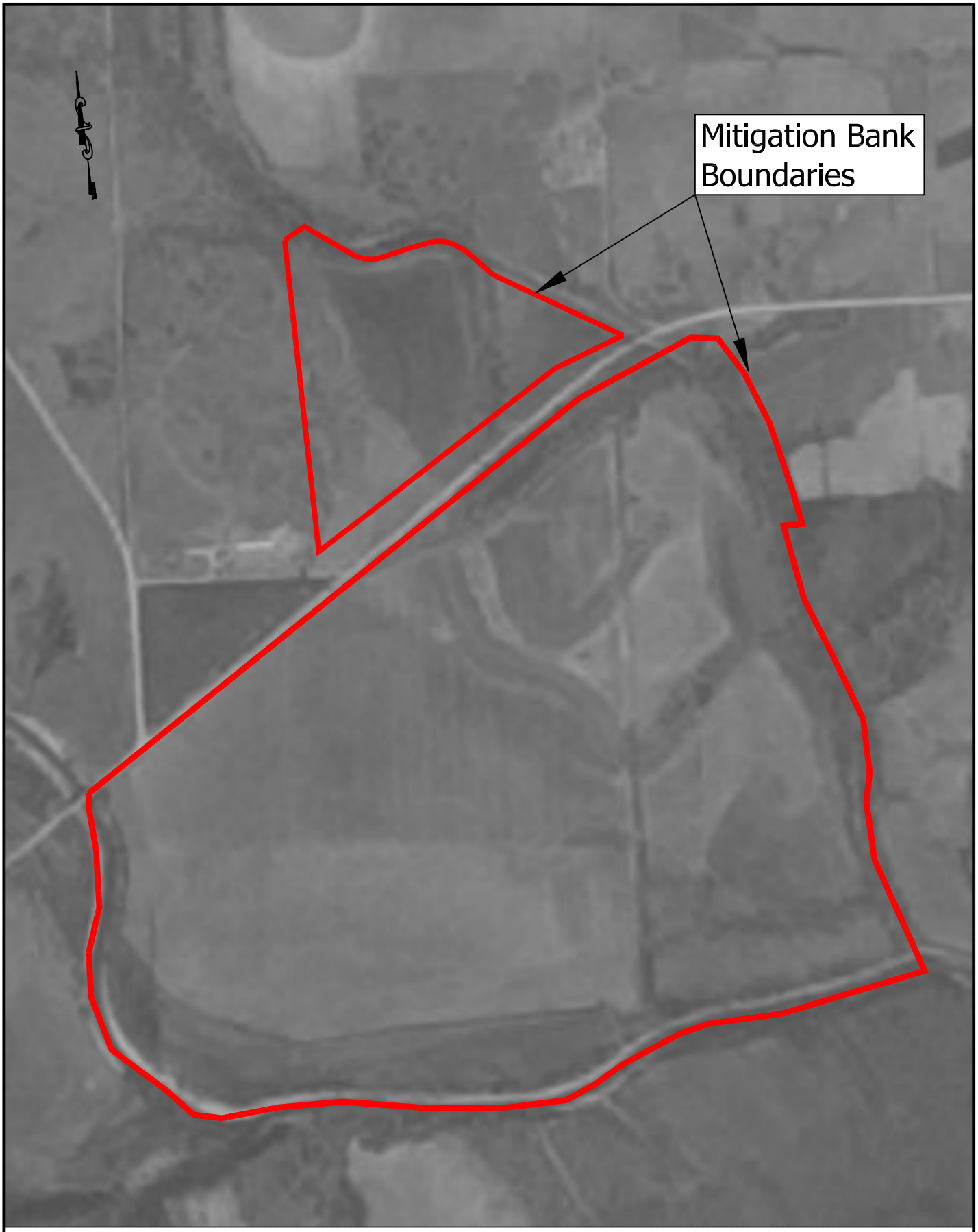
Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1947 USGS Historical
Aerial Photograph

DRAWING	DATE
FIG 5	JUN 2014



Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1950 USGS Historical
Aerial Photograph

DRAWING	DATE
FIG 6	JUN 2014

Revisions		
No.	Description	Date

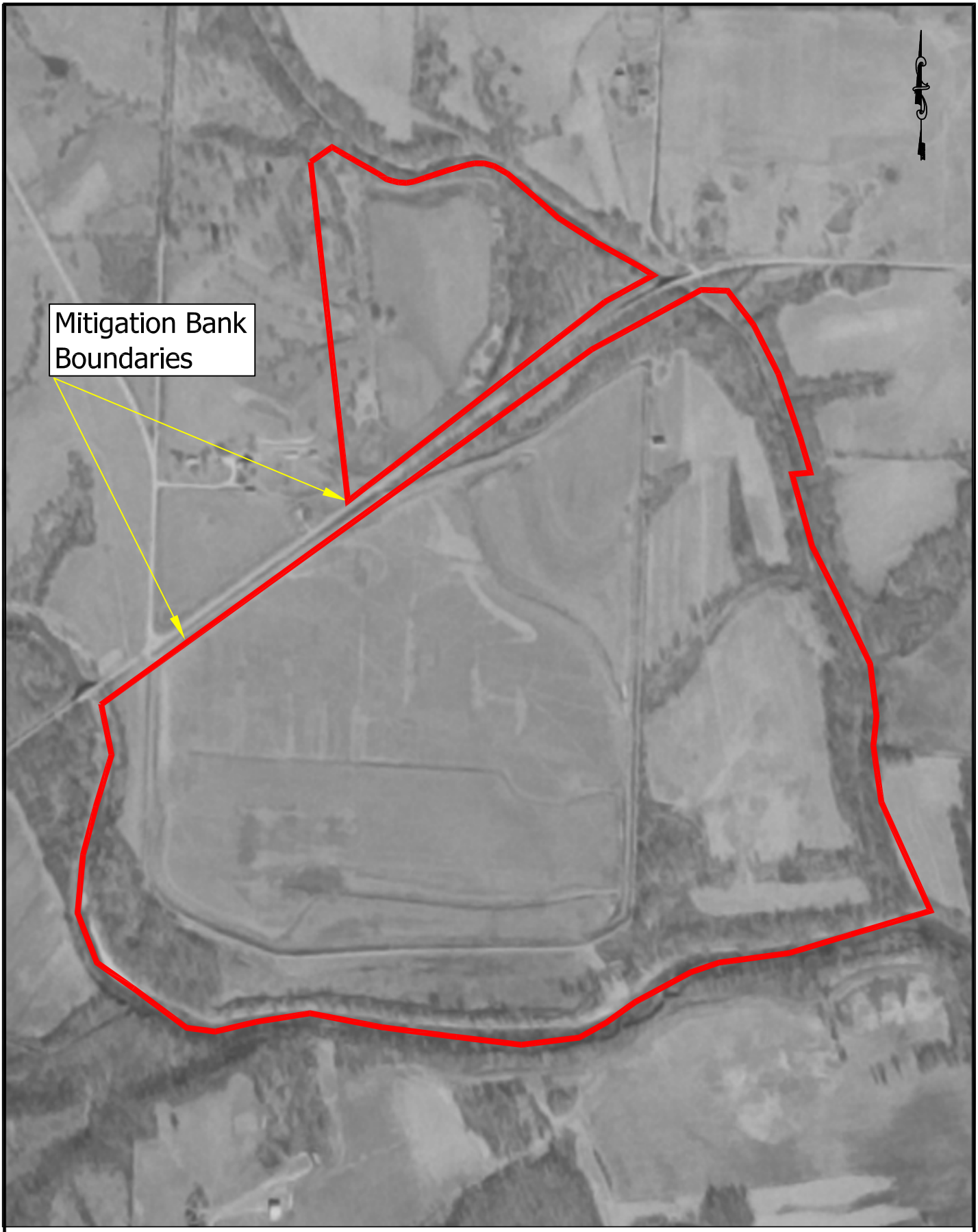
Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1960 USGS Historical
Aerial Photograph

DRAWING	DATE
FIG 7	JUN 2014



Revisions		
No.	Description	Date

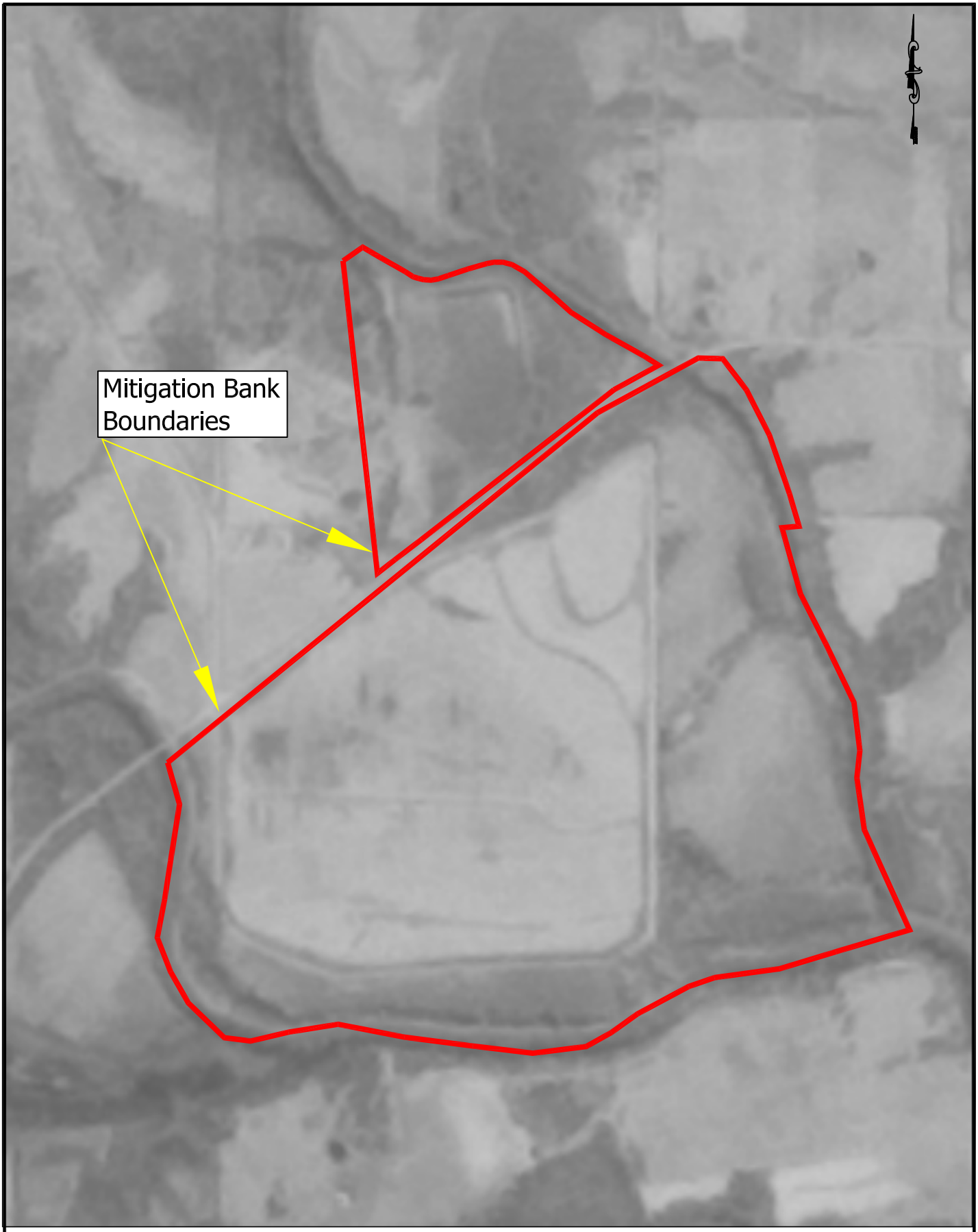
Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1977 USGS Historical
Aerial Photograph

DRAWING	DATE
FIG 8	JUN 2014



Revisions		
No.	Description	Date

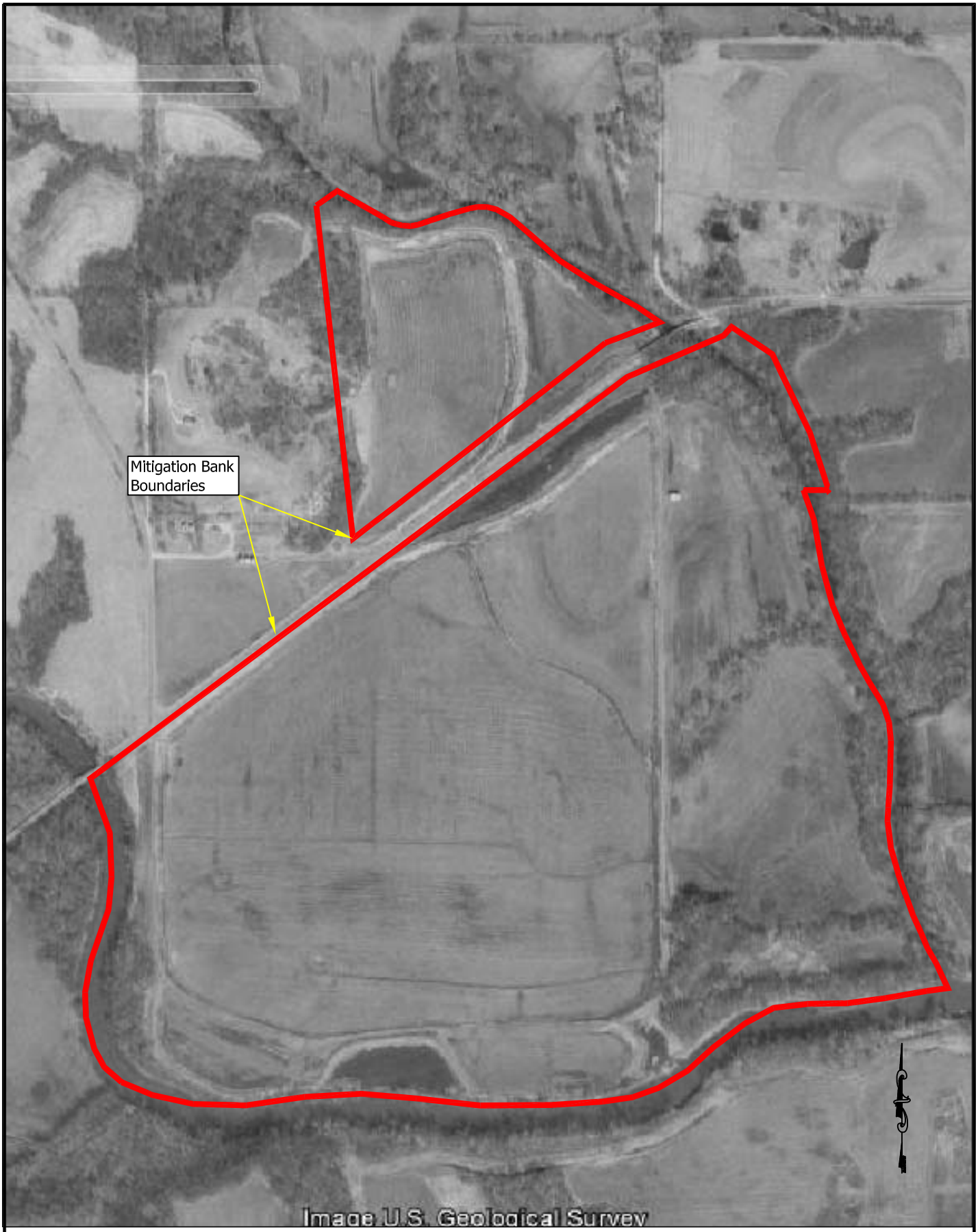
Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

1980 USGS Historical
Aerial Photograph

DRAWING	DATE
FIG 9	JUN 2014



Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
02/23/1996

DRAWING	DATE
FIG 10	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
2002

DRAWING	DATE
FIG 11	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
07/28/2004

DRAWING	DATE
FIG 12	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
06/14/2005

DRAWING	DATE
FIG 13	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
06/09/2006

DRAWING	DATE
FIG 14	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
06/14/2007

DRAWING	DATE
FIG 15	JUN 2014

	Revisions	
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
03/31/2008

DRAWING	DATE
FIG 16	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies
1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
06/15/2009

DRAWING	DATE
FIG 17	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
07/08/2010

DRAWING	DATE
FIG 18	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
08/27/2010

DRAWING	DATE
FIG 19	JUN 2014

Revisions		
No.	Description	Date

Terra Technologies

1920 West 143rd Street, Suite 140, Leawood, KS 66224

Castile Creek
Wetland & Stream
Mitigation Bank
Buchanan County, Missouri

Aerial Photograph
09/07/2012

DRAWING	DATE
FIG 20	JUN 2014

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the west side of farmed Wetland #3. PHOTO #: 1	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing another view of farmed Wetland #3. Note that the elevation on the left side of the photograph is lower that the elevation on the right side. This has created a bowl-like feature in the topography and has allowed wetland characteristics to develop. PHOTO #: 2	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing the agricultural row crop field at this location. Note that farmed Wetland #3 can be seen on the right side of the photograph. PHOTO #: 3	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the upland agricultural field at this location in the central part of the Northern Section of the Bank. PHOTO #: 4	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing rows of corn at this location which were used to determine the limits between the farmed Wetland #3 and the scrub-shrub Wetland #2. PHOTO #: 5	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing the typical upland characteristic of the forested hillslope at this location. PHOTO #: 6	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest looking upstream on Ephemeral #1. PHOTO #: 7	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream on Ephemeral #1. PHOTO #: 8	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the southern portion of Wetland #1. PHOTO #: 9	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #1. Note that the feature in the middle of the wetland is a deer path and not a stream channel. PHOTO #: 10	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing the northern portion of Wetland #1. PHOTO #: 11	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing the overflow pipe that drains Wetland #1. PHOTO #: 12	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing Perennial #2 (Castile Creek) as it flows onto the site. PHOTO #: 13	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream on Castile Creek after it flows onto the site. PHOTO #: 14	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #2. PHOTO #: 15	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #2. PHOTO #: 16	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the drain pipe at this location. PHOTO #: 17	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #2. PHOTO #: 18	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #5. PHOTO #: 19	

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the Wetland #5 and the road embankment for Highway 116. PHOTO #: 20	

PHOTO LOG

DATE: 3/10/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest showing the eastern side of Wetland #5. PHOTO #: 21	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing Wetland #4. PHOTO #: 22	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north west showing the riparian buffer along Castile Creek. Note that this area is a high spot in the topography which cannot hold water. PHOTO #: 23	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest looking upstream on Ephemeral #2 before it flows into Castile Creek. PHOTO #: 24	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Ephemeral #2 as it flows into Castile Creek. PHOTO #: 25	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream from the start of Ephemeral #2. PHOTO #: 26	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest showing Wetland #7 PHOTO #: 27	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Wetland #7. PHOTO #: 28	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Wetland #6. PHOTO #: 29	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #6. PHOTO #: 30	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing looking upstream from the start of Ephemeral #3. From this location to the southwest the channel becomes vegetated. PHOTO #: 31	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream from the start of Ephemeral #3. Though the channel is cluttered with willow droppings, there is a clear ordinary high water mark at this location and downstream. PHOTO #: 32	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #11. PHOTO #: 33	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the upland row crop field at this location. PHOTO #: 34	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Wetland #10. PHOTO #: 35	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east overlooking the eastern portion of Wetland #10. PHOTO #: 36	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing the Castile Creek riparian buffer which was determined to be upland. While difficult to discern, this area is actually at a higher elevation than Wetland #6 to the north and it also appeared to be well drained. PHOTO #: 37	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the western portion of Wetland #12 as well as the upland area that is a higher ridge in the center of the field. PHOTO #: 38	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #12. PHOTO #: 39	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest looking upstream from the start of Ephemeral #5. Note that there is still a slight channel that continues on from this point but the channel is an erosional feature which is vegetated. PHOTO #: 40	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream from the start of Ephemeral #5. Note that the channel is more defined and is not fully vegetated, and that there is not a clear ordinary high water mark. PHOTO #: 41	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest looking upstream on Ephemeral #5 before it flows into Ephemeral #4. PHOTO #: 42	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing Ephemeral #5 as it flows into Ephemeral #4. PHOTO #: 43	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #17. PHOTO #: 44	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #15 in the foreground and Wetland #16 in the background. PHOTO #: 45	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Wetland #16. PHOTO #: 46	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing the eastern portion of Wetland #15. PHOTO #: 47	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest looking upstream from the start of Ephemeral #4. Photograph also shows the farmed crossing portion of Wetland #15. PHOTO #: 48	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream from the start of Ephemeral #4. PHOTO #: 49	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream on Ephemeral #4. PHOTO #: 50	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west looking upstream on Ephemeral #4 before it flows into Castile Creek. PHOTO #: 51	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Ephemeral #4 as it flows into Castile Creek. PHOTO #: 52	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing Wetland #13. While some vegetation is growing at this location, the observation of soy bean stubble and researching historical aerials determined that this wetland is a farmed wetland. PHOTO #: 53	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing Wetland #13. While some vegetation is growing at this location, the observation of soy bean stubble and researching historical aerials determined that this wetland is a farmed wetland. PHOTO #: 54	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #14. PHOTO #: 55	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest looking upstream from the start of Ephemeral #6. PHOTO #: 56	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream from the start of Ephemeral #6. PHOTO #: 57	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream on Ephemeral #6. PHOTO #: 58	

PHOTO LOG

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest looking upstream on Ephemeral #6 upstream of where it flows into Castile Creek. PHOTO #: 59	

DATE: 3/11/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream on Ephemeral #6 as it flows into Castile Creek. PHOTO #: 60	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #19. PHOTO #: 61	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing the upland row crop field at this location. Note that this portion of the field is at a higher elevation. PHOTO #: 62	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing another view of Wetland #19. Note the bean stubble that can be seen throughout this area. PHOTO #: 63	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #20. PHOTO #: 64	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #18. PHOTO #: 65	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing the elevation change from Wetland #18 on the left side of the photograph to the upland Platte River riparian buffer on the right. PHOTO #: 66	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the Platte River riparian buffer which was determined not to be a wetland. PHOTO #: 67	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing the western portion of Wetland #18. PHOTO #: 68	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the elevation change from Wetland #18 on the left side of the photograph to the upland Platte River riparian buffer on the right. PHOTO #: 69	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing Castile Creek immediately upstream of its confluence with the Platte River (Perennial #1). PHOTO #: 70	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest looking upstream on the Platte River upstream of where it flows off the site. PHOTO #: 71	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream on the Platte River as it flows off the site. PHOTO #: 72	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest (looking upstream) from the start of Ephemeral #7, and also showing another view of Wetland #18. PHOTO #: 73	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking downstream from the start of Ephemeral #7. PHOTO #: 74	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing another view of Wetland #18. PHOTO #: 75	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing the southern portion of Wetland #19. PHOTO #: 76	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west looking upstream on Ephemeral #7 before it flows into Castile Creek. PHOTO #: 77	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east looking downstream on Ephemeral #7 as it flows into Castile Creek. PHOTO #: 78	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the agricultural row crop field at this location. This portion of the field is at a higher elevation than the surrounding field. PHOTO #: 79	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25. PHOTO #: 80	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #25 and Wetland #30. It should be noted that the drain pipe within the levees was plugged at the time of the photograph and it is likely that water levels are usually much lower at present. This is the case throughout this entire field within the levees. PHOTO #: 81	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing Wetland #25 in the foreground and Wetland #29 in the background. PHOTO #: 82	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #25. PHOTO #: 83	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #25. PHOTO #: 84	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25 and Wetland #29. PHOTO #: 85	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #25 and Wetland #30. PHOTO #: 86	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25. PHOTO #: 87	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #25 and Wetland #29. PHOTO #: 88	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25 and Wetland #29. PHOTO #: 89	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwestern portion of Wetland #31. PHOTO #: 90	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #32. PHOTO #: 91	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing the Platte River as it flows onto the site. PHOTO #: 92	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the Platte River after if flows onto the site. PHOTO #: 93	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #33. PHOTO #: 94	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing another view of Wetland #25. PHOTO #: 95	

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing where Wetland #25 connects to Wetland #32. PHOTO #: 96	

PHOTO LOG

DATE: 3/13/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the arm of Wetland #25 at this location. PHOTO #: 97	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #34. PHOTO #: 98	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the western portion of Wetland #24. PHOTO #: 99	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing the southern portion of Wetland #32. PHOTO #: 100	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing another view of Wetland #24. PHOTO #: 101	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #27. PHOTO #: 102	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #28. PHOTO #: 103	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #21. PHOTO #: 104	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #22. PHOTO #: 105	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #26. PHOTO #: 106	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north looking upstream on Ephemeral #8 and showing Wetland #25. PHOTO #: 107	

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south looking downstream on Ephemeral #8. PHOTO #: 108	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south looking downstream on Ephemeral #8 and showing Wetland #23. PHOTO #: 109	

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northwest showing the confluence of Ephemeral #8 and Ephemeral #9 at the drain pipe through the levee. PHOTO #: 110	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast looking upstream on Ephemeral #9. PHOTO #: 111	

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west looking upstream on Ephemeral #9. PHOTO #: 112	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast looking downstream on Ephemeral #8 as it flows out of the levee drain pipe. Note that at the time of the Photo the Platte River was up and the water seen in the channel is back water from the Platte River. PHOTO #: 113	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the upland row crop field in the foreground and Wetland #23 in the background. PHOTO #: 114	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #24. PHOTO #: 115	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #24. PHOTO #: 116	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing Wetland #24 and Ephemeral #9. PHOTO #: 117	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #24 and Ephemeral #9. PHOTO #: 118	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing Wetland #24. PHOTO #: 119	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing the upland agricultural row crop field. PHOTO #: 120	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest showing Ephemeral #8 and Wetland #25. PHOTO #: 121	

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast Showing Ephemeral #8 and Wetland #25. PHOTO #: 122	

PHOTO LOG

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing looking downstream from the start of Ephemeral #8 and showing Wetland #25. PHOTO #: 123	

DATE: 8/28/14 TAKEN BY: CG	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west looking upstream from the start of Ephemeral #8 and showing Wetland #25. Note that there is no longer a channel. PHOTO #: 124	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing this Wetland #25 and Wetland #29. PHOTO #: 125	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing this Wetland #25 and Wetland #29. PHOTO #: 126	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing upland row crop field at this location. PHOTO #: 127	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east showing the upland row crop field at this location. PHOTO #: 128	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing the upland farm field which was planted with corn. PHOTO #: 129	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing west showing the upland agricultural field at this location. PHOTO #: 130	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southeast showing a Portion of Wetland #25. This portion of the wetland appears to be a drainage ditch that was dug in order to drain the water the from the irrigation pad at this location. PHOTO #: 131	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #25 at this location. PHOTO #: 132	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25 at this location. PHOTO #: 133	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing north showing Wetland #25 at this location. PHOTO #: 134	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south showing Wetland #25 at this location. PHOTO #: 135	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing a waterfall on Intermittent #1. Note the water that is flowing over the fall. All of the water that is flow in Intermittent #1 at the time of this photograph was completely fed by ground water. PHOTO #: 136	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing southwest looking downstream on Intermittent #1 as it flows into Castile Creek. PHOTO #: 137	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing south east showing the typical upland conditions and steep slopes of the forested area east of Castile Creek. PHOTO #: 138	

PHOTO LOG

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing northeast showing the steep slopes of the row crop field at this location. PHOTO #: 139	

DATE: 3/14/14 TAKEN BY: DD	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
COMMENTS: Photograph facing east looking upstream on Ephemeral #10 before it flows into Castile Creek. PHOTO #: 140	

PHOTO LOG

DATE: 3/14/14	SITE NAME: CASTILE CREEK WETLAND & STREAM MITIGATION BANK
TAKEN BY: DD	
COMMENTS: Photograph facing southwest looking downstream on Ephemeral #10 as it flows into Castile Creek.	
PHOTO #: 141	

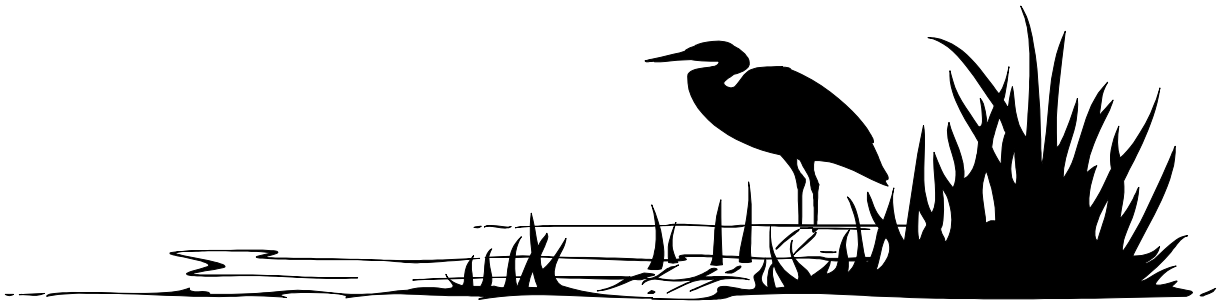
APPENDIX C

OHIO RAPID ASSESSMENT METHOD FOR WETLANDS
USER'S MANUAL & SCORING FORMS

Ohio Rapid Assessment Method for Wetlands v. 5.0

User's Manual and Scoring Forms

February 1, 2001



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Ohio Rapid Assessment Method for Wetlands v. 5.0

User's Manual and Scoring Forms

February 1, 2001

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This entire document including scoring forms can be downloaded from the website of the Ohio EPA, Division of Surface Water:

http://www.epa.state.oh.us/dsw/401/

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Earlier versions of this method (1.0, 2.0, 3.0, 4.0, 4.1) were very similar to the Washington State Wetland Rating System, Second Edition Washington State Department of Ecology, 1993. Version 5.0 represents a substantial departure from the format and structure of the Washington Rating System although elements still remain. Text in Section 5.0 was borrowed and paraphrased from the Washington Rating System manual; images in Section 5.0 were scanned and imported from the Washington Rating System manual.

The Ohio Rapid Assessment Method for Wetlands could not have been developed without the assistance of Ohio EPA's 401/Wetland Ecology Unit including Laura Fay, Tom Harcarik, Amy Holtshouse, Linda Merchant, Dan Osterfeld, Ric Queen, Michael Smith, and Holly Tucker, and the past and present members of the Ohio Rapid Assessment Method Workgroup:

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Table of Contents

Acknowledgments iv

1.0 INTRODUCTION. 1
- 1.1 Ohio's Wetland Categorization Scheme. 1
- 1.2 Sequence of Review under Wetland Antidegradation Rule. 3
- 1.3 Relationship to Earlier Versions of the ORAM. 7
- 1.4 Cautionary Statement. 10

2.0 INTERPRETING THE RESULTS OF THE ORAM. 12
- 2.1 Interpreting the Narrative Rating Answers. 12
  - 2.1.1 The wetland is a Category 1 wetland. 12
  - 2.1.2 The wetland should be evaluated for possible Category 3 status. 13
  - 2.1.3 The wetland is a Category 3 wetland. 13
- 2.2 Quantitative Rating. 13
  - 2.2.1 General considerations for the quantitative score. 13
  - 2.2.2 Interpreting and applying the quantitative score. 15
- 2.3 Problem situations and reevaluation of ORAM categorization. 15
- 2.4 Seasonality, Droughts and Floods. 16

3.0 HOW TO USE THE ORAM AND THIS USER'S MANUAL. 17

4.0 BACKGROUND INFORMATION. 19

5.0 DETERMINING THE SCORING BOUNDARIES. 21
- 5.1 General Guidelines. 21
- 5.2 Wetlands that form a Patchwork on the Landscape. 22
- 5.3 Wetlands divided by artificial boundaries. 23
- 5.4 Wetlands contiguous with an area of open water 23
  - 5.4.1 The area of open water is *less than or equal to* 20 acres in size. 23
  - 5.4.2 The area of open water is *greater than* 20 acres in size. 24
- 5.5 Wetlands contiguous to a stream, river or ditch. 24
- 5.6 Estuarine Wetlands. 25
- 5.7 Scoring Boundaries where only part of a wetland is Category 3. 25

6.0 NARRATIVE RATING. 27
- 6.1 Critical Habitat. 27
- 6.2 State or Federal Threatened or Endangered Species. 28
- 6.3 High Quality Wetlands. 28
- 6.4 Significant breeding/nonbreeding bird concentration areas. 29
- 6.5 Category 1 Wetlands. 29
- 6.6 Bogs. 30
- 6.7 Fens. 32
- 6.8 Old Growth and Mature Forested Wetlands. 33
  - 6.8.1 Old Growth Forests. 33
  - 6.8.2 Mature Forested Wetlands. 35
- 6.9 Lake Erie Coastal and Tributary Wetlands. 36
- 6.10 Lake Plains Sand Prairies (Oak Openings). 37
- 6.11 Relict Wet Prairies. 37

7.0 QUANTITATIVE RATING. 38
7.1 Metric 1: Wetland Size. 38
7.2 Metric 2: Upland Buffers and Surrounding Land Use. 38
7.2.1 Question 2a: Average Buffer Width. 39
7.2.2 Question 2b: Intensity of Predominant Surrounding Land Use(s). 39
7.3 Metric 3: Hydrology. 40
7.3.1 Question 3a: Sources of Water. 40
7.3.1.1 High pH Groundwater 41
7.3.1.2 Other Groundwater 41
7.3.1.3 Precipitation 42
7.3.1.4 Seasonal Surface Water 42
7.3.1.5 Perennial Surface Water (lake or stream) 42
7.3.2 Question 3b: Connectivity. 42
7.3.3 Question 3c: Maximum Water Depth. 44
7.3.4 Question 3d: Duration of Standing Water/Saturation 44
7.3.5 Question 3e: Modifications to Natural Hydrologic Regime. 44
7.4 Metric 4: Habitat Alteration and Development 47
7.4.1 Question 4a: Substrate/Soil Disturbance 47
7.4.2 Question 4b: Habitat Development. 48
7.4.3 Question 4c: Habitat alteration. 48
7.5 Metric 5: Special Wetland Communities. 50
7.6 Metric 6: Vegetation, Interspersion, and Microtopography. 51
7.6.1 Question 6a: Wetland Plant Communities. 51
7.6.1.1 Aquatic Bed Class. 51
7.6.1.2 Emergent Class. 52
7.6.1.3 Shrub Class. 52
7.6.1.4 Forested Class. 52
7.6.1.5 Mudflat Class. 53
7.6.1.6 Open Water Class. 53
7.6.1.7 Other Classes Not Listed. 53
7.6.2 Question 6a continued: Assigning Points to Vegetation Communities. 54
7.6.2.1 Assigning a "0" score. 56
7.6.2.2 Assigning a "1" score. 56
7.6.2.3 Assigning a "2" score. 57
7.6.2.4 Assigning a "3" score. 58
7.6.3 Question 6b: Horizontal (plan view) community interspersion. 58
7.6.4 Question 6c: Coverage of Invasive Plant Species. 59
7.6.5 Question 6d: Microtopography. 60

8.0 REFERENCES. 61

9.0 APPENDICES. 63

List of Tables

Table 1. Decision Matrix for SEJ portion of Antidegradation Review.. 5
Table 2. Comparison table between Version 4.0/4.1 and ORAM v. 5.0 9
Table 3. Metrics in quantitative rating and the partitioning of the score 14
Table 4. Decision table for determining a patchwork on the landscape 23
Table 5. Characteristics of old-growth forests in the central hardwood forest region 35
Table 7. Qualitative cover scale for vegetative comminutes. 55
Table 8. Narrative descriptions of vegetation community quality. 55
Table 9. Mudflat and open water community quality. 55
Table 10. Cover scale for microtopographic habitat features. 60

List of Figures

Figure 1. Boundaries for contiguous wetlands along a stream corridor or floodplain. 21
Figure 2. Scoring boundaries for wetlands located in a patchwork or mosaic on the landscape.. 22
Figure 3. Scoring boundaries of wetlands contiguous to areas of open fresh water <20 acres.. 24
Figure 4. Scoring boundaries of wetlands contiguous to areas of open fresh water 20acres 24
Figure 5. Scoring boundaries for wetlands contiguous to a stream or river. 25
Figure 6. Hypothetical wetland example for estimating average buffer width. 39
Figure 7. Hypothetical wetlands for estimating degree of interspersion. 59

1.0 INTRODUCTION.

The regulation of wetlands under the federal and state environmental laws, e.g. under Section 401 and 404 of the Clean Water Act, has required the assessment of the function and quality of wetlands in order to determine whether to permit the destruction, alteration, or degradation of a wetland and to determine the appropriate level of mitigation that should be required. This type of assessment is different from the delineation of whether a particular location is a "wetland" at all, i.e. a "jurisdictional" wetland. Delineation attempts to draw a line around a location to call what lies within the line a "wetland" and subject to protection, and what lies outside the line, something else (typically upland areas).

Assessment attempts to determine the ecological quality and the level of function of a particular wetland. Among other things, the State of Ohio's Wetland Water Quality Standards require applicants to use "an appropriate wetland evaluation methodology acceptable to the director" to determine the appropriate category for the wetland which is the subject of the application. These methods are often called "rapid assessment methods." Ohio EPA has used a method developed by the State of Washington's Department of Ecology (Washington DE 1993) and adapted it for use in Ohio as a "draft" Ohio Rapid Assessment Method for Wetlands (ORAM) versions 1.0, 2.0, 3.0, 4.0 and 4.1 (Fennessy et al. 1998b). While still retaining some elements of the Washington State Wetlands Rating System, ORAM v. 5.0 represents a substantial departure from its format and focus.

A serious question in the development of such assessment tools is their sensitivity, i.e. their ability to distinguish between wetlands of differing quality and disturbance levels in order to properly categorize a site. The development and use of rapid assessment methods is not meant to replace more detailed quantitative measures of ecosystem function. In fact, Ohio EPA has ongoing research to develop numeric biocriteria for wetlands and other more intensive measures of wetland function and condition.

The numeric score obtained from the Ohio Rapid Assessment Method for Wetlands (ORAM) is not, and should not be considered, an absolute number with intrinsic meaning. The numeric score should be considered in light of other available information. The numeric score does however allow for relative comparisons between wetlands to be made. Where ORAM scores fall at the "break points" between wetland categories, for example, between Category 1 and 2, or 2 and 3, the ORAM score, by itself, is not sensitive enough to distinguish between wetland type and other assessment techniques and professional judgment will need to be used in categorizing the wetland.

This User's Manual is intended to explain the underlying scientific rationale for the ORAM, to provide detailed explanatory notes for the different sections and scores of the ORAM, and to aid in the consistent use of the ORAM.

Ohio Administrative Code (OAC) Rule 3745-1-54 requires that "an appropriate wetland evaluation methodology acceptable to the director" be used to determine the category of the wetland which is the subject of the application. In general, Ohio EPA considers the ORAM to be "an appropriate wetland evaluation methodology", however the appropriateness of its use, as with any assessment method, should be evaluated based on the conditions present at each particular wetland. Although this method has been developed for use in Ohio, it is a general wetland assessment tool and may have broader geographic applications.

1.1 Ohio's Wetland Categorization Scheme.

As with any attempt to differentiate wetlands based on some measure of "quality", there is considerable controversy over how such assessments should be performed and whether they should be performed at all. The ORAM has been developed to provide a relatively fast and easy method for determining the appropriate category of a particular wetland under the Wetland Antidegradation Rule, OAC Rule 3745-1-54. In order to properly use the ORAM, it is critical to understand the controlling rule language for

determining a wetland's category. The various parts of the ORAM are intended to incorporate the narrative descriptions by means of questions in the Narrative Rating Forms and the scoring scheme in the Quantitative Rating Form. *However, in the event of a conflict between the ORAM and the provisions in the Wetland Water Quality Standards and Wetland Antidegradation Rule, the rule language should always be considered controlling.*

In Ohio, the Ohio Environmental Protection Agency (Ohio EPA) recently adopted regulations which categorize wetlands based on their quality and impose differing levels of protection based on the wetland's category (OAC rules 3745-1-50 through 3745-1-54). The regulations specify three wetland categories: Category 1, Category 2, and Category 3 wetlands. These categories correspond to wetlands of low, medium and high "quality." In addition, there is an implied fourth category described in the definition of Category 2 wetlands, i.e. wetlands that are degraded but restorable. *These potentially restorable wetlands are Category 2 wetlands and receive the same level of regulatory protection as other Category 2 wetlands.*

Category 1 Wetlands

Ohio Administrative Code Rule 3745-1-54(C)(1) defines Category 1 wetlands as wetlands which "...support minimal wildlife habitat, and minimal hydrological and recreational functions," and as wetlands which "...do not provide critical habitat for threatened or endangered species or contain rare, threatened or endangered species." In addition, Category 1 wetlands are often hydrologically isolated, and have some or all of the following characteristics: low species diversity, no significant habitat or wildlife use, limited potential to achieve beneficial wetland functions, and/or a predominance of non-native species.

Examples given in the rule of Category 1 wetlands are those that have developed on excavated or mined lands or wetlands that are isolated from other surface waters and that are dominated by invasive plant species like narrow-leaved cat-tail (*Typha angustifolia*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), European buckthorn (*Rhamnus frangula*), or giant reed (*Phragmites australis*). In other instances, Category 1 wetlands may be wetlands which have been seriously degraded by human-caused disturbances such that the wetland' s species diversity and functionality has been significantly compromised.

Category 1 wetlands are often isolated emergent marshes dominated by cattails with little or no upland buffers located in active agricultural fields. Category 1 forested, depressional wetlands are less common, if only for the fact that they often have had the trees removed at some time in the past, and therefore, definitionally, are no longer "forested." However, Category 1 forested systems do exist. Typically, they have been disturbed by grazing activities, stormwater inputs, or other hydrologic modifications. A confounding factor for forested wetlands is that the canopy may be relatively mature and diverse because of the long-lived nature of most tree species. Such wetlands often have a "reasonable potential for restoration" such that they will be Category 2 wetlands.

Category 1 wetlands are defined as "limited quality waters" in OAC Rule 3745-1-05(A). They are considered to be a resource that has been so degraded or with such limited potential for restoration, or of such low functionality, that no social or economic justification and lower standards for avoidance, minimization, and mitigation are applied.

Degraded but Restorable Category 2 Wetlands

As discussed below, OAC Rule 3745-1-54(C) states that wetlands that are assigned to Category 2 constitute the broad middle category that "...support moderate wildlife habitat, or hydrological or recreational functions," but also include "...wetlands which are degraded but have a reasonable potential for reestablishing lost wetland functions." This language creates an implied fourth category of wetlands. The Rater should expect to observe certain wetlands which are presently of somewhat lower quality than

other undegraded Category 2 wetlands, but which could be restored. The Rater should expect to observe "fair" and "good" quality Category 2 wetlands. Professional judgment and other more detailed measures of biology and functions may be necessary when evaluating a wetland that is degraded but may have a reasonable potential for restoration.

It should again be stressed that this "fourth" category does not mean that these wetlands receive less protection or applications to impact these wetlands should be easier to obtain. Category 2 includes wetlands of moderate quality and also wetlands that are degraded but could be restored. The same avoidance, minimization, and mitigation standards apply to the entire category. Being able to identify degraded but restorable wetlands allows for increased enhancement and restoration possibilities; it should not be used as a tool for authorizing further degradation.

Category 2 Wetlands

Ohio Administrative Code Rule 3745-1-54(C)(2) defines Category 2 wetlands as wetlands which "...support moderate wildlife habitat, or hydrological or recreational functions," and as wetlands which are "...dominated by native species but generally without the presence of, or habitat for, rare, threatened or endangered species; and wetlands which are degraded but have a reasonable potential for reestablishing lost wetland functions."

Generally, Category 2 wetlands do not have rare, threatened or endangered species or the habitat for such species. While this is usually true, Ohio EPA has studied wetlands which, while otherwise appearing to be Category 2 wetlands, have an endangered species present within their boundaries.

Category 2 wetlands constitute the broad middle category of "good" quality wetlands. In comparison to Ohio EPA's stream designations, they are equivalent to "warmwater habitat" streams, and thus can be considered a functioning, diverse, healthy water resource that has ecological integrity and human value. Some Category 2 wetlands are relatively lacking in human disturbance and can be considered to be naturally of moderate quality; others may have been Category 3 wetlands in the past, but have been disturbed "down to" Category 2 status.

Category 3 Wetlands

Wetlands that are assigned to Category 3 have "...superior habitat, or superior hydrological or recreational functions." They are typified by high levels of diversity, a high proportion of native species, and/or high functional values. Category 3 wetlands include wetlands which contain or provide habitat for threatened or endangered species, are high quality mature forested wetlands, vernal pools, bogs, fens, or which are scarce regionally and/or statewide.

It is important to stress that a wetland may be a Category 3 wetland because it exhibits one or all of the above characteristics. For example, a forested wetland located in the flood plain of a river may exhibit "superior" hydrologic functions (e.g. flood retention, nutrient removal), but not contain mature trees or high levels of plant species diversity.

1.2 Sequence of Review under Wetland Antidegradation Rule.

Once a wetland has been properly categorized, Paragraph (D) of OAC Rule 3745-1-54 outlines the sequence of review and the substantive review requirements applicable to Category 1, 2, or 3 wetlands. An overview of these requirements is important to properly use and apply the ORAM.

A sequenced review is mandated under OAC Rule 3745-1-54(D). The Director cannot authorize a lowering of water quality unless the applicant makes the demonstrations specified by the rule. "Compensatory mitigation" is *only* appropriate after the applicant has demonstrated that the wetland

impacts cannot be avoided, that the unavoidable impacts have been minimized, that the impacts are necessary to accommodate important social or economic development in the area in which the wetland is located, and, for Category 3 wetlands, the proposed activity is necessary to meet a demonstrated public need. Thus, for example, compensatory mitigation is not appropriate unless and until it is demonstrated that an impact *cannot* be avoided altogether.

It is important to stress that Category 2 and 3 wetlands receive the *identical* regulatory protection under the sequenced review described below with the exception that for Category 3 wetlands, there is an additional requirement to demonstrate "public need." Therefore, adverse impacts to Category 2 wetlands should be avoided, minimized, mitigated for, and justified by important social and economic development *to the same extent* as for Category 3 wetlands. Under the Wetland Water Quality Standards, Category 2 wetlands represent intact, strongly functioning, valuable water resources in the State of Ohio's landscape.

Step 1: Avoidance.

Impacts to wetlands should be avoided unless the applicant demonstrates that there is no practicable alternative[1] to the impacts. For Category 2 and 3 wetlands, a rebuttable presumption that less damaging upland alternatives exist is created in OAC Rule 3745-1-54. It is presumed that the wetland impacts can be avoided unless the applicant rebuts this presumption and demonstrates that the impact is not avoidable.

Step 2: Minimization.

For those impacts which cannot be avoided, the applicant must take "appropriate and practicable steps...to minimize potential adverse impacts on the wetland ecosystem."

For Category 1 wetlands, the minimization requirement is satisfied if stormwater controls are installed.

For Category 2 and 3 wetlands, OAC Rule 3745-1-54 states that the "...applicant shall minimize all potential adverse impacts foreseeably caused by the project and each application shall include an evaluation of: (a) the spatial requirements of the project; (b) the location of existing structural or natural features that may dictate the placement or configuration of the proposed project; (c) the overall and basic purpose of the project and how the purpose relates to the placement, configuration or density of the project; (d) the sensitivity of the site design to the natural features of the site, including topography, hydrology, and existing flora and fauna; (e) direct and indirect[2] impacts..."

---

[1] "Practicable alternative" is defined in OAC Rule 3745-1-50(GG) as, "...available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall and basic project purposes. For the purposes of this definition, (1) "available" means an alternative which is obtainable for the purpose of the project; (2) "basic project purpose" means the generic function of the project; and (3) "overall project purpose" means the basic project purpose plus consideration of costs and technical and logistical feasibility."

[2] Note that "direct" and "indirect impacts" are defined terms in OAC Rule 3745-1-50. "Direct impacts" mean effects which are caused by the action and occur at the same time and place. "Indirect impacts" means effects which are caused by the project that occur farther removed in distance from the project, but are still reasonably foreseeable. Indirect impacts may include related effects on air and water and other natural systems, including ecosystems, and other adverse environmental impacts that may be a consequence of the project.

Step 3: Social/economic justification.

It is a mandatory element of state water quality standards that the standards include an antidegradation requirement and that prohibits the lowering of water quality unless it is necessary to accommodate important social or economic development in the area in which the water body is located. This requirement is included in OAC Rule 3745-1-54(D)(2) and (D)(3) for Category 2 and 3 wetlands. Since Category 1 wetlands are definitionally "limited quality waters", the social and economic justification (SEJ) is not required.[3]

A detailed discussion of the SEJ portion of an antidegradation review is beyond the scope of this manual. The Rater is referred to Table 1 and U.S. EPA guidance documents for additional guidance as to when and how this demonstration can be satisfied.[4] The matrix in Table 1 lists the initial factors that should probably be considered given the relative degree of the lowering of water quality and the relative importance of the development. The SEJ demonstration in OAC Rule 3745-1-54 is essentially a balancing test which compares the amount or degree of the lowering of water quality to the importance of the social and economic development. Thus, for example, if the lowering of water quality is "minor" but the development is "very important," the balance shifts to allowing the impact.

Table 1. Decision Matrix for SEJ demonstration. Matrix elements are nonbinding characterizations that an impact may be authorized given its size and the relative importance development.

	degree of lowering of water quality/degree of wetland impact		
importance of social or economic development	**minor**	**moderate**	**major**
not important	*not* allowable	*not* allowable	*not* allowable
important	probably allowable	may be allowable, or may *not* be allowable	may *not* be allowable
very important	probably allowable	may be allowable	may be allowable, or may *not* be allowable

[3] See OAC Rules 3745-1-54(D)(1) and 3745-1-05(A)(11).

[4] *Water Quality Standards for Wetlands, National Guidance*, US EPA Office of Water, EPA 440/S-90-011, July 1990; *Questions and Answers on: Antidegradation*, United States Environmental Protection Agency, Office of Water, Regulations and Standards, August 1985; *Water Quality Standards Handbook*: Second Edition, United States Environmental Protection Agency, Office of Water, EPA-823-B-94-005a, August 1994; *Interim Economic Guidance for Water Quality Standards Workbook*, United States Environmental Protection Agency, Office of Water, EPA-823-B-95-002, March 1995; *Water Quality Guidance for the Great Lakes System: Supplementary Information Document (SID)* (U.S. EPA, Office of Water, EPA-820-B-95-001, March 1995)

Step 4. Storm water controls (Category 2 and 3 only).

For both Category 2 and 3 wetlands, OAC Rule 3745-1-54 requires that stormwater and water quality controls be installed "...to ensure that peak post-development rates of surface water runoff from the impacted wetland site do not exceed the peak pre-development rates of runoff from the on-site wetlands, for all categories of wetlands. Water quality improvement measures shall be incorporated into the design of the storm water control measures to the maximum extent practicable. Examples of these measures include, but are not limited to, incorporating vegetated areas in the storm water control plans." Note that for Category 1 wetlands, these types of controls suffice to satisfy the minimization requirement.

Step 5 (Category 3 only). Public Need Demonstration for Category 3 Wetlands.

In addition to and different from the SEJ demonstration, impacts to Category 3 wetlands are not allowable unless the applicant demonstrates "The *proposed activity is necessary to meet a demonstrated public need*, as defined in rule 3745-1-50 of the Administrative Code.."[5] Ohio Administrative Code Rule 3745-1-50(II) defines the entire phrase "public need" as follows:

> "Public need" means an activity or project that provides *important tangible or intangible gains to <u>society</u>*, that satisfies *the <u>expressed or observed needs</u> of the <u>public</u> where accrued benefits <u>significantly outweigh</u> reasonably foreseeable detriment*s (Emphasis added).

Public need is defined in terms of *societal* gains and losses and not *local* gains and losses. Thus, in order for a project or activity to satisfy a "public need" it must, 1) provide *tangible/intangible gains to society*; 2) these gains must satisfy the *expressed or observed needs* of the public; 3) the accrued benefits of these gains to society must *significantly outweigh* the reasonably foreseeable detriments of achieving these gains; and 4) assuming 1, 2, and 3 are present, the project or activity must be *necessary* to *meet* the *demonstrated* public need.

In answering these four questions, several factors should be considered. First, although it can be said that society benefits from improvements in the local economy, new jobs, etc., these are factors considered in the SEJ portion of the antidegradation review and should generally be excluded from a

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[5] In order to determine what a "public need" demonstration is, it is helpful to explore the more typically performed SEJ review that has been a part of the federal and state antidegradation policy since its inception. The *Water Quality Guidance for the Great Lakes System: Supplementary Information Document (SID)* (U.S. EPA, Office of Water, EPA-820-B-95-001, March 1995) contains a concise summary of the SEJ review:

> In determining whether or not a proposed activity will support important social and economic development, Tribes and States should consider the geographic area in which the significant lowering of water quality will occur, the current or baseline economic condition of that area, the net positive impacts that will result from the proposed activity and the possibility of other development occurring in the area that will result in similar economic and social benefits but will not cause a significant lowering of water quality.

The focus of this review is then on the "area" where the lowering of water quality will occur and requires a balancing of the positive social/economic effects of the development versus the negative effects of the lowering of water quality plus the negative social/economic effects of the development. The emphasis is on the state of the local economy, unemployment rates, jobs created, jobs lost, the economic value of the water body to be impacted, the economic impact on the water body (e.g. tourism, recreation, fishing, etc.). *See also* OAC Rule 3745-1-05(C)(6)(e) and (l) for factors which can be considered "economic." *See* OAC Rule 3745-1-05(C)(6)(b), (c), (d), and (f) for factors which can be considered "social."

consideration of *societal* gains. However, there may be examples where the 1) reduction in unemployment or improvement in the local economy is so great, or 2) the unemployment is so high and the local economy so depressed, or both, that these economic factors could also be said to constitute a societal gain.

Second, it probably will be much easier for state and local government to adequately document expressed or observed public needs for projects involving the transportation system, energy, flood control, parks and recreation, public buildings, schools, museums, hospitals, and other similar public projects. Private, commercial, or industrial ventures may fail on this component of the definition of public need.

Third, when considering whether the accrued benefits from the gains to society significantly outweigh the reasonably foreseeable detriments from the project, the "gains" to society must be more than incremental in nature: the societal gains must *significantly outweigh* the reasonably foreseeable detriments from the project. Detriments from the destruction of a Category 3 wetland include but are not limited to the following: 1) not meeting public policy goals of the Clean Water Act, i.e. restoring and maintaining the chemical, physical and biological quality of the nation's waters; 2) losing these wetlands as a resource for future generations; 3) loss of wetland habitat; 4) loss of functions and values of these wetlands as wildlife habitat, flood retention, nutrient removal, etc.; 5) fostering additional development in aquatic and terrestrial habitats in the immediate vicinity where there may be greater societal gains from channeling development away from those habitats.

And, fourth, assuming the need addressed by the project is a "public need", the final question is whether the project is "necessary" to satisfy that need. "Necessary" is defined in Webster's II New Riverside Dictionary (1983) and means, "...1. Absolutely required: indispensable. 2. Needed to bring about a certain effect or result <the necessary equipment>..." Again, it is important to distinguish between "societal" gains and "local" gains: is the project *necessary* to satisfy a societal gain? The answer could well be "No, it is not necessary." The public need could be met in some other fashion that does not impact Category 3 wetlands. The answer could be also be "Yes," depending on the facts relating to the particular development being proposed.

Step 6. Compensatory mitigation.

The final step in the review process is compensatory mitigation, provided the applicant has satisfied the preceding steps. It is important to stress that for Category 2 and 3 wetlands, compensatory mitigation should be considered a last resort and a final step of unavoidable, unminimizable impacts. Category 1 wetlands have less restrictive review standards, and therefore it is expected that compensatory mitigation will be an early consideration versus a final one. The requirements of compensatory mitigation are outlined in detail in OAC Rule 3745-1-54 and will not be discussed further in this Manual.

It should be noted that the ORAM has not been developed to allow its use in the evaluation of the success of a mitigation project. Use of the ORAM in this manner should be avoided or should be done with extreme caution. Ohio EPA will be investigating whether the ORAM can be used to evaluate mitigation wetlands with or without substantial modifications.

1.3 Relationship to Earlier Versions of the ORAM.

Users familiar with earlier versions of the ORAM should find much that is similar in this version. The Narrative Rating questions are virtually identical. Nearly every question in ORAM v. 4.1 Quantitative Rating (the final "draft" version) can be found somewhere in ORAM v. 5.0. See Table 2 for side by side comparison of Quantitative Rating questions in ORAM v. 5.0 with v. 4.1.

Most importantly, **it is not intended or expected that wetlands evaluated under earlier versions of**

the ORAM, and any certification and permitting decisions based on those evaluations, should be rescored or reconsidered using v. 5.0. Version 5.0 should be used for applications pending as of the date of this Manual and for applications received after the date of this manual.

The biggest change Raters will be faced with in ORAM v.5.0 is the revisions to the Quantitative Rating. The main changes and the rationale for them are discussed below.

Revision of format, scores, and scoring ranges

With ORAM v. 5.0, Ohio EPA revised the Quantitative Rating into a format similar to that already in use by Ohio EPA for the Qualitative Habitat Evaluation Index (QHEI) for streams. Ohio EPA has had considerable experience using the QHEI and in successfully correlating it with biological data from streams (Rankin 1989). The format and internal logic of the questions in the QHEI is already familiar within the regulated community of Ohio. In addition, several new questions, in particular Metric 3 and 4 (discussed below) were very easy to develop using the QHEI style.

The score from the Quantitative Rating now ranges from 0 to 100, whereas under earlier versions of the ORAM, the score ranged from 0 to some indeterminable limit (high 50s to low 60s). Ohio EPA believes that a 100 point scale provides several advantages: 1) it has a definite maximum, 2) it is a much more intuitive base 10 scale, and 3) it provides a greater range of scores, allowing for more visual “spread” when graphing the score versus quantitative biological data.

Finally, each “metric” in ORAM v. 5.0 also has a definite maximum. This allows the entire score to be easily partitioned and allows for a relative weighting of importance attributed to each metric. It also allows the Rater to expressly understand any built in assumptions or subjectivity and to better evaluate the methods success and failure.

Addition of Metrics expressly addressing Hydrology and Habitat Alteration

One of the main shortcomings of earlier versions of the ORAM was a failure to expressly address the hydrology (and human modifications thereto) of a wetland and also human alterations to a wetland's natural habitat. These two factors account for much, if not most, of the possible disturbances to a wetland and to the wetland's perceived overall “quality.” Earlier versions of the ORAM addressed “human disturbance” in an indirect fashion, if at all, and did not expressly address all aspects of a wetland’s hydrology.

Table 2. Comparison table between quantitative rating questions in Version 4.0/4.1 and ORAM v. 5.0

Version 5.0	Version 4.1	comments
1	1	
2a	11	
2b	12	
3a	8i,10a, 10c, 10d	groundwater and precipitation choices have no direct counterparts in earlier versions of the ORAM
3b	10a, 10b, 13, 14	connectivity to riparian or upland areas based on Questions 13 and 14 from ORAM v. 4.1; however, emphasis much reduced
3c	none	this question has no direct counterpart in earlier versions of the ORAM although earlier versions of ORAM asked questions regarding ponding of water and implicitly included an evaluation of depth
3d	8g, 8h	
3e	none	no direct counterpart except Question 1 (Disturbances) in qualitative sections of Versions 3 and 4.
4a	none	no direct counterpart except Question 1 (Disturbances) in qualitative sections of Versions 3 and 4.
4b	none	no direct counterpart except Question 1 (Disturbances) in qualitative sections of Versions 3 and 4.
4c	none	no direct counterpart, however, earlier versions implicitly addressed this evaluation
4d	none	no direct counterpart except Question 1 in qualitative sections of versions 3 and 4.
5	none	however, this question merely assigns points based on Qualitative (now called Narrative) questions found in every version of ORAM.
6a	2, 4a-d, 7, 8c	however, methods for identifying communities and assigning points are somewhat modified from earlier versions.
6b	none	
6c	5	
6d	8e, 8f, 8h	

Addition of point values to wetlands listed in Narrative Rating

Since the adoption of the Wetland Water Quality Standards in May 1998 and the widespread use of the ORAM Versions 3.0, 4.0, and 4.1 in Ohio, Ohio EPA has found considerable attention and deference being paid to the particular "score" that a wetland obtains on the Quantitative Rating. Version 5.0 addresses this circumstance in at least three ways: by including an express cautionary statement regarding the "score" (*See* Section 2.0); by developing a broader scoring range and calibrating it against actual biological data; and by ensuring, to the maximum extent possible, that the scores obtained using ORAM v.5.0 are high for Category 3 wetlandsand low for Category 1 wetlands. To this end, Metric 5 was added to the Quantitative Rating which assigns additional points to wetlands which may be, or are determined to be, Category 3 wetlands in the Narrative Rating, and deducts points for certain types of Category 1 wetlands.

Discrimination in scores based on wetland type, number of vegetation classes or proximity to surface waters

One of the other major shortcomings to prior versions of the ORAM was a clear preference for wetlands located near streams and discrimination against groundwater-driven or precipitation-driven depressional systems. In addition, earlier versions of the ORAM assigned 40-60% of the total points a wetland might obtain to an enumeration of the number of vegetation communities >0.25 acres in size and the number of species in those communities with an areal cover >10%. However, earlier versions of the ORAM did not include an express evaluation of the importance or quality of those vegetation communities for that wetland, or whether the species present were merely invasive weeds and disturbance-tolerant native plants. These problems led to both overscoring of low quality, highly disturbed wetlands that happened to have multiple vegetation classes and/or proximity to surface waters, as well as underscoring of high quality, undisturbed, depressional wetlands with a single vegetation class.

The scoring scheme in Version 5.0 does not discriminate between wetlands with different types of hydrologic regimes, e.g. between a forested seep wetland located on a flood plain with seasonal inundation and a leatherleaf (*Chamaedaphne calyculata*) bog with precipitation and minor amounts of surface run-off from a small watershed. Rather, ORAM v. 5.0 evaluates the "intactness" of the hydrologic regime and natural habitat attributable to *that type of wetland*. It also provides the Rater with the ability to evaluate the "quality" and size of plant communities present. In the example above, both the riparian forested wetland and the leatherleaf bog can score the maximum points for hydrology if there are no, or no apparent, modifications to the natural hydrologic regime and habitats.

1.4 Cautionary Statement.

The Ohio Rapid Assessment Method is designed to aid in the determination of wetland categories as defined in Ohio's Wetland Antidegradation Rule (OAC Rule 3745-1-54). As such, the method is designed to identify the appropriate level of regulatory protection a particular wetland should receive. It is not designed or intended to be used to determine a particular wetland's ecologic or human value. The use of the Ohio Rapid Assessment Method should not be considered as a substitute, and is not intended to be a substitute, for detailed studies of the functions and biology of a wetland. In addition, while the score and conclusions of the ORAM are designed such that they correlate well with more detailed measures of a wetland's biology, they are not, and should not, be considered absolutely definitive.

While every effort has been made to reduce the failure rate, and to increase the usability of the method, the Rater should be aware that as a "rapid", "qualitative" procedure, the method, and especially, the quantitative score may incorrectly categorize a wetland. ***In all instances, the definitions and requirements found in OAC Rule 3745-1-54 are ultimately controlling, and in the event of a conflict between the ORAM and the rule, the definitions and requirements of the rule control.***

While the instances where such failures may occur in the future cannot be known, the Rater should be aware of this possibility. For example, position in the landscape may markedly affect a wetland's functionality. For example, a forested wetland located in the flood plain of a river may exhibit “superior” hydrologic functions (e.g. flood retention, nutrient removal) but not contain mature trees or high levels of plant species diversity. This wetland would be a Category 3 wetland. This same system located in an isolated woodlot of an active farm field may only be a Category 2 or even a Category 1 wetland if it has been substantially degraded. Similarly, wetlands located in heavily urbanized areas will lose points in the Quantitative Rating. *See* Metric 2. Metric 2 (buffers and surrounding land use) focuses on the generalized observed decline in wetland quality as upland buffers decrease and land uses intensify. However, very high quality systems can exist as self-maintaining wetlands in urbanized contexts. When faced with this situation, the Rater should consider other portions of the wetland rules, e.g. OAC Rule 3745-1-54(B)(3)(regional significance), 3745-1-54(C)(2) (degraded category two wetlands), etc.

2.0 INTERPRETING THE RESULTS OF THE ORAM.

The Ohio Rapid Assessment Method for Wetlands has been derived from the Washington State Wetlands Rating System (Washington DE 1993). In addition, Ohio's method has been developed with the aid of a team of wetland experts with a diverse background in the protection, assessment, restoration, and management of Ohio's wetlands.

Ohio EPA has and is continuing to undertake substantial research to validate and calibrate the Ohio Rapid Assessment Method using vascular plants, macroinvertebrates, and amphibians as indicator organisms. Ohio EPA has validated and calibrated other qualitative evaluation schemes for other surface water systems, e.g. the Qualitative Habitat Evaluation Index for Streams (Rankin, 1989). The results from Ohio EPA wetland biocriteria studies, to date, support the conclusion that the ORAM is able to distinguish between Category 1, 2 and 3 wetlands as they are defined in OAC Rule 3745-1-54 (Fennessy, Geho, Elifritz, and Lopez 1998a; Fennessy, Gray, Lopez, and Mack 1998b; Mack, Micacchion, Augusta, and Sablak 2000; Micacchion, Gray, and Mack 2000).

Scoring ranges are found in the most recent version of the companion document *ORAM v. 5.0 Quantitative Score Calibration.* This and subsequent revisions to the scoring ranges are posted on Ohio EPA's web page at http://www.epa.state.oh.us/dsw/401/401.html.

As previously discussed, rapid assessment methods are not a substitute for detailed studies of the biology and functions of wetlands. Every attempt has been made to reduce the "error-rate" of this method, but the user should always evaluate the possibility that the method may have over- or under-scored the wetland being evaluated, especially when the wetland does not fit into the assumptions built into this method. In this regard, the Rater will do well to remember that nature does not read the User's Manual.

Given that the ORAM is primarily a regulatory tool for determining a wetland's category, user's should be especially cautious in applying the results of the method outside of this context, although Ohio EPA is beginning to evaluate its use in other contexts, e.g. evaluation of success of restoration projects.

2.1 Interpreting the Narrative Rating Answers.

The Narrative Rating is designed to incorporate narrative elements of the Wetland Water Quality Standards and Wetland Antidegradation rules as well as to require the Rater to consult known information sources regarding the wetland. Depending on the question, there are three possible answers to the Narrative Rating: the wetland is a Category 1 wetland; the wetland “should be evaluated for possible Category 3 status”; and, "the wetland is a Category 3 wetland." Each of these “answers” presents separate interpretation issues.

2.1.1 The wetland is a Category 1 wetland.

This is a possible answer to Question 5 of the Narrative Rating. If the Rater answers "yes" to this question, the wetland should be considered a Category 1, unless the wetland scores above the Category 1 threshold on the Quantitative Rating. In that case the Rater should reevaluate the category of the wetland using the narrative criteria[6] in OAC Rule 3745-1-54(C) and further evaluate the wetland using detailed assessments, including determining a wetland IBI score for that type of wetland.

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[6] OAC Rule 3745-1-54(C) includes narrative criteria describing the characteristics of Category 1, 2, or 3 wetlands. These criteria should be distinguished for the narrative wetland water quality standards in OAC Rule 3745-1-51.

2.1.2 The wetland should be evaluated for possible Category 3 status.

This is a possible answer for Narrative Rating Questions 1, 8b, 9b, 9e, and 11. For a wetland that should be evaluated for possible Category 3 status, the Rater should 1) evaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and 2) evaluate the category of the wetland using the Quantitative Rating. If the wetland is determined to be a Category 3 wetland using either of these, it is a Category 3 wetland. In addition, detailed biological or functional assessments may also be used to determine the wetland's category, including determining a wetland specific IBI score.

2.1.3 The wetland is a Category 3 wetland.

This is a possible answer to Narrative Rating Questions 2, 3, 4, 6, 7, 8a, 9d, and 10. In this situation, the wetland should be considered a Category 3 wetland unless the wetland scores in the Category 1 range on the Quantitative Rating. In that case the Rater should reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and further evaluate the wetland using detailed biological or functional assessments, including determining the IBI score for that type of wetland.

2.2 Quantitative Rating.

2.2.1 General considerations for the quantitative score.

In interpreting the score from the Quantitative Rating, the Rater is referred to the most recent version of the companion document *ORAM v.5.0 Score Calibration* which is posted on Ohio EPA's web page at http://www.epa.state.oh.us/dsw/401/401.html. Some general considerations in interpreting the ORAM score are discussed below.

The Rater is cautioned that the ORAM scoring breakpoints that are in use at the time the wetland is rated may have been developed based on the scoring and study of wetlands located primarily in the other ecological regions. Ohio EPA will be studying wetlands in all of the state's ecoregions in the coming years, but the user should be aware that the scoring ranges and breakpoints may have been calibrated based on biological data obtained from wetlands of classes (vegetation, hydrogeomorphic) or regions different from the wetland being evaluated. Thus, the scoring breakpoints should be applied with caution to wetlands located in ecoregions that have not been studied and to wetlands located in riparian or lacustrine settings. Ohio EPA has found significant ecoregional differences in streams, and this may also be the case for wetlands (Ohio EPA 1988a, 1988b, 1989).

The ORAM score ranges from 0 to 100. A 100 point scale provides several advantages: 1) it has a definite maximum, 2) it is a much more intuitive base 10 scale, and 3) it provides a greater range of scores, allowing for more visual “spread” when graphing the score versus quantitative biological data. Each “metric” in ORAM v. 5.0 also has a definite maximum. This allows the entire score to be easily partitioned and allows for a relative weighting of importance attributed to each metric. It also allows the Rater to expressly understand any built in assumptions or subjectivity and to better evaluate the method's success and failure. Table 3 shows the maximum score possible for each question and subquestion as well as the percentage of the total score represented by each question.

Table 3. Metrics in quantitative rating and the partitioning of the score

Metric	Title	submetric	submetric maximum	metric maximum	% total score each metric
1	Wetland Size	None	6	6	6%
2	Upland buffers and surrounding land use	2a Average buffer width	7	14	14%
		2b Surrounding Land Use	7		
3	Hydrology	3a Sources of Water	11	30	30%
		3b Connectivity	3		
		3c Maximum water depth	3		
		3d Duration inundation or saturation	4		
		3e Modifications to natural hydrologic regime	12		
4	Habitat alteration and development	4a Substrate Disturbance	4	20	20%
		4b Habitat development	7		
		4c Habitat alteration	9		
5	Special Wetland Communities	None	10+/10-	10	10%
6	Vegetation, Interspersion, Microtopography	6a Wetland vegetation communities	18	20	20%
		6b Horizontal community interspersion	5		
		6c Presence of Table 1 Invasives	-5		
		6d Microtopography	12		

2.2.2 Interpreting and applying the quantitative score.

The following decision rules should be used to interpret the score a wetland receives on the Quantitative Rating.

Wetlands that fall clearly within the scoring range for a wetland category.

Assuming the category has not been determined using the Narrative Rating, if the Quantitative Rating score is *within the scoring range* for a particular category, the wetland should be assigned to that category. For example, assume the scoring range for a Category 2 wetland is 35.0 to 59.9. The wetland receives a score of 43 on the quantitative rating; the wetland should be assigned to Category 2. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) or detailed functional or biological assessments can be used to clarify or change a categorization based solely on an ORAM score.

Wetlands that fall within the scoring "gray zone" between categories.

Assuming the category has not been determined using the Narrative Rating, if the quantitative rating score is *between the scoring ranges* for Categories 1 and 2 or Categories 2 and 3, i.e. is in the "gray zone" between categories, the Rater can do either of the following:

1. Assign the wetland to the *higher* of the two categories, e.g. if the wetland is in the gray zone between Category 1 and 2, the Rater would assign the wetland to Category 2;

2. Assess the quality of the wetland using a nonrapid method, i.e. a detailed functional and/or biological assessment of the wetland and use this information in conjunction with any wetland indices of biotic integrity, the narrative criteria in OAC Rule 3745-1-54(C), etc., to assign the wetland to a category.

2.3 Problem situations and reevaluation of ORAM categorization.

Although it was designed to minimize such occurrences, in certain situations the ORAM and the ORAM score calibration may over- or under-categorize a particular wetland. Built into the ORAM is the assumption that human disturbance degrades the biological integrity and functioning of wetland ecosystems. This assumption is sound and well supported by the literature. However, in some instances a wetland may be degraded but still exhibit one or more moderate or superior functions, which could result in the wetland being under-categorized by the ORAM. Conversely, it is possible that a wetland could be over-categorized by the ORAM.

The narrative criteria for a Category 3 wetland in OAC Rule 3745-1-54(C) states that "Wetlands assigned to Category 3 support superior habitat, or hydrological or recreational functions..." Thus, a wetland only needs to exhibit superior functioning in one or these areas to be Category 3.[7] Thus, a wetland may be under-categorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(3) are controlling and the under-categorization should be corrected.

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[7] Similar language is used in the narrative language for Category 1and 2 wetlands. OAC Rules 3745-1-54(C)(1) and (2).

2.4 Seasonality, Droughts and Floods.

The Rater should be aware that the time of year in which a rapid assessment is performed may affect metric and submetric scores as well as the overall score for the wetland. Based on the use of previous versions and this version of the ORAM, the most reliable scores are obtained during the growing season: approximately April through October depending on where in the state the wetland is located. Although there are numerous seasonal factors which could affect the assessment, several bear consideration: In situations where categorization will be based solely on the wetland's quantitative score, the time of the year of the assessment should be evaluated to determine whether the score has been suppressed due to seasonal factors and whether the wetland has been under-categorized because of this.

1. Assessments should generally not be performed when their has been significant snowfall which obscures the wetland and its plant communities. If an assessment is performed during such a time, it should be rescored after snowmelt.

2. Some riparian wetlands experience very deep flood events at various times during the year. Given the ORAM's reliance on an evaluation of plant community quality, heterogeneity, sources of hydrology, etc., a follow up assessment may be necessary after the flood waters have receded.

3. Assessments performed in the winter or early spring will often find large areas of what appears to be open water but in actuality later in the growing season is really mudflat with obligate annuals, aquatic beds, or sedge meadow. This situation can occur at inland wetlands, in riparian contexts, and in coastal situations. In these circumstances, the Rater should make a notation on the rating forms that the open water may not be "open water" or the Rater may need to infer the community present during the growing season from plant stems or seed heads left over from the previous season.

4. Given their reliance on plant communities, Metric 6 and Submetric 4c may be underscored during winter, early spring, or late fall.

5. Metric 3 and its submetric questions may be underscored during drought years or during late summer drydowns typical of many inland depressional wetlands. During these periods, it is likely that secondary indicators of hydrology will need to be used to answer these questions. Areas of uncertainty should be noted on the scoring sheets.

A reassessment or confirmation of an assessment performed during a problem period can be required, especially in situations where categorization was based solely on the wetland's score and it is within a gray zone or just below a category breakpoint.

3.0 HOW TO USE THE ORAM AND THIS USER'S MANUAL.

The ORAM consists of a series of questions found in the following forms:

Background Information
Scoring Boundary Worksheet
Narrative Rating
Quantitative Rating
Wetland Categorization Worksheets

Each of these sets of questions emphasizes different aspects of the wetland category descriptions found in OAC Rule 3745-1-54. *Failure to properly complete all questions may result in the incorrect categorization of the wetland.* For example, failure to properly complete the Narrative Rating will not allow the rater to determine whether the wetland is a Category 3 wetland because of the documented presence of a threatened or endangered species (Recall that OAC Rule 3745-1-54(C)(3) states that the presence of threatened or endangered species is an indicator that the wetland is a Category 3 wetland).

The underlying logic and purpose of the ORAM is discussed briefly below. More detailed discussions of individual questions can be found in Sections 5.0, 6.0, and 7.0.

The "Background Information" incorporates basic information about the Rater, the location of the wetland, the wetland's size, shape, and position in the landscape, and the information sources the Rater has used, e.g. USGS Maps, Wetland Inventory Maps, etc. In addition to estimating the size of the wetland, it is implicit in filling out the Background Information form that the Rater determine the "scoring boundaries" of the wetland being evaluated. This determination is discussed in detail in Section 4.0.

The "Scoring Boundary Worksheet" is designed to ensure that the Rater has properly decided what wetland or wetlands are being evaluated since incorrectly establishing the scoring boundaries can substantially change the result of the ORAM evaluation.

The "Narrative Rating" consists of a series of eleven questions designed to determine whether a wetland is a Category 3 wetland or to alert the Rater that the wetland may be a Category 3 wetland. As discussed above, Category 3 wetlands support "superior" habitat, hydrological, or recreational functions. They often provide habitat for threatened or endangered species or are wetlands of exceptional quality or rarity. Questions 1, 2, 3, and 4 of the Narrative Rating portion of the ORAM ask the Rater to consult the Natural Heritage Program database and/or other readily available information sources to determine whether the wetland in question has the characteristics of a Category 3 wetland. These questions are intended to be answered by "literature review" type activities that can be performed "in the office."

Questions 5 through 11 of the Narrative Rating are also designed to determine whether a wetland is a Category 3 wetland or to alert the Rater that the wetland may be a Category 3 wetland. In addition, the Narrative Rating also allows the Rater to determine whether a wetland is a Category 1 wetland. With regards to Category 3 wetlands, these questions focus more on whether the wetland in question is unique, regionally scarce or scarce throughout Ohio, e.g. bogs, fens, mature or old-growth forested wetlands, coastal marshes, etc, and also allows for the identification of particular types of wetlands which often have high levels of diversity, high native species richness, or high functional values.

It is very important to properly and thoroughly answer each of the questions in the Narrative Rating. These questions are designed to categorize certain wetlands as very low quality (Category 1) or as very high quality (Category 3). ***Therefore, just completing the Quantitative Rating Questions gives an incomplete answer as to the wetland's regulatory category.***

The Quantitative Rating consist of six "metrics": wetland size (metric 1), upland buffers and surrounding

land use (metric 2), hydrology (metric 3), habitat (metric 4), special wetland communities (metric 5) and vegetation, interspersion, and microtopography (metric 6). The score is on a 100 point scale. Interpreting the final score is discussed below in Section 2.0. These questions are intended to act as surrogates for more direct and time-consuming measures of function. They are designed to ensure that wetlands that have moderate to high quality functions and habitats will be rated as Category 2 or 3 wetlands, while highly degraded systems with minimal functions or habitats will be rated as Category 1 wetlands.

The following sections (4.0, 5.0, 6.0, 7.0) contain detailed information for completing the Ohio Rapid Assessment Method for Wetlands. These sections are organized in a linear fashion beginning with establishing the scoring boundaries and then working through each set of questions in turn.

It should be noted that the ORAM is flexible enough to be completed using only inventory maps and aerial photographs. However, this is not sufficient to categorize a wetland for regulatory purposes. It is expected that in most instances a field survey will need to be performed.

The time necessary to evaluate a particular wetland will vary. For small isolated wetlands, the Narrative and Quantitative Ratings may be able to be answered in a few minutes. For large wetlands, or wetlands that are part of a complex of wetlands that must be scored together, it may take several hours to accurately evaluate the wetland. In some instances inventory maps and aerial photographs may be useful, in conjunction with the field survey, in answering some of the Quantitative Rating questions, e.g. connectivity to riparian or upland corridors, size of vegetation classes, etc.

The ORAM is designed to be used by persons with a wide range of training and experience. It does not require the Rater to be an expert in field botany although it does require and assume an ability to identify the dominant plant species and a knowledge of basic vegetation sampling techniques, e.g. the rater should be familiar with the concept of “cover” and how to determine percent cover. The method also requires an ability to recognize high quality or unique wetlands (e.g. fens and mature forested wetlands), and a familiarity with the kinds of wetlands and the type and quality of the vegetation communities typically found in the regions of Ohio in which the Rater is working. In addition, the Rater should be aware of the amphibian species that live and breed in wetlands, and be able to evaluate whether a wetland provides habitat for such species. In general, persons trained to delineate wetlands in accordance with the 1987 Corps of Engineers Delineation Manual should have the necessary basic skills to use the ORAM.

4.0 BACKGROUND INFORMATION.

Name

The name of the Rater(s) should be listed

Date

The date the wetland is visited should be included. If the Rater does not perform a site visit, the date the form is completed should be included.

Affiliation

The Rater's affiliation should be listed, e.g. business name, governmental entity, etc.

Address

List address where the Rater can be contacted.

Phone Number

List the phone number where the Rater can be contacted.

e-mail address

List the e-mail address, if any, where the Rater can be contacted.

Name of Wetland

Include the name of the wetland if one exists. Alternatively, provide the name of the parcel, the owner's name, or any other descriptive title used to identify the wetland, e.g. Wetland located on the Smith tract, or Wetland B-1, etc.

Vegetation Communities

List all of the vegetation communities present within the wetland being evaluated.

HGM Class

Describe the hydrogeomorphic class that the Rater would assign the wetland to.

Location of Wetland

Describe the location of the wetland with sufficient detail that someone unfamiliar with its location could find it by reference to USGS maps, County Road Maps, etc. If the property has a street address, include the street address. For example, "Wetland is located 0.3km northeast of the intersection of Highway 1 and Main Street in Pleasantville Township, Utopia County. Include a locational sketch to aid in locating the wetland.

Latitude/Longitude or UTM Coordinate

Include the wetland's latitude and longitude.

USGS Quad Name

List the name(s) of the United States Geological Survey 7.5 minute Quadrangle map that cover the area where the wetland is located.

County, Township, Section, and Subsection

List the names of the county, township, section, and subsection where the wetland is located.

Sources of Information

The intent of this section is for the Rater to identify the sources of information used by the Rater to complete the forms.

Wetland Size

The estimated size of the wetland in acres or hectares should be listed. In addition, the Rater should indicate how the size was estimated, e.g. visually, using a map, GIS, by a survey, etc. Refer to Section 4.0 for a more detailed discussion of estimating wetland size.

Site Sketch

A sketch of the wetland indicating its approximate shape, major vegetation classes and open water classes, relation to other surface waters, landmarks, and a north arrow should be included. A more detailed map of the wetland, if one is available, can be referred to here in place of a hand-drawn sketch.

Comments, Discussion of Problems, Justification for Categorization Changes

The Rater should include narrative discussing problem questions, uncertainties, or reasons for disagreeing with ORAM results in this section.

Final Score

The score from the Quantitative Rating should be written here.

Wetland Category

The wetland's category as determined by the Rater should be listed.

5.0 DETERMINING THE SCORING BOUNDARIES. [8]

The initial step in completing the ORAM is to identify the scoring boundaries[9] of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland.

Establishing a proper scoring boundary is the critical first step in performing a correct rapid assessment. An incorrect scoring boundary can result in an under- or over-categorization of the wetland being assessed.

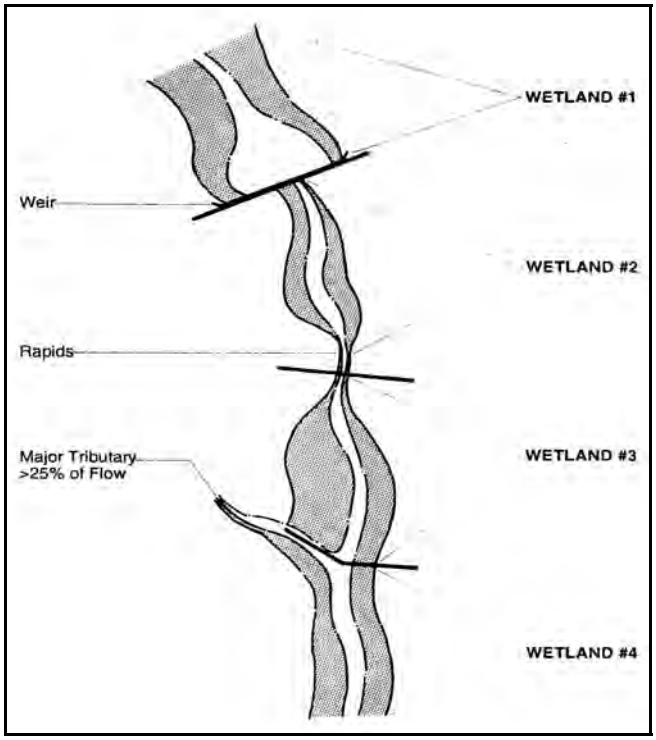

Figure 1. Boundaries for contiguous wetlands along a stream corridor or floodplain. Adapted from Washington DE (p. 13, 1993).

5.1 General Guidelines.

Hydrology is the main criterion that should be used in establishing scoring boundaries. Boundaries between contiguous or connected wetlands should be established where the volume, flow, source or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. There are several general guidelines which should be used. These guidelines are also applicable when applying the specific guidelines outlined in Section 4.2.

1. Identify the wetland area of interest. This may be the site of a proposed impact, a mitigation site, conservation site, etc.

2. Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic

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[8] Most of this section is substantially similar to the Washington State Wetland Rating System, 2nd Edition, 1993, pages 12-14, 57-60 (Washington DE 1993). Credit for the concepts, format, figures, and in some instances, text goes to the authors of that manual.

[9] For the purposes of the ORAM, "Scoring boundary" means the boundary placed around a wetland for the purposes of categorizing a wetland using the Ohio Rapid Assessment Method for Wetlands. Depending on the circumstances, the scoring boundary, may or may not coincide with the jurisdictional boundary. "Jurisdictional boundary" means the legal boundary of the wetland for the purposes of determining whether the location is regulatable under the Clean Water Act.

interaction between the wetlands or parts of a single wetland.

3. Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction, are included within the scoring boundary.

4. Artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc. *should not be used* to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes. *See* additional discussion below.

5. Wetlands often have several dominant vegetation communities. For example, a wetland may be predominately forested with emergent or shrub communities along one side. Or a wetland may have a high quality forested area contiguous to a degraded emergent area. It is generally not appropriate to treat these as separate wetlands and separately score them.

6. In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.

Figure 1 shows how these guidelines would be used to establish scoring boundaries for a series of interconnected riparian wetlands. It is important to note that all of these wetlands are contiguous to each other but are separated for scoring purposes by obvious breaks in the hydrology.

In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with large areas of open freshwater, streams, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that the Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Unit if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

5.2 Wetlands that form a Patchwork on the Landscape.

The Rater may be presented with a situation where the wetland is part of a complex of wetlands. Often the wetlands are separated from each other by upland areas that are lacking in one, two, or all three of the indicators of a jurisdictional wetland. In Ohio, this situation could occur in an area where there are multiple vernal pools separated from each other by small areas of upland forest, or in complex of emergent and forested wetlands in a 100 year flood plain.

Wetlands that are small (<1 acre or 0.4ha), located in close proximity to each other within the same forest, flood plain, soil mapping unit, etc., and that are separated from each other by relatively narrow areas of non-wetland, should be scored together as a "single" wetland. The procedure in Table 4 may aid in the determination of the scoring boundary.

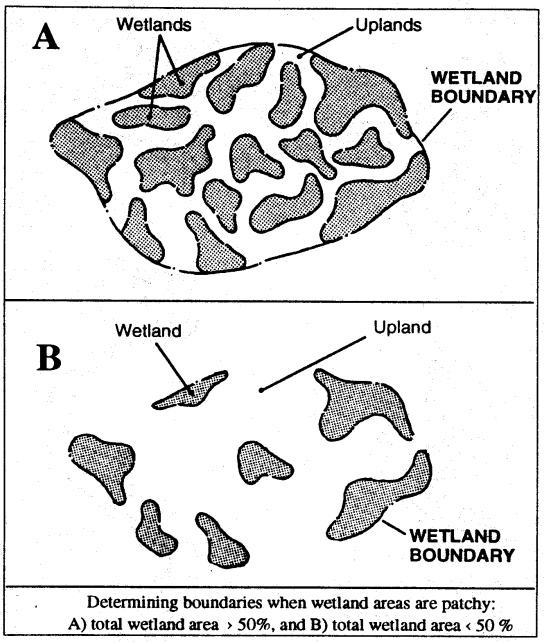

Figure 2. Establishing scoring boundaries for wetlands located in a patchwork or mosaic on the landscape. A: area of wetlands is >50% total area and average distance between wetland's is <30 meters; scoring boundary set around entire mosaic. B: total wetland area is <50% and average distance between wetlands is >100 meters; scoring boundary is set around individual wetlands. Adapted from Washington DE (p. 60 1993).

Table 4. Decision table for determining whether to score wetland separately or as a patchwork on the landscape

1	Is the wetland less than 1 acre (0.4ha) in size?	yes go to question 2	no score wetland separately
2	Is the wetland a part of a patchwork or mosaic of wetlands on the landscape?	yes go to question 3	no score wetland separately
3	Are the wetlands in a patchwork or mosaic of wetlands less than 100 ft apart on average?	yes go to question 4	no score wetland separately
4	Do the areas that are jurisdictional wetland within the patchwork or mosaic cover more than 50% of the surface area of the patchwork or mosaic?	yes score the entire patchwork or mosaic as a "single" wetland	no score wetland separately

Figure 2 may be helpful in identifying situations in which the scoring boundary is established around a mosaic of wetlands and in which a wetland is scored separately from other nearby wetlands. CAUTION: nothing stated here is intended to and should not be construed to affect the jurisdictional boundaries of the wetland in question.

5.3 Wetlands divided by artificial boundaries such as property lines, roads, or railroad embankments.

Wetlands should be rated *without regard to property boundaries or boundaries between political jurisdictions*, e.g. county lines, city limits, township lines, local, state, or federal park boundaries, etc.

Wetlands that are divided by artificial physical barriers like roads and railroad beds should generally be scored as a single wetland *provided there is a surface water connection between the two parts of the wetland that permits flow of water, fish, or other organisms between the wetlands*, at least at some times during the year, e.g. during times of high water during the spring. For example, if there are wetlands on either end of a culvert under a road, the scoring boundary should be established around both wetland areas and the wetland rated as a "single" wetland.

5.4 Wetlands contiguous with an area of open water (e.g. a lake, pond, or reservoir).[10]

In some circumstances in Ohio, wetlands are contiguous to large and small areas of open water. Examples of this include wetlands that surround a natural kettle lake, wetlands that have developed or remain adjacent to reservoirs, and coastal or estuarine wetlands located along Lake Erie. The Rater should determine the scoring boundary based on the following guidelines.

5.4.1 The area of open water is less than or equal to 20 acres in size.

Referring to Figure 3, if any part of a wetland is located contiguous to an area of open water that is less than or equal to 20 acres, the scoring boundary should include 1) Wetland #1, 2) the area of open water, e.g. the kettle lake itself, and 3) any other wetlands including Wetland #2 that are contiguous with the area of open water. The boundary of the open water area is at the point where a stream flows into

[10] "Open water" is defined in Section 7.0 below.

and out of the area of open water.[11] In Figure 3, the wetlands located contiguous to the open water and the stream at the line dividing the stream from the lake, are also included in the scoring boundary.

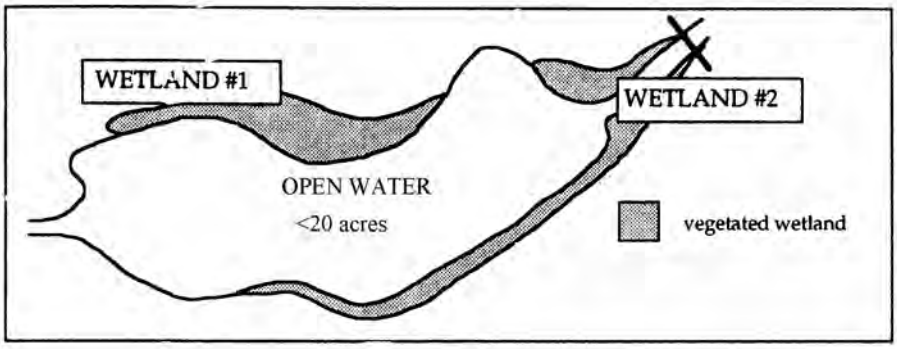

Figure 3. Scoring boundaries of wetlands contiguous to areas of open fresh water <20 acres. Adapted from Washington DE (p. 57, 1993).

5.4.2 The area of open water is greater than 20 acres in size.

If any part of a wetland is located contiguous to an area of open water that is greater than 20 acres), the scoring boundary should *include* the area of open water, with the following exceptions: 1) only 0.5 acres of open water should be added to the size of the wetland (although the wetland should *not* be considered to have an "open water" vegetation class; and 2) if aquatic beds or mudflats are contiguous to the wetland, they should be included in the scoring boundary and the wetland should also score points for having these classes (Metric 6). This situation is illustrated in Figure 4. In this example, Wetland #1 is 2.7 acres in size. The size of the wetland excludes all but 0.5 acres of the area of open water. The wetland receives 3 points instead of 2 in Metric 1 (wetland size) since its total size is considered to be 3.2 acres. In addition, an area of aquatic bed vegetation, e.g. *Nymphaea odorata*, extends into the lake. The aquatic bed community is included in the wetland's size and the wetland also receives points for having an "aquatic bed" vegetation community in Metric 6.

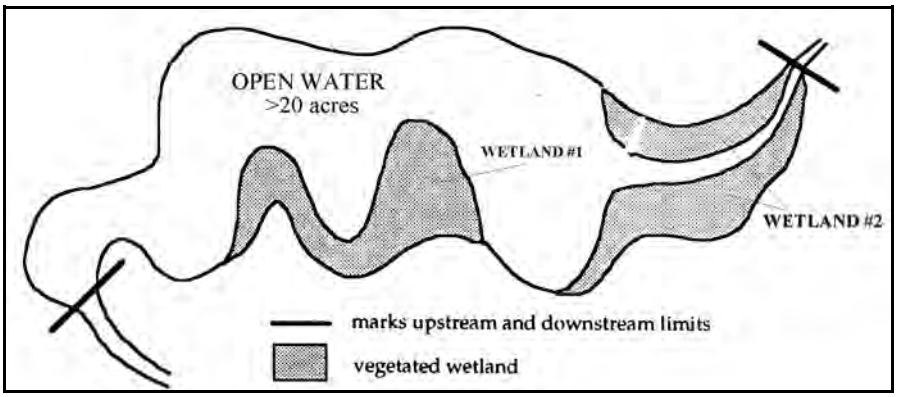

Figure 4. Scoring boundaries of wetlands contiguous to areas of open fresh water 20acres. Adapted from Washington DE (p. 57, 1993).

Finally, Wetland #2 in Figure 4 is contiguous to the same area of open water as Wetland #1 as well as to a stream. Because the predominant influence on Wetland #2's hydrology is the stream, it should be rated separately in relation to the area of open water. However, if Wetland #1 and #2 shared a similar lake-dominated hydrology and were part of the same wetland/lake system, in certain instances they may be more appropriately scored together.

5.5 Wetlands contiguous to a stream, river or ditch.

Separate scoring boundaries for two or more wetlands that are contiguous to a stream, river or ditch should be established, if the wetlands are separated from each other by either 1) non-wetland corridors greater than 200ft long, or 2) wetland corridors that are less than 50ft wide (including the stream channel) at its widest point, and greater than 200 ft long. Wetlands that are located on opposite sides of a stream, river or ditch are scored together as a single wetland, unless the stream bed or its meander

[11] For the purposes of this guideline, the stream begins where there is at least seasonal flow of water that is predominately in one direction and there is a defined bank or series of banks containing water.

channel is greater than 200ft wide on average.[12] These situations are illustrated in Figure 5.

In Figure 5, separate scoring boundaries are established for Wetland #1 and Wetland #2 since more than 200ft of non-wetland stream corridor separates them. The scoring boundary for Wetland #1 and #2 includes the wetlands located on both sides of the stream since the stream averages less than 200ft. In contrast, separate scoring boundaries are established for Wetland #3 and Wetland #4, since Wetland #3 is less than 50ft wide and more than 200ft long. The dividing line between the scoring boundaries of Wetland #3 and #4 set at the point the wetland width abruptly changes (becomes wider).

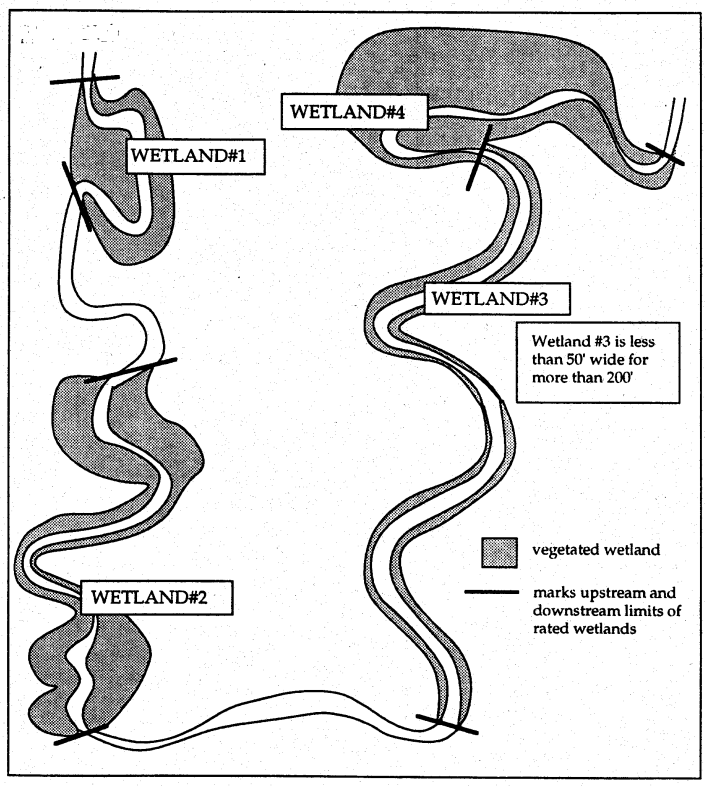

Figure 5. Scoring boundaries for wetlands contiguous to a stream or river. Adapted from Washington DE (p. 59, 1993).

5.6 Estuarine Wetlands.

In Ohio, freshwater estuarine wetlands are located along the Lake Erie coastline. One of the most famous examples of an Ohio estuarine wetland is Old Woman Creek National Estuarine Reserve in Huron, Erie County, Ohio. Other major estuarine systems can be found in the Maumee River and the Huron River, the Lake Erie Islands, and the mouths of other small rivers along Ohio's Lake Erie coastline (Herdendorff 1987; Schneider 1999). Estuarine wetlands are wetlands whose hydrology is strongly influenced by water from Lake Erie as well as from the streams or rivers that enter them. Hence, they have characteristics of both types of systems.

In most instances, the guidelines for wetlands adjacent to areas of open water and to streams or rivers in Sections 4.4 and 4.5 should allow the rater to appropriately establish the scoring boundary of estuarine wetlands.

5.7 Scoring Boundaries where only part of a wetland is Category 3.

Large wetlands often contain areas that would be rated as Category 3 wetlands because they contain features, such as bogs or areas of mature forest, that cover a smaller area, but the remainder of the wetland would be rated as Category 2. In this situation, the wetland could be 1) rated in its entirety as a Category 3 wetland; or 2) be given a dual wetland rating as a Category 2/3 wetland.

To assign a dual rating, the Rater will need to separate the Category 3 wetland from the Category 2 wetland by establishing a scoring boundary between them. Depending on the type of wetland and the physical circumstances at a particular site, a dual rating may not be possible. For example, where there is a strong degree of hydrological interaction between all areas and communities of a wetland, a dual

[12] It is recommended that average stream width be determined using the methods described in Rosgen (1996).

rating would not be appropriate, even if parts of the wetland were of lower quality due to past disturbances.

Under the ORAM, *dual ratings are never acceptable for Category 3 wetlands that are determined to be Category 3 using the Narrative Rating*. *In no instance is a Category 1/2 or 1/3 dual rating appropriate under the ORAM.*

It is important to stress that in deciding whether a dual rating is appropriate, it will be necessary to demonstrate that the Category 3 wetland will be protected from direct and indirect adverse impacts. If this cannot be demonstrated, then a dual rating is inappropriate and the entire wetland should be rated as a Category 3 wetland. The use of a dual rating should be considered an exception rather than the rule in establishing scoring boundaries and categorizing wetlands.

6.0 NARRATIVE RATING.

The Narrative Rating consists of a series of eleven questions designed to determine whether a wetland is a Category 1 or Category 3 wetland or to alert the Rater that the wetland may be a Category 3 wetland. As discussed above in Section 1.3, Category 3 wetlands support "...superior habitat, or superior hydrological or recreational functions." They often provide habitat for threatened or endangered species or are wetlands of exceptional quality.

The first four questions ask the Rater to consult the U.S. Fish and Wildlife Service, the State of Ohio's Natural Heritage Database[13] and/or other readily available information sources to determine whether the wetland in question has the characteristics of a Category 3 wetland. These questions are intended to be answered by literature review type activities that can be performed in the office.

The remaining questions focus more on whether the wetland in question is of very poor quality, locally scarce or scarce throughout Ohio, e.g. bogs, fens, mature or old-growth forested wetlands, undisturbed coastal marshes, etc., and also allows for the identification of particular types of wetlands which often have high levels of diversity, high native species richness, or high functional values. It is very important to properly and thoroughly answer each of the questions in the Narrative Rating. ***Just completing the Quantitative Rating may give an incomplete answer as to the wetland's regulatory category.***

6.1 Critical Habitat.

Question 1. Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as critical habitat for any threatened or endangered plant or animal species?

Critical habitat is defined as the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. However, as of December 1, 2000, of the federally listed endangered or threatened species that are or may be present in Ohio, only the Indiana Bat has had critical habitat designated, and this critical habitat is located outside the State of Ohio. *See* 50 CFR 17.95(a). However, the U.S. Fish and Wildlife Service recently proposed critical habitat for the Great Lakes breeding population of the Piping Plover along portions of the State of Ohio's Lake Erie shoreline. *See* 65 Federal Register 41812 (July 6, 2000).

The Rater should contact the Region 3 Headquarters or the Reynoldsburg Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. *See* Important Contacts at the beginning of the Manual. *See also* USFWS endangered species program homepage for summary lists of endangered and threatened species in Ohio and Region 3 at http://www.fws.gov/r9endspp/r3spndx.html.

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[13] "The Natural Heritage Data Base was started in 1976. It now contains over 13,000 records which represent known locations for Ohio's rare plants and animals, high quality plant communities and other natural features. Data are obtained from a broad range of sources including the division's botanists, zoologist and ecologist, museums and herbaria, publications and experts throughout the state. In addition to the division's needs, data are used in the department's environmental review process and are provided to consulting firms, federal, state and local government agencies, conservation groups and private citizens." Excerpted from http://www.dnr.state.oh.us/odnr/dnap/heritage/herintro.html.

6.2 State or Federal Threatened or Endangered Species.

Question 2. Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant[14] or animal species[15]?

In order to properly answer this question, the Rater should, *at a minimum*, submit a Data Request Form to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Database Services, 1889 Fountain Square, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/odnr/dnap/heritage/.[16]

In the Data Request Form, the Rater should specifically request that the Natural Heritage Database be searched for records of state and federal endangered species that have been documented to occur at the wetland being evaluated.

In addition, the Rater should consult any other published literature and accounts available to the Rater which indicate that an endangered or threatened species has been found at the wetland being evaluated.

Finally, Question 2 should be answered affirmatively, if the Rater, or other persons known to the Rater, actually observes a state or federal threatened or endangered species at the wetland.

6.3 High Quality Wetlands.

Question 3. Is the wetland on record with the Ohio Natural Heritage Program as a high quality wetland?

In order to properly answer this question, the Rater should, *at a minimum*, do both of the following:

Submit a Data Request Form to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Database Services, 1889 Fountain Square, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/odnr/dnap/heritage. The Rater should specifically request in the "Other Features" category of the Data Request Form whether the wetland is documented in the Natural Heritage Database as a wetland of high quality on a County, Regional, and/or Statewide level.

Finally, the Rater should consult any other published literature and accounts available to the Rater which

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[14] The status list for rare native Ohio plants is revised every two years. The current 1998-99 list contains 642 species and became effective on June 13, 1998. *See* http://www.dnr.state.oh.us/odnr/dnap/heritage/ for the most recent version of the list. State status is determined from records in the Natural Heritage Data Base. Six Ohio plants are also included on the federal list of endangered and threatened species. Running buffalo clover (*Trifolium stoloniferum*) is federally endangered. Northern monkshood *(Aconitum noveboracense*), lakeside daisy (*Hymenoxys herbacea)*, small whorled pogonia (*Isotria medeoloides)*, prairie fringed orchid (*Platanthera leucophaea)*, and Appalachian spiraea (*Spiraea virginiana)*, are federally threatened.

[15] *See* OAC Rule 1501:31-23-01 for a list of state threatened, endangered, and special interest animal species. *See* Appendix VII for federally threatened and endangered animal species.

[16] Fees for the submission of a Data Request Form are determined by the time it takes to complete the request. As of 2001, the charge is $25.00 per ½ hour with a ½ minimum. A cost estimate can be provided upon request. Unless otherwise specified, an invoice will accompany the data services response.

indicate that the wetland being evaluated is of high quality.

6.4 Significant breeding/nonbreeding bird concentration areas.

Question 4. Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?

In order to properly answer this question, the Rater should, *at a minimum*, do both of the following:

1. Submit a Data Request Form to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Database Services, 1889 Fountain Square, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/odnr/dnap/heritage. The Rater should specifically request in the "Other Features" category of the Data Request Form whether the wetland is documented in the Natural Heritage Database as a wetland where breeding/nonbreeding animal concentrations are known to occur.

2. Consult the North American Waterfowl Management Plan for Ohio. State Contact: Pat Ruble, Ohio Division of Wildlife, 1840 Belcher Drive, Columbus, OH 43224-1329, 614-265-6330 (phone), 614-262-1143 (fax). Regional Contact: Jim Leach, Joint Venture Coordinator, U.S. Fish and Wildlife Service BHW Federal Building, 1 Federal Drive, Fort Snelling, MN 55111-4056, 612- 713-5433 (phone), 612-713-5286 (fax).

Finally, the Rater should consult any other published literature and accounts available to the Rater which indicate that the wetland being evaluated provides regionally significant breeding or nonbreeding concentration areas.

6.5 Category 1 Wetlands.

Question 5. Is the wetland less than 1 acre in size and hydrologically isolated and either (1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phragmites australis, Lythrum salicaria,* or *Phalaris arundinacea*, or (2) an acidic pond created or excavated on mined lands that has little or no vegetation?

Certain types of wetlands are of such low quality and so small that the Wetland Antidegradation rule describes them as, in a sense, automatic Category 1 wetlands. In addition, it is assumed that the loss of this type of wetland is able to be successfully mitigated. *See* OAC Rule 3745-1-54(C)(1)(c). The key feature of these wetlands is that they are small, and that they are completely "hydrologically isolated" from all other surface waters.[17] In order to be considered hydrologically isolated, the wetland being evaluated must meet all three of the criteria in the definition in OAC Rule 3745-1-50(T). Assuming the wetland is hydrologically isolated, two types of wetlands are automatically considered to be Category 1 wetlands.

The first type are wetlands dominated by purple loosestrife *(Lythrum salicaria)*, reed canary grass (*Phalaris arundinacea)*, or phragmites *(Phragmites australis)*. Generally, these wetlands will appear to be small shallow, emergent marshes. The second type are wetlands that often develop on strip-mined lands. They are generally characterized by shallow, depressional areas with sparse or no vegetation.

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[17] *See* OAC Rule 3745-1-50(T). "Hydrologically isolated wetlands" means those wetlands which, (1) have no surface water connection to a surface water of the state; (2) are outside of, and not contiguous to, any one hundred-year "flood plain" as that term is defined in this rule; and (3) have no contiguous hydric soil between the wetland and any surface water of the state.

6.6 Bogs.

Question 6. Is the wetland a peat-accumulating wetland that has 1) no significant inflows or outflows, 2) >30% cover of acidophilic mosses, particularly Sphagnum *spp., 3) at least one of species listed in Table 1 in the wetland, and 4) <25% cover of the invasive species listed in Table 1?*

Bogs are defined in OAC Rule 3745-1-50 as "a peat-accumulating wetland that has no significant inflows or outflows and supports acidophilic mosses, particularly *Sphagnum* spp." In Ohio, bogs are relicts of the Wisconsinin glaciation. Bogs are often separated from "fens" (see next section) on the basis of differences in vegetation or water chemistry. However, Andreas (1985) states that this separation is often difficult and that in Ohio it is compounded by the fact that Ohio glacier-created bogs and fens are at the southern limit of their North American range, they are small in terms of surface area, and neither bogs or fens are represented in Ohio by the "classic" type of bog and fen found further north in Michigan, northern Wisconsin, or Minnesota.

Andreas (1985, p. 116) defines a "sphagnous bog" as a habitat that

> ...(1) develops in an area where drainage is blocked and there is little or no circulation of water, (2) contains a *Spaghnum* dominated ground layer which accumulates to form a more or less continuous mat, (3) has a shrubby vegetation dominated by members of the Ericaceae and a herbaceous layer primarily dominated by members of the Cyperaceae, and (4) has a water pH between 3.5 and 5.5. Typically, bog waters are brown due to the accumulation of organic material. In Ohio, plant communities with the above characteristics are referred to as *Spaghnum* mats, leatherleaf bogs, ericaceous shrub bogs, tamarack bogs, and more recently, ombrotrophic to weakly minerotrophic swamps...

In contrast, Andreas (1985, p. 116) defines "fens" as a habitat,

> ...characterized by having (1) relatively clear water coming from an artesian source which surfaces as springs or seeps, (2) a wet, springy calcareous substrate which supports minerotrophic species of *Spaghnum* and other bryophytes which do not accumulate to form a continuous mat, (3) vegetation dominated by members of the Cyperaceae, Compositae, Rosaceae and Graminae [Poaceae] with approximately 20% of the vegetation made up of shrubs, usually including *Potentilla fruticosa*, and (4) water pH between 5.5 and 8.0.

Bogs are specifically mentioned in OAC Rule 3745-1-54 in the examples of the types of the wetlands that may be Category 3 wetlands.[18] Bogs are often Category 3 wetlands because they exhibit high levels of biodiversity, are difficult to mitigate, are highly sensitive to disturbance, are generally scarce both regionally and statewide, and usually have threatened or endangered species present. *See* OAC Rule 3745-1-54 paragraphs (B)(2)a)(i), (B)(2)(b)(vii), (B)(3), (B)(4), and (C)(3).

In Ohio, most of the bogs present prior to European settlement have been destroyed or degraded. Gordon (1966) maps several large bog complexes in northeast (Geauga, Portage, Summit, Stark, Trumbull Counties), north-central (Seneca, Crawford, Morrow Counties), and south-central Ohio (Licking, Fairfield, Perry Counties). The plant and animal species present in Ohio bogs are often at the southerly limits of their distribution and represent important reservoirs of genetic diversity.

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[18] *See* OAC Rule 3745-1-54(C)(3)(c): Wetlands assigned to category 3 may include, but are not limited to: wetlands which contain or provide habitat for threatened or endangered species; high quality forested wetlands, including old growth forested wetlands, and mature forested riparian wetlands; vernal pools; *and wetlands which are scarce regionally and/or statewide including, but not limited to, bogs and fens* (emphasis added).

Certain Ohio bogs are classified as Category 3 wetlands, regardless of the bog's score in quantitative questions. A Category 3 bog has the following characteristics:

1) No *significant* inflows or outflows of surface water with significance relating to whether the bog's hydrologic regime is dominated by precipitation and evapotranspiration. However, it is expected that most bogs will have some surface water inputs from upland watershed areas. True ombrotrophic boreal bogs were probably very rare in Ohio at the time of settlement;

2) Acidophilic mosses, particularly *Sphagnum* spp., are growing in the bog.

3) Percent cover of the acidophilic mosses is greater than 30%.

4) At least one characteristic bog plant species is present[19]; and

5) the cover of invasive species is less than 25%?[20]

It is important to stress that not every bog will necessarily meet the criteria of Question 6 for automatic classification as a Category 3 wetland. In particular, bogs that are overrun with invasive species *(Rhamnus frangula* is a common invader), or are otherwise degraded may not satisfy the criteria in this question.

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[19] Characteristic bog species from Table 1 in ORAM Scoring Form.

Calla palustris
Carex atlantica var. capillacea
Carex echinata
Carex oligosperma
Carex trisperma
Chamaedaphne calyculata
Decodon verticillatus
Eriophorum virginicum
Larix laricina
Nemopanthus mucronatus
Schechzeria palustris
Vaccinium macrocarpon
Vaccinium corymbosum
Vaccinium oxycoccos
*Woodwardia virgin*ica
Xyris difformis

[20] Invasive/exotic plant species from Table 1 in ORAM Scoring Form.

*Lythrum salicaria (*purple loosestrife)
Myriophyllum spicatum (European milfoil)
Najas minor (lesser naiad)
Phalaris arundinacea (reed canary grass)
Phragmites australis (phragmites or giant reed)
Potamogeton crispus (curly pondweed)
Ranunculus ficaria (lesser celandine)
Rhamnus frangula (European buckthorn)
Typha angustifolia (narrow-leaved cattail)
Typha xglauca (hybrid cattail)

6.7 Fens.

Question 7. Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral pH (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?

A Fen is defined in OAC Rule 3745-1-50 as

> a carbon accumulating (peat, muck) wetland that is saturated, primarily by a discharge of free flowing ground water during most of the year. Fens are rarely inundated. Fens often have a sloped surface which prevents the accumulation of stagnant or ponded water. The water of fens is usually mineral rich and has a circumneutral pH (5.5-9.0). In calcareous fens, soil may be dominated by deposits of calcium carbonate rich sediments (marl). Characteristic indicator vegetation species may include, but are not limited to *Potentilla fruticosa*, *Solidago ohioensis*, *Lobelia kalmii*, *Cacalia plantaginea*, *Deschampsia cespitosa*, *Triglochin* spp., *Parnassia glauca*, *Gentianopsis* spp., *Rhynchospora* spp., and some *Eleocharis* spp."

It should be noted that this definition is considerably broader than the definition proposed by Andreas (1985) and cited above. Fens are specifically mentioned in OAC Rule 3745-1-54 in the examples of the types of the wetlands that may be Category 3 wetlands. Fens are often Category 3 wetlands because they exhibit high levels of biodiversity and groundwater discharge, are difficult to mitigate, are highly sensitive to disturbance, are generally scarce both regionally and statewide, and usually have threatened or endangered species present. *See* OAC Rule 3745-1-54 paragraphs (B)(2)a)(i), (B)(2)(b)(i), (B)(2)(b)(vii), (B)(3), (B)(4), and (C)(3).

In Ohio, most of the fens present prior to European settlement have been destroyed or degraded. Stuckey and Denny (1981) map the distribution of 52 known fens in Ohio. Fens are found throughout the state but large concentrations exist in northeast Ohio (Holmes, Portage, Stark, and Summit Counties) and in west-central Ohio (Champaign, Clark, Greene, Logan, and Miami Counties). Fens are often associated with esker-kame complexes near major end moraines (Stuckey and Denny 1981). Andreas (1985) found that 50% of Ohio peatlands (bogs and fens) were associated with esker-kame complexes (e.g. Mad River and Summit Interlobate Areas), and 82% of Ohio peatlands occur on or near buried pre-glacial river valleys. The plant and animal species present in Ohio fens are often at the limits of their distribution, and represent important reservoirs of genetic diversity.

Certain Ohio fens are classified as Category 3 wetlands, regardless of the fens' score in quantitative questions. A Category 3 fen has the following characteristics:

> 1) Saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral pH (5.5-9.0);

2) One or more fen plant species listed in Table 1[21] is present; and

3) The cover of invasive species listed in Table 1 is less than 25%

As was discussed above regarding bogs, it is important to stress that not every fen will necessarily meet the criteria of Question 7 for automatic classification as a Category 3 wetland. Fens that are overrun with invasive species, or are otherwise degraded may not satisfy the criteria in this question.

6.8 Old Growth and Mature Forested Wetlands.

6.8.1 Old Growth Forests.

Question 8a. Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?

Very little "old-growth" forest remains in Ohio and its surrounding states. Parker (1989) estimates that 0.07 percent of the original forest in the Central Hardwood Region (Ohio, Illinois, Missouri, Kentucky, Tennessee, West Virginia, western Pennsylvania, northern Arkansas, southern Wisconsin, and eastern Iowa) remains. In Ohio, many of the remaining old growth forests remnants have been acquired by the state or by local or regional park districts. e.g. Drew Woods (Darke County), Goll Woods (Fulton County), Hueston Woods (Butler County), Fowler Woods (Richland County). However, other relict forests probably still remain. According to Parker (1989), most of the old-growth forests remaining in the Central Hardwood Region are the result of long-term protection on family farms.

Prior to settlement, the Great Black Swamp, located in northwest Ohio on a former bed of Lake Erie, was one of the largest swamp forests in the lower 48 states. This large wetland system has largely been destroyed, although remnants remain in isolated woodlots in this largely agricultural region. In fact, in some western Ohio counties, many remaining woodlots contain some type of vernal pools, wet woods, or swamp forest (Mack, pers. obs.). In northeast Ohio, many forested wetlands remain, and some of these may contain old-growth stands. For example an old growth stand was recently "discovered" and acquired as Johnson Woods State Nature Preserve in Wayne County.

Thus, while the Rater should not expect to encounter old growth forests frequently, this situation should

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[21] Characteristic fen species from Table 1 in ORAM Scoring Form.

Zygadenus elegans var. glaucus	*Potentilla fruticosa*
Cacalia plantaginea	*Rhamnus alnifolia*
Carex flava	*Rhynchospora* capillacea
Carex sterilis	*Salix candida*
Carex stricta	*Salix myricoides*
Deschampsia caespitosa	*Salix serissima*
Eleocharis rostellata	*Solidago ohioensis*
Eriophorum viridicarinatum	*Tofieldia glutinosa*
Gentianopsis spp.	*Triglochin maritimum*
Lobelia kalmii	*Triglochin palustre*
Parnassia glauca	

always be considered a possibility, especially in regions that had large areas of swamp forest presettlement.

There has not been as coordinated an effort in the Central Hardwood Region to define what an old-growth forest is as has occurred in the Pacific Northwest (Parker 1989). The definition used in Question 8a and in OAC Rule 3745-1-50(EE) is largely based on Parker (1989, p.6). He states,

> Mesic old-growth deciduous forests are defined here as those with overstory canopy trees older than 150 years and with little or no understory disturbance (human-caused) during the past 80 to 100 years. These forests have an all-aged structure and multilayered canopies. Many stands currently have canopies of mid-seral species and understories of late-seral shade tolerant species with dominant canopy individuals ranging from 80 to 160 cm in diameter. Horizontal structure is characterized by aggregations of canopy trees interspersed with small all-aged canopy gaps of varying species composition. Significant numbers of standing dead snags and downed logs are also present. The mix of species found in any given forest varies by site factors and along north-south and east-west regional gradients.

Table 5, reproduced from Parker (1989, p. 8) is included as an aid in determining what is or may be old-growth forest.

Question 8a can be answered in the affirmative based on the Rater's professional judgment after a site visit in which the wetland being evaluated appears to have many or all of the characteristics of an old-growth forest. The Rater is cautioned that often the jurisdictional wetland portion of the forest will only be a small area of the total forest. For example, in Drew Woods State Nature Preserve in Darke County, most of the forest is upland forest dominated by various Oak species with ash and hickory as significant co-dominants. Portions of the forest contain relatively small, vernal pools with canopy gaps over them with buttonbush (*Cephalanthus occidentalis*) and some large swamp white oaks (*Quercus bicolor*) near the edges of the pools. Simply counting the species and basal areas of the trees within the jurisdictional wetland boundary could lead to a conclusion that the "wetland" is not "old-growth forest." This is an erroneous conclusion; when faced with this or similar situations, the Rater should conclude that wetland is *part of* an old-growth forest.

Question 8a can also be safely answered in the negative when the Rater does not observe *any* large trees in the canopy, especially when the forest is clearly young second growth with most or all trees less than 45cm dbh.

In borderline situations, or where the Rater wishes to quantitatively confirm his or her conclusion that the forest is or is not old growth, it is recommended that standard forest inventory methods be used (*See e.g.* Peet et al. 1998).

Table 5. Characteristics of mesic old-growth forests in the central hardwood forest region from published literature. From Parker (1989, p.8).

character	range	reference
tree species richness (#/forest)	20-40	*See* Parker (1989) for citations
herbaceous species (#/forest)	17-53	
breeding bird species richness (# forest)	18-33	
tree density (stems > or = to 10 cm dbh ha^{-1})	161-427	
basal area (m^2 ha^{-1})	25-35	
volume (1000 bd. ft. ha^{-1})	39-62	
mean age of overstory mortality (years)	135-210	
Maximum age of overstory mortality (years)	190-375	
Annual mortality (%)	0.6-0.9	
Deadwood on ground (Mg ha^{-1})	16-24	
Standing snags (stems > 10 cm dbh ha^{-1})	19-44	
Canopy distribution	random	
mean canopy gap size (m^2)	50-374	
Canopy gaps (% of forest)	7-8	

6.8.2 Mature Forested Wetlands.

Question 8b. Is the wetland a forested wetland and is the upper forest canopy dominated by trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?

A “forested wetland” is defined in OAC Rule 3745-1-50(O) as “...a wetland class characterized by woody vegetation that is twenty feet [6 meters] tall or taller.” This definition follows the classification outlined in Cowardin et al. (1979). For the purposes of answering this question, the Rater should distinguish between a predominately emergent or scrub-shrub wetland that has a small area of trees located within it or along its margin such that it may receive points in Metric 6 of the Quantitative Rating for having a “forested” vegetation class (in which case this question should be answered “no”), and a wetland that is predominately a “forest,” in which case the question should be answered "yes." Question 8b asks the Rater to evaluate the maturity of wetlands that are predominately “forests” or predominately “forested.”

Given that most of Ohio’s original forest has been cut at some point in the last two centuries of settlement and allowed to regenerate, it is likely the Rater will frequently encounter forested wetlands which are 60 to 100 years old. In some areas of the state (e.g. the Eastern Corn Belt Plains Ecoregion), many of the remaining wetlands are located in large and small woodlots of varying stages of forest development (Mack, pers. obs.). When evaluating such wetlands, the Rater should be sensitive to the possibility that the wetland is or is part of a mature second growth forest.

As with Question 8a above, Question 8b can be answered in the affirmative based on the Rater’s professional judgment after a site visit in which the wetland being evaluated appears to have many or all of the characteristics of a mature forested wetland. The Rater is again cautioned that often the jurisdictional wetland portion of the forest will only be a small area of the total forest, and that simply

counting the species and basal areas of the trees within the jurisdictional wetland boundary could lead to a conclusion that the “wetland” is not a “mature forested wetland.” This is an erroneous conclusion; when faced with this or similar situations, the Rater should conclude that the wetland is *part of* a mature forest.

Question 8a can also be safely answered in the negative when the Rater does not observe *any* large trees in the canopy, especially when the forest is clearly young second growth with most or all trees less than 45cm (17.7in) dbh and/or between 6 and 15 meters in height.

In borderline situations, or where the Rater wishes to quantitatively confirm his or her conclusion that the forest is or is not mature forest, it is recommended that standard forest inventory methods be used (*See e.g.* Peet et al. 1998).

6.9 Lake Erie Coastal and Tributary Wetlands.

Lake Erie coastal and tributary wetlands. *Question 9a. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?*

Question 9b. Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?

Question 9c. Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or can the wetland be characterized an "estuarine" wetland with lake and river influenced hydrology? These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.

Question 9d. Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?

Question 9e. Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?

Of all the Great Lakes, the industrialized Lake Erie shoreline has the smallest number and area of wetlands (Herdendorf 1987). Of those that remain, most are preserved today as diked units. Coastal wetlands with unrestricted hydrology are very rare on Ohio's Lake Erie coastline and represent the last relicts of a once extensive coastal wetland system. Coastal wetlands were formed in the deltas of rivers that flow into the lake and in protected areas behind natural barrier beaches or levees (Herdendorf 1987; Schneider 1999). Coastal wetlands provide numerous benefits including flood control, shoreline protection, nutrient-cycle control, trapping sediment, fish spawning and nursery grounds, and water fowl habitat.

Herdendorff (1987) defines coastal wetlands of Lake Erie as all wetlands located within 1 km of the lake shore, or if further from the shore, those that are directly influenced by water level changes of the lake or their connecting waterways.

This question presents the Rater with a series of either/or statements to first determine if the wetland is potentially a Lake Erie coastal or tributary wetland (Question 9a), and then to determine whether the wetland is a Category 3 wetland (Question 9c and 9d), or whether the wetland may be a Category 3 wetland (9b and 9d). Given their rarity and significance coastal or tributary wetlands with unrestricted hydrology and a predominance of native plant species are classified as Category 3 wetlands. Schneider

(1999) in his survey of the Lake Erie Coast found only a few of these types of wetlands remaining. Hydrologically restricted wetlands or degraded unrestricted wetlands should be evaluated for Category 3 status.

6.10 Lake Plains Sand Prairies (Oak Openings).

Question 10. Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the description below? The wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 4 (woody species may also be present). The Ohio Department of Natural Resources can provide assistance in confirming this type of wetland and its quality.

The Oak Openings region was so named because of the thin groves or scattered clumps of oaks stands or islands which were surrounded by wet prairie “openings”. The typical soil found in the oak openings is composed of mostly Ottokee soils (deep sand over till) with very poor drainage (Hawkins, 1977).

The Oak Openings are sand-hills or dunes that are the remains of the old beach ridges of glacial Lake Warren. The dunes are 15 to 30 feet above the adjacent lowland and are underlain by an impervious blue clay. The higher dunes are well-drained, light colored and low in organic matter with poorly drained soils found in the depressions. Parts of the Oak Openings have been preserved as publicly-owned natural areas such as Irwin Prairie, Schwamberger Preserve, Oak Openings Metro Parks, Secor Metro Park and Wildwood Preserve.

Oak openings wetlands are a very unique type of wetland system in Ohio. It is recommended that the Rater consult with Ohio DNR, metroparks naturalists, and other local experts if you suspect a wetland may fit this characterization.

6.11 Relict Wet Prairies.

Question 11. Is the wetland a relict wet prairie community dominated by some or all of the following species listed in Table 1. Extensive prairies were formerly located in the Darby Plains (Champaign, Clarke, Greene, Madison and Union counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert counties, etc.).

Extensive areas of prairie were present in Ohio prior to settlement (Sears 1926; Transeau 1935; Gordon, 1966). Ohio prairies were often "wet" prairie communities that developed below glacial moraines and on former glacial lake beds (Sears 1926; Transeau 1935). Large prairies were formerly located in the Darby Plains (Champaign, Clarke, Greene, Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert Counties, etc.), and northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties). The northwest Ohio prairies may be Oak Openings Sand Prairies described in the previous section.

Virtually all of Ohio's native prairies have been destroyed by agricultural activities although relict areas still remain along railroad rights of way and in occasional larger contiguous areas. Relict wet prairie is thus one of the rarest community types in Ohio.

Anderson (1982) identified several types of prairie communities. The slough grass-bluejoint prairie will usually be a jurisdictional wetland; in certain instances, the "big bluestem prairie" may also be a wetland depending on the soils and hydrology. A list of indicator species is provided in Table 1 of the ORAM Scoring Forms. It is recommended that the Rater consult with Ohio EPA or Ohio DNR, local metroparks naturalists, and other local experts, if you suspect a wetland may fit this characterization.

7.0 QUANTITATIVE RATING.

7.1 Metric 1: Wetland Size.

Historically, the state of Ohio had many large wetlands and wetland complexes, e.g. the Great Black Swamp in Northwest Ohio, the Lake Erie Coastal Marshes, large wet prairie complexes in the Sandusky and Darby Plains, large bog and fen complexes in Northeast and central Ohio, etc., although this is not to say that many small wetlands did not exist presettlement. Many of these systems have been largely destroyed or fragmented into relict wetlands of a few acres in size. Where large, contiguous wetlands or wetland complexes exist, they often represent the best of what remains in the state. Metric 1 therefore assigns additional points to large wetlands versus small.

Metric 1 asks the rater to estimate the size of the wetland. This question is virtually identical to earlier versions of the ORAM, except that the associated scores are one point less. *See* e.g. Question 1 of ORAM v.4.1. The question uses size classes that increase in increments that are relatively easy to visualize. It is expected that the requirements to delineate wetlands for federal jurisdictional purposes will make this a relatively easy question to answer. However, in situations where precise areal estimates are not available, wetland size can be visually estimated, so long as the rater is confident that the estimate places the wetland in the appropriate size class.

Table 6 may be helpful in performing English or Metric System visual estimations.

Table 6. Metric to English conversion table with visual estimation sizes.

acres	ft^2	yd^2	ft on side	yd on side	ha	m^2	m on side
50	2,177,983	241,998	1476	492	20.2	202,000	449
25	1,088,992	120,999	1044	348	10.1	101,000	318
10	435,596	48,340	660	220	4.1	41,000	203
3	130,679	14,520	362	121	1.2	12,000	110
0.3	13,067	1,452	114	38	0.12	1,200	35
0.1	4,356	484	66	22	0.04	400	20

7.2 Metric 2: Upland Buffers and Surrounding Land Use.

Wetlands are areas transitional between upland and aquatic environments. Like many natural systems, both terrestrial and aquatic, they are sensitive to human disturbances, both direct and indirect. Nutrient enrichment or eutrophication from stormwater inputs, urban runoff, or agricultural runoff can degrade wetlands just as these disturbances can degrade streams and lakes.

The questions in Metric 2 reflect the fact that wetlands with “buffer” zones between the wetland and human land uses are often less disturbed than wetlands without such buffers. Conversely, wetlands that are located in places where human land use is more intensive are often subject to greater degrees of disturbance. However, it is important to stress that merely because a wetland is located in an area with intensive human land uses does not mean that it is or will become degraded.

Metric 2 is very similar to earlier versions of the ORAM with the exception that the point values have been adjusted. *See e.g.*, Questions 11 and 12 in ORAM v. 4.1.

7.2.1 Question 2a: Average Buffer Width.

For the purposes of this question, “buffer” means non-anthropogenic landscape features which have the capability of protecting the biological, physical, and/or chemical integrity of the wetland from effects of human activity. Typically, a buffer could be forested or shrubby margin, prairie, streams or lakes, old fields, and in certain instances more managed landscapes like meadows or hay fields. Intensive human land uses should not be counted as buffers. These include active agricultural row cropping, fenced or unfenced pastures, paved areas, housing developments, golf courses, mowed or highly managed parkland, mining or construction sites, etc. A comprehensive list is not proposed in this manual. The key concept is whether the buffer area, whatever it is, *functions* to protect the wetland from degradation.

In order to calculate the average buffer width, estimate the width of buffer on each side of the wetland to a maximum of 50m and divide by the number of sides, e.g. the average buffer width of a wetland with buffers of 100m, 50m, 0m and 0m would be calculated as follows: abw = (50 + 50 + 0 + 0)/4 = 25. *See* Figure 6. The wetland in Figure 6 would score 4 points for Question 2a. A wetland with buffers greater than 50m on all sides would have an abw≥50m and would score 7 points.

This procedure works well with smaller wetlands. For very large wetlands or wetlands with unusual shapes there may be multiple "sides" and it may be difficult to measure, determine, or obtain access to all of the sides of the wetland. In this situation, the Rater may consider this question to provide a buffer continuum from very narrow to wide and assign the points associated with the most appropriate category.

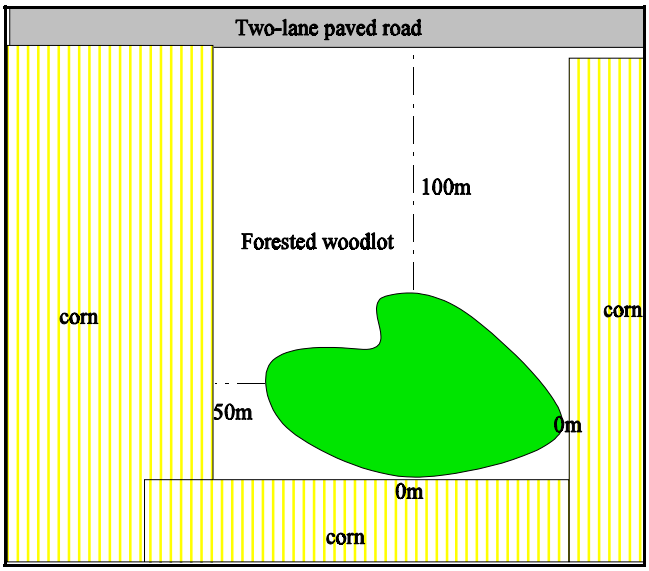

Figure 6. Hypothetical wetland example for estimating average buffer width.

7.2.2 Question 2b: Intensity of Predominant Surrounding Land Use(s).

In order to answer this question, the Rater should evaluate the intensity of the predominant land uses in the areas outside the wetland and beyond the wetland’s buffer zone, i.e. more than 50m (164 ft) if the wetland has buffers greater than 50m on all sides. The questions form a continuum from most intensive to least intensive land uses. In many instances, the Rater will need to “double check” and average the score. This question asks the Rater to generally characterize the type of land uses that are most common in the immediate vicinity of the wetland. Several examples are offered to aid in answering this question.

Example 1. Wetland is a deep (90cm), largely unvegetated (except for the canopy trees above it) vernal pool, located entirely within a large, contiguous patch of second growth forest. Upland forest extends from 100 to 300m on all sides of the wetland. Outside of the forest, the land use is agricultural row cropping. Score: the wetland is entirely surrounded by second growth forest and should receive a score of 7.

Example 2. The wetland is deep, largely unvegetated (except for the canopy trees above it) vernal pool, located *at the edge of* a large, contiguous patch of second growth forest. Outside of the forest, the land use is agricultural row cropping. The boundary of hydric soils extends from the current wetland edge into the agricultural field. Score: the Rater should double check “very low” (7) and “high” (1), and average the scores , (7+1)/2=4.

Example 3. The wetland is a vegetatively diverse emergent marsh located in the floodplain of a State Scenic River. A mature forested, riparian corridor is adjacent to one side of the wetland; on the other side is a fenced pasture (Note: both sides of the river have a forested, riparian corridor). Score: the Rater should double check “very low” and “moderately high”, and average the scores, (7+3)/2=5.

Example 4. The wetland is an isolated, depressional cattail marsh. On one side, the wetland has no buffer and is immediately adjacent to active row cropping. On the other three sides, the wetland is surrounded by a new fallow field. Score: the Rater should double check “moderately high” (3) and “high” (1), and average the scores, (3+1)/2=2.

Example 5. The wetland is a depressional buttonbush swamp with forested margins. The wetland is bisected by a small, paved township road. The wetland has mature to young second growth forest on one side, a “shrubby” old field (probably >10 years old) on 2 sides, and is hydrologically connected to another buttonbush swamp on the fourth side but is separated from this other wetland by a 20 to 50 meter wide upland forested area. *Score*: the Rater should double check "very low" and "low" and average the scores, (7+5)/2=6.

7.3 Metric 3: Hydrology.

“*Hydrology is probably the single most important determinant for the establishment and maintenance of specific types of wetlands and wetland processes*.” (Mitsch and Gosselink, 1996, p.55, italics in the original). Thus, 30% of the total points possible in the ORAM Quantitative Rating are awarded in Metric 3. This metric asks the Rater to evaluate the wetland’s water budget, hydroperiod, the hydrologic connectivity of the wetland to other surface waters, and finally, the degree to which the wetland’s hydrology has been altered by human disturbances.

The functions and values of a particular wetland’s hydrology and position in the landscape are addressed both implicitly and explicitly in these questions. The Rater should be familiar with the definitions, criteria and methods of the *Corps of Engineers Wetlands Delineation Manual* (U.S. ACOE 1987, hereafter the *1987 Manual*) for determining whether a particular area has wetland hydrology. In addition, the Rater’s answers to Questions 3a, 3b, 3c and 3d can often be based on the same information and indicators of wetland hydrology discussed in the 1987 Manual.

A wetland can receive no more than 30 points for Metric 3 even though it is possible, although not likely, that a particular wetland could score more than 30 points. If this occurs, the Rater should give the wetland a score of 30 for Metric 3.

7.3.1 Question 3a: Sources of Water.

This question relates to a wetland's water budget. It also reflects that wetlands with certain types of water sources, or multiple water sources, e.g. high pH groundwater or perennial surface water

connections, can be very high quality wetlands or can have high functions and values. This question asks the Rater to check all of the following water sources that are part of the wetland's hydrologic budget:

G High pH groundwater (5 points)
G Other groundwater (3 points)
G Precipitation (1 point)
G Seasonal/Intermittent surface water (3 points)
G Perennial surface water (lake or stream) (5 points)

The applicability of each of these options is discussed in detail below.

7.3.1.1 High pH Groundwater.[22]

This type of water source is usually associated with fens. But, high pH groundwater can also be present in smaller quantities such that a "fen" *per se* does not develop although the wetland may have plants or substrates characteristic of fens. In other situations, groundwater may express at breaks in a slope above a river or creek and a "seep fen" may develop under a forest canopy or in unforested areas. In these situations, the Rater will often observe a rich graminoid (sedge and grass species) herbaceous layer growing under a forest canopy or in full or part sun. Skunk cabbage (*Symplocarpus foetidus*) may also be observed, although this plant may also be associated with other groundwater seeps.

The presence of high pH groundwater (pH > 7.5) can be inferred from marl beds or from the dominance of calciphile vascular plants in the herbaceous layer. Alternatively, simple handheld pH probes can be used. If groundwater discharges are observable but are not confirmed as "high pH," the wetland should be scored as "other groundwater."

7.3.1.2 Other Groundwater.[23]

Although many wetlands may receive inputs from the water table as part of their annual water budget, this question should not be scored unless the Rater can observe seeps or other signs that groundwater is a source of water, or unless the Rater has more detailed water budget data available that confirms a net input of groundwater to the wetland. It is often expensive and time-intensive to obtain more detailed information on a wetland's subsurface hydrology. Therefore, it is not expected that the Rater obtain such information in order to complete this portion of ORAM. **"Other groundwater" should not be scored without observable or documentary evidence. However, if the Rater suspects but does not observe sufficient evidence of groundwater inputs, this should be noted on the scoring forms for further investigation, especially if the wetland's category might change**.

Because of this, the Rater should be aware that wetlands can be underscored if groundwater inputs are not readily observable or the Rater evaluates the wetland at a time of year when the wetland is a net exporter of water to local groundwater. However, Ohio EPA believes the ORAM will be robust enough that wetlands will score highly in other portions of the Quantitative Rating such that they will be appropriately categorized. If the Rater suspects but does not have evidence to support scoring the wetland for "other groundwater," this should be noted on the scoring sheets or comments section and revisited if the loss of these points affects a categorization decision.

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[22] This question has no direct counterpart in earlier versions of the ORAM.

[23] This question has no direct counterpart in earlier versions of the ORAM.

As with high pH groundwater, other groundwater can be inferred by observing seeps or rivulets flowing into the wetland or by observing plant species associated with groundwater, e.g. skunk cabbage *(Symplocarpus foetidus),* sweet flag *(Acorus calamus*), species typically associated with fens, various Cyperaceae species, etc. Other circumstantial factors which can be used to infer whether "other groundwater" is present are whether what otherwise appears to be an isolated wetland remains inundated or saturated through late summer and fall, and the clarity or oxygen content of the water.

7.3.1.3 Precipitation.

At a minimum, every wetland evaluated under the ORAM receives at least 1 point since all wetlands receive precipitation as a hydrologic input. Note that this question has no counterpart in earlier versions of the ORAM

7.3.1.4 Seasonal Surface Water.

Many wetlands receive a substantial portion of their annual hydrologic input from seasonal or semiseasonal flooding from nearby streams or rivers. Wetlands located in the headwater areas of watersheds or that have their own small watersheds, often receive intermittent surface water inputs via definable small channels that flow into the wetland after a substantial rain event. Note, that this type of surface water input should be distinguished from seasonal or semiseasonal flood events and should be scored under the precipitation category.

In order to award points for “seasonal” surface water, the Rater should observe a definable channel, tributary, stream, etc. whereby surface water flows into the wetland. Seasonal surface water, e.g. from spring flooding of a river or stream, can be inferred using the indicators of hydrology outlined in the *1987 Manual*, e.g. recorded data, drift lines, sediment deposits, etc. The Rater *does not* need to actually observe surface water flowing into the wetland at the time the rating is being performed. The use of secondary indicators, as outlined in the 1987 Manual is necessary and expected.[24]

7.3.1.5 Perennial Surface Water (lake or stream).

A wetland has a “perennial surface water” connection to a lake or stream if there is a permanent or nearly permanent surface water connection between the wetland and the lake or stream such that the wetland’s hydrology is completely or significantly dominated by water from the stream or lake. The qualifier “significantly” is used since some wetlands can have other water sources, in addition to the connection to the stream or lake, that also are important. For example, a wetland that forms on the margins of a kettle lake can have a perennial surface water connection to the lake, and can also receive high pH ground water. Both water sources are significant to the wetland’s overall hydrology.

Note that this question is substantially similar to earlier versions of the ORAM. *See e.g.* Question 10c in ORAM v. 4.1.

7.3.2 Question 3b: Connectivity.

Question 3b awards points for a wetland’s position in the landscape. This question incorporates aspects of earlier versions of the ORAM (see Question 10a, 10b, 13 and 14 of ORAM v. 4.1) and awards additional points if a wetland is located in a flood plain, is located between a stream or lake and a human land use, is part of a riparian or upland corridor, or is part of a wetland or upland (e.g. forest or prairie) complex. Fennessy et al. (1998b) found strong positive correlations between a wetland’s proximity to other wetlands and the wetland’s “quality.” Wetlands that are located in 100 year flood plains or that are

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[24] *See* 1987 Manual, Part III, Wetland Hydrology, pages 34-41.

in a position to intercept contaminated water before it reaches a stream or lake have functions that are valued by human society. Wetlands located in riparian or upland corridors, or that are part of larger natural systems, e.g. large, contiguous patches of forest are important components of watersheds and regional ecosystems.

100 Year Flood plain.[25]

"Flood plain" is defined in OAC Rule 3745-1-50(P) as "...the relatively level land next to a stream or river channel that is periodically submerged by flood waters. It is composed of alluvium deposited by the present stream or river when it floods." Where they are available, the Rater can use flood insurance rate maps (FIRMs) and flood boundary and floodway maps published by the Federal Emergency Management Agency (FEMA). These maps cover over 99 percent of the flood-prone communities in the United States and can be obtained at no cost from the FEMA Flood Map Distribution Center in Baltimore, Maryland. Guidance on using FIRMs is provided in the FEMA publication entitled *How to Read a Flood Insurance Rate Map* (FEMA, 1980).

Wetland is located between a stream/lake and other human use.[26]

This question asks the Rater to determine whether the wetland is located between a surface water and a different adjacent land use, such that run-off from the adjacent land use could flow through the wetland before it discharges into the surface water. "Different adjacent land uses" include agricultural, commercial, industrial, mining, or residential uses.

Wetland is part of a wetland or upland complex[27]

Both this and the next question ask whether the wetland is in physical proximity to, or a part of other nearby wetland or upland natural areas. The difference is whether the area the wetland is connected to is "long and narrow", like a river, or more "squarish", like a large, contiguous forest or woodlot. If the latter is the case, this question applies; if the former, the next question applies. In some instances, both may apply where a wetland is located in a riparian corridor but is adjacent to a large wetland or upland complex. In this case, the wetland should be scored for both.

Wetland is part of a riparian/upland corridor

The term "corridor" has its common meaning and should be understood differently from the term "complex" used in the preceding question. Riparian corridors are typically areas within the flood plain of rivers or streams that are often forested, however, a mix of natural and human land uses is possible. The key concept for deciding to score this and the preceding question is whether the wetland is connected to other natural areas such that organisms can move between or through the systems. Upland corridors can be as narrow as a vegetated fence row along a farm field, that eventually connects to a woodlot, forest, or riparian corridor.

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[25] *See* question 10a of ORAM v. 4.1 for the counterpart to this question.

[26] *See* question 10b of ORAM v. 4.1 for the counterpart to this question.

[27] *See* questions 13 and 14 of ORAM v. 4.1 for the counterparts to this and following question.

7.3.3 Question 3c: Maximum Water Depth.

Depth of water often correlates well with permanence of inundation and also relates to other habitat features of the wetland, e.g. use of the wetland as breeding pools by salamanders and other amphibians. There is some redundancy between this question and Question 3d (duration). However, it is generally easier to determine depth, even when the wetland is dry, than duration, especially when the wetland may only be visited once or during one season. This question asks the Rater to determine the maximum water depth of the wetland being rated as follows:

G >70cm (27.6in) (3 points)
G 40 to 70cm (15.7 to 27.6in) (2 points)
G <40cm (<15.7in) (1 point)

The Rater *does not* need to actually observe the wetland when its water depth is greatest in order to award the maximum points for this question. The use of secondary indicators, as outlined in the 1987 Manual is necessary and expected in order to properly answer this Question.[28]

7.3.4 Question 3d: Duration of Standing Water/Saturation.[29]

Duration of standing water/soil saturation often correlates well with use of the wetland as breeding or migratory habitat, e.g. breeding pools for salamanders and other amphibians. There is some redundancy between this question and Question 3b (connectivity). This question will often be difficult to answer if the wetland is only visited once in the late summer or fall. The use of secondary indicators, as outlined in the 1987 Manual is necessary and expected in order to properly answer this Question. The scoring categories correspond approximately to Zones II, III, and IV of Table 5 of the 1987 Manual, with Zone IV being subdivided into seasonally inundated and seasonally saturated.

G semipermanently to nearly permanently inundated or saturated (4 points)
G regularly inundated or saturated (3 points)
G seasonally inundated (2 points)
G seasonally saturated upper 30cm (12in) (1 point)

The Rater does *not* need to actually observe the wetland during the wettest time of the year in order to award the points for this question.

7.3.5 Question 3e: Modifications to Natural Hydrologic Regime.

This question asks the Rater to evaluate the "intactness" of, or lack of disturbance to, the natural hydrologic regime of the type of wetland that is being evaluated. Given that hydrology is one of the fundamental determinants of wetland function, and disturbances to hydrology one of the main sources of degradation to wetlands, this question represents 12% of the total possible points awardable under the Quantitative Rating.

It is very important to stress that this question does not discriminate between wetlands with different types of hydrologic regimes, e.g. between a forested seep wetland located on a flood plain with seasonal inundation and a bog with precipitation and minor amounts of surface run-off from a small watershed.

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[28] *See* 1987 Manual, Part III, Wetland Hydrology, pages 34-41.

[29] This question incorporates portions of earlier versions of the ORAM. *See e.g.*, Question 8g and 8h in ORAM v. 4.1.

Rather, it asks the rater to evaluate the “intactness” of the hydrologic regime attributable to *that type of wetland*, with "type" referring to the wetland's hydrogeomorphic class or vegetation community class, or both. In the example above, both the forested seep wetland and the leatherleaf bog can score the maximum points (12) if there are no apparent modifications to the natural hydrologic regime.

In order to properly answer this question, the Rater should check all possible disturbances to the wetland’s hydrology that are observed by the Rater. The following list of disturbances, that are located in or near the wetland, is provided on the rating sheet:

G ditch
G tile
G dike
G weir
G stormwater input (urban, ag field run-off, etc.)
G point source discharge (nonstormwater)
G filling/grading
G road bed/RR track
G dredging
G other_____

All available information, field visits, aerial photos, maps, etc. can be used to identify a possible ongoing or past hydrologic disturbance. It is important to stress that this is a list of *possible* disturbances to the wetland’s natural hydrology. The Rater must then evaluate whether the activity *actually* disturbed the wetland’s hydrology (see examples below).

Once the Rater has listed all possible past and ongoing disturbances, the Rater must determine whether any of the observed disturbances caused more than trivial alterations to the natural hydrologic regime, or have occurred so far in the past that current hydrology should be considered to be "natural." The possible scoring categories are listed below:

G none or none apparent (12 points). There are no modifications or no modifications that are apparent to the Rater.

G recovered (7 points). The wetland appears to have recovered from past modifications which altered the wetland's natural hydrologic regime.

G recovering (3 points). The wetland appears to be in the process of recovering from past modifications which altered the wetland's natural hydrologic regime.

G recent or no recovery (1 point). The modifications have occurred recently, and/or the wetland has not recovered from past modifications, and/or the modifications are ongoing.

In instances where the Rater believes that a wetland falls between two categories, or where the Rater is uncertain as to which category is appropriate, it is appropriate to “double check” and average the score. The labels on the scoring categories are intended to be descriptive but not controlling. In some instances, it may be more appropriate to consider the scoring categories as fixed locations on a hydrologic disturbance continuum, from very high to very low or no disturbance.

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12          9.5          7          5          3          2          1
 |----------|----------|----------|----------|----------|----------|
none or                recovered                recovering            recent or no
none apparent                                                         recovery
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It is very important to stress that the Rater may check one or several of these possible disturbances, yet still determine that disturbances did not alter the natural hydrologic regime. If the Rater does not observe any alterations, or determines that the alterations have made trivial changes to the natural hydrology, then the maximum points should be assigned. If the alterations have caused more than trivial changes, a score of 1, 3 or 7, or an intermediate score of 2 or 5 (if 1 and 3 or 3 and 7 are double-checked) should be assigned. If the Rater is unsure whether the alterations were more than trivial or did not occur so far in the past that the current conditions are "natural," 7 and 12 should be double-checked and a score of 9.5 assigned.

Example 1. The wetland is a complex of marshes, aquatic beds, fens and forested seep wetlands located around the perimeter of a natural kettle lake. In the 1930s, portions of the wetland were filled and dredged to develop a private beach/picnic/campground area. A dike with a weir was installed to deepen the lake by several feet. The private beach is still in use throughout the growing season. Approximately, 15 hectares (37 acres) of high quality wetlands remain. *Score*: the past disturbances did not seriously impact this groundwater-driven wetland system, although a considerable amount of wetland was probably flooded when the lake level was raised but the system appears to have recovered from this disturbance. “Recovered” should be checked and the wetland receives a score of 7.

Example 2. The wetland is a 4 hectare (10 acres) depressional, buttonbush swamp with areas of forested wetland with closed canopy on one side. No significant outflows are observed although a small, shallow ditch from an abandoned farm field is observed. A small, asphalt-paved township road cuts off the forested area from the buttonbush swamp. A small culvert connects the two wetlands. The road was installed more than 25 years ago. *Score*: double check “none or none apparent” and “recovered” since it is unclear whether the disturbances disturbed the natural hydrologic regime at all, or whether the wetland has recovered from the disturbances. The wetland receives a score of “9.5" for this question.

Example 3. The wetland is a 2.5 hectare (6 acre) predominately emergent marsh with a strong shrub/sapling component. Small amounts of fill were placed to construct a pole barn 15 meters from the wetland's edge. *Score*: check “none or none apparent” and assign a score of “12" since the filling activity did not affect the wetland’s natural hydrology.

Example 4. The wetland is a forested wetland with shallow (<20cm deep) pools located in an isolated woodlot. Surrounding farm fields have been ditched and tiled and are actively farmed and the county soil map shows large areas of hydric soils extending through portions of the woodlot into the surrounding farm fields. The remaining wetland areas appear to be at the local topographic low. A feeder ditch passes along one side of the woodlot. The herbaceous layer appears degraded and over-run by poison ivy (*Toxicodendron radicans*). *Score*: double check “recovering” and “recent or no recovery” since it appears that the ditching and tiling has and is diverting water from this remnant wetland but it is unclear whether the wetland has not recovered or is in the process of recovering from this hydrologic modification.

Example 5. Wetland is a seasonally-flooded, forested wetland on the flood plain of a warmwater habitat creek. The wetland abuts a wooded ridge and is located at the side of a former pasture. The understory is regularly mowed and woody debris removed by the owner. Some selective cutting has also occurred. *Score*: “none or none apparent” (12 points) since the disturbances, while substantial, have not affected the wetland's natural hydrology (But see Metric 4 habitat alterations).

Example 6. Wetland is a remnant forested, depressional wetland that was avoided during development of a large commercial, residential development, but is now completely landlocked by streets, stores and apartment housing. The wetland has old field vegetation around its margins but has a diverse canopy and herbaceous vegetation within its boundaries. It is suspected that the surrounding development has increased the surface flows into the wetland, although no stormsewers directly discharge into the wetland. *Score*: since it is unclear whether the development has actually affected the wetland’s natural

hydrologic regime, although it seems likely that there has been *some* type of disturbance, the Rater decides to view the scores as points on a hydrologic disturbance continuum and double checks "none or none apparent" and "recovered" and assigns a score of "9.5."

Example 7. The wetland is a 2 hectare (5 acre) depressional forested wetland located in a mature forest of 10 hectares (24 acres). The wetland has a diverse sedge flora. The forest is located on a large 40 hectare (98 acre) plot of undeveloped land located within a heavily urbanized suburb. *Score*: the Rater should check none or none apparent (12 pts.) since the natural hydrologic regime has not been disturbed by the surrounding urbanization.

7.4 Metric 4: Habitat Alteration and Development.[30]

While hydrology may be the single most important determinant for the establishment and maintenance of specific types of wetlands and wetland processes, there is a range of other factors and activities which affect wetland quality and cause disturbances to wetlands that are unrelated to hydrology. This metric attempts to evaluate these things under the rubric "habitat alteration."

In many instances, items checked as possible hydrologic disturbances in Question 3e will be instead alterations to a wetland's habitat or disruptions in its development (successional state). In other instances, a disturbance may be appropriately considered under both Metric 3 and Metric 4. In any case, the Rater should carefully consider what is the actual proximate (direct) cause of the disturbance to the wetland.

7.4.1 Question 4a: Substrate/Soil Disturbance.

This question asks the Rater to evaluate generally physical disturbances to the soil and surface substrates of the wetland. The continuum of recovery or disturbance seen in Question 3e is also used here with disturbance ranging from recent to none:

G none or none apparent (4 points). There are no disturbances or no disturbances apparent to the Rater.

G recovered (3 points). The wetland appears to have recovered from past disturbances.

G recovering (2 points). The wetland appears to be in the process of recovering from past disturbances.

G recent or no recovery (1 point). The disturbances have occurred recently, and/or wetland has not recovered from past disturbances, and/or the disturbances are ongoing.

The Rater should check the most appropriate category to describe the present state of the wetland. In instances where the Rater believes that a wetland falls between two categories, or where the Rater is uncertain as to which category is appropriate, it is expected and highly appropriate to "double check" and average the score. Note also that the labels on the scoring categories are intended to be descriptive but

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[30] None of the questions in this metric have direct counterparts in earlier versions of the ORAM scoring scheme. However, earlier versions of the ORAM included a qualitative question titled variously "human-caused disturbances" or "lack of human-caused disturbances" which asked the Rater to determine whether various types of hydrologic and habitat disturbances were present. *See e.g.*, Question 1 in ORAM v. 3.0 or Question 7 in ORAM v. 4.0. Lack of such disturbances was an indicator that a high quality wetland may be present. Version 5.0 assigns a point value to human disturbances in this Metric and in Metric 3e (hydrologic modifications).

not controlling. In some instances, it may be more appropriate to consider the scoring categories as fixed locations on a disturbance continuum, from very high to very low or no disturbance.

Examples of substrate/soil disturbance include filling and grading, plowing, grazing (hooves), vehicle use (motorbikes, off-rode vehicles, construction vehicles), sedimentation, dredging, and other mechanical disturbances to the surface substrates or soils.

7.4.2 Question 4b: Habitat Development.

This question asks the Rater to assign an overall qualitative rating of how well-developed the wetland is in comparison to other ecologically or hydrogeomorphically similar wetlands. More than most questions, this question presumes the Rater has a good sense of the types of wetlands and the range in quality of those wetlands typical of the region, watershed, or state. Again, a scoring continuum is presented from poor to excellent. Uncertainties in assigning a wetland to a particular category should be resolved by double checking the two most appropriate categories and averaging the score.

G Excellent (7 points). Wetland appears to represent the best of its type or class.

G Very good (6 points). Wetland appears to be a very good example of its type or class but is lacking in characteristics which would make it excellent.

G Good (5 points). Wetland appears to be a good example of its type or class but because of past or present disturbances, successional state, etc. is not excellent.

G Moderately Good (4 points). Wetland appears to be a fair to good example of its type or class.

G Fair (3 points). Wetland appears to be a moderately good example of its type or class but because of past or present disturbances, successional state, etc. is not good.

G Poor to Fair (2 points). Wetland appears to be a poor to fair example of its type or class.

G Poor (1 point). Wetland appears to <u>not</u> be a good example of its type or class because of past or present disturbances, successional state, etc.

7.4.3 Question 4c: Habitat alteration.

This question is directly analogous to Question 3e, except that it asks the Rater to evaluate the "intactness" of, or lack of disturbance to, the natural habitat of the type of wetland that is being evaluated. Again, it is very important to stress that this question does not discriminate between wetlands with different types of habitat, e.g. between a forested vernal pool and a flood plain forested wetland. This questions asks the rater to evaluate the "intactness" of the habitat attributable to *that type of wetland*. In the example above, both the vernal pool and flood plain forest can score the maximum points (9) if there are no, or no apparent, modifications to the natural habitat.

In order to properly answer this question, the Rater should check all possible alterations to the wetland's habitat that are observed by the Rater using list of possible disturbances on the rating sheet:

G mowing
G grazing (cattle, sheep, pigs)
G clearcutting
G selective cutting
G woody debris removal

G toxic pollutants
G shrub/sapling removal
G herbaceous/aquatic bed removal
G sedimentation
G nutrient enrichment
G dredging
G farming

All available information, field visits, aerial photos, maps, etc. can be used to identify possible ongoing or past habitat alterations. It is important to stress that this is a list of *possible* alterations to the wetland's habitat. The Rater must then evaluate whether the activity actually disturbed the habitat (see examples below).

Once the Rater has listed all possible past and ongoing disturbances, the Rater must determine whether any of the observed disturbances caused more than trivial alterations to the natural habitat, or have occurred so far in the past that current conditions should be considered to be "natural." The possible scoring categories are listed below:

G none or none apparent (9 points). There are no alterations or no alterations apparent to the Rater.

G recovered (6 points). The wetland appears to have recovered from past alterations.

G recovering (3 points). The wetland appears to be in the process of recovering from past alterations.

G recent or no recovery (1 point). The alterations have occurred recently, and/or the wetland has not recovered from past alterations, and/or the alterations are ongoing.

In instances where the Rater believes that a wetland falls between two categories, or where the Rater is uncertain as to which category is appropriate, it is appropriate to "double check" and average the score. The labels on the scoring categories are intended to be descriptive but not controlling. In some instances, it may be more appropriate to consider the scoring categories as fixed locations on a habitat disturbance continuum, from very high to very low or no disturbance.

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9          7.5          6          4.5          3          2          1
 |----------|----------|----------|----------|----------|----------|
none or                recovered                recovering          recent or no
none apparent                                                        recovery
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It is very important to stress that the Rater may check one or several of these possible disturbances, yet still determine that disturbances did not alter the natural habitat of the wetland. If the Rater does not observe any alterations, or determines that the alterations have made trivial changes to the natural habitat, then the maximum points should be assigned. If the alterations have caused more than trivial changes, a score of 1, 3 or 6, or an intermediate score of 2 or 4.5 (if 1 and 3 or 3 and 6 are double-checked) should be assigned. If the Rater is unsure whether the alterations were more than trivial or did not occur so far in the past that the current conditions are "natural," 6 and 9 should be double-checked and a score of 7.5 assigned.

Example 1. The wetland is a large 100 hectare (247 acre) fen, marsh, wet prairie, located between end moraines and receiving artesian ground water as its predominate source of hydrology. The wetland is a relict of a much larger wetland complex that existed presettlement. In the 1950s, peat mining occurred throughout the wetland. Adjacent wetland areas were ditched and tiled and are now actively farmed.

The wetland is now largely vegetated with narrow-leaved cattail (*Typha angustifolia*), although small areas of fen vegetation are maintained by removing cattails through cutting or spraying. *Score*: the peat mining was a substantial disturbance to the wetland's natural vegetation from which the wetland may either have not recovered from or be in the process of recovering from. The Rater double checks "recovering" and "recent or no recovery" to resolve this uncertainty and assigns a score of "2."

Example 2. The wetland is a 1.5 hectare (3.7 acre) formerly forested/buttonbush swamp wetland in which most of the trees were removed to incorporate the wetland into a golf course as a water hazard. The wetland also received large amounts of sediment during golf course construction. The wetland now supports a diverse emergent marsh community along with a richly vegetated forested/buttonbush community along one side. *Score*: "recovering" is checked (3 points) since the clear cutting has changed the vegetative community and "reset" the successional "clock" of a part of the wetland but a forested/buttonbush swamp component remains relatively intact.

Example 3. The wetland is a 3.0 hectare (7.4 acre) forested wetland which was heavily grazed by cattle no more than 5 years ago. The wetland is near a large (400 hectare, 988 acre) mature second growth forest with other forested wetlands that were fenced off from the pasture. The wetland has few tree seedlings or saplings and no shrubs, although a relatively diverse herbaceous (sedges and grasses) community is now present. *Score*: the wetland appears to be recovering from the heavy grazing. The Rater assigns a score of "3" to this wetland.

Example 4. The wetland is a 2 hectare (5 acre) depressional forested wetland located in a mature forest of 10ha. The wetland has a diverse sedge flora. The forest is located on a large 40 hectare (98 acre) plot of undeveloped land located within a heavily urbanized suburb. Surrounding the forest are other wetlands, some of which have been clear cut, mowed, or partially filled. *Score*: the Rater should check none or none apparent (9 points) since the forested wetland does not appear to be disturbed even though the surrounding area is heavily urbanized.

Example 5. Wetland is an emergent marsh dominated by river bullrush (*Scripus fluviatilis*) and reed canary grass (*Phalaris arundinacea*) surrounding a kettle lake. Much of the wetland and surrounding upland areas was farmed until 15 years ago, when the groundwater fed kettle lake was allowed to revert to a natural state. The surrounding hillsides can be characterized as young "old-field." Carp, bullheads and green sunfish are abundant in the lake itself. *Score*: the Rater considers double-checking "recovering" and "recent or no recovery", but ultimately decides that the system as a whole is in the process of recovering from these past disturbances. A score of "3" is assigned.

Example 6. Wetland is a forested, depressional wetland with a rich herbaceous community with several rare or endangered plant species. As recently as 15 years ago, the wetland and adjacent upland forests were selectively cut. The canopy of the forest has largely reestablished itself. *Score*: the wetland has "recovered" from this disturbance and a score of "6" is assigned.

7.5 Metric 5: Special Wetland Communities.

This metric assigns or deducts up to 10 additional points to the types of wetlands and circumstances addressed in the Narrative Rating Questions. ***No wetland can ever receive more than 10 points for this metric*** even if multiple categories are applicable, e.g. the wetland is a fen (10 points) with the documented occurrence of an endangered species (10 points) for a total of 20 points: the score for Metric 5 would still be only 10 points.

If the Rater answers "yes" to the questions 2, 4, 5, 6, 7, 8a, 8b, 9b, 9c, 10, or 11 in the Narrative Rating, the Rater should check the appropriate scoring category(ies) in Metric 5. Refer to the Section 6.0 for guidance in determining whether one of these choices is applicable.

7.6 Metric 6: Vegetation, Interspersion, and Microtopography.

Vascular plants are an easily observable component of most wetland communities. Increases and decreases in the diversity, horizontal and vertical complexity, and abundance of plant species are well correlated with disturbances to wetlands. *See* Fennessy et al. 1998a and 1998b; Mack et al. 2000. Also included in this metric are physical habitat attributes like standing dead trees, hummocks, and coarse woody debris since these are ultimately plant-produced attributes.

Users of earlier versions of the ORAM should find this Metric to be familiar. *See e.g.*, Questions 2, 3, 4, 5, 7, 8e, and 8f of ORAM v. 4.1.The most important difference in v. 5.0 is the use of a "cover scale" which requires the Rater to evaluate the quality of the plant communities and physical habitats present in the wetland. This scale is discussed in detail below in Questions 6a and 6d.

7.6.1 Question 6a: Wetland Plant Communities.

This question asks the Rater to identify all of the plant communities present within the wetland being evaluated. Six communities are identified: aquatic bed, emergent, shrub, forested, mudflats, and open water (with mudflats and open water being notable for their overall *lack* of vegetation). As in all previous versions of the ORAM, to be counted towards the score, a vegetation community must cover a minimum contiguous area within the wetland. This area is set at 0.1 hectares or 1000m^2 (0.2471 acres)

Importantly, when evaluating the presence or absence of a plant community, the Rater must consider simultaneously its horizontal and vertical distribution. For example, a typical Ohio marsh will often have horizontally dispersed zones of vegetation: emergent to aquatic bed to open water. However, vegetation communities can also be vertically stratified: a forested wetland may have a "forest community" composed of trees, with buttonbush (a shrub class) and a rich sedge herbaceous layer (an emergent class).

The definitions for the vegetation classes listed in the ORAM v. 5.0 are largely based on the vegetation classification scheme outlined in Cowardin et al. (1979).

7.6.1.1 Aquatic Bed Class.

The "aquatic bed" vegetation community includes wetlands or areas of wetlands dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

The most common types of plants found in Aquatic bed habitats in Ohio are water celery (*Vallisneria americana),* pondweed (*Potamogeton* spp.*), Chara* spp. *Najas* spp.*,* water milfoil (*Myriophyllum* spp.*),* waterweed (*Elodea* spp.)*,* coontail (*Ceratophyllum* spp.*),* water lilies (*Nymphaea* spp.*),* spatterdock (*Nuphar* spp.*),* water-cup (*Ranunculus flabellaris* and *R. longirostris),* mermaid weed (*Proserpinaca palustris*) and bladderwort (*Utricularia* spp.) . Floating aquatic species like duckweed (*Lemna* spp.*, Spirodela* spp.*),* watermeal (*Wolffia* spp.*), Riccia* sp., and *Ricciocarpus* sp. are excluded from the definition of "aquatic bed" for the purposes of ORAM v. 5.0, although Cowardin et al. (1979) includes them in their classification.

In most instances, aquatic beds will occur as a distinct zone or ring in the wetland; however, occasionally aquatic beds can occur as an "understory" below shrubs or trees. For example, watercup (*Ranunculus flabellaris*) often grows in rich beds in inundated pools of forested wetlands and buttonbush swamps. In this situation, the Rater should consider the aquatic bed community to be present even though it occurs under a "canopy" of shrubs or trees.

7.6.1.2 Emergent Class.

The "emergent" vegetation community includes wetlands or areas of wetlands dominated by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.

Emergent wetlands can maintain the same appearance in areas with relatively stable hydrology or can change appearance if water levels fluctuate strongly or in drought years. Common names for emergent communities include marsh, wet meadow, wet prairie, sedge meadow, fens, prairie pothole, and bluejoint slough.

In Ohio, with the exception of the Lake Erie coastal and estuarine wetlands, most emergent communities are classified as "palustrine" emergent wetlands. Cowardin et al. (1979) distinguishes between persistent and nonpersistent emergent communities but this distinction is not critical for the purposes of the ORAM. The most common types of plants found in emergent wetlands include cattails (*Typha* spp.), sedge family plants (*Carex* spp., *Scirpus* spp., *Eleochris* spp., *Cyperus* spp. etc.), burreeds (*Sparganium* spp.) rushes (*Juncus* spp.), grass family plants (*Glyceria* spp., *Phalaris arundinacea, Phragmites australis, Leersia* spp., *Poa palustris*, *Calamogrostis* spp., *Spartina pectinata*, etc.), and many broad-leaved persistent and nonpersistent dicots (e.g. *Lythrum* spp., *Lysimachia* spp., *Rumex verticillatus, Polygonum* spp., *Peltandra virginica, Pontederia cordata, Sagittaria* spp., *Alisma subcordatum, Lycopus* spp., *Bidens* spp., *Impatiens* spp., *Iris* spp., *Mimulus* spp., *Verbena hastata*, *Boehmeria cylindrica, Asclepias incarnata).*

In most instances, emergent communities will occur as distinct zones or rings in the wetland; however, an emergent community can also be found as an "understory" below shrubs or trees. For example, some forested wetlands in Ohio can have very rich, diverse herbaceous communities also. In this situation, the Rater should consider the emergent community to be present even though it occurs under a "canopy" of shrubs or trees.

7.6.1.3 Shrub Class.

The "shrub" vegetation community includes wetlands or areas of wetlands dominated by woody vegetation less than 6m (20 ft) tall. The plant species include true shrubs, young trees, or trees or shrubs that are small or stunted because of environmental conditions.

Shrub wetlands may represent a successional stage leading to forested wetland or they may be relatively stable plant communities (Anderson 1982). Outside of shrub dominated bogs and fens[31], one of the most common scrub-shrub communities in central and western Ohio is a buttonbush *(Cephalanthus occidentalis*) swamp. Buttonbush is common under closed canopies within otherwise forested wetlands, under breaks in the canopy of upland and wetland forests, and also by itself in otherwise treeless wetlands. Alder *(Alnus* spp.), *Viburnum* spp. and buckthorn (*Rhamnus* spp.) are common scrub-shrub dominants. Willows (*Salix* spp.), chokeberries (*Aronia (Pyrus)* spp.), dogwoods (*Cornus* spp.), *Spirea* spp., blueberries *(Vaccinium* spp.), winterberry *(Ilex verticillata*) and swamp rose (*Rosa palustris*) are also common shrub components in many Ohio wetlands.

7.6.1.4 Forested Class.

The "forested" vegetation community includes wetlands or areas of wetlands characterized by woody

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[31] Common shrub species found in bogs and fens include leatherleaf (*Chaemaedaphne calyculata*), *blueberries (Vaccinium* spp.), Labrador tea (*Ledum groenlandicum*), bog birch (*Betula pumila*), shrubby cinquefoil (*Potentilla fruticosa*), and hoary willow (*Salix candida*).

vegetation greater than 6m (20ft) or taller. Forested wetlands have an overstory of trees and often contain an understory of young trees and shrubs and an herbaceous layer, although the young tree/shrub and herbaceous layers can be largely missing from some types of forested wetlands.

In some parts of Ohio, forested wetlands were probably the most common type of wetland, e.g. the former Great Black Swamp in northwest Ohio. Forested wetlands are also common in flood plains where they form a mosaic with upland riparian forests. Finally, both vegetated and unvegetated depressional forested wetlands are common in Ohio. Unvegetated forested wetlands are defined as "vernal pools" in OAC Rule 3745-1-50. Vegetated forested wetlands typically have a rich herbaceous layer with multiple *Carex* sp. and monocot and dicot forbs.

The most commonly observed canopy trees in Ohio forested wetlands are probably silver maple (*Acer saccarhinum*), American elm (*Ulmus americana*), and green and red ash (*Fraxinus pennsylvanica pennsylvanica*, *F. pennsylvanica subintegerrima*). Other Ohio wetland tree species include swamp white oak (*Quercus bicolor*), pin oak (*Q. palustris*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), black willow (*Salix nigra*), and in Northeast Ohio, yellow birch (*Betula allegheniensis*), sourgum (*Nyssa sylvatica*), and hemlock (*Tsuga canadensis*). With the exception of tamarack (*Larix laricina*) in bogs[32], most Ohio forested wetlands are dominated by broad-leaved deciduous trees.

7.6.1.5 Mudflat Class.

The "mudflat" class is generally equivalent to the "unconsolidated bottom/mud" class/subclass (PUB_3) described in Cowardin et al. (1979). Although not commonly found in inland wetlands, it is a very frequent component of Lake Erie coastal wetlands. The mudflat class includes wetlands or areas of wetlands characterized by exposed or shallowly inundated substrates of unconsolidated particles of silt and clay, although coarser sediments or organic material may be intermixed, with vegetative cover less than 30%. If vegetation is present it will often be limited to annual plants, e.g. some smartweeds (*Polygonum* spp.), flatsedges (*Cyperus* spp.) and other annual hyrophytes, which can become established in years when the mudflat dries down enough to trigger germination of these plants from the seed bank. Upland pioneer species and weed species, e.g. barnyard grass (*Echinochloa crusgalli*) or cocklebur (*Xanthium chinense*), can also become established during these times.

7.6.1.6 Open Water Class.

The "open water" class is equivalent to the "open water - unknown bottom" class in Cowardin et al. (1979). "Open water" can occur in both inland and coastal wetlands and includes areas of wetlands that are 1) inundated, 2) unvegetated (no emergent or aquatic bed vegetation), and 3) "open", i.e. there is no "canopy" of any type of vegetation: "open water" does not definitionally occur under a canopy of shrubs or trees.

7.6.1.7 Other Classes Not Listed.

Although it is expected that the classes described above will be sufficient to characterize most if not all Ohio wetlands, the Rater may be faced with a wetland or portion of a wetland that does not fit within one of these communities. In this situation, it is recommended that the classification outlined in Cowardin et al. (1979), *Classification of Wetlands and Deepwater Habitats of the United States*, or Anderson (1982), be used to determine an appropriate classification of the wetland. The Rater should clearly document the reasons for using the new class. The class should then be scored using the cover scale (see below).

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[32] A hemlock (*Tsuga canadensis*)/white pine (*Pinus strobus*) community can be found in at least two northeast Ohio forested wetlands. Contact Ohio Department of Natural Resources, Division of Natural Areas and Preserves, for more information regarding this uncommon Ohio wetland community.

7.6.2 Question 6a continued: Assigning Points to Communities Using "Cover Scale".

One of the major differences between ORAM v. 5.0 and prior versions is the evaluation of the quality of vegetation communities and the relative importance of that community in relation to the other vegetation communities in the wetland. Prior versions of the ORAM required the Rater to merely count the number of vegetation communities observable from a plan view perspective with an area >0.25 acres (0.1ha) and to count species with areal coverage >10%, whether the species present were merely invasive weeds or disturbance-tolerant native plants. This method led to both overscoring of low quality, highly disturbed wetlands which happened to have multiple vegetation classes, as well as underscoring of high quality, undisturbed, depressional wetlands with a single vegetation class.

These problems have been corrected by requiring a qualitative evaluation of each community present in the wetland using a cover scale of 0 (not present or less <0.1ha) to 3 (high quality). *See* Table 7.

"Low," "moderate," and "high" quality vegetation communities presume the Rater has knowledge of the types and range in quality of the vegetation communities found in wetlands in the region where the wetland is located, such that the Rater can place a particular community on a relative scale of quality. Table 8 provides narrative descriptions of vegetation community quality.

For mudflat and open water classes an alternative quality scale is used based on the size of these classes. *See* Table 9.

Table 7. Qualitative cover scale for vegetative comminutes.

Cover scale	Description
0	the vegetation community is either, 1) absent from wetland, OR 2) comprises less than 0.1ha (0.2471 acres) of contiguous area within the wetland
1	vegetation community is present and either, 1) only comprises a small part of the wetland's vegetation and is of moderate quality, OR 2) if it comprises a significant part of the wetland's vegetation, this community is of low quality
2	the vegetation community is present and either, 1) comprises a significant part of the wetland's vegetation and is of moderate quality, OR 2) the vegetation community comprises a small part of the wetland's vegetation but is of high quality
3	the vegetation community is of high quality and comprises a significant part, or more, of the wetland's vegetation.

Table 8. Narrative descriptions of vegetation community quality.

narrative	description
low	low species diversity and/or a predominance of non-native or disturbance tolerant native species
moderate	native species are the dominant component of the vegetation, although non-native or disturbance tolerant native species can also be present, and species diversity is moderate to moderately high, but generally without the presence of rare, threatened, or endangered species
high	a predominance of native species, with non-native species absent or virtually absent, and high species diversity and sometimes, but not always, the presence of rare, threatened or endangered species.

Table 9. Mudflat and open water community quality.

mudflat or open water quality	narrative description
0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more[33]

[33] Note open water greater than 20 acres adjacent to a wetland may not be included within the scoring boundary. *See* Section 4.4.

The following guidelines are presented for when and how to assign a score to a vegetation community.

7.6.2.1 Assigning a "0" score.

All classification schemes are artificial to greater or lesser extent and impose arbitrary thresholds. Thus, it is likely that most wetlands have *some* element of *most* of the vegetation communities described above. Emergent marshes often have a wooded fringe that is located on hydric soils and within the jurisdictional boundary of the wetland. Unvegetated forested wetlands often have small amounts of buttonbush growing under a closed canopy, or have small amounts of emergent wetland vegetation or mesic woodland herbs growing on logs or the bases of trees. However, for the purposes of this method, in order for a vegetation community to be considered "present" in the wetland, the community must cover a minimum contiguous area of 0.1 hectares or 1000m^2 (0.2471 acres), unless the wetland itself is less than 0.1 hectares in size, in which case the Rater will need to select the single most characteristic class. This minimum area is equivalent to an area with the dimensions 31.6 x 31.6 meters (34.6 x 34.6 yards).

Some qualifications and explanations for what constitutes the "minimum contiguous area" may be helpful.

1. With regard to the herbaceous vegetation that comprises emergent and aquatic bed communities, the community may have areas of bare ground, small areas of open water, or somewhat sparse stem or tussock density. Some forested wetlands have diverse herbaceous emergent communities that are characterized by scattered tussocks growing throughout the wetland or in wide or narrow zones around the shallower perimeter areas of the wetland. The Rater should "sum up" all the parts of this entire community, including open areas between tussocks or stems, when determining whether it meets the minimum size.

2. If the forested vegetation area is no more than a thin band of 1 or 2 trees around some or all of the perimeter, a score of 0 should be assigned. Conversely, many emergent marshes and buttonbush swamps grade into a clearly forested community with a closed canopy and a rather abrupt change occurs in understory vegetation, either in a zone around the perimeter or on one or several sides, especially when upland forest is nearby. In this situation a forested community should be considered to be present and a score of 1, 2, or 3 assigned.

3. Scrub-shrub and emergent communities can often be densely intermingled; however, it is equally common for emergent marshes to have one or several buttonbush, willow, or dogwood plants scattered here or there. The coverage of these scattered individuals should not be "summed up" to meet the size threshold. The Rater should be able to observe one to three large patches of shrubs or small trees which together are equal or greater than 0.1 hectares (0.2471 acres).

4. Mudflats and open water classes do not occur under any type of "canopy." Thus, a vernal pool never has an open water class, or a mudflat class after the pool dries down by late summer.

7.6.2.2 Assigning a "1" score.

In assigning a score of "1" to a vegetation community that is determined to be present, the Rater must find one of the following:

1. The vegetation community only comprises *a small part* of the wetland's *entire* vegetation and is of moderate quality, or

2. The vegetation community comprises *a significant part* of the wetland's vegetation, and this community is of *low quality*.

The Rater is asked to compare the relative contribution of the vegetation community to all of the vegetation communities that make up this wetland. If the relative contribution is small, then a "1" is appropriately assigned to this community even if it is of moderate quality (if it is of high quality, a "2" should be assigned. *See* the next section). Alternatively, if the relative contribution is significant, but the community is of low quality, the Rater can also assign a "1."

If neither of the choices above apply, the Rater must consider assigning at least a "2" to the community.

Example 1. The wetland is a 4 hectare (9.88 acre) high quality emergent marsh. Areas of buttonbush and swamp loosestrife are present with surface area of 0.5 to 1.0 hectares (1.2 to 2.5 acres). The south edge of the wetland abuts a young second growth forest and a forested wetland community of 0.2 hectares (0.5 acres) has developed at this margin. *Score:* The forested wetland community receives a score of "1" since it only comprises a small part of the wetland's entire vegetation. Conversely, the emergent marsh will receive a score of "2" or higher.

Example 2. Portions of a forested flood plain wetland have been clearcut and partially filled. Sedimentation from a nearby construction site has resulted in an emergent community dominated by narrow-leaved cattail and *Phragmites australis.* The emergent community is approximately 30% of the area of mapped hydric soils. *Score:* The emergent community receives a score of "1" since it comprises a significant part of the wetland's present vegetation; however, it is of low quality (Note: the remaining forested component will likely receive a score of 2 or more).

7.6.2.3 Assigning a "2" score.

In assigning a score of "2" to a vegetation community that is determined to be present, the Rater must find one of the following:

1. The vegetation community comprises a *significant part* of the wetland's vegetation and is of *moderate* quality, or

2. The vegetation community comprises a *small part* of the wetland's vegetation but is of *high quality*.

"Significance" is understood as whether the community is ecologically significant part of the entire wetland. In some instances, however, just considering the physical size of a community may go a long way to deciding what the ecological significance of the community is. For example, if 6.5ha of a 7.0ha marsh is an "emergent" vegetation community, and 0.5ha is relatively narrow (20-40m wide), moderate quality, forested wetland community in one corner, the forested component probably does not comprise a significant part of the of the wetland' s vegetation (and the Rater should reconsider assigning a "1" to the forested community).

Alternatively , if the relative contribution is small, but the community is of high quality, the Rater should assign a "2" to the vegetation community.

If neither of the choices above apply, the Rater should consider assigning a "3" to the community.

Example 1. The wetland is a 7 hectare (17 acre) wetland located in the flood plain of a low-gradient river that floods one to several times yearly. Approximately 3 hectares (7.4 acres) is buttonbush, 1 hectare 2.5 acres) open water, and 3 hectares (7.4 acres) is second-growth forested with silver maple and green ash. The forested portions of the wetland lie around the central area of buttonbush and open water. A diverse, sedge-dominated herbaceous community (*Carex muskingumensis, C. grayii, C. lacustris, C. lupulina, C. typhina)* is present under portions of the forested wetland; annual and perennial emergents (*Polygonum cespitosum, P. hydropiperoides,* and *Iris versicolor*) and a floating aquatic herb

(*Proserpinaca palustris*) are present in the margins of the buttonbush/open water area. *Score:* four communities are present in this wetland: forested, open water, emergent, and scrub-shrub (The aquatic bed species is not present over a sufficient area to count as a separate community). The forested wetland is of moderate quality given the moderate species diversity and age of the forest and should receive a score of 2 points. The emergent and buttonbush (scrub-shrub) community appear to be high quality and would receive a score of 3 (refer to discussion in next section of when to assign a score of 3). Referring to Table 8, the open water is determined to be low quality based on its size and receives a 1 point.

Example 2. The wetland is a 2.5 hectare (6.2 acre) forested wetland ringing a central 0.3 hectare (0.75 acre) area dominated by buttonbush. On two sides a rare sedge is present growing in tussocks in areas more shallowly inundated (0.25 hectares or 0.6 acres in area) under a mixed canopy of green ash, silver maple, and American elm; other wetland and mesic forest herbs grow intermixed with the tussocks or on downed logs and tree bases. *Score:* herbaceous community counts as an "emergent" class and receives a score of two as a "high quality community present in small amounts. Forested community is present in moderate quality in large amounts and receives a score of "2"; the scrub-shrub community is present in moderate quality in small amounts and receives a score of "1".

7.6.2.4 Assigning a "3" score.

In assigning a score of "3" to a vegetation community that is determined to be present, the Rater must find that the vegetation community is,

1. of high quality, *and*

2. that it comprises a significant part, or more, of the wetland's vegetation.

Example 1. Wetland is an intact 2.5 hectare (6.2 acre) relict wet prairie that is part of a 15 hectare (37 acre) oak savannah. The wetland is dominated by bluejoint grass (*Calamagrostis stricta*), lake sedge (*Carex lacustris*), and tussock sedge (*Carex stricta*) and has a diverse assemblage of prairie forbs. The wetland also has small areas (0.3 hectares or 0.75 acres) of open water dominated by mermaid weed (*Proserpinaca palustris*) and water primrose (*Ludwigia palustris*). The emergent community is of high quality and comprises a significant amount of the wetland's vegetation and scores a "3"; the aquatic bed community is of moderate quality but is only a small part of the wetland's vegetation and scores a "1".

Example 2. Wetland is a 1.5 hectare (3.7 acre), high quality floating-leaved marsh surrounded by a 7 hectare (17 acre) buttonbush/swamp rose shrub swamp located on the flood plain of a low-gradient stream. Areas of young second growth swamp forest (<2 hectares or 5 acres) exist at the margins of the wetland. Lake cress (*Armoracia lacustris*) is present in the marsh. The aquatic bed community and scrub-shrub communities receive a score of "3"; The swamp forest community receives a score of "1".

7.6.3 Question 6b: Horizontal (plan view) community interspersion.

This question is identical to the horizontal interspersion question found in earlier versions of the ORAM. In order to properly answer this question, the Rater must evaluate the wetland from a "plan view," i.e. as if the Rater was hovering above the wetland in the air and looking down upon it. Figure 7 is provided as

an aid in evaluating the degree of horizontal interspersion. The Rater can select from the following categories of interspersion:

G high (5 points). Wetland has a high degree of plan view interspersion.

G moderately high (4 points). Wetland has a moderately high degree of plan view interspersion.

G moderate (3 points). Wetland has a moderate degree of plan view interspersion.

G moderately low (2 points). Wetland has a moderately low degree of plan view interspersion.

G low (1 point). Wetland has a low degree of plan view interspersion.

G none (0 points). Wetland has no plan view interspersion.

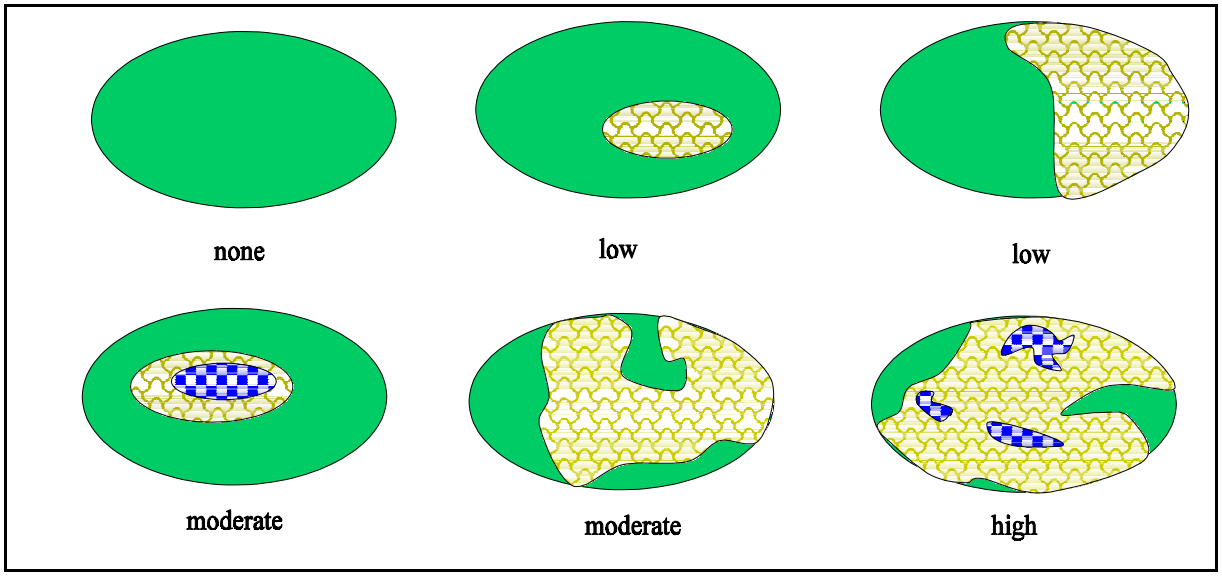

Figure 7. Hypothetical wetlands for estimating degree of interspersion.

7.6.4 Question 6c: Coverage of Invasive Plant Species.

In Metric 5, a "-10" point deduction is assigned to hydrologically isolated wetlands that have >80% cover of the species listed in Table 1.[34] However, other types of wetlands can be invaded by these species

[34] List of invasive/exotic plant species

*Lythrum salicaria (*purple loosestrife)
Myriophyllum spicatum (European milfoil)
Najas minor (lesser naiad)
Phalaris arundinacea (reed canary grass)
Phragmites australis (phragmites or giant reed)
Potamogeton crispus (curly pondweed)
Ranunculus ficaria (lesser celandine)
Rhamnus frangula (European buckthorn)
Typha angustifolia (narrow-leaved cattail)
Typha xglauca (narrow-common cattail hybrid)

and many wetlands have coverages of less than 80% for these species. This question incorporates narrative descriptions found in OAC Rule 3745-1-54 for Category 1 wetlands and requires the Rater to deduct points for the presence of the listed invasive plant species or to add a point if these species are absent from the wetland being rated.

7.6.5 Question 6d: Microtopography.

This final question in Metric 6 asks the Rater to evaluate various plant-derived microtopograhic habitat features often present in wetlands and whether the wetland provides breeding pools for amphibians, particularly salamanders. A 0 to 3 point cover scale similar to that used in Question 6a is used to rate both the quantity and quality of habitat features present in the wetland.

The features to be evaluated are,

- G vegetated hummocks/tussocks
- G coarse woody debris >10cm (6in)
- G standing dead trees >25cm(10in)
- G amphibian breeding pools

The Rater checks all of the microtopographic features that are present in the wetland and then assigns a cover score of 0, 1, 2, or 3. *See* Table 10.

Table 10. Cover scale for microtopographic habitat features.

microtopographic habitat quality	narrative description
0	feature is absent or functionally absent from the wetland
1	feature is present in the wetland in very small amounts or if more common, of low quality
2	feature is present in moderate amounts, but not of highest quality, or in small amounts of highest quality
3	present in moderate or greater amounts and of highest quality

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9.0 APPENDICES.

ORAM v.5.0 Forms
ORAM v.4.1 Forms

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APPENDIX D

OHIO RAPID ASSESSMENT METHOD FOR WETLANDS COMPLETED FORMS

Site: Castile Creek Mitigation Bank: Wetland #1	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
8	10

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [X] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
12	22

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [X] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____

max 20 pts.	subtotal
12	34

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [X] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [X] Recovered (6)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

subtotal this page
34

Site: Castile Creek Mitigation Bank: Wetland #1	Rater(s): Mat Rogers	Date: June 5, 2014

34
subtotal this page

0	34
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

8	42
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [2] Emergent
- [0] Shrub
- [2] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [1] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [1] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

42 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #2 & 3	Rater(s): Mat Rogers	Date: June 5, 2014

4	4
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [X] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

3	7
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [X] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [X] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

10	17
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [X] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

5	22
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [X] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

22
subtotal this page

Site: Castile Creek Mitigation Bank: Wetlands #2 & 3	Rater(s): Mat Rogers	Date: June 5, 2014

22
subtotal this page

0	22
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3	25
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [0] Emergent
- [1] Shrub
- [0] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [X] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [1] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

25 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #4, 5, 6, 7, and 35	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
4	4

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [X] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
4	8

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [X] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [X] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
17	25

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [X] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [X] road bed/RR track
- [ ] dredging
- [ ] other_____

max 20 pts.	subtotal
8.5	33.5

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [X] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [X] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

subtotal this page
33.5

Site: Castile Creek Mitigation Bank: Wetlands #4, 5, 6, 7, and 35	Rater(s): Mat Rogers	Date: June 5, 2014

33.5
subtotal this page

0	33.5
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

8	41.5
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- 0 Aquatic bed
- 1 Emergent
- 1 Shrub
- 1 Forest
- 0 Mudflats
- 0 Open water
- 0 Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- X Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- X Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- 1 Vegetated hummucks/tussucks
- 1 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 1 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

41.5 **GRAND TOTAL(max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetland #10	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
3	3

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [X] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
1	4

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [X] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
12	16

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
3	19

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

19
subtotal this page

Site: Castile Creek Mitigation Bank: Wetland #10	Rater(s): Mat Rogers	Date: June 5, 2014

19
subtotal this page

0	19
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1	20
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [0] Emergent
- [0] Shrub
- [0] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [X] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

20 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetland #11	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
1	1

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [X] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
1	2

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [X] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
11	13

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
3	16

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

16
subtotal this page

Site: Castile Creek Mitigation Bank: Wetland #11	Rater(s): Mat Rogers	Date: June 5, 2014

16

subtotal this page

0	16
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1	17
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [0] Emergent
- [0] Shrub
- [0] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [X] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

17 **GRAND TOTAL(max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetland #12	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
1	3

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [X] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
11	14

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
3	17

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [X] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

subtotal this page
17

Site: Castile Creek Mitigation Bank: Wetland #12	Rater(s): Mat Rogers	Date: June 5, 2014

17
subtotal this page

0	17
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1	18
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [0] Emergent
- [0] Shrub
- [0] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [X] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

18 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #13 & 14	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
8	10

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [X] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
13.5	23.5

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [X] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
9.5	33

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [X] None or none apparent (4)
- [ ] Recovered (3)
- [X] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [X] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [X] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

subtotal this page
33

Site: Castile Creek Mitigation Bank: Wetlands #13 & 14	Rater(s): Mat Rogers	Date: June 5, 2014

33
subtotal this page

0	33
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

5	38
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [1] Emergent
- [1] Shrub
- [1] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

38 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #15, 16 & 17	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
1	3

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [X] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
13.5	16.5

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [X] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
6.5	23

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [X] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [X] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [X] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

subtotal this page
23

Site: Castile Creek Mitigation Bank: Wetlands #15, 16 & 17	Rater(s): Mat Rogers	Date: June 5, 2014

23

subtotal this page

0	23
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

6	29
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- 0 Aquatic bed
- 1 Emergent
- 1 Shrub
- 1 Forest
- 0 Mudflats
- 0 Open water
- 0 Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [X] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- 0 Vegetated hummucks/tussucks
- 0 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

29 **GRAND TOTAL(max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #18, 19 & 20	Rater(s): Mat Rogers	Date: June 5, 2014

4	4
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [X] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

5	9
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [X] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

13.5	22.5
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [X] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

8.5	31
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [X] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [X] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

31
subtotal this page

Site: Castile Creek Mitigation Bank: Wetland #18, 19, 20	Rater(s): Mat Rogers	Date: June 5, 2014

31
subtotal this page

0	31
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

6	37
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- 0 Aquatic bed
- 1 Emergent
- 1 Shrub
- 2 Forest
- 0 Mudflats
- 0 Open water
- 0 Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [X] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [X] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- 0 Vegetated hummucks/tussucks
- 2 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

37 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #21 & 22	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
6	8

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [X] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [X] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
16.5	24.5

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [X] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____

max 20 pts.	subtotal
11	35.5

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [X] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [X] Recovered (6)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

subtotal this page
35.5

Site: Castile Creek Mitigation Bank: Wetlands #21 & 22	Rater(s): Mat Rogers	Date: June 5, 2014

35.5
subtotal this page

0	35.5
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1	36.5
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [1] Emergent
- [0] Shrub
- [1] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [X] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [1] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
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Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

36.5 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #23-25 & 27-32	Rater(s): Mat Rogers	Date: June 5, 2014

4	4
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [X] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

1	5
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [X] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

10	15
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [X] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [X] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

5	20
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [X] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

20
subtotal this page

Site: Castile Creek Mitigation Bank: Wetlands #23-25 & 27-32	Rater(s): Mat Rogers	Date: June 5, 2014

20
subtotal this page

0	20
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

4	24
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- 0 Aquatic bed
- 1 Emergent
- 1 Shrub
- 0 Forest
- 0 Mudflats
- 0 Open water
- 0 Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [X] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- 0 Vegetated hummucks/tussucks
- 0 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 1 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

24 **GRAND TOTAL(max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetland #26	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
1	1

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [X] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
5	6

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [X] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
8	14

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [X] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
3	17

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [X] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

subtotal this page
17

Site: Castile Creek Mitigation Bank: Wetland #26	Rater(s): Mat Rogers	Date: June 5, 2014

17
subtotal this page

0	17
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1	18
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [0] Aquatic bed
- [0] Emergent
- [0] Shrub
- [0] Forest
- [0] Mudflats
- [0] Open water
- [0] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [X] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [0] Vegetated hummucks/tussucks
- [0] Coarse woody debris >15cm (6in)
- [0] Standing dead >25cm (10in) dbh
- [0] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

18 GRAND TOTAL(max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Site: Castile Creek Mitigation Bank: Wetlands #33 & 34	Rater(s): Mat Rogers	Date: June 5, 2014

max 6 pts.	subtotal
2	2

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [X] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

max 14 pts.	subtotal
8	10

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [X] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [X] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [X] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

max 30 pts.	subtotal
13.5	23.5

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [X] Precipitation (1)
- [X] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [X] 100 year floodplain (1)
- [X] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [X] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [X] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [X] Seasonally inundated (2)
- [X] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [ ] None or none apparent (12)
- [X] Recovered (7)
- [ ] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [X] other Farming

max 20 pts.	subtotal
6	29.5

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [ ] None or none apparent (4)
- [X] Recovered (3)
- [ ] Recovering (2)
- [X] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [X] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [X] Recovering (3)
- [X] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [X] farming
- [ ] nutrient enrichment

subtotal this page
29.5

Site: Castile Creek Mitigation Bank: Wetlands #33 & 34	Rater(s): Mat Rogers	Date: June 5, 2014

29.5
subtotal this page

0	29.5
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Praires (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

6	35.5
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- 0 Aquatic bed
- 1 Emergent
- 1 Shrub
- 2 Forest
- 0 Mudflats
- 0 Open water
- 0 Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [X] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- 0 Vegetated hummucks/tussucks
- 0 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generallyw/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

35.5 **GRAND TOTAL(max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html